CICS VSAM Recovery for z/OS 6.1

Implementation Guide and Reference

SC31-5760 -00

Note

Before using this information and the product it supports, read the information in “Notices” on page 405.

This edition applies to the CICS VSAM Recovery for z/OS 6.1, program number 5655-GY1, and to all subsequent releases and modi ications until otherwise indicated in new editions.

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About this document

This document describes the tasks you need to perform to set up IBM CICS® VSAM Recovery Version 6 Release 1 (CICS VR), Program Number 5655-GY1. This publication is for people who are responsible for the recovery of lost or damaged VSAM data.

To implement CICS VR, you must know how to:

- Change CICS resource definitions
- Use job control language (JCL)
- Create VSAM data sets
- Use an Interactive System Productivity Facility (ISPF) dialog interface
- Write assembler programs for CICS VR exits (optional)

How to use this document

Use this book for guidance on how to set up CICS VR when you use CICS TS.

This book contains the following information:

Getting Started :

- Chapter 1, “Introducing CICS VR,” on page 1 introduces CICS VR and explains the CICS VR functions and CICS TS transaction backout concepts.
- Chapter 2, “Overview of CICS VR installation,” on page 7 is a quick installation guide that describes all the necessary steps to successfully set up CICS VR V6R1.
- Chapter 3, “Migration considerations,” on page 25 describes tasks required to migrate to CICS VR V6R1 from a previous release of CICS VR or another VSAM recovery product.
- Chapter 4, “Activating the CICS VR server address space,” on page 29 describes the tasks you need to do to set up the CICS VR server address space.
- Chapter 5, “Setting up CICS VR VSAM batch logging,” on page 63 describes the tasks you need to do to set up CICS VR VSAM batch logging.
- Chapter 6, “CICS VR security,” on page 79 describes CICS VR security profiles.

CICS VR and CICS TS:

- Chapter 7, “Setting up CICS VR for CICS TS,” on page 83 describes tasks you need to do to set up CICS VR in your CICS TS environment.
- Chapter 8, “Setting up your CICS TS environment,” on page 129 describes the tasks you need to do to set up CICS TS for CICS VR.
- Chapter 9, “Using the CICS VR file copy notification service,” on page 173 describes how to invoke the CICS VR file copy notification service.
- Chapter 10, “Using CICS VR with CICS TS at your disaster recovery site ,” on page 205 describes the tasks you need to do to prepare your primary site and your remote site for CICS VR recovery.
- Chapter 11, “Automated Recovery and Reorganization,” on page 223 describes the tasks to perform when enabling automated recovery in CICS VR V6R1.

CICS VR Command Reference :

- Chapter 12, “CICS VR command reference,” on page 231 describes CICS VR command rules and how to read the syntax diagrams.
- Chapter 13, “CICS VR commands,” on page 237 describes all the CICS VR commands you can use with CICS TS and batch.

CICS VR Exits :

- Chapter 14, “Using the CICS VR archive exits,” on page 311 describes the CICS VR exit programs that you can use with the archive utility and the log stream copy utility.
- Chapter 15, “Implementing exits for forward recovery and backout,” on page 317 describes the CICS VR exit programs that you can use with forward recovery and backout.

Chapter 16, “CICS VR ddnames,” on page 331 shows the ddnames for CICS VR Version 6.

Chapter 17, “Diagnosing change accumulation and DFSORT problems,” on page 335 describes how to get DFSORT messages and dumps as well as how to identify and eliminate other common errors.

Chapter 18, “Diagnosing logging problems,” on page 337 describes what to do if you encounter problems with MVS system logger.

Chapter 19, “Sample CLIST (DWWCLIST),” on page 343 shows a sample command list that you can use to start the CICS VR ISPF dialog interface.

Chapter 20, “VSAMREC CLIST,” on page 347 describes the VSAMREC CLIST that CICS VR provides to allow integration with ISMF data set lists.

Chapter 21, “Using selective scan,” on page 355 describes how you can tell CICS VR to scan a subset of the log of logs registered to CICS VR using the CICS VR ISPF dialog interface.

Chapter 22, “Using CICS TS autojournaling,” on page 357 describes how CICS TS supports the automatic journaling (autojournaling) of file control data to a specified general log stream.

Chapter 23, “UNDO log structure overview,” on page 361 describes the undo logs.

Operating environment

CICS VR uses logs to recover your VSAM data.

CICS VR supports:

- MVS log streams
- CICS VR SAM copies of MVS log streams

Software requirements

System requirements: z/OS® V1.13 or later is required for installation and invocation of CICS VR V6R1.

Additionally, the following APARs are required to run all the CICS VR V6R1 functions, if you are using CICS VR with z/OS V1.13:

- OA39096
- OA42354
- OA41727
- OA43148

Replication logging requirements: z/OS V1.13 with the PTFs for the following z/OS APARs is required for replication logging support:

- OA38198, OA38200, OA38201, OA38202, OA38203, OA38204, OA38205, OA38209, OA38210, OA38550, and OA44628.

CICS Requirements: The following APARs for the listed releases of CICS are required to run CICS VR V6R1 VSAM batch logging:

CICS Release	APARs
CICS TS V3.1	PK23984
CICS TS V3.2 and later	None

CICS TS compatibility: CICS VSAM Recovery V6R1 supports all releases of CICS TS that are currently supported by IBM, to a minimum of CICS TS V3.1. If extended ESDS support is to be used, a minimum of CICS TS V3.2 is required. CICS VR V6R1 can recover VSAM spheres from log records produced by either CICS TS forward recovery logging or CICS TS autojournaling. However, it is recommended to use log records produced by CICS TS forward recovery logging with CICS VR.

Additional requirements: None

Optional software requirements

CICS VR V6R1 contains additional support for the following optional software offerings on all supported z/OS and CICS levels.

The following software is optional and is not required to install and run CICS VR.

- DFSMShsm logical backups and full volume dumps
- DFSMSdss logical copies and dumps
- VSAM Record Level Sharing (RLS), only CICS updates supported. CICS VR VSAM batch logging does not support RLS data sets.
- DFSMStvs (Transactional VSAM)
- Backups made using the backup while open (BWO) and concurrent copy facilities.

Hardware requirements

You need the following hardware to run CICS VR:

- A processor that supports the software mentioned in "Software requirements" on page xx.
- A tape unit or cartridge unit, disk drive space. Refer to the *IBM CICSVR Version 6 Release 1 Program Directory* for required storage space needed to install CICS VR.
- CICS VR requires a minimum private area of 4 MB below the 16 MB line to execute.

Optional hardware requirements

The following hardware provides optional capabilities:

- For concurrent copy:
  - An IBM 3990 Model 3 with the Extended Platform and Licensed Internal Code or an IBM 3990 Model 6.
- For VSAM RLS support:
  - A coupling facility device or z/OS image running coupling facility support is required.
- For CICS VR VSAM batch logging:
  - Both DASD-only and coupling facility log streams are supported. Coupling facility log streams require active coupling facility links; for details, see *z/OS MVS Setting up a SYSPLEX.*

Terminology

CICS Transaction Server is used when referring to the CICS element of CICS Transaction Server for OS/390® or CICS Transaction Server for z/OS.

CICS is used when referring to all versions (CICS V4 and CICS Transaction Server).

The term *log* is used to describe any of these:

- MVS log streams
- CICS VR SAM copies of MVS log streams
- CICS system log

What's new in CICS VR 6.1

CICS VR 6.1 contains these changes.

Add New Fields into the DWWJUP Utility

CISC VR Journal print utility (DWWJUP) generates journal print reports. Each log record has its own record header. However, these headers do not have transaction IDs and task numbers. To improve diagnostic information and readability, the customer has asked to include the **transaction ID** and **task number** in the record header.

Need a way to better control Automatic Log of Logs Scanning

The initial automatic log of logs scan begins **24 hours** after the CICS VR server is activated and continues to run every **24 hours** thereafter. If the **LOLSCAN** parameter is set to the default value of **NO**, automatic log scans will not be initiated. Each log of logs scans updates the **RCDS (Recent Change Data Set)** with the latest information. Added option in CICS VR panel to customize log of log scan interval time and start time.

Timer-Based Buffer Flush

Currently, users do not have the option to control when the content of buffer storage is written to the log stream. This limitation adversely impacts the performance of IIDR (IBM Infosphere Data replication). A new option has been introduced for the user to start a timer inside CICS VRs address space. The contents of the buffer will be written to the log stream as per user-defined intervals so that there will not be any delay in data replication.

Option to do a Selective Log of Logs Scan

CICS VR provides customers to generate forward recovery jobs by using CLIST. When creating a forward recovery job using CLIST, CICS VR performs a log of log scan for all registered log of logs to update RCDS with recent information. Customer will now be able to perform particular or multiple log of logs scan instead of scanning all log of logs by default.

DWWGJCDS/DWWAR to use the above line storage

The CICS VR RCDS reports utility **DWWGJCDS** and the archive utility **DWWAR** utilizes below-the-line storage to handle requests. As the available memory in below-the-line storage is restricted to **16MB**, these utilities can only process a limited number of records.

When a large volume of records was processed, **DWWGJCDS** and **DWWAR** utilities were failing with S878 abend due to storage outage. An additional (optional) parameter **ALL31** in **DWWIN** (input DD statement) was introduced to carve memory in any line storage, i.e., up to 2GB. So, the CICS VR RCDS report utility - DWWGJCDS and archive utility - **DWWAR**, will be able to handle enormous amounts of records.

Chapter 1. Introducing CICS VR

CICS VSAM Recovery Version 6 Release 1 (CICS VR) recovers your lost or damaged VSAM data.

CICS VR is for organizations where the availability and integrity of VSAM data is vital.

This section introduces you to the following information:

- How CICS VR can help you
- Understanding CICS VR functions
  - General CICS VR functions
  - CICS VR functions for CICS TS
- CICS VR capabilities and limitations
- CICS transaction backout concepts

How CICS VR can help you

CICS VR helps you recover your VSAM data sets in CICS VR VSAM batch logging, when the VSAM data sets are not accessed in record level sharing–mode following, and CICS TS environments.

Your VSAM data sets can be corrupted in the following situations:

- Physical loss or damage of VSAM data could occur because:
  - An application alters or deletes the data incorrectly.
  - A disaster occurs and the data at the entire site is destroyed.
  - A device failure makes part of a disk inaccessible or causes damage to certain files.
  - A batch application encounters an abend.
- Logical corruption of VSAM data due to incorrect updates or transactions.

Understanding CICS VR functions

CICS VR offers many different functions. Some functions are specific to a particular environment such as: VSAM batch logging, or CICS TS.

Other functions work in all the environments. This section describes which functions are available in each environment.

General CICS VR functions

The functions that can be used with CICS TS, or without CICS.

- CICS VR server address space
- CICS VR change accumulation
- CICS VR RCDS export and import

What is the CICS VR server address space?

The CICS VR server address space is an essential part of CICS VR. It is started when MVS is IPLed.

The CICS VR server address space must be active if you want to use any of the following CICS VR functions:

- CICS VR VSAM batch logging.
- Notification and registration of logical backups in the CICS VR RCDS.
- Notification of CICS backout failures in the CICS VR RCDS.

- Automated change accumulation processing with backups of which CICS VR is notified.

The DISPLAY and VARY commands are available to display and alter the status of the CICS VR server address space.

What is the CICS VR change accumulation utility?

CICS VR change accumulation (CA) is the process of consolidating forward recovery log records into a change accumulation data set. CICS VR uses the change accumulation data set in conjunction with the forward recovery log to speed up forward recovery processing.

Change accumulation is a two step process:

1. You must first create CA batch jobs that define CA groups and identify the spheres that are in each group. When you run one of these CA batch jobs, CA reads the forward recovery log for a certain log range, selects the log records for the spheres in that CA group that are important for forward recovery, and then calls DFSORT to sort these log records. CA saves the last update for each record using the sorted log records. Then CA stores the consolidated records in the CA data set. Every time you run the CA batch job, the change accumulation data set is updated with the information from the next log range. You must perform the following:
   a. Run the CA batch job after a backup is taken for any of the spheres in the CA group.
   b. Set up a CA batch job so that it is regularly submitted with a production planning system, such as Tivoli® Workload Scheduler for z/OS.

   CA runs in parallel with CICS production runs or VSAM batch logging; so keeping the CA data set as current as possible reduces the amount of log data that must be read and applied to forward recover a VSAM sphere.
2. The second step occurs when you want to forward recover a VSAM sphere. Use the ISPF panels to restore the backed up version of the sphere and generate the necessary JCL using information in the CICS VR RCDS. The APPLYCA keyword is generated on the RECOVER command. APPLYCA tells CICS VR to apply the records in the CA data set to the restored VSAM sphere, and then to apply the remaining log range from the forward recovery log to pick up the most recent changes.

What is the CICS VR RCDS export/import utility?

You can use the CICS VR RCDS export/import utility to extract the information in your RCDS so that you can send it to your remote recovery site and incorporate the information into its RCDS.

This utility helps you to keep your remote site in synchronization with your local site. If your RCDS is lost at your primary site, the reverse process can be done to restore the RCDS at your local site to the same level as the recovery site.

What is VSAMREC?

VSAMREC is the name of a list command and line operator that can be issued from the ISMF data set list. Use the ISMF data set list feature to group VSAM spheres based on user-defined selection criteria.

Issue VSAMREC from the ISMF data set list to display the CICS VR panels, allowing you to create a recovery job for individual or all data sets in the list. See *CICS VR User's Guide* for more information.

CICS VR functions for CICS TS

The CICS VR functions that are specifically available in the CICS TS environment.

- Forward recovery
- Log of logs scan utility
- Log stream copy utility
- Automated recovery
- Reorganization

What is CICS VR forward recovery for CICS TS?

CICS VR forward recovery helps you to recreate a VSAM sphere from a backup copy of the sphere.

Use the panel interface to build and submit a recovery job that restores the VSAM sphere from a selected backup, then reapplies all changes made to the VSAM sphere since the selected backup was taken. This returns your sphere back to the exact state before it became corrupted. The sphere can be an entry-sequenced data set (ESDS), a key-sequenced data set (KSDS), a fixed-length relative record data set (RRDS), or a variable RRDS (VRRDS). CICS VR obtains the information that it needs to construct the recovery job from the CICS VR RCDS.

The CICS VR selective forward recovery function provides a way for you to remove unwanted changes to VSAM spheres. By specifying certain log records to be excluded when CICS VR is performing a forward recovery on a backup, unwanted updates can be removed from the data set.

What is the CICS VR log of logs scan utility for CICS TS?

You can use the log of logs scan utility, also referred to as scan, in your CICS TS environment. The utility scans all the log of logs that are registered in the RCDS, then updates and stores the details needed for recovery in the RCDS.

Scan is run automatically when a forward recovery job is constructed using the ISPF panel interface. The log of logs scan utility must be set up as a batch job which is regularly submitted with a production planning system such as Tivoli Workload Scheduler for z/OS.

What is the CICS VR log stream copy utility for CICS TS?

You can use the log stream copy utility to copy an MVS log stream to up to nine sequential access method (SAM) data sets.

You cannot use IDCAMS or CICS VR archive to copy an MVS log stream; you must use the CICS VR log stream copy utility to copy a log stream.

You can perform a CICS VR forward recovery using a log stream copy. When the log stream copy is run, information about the copy is stored in the RCDS.

What is CICS VR automated recovery for CICS TS?

CICS VR Automated Recovery helps you to repair or reorganize a VSAM sphere after a backout failure has occurred in CICS TS, while attempting to back out changes to the sphere.

Automated recovery involves several events:

1. CICS automatically alerts CICS VR that a backout failure has occurred. This alert is received through the NOTIFY interface.
2. The backout failure is automatically registered in the CICS VR RCDS.
3. Optional: A job stream for forward recovery or reorganization of the affected VSAM sphere is automatically built and submitted.

   Note: A job to perform forward recovery or reorganization can be also created and submitted manually using the CICS VR ISPF dialog.
4. Within the same job stream, the affected data set is taken offline from CICS before recovery or reorganization. After recovery or reorganization, the data set is brought back online to CICS, and CICS instructed to retry its backout.

What is reorganization?

Reorganization is required when CICS notifies CICS VR that an error occurred during a backout attempt, where the error was because the system is running out of space.

Reorganization replaces the data sets by redefining them with more space, or a larger index record space. The reorganization process can be run manually, or automatically as part of the Automatic Recovery feature, as described in Chapter 11, “Automated Recovery and Reorganization,” on page 223.

In addition, reorganization jobs can be initiated from the panel interface. For further information, see the *CICS VR User's Guide*.

Batch functions

The batch functions that can be used with CICS VR.

- Batch logging
- Batch backout

What is CICS VR VSAM batch logging?

CICS VR VSAM batch logging provides logging for your batch changes to VSAM data sets that are not accessed in RLS-mode.

This means that your CICS transactions and your batch jobs that use CICS VR VSAM batch logging cannot update the same VSAM data set at the same time. Once you have disabled the file from CICS, you can use CICS VR VSAM batch logging to log your application's batch updates. The following types of VSAM batch logging are available:

- Forward recovery logging (REDO logging)
- Undo logging
- Replication logging

CICS VR forward recovery logging records an after-image log record for every update made to the VSAM data set by a batch job. Therefore allowing you to run CICS VR forward recovery to recover the batch updates if the data set becomes corrupted.

CICSVR undo logging records a copy of the data prior to any changes being made, so UNDO logging is always done when any indication is given of intent to update the data, therefore allowing you to run CICSVR batch backout to remove the batch updates if the batch job encounter an abend.

UNDO logging is done for the following VSAM commands in the application:

GET UPD
Get a record with the intent to update or erase it.

PUT ADD
Add a new record.

UNDO records are not written to the undo log for a PUT UPD or ERASE request because these operations modify existing records that are first obtained using GET UPD.

If a batch job reads all records using GET UPD commands even though only a few records are actually updated, CICSVR undo logger records every before-image record. However, unless a record is updated, logging the before image is not necessary and it adds to the overhead and runtime of the batch job. Also batch backout takes longer when before-images are written back to a data set but they only replace identical records. The alternate approach to avoid such overhead is to specify FRLOG(ALL) for the sphere. In this case, if a subsequent PUT_UPDATE or ERASE is not done, CICS VR will remove the GET for UPDATE UNDO record if it is still present in the log buffer

CICS VR replication logging records both the before-image and the after-image log records in the replication log. If both forward recovery and replication logging are requested for the VSAM sphere, the VSAM batch logger shares the forward recovery log for forward recovery logging and replication logging. If

both undo and replication logging are requested for the VSAM sphere, VSAM batch logger uses separate logs for undo logging and replication logging.

What is CICS VR batch backout?

CICS VR batch backout allows you to remove updates that were made to VSAM data sets by a failed batch job step.

You can also remove updates made by multiple job steps or an entire batch job. Using CICS VR batch backout could reduce the amount of time it takes to recover from an error during batch window processing, therefore increasing the possibility of completing all required actions during the allocated batch window.

CICS VR capabilities and limitations

Descriptions of the capabilities and limitations of CICS VR.

Forward recovery

CICS VR uses the after-images on the logs to forward recover your VSAM spheres; it cannot forward recover a VSAM sphere that does not have an associated log containing after-images.

CICS VR accepts logs on disk, tape, or cartridge; the CICS VR archive utility and the ISPF dialog interface cannot process uncataloged logs on tape or cartridge. If you run CICS VR manually, without using the ISPF dialog interface, forward recovery and backout can process uncataloged logs.

CICS VR can recover base clusters with path updates; it cannot recover a base cluster with path updates if the base and path updates are recorded on separate logs. Record base and path updates on the same log.

Alternate indexes

- When an offline or "SHARP" online backup is restored, or no backup is restored by CICS VR:
  - Forward recovery and batch backout automatically update any alternate indexes defined for a VSAM sphere that are part of the upgrade set.
- When an online "Fuzzy" backup is restored by CICS VR:
  - Forward recovery automatically removes alternate indexes that are part of the upgrade set and are reusable prior to forward recovery processing. The alternate indexes are then rebuilt after forward recovery completes.
- Forward recovery can process a VSAM sphere with non-unique alternate indexes.

CICS VR batch backout

CICS VR uses the before-image log records to back out updates that are made by a batch job. CICS VR undo logging can produce before-image log records for updates that are made to VSAM spheres by batch jobs.

CICS VR accepts either DASD-only or coupling facility MVS system logger log streams. Log stream copies are currently not supported by CICS VR batch backout.

CICS VR can backout all updates that are made to a VSAM base cluster with path updates when all necessary before-image log records reside on the same undo log stream that is defined to CICS VR.

The batch backout utility also supports UNDO log records that are created by CICS VR V4.2 with APAR PK44606, CICS VR V4.3, or CICS VR V5.1

Note: The keyword PROCSTEP must not be used for UNDO log records that are created by CICS VR V4.

Alternative indexes that are part of the upgrade set are updated appropriately during batch backout processing. Any alternate indexes that are not part of the upgrade set must be manually rebuilt after batch backout processing.

Allocating the RCDS is optional for batch backout of before images based on the specification of the RCDS(YES|NO) keyword in the BATCHBACK command.

VSAM data set attributes

CICS VR can detect whether the VSAM attributes of the target VSAM sphere in a recovery run differ from the attributes of the sphere as recorded on the log.

Extended Addressability mode support

CICS VR supports the Extended Addressability mode for ESDS, KSDS, RRDS and VRRDS VSAM spheres.

CICS VR supports Extended Addressability both for CICS updates and for CICS VR Batch Logging updates.

DFSMShsm

CICS VR can restore VSAM spheres from DFSMShsm logical backups and logical dumps.

Additionally, CICS VR can maintain an inventory of and list all DFSMShsm logical backups that exist for selected spheres, through the CICS VR panel interface. For more information about DFSMShsm and CICS VR, see “Using DFSMShsm as your backup utility” on page 136.

DFSMSdss

CICS VR can keep an inventory of and restore DFSMSdss logical copies and dumps created for VSAM base clusters.

Additionally, CICS VR can list all DFSMSdss logical copies and dumps that exist for selected VSAM data sets, through the CICS VR panel interface. For more information about DFSMSdss and CICS VR, see “Using DFSMSdss as your backup utility” on page 138.

ABARS

CICS VR can keep an inventory of and restore backups created by ABARS.

CICS VR can list all these backups through the CICS VR panel interface. For more information about ABARS and CICS VR, see “Using ABARS as your backup utility” on page 146.

Other logical backups

By using the CICS VR file copy notification service, CICS VR can maintain an inventory of, and list through the panel interface, logical backups made using other backup products (IBM or non-IBM).

Additionally, by specifying a restore skeleton associated with each registered backup type, CICS VR can restore VSAM spheres from the selected logical backups.

Chapter 2. Overview of CICS VR installation

This information describes all the necessary steps to successfully set up CICS VR 6.1. It includes a detailed description of the various CICS VR components and how to set them up. The CICS VR server address space is required for batch logging, backup notification, and backout failure notification.

The following information and examples use a high level qualifier of DWW.V610 for the CICS VR libraries. It is assumed that the SMP/E installation steps described in *Program Directory for CICS VSAM Recovery* have been completed. It is also assumed that the CICS VR Server installation is required.

After you complete the following instructions, you are ready to run the IVP jobs.

Running CICS VR JCL customization

CICS VR JCL customization is an optional step that assists you to customize the CICS VR sample jobs, clists, and ISPF dialog skeletons.

This function copies the SDWWCNTL and SDWWSENU/SJPN libraries to your specified output data sets and then sets symbolic variables, such as a high-level qualifier of the CICS VR data sets and RCDS prefix and suffix, to specified values to suit your environment.

To start the CICS VR JCL customization, run member DWWCSTG1 of the SDWWCNTL library. The function requires two parameters to be passed to it:

1. The high-level qualifier and, optionally, the suffix of the CICS VR data sets as &HLQ[/&SUFFIX].
2. The national language to be used in messages and on panels &LANG. Two languages are supported:
   - ENU English, the default.
   - JPN Japanese

This example shows a command that you enter at an ISPF command line to start the CICS VR JCL customization. In this example the CICS VR data sets do not have a suffix in the names:

```
tso ex 'DWW.V610.SDWWCNTL(DWWCSTG1)'  'DWW.V610  ENU'
```

This example shows a command when a suffix is specified for CICS VR data sets:

```
tso ex 'DWW.V610.SDWWCNTL.STAGE01(DWWCSTG1)' 'DWW.V610/STAGE01  ENU'
```

To customize CICS VR, on the **Welcome** panel, DWWCST00, press **Enter** to proceed to the **DWWCST01** panel that presents the customization parameters that you can modify.

Here is an example of setting some parameters on the **DWWCST01** panel that are matched with those parameters that are used in Chapter 2, “Overview of CICS VR installation,” on page 7.

```
Output Data sets:
OUTPUT DSN FOR SDWWCNTL  . . . . DWW.V610.SDWWCNTL.OUT
OUTPUT DSN FOR SDWWSENU/SJPN . . DWW.V610.SDWWSENU.OUT
…
RCDS data set names:
RCDS PREFIX  . . . . . . . . . DWWUSER.V610
GRPNAME SUFFIX  . . . . . . .  PROD
…
IVP test data allocation parameters:
CUSTOMIZE IVP JOBS . . . . . . YES  (YES or NO)
HLQ FOR VSAM DATA SETS . . . . DWWUSER.V610
…
LOG STREAM NAME  . . . . . . . DWWUSER.IVP.FILELOG
…
Setting up the ISPF interface:
HLQ FOR USER DATA SETS (ISPFILE, DWWMSG, etc) . . DWW.&ZUSER
USE STEPLIB DD FOR CICS VR LIBRARIES  . . . . . . YES  (YES or NO)
USE CICS VR EXIT LOAD LIBRARY . . . . . . . . . . YES  (YES or NO)
USE CICS VR EXIT LOAD LIBRARY . . . . . . . . . . YES  (YES or NO)
…
```

For the list of all customization parameters, see Chapter 26, “Customization parameters,” on page 369.

When the CICS VR customization function is complete, the customized output data sets, in this example, which is known as SDWWCNTL.OUT and SDWWSENU/SJPN.OUT, are used instead of the installed CICS VR SDWWCNTL and SDWWSENU/SJPN, without extra modifications.

LPALST updates

Add the library DWW.V610.SDWWLPA to the LPALST. To add the library dynamically to the LPALST issue the SETPROG command.

If an older level of CICS VR was previously installed on the system, use the SETPROG command to override the previous library, as shown in this example:

```
SETPROG LPA,ADD,MASK=*,DSNAME=DWW.V610.SDWWLPA
IEF196I IEF237I C90A ALLOCATED TO SYS00339
IEF196I IEF285I DWW.V610.SDWWLPA
IEF196I IEF285I VOL SER NOS= TOTCI3.
CSV551I 09.36.03 LPA ADD 670
SUCCESSFUL: 3 UNSUCCESSFUL: 0 NOT PROCESSED: 0
MODULE RESULT
DWW1SCSR SUCCESSFUL
DWW1SINI SUCCESSFUL
DWW1VS00 SUCCESSFUL
```

Figure 1. SETPROG command output

LNKLST updates

Libraries need to be added to the LNKLST concatenation for the CICS VR server.

Add these libraries to the LNKLST concatenation:

- DWW.V610.SDWWLOAD
- DWW.V610.SDWWLENU

Use the following command sequence to update the LNKLST dynamically with the new library names:

```
P LLA
T PROG=AA
IEE252I MEMBER PROGAA FOUND IN SYS1.PARMLIB
CSV500I LNKLST SET LNKLST68 HAS BEEN DEFINED
IEF196I IEF237I C90A ALLOCATED TO SYS00340
IEF196I IEF285I DWW.V610.SDWWLOAD
IEF196I IEF285I VOL SER NOS= TOTCI3.
CSV501I DATA SET DWW.V610.SDWWLOAD 886
HAS BEEN ADDED TO LNKLST SET LNKLST68
S LLA,SUB=MSTR
SETPROG LNK,UPDATE,JOB=*
```

Figure 2. Update LNKLST

Use the display LLA command to verify that the LNKLST contains the correct library names. The L character on the left to the library name indicates that it is in the current LNKLST.

This example shows the output of the command:

```
D LLA
CSV600I 06.48.20 LLA DISPLAY 292
EXITS: CSVLLIX1 - ON CSVLLIX2 - OFF
VLF: ACTIVE GET LIB ENQ: YES SEARCH FAIL COUNT: 0
LNKLST SET: LNKLST66
94 LIBRARY ENTRIES FOLLOW
ENTRY L F R P LIBRARY NAME
1 L IGY.SIGYCOMP
...
...
10 L SYS1.SC66.LINKLIB
11 L CPAC.LINKLIB
12 L DWW.V610.SDWWLENU
...
...
45 L DWW.V610.SDWWLOAD
```

Figure 3. Display LLA command

APF authorizing CICS VR libraries

The CICS VR SDWWLOAD and SDWWLENU libraries are required for the CICS VR server and must be authorized. Add these libraries to the list of APF-authorized libraries in the appropriate PROGxx (or IEAAPFxx) member in SYS1.PARMLIB:

- DWW.V610.SDWWLOAD
- DWW.V610.SDWWLENU

If your list(s) of APF-authorized libraries are specified in the dynamic format, in a PROGxx member, refresh the APF list dynamically using the SETPROG or SET PROG=xx command.

If your list(s) of APF-authorized libraries are specified in the static format (in IEAAPFxx members), schedule an MVS IPL for the APF-authorization to take effect.

For information about maintaining lists of APF-authorized libraries, see the *z/OS MVS Initialization and Tuning Reference*.

SYS1.PARMLIB updates

The parameters required to activate the CICS VR server address space are discussed here with some example settings.

```
CICSVR_INIT(YES)
CICSVR_GRPNAME_SUFFIX(PROD)
CICSVR_DSNAME_PREFIX(DWWUSER.V610)
CICSVR_RCDS_PREFIX(DWWUSER.V610)
CICSVR_UNDOLOG_PREFIX(DWW) - Optional Parameter
```

Figure 4. Example of CICS VR parameter settings in IGDSMSxx member of SYS1.PARMLIB

There are two additional CICS VR parameters available, CICSVR_GENERAL_CONTROL and CICSVR_ZZVALUE_PARM. It is recommended that these additional CICS VR parameters are allowed to default. Either, do not specify them in the IGDSMSxx member or specify the following parameters:

- CICSVR_GENERAL_CONTROL(NONE)
- CICSVR_ZZVALUE_PARM(NONE)

The following parameters can be used:

CICSVR_INIT(YES)
Specifies that the CICS VR server address space is activated during the initialization of the z/OS image. If NO is specified the server address space does not startup up automatically and you have to issue a SETSMS CICSVR_INIT(YES) command before you can manually activate the CICS VR server.

CICSVR_GRPNAME_SUFFIX(PROD)
During initialization the server address space joins to an XCF group. In this example the default value of PROD is used as the group suffix. If PROD is specified, the name of the XCF group the server tries to connect to is DWWMPROD. You can run only one server address space per z/OS image. All active

server address spaces in the sysplex that connect to the same XCF group must use the same set of RCDS data sets.

CICSVR_UNDOLOG_PREFIX(HLQ)
This parameter is used to set the PREFIX for the UNDO Logstream. Only one level of qualifier is accepted. When specified, the HLQ is used by CICS VR during start-up to locate the UNDO Logstream. If the parameter is not specified, then CICS VR will use DWW as the default HLQ to locate the UNDO logstream.

CICSVR_DSNAME_PREFIX(DWWUSER.V610)
During initialization of the server address space the dsname prefix is used to allocate two CICS VR message data sets, and the CICS VR trace and dump data sets. Above data sets can be pre-allocated or are allocated automatically during server initialization.

CICSVR_RCDS_PREFIX(DWWUSER.V610)
The RCDS data sets contain the necessary recovery information. They must be pre-allocated before activating the server address space. You need three RCDS data sets allocated to the following DD statements: DWWCON1, DWWCON2, and DWWCON3.

The naming convention for the RCDS data sets is:
cicsvr_rcds_prefix.DWWCONx.GRPcicsvr_grpname_suffix therefore in the example the RCDS data set names used for the server address space installation are:

DWWUSER.V610.DWWCON1.GRPPROD
DWWUSER.V610.DWWCON2.GRPPROD
DWWUSER.V610.DWWCON3.GRPPROD

You must enable the CICS VR program id by adding the following entry to the IFAPRDxx member, as shown in this example:

```
PRODUCT OWNER('IBM CORP')
NAME(CICSVR)
ID(5655-GY1)
VERSION(*) RELEASE(*) MOD(*)
FEATURENAME(CICSVR)
STATE(ENABLED)
```

Figure 5. IFAPRDxx member

If the IFAPRDxx member contains an older version of CICS VR, message DWW190E is issues when the server address space initializes.

```
*DWW190E CICSVR IS NOT LICENSED FOR USE ON THE SYSTEM.
DWW016I TERMINATING ERROR DETECTED IN CICSVR SERVER ADDRESS SPACE. 252
RETURN CODE (HEX): 00000024
REASON CODE (HEX): 71112416
MODULE NAME: DWW1CNUP
RETURN ADDR (HEX): A4D044A2
```

Figure 6. Not licensed message

Define the RCDS data sets

To allocate your final RCDS data sets so that they can both be used by the ISPF interface and the server address space, you must follow the RCDS naming convention.

The naming convention for RCDS data sets is as follows:

- DWWUSER.V610 - the value chosen as the RCDS prefix
- DWWCON1 - DD name
- GRP - constant
- PROD - the value chosen as the group suffix

All active server address spaces in the sysplex that belong to the same XCF group can share one set of RCDS data sets. Only one server address space can be active per z/OS image. The RCDS data sets must be defined on DASD that is shared by all systems in a sysplex that belong to the same CICS VR XCF group.

This JCL example defines the RCDS data sets.

```
//CICSRS3 JOB (999,POK),'CICS VR 6.1',CLASS=A,MSGLEVEL=(1,1),
// MSGCLASS=T,NOTIFY=&SYSUID,REGION=0M
/*JOBPARM L=9999,SYSAFF=SC66
//S1 EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
   DEFINE CLUSTER( -
          NAME(DWWUSER.V610.DWWCON1.GRPPROD)-
                  STORCLAS(SCCOMP) -
                  CYLINDERS(200 30)-
                  LINEAR -
                  SHAREOPTIONS(3 3) -
                 )
   DEFINE CLUSTER( -
          NAME(DWWUSER.V610.DWWCON2.GRPPROD)-
                  STORCLAS(SCCOMP) -
                  CYLINDERS(200 30) -
                  LINEAR -
                  SHAREOPTIONS(3 3) -
)
   DEFINE CLUSTER( -
          NAME(DWWUSER.V610.DWWCON3.GRPPROD)-
                  STORCLAS(SCCOMP) -
                  CYLINDERS(150 30) -
                  LINEAR -
                  SHAREOPTIONS(3 3) -
                  )
```

Figure 7. JCL to define RCDS data sets

You can use the DWWRCDEF job to define RCDS data sets.

For more information about creating RCDSs see, “Understanding the recovery control data sets (RCDSs)” on page 53.

Activating the CICS VR server address space

The commands that are required to activate the CICS VR server address space.

Use the VARY command to activate or terminate the CICS VR server on a single system. The following VARY commands are available for the CICS VR server address space:

- VARY SMS,CICSVR,ACTIVE
- VARY SMS,CICSVR,TERMINATESERVER

The VARY commands that are listed are not multi-system commands. Use the ROUTE command with the VARY command to route the request to all relevant systems. For example, when you issue the following command the CICS VR server address space is activated on all systems in the sysplex.

- ROUTE *ALL,VARY SMS,CICSVR,ACTIVE

When all the installation steps are completed successfully, use the **/V SMS,CICSVR,ACTIVE** command to activate the server. When the server address space successfully starts, message DWW014I is issued. If the server address space initialization fails, investigate the log to solve the problem.

```
DWW014I CICSVR SERVER ADDRESS SPACE IS NOW ACTIVE.
```

Figure 8. Message DWW014I

Setting up the ISPF interface

To run IVP jobs the ISPF interface must be set up first, using the sample JCL and pre-allocated data sets.

The data sets are pre-allocated to the following DD statements; DWWMSG, DWWDMSG, DWWPRINT, and DWWDUMP.

Alternatively, you can use the sample JCL shown here to define the data sets. The data sets must have unique names for ISPF, CICS VR utilities, and the server. Use the TSO user ID as HLQ or part of HLQ in ISPF for DWWMSG, DWWDMSG, DWWDUMP, and DWWPRINT.

Before you run the CICS VR dialog interface, you must create the data sets that are allocated to the ISPFILE, DWWMSG, DWWDMSG and DWWPRINT DD names in DWWCLIST. You can use the DWWUALLC sample job in SDWWCNTL to allocate these data sets.

```
//DWWUALLC JOB (999,POK),'CICS VR 6.1',CLASS=A,MSGLEVEL=(1,1),
// MSGCLASS=T,NOTIFY=&SYSUID,REGION=0M
/*JOBPARM L=9999,SYSAFF=SC66
//*********************************************************************
//*                                                                   *//
//* @BANNER_START                          01                       *//
//* Licensed Materials - Property of IBM                              *//
//*                                                                   *//
//* 5655-GY1              DWWUALLC                                    *//
//*                                                                   *//
//* (C) Copyright IBM Corp. 2014                                      *//
//* (C) Copyright HCL Technologies Ltd. 2025                          *//
//*                                                                   *//
//*                                                                   *//
//* @BANNER_END                                                       *//
//*       PN= REASON  REL YYMMDD ID:       REMARKS                    *//
//*           R71977  520 140128 ......... customization              *//
//******************************************************************* //*
//*  Set "CAPS ON" to prevent JCL errors
//* 1. Modify the JOB statement to meet your system requirements.
//*
//*    This sample job allocates user data sets to the following
//*    DD statements: DWWMSG, DWWDMSG, DWWPRINT, DWWDUMP and ISPFILE
//* 2. Specify a value for the UHLQ symbolic parameter that points
//*    to the high level qualifier for user data sets.
//*--------------------------------------------------------------------*
//SETPARM  SET UHLQ=DWW.JTILLI1
//BR14     EXEC PGM=IEFBR14
//DWWDUMP1 DD DISP=(,CATLG),UNIT=3390,SPACE=(CYL,(10,10)),
//            RECFM=VBA,LRECL=84,BLKSIZE=3120,
//            DSN=&UHLQ..DWWDUMP
//DWWPRINT DD DISP=(,CATLG),UNIT=3390,SPACE=(CYL,(1,1)),
//            RECFM=FBA,LRECL=133,BLKSIZE=27930,
//            DSN=&UHLQ..DWWPRINT
//DWWDMSG1 DD DISP=(,CATLG),UNIT=3390,SPACE=(CYL,(1,1)),
//            RECFM=VBA,LRECL=84,BLKSIZE=3120,
//            DSN=&UHLQ..DWWDMSG
//DWWMSG2  DD DISP=(,CATLG),UNIT=3390,SPACE=(CYL,(1,1)),
//            RECFM=VBA,LRECL=133,BLKSIZE=27930,
//            DSN=&UHLQ..DWWMSG
//ISPFILE  DD DISP=(,CATLG),UNIT=3390,SPACE=(CYL,(1,1,2)),
//            RECFM=FB,LRECL=80,BLKSIZE=32000,
//            DSN=&UHLQ..ISPFILE
```

Figure 9. Sample DWWUALLC updated for TSO user JTILLI1

The sample CLIST is provided in member DWWCLIST of the SDWWCNTL data set. To activate the ISPF interface modify settings for the following variables into the sample CLIST to allocate the required data sets.

- HLQ - high level qualifier for CICS VR libraries
- UHLQ - high level qualifier for user data sets (ISPFILE, DWWMSG, and so on)
- PREF - value used for CICSVR_RCDS_PREFIX
- SUFF - value used for CICSVR_GRPNAME_SUFFIX

Note: If you have run CICS VR JCL customization, all these parameters are already modified and you can use the customized DWWCLIST from SDWWCNTL.OUT.

This example shows the DWWCLIST customized with the settings for HLQs and RCDS names that are used in this topic.

```
ISPEXEC VGET ZPFSHOW PROFILE        /* CHANGE PFSHOW SO THAT       */
SET PFSAVE = &ZPFSHOW               /* PF-KEY ARE DISPLAYED DURING */
SET PFCMD  = &STR(PFSHOW ON)        /* CICSVR DIALOG INTERFACE     */
ISPEXEC DISPLAY COMMAND(PFCMD)

ISPEXEC LIBDEF ISPFILE
ISPEXEC LIBDEF ISPPLIB
ISPEXEC LIBDEF ISPMLIB
ISPEXEC LIBDEF ISPTLIB
FREE FI(DWWCON1,DWWCON2,DWWCON3,DWWMSG,DWWPRINT,MYFILE,ISPFILE)
FREE FI(DWWSLIB,DWWLLIB,DWWDMSG)
FREE FI(DWWLOAD)

/* ------------------------------------------------- DWWCON1    */
 ALLOC FI(DWWCON1) DA('&PREF..DWWCON1.GRP&SUFF') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWCON1
    GOTO SETMSG3
 END
/* ------------------------------------------------- DWWCON2    */
 ALLOC FI(DWWCON2) DA('&PREF..DWWCON2.GRP&SUFF') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWCON2
    GOTO SETMSG3
 END
/* ------------------------------------------------- DWWCON3    */
 ALLOC FI(DWWCON3) DA('&PREF..DWWCON3.GRP&SUFF') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWCON3
    GOTO SETMSG3
 END
/* ------------------------------------------------- DWWMSG     */
 /** ALLOC FI(DWWMSG) SYSOUT(X) DEST(XXXX)  ***/
 ALLOC FI(DWWMSG) DA('&UHLQ..DWWMSG') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWMSG
    GOTO SETMSG3
 END
/* ------------------------------------------------- DWWPRINT   */
 /** ALLOC FI(DWWPRINT) SYSOUT(X) DEST(XXXX) ***/
 ALLOC FI(DWWPRINT) DA('&UHLQ..DWWPRINT') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWPRINT
    GOTO SETMSG3
 END
/* ------------------------------------------------- DWWDMSG    */
 /** ALLOC FI(DWWDMSG) SYSOUT(X) DEST(XXXX) ***/
 ALLOC FI(DWWDMSG) DA('&UHLQ..DWWDMSG') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWDMSG
    GOTO SETMSG3
 END
```

```
/* ------------------------------------------------- ISPLLIB    */
/*  The following line (LIBDEF for ISPLLIB) is added only if       */
/*  the CICSVR LOADLIB'S are not allocated to ISPLLIB in the       */
/*  TSO LOGON PROC.                                                */
/* ---------------------------------------------------------------   */
 ISPEXEC LIBDEF ISPLLIB DATASET ID('&HLQ..SDWWLOAD',   +
                                   '&HLQ..SDWWLENU')
/* ------------------------------------------------- DWWLOAD    */
/*  The following allocation is required only if the CICSVR        */
/*  LOADLIB'S are not allocated to ISPLLIB in the TSO LOGON        */
/*  PROC.                                                          */
/* ---------------------------------------------------------------   */
 SET &LIBS = &STR('&HLQ..SDWWLOAD')
 SET &DSN  = &STR('&HLQ..SDWWLENU')
 SET &LIBS = &STR(&LIBS , &DSN)
 ALLOC FI(DWWLOAD) DA(&LIBS) SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWLOAD
    GOTO SETMSG3
 END
/* ------------------------------------------------- DWWLLIB   */
 SET &LIBS = &STR('&HLQ..SDWWLOAD')
 SET &DSN1 = &STR('&HLQ..SDWWLENU')
 SET &LIBS = &STR(&LIBS , &DSN1 )
 ALLOC FI(DWWLLIB) DA(&LIBS) SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWLLIB
    GOTO SETMSG3
 END
/* ------------------------------------------------- ISPPLIB   */
 ISPEXEC LIBDEF ISPPLIB DATASET ID('&HLQ..SDWWPENU')
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = ISPPLIB
    GOTO SETMSG3
 END
/* ------------------------------------------------- ISPMLIB   */
 ISPEXEC LIBDEF ISPMLIB DATASET ID('&HLQ..SDWWMENU')
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = ISPMLIB
    GOTO SETMSG3
 END
* ------------------------------------------------- ISPTLIB    */
 ISPEXEC LIBDEF ISPTLIB DATASET ID('&HLQ..SDWWTENU')
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = ISPTLIB
    GOTO SETMSG3
 END
/* -------------------------------------------------  DWWSLIB   */
 SET &LIBS = &STR('&UHLQ..ISPFILE')
 SET &DSNO= &STR('&HLQ..SDWWSENU')
 SET &LIBS = &STR(&LIBS , &DSNO)
 ALLOC FI(DWWSLIB) DA(&LIBS) SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWSLIB
    GOTO SETMSG3
END
```

```
/* ------------------------------------------------- ISPFILE   */
 ALLOC FI(MYFILE) DA('&UHLQ..ISPFILE') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = MYFILE
    GOTO  SETMSG3
 END

 ALLOC FI(ISPFILE) DA('&UHLQ..ISPFILE') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = ISPFILE
    GOTO  SETMSG3
 END
/*************************************************************/
/*  INVOKE CICSVR DIALOG PROGRAM.                            */
/*************************************************************/
 ISPEXEC SELECT PGM(DWWPM) NEWAPPL(DWW) PASSLIB

 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN    +
    SET ZERRLM = &STR(CICSVR DIALOGS COMPLETED, RC = &RCSAVE)
 GOTO FINISH
/*************************************************************/
/*   SET ERROR MESSAGE IF ANY, TO BE DISPLAYED ON ISPF PANEL. */
/*************************************************************/
 SETMSG3:   +
  SET ZERRLM = &STR(ALLOCATE OF DDNAME &DDNAME FAILED WITH RC= &RCSAVE)

 FINISH:    +
 ISPEXEC LIBDEF ISPFILE
 ISPEXEC LIBDEF ISPPLIB
 ISPEXEC LIBDEF ISPMLIB
 ISPEXEC LIBDEF ISPTLIB
 ISPEXEC LIBDEF ISPLLIB           /** ONLY IF NOT IN LOGON PROC  **/
 FREE FI(DWWCON1,DWWCON2,DWWCON3,DWWMSG,DWWPRINT,MYFILE,ISPFILE)
 FREE FI(DWWSLIB,DWWLLIB,DWWDMSG)
 FREE FI(DWWLOAD)
 IF &RCSAVE = 0 THEN    +
    SET ZERRHM = &STR(ISR00003)   /* SET TO TOP ISPF TUTOR PANEL  */
 IF &RCSAVE = 0 THEN    +
    GOTO EXIT1                    /* NORMAL EXIT                  */

 SETERROR:  +
 SET ZERRMSG = &STR(ISRZ002)      /* USE THIS ISPF MESSAGE NUMBER.*/
 SET ZERRALRM = &STR(YES)         /* BEEP AT USER                 */
 SET ZERRNM = &STR(ISR00003)      /* SET TO TOP ISPF TUTOR PANEL  */

 EXIT1:   +
 SET PFCMD = &STR(PFSHOW &PFSAVE) /* RESTORE PFKEY DISPLAY TO     */
 ISPEXEC DISPLAY COMMAND(PFCMD)   /*   PREVIOUS STATUS            */
 EXIT CODE(&RCSAVE)
```

Figure 10. Sample DWWCLIST

Running the IVP jobs to verify your CICS VR installation

When you have completed the installation of the CICS VR server address space you run the following IVP jobs to verify your installation using the following CICS VR installation verification procedures (IVPs) to confirm that CICS VR is operational. You must also run the CLIST to activate the ISPF interface in order to complete the IVP process.

Before running the IVP jobs, it is recommended that you perform the CICS VR JCL customization, described in “Running CICS VR JCL customization” on page 7, to set the symbolic parameters in IVP jobs.

If you have not performed customization before you run the IVP sample jobs, you must be modify the IVP sample jobs manually, following the instructions in the comments in the job. The IVP jobs are listed in this table:

Table 1. Sample IVP jobs			
Job Name	**Description**	**RELFILE**	**Dsname**
DWWASMLI	Assemble and link the sample exit.	IBM.HCVR610.F4	hlq.SDWWCNTL
DWWRCDEF	Create the RCDS data sets.	IBM.HCVR610.F4	hlq.SDWWCNTL
DWWVRDEF	Create the sample VSAM clusters.	IBM.HCVR610.F4	hlq.SDWWCNTL
DWWRUNBL	Make updates to the sample VSAM cluster. CICSVR server must be active to perform batch logging.	IBM.HCVR610.F4	hlq.SDWWCNTL
DWWCLIST	Sample CLIST to allocate and invoke CICSVR dialog, English version. Run the CICSVR ISPF dialog interface.	IBM.HCVR610.F4	hlq.SDWWCNTL
DWWCLISJ	Sample CLIST to allocate and invoke CICSVR dialog, Japanese version. Run the CICSVR ISPF dialog interface.	IBM.JCVR61K.F5	hlq.SDWWCNTL
DWWCLNUP	Clean up job to delete the test data created by IVP jobs.	IBM.HCVR610.F4	hlq.SDWWCNTL

The DWWASMLI job

The first IVP job to run is an assemble and link job for one of the sample exits. You can use this exit to examine and modify a before or after image before it is applied to the VSAM data set.

Run the DWWASMLI job from your customized SDWWCNTL.OUT data set. If you have not performed customization, copy member DWWASMLI from the SDWWCNTL data set and modify settings for the HLQ and MACLIB variables. The following example shows the first part of the JCL used to submit the job:

```
//CICSRS3 JOB (999,POK),'CICS VR 6.1',CLASS=A,MSGLEVEL=(1,1),
// MSGCLASS=T,NOTIFY=&SYSUID,REGION=0M
//SETPARM SET HLQ=DWW.V610
//        SET MACLIB=SYS1.MACLIB
//REXXCRE EXEC PGM=IEBGENER,REGION=4M
...
```

Figure 11. DWWASMLI

When the job has run successfully, the exit load module DWWPREEX is link edited to library DWW.V610.DWWEXLD as shown here:

```
SAVE OPERATION SUMMARY:
MEMBER NAME                 DWWPREEX
LOAD LIBRARY                DWW.V610.DWWEXLD
PROGRAM TYPE                LOAD MODULE
VOLUME SERIAL               TSTO21
MAX BLOCK                   32760
DISPOSITION                 REPLACED
TIME OF SAVE                03.33.34 MAY 23, 2012
```

Figure 12. Binder operation summary

The DWWRCDEF job

The DWWRCDEF job is optional and is run to allocate RCDS data sets intended only for the IVP process.

Run the DWWRCDEF job from your customized SDWWCNTL.OUT data set. If you have not performed customization, copy member DWWRCDEF from the SDWWCNTL data set and update the following variables:

- SET PREF=DWWUSER.V610

- SET SUFF=PROD
- SET RVOL=volume
- SET MGMCLAS= management_class
- SET STRCLAS= storage_class

Specify the values for the MGMCLAS and STRCLAS symbolic parameters to allocate the SMS managed RCDS data sets. Or you can leave them blank to use the default SMS classes or to allocate nonSMS RCDSs.

This example shows the SET statements of the JCL used to submit the job:

```
//*-----------------------------------------
//SETPARM  SET PREF=DWWUSER.V610
//         SET SUFF=PROD
//         SET RVOL=TOTCI3
//         SET MGMCLAS=
//         SET STRCLAS=SCCOMP
//REXXCRE  EXEC PGM=IEBGENER
//SYSPRINT DD SYSOUT=*
//SYSUT1   DD *
```

When the job is successfully submitted the following data sets are produced:

- DWWUSER.V610.DWWCON1.GRPPROD
- DWWUSER.V610.DWWCON1.GRPPROD.DATA
- DWWUSER.V610.DWWCON2.GRPPROD
- DWWUSER.V610.DWWCON2.GRPPROD.DATA
- DWWUSER.V610.DWWCON3.GRPPROD
- DWWUSER.V610.DWWCON3.GRPPROD.DATA

Related concepts

“Define the RCDS data sets” on page 10

To allocate your final RCDS data sets so that they can both be used by the ISPF interface and the server address space, you must follow the RCDS naming convention.

The DWWVRDEF job

The DWWVRDEF job produces four data sets when it is submitted successfully.

Run the DWWVRDEF job from your customized SDWWCNTL.OUT data set. If you have not performed customization, copy member DWWVRDEF from data set SDWWCNTL and update the following variables:

- SET THLQ=DWWUSER.V610
- SET LOGSTRM=DWWUSER.IVP.FILELOG
- SET MGMCLAS= management_class
- SET STRCLAS= storage_class

Specify the values for the MGMCLAS and STRCLAS symbolic parameters to allocate the SMS-managed VSAM data set.

The specified forward recovery log stream must be created, if it does not exist, before the DWWRUNBL IVP job starts. For more information about defining log structures, see *Defining coupling facility structures* in the CICS Transaction Server for z/OS Knowledge Center.

The following example shows how to use IXCMIAPU to define a forward recovery log stream named DWWUSER.IVP.FILELOG:

```
//*-------------------------------------------------------------------*/
//*  Allocate forward recovery log                                    */
//*-------------------------------------------------------------------*/
//DELLOGS  EXEC PGM=IXCMIAPU
//SYSPRINT DD SYSOUT=*,DCB=RECFM=FBA
//SYSIN    DD *
DATA TYPE(LOGR) REPORT(NO)
DEFINE LOGSTREAM NAME(DWWUSER.IVP.FILELOG)
```

```
STRUCTNAME(LOG_CICSVR) LS_SIZE(1180)
/*
```

The following examples show how to define a coupling facility structure named LOG_CICSVR:

```
STRUCTURE NAME(LOG_CICSVR) /* CICS VR log */
  INITSIZE(10000) SIZE(16000)
  PREFLIST(cfname) REBUILDPERCENT(1)
```

```
//*-------------------------------------------------------------------*/
//*  Define the LOG_CICSVR structure                                  */
//*-------------------------------------------------------------------*/
//DEFCFSTR EXEC PGMIXCMIAPU
//SYSPRINT DD SYSOUT*,DCBRECFM! FBA
//SYSIN DD *
DATA TYPE(LOGR) REPO
```

See “Creating the MVS log streams” on page 70 for more information.

The example below shows the first part of the JCL used to submit the job:

```
//SETPARM  SET THLQ=DWWUSER.V610
//         SET LOGSTRM=DWWUSER.IVP.FILELOG
//         SET MGMCLAS=
//         SET STRCLAS=SCCOMP
//REXXCRE  EXEC PGM=IEBGENER
//* This step is expected to complete with return code 0
//SYSPRINT DD SYSOUT=*
//SYSUT1   DD *
```

When the job is successfully submitted, the following data sets are produced:

- DWWUSER.V610.CUSTOMER
- DWWUSER.V610.CUSTOMER.DATA
- DWWUSER.V610.CUSTOMER.NEW
- DWWUSER.V610.CUSTOMER.NEW.DATA

The DWWRUNBL job

The DWWRUNBL job updates the sample VSAM cluster created by the DWWVRDEF IVP job.

Before running the DWWRUNBL job, enter this command **D SMS,CICSVR** to ensure that the CICS VR server address space is activated successfully. The output from the **D,SMS,CICSVR** command is similar to this:

```
DWW020I DISPLAY SMS,CICSVR
DISPLAY SMS,CICSVR - SERVER STATUS
  SYSNAME:  MVV2       AVAILABLE ASID: 001E STEP: CICSVR_Init_Complete

DISPLAY SMS,CICSVR - JOB STATUS
  APPLID AND NUMBER OF JOBS USING BATCH LOGGING:
  SYSNAME:  MVV2     .RPROD03        0        0        0

DATA SET NAMING CONVENTION IN USE:
  SYSNAME:  MVV2     DWWUSER

UNDO LOG NAMING CONVENTION IN USE:
  SYSNAME:  MVV2     DWW

RCDS NAMING CONVENTION IN USE: DWWUSER.V610

XCF GROUP NAMING CONVENTION IN USE: PROD
```

Run the DWWRUNBL job from your customized SDWWCNTL.OUT data set. If you have not performed customization, copy member DWWRUNBL from data set SDWWCNTL and only modify the SETPARM statement using the THLQ DWWUSER.V610. This example shows the first part of the JCL used to submit the job:

```
//*-----------------------------------------
```

```
//SETPARM  SET THLQ=DWWUSER.V610
//*-----------------------------------------
//* Load Vsam data sets
//*-----------------------------------------
//LOAD     EXEC PGM=IDCAMS
//OUTFILE1 DD  DISP=SHR,
//             DSN=&THLQ..CUSTOMER
//OUTFILE2 DD  DISP=SHR,
//             DSN=&THLQ..CUSTOMER.NEW
//SYSPRINT DD  SYSOUT=*
```

When you submit the DWWRUNBL job the output, which is similar to the screen shot below, is saved in the JES2 job log. Look for message DWW264I in the output to confirm that VSAM batch REDO logging completed successfully.

```
---- THURSDAY,  30 JAN 2014 ----
  IEF403I DWWRUNBL - STARTED - TIME=13.28.06
 -                                        --TIMINGS (MINS.)--            ----PA
 -JOBNAME  STEPNAME PROCSTEP    RC   EXCP    CPU    SRB  CLOCK   SERV  PG   PAGE
 -DWWRUNBL          LOAD        00     30    .00    .00    .00    974   0      0
 DWW269I BATCH LOGGING REQUESTED: FRLOG(REDO)  132
  SPHERE: DWWUSER.V610.CUSTOMER
  REDOS: 5
  UNDOS: 0
 DWW264I VSAM BATCH REDO LOGGING COMPLETED SUCCESSFULLY.  136
  ASID (IN HEX):        0033
  RETURN CODE (IN HEX): 00000000
  REASON CODE (IN HEX): 73050092
 -DWWRUNBL          ADDREC      00     23    .00    .00    .08    662   0      0
 IEF404I DWWRUNBL - ENDED - TIME=13.28.11
```

Make a note of the time that the DWWRUNBL job is started because this time must be specified as the forward recovery start time during the CICS VR ISPF dialog interface as described in “DWWCLIST - ISPF dialog interface” on page 19.

Note: The VSAM dataset has to be SMS managed for batch logging to work.

DWWCLIST - ISPF dialog interface

The next step to verify the CICS VR installation requires activating the CICS VR ISPF interface.

See “Setting up the ISPF interface” on page 12 to set up the CICS VR interface in. Assume that the CLIST created is available for this IVP step.

1. Start CICS VR dialog by issuing this command EXEC‘DWW.V610.SDWWCNTL.OUT(DWWCLIST) to display the "CICS VR main menu".
2. Select option 5 from the "CICS VR main menu".
3. Verify the JCL skeleton to ensure the following:
   - The correct job is specified.
   - hlq.SDWWLOAD, hlq.SDWWLENU and hlq.DWWEXLD are added to STEPLIB.
   - This example shows the JCL skeleton that is used in this CICS VR environment.

   ```
   )SET HLQ = DWW.V610
   //CICSRS3&CJOBCHAR JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=&&SYSUID,
   // MSGCLASS=X,CLASS=A,REGION=4M
   /*JOBPARM L=9999,SYSAFF=SC66
   )SEL &CUTIL NE BACKUP
   //DWW      PROC
   //&CUTIL   EXEC PGM=&CPROG,COND=(8,LE)
   //STEPLIB  DD DSN=&HLQ..SDWWLOAD,DISP=SHR
   //         DD DSN=&HLQ..SDWWLENU,DISP=SHR
   //         DD DSN=&HLQ..DWWEXLD,DISP=SHR
   //DWWMSG   DD SYSOUT=*
   //DWWPRINT DD SYSOUT=*
   //DWWDUMP  DD SYSOUT=*
   //         PEND
   ```

   Figure 13. JCL skeleton
4. Select 1, **List of VSAM spheres**, from the "CICS VR main menu"

5. Select **CICS VR VSAM sphere list include window** and press Enter to open the "CICS VR VSAM sphere list" window. In the "CICS VR VSAM sphere list include" window, type DWWUSER.V610.CUSTOMER in the VSAM sphere field as shown here, and press Enter.

```
CICSVR VSAM sphere list include
Command ===>

Specify VSAM sphere list search criteria, then press Enter.

VSAM sphere . . . . . DWWUSER.V610.CUSTOMER


                                  OR

Specify the name of a data set that contains a list of VSAM spheres,
then press Enter.

Data Set Name . . .
```

   - The sphere list panel displays the one and only DWWUSER.V610.CUSTOMER.

```
Administrate  Utilities  Tools  List  View  Help
------------------------------------------------------------------------------
                           CICSVR VSAM sphere list            Row 1 to 1 of 1
Command ===>

Select one or more VSAM spheres, then select an action.

N  Use default parameters for selected spheres
S  VSAM sphere                                 Scan time (Local)       RR bit
s  DWWUSER.V610.CUSTOMER                       00.001 00:00:00
****************************** Bottom of data
********************************
```

6. Select the first, and only, sphere in the list and press F5 to perform only forward recovery. The "CICS VR VSAM sphere parameters" window opens:

```
CICSVR VSAM sphere parameters
Command ===>

Press F4 when the cursor is in the Backup time field to get a list of data
set backup times. Press Enter to continue.

  VSAM sphere . . . . . : DWWUSER.V610.CUSTOMER
  New VSAM sphere name  . . DWWUSER.V610.CUSTOMER.NEW
  Forward-recovery start time . . 14.030 13:28:06  (YY.DDD HH:MM:SS)
  Forward-recovery stop time  . .                  (YY.DDD HH:MM:SS)
  Backup time . . . . . .                          + (YY.DDD HH:MM:SS)
  Time format . . . . . Local  +    Backup type  . None              +
  Volume for restore . .            Unit for restore . . . . .

 F1=Help  F4=Prompt  F5=GetDef  F6=SaveDef F7=PrevVSAM  F12=Cancel
```

7. Complete the following fields:

   - New VSAM Sphere name.....&THLQ.CUSTOMER.NEW (where &THLQ is the high level qualifier used in job DWWVRDEF).
   - Forward recovery start time.....yy.ddd hh:mm:ss (that is, the time the DWWRUNBL job started).

   Press Enter.

8. In the "CICS VR log stream type" window select 1, **MVS logger log stream**, and press Enter.
9. In the "CICS VR forward recovery only" window, select **CICS VR exits**, and press Enter.
10. In the "CICS VR exits" window type DWWPREEX in the **Preapply** field as shown here, and press Enter.

```
CICSVR exits
Command ===>
Specify member names for the CICSVR exits. Press Enter to use the
displayed member names in the recovery.
    Preapply . . . DWWPREEX
    Error . . . . .
    ESDS delete . .
    Termination . .

F1=Help F5=GetDef F6=SaveDef F12=Cancel
```

11. Press Enter again to create the JCL.
12. Select option 2 **Browse the job** to view the generated job.

```
//CICSRS31 JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=&SYSUID,
//             MSGCLASS=X,CLASS=A,REGION=4M
/*JOBPARM L=999,SYSAFF=SC66
//DWW      PROC
//FORWARD   EXEC PGM=DWWCO,COND=(8,LE)
//STEPLIB  DD DSN=DWW.V610.SDWWLOAD,DISP=SHR
//         DD DSN=DWW.V610.SDWWLENU,DISP=SHR
//         DD DSN=DWW.V610.DWWEXLD,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWDUMP  DD SYSOUT=*
//         PEND
//DWW001 EXEC DWW,COND=(8,LT)
//DWWCON1 DD DISP=SHR,DSN=DWWUSER.V610.DWWCON1.GRPPROD
//DWWCON2 DD DISP=SHR,DSN=DWWUSER.V610.DWWCON2.GRPPROD
//DWWCON3 DD DISP=SHR,DSN=DWWUSER.V610.DWWCON3.GRPPROD
//DWWIN    DD   *
  RECOVER                  -
    ONLY                 -
  NEWSPHERE(DWWUSER.V610.CUSTOMER.NEW)      -
  APPLYCA          -
  STARTTIME(14.030/13:28:08)       -
  STOPTIME(14.030/13:28:09)         -
  STARTAT(DSNAME)           -
  SPHERE(DWWUSER.V610.CUSTOMER)
MVSLOG                     -
  NAME(DWWUSER.IVP.FILELOG)
BLDVRP
DEFEXIT                    -
  PREAPPLY(DWWPREEX,NEW)
//*
```

Figure 14. The generated job

13. Select 1 to submit the JCL.

When the job has completed you can use any standard utility to view the job output. The results of the Forward Recovery is as follows:

The journal contains 6 records:

- One DSNAME records
- Five file control records after-images. These five file control after-image records consist of:
  - Zero UPD_AFTER
  - Five ADD-AFTER
  - Zero DEL-AFTER

```
-------------------------------------------
 UPD-AFTER  UPDATE AFTER IMAGE
 ADD-AFTER  ADD AFTER IMAGE
 DEL-AFTER  DELETE AFTER IMAGE
 DSNAME     DDNAME TO SPHERE AND PATH NAME
 -------------------------------------------
-                          NO OF RECORDS       NO OF       NO OF       NO OF       NO OF
 NAME OF MVS LOG STREAM        PROCESSED      DSNAME   UPD-AFTER   ADD-AFTER   DEL-AFTER
 ---------------------------  ------------   ---------   ---------   ---------   ---------
 DWWUSER.IVP.FILELOG                 6           1           0           5           0
 ---------------------------  ------------   ---------   ---------   ---------   ---------
 TOTAL                               6           1           0           5           0
 ---------------------------  ------------   ---------   ---------   ---------   ---------
```

Figure 15. Journal data set statistics

Verify the results of the IVP recovery. The journal data statistics are shown in the figure Figure 15 on page 21 and the recovery progress reports are shown below:

```
RECOVERY PROGRESS REPORT
 -------------------------


 VSAM SPHERE NAME: DWWUSER.V610.CUSTOMER

 NO PREVIOUS FORWARD RECOVERY REGISTERED FOR THIS VSAM SPHERE.


 THIS FORWARD RECOVERY WAS RUN AT: 14.030 14:54:07
 TYPE OF RECOVERY : FORWARD RECOVERY IN ONE STEP ONLY.

 THE VSAM RECOVERY REQUESTED BIT WAS SUCCESSFULLY SET.
 THERE WERE NO VSAM RLS LOCKS TO UNBIND.
 NO AIXS WERE REMOVED FROM THE UPGRADE SET.
 FORWARD RECOVERY RAN SUCCESSFULLY.
 NO AIXS NEEDED TO BE REBUILT.
```

Figure 16. Recovery progress report

```
RECOVERY PROGRESS REPORT
-------------------------

VSAM SPHERE NAME: DWWUSER.V610.CUSTOMER

NO PREVIOUS FORWARD RECOVERY REGISTERED FOR THIS VSAM SPHERE.


THIS FORWARD RECOVERY WAS RUN AT: 12.201 08:31:05
TYPE OF RECOVERY : FORWARD RECOVERY IN ONE STEP ONLY.

THE VSAM RECOVERY REQUESTED BIT WAS NOT SET
BECAUSE THERE IS NO VSAM RLS SUPPORT FOR THIS VSAM SPHERE.
UNBINDING THE VSAM RLS LOCKS WAS SKIPPED
BECAUSE THERE IS NO VSAM RLS SUPPORT FOR THIS VSAM SPHERE.
NO AIXS WERE REMOVED FROM THE UPGRADE SET.
FORWARD RECOVERY RAN SUCCESSFULLY.
NO AIXS NEEDED TO BE REBUILT.
```

Figure 17. Recovery progress report for non-RLS VSAM spheres

The DWWCLNUP job

The DWWCLNUP job is optional, it is run to delete the test data created by the IVP jobs.

Run the DWWCLNUP job from your customized SDWWCNTL.OUT data set. If you have not performed customization, copy member DWWCLNUP from the SDWWCNTL data set and update the following variables:

- SET THLQ=DWWUSER.V610
- SET PREF=DWWUSER.V610
- SET SUFF=PROD

When the job is successfully submitted these data sets are deleted:

- DWWUSER.V610.CUSTOMER
- DWWUSER.V610.CUSTOMER.DATA
- DWWUSER.V610.CUSTOMER.NEW
- DWWUSER.V610.CUSTOMER.NEW.DATA
- DWWUSER.V610.DWWCON1.GRPPROD
- DWWUSER.V610.DWWCON1.GRPPROD.DATA
- DWWUSER.V610.DWWCON2.GRPPROD
- DWWUSER.V610.DWWCON2.GRPPROD.DATA
- DWWUSER.V610.DWWCON3.GRPPROD

- DWWUSER.V610.DWWCON3.GRPPROD.DATA

Before deleting the RCDS data sets, ensure that the CICS VR server address space is terminated. If you do not want to delete the RCDS data sets, specify blank values for the PREF and SUFF variables:

- SET THLQ=DWWUSER.V610
- SET PREF=
- SET SUFF=

Chapter 3. Migration considerations

Consider these general migration considerations when you migrate to CICS VR V6.1 from an earlier release.

General migration considerations

When you migrate to CICS VR V6.1 from an earlier CICS VR version, you must take precautions to avoid losing data if any problems occur during migration.

Therefore, consider using the following steps before migration:

- Create backups of all of your production VSAM spheres.
- Create a backup copy of at least one CICS VR RCDS, if a previous version of CICS VR exists.
- The CICS CSD definitions are supplied in DWWCSD for CICS VR V6.1; see "Preparing for Automated Recovery" on page 224 for the sample JCL. Update the definitions, following these steps:
  1. Delete group DWWCICVR.
  2. Run the CICS VR V6.1 DWWCSD job to create a new DWWCICVR group that contains the updated definitions.

     Note: The transaction IDs DWWD, DWWE,and DWWX are changed to CVRD, CVRE, and CVRX respectively, to be used exclusively by CICS VR.

It is highly advisable to perform migration during a time when no VSAM spheres are being updated. Also, remember that different levels of CICS VR can run concurrently and independently of each other, if they are using different recovery control data sets (RCDSs). Therefore, you can install and test CICS VR V6.1 while you continue to use the previous CICS VR release until you verify that migration has completed successfully. You can activate only one CICS VR address space for each MVS image.

The steps required to migrate to CICS VR V6.1 differ depending on whether you are migrating from an earlier release, or from another forward recovery product. The next two topics list the steps required to migrate to CICS VR V6.1.

If you are using automated recovery, it is advisable to update your PLT to add program DWWSFCBF; see Chapter 11, "Automated Recovery and Reorganization," on page 223 for more information.

Migration from an earlier CICS VR release

CICS VR is fully downwards compatible with CICS VR V5.2, V5.1, V4.3 and V4.2. If you are migrating from CICS VR V4R2, V4R3, V5R1 or V5R2 you do not need to migrate the contents of your existing CICS VR RCDSs.

The RCDS format in CICS VR V5R2 is unchanged from CICS VR V5R1, V4R2 or V4R3.

CICS VR provides a migration utility, DWWMIW, to assist with RCDS migration. If you need to run this utility, first create the target CICS VR V6R1 RCDSs.

CICS VR V6R1 implements the MIGRATE RCDS command to migrate CICSVR Server AS defaults from previous releases. See "MIGRATE RCDS: Specify migration option" on page 278 for a detailed description of the MIGRATE command.

The following sample JCL to run the CICS VR migration utility contains an example of running the DWWMIW program to migrate RCDSs:

```
//MIGRATE JOB (ACCOUNT),MSGLEVEL=(1,1),MSGCLASS=H,REGION=4M
//*
//* INVOKE THE CICSVR MIGRATION UTILITY TO MIGRATE AN RCDS
//*
//STEP1 EXEC PGM=DWWMIW                                          (1)
//STEPLIB DD DISP=SHR,DSN=DWW.SDWWLOAD ! CICSVR 6.1 LIB          (2)
//         DD DISP=SHR,DSN=DWW.SDWWLENU
//DWWMSG DD SYSOUT=*                   ! MESSAGE DATA SET        (3)
//*
//DWWCON1 DD DISP=SHR,DSN=hlq.slq.DWWCON1.GRPsuffix ! NEW RCDS   (4)
//DWWCON2 DD DISP=SHR,DSN=hlq.slq.DWWCON2.GRPsuffix ! NEW RCDS   (5)
//DWWCON3 DD DISP=SHR,DSN=hlq.slq.DWWCON3.GRPsuffix ! NEW RCDS   (6)
//*
//DWWOCON1 DD DISP=SHR,DSN=prefix.DWWCON1 ! OLD RCDS             (7)
//DWWOCON2 DD DISP=SHR,DSN=prefix.DWWCON2 ! OLD RCDS             (8)
//DWWOCON3 DD DISP=SHR,DSN=prefix.DWWCON3 ! OLD RCDS             (9)
//DWWIN    DD  *                                                 (10)
     MIGRATE RCDS DEFAULTS (YES)
//*
```

Figure 18. Sample JCL to run the CICS VR V6R1 migration utility

(1) The migration program is DWWMIW. The prefix DWW always refers to a component of CICS VR.

(2) STEPLIB references the CICS VR load library. Be sure the library referenced is the new CICS VR V6R1 load library.

(3) DWWMSG refers to the output data set to which CICS VR writes messages. This data set is usually defined as a SYSOUT data set. The DCB parameters for this data set are RECFM=FBA and LRECL=133. The block size can be provided on the DWWMSG DD statement and must be a multiple of 133. The default is 27930.

(4 – 6) Specifies the target CICS VR V6R1 RCDSs. These RCDSs must be empty and use the required naming convention if using the CICS VR server address space.

(7 - 9) Specifies the RCDSs to be migrated.

(10) DWWIN defines the data set that contains the CICS VR commands. You can either specify a sequential data set with 80-byte, fixed-length records, or include the CICS VR MIRGATE RCDS command in-stream as shown. You can also specify dummy or empty input data set for using default value for option DEFAULT(NO).

CICS VR utilities continue to work if the following items are true:

- The jobs allocate the CICS VR V6R1 libraries and update STEPLIB if required.
- The jobs allocate the CICS VR V6R1 RCDSs and update DWWCON1, DWWCON2, and DWWCON3 if required.

All data sets that were created for use with the panel interface of a previous CICS VR release work with the CICS VR V6R1 panel interface. The data sets allocated to the DWWMSG, DWWDMSG, and DWWDUMP ddnames for the panel interface must be different from the ones used with the CICS VR server address space.

Migration from another recovery product

Migrating to CICS VR from another recovery product is the same as installing CICS VR and performing all required setup for the first time. CICS VR does not supply a utility that transfers recovery information stored by the previous recovery product into the CICS VR RCDS.

However, by registering the log of logs to CICS VR, and then periodically performing a log of logs scan, the CICS VR RCDS is automatically populated with recovery information:

- Names of updated VSAM spheres
- Names of log streams that contain the log records
- Update activity dates and times

If DFSMShsm is used to create backups, the backups are automatically displayed through the CICS VR panel interface because CICS VR dynamically queries the DFSMShsm inventory. If DFSMSdss or another product is used to create logical backups, CICS VR can be notified about new backups created for your VSAM data sets. The backup information is stored in the RCDS.

Therefore, you can create recovery jobs for VSAM spheres after performing a log of logs scan without migrating recovery information stored from the previous recovery product.

Chapter 4. Activating the CICS VR server address space

The CICS VR server address space provides a communication vehicle for CICS VR and other applications. It must be active if you want to use any of these CICS VR functions.

- CICS VR VSAM batch logging.
- Notification and registration of DFSMSdss and other logical backups in the CICS VR RCDS.
- Automated change accumulation processing with DFSMSdss logical dumps and logical copies.
- Notification of CICS TS backout failures.

Note: The CICS VR server address space is not required to use DFSMShsm; however, if the CICS VR server address space is enabled, all user IDS running CICS VR must be authorized to issue DFSMShsm-authorized commands. See "Authorizing user IDS to issue DFSMShsm commands" on page 61.

The following topics are described in this section:

- Understanding the CICS VR server address space requirements.
- Setting up PARMLIB for the CICS VR server address space.
  - Initializing the CICS VR server address space.
  - Defining a CICS VR XCF group.
  - Defining a CICS VR prefix.
  - Defining a CICS VR RCDS prefix.
  - Defining a CICS VR general control parameter
  - Defining a CICS VR ZZVALUE parameter.
  - Dynamically changing a CICS VR PARMLIB setting.
  - Dynamically executing functions controlled by the CICSVR_GENERAL_CONTROL parameter
  - Example IGDSMS*xx* member.
- Allocating data sets required by the CICS VR server address space
- Using the DISPLAY command to display the CICS VR server status.
- Using the VARY command to activate or terminate the CICS VR server.
- Assigning CICS VR proper access authority.
- Authorizing user IDs to issue DFSMShsm commands.
- Understanding the CICS VR scavengers

Understanding the CICS VR server address space requirements

To enable the CICS VR server address space, these are the requirements that must be met.

- The CICS VR linklist libraries, SDWWLOAD and SDWWLENU (or SDWWLJPN, if JCVR61K is installed) must be included in the MVS LNKLST concatenation and must be defined as APF-authorized libraries.
- All systems must be running as a sysplex; local mode is not allowed.
- The CICS VR recovery control data sets (RCDSs) must be created, one is required, but three are recommended. The RCDSs must be defined on storage that is shared by all systems in a sysplex that belong to the same CICS VR XCF group.
- Two CICS VR message data sets must be defined, and the CICS VR trace and dump data sets must be defined. CICS VR can dynamically create and allocate these data sets during system initialization if SMS-managed storage is available.
- SMS must be active.

- Required parameters must be specified in the active IGDSMS*xx* member of SYS1.PARMLIB.

Setting up PARMLIB for the CICS VR server address space

Prior to activating the CICS VR server address space there are parameters that you must specify.

The following parameters in the active IGDSMS*xx* member of SYS1.PARMLIB:

- CICSVR_INIT(*value*)
- CICSVR_GRPNAME_SUFFIX(*value*)
- CICSVR_DSNAME_PREFIX(*value*)
- CICSVR_RCDS_PREFIX(*value*)
- CICSVR_GENERAL_CONTROL(*string*)
- CICSVR_ZZVALUE_PARM(*value*)

The active IGDSMS*xx* member must be updated on every system that runs an instance of the CICS VR server address space.

Note:

1. Each parameter can be specified in the active IGDSMS*xx* member of SYS1.PARMLIB only once.
2. Omit the CICS VR parameter from the IGDSMS*xx* member to specify the default value.

The following sections describe each of the CICS VR parameters that must be specified in IGDSMS*xx*.

Initializing the CICS VR server address space

The behavior of command and parameters during initialization of the server address space.

During the initialization of a system that has CICS VR installed, the value specified in the CICSVR_INIT(YES | NO) parameter in the active IGDSMS*xx* member of SYS1.PARMLIB is examined. If YES is specified, the system attempts to automatically start the CICS VR server address space. If NO is specified, the system does not attempt to automatically start the CICS VR server address space. This parameter must be specified on each system that runs an instance of the CICS VR server address space.

If the CICS VR server address space is not automatically started during system initialization, it can be started at a later time by issuing the VARY SMS,CICSVR,ACTIVE operator command on the system. However, the CICS VR server address space cannot be started either automatically or dynamically when the value for the CICSVR_INIT parameter is NO. Therefore, before issuing the VARY command, either change the CICSVR_INIT parameter to YES in the active IGDSMS*xx* member, or run the SETSMS CICSVR_INIT(YES) operator command to allow activation of the CICS VR server address space.

If an error occurs with the CICS VR server address space during system initialization, for example, cannot allocate the RCDSs, the CICS VR server terminates and does not automatically restart. You must first correct the problem and then use the VARY SMS,CICSVR,ACTIVE command to start the CICS VR server. See “Activate the CICS VR server” on page 59 for more information.

Defining a CICS VR XCF group

In a sysplex environment an instance of the CICS VR server address space must be installed and running on particular systems.

Each system that:

- Runs batch jobs that start CICS VR VSAM batch logging.
- Notifies CICS VR about backups created for VSAM spheres.
- Notifies CICS VR about CICS TS backout failures.

Only one instance of CICS VR can be active for each system.

Various tasks performed by the CICS VR server address space update the contents of the CICS VR Recovery Control Data Sets (RCDSs) allocated to the CICS VR server. The information in the RCDSs is then

read by CICS VR during recovery job construction and processing. Therefore, to ensure data integrity of the RCDSs it might be desirable to logically group the CICS VR instances.

For example, consider the following scenario:

- The CICS VR server address space is installed on 2 systems in a sysplex environment.
- Both systems run batch jobs that start CICS VR VSAM batch logging for common VSAM spheres.

In this scenario, if a common VSAM sphere becomes corrupted, the updates made by batch jobs ran on both systems need to be recovered. Therefore, the same RCDSs must be allocated to both of the CICS VR instances in the sysplex. To enforce usage of the same RCDSs, CICS VR contains the CICSVR_GRPNAME_SUFFIX() parameter.

CICS VR allows you to logically group CICS VR instances into cross-system coupling facility (XCF) groups by specifying the following parameter in the active IGDSMSxx member:

CICSVR_GRPNAME_SUFFIX(*suffix*)
Where *suffix* specifies the CICS VR XCF group name suffix. The suffix can be 1 - 4 characters in length, and can be alphanumeric, A-Z, 0-9, and national ($, @, and #). PROD is the default value.

CICS VR ensures that all systems defined with the same CICS VR XCF group name suffix use the same set of RCDSs. Therefore, all CICS VR instances that either run batch jobs or notify CICS VR of backups created for common VSAM spheres must use the same CICS VR XCF group name.

When grouping CICS VR instances into XCF groups, the following notes must be considered:

- IBM recommends that all CICS VR instances that are part of the same CICS VR XCF group use common CICS VR load module libraries, SDWWLOAD and SDWWLPA. This ensures that all CICS VR instances in a CICS VR XCF group use the same level of CICS VR.

  Because CICS VR XCF groups operate independently of each other, CICS VR instances defined to a different CICS VR XCF group can use a different level of CICS VR.
- Issuing a SETSMS command to change a CICS VR parameter only changes the specified parameter on the system that processes the request. The ROUTE command must be used to route the SETSMS command to all relevant systems. Also, some values changed by the SETSMS command only take effect when the system is restarted. Therefore, when updating a CICS VR parameter on all systems in a CICS VR XCF group, you must terminate and restart all active CICS VR servers after issuing the SETSMS command.
- All CICS VR instances that perform batch logging or register backups for common VSAM spheres must be grouped into the same CICS VR XCF group.
- All CICS VR instances in a CICS VR XCF group must have access to the same RCDSs. CICS VR ensures all instances in a CICS VR XCF group use the same RCDSs.

Production and test groups

Another use of the CICS VR XCF group name suffix might be to logically group the CICS VR instances into production and test groups.

For example, all CICS VR instances in a sysplex that update production data could have the same CICS VR XCF group name suffix defined, for example, PROD. Then, you can create one or more CICS VR instances for testing purposes only. The CICS VR testing instances could be assigned a different CICS VR XCF group name suffix, for example, TEST.

You could then assign separate levels of the CICS VR libraries to each CICS VR XCF group. This you would then allow you to change or update the CICS VR load libraries assigned to the test group without affection production activity. For example, you could apply and test an APAR on the CICS VR load libraries assigned to the test group prior to applying it to the CICS VR load libraries assigned to the production group.

Defining a CICS VR prefix

When the CICS VR server address space activates, it attempts to allocate the CICS VR message, trace and dump data sets using a predefined naming convention.

This value is also used as the high level qualifier, and optional second level qualifier by CICS VR when it is notified of DFSMSdss logical copies and when creating CICS VR change accumulation data sets. The first level qualifier and optional second level qualifier of this predefined naming convention is taken from the value specified in the CICSVR_DSNAME_PREFIX parameter.

Prior to activating the CICS VR server address space, you must specify the following parameter in the active IGDSMS*xx* member of SYS1.PARMLIB.

CICSVR_DSNAME_PREFIX(*hlq.slq*)
Where *hlq.slq* specifies the first level qualifier, and optional second level qualifier that CICS VR must use in the naming convention for the CICS VR message, trace and dump data sets, DFSMSdss logical copies, and change accumulation data sets. DWW is the default value. The maximum length of this parameter is 17 characters, allowing for up to 8 characters per qualifier with a single period delimiter. For more information refer to Data Set Names in z/OS DFSMS Using Data Sets.

See "Understanding the DWWMSGA, DWWMSGB, DWWDMSG, and DWWDUMP data sets naming convention" on page 50 for more information.

Defining a CICS VR RCDS prefix

The CICS VR recovery control data sets (RCDSs) are three linear VSAM data sets used by CICS VR as a data repository. Necessary recovery information is both written to and read from the RCDSs by various CICS VR processes.

The RCDSs must be created prior to activating the CICS VR server address space, using a predefined naming convention. During activation of the CICS VR server address space, CICS VR attempts to allocate the previously created RCDSs to the DWWCON1, DWWCON2, and DWWCON3 ddnames using the predefined naming convention. The first level qualifier, and optional second level qualifier, of the RCDS naming convention used by CICS VR is taken from the value specified in the CICSVR_RCDS_PREFIX parameter.

Prior to activating the CICS VR server address space, you must specify the following parameter in the active IGDSMSxx member of SYS1.PARMLIB:

CICSVR_RCDS_PREFIX(*hlq.slq*)
Where hlq.slq specifies the first level qualifier, and optional second level qualifier that CICS VR must use in the naming convention for the DWWCON1, DWWCON2, and DWWCON3 recovery control data sets. The specified qualifiers must follow MVS data set naming conventions. DWW is the default value. The maximum length of this parameter is 17 characters, allowing for up to 8 characters per qualifier with a single period delimiter. For more information refer to Data Set Names in z/OS DFSMS Using Data Sets.

See "Understanding the recovery control data sets (RCDSs)" on page 53 for more information.

CICS VR XCF group considerations

All systems in a sysplex that run a CICS VR instance that belongs to the same CICS VR XCF group must have the same value specified for the CICSVR_RCDS_PREFIX parameter. CICS VR contains logic to ensure all CICS VR instances in the same CICS VR XCF group use common RCDSs.

The RCDS prefix defined for the first system that activates the CICS VR server address space in a CICS VR XCF group is used for all instances in the same CICS VR XCF group. Therefore, if you need to change the value of the CICSVR_RCDS_PREFIX parameter for a CICS VR XCF group, you must:

- Terminate all CICS VR instances that belong to the same CICS VR XCF group.
- Change the CICSVR_RCDS_PREFIX value on all systems.
- Restart all CICS VR instances that belong to the same CICS VR XCF group.

Defining a CICS VR general control parameter

The CICSVR_GENERAL_CONTROL parameter is used to control the execution of various CICS VR functions. Before starting the CICS VR server address space, you can specify the CICSVR_GENERAL_CONTROL parameter in the active IGDSMSxx parmlib member of SYS1.PARMLIB.

Note:

1. Any function specified in the CICSVR_GENERAL_CONTROL parameter in the active IGDSMSxx member is immediately run upon every activation of the CICS VR server address space.
2. If you omit the CICSVR_GENERAL_CONTROL parameter in the IGDSMSxx member, the default value is assumed.

The following values can be specified for the CICSVR_GENERAL_CONTROL parameter:

Default value, parameter is omitted
CICS VR performs no additional processing during initialization of the CICS VR server address space. However, specifying the default value enables you to start various CICS VR functions dynamically using the SETSMS CICSVR_GENERAL_CONTROL operator command or, using the panel interface

CBAUTO (NO | YES)
Activate the CICS backout automated recovery control default. The specified value is registered in the RCDS as a value for the global default, and is unique for the CICS VR XCF group.

NO
This is the installation default setting. Register a NO value as the default in RCDS. This prohibits CICS backout automated recovery.

YES
Register a YES value as the default in RCDS. This permits CICS backout automated recovery.

You can also activate the CBAUTO control default using the panel interface.

DISPLAY CBAUTO
Display the CICS backout automated recovery control default value.

DISPLAY CONTALL
Display all active CICS VR control strings, CICSVR_UNDOLOG_CONTROL, CICSVR_BACKOUT_CONTROL, and CICSVR_GENERAL_CONTROL, for all systems in the sysplex that belong to the same CICS VR XCF group.

DISPLAY CONTROL
Display all active CICS VR control strings, CICSVR_UNDOLOG_CONTROL, CICSVR_BACKOUT_CONTROL, and CICSVR_GENERAL_CONTROL for the system.

DISPLAY DEFAULTS
Display all control defaults.

DISPLAY DSSLDREG
Display the DFSMSdss logical dump registration control default.

DISPLAY LCDEL
Display the CICS VR log stream delete control default.

DISPLAY LOLSCAN
Display the log of logs scan automation control default.

DISPLAY PACING
Display the Pacing control default.

DISPLAY REALDDN
Display the batch logging real ddname usage control default.

DISPLAY REDORC
Display the VSAM REDO batch logging continue control default.

DISPLAY SELBKREG
Display the selective backup registration control default.

DISPLAY SERVSEC
Display the server security control default.

DISPLAY SECURITY
Display the security control default.

DISPLAY SETUP
Display the setup default.

DISPLAY SYSTEMID
Display the system identifier usage control default.

DSSLDREG (NO | YES | YESTOP | ABARS | ABARSTOP)
Activate the DFSMSdss logical dump registration control default. The specified value is registered in the RCDS as a value for the global default unique for the CICS VR XCF group.

NO
This is the installation default setting. Register a NO value as the default in the RCDS. This means that DFSMSdss logical dumps are not registered for any applications.

YES
Register a YES value as the default in the RCDS. This means that DFSMSdss logical dumps are registered for all applications. Backups created for ABARS applications are registered as ABARS backups. Backups created for all other applications are registered as DSSLD backups. If the CICS VR server address space is not active, registration is still attempted. DFSMSdss produces appropriate error messages and does not include filtered VSAM data sets in the logical dumps created.

YESTOP
Register a YESTOP value as the default in the RCDS. This means that DFSMSdss logical dumps are registered for all applications. Backups created for ABARS applications are registered as ABARS backups. Backups created for all other applications are registered as DSSLD backups. If the CICS VR server address space is not active, registration stops.

ABARS
Register an ABARS value as the default in the RCDS. This means that DFSMSdss logical dumps are registered for ABARS applications only. Backups created for ABARS applications are registered as ABARS backups. If the CICS VR server address space is not active, registration is still attempted. DFSMSdss produces appropriate error messages and does not include filtered VSAM data sets in the logical dumps created.

ABARSTOP
Register an ABARSTOP value as the default in the RCDS. This means that DFSMSdss logical dumps are registered for ABARS applications only. Backups created for ABARS applications are registered as ABARS backups. If the CICS VR server address space is not active, registration stops.

Note: If the DFSMSdss DUMP command includes the CICSVRBACKUP keyword it takes precedence over any current value for the DFSMSdss logical dump registration control default.

You can also activate the DSSLDREG control default using the panel interface.

FLUSHBUF(NOW|*bufferflushtimer*)
Buffer flush mechanism(BFM) enables user to initiate offloading VSAM buffer contents to the appropriate logstream. This can be done by below mentioned ways,

1. Immediate buffer flush mechanism
2. Timer based buffer flush mechanism

Immediate buffer flush mechanism can be initiated by SETSMS CICSVR_GENERAL_CONTROL*(FLUSHBUF NOW).*

Specific interval based BFM can be initiated by SETSMS CICSVR_GENERAL_CONTROL*(FLUSHBUF NU).* Here, N is numeric. U is alphabetic character. A value of ‘S’ for unit specifies timer interval in seconds and if not specified default unit is microseconds. If specified as seconds, range should be 1 to 3600. If not specified, range would be 1 to 99999999 microseconds.

NOW

CICS VR performs immediate buffer flush for all active batch jobs. CICS VR initiate process to perform buffer flush once the entry has been processed. Immediately appropriate logstream will be get updated with recent data.

Bufferflushtimer

The *bufferflushtimer* is an interval for Buffer Flush Mechanism (BFM), must be used to perform timer-based buffer flush for all active batch jobs. The range of buffer flush timer is from 1 microsecond to 1hr i.e., 3600 seconds. Buffer flush will occur once the timer interval expires. So, appropriate logstream will get updated with recent data once BFM completed and continues the process until *bufferflushtimer* is set to zero. Here, if zero is specified then buffer flush will not happen.

Note: We would recommend setting timer interval above 5000 s based on our internal performance test results. Also, It's recommended updating IGDSMSxx to preserve *bufferflushtimer* value.

Example 1:

SETSMS CICSVR_GENERAL_CONTROL(FLUSHBUF NOW) is an entry to initiate immediate BFM.

```
SETSMS CICSVR_GENERAL_CONTROL(FLUSHBUF NOW)
DWW590I CICSVR CONTROL SERVICE REQUEST IS ACCEPTED.
  CONTROL FUNCTION:  GENERAL
  CONTROL STRING:    FLUSHBUF NOW
  STATE DESCRIPTION: CONTROL DEFAULT(S) ACTIVATED
DWW599I DISPLAY CONTROL DEFAULTS.
  CONTROL DEFAULTS
    NAME      VALUE     SCOPE     OWNER
    FLUSHBUF  NOW       GLOBAL    DWWMPROD
```

Once the above-mentioned entry has been processed CICS VR initiates immediate buffer flush for all active batch jobs, then appropriate logstream will be get updated with recent data.

Example 2:

SETSMS CICSVR_GENERAL_CONTROL(FLUSHBUF 10S) is an entry to set buffer flush timer as 10 seconds. On every 10 seconds once CICS VR initiates BFM for all active batch jobs to perform buffer flush, then appropriate logstream will be get updated with recent data.

```
SETSMS CICSVR_GENERAL_CONTROL(FLUSHBUF 10S)
DWW590I CICSVR CONTROL SERVICE REQUEST IS ACCEPTED.
  CONTROL FUNCTION:  GENERAL
  CONTROL STRING:    FLUSHBUF 10S
  STATE DESCRIPTION: CONTROL DEFAULT(S) ACTIVATED
DWW599I DISPLAY CONTROL DEFAULTS.
  CONTROL DEFAULTS
    NAME      VALUE     SCOPE     OWNER
    FLUSHBUF  10S       GLOBAL    DWWMPROD
```

Example 3:

SETSMS CICSVR_GENERAL_CONTROL(FLUSHBUF 0) is an entry to inform CICS VR to stop BFM.

```
SETSMS CICSVR_GENERAL_CONTROL(FLUSHBUF 0)
DWW590I CICSVR CONTROL SERVICE REQUEST IS ACCEPTED.
  CONTROL FUNCTION:  GENERAL
  CONTROL STRING:    FLUSHBUF 0
  STATE DESCRIPTION: CONTROL DEFAULT(S) ACTIVATED
DWW599I DISPLAY CONTROL DEFAULTS.
  CONTROL DEFAULTS
    NAME      VALUE     SCOPE     OWNER
    FLUSHBUF  0         GLOBAL    DWWMPROD
```

Example 4:

SETSMS CICSVR_GENERAL_CONTROL(DISPLAY FLUSHBUF) is an entry to display current *Bufferflushtimer* value i.e., timer based BFM interval.

```
SETSMS CICSVR_GENERAL_CONTROL(DISPLAY FLUSHBUF)
DWW599I DISPLAY CONTROL DEFAULTS.
  CONTROL DEFAULTS
    NAME      VALUE     SCOPE     OWNER
    FLUSHBUF  10S       GLOBAL    DWWMPROD
DWW590I CICSVR CONTROL SERVICE REQUEST IS ACCEPTED.
  CONTROL FUNCTION:  GENERAL
  CONTROL STRING:    DISPLAY FLUSHBUF
  STATE DESCRIPTION: CONTROL DEFAULT(S) DISPLAYED
```

LCDEL (NO | YES)

Activate the log stream copy delete control default. The specified value is registered in the RCDS as the global default value, and is unique for the CICS VR XCF group.

NO

This is the installation default setting. Register a NO value as the default in the RCDS. This prohibits the log stream copy deletion.

YES

Register a YES value as the default in the RCDS. This permits the log stream copy deletion.

You can also activate the LCDEL control default using the panel interface.

LOLSCAN (NO | YES | DEREG | REPORT | DEREPORT)

Activate the log of logs scan automation control default. The specified value is registered in the RCDS as a value for the local default, unique for the system. If specified, the first automatic log of logs scan starts twenty-four hours after the CICS VR server is activated and continues to be activated once every twenty-four hours. Automatic log scans are not activated if NO is used.

NO

This is the installation default setting. Register a NO value as the default in the RCDS. This means that the log of logs scan is not run automatically.

YES

Register a YES value as the default in the RCDS. This causes the log of logs scan to run automatically. Automatic deregistration does not occur, because the scan is run with the AUTODEREG(NO) keyword. No recovery report is produced, because the scan is run with the RECOVERYREPORT(NO) keyword.

DEREG

Register a DEREG value as the default in the RCDS. This causes the log of logs scan to run automatically. The scan runs with the automatic deregistration function enabled, by using the AUTODEREG(YES) keyword. No recovery report is produced, because the scan runs with the RECOVERYREPORT(NO) keyword.

REPORT

Register a REPORT value as the default in the RCDS. This causes the log of logs scan to run automatically. Automatic deregistration does not occur, because the scan is run with the AUTODEREG(NO) keyword. A recovery report is produced, because the scan runs with the RECOVERYREPORT(YES) keyword.

DEREPORT

Register a DEREPORT value as the default in the RCDS. This causes the log of logs scan to run automatically. The scan runs with the automatic deregistration function enabled, by using the AUTODEREG(YES) keyword. A recovery report is produced, because the scan runs with the RECOVERYREPORT(YES) keyword.

You can also activate the LOLSCAN control default using the panel interface.

OPTWAIT*(optwait)*

VSAM issues IXGCONN request to establish connection between CICS VR MVS System Logger Interface (MSLI). By default, the connection request waits from 1 second and goes up to 5 minutes until the request gets completed. Mostly the Logger Connect Request (LCR) can be completed within seconds. So, CICS VR provides facility to customize LCR wait time from 0.1 to 0.99 seconds instead of default 1 second.

optwait

Specifies the wait time of logger connect request. The *optwait* range should be 1 to 99.

Minimum wait time of LCR Formula,

Minimum wait time of Logger Connect Request(LCR) = optwait/10

For example, if the *optwait* value is 1 and applied in “Minimum wait time of LCR” formula then the resulted minimum wait time of LCR is 0.01seconds. likewise, minimum wait time of LCR ranges can be set from 0.01 seconds to 0.99seconds. If *optwait*, is zero then CICS VR will uses default wait time for logger connect request i.e., 1 second.

Examples

SETSMS CICSVR_GENERAL_CONTROL(OPTWAIT 5)

The above entry specify CICS VR will uses 0.05 seconds for logger connect request wait time.

```
SETSMS CICSVR_GENERAL_CONTROL(OPTWAIT 5)
DWW590I CICSVR CONTROL SERVICE REQUEST IS ACCEPTED.
  CONTROL FUNCTION:  GENERAL
  CONTROL STRING:    OPTWAIT 5
  STATE DESCRIPTION: CONTROL DEFAULT(S) ACTIVATED
DWW599I DISPLAY CONTROL DEFAULTS.
  CONTROL DEFAULTS
    NAME      VALUE     SCOPE     OWNER
    OPTWAIT   5         GLOBAL    DWWMPROD
```

SETSMS CICSVR_GENERAL_CONTROL(OPTWAIT 0)

The above entry specify CICS VR will uses default logger connect wait time i.e., 1second.

```
SETSMS CICSVR_GENERAL_CONTROL(OPTWAIT 0)
DWW590I CICSVR CONTROL SERVICE REQUEST IS ACCEPTED.
  CONTROL FUNCTION:  GENERAL
  CONTROL STRING:    OPTWAIT 0
  STATE DESCRIPTION: CONTROL DEFAULT(S) ACTIVATED  DWW599I DISPLAY CONTROL
DEFAULTS.
  CONTROL DEFAULTS
    NAME      VALUE     SCOPE     OWNER
    OPTWAIT   0         GLOBAL    DWWMPROD
```

PACING (NO|YES)

When a 'resource temporarily unavailable' condition occurs, PACING pauses the client thread to prevent it from allocating additional memory required for buffering. Once the temporary condition is resolved, the paused thread is released, allowing it to resume log-writing operations seamlessly.

The following values can be assigned to the **PACING** control command:

NO

This is an installation default setting. Register a NO value as the default in the RCDS. This will prohibit Pacing.

YES

Register a YES value as the default in the RCDS. This will enable Pacing and prevent LSQA (Local System Queue Area) shortage issue due to Log stream temporary conditions.

Note: To prevent unexpected changings in the service stream, the default value for PACING is NO. However, YES is recommended when tested and rolled out in a controlled manner.

Example 1:

SETSMS CICSVR_GENERAL_CONTROL(DISPLAY PACING) is an entry to display current ***Pacing*** value.

```
SETSMS CICSVR_GENERAL_CONTROL(DISPLAY PACING)
DWW599I DISPLAY CONTROL DEFAULTS.
CONTROL DEFAULTS
     NAME      VALUE     SCOPE     OWNER
     PACING    NO         GLOBAL    DWWMPROD
 DWW590I CICSVR CONTROL SERVICE REQUEST IS ACCEPTED.
 CONTROL FUNCTION:  GENERAL
 CONTROL STRING:    DISPLAY,PACING
 STATE DESCRIPTION: CONTROL DEFAULT(S) DISPLAYED
```

Example 2:

SETSMS CICSVR_GENERAL_CONTROL(PACING NO) is an entry to turn OFF Pacing.

```
SETSMS CICSVR_GENERAL_CONTROL(PACING NO)
DWW590I CICSVR CONTROL SERVICE REQUEST IS ACCEPTED.
  CONTROL FUNCTION:  GENERAL
  CONTROL STRING:    PACING,NO
  STATE DESCRIPTION: CONTROL DEFAULT(S) ACTIVATED
DWW599I DISPLAY CONTROL DEFAULTS.
  CONTROL DEFAULTS
    NAME      VALUE     SCOPE     OWNER
    PACING    NO        GLOBAL
DWWMPROD
```

Example 3:

SETSMS CICSVR_GENERAL_CONTROL(PACING YES) is an entry to turn ON Pacing.

```
SETSMS CICSVR_GENERAL_CONTROL(PACING YES)
DWW590I CICSVR CONTROL SERVICE REQUEST IS ACCEPTED.
   CONTROL FUNCTION:  GENERAL
   CONTROL STRING:    PACING,YES
   STATE DESCRIPTION: CONTROL DEFAULT(S) ACTIVATED
DWW599I DISPLAY CONTROL DEFAULTS.
   CONTROL DEFAULTS
     NAME      VALUE     SCOPE     OWNER
     PACING    YES       GLOBAL    DWWMPROD
```

You can also activate the PACING control default using the panel interface.

REALDDN (NO | YES)

Activate the batch logging real ddname usage control default. The specified value is registered in RCDS as the value of the batch logging real ddname usage control default.

NO

This is the installation default setting. Register a value NO as the real DD name default in RCDS. This means that real DD name logging is not provided.

YES

Register a value YES as the real DD name default in RCDS. This means that real DD name logging is provided.

You can also activate the REALDDN control default using the panel interface.

REDORC(*redorc*)

Activate the VSAM REDO batch logging continue control default. The specified value is registered in the RCDS as a value for the global default, unique for the CICS VR XCF group.

redorc
Specifies the maximum return code that is treated by CICS VR as a successful completion of the job to continue VSAM REDO batch logging. The maximum return code must be a value between 0 and 4095. A value of 0 is the installation default setting.

You can also activate the REDORC control default using the panel interface.

SCAN (LOL | LOLDEREG | LOLREP | LOLDEREP)
Run the specified scan function immediately.

LOL
Run the log of logs scan immediately Automatic deregistration is not performed during the scan. No recovery report is produced. This is the same as running the scan with the AUTODEREG(NO) and RECOVERYREPORT(NO) keywords.

LOLDEREG
Run the log of logs scan immediately Automatic deregistration is performed during the scan. No recovery report is produced. This is the same as running the scan with the AUTODEREG(YES) and RECOVERYREPORT(NO) keywords.

LOLREP
Run the log of logs scan immediately Automatic deregistration is not performed during the scan. A recovery report is produced. This is the same as running the scan with the AUTODEREG(NO) and RECOVERYREPORT(YES) keywords.

LOLDEREP
Run the log of logs scan immediately Automatic deregistration is performed during the scan. A recovery report is produced. This is the same as running the scan with the AUTODEREG(YES) and RECOVERYREPORT(YES) keywords.

SCAVENGE (ALL | SERVER | INV | HISTORY)
Run the referenced CICS VR scavenger in ASYNCHRONOUS processing mode. CICS VR also continues to perform automatic execution of the CICS VR scavenger according to the frequency listed in the “Understanding the CICS VR scavengers” on page 61 regardless of the CICSVR_GENERAL_CONTROL setting.

ALL
Run the server, inventory, and history CICS VR scavengers. If ALL is specified, SERVER, INV, and HISTORY cannot be specified.

SERVER
Run the server CICS VR scavenger. If SERVER is specified, ALL, INV, and HISTORY cannot be specified.

INV
Run the inventory CICS VR scavenger. If INV is specified, ALL, SERVER, and HISTORY cannot be specified.

HISTORY
Run the history CICS VR scavenger. If HISTORY is specified, ALL, INV, and SERVER cannot be specified.

SCAVSYNC (ALL | SERVER | INV | HISTORY)
Run the referenced CICS VR scavenger in SYNCHRONOUS processing mode. CICS VR also continues to perform automatic execution of the CICS VR scavenger according to the frequency listed in “Understanding the CICS VR scavengers” on page 61 regardless of the CICSVR_GENERAL_CONTROL setting.

ALL
Run the server, inventory, and history CICS VR scavengers. If ALL is specified, SERVER, INV, and HISTORY cannot be specified.

SERVER
Run the server CICS VR scavenger. If SERVER is specified, ALL, INV, and HISTORY cannot be specified.

INV
Run the inventory CICS VR scavenger. If INV is specified, ALL, SERVER, and HISTORY cannot be specified.

HISTORY
Run the history CICS VR scavenger. If HISTORY is specified, ALL, SERVER, and INV cannot be specified.

For further information about CICS VR scavengers, see "Understanding the CICS VR scavengers" on page 61.

SECURITY (NO|YES)
Activate the security default. The specified value is registered in the RCDS as a value of the global, unique for the CICS VR XCF group, security default.

NO
This is the installation default setting. Register a value NO, do not provide security checking, as the security default in the RCDS.

YES
Register a value YES, provide security checking, as the security default in the RCDS.

You can also activate the SECURITY control default using the panel interface.

SERVSEC(NO|YES)
Activate the server security control default. The specified value is registered in the RCDS as a value for the global default, unique for the CICS VR XCF group.

NO
This is the installation default setting. Register a value NO for the default in the RCDS. This deactivates the server security checking.

YES
Register a value YES for the default in the RCDS. This activates the server security checking.

You can also activate the SERVSEC control default using the panel interface.

SETUP(*jobname*)
Activate the server set up control default. The specified value is registered in the RCDS as a value for the local default, unique for the system. Thus, you can specify a unique default value for each system to set up a specific environment for the given system. If RACF® or a similar security product is in place, define the setup job as a started task to RACF and assign it a user ID with appropriate authorization to browse the output of the setup job. CICS VR supplies a sample job DWWRMDFS to show how to activate several defaults, see Figure 19 on page 44.

jobname
Specifies the name of the setup job that must be run during the initialization of the CICS VR server address space. The name of the setup job must be up to eight characters long. The valid characters are alpha-numeric (A-Z, 0-9) and national ($, @, and #) characters. The first character must be alphabetic (A-Z) or a national ($, @, and #) character. A blank character string is the installation default setting.

You can also activate the SETUP control default using the panel interface.

SELBKREG(NO|YES)
Activate the selective backup registration control default. The specified value is registered in the RCDS as a value for the global default, unique for the CICS VR XCF group.

NO
This is the installation default setting. Register a value NO for the default in the RCDS. The value NO prohibits the selective backup registration so that all backups is registered in the RCDS.

YES
If you register a value YES for the default in the RCDS, selective backup registration is permitted so that only backups for which VSAM spheres was already registered are registered in the RCDS.

You can also activate the SELBKREG control default using the panel interface.

SYSTEMID(*systemid*)

Activate the system identifier usage control default. The specified value is registered in the RCDS as a value for the local default, unique for the system. Thus, you can specify a unique default value for each system to unambiguously identify the given system.

systemid

Specifies the system identifier that must be used in place of the system slot number. The system identifier must be two characters long. The valid characters are alpha-numeric (A-Z, 0-9) and national ($, @, and #) characters. A blank character string is the installation default setting.

You can also activate the SYSTEMID control default using the panel interface.

Examples

CICSVR_GENERAL_CONTROL(DISPLAY CONTROL)

All active CICS VR control strings are displayed during system initialization, as shown in this example:

```
DWW591I DISPLAY CONTROL

DISPLAY CONTROL - UNDO LOGGING CONTROL STRINGS

  SYSNAME:  MVV3   ENABLE CONT

DISPLAY CONTROL - BATCH BACKOUT CONTROL STRINGS

  SYSNAME:  MVV3   SUBMIT NONE

DISPLAY CONTROL - GENERAL CONTROL STRINGS

  SYSNAME:  MVV3
```

CICSVR_GENERAL_CONTROL(DISPLAY DEFAULTS)

All defaults are displayed during system initialization, as shown in this example:

```
DWW599I DISPLAY CONTROL DEFAULTS.
  CONTROL DEFAULTS
    NAME      VALUE     SCOPE     OWNER
    CBAUTO    YES       GLOBAL    DWWMTSTS
    DSSLDREG  YES       GLOBAL    DWWMTSTS
    LCDEL     YES       GLOBAL    DWWMTSTS
    LOLSCAN   YES       LOCAL     MVV1
    PACING    YES       GLOBAL    DWWMTSTS
    REALDDN   YES       GLOBAL    DWWMTSTS
    REDORC    4         GLOBAL    DWWMTSTS
    SECURITY  YES       GLOBAL    DWWMTSTS
    SELBKREG  YES       GLOBAL    DWWMTSTS
    SERVSEC   YES       GLOBAL    DWWMTSTS
    SETUP     DWWRMDFS  LOCAL     MVV1
    SYSTEMID  QA        LOCAL     MVV1
```

CICSVR_GENERAL_CONTROL(DISPLAY DSSLDREG)

The DFSMSdss logical dump registration control default is displayed as shown in this example:

```
DWW599I DISPLAY CONTROL DEFAULTS.
  CONTROL DEFAULTS
    NAME      VALUE     SCOPE     OWNER
    DSSLDREG  ABARS     GLOBAL    DWWMPROD
```

CICSVR_GENERAL_CONTROL(DSSLDREG ABARS)

An ABARS value for the DFSMSdss logical dump registration control default is registered in the RCDS, to permit the DFSMSdss logical dumps registration for ABARS applications only.

CICSVR_GENERAL_CONTROL(DISPLAY LOLSCAN)

The log of logs scan automation control default is displayed as shown in this example:

```
DWW599I DISPLAY CONTROL DEFAULTS.
  CONTROL DEFAULTS
    NAME      VALUE     SCOPE     OWNER
    LOLSCAN   NO        GLOBAL    MVV1
```

CICSVR_GENERAL_CONTROL(DISPLAY SELBKREG)
The selective backup registration control default is displayed as shown in this example:

```
DWW599I DISPLAY CONTROL DEFAULTS.
  CONTROL DEFAULTS
    NAME      VALUE     SCOPE     OWNER
    SELBKREG  YES       GLOBAL    DWWMPROD
```

- You can activate the selective backup registration control default using the panel interface.
- You can register VSAM spheres in the RCDS using the log of logs scan utility, VSAM batch logging and the panel interface.

CICSVR_GENERAL_CONTROL(DISPLAY SERVSEC)
The server security control default is displayed as shown in this example:

```
DWW599I DISPLAY CONTROL DEFAULTS.
  CONTROL DEFAULTS
    NAME      VALUE     SCOPE     OWNER
    SERVSEC   YES       GLOBAL    DWWMPROD
```

You can also activate the server security control default using the panel interface.

CICSVR_GENERAL_CONTROL(DISPLAY SETUP)
The server set up control default is displayed as shown in this example:

```
DWW599I DISPLAY CONTROL DEFAULTS.
  CONTROL DEFAULTS
    NAME      VALUE     SCOPE     OWNER
    SETUP     DWWRMDFS  LOCAL     MVV1
```

- You can activate the server set up control default using the panel interface.

CICSVR_GENERAL_CONTROL(LOLSCAN DEREG)
A DEREG value for the log of logs scan automation control is registered as the default in the RCDS. This enables the automatic log of logs scan to run at regularly scheduled times. If specified, the first automatic log of logs scan starts twenty-four hours after the CICS VR server is activated.

During the log of logs scan, the automatic deregistration function is started, but the recovery report is not produced.

CICSVR_GENERAL_CONTROL(NONE)
You can specify a value of NONE as an alternative to omitting the parameter to indicate the default value.

CICSVR_GENERAL_CONTROL(REALDDN YES)
The real DD name default is set to YES and registered in RCDS during system initialization, to provide the batch logging real ddname usage control default.

CICSVR_GENERAL_CONTROL(DISPLAY REDORC)
The VSAM REDO batch logging continue control default is displayed as shown in this example:

```
DWW599I DISPLAY CONTROL DEFAULTS.
  CONTROL DEFAULTS
    NAME      VALUE     SCOPE     OWNER
    REDORC    4         GLOBAL    DWWMPROD
```

The VSAM REDO batch logging continue control default can be also activated by the panel interface.

CICSVR_GENERAL_CONTROL(DISPLAY SYSTEMID)
The system identifier usage control default is displayed as shown in this example:

```
DWW599I DISPLAY CONTROL DEFAULTS.
  CONTROL DEFAULTS
    NAME      VALUE     SCOPE     OWNER
    SYSTEMID  QA        LOCAL     MVV1
```

The system identifier usage control default can be also activated by the panel interface.

CICSVR_GENERAL_CONTROL(REDORC 4)
A value 4 for the VSAM REDO batch logging continue control default is registered in the RCDS as the maximum return code that is treated by CICS VR as a successful completion of the job step to continue VSAM REDO batch logging.

CICSVR_GENERAL_CONTROL(SCAN LOLDEREG)
Run the log of logs scan. During the log of logs scan, start the automatic deregistration function, but do not produce the recovery report.

CICSVR_GENERAL_CONTROL(SCAN LOLDEREP)
Run the log of logs scan. During the log of logs scan, start the automatic deregistration function and produce the recovery report.

CICSVR_GENERAL_CONTROL(SECURITY YES)
The security default is set to YES, and registered in the RCDS during system initialization, to provide security checking.

CICSVR_GENERAL_CONTROL(SELBKREG YES)
A value YES for the selective backup registration control default is registered in the RCDS to permit the selective backup registration.

CICSVR_GENERAL_CONTROL(SERVSEC YES)
A value YES for the server security control default is registered in the RCDS to activate the server security checking.

CICSVR_GENERAL_CONTROL(SETUP DWWRMDFS)
A value DWWRMDFS for the server set up control default is registered in the RCDS as the name of the setup job that must be run during the initialization of the CICS VR server address space.

If RACF or a similar security product is in place, you must define the setup job as a started task to RACF and assign a user ID with the appropriate authorization to browse the output of the setup job.

RDEFINE STARTED DWWRMDFS.* STDATA(USER(user ID)) SETR RACLIST(STARTED) REFRESH

CICSVR_GENERAL_CONTROL(SYSTEMID QA))
A value QA for the system identifier usage control default is registered in the RCDS and is used in place of the system slot number.

Each parameter can be specified in the active IGDSMSxx member of SYS1.PARMLIB only once. To specify several default values immediately after the CICS VR server address space starts, you can use the appropriate SETSMS CICSVR_GENERAL_CONTROL commands, as described in “Dynamically executing functions controlled by the CICS VR general control parameter” on page 46.

All default values are registered in RCDS, so setting these parameters is normally performed only once when you initially set the default values to meet your system requirements, or later when a reconfiguration occurs. Sample DWWRMDFS shown in Figure 19 on page 44 is included in SDWWCNTL, and shows how to activate several defaults.

```
//DWWRMDFS JOB (ACCOUNT),MSGLEVEL=(1,1),MSGCLASS=H,REGION=1M
//*****************************************************************/
//*                                                               */
//* @BANNER_START                                                 */
//* Licensed Materials - Property of IBM                          */
//*                                                               */
//* 5655-GY1              DWWRMDFS                                */
//*                                                               */
//* (C) Copyright IBM Corp. 2006, 2014                            */
//* (C) Copyright HCL Technologies Ltd. 2025                      */
//* @BANNER_END                                                   */
//*                                                               */
//*****************************************************************/
//*                                                               */
//*   CHANGE ACTIVITY:                                            */
//*                                                               */
//* $AJ= CVR420  420 061201 KVV                                @AJA*/
//*      ABARS Backups Control                                  @AJA*/
//* $AW= CVR430  430 070914 KVV                                @AWA*/
//*      Security Improvements                                  @AWA*/
//* $AI= CVR430  430 070914 KVV                                @AIA*/
//*      Miscellaneous Improvements                             @AIA*/
//*                                                                 */
//* $PC= PH64446  520  241203 SRIKHAR New Feature - Pacing     @PCA*/
//*****************************************************************/
//*                                                               */
//* Name:  DWWRMDFS                                               */
//*                                                               */
//* Function:  Activate CICSVR defaults                           */
//*                                                               */
//* Set "CAPS ON" to prevent JCL errors                           */
//*                                                               */
//* 1. Add the JOB statement to meet your system requirements     */
//*                                                               */
//* 2. Change default values to meet your system requirements     */
//*                                                               */
//*****************************************************************/
//*
//*  SET SYMBOLIC PARAMETERS
//*
//SETPREF  SET PREF=DWW                 ! CICSVR RCDS NAME PREFIX
//SETSUFF  SET SUFF=PROD                ! CICSVR XCF GROUP NAME SUFFIX
//*
//*  ACTIVATE DEFAULTS
//*
//  COMMAND  'SETSMS CICSVR_GENERAL_CONTROL(SECURITY NO      )'
//  COMMAND  'SETSMS CICSVR_GENERAL_CONTROL(CBAUTO   NO      )'
//  COMMAND  'SETSMS CICSVR_GENERAL_CONTROL(REALDDN  NO      )'
//  COMMAND  'SETSMS CICSVR_GENERAL_CONTROL(LCDEL    NO      )'
//  COMMAND  'SETSMS CICSVR_GENERAL_CONTROL(DSSLDREG NO      )'
//  COMMAND  'SETSMS CICSVR_GENERAL_CONTROL(LOLSCAN  NO      )'
//  COMMAND  'SETSMS CICSVR_GENERAL_CONTROL(SERVSEC  NO      )'
//  COMMAND  'SETSMS CICSVR_GENERAL_CONTROL(SYSTEMID         )'
//  COMMAND  'SETSMS CICSVR_GENERAL_CONTROL(REDORC   0       )'
//  COMMAND  'SETSMS CICSVR_GENERAL_CONTROL(SETUP            )'
//  COMMAND  'SETSMS CICSVR_GENERAL_CONTROL(SELBKREG NO      )'
//*
//DUMMY    EXEC  PGM=IEFBR14
//*
//
```

Figure 19. Activating several defaults

Defining a CICS VR ZZVALUE parameter

CICS VR ZZVALUES are flags that can be set within the CICS VR code to produce additional tracing and dump information to help resolve errors. However, these flags can be turned on only when instructed by IBM support to help diagnosis errors that occur.

Therefore it is not recommended to set CICSVR_ZZVALUE_PARM parameter in the active IGDSMSxx member of SYS1.PARMLIB.

This enables you to dynamically set various ZZVALUES with the SETSMS command if you encounter a problem and are instructed by IBM support to do so. This CICSVR_ZZVALUE_PARM parameter must be specified in the active IGDSMS*xx* member of all systems that run an instance of the CICS VR server address space.

You can specify a none character string as a parameter value, CICSVR_ZZVALUE_PARM(NONE), that is ignored in the active IGDSMSxx member of SYS1.PARMLIB (it is affected during system initialization) or in the SETSMS operator command (it is affected at run time).

Note:

This table lists the values that can be specified for the CICSVR_ZZVALUE_PARM parameter. However, they are listed just as a reference if you are asked by IBM support to specify one of the values. None of the values listed below can be specified for the CICSVR_ZZVALUE_PARM parameter without prior instruction by IBM support. CICS VR data sets affected are identified by the ddnames they are allocated to.

ZZVALUE	Meaning
BLANK	Clear the ZZVALUE parameter string.
CLEAR	Clear, or delete, diagnostic ZZVALUEs.
DISPLAY	Display status of a diagnostic session.
START	Start a diagnostic session.
STOP	Stop a diagnostic session.
FLUSH	Flush the DWWDMSG and DWWDUMP data sets.
RESET	Empty the DWWDMSG and DWWDUMP data sets.
FDMSG	Flush the DWWDMSG data set.
RDMSG	Empty the DWWDMSG data set.
FDUMP	Flush the DWWDUMP data set.
RDUMP	Empty the DWWDUMP data set.
FLUSHMSG	Flush the DWWMSG data set.
RESETMSG	Empty the DWWMSG data set.
FLUSHALL	Flush the DWWMSG, DWWDMSG, and DWWDUMP data sets.
RESETALL	Empty the DWWMSG, DWWDMSG, and DWWDUMP data sets.

Dynamically changing a CICS VR PARMLIB setting

You can dynamically change the value of any of the CICS VR PARMLIB parameters specified in the active IGDSMS*xx* member without updating the member itself.

The SETSMS operator command, followed by the CICS VR parameter name and value, can be issued for each of the CICS VR parameters to change the current setting. However, note that some of the dynamically changed parameters are not used by CICS VR until the next time the CICS VR server address space is started.

For example, if the CICS VR server address space is active when the SETSMS CICSVR_DSNAME_PREFIX(PROD) command is issued, the CICS VR server address space must be terminated, then restarted for CICS VR to use the value specified in the SETSMS command.

Note: Any values changed by issuing the SETSMS command are no longer available after a system has been reinitialized, re-IPL'd. The first time that the CICS VR server address space is started on a system after the system has been re-IPL'd, CICS VR uses the settings specified in the active IGDSMS*xx* member of SYS1.PARMLIB.

Below is a list of the available SETSMS commands that can be issued to change CICS VR parameters without updating the active IGDSMS*xx* member:

```
SETSMS CICSVR_INIT(YES | NO)
SETSMS CICSVR_GRPNAME_SUFFIX(suffix)
SETSMS CICSVR_DSNAME_PREFIX(hlq.slq)
```

```
SETSMS CICSVR_RCDS_PREFIX(hlq.sql)
SETSMS CICSVR_ZZVALUE_PARM(zzvalue)
```

Examples

SETSMS CICSVR_INIT(NO)
Changes the CICS VR initialization parameter to NO on the system that processed the command. If CICS VR is active on the system when this command is issued, CICS VR remains active. After this command is issued, and CICS VR is terminated, you is not able to restart the CICS VR server address space until the CICSVR_INIT parameter is reset to YES.

SETSMS CICSVR_GRPNAME_SUFFIX(TEST)
Changes the CICS VR XCF group name parameter to TEST on the system that processed the command. The specified value is activated the next time the CICS VR server address space is started.

SETSMS CICSVR_DSNAME_PREFIX(PROD.ONE)
Changes the CICSVR_DSNAME_PREFIX parameter value to PROD.ONE on the system that processed the command. The specified value is used for DWWMSGA, DWWMSGB, DWWDMSG, and DWWDUMP data sets naming convention the next time the CICS VR server address space is started. However, CICS VR uses the specified value immediately for DFSMSdss logical copy notification support and change accumulation data sets without restarting the CICS VR server address space

SETSMS CICSVR_RCDS_PREFIX(DWW2)
Changes the RCDS prefix value used in the RCDS naming convention to DWW2. The specified value used by CICS VR the next time the CICS VR server address space is started.

Multi-system considerations

Issuing the SETSMS command only changes the CICS VR parameter setting on the system that processes the command.

Use the ROUTE command to issue the SETSMS command on multiple systems. For example, issuing the following command changes the CICSVR_DSNAME_PREFIX setting on all systems in the sysplex:

```
ROUTE *,ALL,SETSMS CICSVR_DSNAME_PREFIX(DWW)
```

See *z/OS MVS System Commands* for further information about the ROUTE command.

Dynamically executing functions controlled by the CICS VR general control parameter

You can dynamically start any function controlled by the CICSVR_GENERAL_CONTROL parameter by issuing the SETSMS CICSVR_GENERAL_CONTROL(string) operator command from the console.

You can also use the panel interface to start any function controlled by the CICSVR_GENERAL_CONTROL parameter to activate control defaults.

Specifying a non-blank value for the CICSVR_GENERAL_CONTROL, string, parameter in the active IGDSMSxx member starts the requested function during initialization of the CICS VR server address space.

SETSMS CICSVR_GENERAL_CONTROL(*string*)
Dynamically starts the specified function that is controlled by the CICSVR_GENERAL_CONTROL parameter.

The string can contain one of the following values. The specified value must be padded on the right with blanks if necessary, and the strings must be separated with a blank or comma.

DISPLAY CBAUTO
DISPLAY CONTALL
DISPLAY CONTROL
DISPLAY DEFAULTS

DISPLAY DSSLDREG
DISPLAY LCDEL
DISPLAY LOLSCAN
DISPLAY REALDDN
DISPLAY REDORC
DISPLAY SECURITY
DISPLAY SELBKREG
DISPLAY SERVSEC
DISPLAY SETUP
DISPLAY SYSTEMID
DSSLDREG (NO | YES | YESTOP | ABARS | ABARSTOP)
LOLSCAN (NO | YES | DEREG | REPORT | DEREPORT)
NONE
REALDDN (NO | YES)
REDORC(redorc)
SCAN (LOL | LOLDEREG | LOLREP | LOLDEREP)
SCAVENGE (ALL | SERVER | INV | HISTORY)
SCAVSYNC (ALL | SERVER | INV | HISTORY)
SECURITY (NO | YES)
SELBKREG (NO|YES)
SERVSEC (NO|YES)
SETUP (jobname)
SYSTEMID (systemid)

Examples

SETSMS CICSVR_GENERAL_CONTROL(DISPLAY CONTALL)
The values of all active CICS VR control strings are displayed.

SETSMS CICSVR_GENERAL_CONTROL(DISPLAY SECURITY)
The security default is displayed.

SETSMS CICSVR_GENERAL_CONTROL(SCAVENGE HISTORY)
The CICS VR history scavenger is dynamically run in asynchronous mode.

SETSMS CICSVR_GENERAL_CONTROL(SECURITY YES)
CICS VR RCDS security checking is turned on.

Note: Executing the SETSMS CICSVR_GENERAL_CONTROL(*string*) operator command does not change the current CICSVR_GENERAL_CONTROL(*string*) setting in the active IGDSMS*xx* member. Use the ROUTE command to send the command to multiple systems.

Example IGDSMSxx member

The figure Figure 20 on page 48 contains an example portion of the IGDSMS*xx* member of SYS1.PARMLIB updated with sample CICS VR parameters.

Note: The values specified for the CICS VR parameters in this figure are for example purposes only. You must specify values for the CICS VR parameters that match your environment.

```
SMS ACDS(SMS.ACDS01) COMMDS(SMS.COMMDS01)
    INTERVAL(15)
    DINTERVAL(150)
    .
    .
    CICSVR_INIT(YES)                                                    1
    CICSVR_GRPNAME_SUFFIX(PROD)                                         2
    CICSVR_DSNAME_PREFIX(DWW)                                           3
    CICSVR_RCDS_PREFIX(DWW.PROD)                                        4
    CICSVR_GENERAL_CONTROL(DISPLAY CONTROL)                             5
    .
    .
```

Figure 20. Example IGDSMSxx member with sample CICS VR parameters

A description of the sample CICS VR parameters specified in the figure Example IGDSMSxx member with sample CICS(r) VR parameters:

1. CICSVR_INIT(YES)
Specifies that the CICS VR server address space must be activated when the system is initialized.

2. CICSVR_GRPNAME_SUFFIX(PROD)
Specifies that this CICS VR instance belongs to the CICS VR XCF group PROD.

3. CICSVR_DSNAME_PREFIX(DWW)
Specifies that CICS VR must use DWW as the high level qualifier in the naming convention used for the DWWMSGA, DWWMSGB, DWWDMSG, DWWDUMP data sets, DFSMSdss logical copies, and change accumulation data sets.

4. CICSVR_RCDS_PREFIX(DWW.PROD)
Specifies that CICS VR must use DWW.PROD as the first and second level qualifiers in the naming convention used for the DWWCON1, DWWCON2, and DWWCON3 recovery control data sets.

5. CICSVR_GENERAL_CONTROL(DISPLAY CONTROL)
Specifies that all active CICS VR control strings are displayed during system initialization.

Allocating data sets required by the CICS VR server address space

During activation of the CICS VR server address space, CICS VR attempts to allocate data sets to various ddnames. For some of the ddnames, CICS VR attempts to dynamically create, catalog and allocate a data set if one was not created prior to activation.

Table 2. Listing of the ddnames CICS VR attempts to allocate during address space activation

Data set description	***ddname***	**Dynamically created**
Message data set	DWWMSG	YES
Alternate message data set	DWWALT	YES
Trace data set	DWWDMSG	YES
Dump data set	DWWDUMP	YES
History data set	DWWHIST	YES
Recovery control data set (RCDS)	DWWCON1	NO
Recovery control data set (RCDS)	DWWCON2	NO
Recovery control data set (RCDS)	DWWCON3	NO

The following topics elaborate on each of the data sets used by the CICS VR server address space:

- “Understanding the DWWMSGA, DWWMSGB, DWWDMSG, and DWWDUMP data sets” on page 49

- “Understanding the history data sets” on page 52
- “Understanding the recovery control data sets (RCDSs)” on page 53

Understanding the DWWMSGA, DWWMSGB, DWWDMSG, and DWWDUMP data sets

The CICS VR server allocates two message data sets at the server activation.

Names of these message data sets should follow a specific naming convention described in the topic “Understanding the DWWMSGA, DWWMSGB, DWWDMSG, and DWWDUMP data sets naming convention” on page 50 and look as follows:

hlq.slq.DWWMSGA.systemname
hlq.slq.DWWMSGB.systemname

When the CICS VR server address space is activated, CICS VR picks out one of the listed message data sets with more free space in it and allocates it as a current message data set to the DWWMSG ddname. It also issues the DWW302I message on a console to indicate the current message data set name. Various messages are written to this data set throughout various processing performed by the CICS VR server address space.

The other message data set is allocated to the DWWALT ddname as an alternate message data set. If both message data sets are full, CICS VR uses the hlq.slq.DWWMSGA.systemname data set as a current and empties it.

The alternate message data set allocated to the DWWALT ddname is used when the CICS VR server detects that the current message data set is becoming full. Then the CICS VR server switches message data sets by performing the following actions:

- Close the DWWMSG data set, making it available for copy.
- Deallocate for both DWWMSG and DWWALT ddnames.
- Allocate the full message data set to the DWWALT ddname as an alternate.
- Allocate the other message data set to the DWWMSG ddname as a current.
- Open the current message data set DWWMSG file for writing to the data set from the beginning.

After switching message data sets, the CICS VR server produces a message that informs which message data set is full. At this point, the first data set is available if you want to run a copy job to archive its contents. A copy job should use DISP=SHR for the copied message data set as shown in the this sample.

```
//*-------------------------------------------------------------
 //* Copy the full DWWMSG data set after switching
 //*-------------------------------------------------------------
 //REPRO   EXEC PGM=IDCAMS
 //DWWMSGCP DD DSN=CICSVR.DWWMSGB.MVV1.COPY,
 //            DISP=(NEW,CATLG),UNIT=SYSDA,
 //            SPACE=(1330,200,,CONTIG),
 //            DCB=(RECFM=FBA,LRECL=133,BLKSIZE=1330,DSORG=PS)
 //INFILE   DD DSN=CICSVR.DWWMSGB.MVV1,DISP=SHR
 //SYSPRINT DD SYSOUT=*
 //SYSIN DD *
      REPRO INFILE(INFILE)                    -
            OUTDATASET(CICSVR.DWWMSGB.MVV1.COPY)
//*
```

The CICS VR server will use the second data set until that becomes full, when it switches back to using the first data set and starts overwriting its contents.

In addition, the CICS VR server address space allocates single data sets to both the DWWDMSG and DWWDUMP ddnames. Therefore, if a problem occurs within the CICS VR server address space, various tracing and dump information can be written to the data sets allocated to the DWWDMSG and DWWDUMP ddnames that could help during problem resolution.

When the CICS VR server detects that the diagnostic message data set or the dump data set is becoming full, it rewrites it without producing any message on a console.

Understanding the DWWMSGA, DWWMSGB, DWWDMSG, and DWWDUMP data sets naming convention

Data sets must be allocated to the DWWMSG, DWWALT, DWWDMSG, and DWWDUMP *ddnames* on each system in a sysplex that has the CICS VR server address space running. In addition, the data sets must be unique for each system. Therefore, CICS VR requires that the data sets follow a specific naming convention.

However, the naming convention slightly differs according to the following variations of a system name:

System name begins with a non-numeric character

If the first character of the system name is a non-numeric character, the following naming convention is used.

```
hlq.slq.DWWMSGA.systemname
hlq.slq.DWWMSGB.systemname
hlq.slq.DWWDMSG.systemname
hlq.slq.DWWDUMP.systemname
```

Where:

- *hlq.slq* is the CICS VR data set name prefix, high level qualifier and optional second level qualifier, defined in the CICSVR_DSNAME_PREFIX parameter of the active IGDSMSxx PARMLIB member.
- DWWMSGA, DWWMSGB, DWWDMSG, and DWWDUMP are constants.
- *systemname* is the name of the system.

For example, if the system name is SYS1, and the value of the CICSVR_DSNAME_PREFIX parameter is DWW, the naming convention of the CICS VR server message data sets is:

```
DWW.DWWMSGA.SYS1
DWW.DWWMSGB.SYS1
```

System name begins with a number and is less than 8 characters long

If the first character of the system name is a number and the name is less than 8 characters long, the following naming convention is used:

```
hlq.slq.DWWMSGA.Ssystemname
hlq.slq.DWWMSGB.Ssystemname
hlq.slq.DWWDMSG.Ssystemname
hlq.slq.DWWDUMP.Ssystemname
```

Where:

- *hlq.slq* is the CICS VR data set name prefix, high level qualifier and optional second level qualifier, defined in the CICSVR_DSNAME_PREFIX parameter of the active IGDSMSxx PARMLIB member.
- DWWMSGA, DWWMSGB, DWWDMSG, and DWWDUMP are constants.
- S is a constant.
- *systemname* is the name of the system.

For example, if the system name is 1290, and the value of the CICSVR_DSNAME_PREFIX parameter is DWW, the naming convention of the DWWDMSG data set is:

```
DWW.DWWDMSG.S1290
```

System name begins with a number and is 8 characters long

If the first character of the system name is a number and the name is 8 characters long, the following naming convention is used:

```
hlq.slq.DWWMSGA.SHsystemname(1:4).SLsystemname(5:8)
hlq.slq.DWWMSGB.SHsystemname(1:4).SLsystemname(5:8)
hlq.slq.DWWDMSG.SHsystemname(1:4).SLsystemname(5:8)
hlq.slq.DWWDUMP.SHsystemname(1:4).SLsystemname(5:8)
```

Where:

- *hlq.slq* is the CICS VR data set name prefix, high level qualifier and optional second level qualifier, defined in the CICSVR_DSNAME_PREFIX parameter of the active IGDSMSxx PARMLIB member.
- DWWMSGA, DWWMSGB, DWWDMSG, and DWWDUMP are constants.
- SH is a constant.
- *systemname*(1:4) is the first four characters of the system name.
- SL is a constant.
- *systemname*(5:8) is the last four characters of the system name.

For example, if the system name is 14091956, and the value of the CICSVR_DSNAME_PREFIX parameter is DWW, the naming convention of the DWWDUMP data set is:

```
DWW.DWWDUMP.SH1409.SL1956
```

Creating the DWWMSGA, DWWMSGB, DWWDMSG, and DWWDUMP data sets

When the CICS VR server address space is activated CICS VR dynamically creates, catalogs, and allocates both the CICS VR message data sets, the CICS VR trace, and dump data sets if the following requirements are met.

Naming conventions:

- The data sets don't already exist
- SMS-managed storage is available

Therefore, if SMS-managed-storage is available, you are not required to manually create these data sets before activating the CICS VR server address space. However, you might still need to refer to the naming convention specified to determine the names of the CICS VR-created data sets when you want to view their contents.

You can manually create and catalog the CICS VR data sets prior to activating the CICS VR server address space. However, ensure the manually created data sets follow the correct naming convention as described in “Understanding the DWWMSGA, DWWMSGB, DWWDMSG, and DWWDUMP data sets naming convention” on page 50. During activation of the CICS VR server address space, CICS VR first allocates any manually created data sets to the appropriate ddnames and uses them during address space processing, instead of dynamically creating them.

If you create the CICS VR data sets manually, ensure that you allocated sufficient contiguous primary storage for these data sets. Otherwise CICS VR server can not start.

This figure shows an example of JCL that can be used to manually create the DWWMSGA, DWWMSGB, DWWDMSG, and DWWDUMP data sets.

```
//*******************************************************
//* PREALLOCATE DWWMSG DATA SETS
//*******************************************************
//* Each DWWMSG data set SPACE value should be
//* 30 tracks or more
//*******************************************************
//DEFMSG EXEC PGM=IEFBR14
//DWWMSG1 DD DSN=hlq.slq.DWWMSGA.systemname,DISP=(NEW,CATLG),
//           SPACE=(CYL,(6),,CONTIG),
//           DCB=(RECFM=FBA,LRECL=133,BLKSIZE=1330)
//DWWMSG2 DD DSN=hlq.slq.DWWMSGB.systemname,DISP=(NEW,CATLG),
//           SPACE=(CYL,(6),,CONTIG),
//           DCB=(RECFM=FBA,LRECL=133,BLKSIZE=1330)
//*
//*******************************************************
//* PREALLOCATE THE DWWDUMP AND DWWDMSG DATA SET
//*******************************************************
//DEFDUMP EXEC PGM=IEFBR14
//*******************************************************
//* The DWWDUMP data set SPACE value should be 30 tracks
//* or more.
//*******************************************************
//DWWDUMP DD DSN=hlq.slq.DWWDUMP.systemname,DISP=(NEW,CATLG),
//           SPACE=(CYL,(3),,CONTIG),
//           DCB=(RECFM=VBA,LRECL=84,BLKSIZE=3120)
//*******************************************************
//* The DWWDMSG data set SPACE value should be 20 tracks
//* or more.
//*******************************************************
//DWWDMSG DD DSN=hlq.slq.DWWDMSG.systemname,DISP=(NEW,CATLG),
//           SPACE=(CYL,(2),,CONTIG),
//           DCB=(RECFM=VBA,LRECL=84,BLKSIZE=3120)
//*
```

Figure 21. Example JCL to manually create the DWWMSGA, DWWMSGB, DWWDMSG, and DWWDUMP data sets.

Attention: The data sets created and allocated to the DWWMSG, DWWDMSG, and DWWDUMP ddnames for the CICS VR server address space must be separate from the ones used by the CICS VR panel interface and jobs that start CICS VR utilities. IBM recommends that you:

- Create and allocate separate data sets to the DWWMSG, DWWDMSG, and DWWDUMP ddnames used by the CICS VR panel interface, the allocations can be made in the CLIST used to display the CICS VR panel interface. Also, there is no specified naming convention for the data sets allocated to the panel interface.
- Specify SYSOUT=* for the DWWMSG, DWWDMSG, and DWWDUMP data set allocations specified in batch jobs that run CICS VR utilities.

Sharing the message, trace, and dump data sets between the CICS VR server address space, CICS VR panel interface, and batch jobs could cause data to be overwritten.

Understanding the history data sets

The CICS VR server uses temporary history data sets which are dynamically allocated with ddname DWWHIST.

The data from these data sets is flushed to the current DWWMSGx data set when the history scavenger runs. The history data sets are not catalogued.

You can run the history scavenger dynamically if the hourly run is not sufficient by using the **SETSMS** command, or using the CICS VR ISPF dialog interface, to specify SCAVENGE(HISTORY) in the CICSVR_GENERAL_CONTROL() string.

Understanding the recovery control data sets (RCDSs)

The CICS VR recovery control data sets are three linear VSAM data sets that CICS VR uses to store and retrieve various recovery information.

The three RCDSs contain the same recovery information, and the redundancy helps protect against loss of recovery data due to hardware failure or data corruption. The three RCDSs must be created prior to using CICS VR and starting the CICS VR server address space, and must follow a specific naming convention. After the RCDSs are created, they are allocated to the CICS VR server address space upon activation to the DWWCON1, DWWCON2, and DWWCON3 ddnames. The same RCDSs must also be allocated to the same DWWCON1, DWWCON2, and DWWCON3 ddnames by the CICS VR panel interface and batch jobs that start CICS VR utilities.

Understanding the RCDS naming convention

There are three recovery control data sets you create must using the following naming convention.

```
hlq.slq.DWWCON1.GRPsuffix
hlq.slq.DWWCON2.GRPsuffix
hlq.slq.DWWCON3.GRPsuffix
```

Where:

- *hlq.slq* is the CICS VR RCDS prefix, high level qualifier and optional second level qualifier, defined in the CICSVR_RCDS_PREFIX parameter of the active IGDSMS*xx* PARMLIB member.
- DWWCON1, DWWCON2, and DWWCON3 are constants.
- GRP is a constant
- *suffix* is the CISCVR XCF group name suffix defined in the CICSVR_GRPNAME_SUFFIX parameter of the active IGDSMS*xx* PARMLIB member.

Creating the RCDSs

Prior to running CICS VR, three RCDSs must be created using the naming convention as described in the previous section. The points to consider when creating the RCDSs.

- To reduce the possibility of losing the recovery information, IBM recommends that you create each of the three RCDSs on separate volumes, disk controllers, and channels. This prevents the loss of recovery data due to a single hardware failure.
- The RCDSs must be created on separate volumes, disk controllers, and channels from those of the VSAM spheres that you update and want to forward recover with CICS VR. This helps to prevent failures that corrupt your production VSAM data from affecting the RCDSs.
- CICS VR contains logic to ensure that all CICS VR instances that belong to the same CICS VR XCF group use the same RCDSs. Therefore, you must create the RCDSs on storage that is accessible from all systems in a sysplex that run an instance of the CICS VR server address space that belongs to the same CICS VR XCF group. All CICS VR instances in the CICS VR XCF group need write access to the RCDSs.

  In addition, you need to create separate sets of CICS VR RCDSs for each CICS VR group defined in a sysplex.
- One of the RCDSs must be defined with a smaller size. Therefore, if the RCDSs are becoming full, you can be notified and take proper action prior to encountering this situation on all three RCDSs. If all three RCDSs become full, CICS VR processes terminate until proper corrective action is taken.

  If this is the first time you are installing CICS VR, and you are using CICS VR VSAM batch logging or backup notification, you might want to use the following sizings as a starting point for your RCDSs.

```
DWWCON1 - CYLINDERS(200 30)
DWWCON2 - CYLINDERS(200 30)
DWWCON3 - CYLINDERS(150 30)
```

- If you do not plan on using CICS VR VSAM batch logging or backup notification, then refer to the RCDS formula in "Creating and maintaining the RCDS when not using the CICS VR server address space" on page 88 for RCDS sizing information.

GRS considerations

Global Resource Serialization (GRS) must be installed to access the RCDSs from more than one MVS system.

CICS VR issues an ENQ for the QNAME DWWCON and a RNAME of each of the recovery control data sets. This ENQ is issued with a scope of SYSTEMS when accessing the RCDSs. If you are using GRS for resource serialization, you do not need to do anything for GRS because this ENQ is propagated to all systems within a GRSplex. If you are using GRS, do not have an entry for this QNAME in the GRS Exclusion list, Conversion list, or Inclusion list as this can cause serialization problems and possibly damage your RCDSs. If you are using a product other than GRS for resource serialization, you need to ensure that the ENQ's issued by CICS VR are propagated to all systems that are sharing the RCDS to avoid damaging or corrupting your RCDSs.

The sample batch job Figure 22 on page 54 allocates three recovery control data sets.

```
//ALLOC    EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
  DEFINE CLUSTER                                -
      (NAME('hlq.slq.DWWCON1.GRPsuffix')         -
       VOLUMES(TSOL01)                          -
       CYLINDERS(200 30)                        -
       LINEAR                                   -
       SHR(3 3))

  DEFINE CLUSTER                                -
      (NAME('hlq.slq.DWWCON2.GRPsuffix')        -
       VOLUMES(TSO007)                          -
       CYLINDERS(200 30)                        -
       LINEAR                                   -
       SHR(3 3))

  DEFINE CLUSTER                                -
      (NAME('hlq.slq.DWWCON3.GRPsuffix')        -
       VOLUMES(TSOL02)                          -
       CYLINDERS(150 30)                        -
       LINEAR                                   -
       SHR(3 3))
/*
```

Figure 22. AMS Commands to Define the CICS VR RCDS

In the example in Figure 22 on page 54:

- *hlq.slq* is the CICS VR RCDS prefix defined in the active IGDSMS*xx* PARMLIB member.
- *suffix* is the CICS VR XCF group name suffix defined in the active IGDSMS*xx* PARMLIB member.

To protect against loss of recovery data, each recovery control data set is defined on a separate volume. Also, to detect when the RCDSs are becoming full, the third RCDS is smaller than the other two RCDSs.

Maintaining the RCDS

Throughout various CICS VR processes, CICS VR verifies the consistency and availability of the RCDSs. Any damaged or unusable RCDS are reported by CICS VR in a message.

For example, CICS VR might issue message DWW1605I indicating that an RCDS is full.

Upon notification of a damaged or unusable RCDS, corrective action must be taken. While CICS VR recommends creating and using three RCDSs for a CICS VR XCF group, it can temporarily run with only one or two RCDSs allocated without affecting any production activity. Therefore, if you are notified that one or two of the RCDSs are damaged or unusable, you can take the following corrective action without terminating the CICS VR server address space and affecting production activity:

1. Deallocate the damaged or unusable RCDS from the CICS VR server address space.

   An RCDS can be deallocated from the CICS VR server address space by issuing the following operator command:

   ```
   VARY SMS,CICSVR,RCDS(ddname),DELETE
   ```

   Where *ddname* is the ddname the CICS VR server address space allocated the RCDS as (DWWCON1, DWWCON2, or DWWCON3).

   Note: In some cases, CICS VR automatically deallocates an unusable RCDS, therefore making this step unnecessary. CICS VR writes messages to the operator console when an RCDS is found to be unaccessible, full, etc. Also, CICS VR writes messages to the operator console when it dynamically deallocates an RCDS that is found to be full or broken.

2. Repair the damaged RCDS.

   In most cases, as long as there is one existing RCDS that is correct and undamaged, it might be easiest to simply delete the damaged RCDS and redefine it. CICS VR can automatically refill an empty RCDS.

3. Reallocate the repaired RCDS to the CICS VR server address space.

   An RCDS can be reallocated to the CICS VR server address space by issuing the following operator command:

   ```
   VARY SMS,CICSVR,RCDS(ddname),ADD
   ```

   Where *ddname* is the ddname the CICS VR server address space uses to allocate the RCDS as (DWWCON1, DWWCON2, or DWWCON3). CICS VR uses the RCDS naming convention when attempting to reallocate an RCDS to the CICS VR server address space.

   When an RCDS is allocated to the CICS VR server address space, CICS VR verifies that its contents are consistent with the other allocated RCDSs. If an RCDS is found to be outdated or empty, CICS VR automatically adds the missing information into the empty or outdated RCDS.

Full RCDS

In the following steps, it is assumed that the RCDS allocated to the DWWCON3 ddname is full.

If an RCDS becomes full, and if the full RCDS was originally allocated with a smaller size from the other two RCDSs, CICS VR reports the RCDS full condition and continues to use the two non-full RCDSs. CICS VR automatically deallocates the full RCDS from all CICS VR instances in the CICS VR XCF group. However, to resize all three RCDSs without terminating the CICS VR server address space, consider the following steps.

1. Carry out steps 2 and 3 for the full RCDS, deleting the RCDS and re-creating it with a larger size.
2. Carry out steps 1 - 3 for DWWCON1, again deleting the RCDS and re-creating it with a larger size. Be sure that it is allocated with a size larger than DWWCON3.
3. Carry out steps 1 - 3 for DWWCON2, again deleting the RCDS and re-creating it with a larger size. Be sure that it is allocated with the same size as DWWCON1.

Identifying preallocation errors

The message that the CICS VR server address space issues if the DWWMSGx or DWWCONn data sets are not preallocated correctly.

```
DWW180E  UNEXPECTED ERROR DURING CICSVR SERVER PROCESSING.
           MODULE WHICH DETECTED THE ERROR: DWW1IRCM
           RETURN CODE (HEX): 00000024
           REASON CODE (HEX): 711152E0
           CALLED MODULE ERROR INFORMATION:
           RETURN CODE (HEX): 00000024
           REASON CODE (HEX): 71122412
           COMPLETION CODE: NORCDS
           PROBLEM DESCRIPTION: CICSVR SERVER PREALLOCATION
           REQUIREMENTS NOT MET
```

Figure 23. Example DWW180E message due to RCDS preallocation error

Using the DISPLAY command

You can use the DISPLAY command to display the status of the CICS VR server address space, logstreams, and RCDS on a single system or all systems that belong to the same CICS VR XCF group.

The following variations of the DISPLAY command are available for the CICS VR server address space:

- DISPLAY SMS,CICSVR
- DISPLAY SMS,CICSVR,ALL
- DISPLAY SMS,CICSVR,LOGSTREAMS(logstreamname)
- DISPLAY SMS,CICSVR,LOGSTREAMS(ALL)
- DISPLAY SMS,CICSVR,RCDS
-

Displaying the CICS VR server status

Use DISPLAY SMS,CICSVR to display the status of the CICS VR server on the system the command was issued.

If DISPLAY SMS,CICSVR is issued and the CICS VR server is not active, the following messages are displayed on the operator console:

```
DWW020I DISPLAY SMS,CICSVR
DISPLAY SMS,CICSVR - SERVER STATUS
  SYSNAME:  SYSTEM1  UNAVAILABLE ASID: 000A STEP: CICSVR_Init_Complete

DISPLAY SMS,CICSVR - JOB STATUS
  APPLID AND NUMBER OF JOBS USING BATCH LOGGING:
  SYSNAME:  SYSTEM1  .RPROD04        0        0        0

DATA SET NAMING CONVENTION IN USE:
  SYSNAME:  SYSTEM1  DWW

UNDO LOG NAMING CONVENTION IN USE:
  SYSNAME:  SYSTEM1  DWW

RCDS NAMING CONVENTION IN USE: DWW

XCF GROUP NAMING CONVENTION IN USE: PROD
```

Figure 24. DISPLAY SMS,CICSVR results when the CICS VR server is not active

Note: APPLID here refers to the ID of the CICS VR server address space.

If DISPLAY SMS,CICSVR,ALL is issued, data for all the systems in the sysplex that belong to the same CICS VR XCF group is displayed on the operator console.

```
DWW020I DISPLAY SMS,CICSVR
DISPLAY SMS,CICSVR - SERVER STATUS
  SYSNAME:  SYSTEM3    AVAILABLE ASID: 000A STEP: CICSVR_Init_Complete
  SYSNAME:  SYSTEM1    AVAILABLE ASID: 000A STEP: CICSVR_Init_Complete

DISPLAY SMS,CICSVR - JOB STATUS
  APPLID AND NUMBER OF JOBS USING BATCH LOGGING:
  SYSNAME:  SYSTEM3  .RPROD02        0        0        0
  SYSNAME:  SYSTEM1  .RPROD04        0        0        0

DATA SET NAMING CONVENTION IN USE:
  SYSNAME:  SYSTEM3  DWW
  SYSNAME:  SYSTEM1  DWW

UNDO LOG NAMING CONVENTION IN USE:
  SYSNAME:  SYSTEM3  DWW
  SYSNAME:  SYSTEM1  DWW

RCDS NAMING CONVENTION IN USE: DWW

XCF GROUP NAMING CONVENTION IN USE: PROD
```

Figure 25. DISPLAY SMS,CICSVR,ALL results when the CICS VR server is active

Note: APPLID here refers to the ID of the CICS VR server address space.

Displaying the log stream status

To determine if an MVS log stream is currently connected to CICS VR VSAM batch logging, and to inquire about the status of the connection, you can issue the operator command shown here:

DISPLAY SMS,CICSVR,LOGSTREAMS(*log stream name*)
where log stream name is the name of an MVS log stream to which CICS VR VSAM batch logging is connected. The log stream can either be a forward recovery log stream or an undo log stream. For example, CICS VR VSAM batch logging connects to the log stream specified in the LOGSTREAMID catalog parameter of a VSAM data set that is enabled for CICS VR forward recovery logging (FRLOG=REDO) when a batch job that updates the data set is run. If the specified log stream is not currently connected to CICS VR VSAM batch logging, then the log stream connection status is blank. See Chapter 5, “Setting up CICS VR VSAM batch logging,” on page 63, for more information about enabling CICS VR VSAM batch logging.

To display the status of the connection of all MVS log streams currently connected to CICS VR VSAM batch logging, you can issue the following operator command:

DISPLAY SMS,CICSVR,LOGSTREAMS(ALL)
where ALL specifies that CICS VR must display the status of all MVS log streams, forward recovery and undo log streams, that are currently connected to CICS VR VSAM batch logging by all CICS VR systems in the same XCF group. Again, an MVS log stream is connected to CICS VR VSAM batch logging when a batch job that starts CICS VR forward recovery logging or CICS VR undo logging is run.

Issuing the DISPLAY SMS,CICSVR,LOGSTREAMS, log stream name, or DISPLAY SMS,CICSVR,LOGSTREAMS(ALL) command produces output similar to the example in Figure 26 on page 58:

```
DWW020I DISPLAY SMS,CICSVR
DISPLAY SMS,CICSVR - LOG STREAM CONNECTION STATUS
  SYSNAME                    00000000011111111112222222222333
  INDENTIFIER                12345678901234567890123456789012

  CICSMVS.TTCICS2.FILELOG1    SS..............................
  CICSMVS.TTCICS2.FILELOG2    SS..............................

  01  SYSNAME:  SYSTEM1
  02  SYSNAME:  SYSTEM2
```

Figure 26. DISPLAY SMS,CICSVR,LOGSTREAMS(ALL) results when the CICS VR server is active

Refer to the description of message DWW020I in *CICS VR Messages and Problem Determination* for an explanation of the reported log stream connection status.

Note: If DISPLAY SMS,CICSVR,LOGSTREAMS, log stream name, is issued, but the specified log stream is not currently connected to CICS VR VSAM batch logging, the log stream connection status field is blank. If DISPLAY SMS,CICSVR,LOGSTREAMS(ALL) is issued, but no batch jobs that start CICS VR VSAM batch logging are currently running, no log streams are reported in the produced output.

Displaying the RCDS status

Use the DISPLAY SMS,CICSVR,RCDS command to display the status of the RCDSs allocated to the CICS VR server address space.

You can use this command to determine if any maintenance is required on the RCDSs. This figure shows an example of the output returned when the DISPLAY SMS,CICSVR,RCDS command is issued and all three RCDSs are properly allocated and in use by CICS VR:

```
DWW520I DISPLAY SMS,CICSVR,RCDS

DISPLAY SMS,CICSVR,RCDS - DATA SET NAMES
  NAME      DATA SET NAME
  DWWCON1   DWW.DWWCON1.GRPPROD
  DWWCON2   DWW.DWWCON2.GRPPROD
  DWWCON3   DWW.DWWCON3.GRPPROD

DISPLAY SMS,CICSVR,RCDS - STATUS
  NAME      STATUS
  DWWCON1   IN USE
  DWWCON2   IN USE
  DWWCON3   IN USE

DISPLAY SMS,CICSVR,RCDS - SPACE
  NAME      TOTAL   USED   UNIT
  DWWCON1   2160K  1004K   200K
  DWWCON2   2160K  1004K   200K
  DWWCON3   1440K  1004K   200K
```

Figure 27. DISPLAY SMS,CICSVR,RCDS results when all three RCDSs are properly allocated and in use.

During some error conditions, CICS VR automatically attempts to deallocate the RCDS. For example, if an RCDS becomes full, CICS VR automatically attempts to deallocate the full RCDS from the CICS VR server address space. Therefore, the status of the full RCDS might be shown as "OUT OF SET" after CICS VR has deallocated the full RCDS. However, CICS VR writes appropriate messages to the operator console when an RCDS error is encountered and when it is automatically deallocated. The status of each RCDS can be one of the following:

IN USE
: An RCDS is currently allocated to the listed ddname and is accessible by the CICS VR server address space. No further action is required.

OUT OF SET
The RCDS of the listed ddname is currently deallocated from the CICS VR server address space. An RCDS can be deallocated from CICS VR by issuing the VARY operator command or automatically by CICS VR when it becomes full, unusable, or broken. An RCDS must be recreated and reallocated to the listed ddname as soon as possible.

INACCESSIBLE
The RCDS of the listed ddname is allocated to CICS VR, but CICS VR cannot access it to read and write information. Either make the RCDS accessible to CICS VR, or deallocte it, then recreate and reallocate a new RCDS to the same ddname.

BROKEN
The RCDS for the listed ddname is corrupted. Deallocate the RCDS from CICS VR, then recreate and redefine a new RCDS to the same ddname. CICS VR automatically attempts to deallocate a broken RCDS.

FULL
The RCDS for the listed ddname has reached its capacity and no more information can be written to it. It must be deallocated from CICS VR, then recreated with a larger capacity and reallocated to the same ddname. CICS VR automatically attempts to deallocte a full RCDS.

INDELIBLE
The RCDS for the listed ddname could not be removed from CICS VR. It must be manually deallocted from CICS VR, then recreated and reallocated to the same ddname.

UNKNOWN
An unresolveable error has occurred while attempting to access the RCDS for the listed ddname. It must be deallocated from CICS VR, then recreated and reallocated to the same ddname.

Using the VARY command to activate or terminate the CICS VR server

You can use the VARY command to activate or terminate the CICS VR server on a single system.

The following VARY commands are available for the CICS VR server address space:

- VARY SMS,CICSVR,ACTIVE
- VARY SMS,CICSVR,TERMINATESERVER

Note: The list of VARY commands are not multi-system commands. Use the ROUTE command with the VARY command to route the request to all relevant systems. For example, issuing the following command activates the CICS VR server address space on all systems in the sysplex:

```
ROUTE *ALL,VARY SMS,CICSVR,ACTIVE
```

Activate the CICS VR server

If the CICS VR server fails, it restarts automatically, up to a maximum of six times. If this limit is exceeded, the automatic restart mechanism is disabled and CICS VR terminates. You can restart the CICS VR server.

When you have resolved the problem, you can restart the CICS VR server by using the VARY SMS,CICSVR,ACTIVE command. When the CICS VR server is restarted, the following message is displayed on the operator console:

```
DWW014I  CICSVR SERVER ADDRESS SPACE IS NOW ACTIVE.
```

Figure 28. VARY SMS,CICSVR,ACTIVE results

VARY SMS,CICSVR,ACTIVE is also needed to restart the CICS VR server after the VARY SMS,CICSVR,TERMINATESERVER command is issued. Also, the CICSVR_INIT parameter in the

SYS1.PARMLIB IGDSMSxx member must be set to YES for successful completion of the VARY SMS,CICSVR,ACTIVE command.

Note: If a failure occurs during the initialization of the CICS VR server address space, automatic restart is not performed.

Stop the CICS VR server

If you need to stop the CICS VR server address space, use the VARY SMS,CICSVR,TERMINATESERVER command.

When the CICS VR server is stopped, the following messages are displayed on the operator console:

```
DWW172I  REQUEST TO TERMINATE THE CICSVR ADDRESS SPACE IS ACCEPTED:
 CICSVR SERVER TERMINATION SCHEDULED.
DWW008I  CICSVR SERVER SUCCESSFULLY TERMINATED AT END OF MEMORY
```

Figure 29. VARY SMS,CICSVR,TERMINATESERVER results

Assigning CICS VR access authority

By default, all processes started by the CICS VR server address space run under an undefined RACF user ID.

If RACF or a similar security product is implemented, you must define the CICS VR started task to RACF and assign it a user ID. This user ID must have appropriate authorization that allows the CICS VR server address space to update and delete information from the appropriate RCDS, log streams, and log stream copies. For example, you can run the following command:

```
RDEFINE STARTED CICSVR.* STDATA(USER(SYSTASK))
SETR RACLIST(STARTED) REFRESH
```

If you plan to use CICS VR automatic batch backout, and if RACF or a similar security product is in place, ensure that you define the DWWBAFJS started task to RACF and assign it to a user ID. This user ID must have appropriate authorization to browse the output of the batch backout job. For example, you can run the following command:

```
RDEFINE STARTED DWWBAFJS.* STDATA(USER(user ID))
SETR RACLIST(STARTED) REFRESH
```

For details about CICS VR automatic batch backout, see *the CICS VR User's Guide*.

A value DWWRMDFS for the server set up control default is registered in the RCDS as the name of the setup job that must be run during the initialization of the CICS VR server address space. If RACF or a similar security product is in place, you must define the setup job as a started task to RACF and assign a user ID with the appropriate authorization to browse the output of the setup job. For example, you can run the following command

```
RDEFINE STARTED DWWRMDFS.* STDATA(USER(user ID))
SETR RACLIST(STARTED) REFRESH
```

CICS VR uses a customized version of the log of logs scan JCL skeleton to run the log of logs scan at regularly scheduled times and to run the scan manually at convenient times. The skeleton is located in member DWWARSCA of the CICS VR library SDWWCNTL. Modify the log of logs scan JCL skeleton to conform to the environment standards by commenting out JOB statement, symbolic parameters and keep “LOGOFLOGS SCAN” command in DWWIN. Copy the updated DWWARSCA member into PROCLIB library. If RACF or a similar security product is in place, define the DWWARSCA started task to RACF and assign it to a user ID with the appropriate authorization to browse the output of the log of logs scan job. For more information about log of logs scanning see, “Automatic and manual log of logs scanning” on page 100.

If you plan to use automated recovery, and if RACF or a similar security product is in place, ensure that you define the DWWCBINF, DWWCBRRG and DWWCBRRY started tasks to RACF and assign them to a user ID. This user ID must have appropriate authorization to browse the output of automated recovery job. For example commands, see “Automated recovery and security” on page 81.

If you plan to use the inventory scavenger, and if RACF or a similar security product is in place, ensure that you define the DWWARSCI started task to RACF and assign it to a user ID. This user ID must have appropriate authorization to browse the output of inventory scavenger job. For details about the inventory scavenger, see “Inventory scavenger” on page 124.

For RACF details, see *z/OS Security Server RACF System Programmer's Guide*.

Authorizing user IDS to issue DFSMShsm commands

If you want to use DFSMShsm as your backup utility and the CICS VR server address space is enabled, you must request that your user ID be authorized to issue DFSMShsm-authorized commands.

If RACF is in place, ask your system programmer to grant your user ID access to discrete RACF FACILITY class profiles that protect the following DFSMShsm macros and commands:

- ARCXTRCT
- ARCHDEL
- ARCHRCAL
- ARCHRCOV
- ABACKUP
- BACKDS
- FIXCDS
- RECOVER

For information about creating discrete RACF profiles, see the *z/OS DFSMShsm Implementation and Customization Guide*.

If RACF is not active, ask your system programmer to add the following AUTH command to the ARCCMDxx member:

```
AUTH userid DATABASEAUTHORITY(USER)
```

where *userid* is the user ID of the person running CICS VR. USER authority is needed for CICS VR change accumulation processing for data sets that have been backed up by DFSMShsm.

Note: The AUTH command only needs to be issued if the CICS VR server address space is enabled.

For more information on the DFSMShsm AUTH command, see *z/OS DFSMShsm User Commands Reference Summary*.

Understanding the CICS VR scavengers

Descriptions of the three scavengers that the CICS VR server address space runs: the history, server and inventory scavengers.

Throughout various CICS VR processing, resources can be allocated to CICS VR. However, over time, some resources might no longer be required by CICS VR. Therefore, to free up storage, the CICS VR server address space periodically runs various scavengers to clean up and remove resources related to various CICS VR entities that are no longer necessary.

HISTORY SCAVENGER

Function: Cleans up resources related to past CICS VR events. The history scavenger flushes all messages written by the CICS VR server address space to the data set allocated to the DWWMSG ddname. Therefore, after the history scavenger is run, you can view the data set allocated to the DWWMSG ddname to see all messages recently written by CICS VR. The default is for the history

scavenger to run once an hour and you can set the history scavenger to run at the time of your choice. See *The CICS VR User's guide* for more information.

SERVER SCAVENGER
Function: Cleans up resources related to the CICS VR server address space. The server scavenger releases all unused resources in both the CICS VR server address space and the client address space to prevent out-of-storage conditions. The server scavenger runs every 60 seconds.

INVENTORY SCAVENGER
Function: Cleans up outdated resources that are registered in the CICS VR recovery control data sets (RCDSs). The inventory scavenger deregisters information from the RCDS, and optionally delete items, that are older than specified CICS VR automatic deregistration criteria to prevent your RCDSs from becoming full. The default is for the inventory scavenger to run once a day, however, you can set the inventory scavenger to run at the time of your choice, and more often than once a day if required. See *The CICS VR User's guide* for more information. Also, see "Understanding CICS VR automatic deregistration" on page 117 for more information about setting automatic deregistration criteria.

Dynamically running CICS VR scavengers

In most environments, the frequency used by CICS VR to automatically run the various CICS VR scavengers effectively clean up unused resources and help prevent out-of-storage conditions. However, a few scenarios might occur where it would be advantageous to dynamically run one or more CICS VR scavengers.

Some of the possible scenarios that might require dynamic execution of a CICS VR scavenger include:

SCENARIO 1: out-of-storage condition
If your batch jobs that start CICS VR VSAM batch logging experience out-of-storage conditions, you might want to dynamically run the server scavenger to release all unused resources in both the CICS VR server address space and the client address space.

SCENARIO 2: CICS VR error
If the CICS VR server address space encounters an error, you might want to dynamically run the history scavenger to flush all messages to the data set allocated to the DWWMSG ddname. You can then view the latest messages written to the data set allocated to the DWWMSG ddname to help resolve the error.

SCENARIO 3: Updated automatic deregistration criteria
If you change the value a CICS VR automatic deregistration setting, you might want to dynamically run the inventory scavenger to deregister, and optionally delete, items that are older than newly specified CICS VR automatic deregistration criteria.

To dynamically run a CICS VR scavenger, you must issue the appropriate SETSMS CICSVR_GENERAL_CONTROL(string) operator command to dynamically start the appropriate CICS VR scavenger. See "Defining a CICS VR general control parameter" on page 33, for more information.

You can set both the time interval parameter and the start time parameter to control the scavenger using the panel interface.

Chapter 5. Setting up CICS VR VSAM batch logging

CICS VR VSAM batch logging, referred to as batch logging, provides logging of updates made to VSAM data sets by batch jobs. Two types of batch logging are available, forward recovery logging and undo logging.

Forward recovery logging writes an after-image log record to a forward recovery log stream for every update made to the VSAM data set by a batch job. Therefore, if the data set becomes corrupted, CICS VR forward recovery can be used to recreate the updates made by the batch job.

Undo logging writes a before-image log record to an undo log stream for every update made to the VSAM data set by a batch job. Therefore, if the batch job encounters an abend, CICS VR batch backout can be used to remove the updates made by the failed batch job or batch job step.

Forward recovery logging, undo logging, or both can be enabled for a VSAM data set. This section explains the tasks required to enable batch logging for your VSAM data sets.

CICS VR VSAM batch logging requires the following:

- z/OS 1.12 or later, with all necessary PTFs applied. Refer to “Operating environment” on page xx for details.
- Activation of the CICS VR server address space. For more information, see Chapter 4, “Activating the CICS VR server address space,” on page 29.
- All VSAM data sets that request batch logging must be SMS-managed.
- The LOGR Couple Data Set (LOGR policy) must be defined. The LOGR policy includes the following definitions:
  - Log stream definitions
  - Coupling facility list structure definitions, if applicable
  - Data containing the current state of a log stream, for example; whether a log stream is currently connected to the coupling facility structure.

  For more information on the formatting a LOGR couple data set and defining the LOGR policy, see *z/OS MVS Setting Up a Sysplex*, section "Preparing to Use System Logger Applications".

CICS VR VSAM batch logging calls the MVS system logger to write the log records to the MVS log stream. The MVS system logger is a component of z/OS, which provides a programming interface to access records on a log stream. For more information about the MVS system logger, see the following publications:

- *z/OS MVS Programming: Assembler Services Guide*
- *z/OS MVS Programming: Assembler Services Reference ABE-HSP*
- *z/OS MVS Setting Up a Sysplex*

The following topics are described in this section:

- Using CICS VR VSAM batch logging
- Enabling CICS VR VSAM batch logging
- Setting up the logging environment for CICS VR VSAM batch logging
- Detecting batch logging error conditions

Activating CICS VR batch logging overview

The steps required to activate three types of batch logging for VSAM data sets, forward recovery logging, undo logging, and forward recovery and undo logging.

The steps assume that you are enabling the associated types of batch logging for the first time on the system. Therefore, some steps, such as specifying parameters in the active IGDSMSxx parmlib member,

do not have to be repeated when enabling similar logging for other VSAM data sets on the same system. Refer to the remainder of this section for details of the listed steps:

Enabling forward recovery logging for a VSAM data set

- Specify FRLOG(REDO).
- Enter the name of the forward recovery log stream in the LOGSTREAMID (name of log stream) parameter.
- Create the specified forward recovery log stream, if it doesn't already exist.
- Authorize CICS VR access to the specified forward recovery log stream.

Enabling undo logging for a VSAM data set

- Specify FRLOG(UNDO).
- Specify the CICSVR_UNDOLOG_PREFIX(prefix) parameter in the active IGDSMS*xx* member.
- Create the undo log stream, using the specified CICS VR undo log prefix (if it doesn't already exist).
- Authorize CICS VR access to the specified undo log stream.
- Specify the CICSVR_UNDOLOG_CONTROL(string) parameter in the active IGDSMS*xx* member.
- Specify the CICSVR_BACKOUT_CONTROL(string) parameter in the active IGDSMS*xx* member.

Enabling forward recovery logging and undo logging for a VSAM data set

- Specify FRLOG(ALL).
- Enter the name of the forward recovery log stream in the LOGSTREAMID(name of log stream) parameter.
- Create the specified forward recovery log stream (if it doesn't already exist).
- Specify the CICSVR_UNDOLOG_PREFIX(prefix) parameter in the active IGDSMSxx member.
- Create the undo log stream, using the specified CICS VR undo log prefix (if it doesn't already exist).
- Authorize CICS VR access to the specified forward recovery log stream and undo log stream.
- Specify the CICSVR_UNDOLOG_CONTROL(string) parameter in the active IGDSMSxx member.
- Specify the CICSVR_BACKOUT_CONTROL(string) parameter in the active IGDSMSxx member.

Using CICS VR VSAM batch logging

You can use batch logging to log changes to VSAM data sets that are not accessed in record level sharing mode (RLS mode) when the VSAM data set is not being used by CICS.

CICS VR VSAM batch logging can only be used with non-RLS access, that is, if MACRF is set to NSR (non-shared resources), LSR (local shared resources) or GSR (global shared resources), and if MACRF is not set to RLS.

Note: RLS is a mode of access to a VSAM sphere that is interpreted at OPEN time; RLS is not an attribute of a sphere. RLS is selected by specifying the RLS JCL parameter or by specifying MACRF=RLS in the ACB.

Use CICS VR VSAM batch logging after you have brought down CICS or have issued a command to deallocate the files your batch jobs need to update. For example, you can use the following CICS command to disable (deallocate) PAYROLL so your batch jobs can update that file and CICS VR VSAM batch logging can log the changes:

```
CEMT SET FILE(PAYROLL) CLOSED DISABLED
```

The “Enabling CICS VR VSAM batch logging” on page 65 section describes the different ways you can enable CICS VR VSAM batch logging.

Enabling CICS VR VSAM batch logging

To enable CICS VR VSAM batch logging for a VSAM sphere, you must update the FRLOG parameter in the ICF catalog definition of the base cluster to an appropriate value.

The FRLOG parameter can contain one of the following values:

FRLOG(*value*)

NULL
Indicates the data set is not eligible for VSAM batch logging. Changes made to the data set by batch applications are not logged by batch logging.

If the FRLOG parameter is omitted when the data set is defined, a value of NULL is assumed.

NONE
Indicates the data set is eligible for VSAM batch logging, but batch logging is currently disabled for the VSAM data set. Changes made to the data set by batch applications are not logged by batch logging. However, if LOGREPLICATE and FRLOG(NONE) are specified, batch replication logging is performed for the VSAM sphere.

If FRLOG(NONE) is specified, the data set must conform to the listed VSAM batch logging restrictions.

REDO
Indicates that CICS VR forward recovery logging is enabled for the VSAM data set. An after-image log record for every update made to the data set by batch jobs is logged by batch logging.

If FRLOG(REDO) is specified, the name of the forward recovery log stream to which CICS VR writes the after-image log records must be specified in the LOGSTREAMID parameter of the catalog entry for the VSAM base cluster.

UNDO
Indicates that CICS VR undo logging is enabled for the VSAM data set. A before-image log record for every update made to the data set by batch jobs is logged by batch logging.

If FRLOG(UNDO) is specified, the undo log stream must be created and then defined to CICS VR. See “CICS VR undo logging” on page 73 for more information.

ALL
Indicates that CICS VR forward recovery logging and undo logging are enabled for the VSAM data set. An after-image log record and a before-image log record for every update made to the VSAM data set by batch jobs are logged by batch logging.

If FRLOG(ALL) is specified, the name of the forward recovery log stream to which CICS VR writes the after-image log records must be specified in the LOGSTREAMID parameter of the catalog entry for the VSAM base cluster. Also, the undo log stream must be created and then defined to CICS VR. See “CICS VR undo logging” on page 73 for more information.

Restrictions:

- A VSAM data set that is eligible for batch logging (FRLOG NONE, REDO, UNDO, or ALL) must meet the following conditions:
  - The data set must be SMS-managed.
  - The data set cannot be LINEAR, KEYRANGE, or a temporary data set.
- Batch logging cannot be performed when the VSAM data set is empty.
- CICS VR VSAM batch logging provides logging for non-RLS data sets. The VSAM data sets must be opened with the ACB setting MACRF=NSR or LSR or GSR. The RLS JCL parameter must not be set.

There are five different ways that you can enable CICS VR VSAM batch logging:

- Using the ISMF Data Class Define panel
- Using the NaviQuest batch job to define a data class

- Using IDCAMS DEFINE CLUSTER
- Using IDCAMS ALTER
- Using the AMP JCL DD parameter

Using ISMF data class define panel

You can use the Interactive Storage Management Facility (ISMF) dialog interface to enable VSAM batch logging for a data class.

On the "DATA CLASS DEFINE" panel, specify one of the following values for the **FRlog** parameter:

A
ALL

N
NONE

R
REDO

U
UNDO

blank
NULL

This figure shows the Data Class Define Panel.

```
Panel  Utilities  Scroll  Help
------------------------------------------------------------------------------
                              DATA CLASS DEFINE                Page 4 of 4

SCDS Name . . . : TEST.CDS
Data Class Name : TEST

To DEFINE Data Class, Specify:

  Shareoptions Xregion  . . . _    (1 to 4 or blank)
               Xsystem  . . . _    (3, 4 or blank)
  Reuse . . . . . . . . . . . N    (Y or N)
  Initial Load  . . . . . . . R    (S=Speed, R=Recovery or blank)
  BWO . . . . . . . . . . . . __   (TC=TYPECICS, TI=TYPEIMS, NO or blank)
  Log . . . . . . . . . . . . _    (N=NONE, U=UNDO, A=ALL or blank)
  Logstream Id  . . . . . . . ____________________________
  FRlog . . . . . . . . . . . _    (A=ALL, N=NONE, R=REDO, U=UNDO or blank)
  RLS CF Cache Value  . . . . A    (A=ALL, N=NONE, U=UPDATESONLY)



Use ENTER to perform Verification; Use UP Command to View previous Panel;
Use HELP Command for Help; Use END Command to Save and Exit; CANCEL to Exit.
Command ===> ____________________________________________________________
```

Figure 30. Data Class Define Panel

Note:

1. If R or A is specified for FRLOG, a LOGSTID must also be specified.
2. Any new VSAM data set created using a specified data class inherits the FRLOG value defined for the data class.
3. All VSAM data sets processed with batch logging must be SMS-managed data sets. FRLOG cannot be used with LINEAR, KEYRANGE, or temporary data sets.

Using NaviQuest batch job to define a data class

You can use NaviQuest to define a data class that enables batch logging.

This is the NaviQuest sample batch job, ACBJBAD1. You can set the FRLOG parameter to one of the following values:

A
ALL

N
NONE

R
REDO

U
UNDO

blank
NULL

```
//*****************************************************
//STEP1   EXEC ACBJBAOB,TABL2=userid.TEST.ISPTABL
//SYSUDUMP DD  SYSOUT=*
//SYSTSIN  DD *
PROFILE PREFIX(IBMUSER)
ISPSTART CMD(ACBQBAD1 +
DEFINE/ALTER +
SCDS(TEST.CDS) +
DCNAME() +
DESCR() +
RECORG() +
 .
 .
 .
REUSE() +
INILOAD() +
SPANONSP() +
BWO() +
LOG() +
LOGSTID(CICSMVS.CICSVR.LGSTRM) +
FRLOG(R) +
SPCCONRL() +
REDSPCUT() +
) +
BATSCRW(132) BATSCRD(27) BREDIMAX(3) BDISPMAX(999999)
/*
```

Figure 31. NaviQuest sample batch job

Note:

1. If R or A is specified for FRlog, a Logstream Id must also be specified.
2. Any new VSAM data set created using a specified data class inherits the FRLOG value defined for the data class.
3. All VSAM data sets processed with batch logging must be SMS-managed data sets. FRLOG cannot be used with LINEAR, KEYRANGE, or temporary data sets.

Using IDCAMS DEFINE CLUSTER

You can use the IDCAMS DEFINE utility to create a VSAM data set and enable batch logging.

You can set the FRLOG value to one of the following values:

```
FRLOG(ALL | NONE | REDO | UNDO)
```

Note:

1. See “Enabling CICS VR VSAM batch logging” on page 65 for a description of the parameters.
2. If ALL or REDO is specified for FRLOG, a LOGSTREAMID must also be specified.
3. If you omit the FRLOG parameter when defining a VSAM cluster, a value of NULL is assumed.

Using IDCAMS ALTER

You can use the IDCAMS ALTER utility to enable batch logging for a VSAM data set that has already been created.

You can set the FRLOG value to one of the following values:

```
FRLOG(ALL | NONE | REDO | UNDO)
```

Restrictions:

This figure shows how to enable CICS VR VSAM forward recovery logging.

```
//ALTER1   JOB    ...
//STEP1    EXEC PGM=IDCAMS
//SYSPRINT DD   SYSOUT=A
//SYSIN    DD   *
     ALTER USER1.BASE1A FRLOG(REDO)  -
     LOGSTREAMID(CICSMVS.BASE1A)
/*
```

Figure 32. Enabling CICS VR VSAM forward recovery logging using IDCAMS ALTER and FRLOG

Note: If ALL or REDO is specified for FRLOG, a LOGSTREAMID must also be specified.

Using the AMP JCL DD parameter to enable VSAM Batch Logging

If do not want to update the catalog entry of a VSAM sphere to enable batch logging, you can specify FRLOG in the AMP parameter on the JCL DD statement of the VSAM data set in the batch job.

You can also override the FRLOG catalog setting of a VSAM data set by specifying FRLOG in the AMP parameter. You can set FRLOG in the AMP parameter to one of the following values:

```
AMP=('FRLOG=ALL | NONE | REDO | UNDO')
```

Note: If ALL or REDO is specified for FRLOG, a LOGSTREAMID must also be specified.

An example of enabling CICS VR forward recovery logging using the AMP parameter on the JCL DD statement of the VSAM data set:

```
//DS1      DD   DSNAME=USER1.BASE1A,AMP=('FRLOG=REDO'),DISP=SHR
```

Figure 33. Enabling CICS VR forward recovery logging using the AMP parameter

How to disable CICS VR VSAM batch logging using the AMP parameter on the JCL DD statement of the VSAM data set:

```
//DS1      DD   DSNAME=USER1.BASE1A,AMP=('FRLOG=NONE'),DISP=SHR
```

Figure 34. Disabling CICS VR VSAM batch logging using the AMP parameter

Determining if VSAM batch logging is enabled

You can determine if CICS VR VSAM batch logging is enabled for a VSAM sphere by examining the contents of the FRLOG parameter in the catalog entry of the VSAM base cluster. You can run the LISTCAT

ALL program against a VSAM base cluster to view the contents of the FRLOG parameter, along with many other parameters.

To view the **FRLOG** value defined for a data class, you can display the attributes of the data class using the ISMF "DATA CLASS LIST" panel:

```
  Panel  List  Utilities  Scroll  Help
------------------------------------------------------------------------------
DGTLGP21                        DATA CLASS LIST
Command ===>                                                   Scroll ===
                                                          Entries 1-9 of 9
                                                          Data Columns 37-40
CDS Name : Y421252.MYSCDS

Enter Line Operators below:

     LINE       DATACLAS SPC CONS   REDUCE   REC ACC
     OPERATOR   NAME     RELIEF     SPC UPT  BIAS     FRLOG
    ---(1)----  --(2)--- --(37)---  -(38)--  -(39)--  -(40)-
                DCC1     NO         --       ------   NONE
                DCY      NO         --       USER     REDO
                DC1      NO         --       ------   ----
                DC3      NO         --       ------   ----
                DC66     NO         --       ------   ----
                DC777    NO         --       USER     ----
                DDC1     NO         --       ------   ----
                DDC2     NO         --       ------   ----
                TDC1     NO         --       ------   REDO
    ----------  -------- ------  BOTTOM  OF  DATA  ------  --------  ---
```

Figure 35. Data Class List Panel

The value in the FRLOG column indicates if CICS VR VSAM batch logging is enabled for the listed data classes. A blank value indicates an FRLOG setting of NULL.

Setting up the environment for CICS VR VSAM batch logging

After enabling your VSAM spheres for CICS VR VSAM batch logging, some additional steps need to be performed to set up the CICS VR VSAM batch logging environment.

However, the additional setup steps differ between forward recovery logging and undo logging. This section outlines the general logging guidelines that apply to both forward recovery logging and undo logging. The additional setup steps are then listed for both forward recovery logging and undo logging.

General logging guidelines

Both CICS VR forward recovery logging and undo logging write to MVS system logger log streams.

Both DASD-only log streams and coupling facility log streams, or a combination of both are supported, as described:

DASD-only logging
: Use DASD-only log streams when you do not have access to or do not want to use a coupling facility for logging. DASD-only log streams can only be single-system in scope; only one system can connect to a DASD-only log stream.

Coupling facility logging
: Use coupling facility logging if you have applications that run on multiple systems in the sysplex and require a single sysplex-wide log stream. A coupling facility is required to merge the data from multiple systems into a single log stream.

Combination of coupling facility logging and DASD-only logging
: You can use a combination of coupling facility logging and DASD-only logging if you use a coupling facility. You can have applications that run on multiple systems in the sysplex that require the log records to be merged into a single log stream. You can also have applications that require separate DASD-only log streams for each system. The coupling facility manages both the coupling facility logging and the DASD-only logging in the sysplex.

To help you decide which type of log stream is correct for you, see *z/OS MVS Setting Up a Sysplex*. This book also contains detailed information on how to set up the coupling facility resource management policy (CFRM policy) and the LOGR couple data set (LOGR policy).

Any logstream that CICS VR VSAM batch logging writes to is automatically registered in the CICS VR RCDS. Therefore, information about the log streams can be viewed through the CICS VR log stream list of the CICS VR ISPF panel interface.

In addition, a retention period can be specified for all registered log streams. If specified, CICS VR deletes log blocks from all registered log streams that are older than the specified retention period. See "Understanding CICS VR automatic deregistration" on page 117 for more information.

Creating the MVS log streams

During CICS VR VSAM batch logging, CICS VR only attempts to connect and write to the appropriate log streams. CICS VR does not attempt to create the log streams if they do not already exist. MVS log streams can be created by invoking the IXCMIAPU utility.

This defines the log stream to the MVS system logger, therefore allowing CICS VR to connect to it. An example of using IXCMIAPU to define an undo log stream named DWW.UNDOLOG. See the *MVS Setting up a Sysplex* manual for more information about defining log streams:

```
//*-------------------------------------------------------------------*/
//* Allocate UNDO LOG STREAM DWW.UNDOLOG                              */
//*-------------------------------------------------------------------*/
//DEFLGSTR EXEC PGM=IXCMIAPU
//SYSPRINT DD   SYSOUT=*,DCB=RECFM=FBA
//SYSIN    DD   *
   DATA TYPE(LOGR) REPORT(NO)
     DEFINE LOGSTREAM NAME(DWW.UNDOLOG)
            STRUCTNAME(LOG_GENERAL_001) LS_SIZE(1180)
            HIGHOFFLOAD(80) LOWOFFLOAD(40)
            AUTODELETE(NO) RETPD(0)
            DESCRIPTION(CICSVR_UNOD_LOG)
/*
```

Figure 36. Example using the IXCMIAPU utility to create a log stream

VSAM batch logging units of work

CICS VR ensures that a batch, non-transactional, job step is consistent, that is, it ensures that recoverable VSAM data sets are in a consistent state when a job step starts and when it successfully ends.

The recoverable sequence of VSAM operations that are performed by a batch job step between job-step start and the end is considered as a VSAM batch logging unit of work. VSAM batch logger uses MVS **end of task** and **end of address space** resource managers to provide commitment or invalidation of logged data and to print the resulting VSAM batch logger messages.

Note: If you need to re-IPL the z/OS system, batch jobs that are using VSAM batch logging should be allowed to complete, or they should be abnormally terminated, before you re-IPL.

Detecting batch logging error conditions

If CICS VR detects a problem with the MVS system logger, CICS VR attempts to trap the error and issue a 3999 condition code. The 3999 condition code indicates that no batch logging occurred for that sphere.

If this message is issued when forward recovery logging is enabled, you might want to consider taking a backup of your spheres because you can not forward recover updates made after logging fails.

Chapter 18, "Diagnosing logging problems," on page 337 discusses the different types of problems that might occur. It also show examples of conditional JCL that you can add to your batch jobs to detect the 3999 condition code from CICS VR VSAM batch logging and trigger a DFSMShsm backup or DFSMSdss dump.

Understanding CICS VR forward recovery logging

CICS VR forward recovery logging writes an after-image log record to a forward recovery log stream for every update made to a VSAM data set by a batch job. Therefore, if a VSAM data set become corrupt, you can use CICS VR forward recovery processing to recreate the batch updates.

When a batch job starts, CICS VR obtains the name of the forward recovery log stream specified in the LOGSTREAMID field in the catalog entry of the VSAM sphere. CICS VR then stores information about this log stream in the RCDS and proceeds to write after-image log records to the log stream.

CICS VR can create forward recovery log data in a single system environment or a multiple system sysplex environment connected through the coupling facility.

When the forward recovery log data is written through the coupling facility, the MVS system logger automatically merges online output with the log stream by log stream name. It does not matter which system in the sysplex the log stream came from.

The RCDS must be allocated to a recover job for batch REDO after images unless the recover being run also specifies the REMOTE keyword.

Planning log streams for forward recovery logging

When a batch job is started, CICS VR obtains the name of the forward recovery log stream defined for each VSAM data set that is updated by the batch job and is defined with FRLOG REDO or ALL. However, CICS VR can write log records reflecting updates made to one or more VSAM data sets to the same forward recovery log stream.

When deciding how many forward recovery log streams to create and how to define them to your VSAM data sets, you must consider such factors as transaction performance, work load, and recovery performance.

The MVS logger merges all the forward recovery log records from the various CICS VR instances onto the shared forward recovery log. Some points to consider are:

- All data sets used by one batch job must use the same log stream, to reduce the number of log streams written to at sync point.
- Share a forward recovery log stream between data sets that:
  - Have similar security requirements
  - Have similar backup frequency
  - Are likely to need restoring in their entirety at the same time
- Log stream names must relate to the data sets. For example, PAYROLL data sets could be mapped to a forward recovery log named PAYROLL.FWDRECOV.PAYLOG.
- Do not mix high update frequency data sets with low update frequency data sets because this causes a disproportionate amount of unwanted log data to be read during recovery of low frequency data sets.
- Do not put all high update frequency data sets on a single log stream because you could exceed the throughput capacity of the log stream.
- If you define too many data sets to a single log stream, you could experience frequent structure-full events when the log stream can not keep up with data flow.
- Delete redundant data from log streams periodically so that the log streams do not become excessively large. Typically, for a forward recovery log, deletion of old data is related to the data backup frequency. For example, you might keep the four most recent generations of backup so that when you delete a redundant backup generation, you can also delete the corresponding redundant forward recovery log records. These are the records older than the redundant backup and they are no longer needed for forward recovery.

Logging the real DD name

CICS VR provides support to implement the real DD name logging to the logstream. This function can be turned on by setting the REALDDN parameter to YES.

The REALDDN parameter can be set by issuing the following command at the system console:

```
SETSMS CICSVR_GENERAL_CONTROL(REALDDN YES )
```

or

```
SETSMS CICSVR_GENERAL_CONTROL(REALDDN NO )
```

It is possible for the REALDDN parameter to be set when the system is IPLed. Do this by adding a line to the IGDSMSxx member of PARMLIB. The line to add is:

```
CICSVR_GENERAL_CONTROL(REALDDN YES )
```

or

```
CICSVR_GENERAL_CONTROL(REALDDN NO )
```

You can also set the REALDDN parameter using the CICS VR panel interface, see *CICS VSAM Recovery User's Guide*.

The default value for the REALDDN parameter is NO.

If REALDDN YES is specified, the CICS VR Batch Logger produces actual DD names for the logstream records.

If REALDDN NO is set, the CICS VR Batch Logger generates unique DD names.

There are two restrictions concerning real DD names writing:

1. If the same DD name is used in two or more updating jobs running simultaneously, and these DD names point to VSAM spheres which are logged to the same logstream, the CICS VR Batch Logger allows logging of the job starts first. For the other jobs, the CICS VR Batch Logger produces the following message:

   ```
   DWW252I ATTEMPT TO CONNECT TO CICSVR ADDRESS SPACE FAILED.
   ```

2. If more than one DD name is specified in the job step for the sphere, the CICS VR Batch Logger uses the DD name of the initial "OPEN for OUTPUT" request for this sphere.

CICS and CICS VR forward recovery logging considerations

Points to be considered when enabling forward recovery logging for a VSAM data set that is also defined to CICS.

- If the LOG(ALL) parameter is specified in the catalog entry of a VSAM sphere, CICS forward recovery logging writes to the forward recovery log stream specified in the LOGSTREAMID parameter. Implementing CICS VR forward recovery logging for this same VSAM data set causes CICS and CICS VR forward recovery logging to write to the same forward recovery log stream, which in most cases is acceptable.
- If the LOG(ALL) parameter is not specified in the catalog entry of a VSAM sphere, CICS forward recovery logging writes to the forward recovery log stream specified in the CICS resource definition. Implementing CICS VR forward recovery logging for this same VSAM data set might cause CICS and CICS VR forward recovery logging to write to different forward recovery log streams, if the log stream specified in the LOGSTREAMID parameter is different from the log stream specified in the CICS resource definition. For recovery purposes, you might want to consider specifying the LOG(ALL) parameter for the VSAM data set to have CICS and CICS VR forward recovery logging write to the same forward recovery log stream.

Note: If any non-null value (ALL/UNDO/NONE) for the LOG parameter is specified in the catalog entry of a VSAM sphere, the z/OS DFSMS SMSVSAM server must be active at CICS VR forward recovery.

CICS VR undo logging

CICS VR undo logging writes a before-image log record to a log stream for every update made to a VSAM data set by a batch job. If the batch job encounters an abend, CICS VR batch backout processing can use these records to remove the updates made by the failed batch job or batch job step.

Like CICS VR forward recovery logging, CICS VR undo logging can use different log streams, which are known as undo logs. However, an undo log cannot be assigned to a specific VSAM sphere. You can use the Undo logs assignment feature of CICS VR to associate an undo log with:

- A user ID
- A job name prefix
- The high-level qualifier of a VSAM sphere name

When you submit a VSAM sphere update job which involves undo logging, CICS VR searches for any matching associations that you have set up between these elements of the job and a particular undo log. When CICS VR finds an association that applies for a submitted job, it writes undo records to the undo log named for the association. The *CICS VR User's Guide* explains how to create undo log associations using the CICS VR ISPF dialog interface as part of the information on customizing CICS VR undo logs.

The undo logs must be used only by CICS VR undo logging. No other applications, such as forward recovery logging, writes to these log streams.

Only one undo log can be used for each VSAM sphere update job. For example, if a job updates more than one VSAM sphere, you cannot associate some of the VSAM spheres with a different undo log; they must all be associated with the same undo log. Because there are different types of undo log association, some jobs which you submit might have more than one matching association. When you submit a job, CICS VR checks that there are no conflicting associations which name different undo logs. If a conflict is found, CICS VR undo logging produces an error.

If CICS VR does not find any associations which apply for a submitted job, it uses the default undo log which is defined for the system. You need to define the default undo log, by setting the default undo log name prefix, before you submit any job involving undo logging. You also need to specify an undo logging control string and a backout control string.

Setting the CICS VR default undo log name prefix

Before you submit any job involving CICS VR undo logging, you need to specify the CICSVR_UNDOLOG_PREFIX (prefix) parameter in the active IGDSMSxx member of SYS1.PARMLIB. The default undo log is used if a submitted batch job does not match with any undo log associations that you have defined.

If CICS VR undo logging is enabled and needs to use the default undo log, it attempts to connect to a log stream with the following name:

***prefix*.UNDOLOG**
where:

prefix
The CICS VR default undo log name prefix. The prefix can be up to 8 characters long and must follow the syntax rules for data set names. The prefix must contain exactly one qualifier. DWW is the default value.

Examples

CICSVR_UNDOLOG_PREFIX(DWW)
When the default undo log is required, CICS VR writes before-image log records to the log stream named DWW.UNDOLOG .

CICSVR_UNDOLOG_PREFIX(DWWPROD)
When the default undo log is required, CICS VR writes before-image log records to the log stream named DWWPROD.UNDOLOG .

You can only define one default undo log for the system. If you want to use further undo logs, create undo log associations, as described in the *CICS VR User's Guide*. The extra undo logs that you name in undo log associations do not need to be defined in SYS1.PARMLIB.

The default undo log must only be used by CICS VR undo logging. No other applications, such as forward recovery logging, writes to this log stream.

Multi-system considerations for the default undo log

If your environment has multiple instances of CICS VR implemented in a sysplex, and the CICS VR instances perform undo logging, consider these suggestions when defining the prefix for the default undo log.

- If the default undo log is to be shared by all CICS VR instances on all systems in the sysplex, make sure that you specify the same undo log prefix on all systems.
- If the default undo log is to be shared by all CICS VR instances in a specific CICS VR XCF group, make sure that you specify the same undo log prefix on all systems that are included in the XCF group. Other systems which have an instance of CICS VR belonging to a different XCF group must have a different value defined for the undo log prefix.

Additional CICS VR undo logging environment setup

In addition to defining the CICS VR undo logging prefix, the CICS VR undo logging control parameter and CICS VR backout control parameter must also be specified in the active IGDSMSxx member of SYS1.PARMLIB before you use CICS VR undo logging.

A none character string can be specified as a parameter value that is simply ignored in the active IGDSMSxx member of SYS1.PARMLIB (it is affected during system initialization) or in the SETSMS operator command (it is affected at run time).

These parameters are:

- `CICSVR_UNDOLOG_CONTROL(`*string*`)`
- `CICSVR_BACKOUT_CONTROL(`*string*`)`
- `CICSVR_UNDOLOG_CONTROL(NONE)`
- `CICSVR_BACKOUT_CONTROL(NONE)`

Setting the CICS VR undo logging control string

The `CICSVR_UNDOLOG_CONTROL` parameter in the active IGDSMSxx member of SYS1.PARMLIB is used to enable or disable CICS VR undo logging on the system, specify the action that CICS VR must take if an undo logging failure occurs, and specify if CICS VR must perform synchronous undo logging.

The following values can be specified for the CICSVR_UNDOLOG_CONTROL parameter in the active IGDSMSxx member:

ENABLE CONT
Enable CICS VR undo logging and allow a client application, batch job, to continue execution when an error occurs with the undo log stream. VSAM sphere updates are not synchronized with CICS VR undo logging. ENABLE CONT is the default value for the CICS VR undo logging control string.

ENABLE TERM
Enable CICS VR undo logging and cancel a client application, batch job, in the case that an error is encountered with the undo log stream. VSAM sphere updates are not synchronized with CICS VR undo logging.

ENABLE SYNC
Enable CICS VR undo logging and cancel a client application, batch job, in the case that an error is encountered with the undo log stream. VSAM sphere updates are synchronized with CICS VR undo logging.

DISABLE
Disable CICS VR undo logging on the system.

Note: If an undo logging error occurs, but the log stream is still accessible, for example; the log structure becomes full, you might want to immediately cancel the batch job, and remove all updates made by the step that was in progress when the logging error occurred. However, you can perform a successful batch backout only when ENABLE SYNC has been specified. SYNC verifies that every log record is successfully written to the undo log stream before control returns to VSAM.

If SYNC was not specified, and a undo logging error occurs, then it might be possible that one or more updates have been made to VSAM data sets that are not reflected in the undo log stream. In this scenario, you would need to restore the affected VSAM spheres from a backup and either run forward recovery or rerun the relevant transactions.

Specifying SYNC could greatly increase the overhead processing of the batch jobs, and might not be ideal in all environments.

Examples

CICSVR_UNDOLOG_CONTROL(ENABLE CONT)
Enable CICS VR undo logging for all VSAM spheres defined with FRLOG ALL or UNDO and allow a client application, batch job, to continue when a logging error occurs. The VSAM sphere updates are not synchronized with CICS VR undo logging.

CICSVR_UNDOLOG_CONTROL(DISABLE)
Disable CICS VR undo logging. No undo logging is performed regardless of the FRLOG settings for the VSAM spheres.

Displaying the currently active undo logging control string

To dynamically display the currently active undo logging control string, you can issue the SETSMS CICSVR_UNDOLOG_CONTROL(DISPLAY string) command from the operator console.

The command has the following options:

SETSMS CICSVR_UNDOLOG_CONTROL(DISPLAY CONTROL)
Displays the active CICS VR undo logging control string for the system in which the command is processed.

SETSMS CICSVR_UNDOLOG_CONTROL(DISPLAY CONTALL) Displays the active CICS VR undo logging control strings on all systems in the sysplex that belong to the same CICS VR XCF group in which the command is processed.

This is an example of the output produced when the SETSMS CICSVR_UNDOLOG_CONTROL(DISPLAY CONTROL) command is issued to display the active CICS VR undo logging control string on the system.

```
DWW591I DISPLAY CONTROL

DISPLAY CONTROL - UNDO LOGGING CONTROL STRINGS

  SYSNAME:  SYSTEM1   ENABLE CONT
```

Figure 37. Sample output using the SETSMS CICSVR_UNDOLOG_CONTROL(DISPLAY CONTROL) command

Setting the CICS VR backout control parameter

The CICSVR_BACKOUT_CONTROL parameter in the active IGDSMSxx member of SYS1.PARMLIB is used to control whether CICS VR must automatically submit a batch backout job if a batch job encounters a failure, system or user abend.

The following values can be specified for the CICSVR_BACKOUT_CONTROL parameter in the active IGDSMSxx member:

SUBMIT NONE
CICS VR does not automatically submit a batch backout job when a batch job encounters a failure, system or user abend.

SUBMIT NONE is the default value for the CICS VR backout control string.

SUBMIT ABEND
CICS VR automatically submits a batch backout job when a batch job encounters a failure, system or user abend. The batch backout job attempts to remove the updates made to the VSAM spheres by the batch job step that was in progress when the abend occurred.

If SUBMIT ABEND is specified, make sure that the batch backout JCL skeleton has been updated to conform to your environment. See "Running CICS VR batch backout", in the *CICS VR User's Guide* for more information.

Note: In the situation where

- SUBMIT ABEND is the currently active backout control string
- ENABLE SYNC is the currently active undo logging control string

and an undo logging error occurs, CICS VR cancels the batch job, and attempts to automatically submit a batch backout job to remove the updates that were made to the VSAM spheres by the batch job step which was in progress when the logging error occurred.

Examples:

CICSVR_BACKOUT_CONTROL(SUBMIT ABEND)
CICS VR automatically submits a batch backout job when a batch job encounters a system or user abend.

CICSVR_BACKOUT_CONTROL(SUBMIT NONE)
CICS VR does not automatically submit a batch backout job when a batch job encounters a system or user abend. A batch backout job can be manually submitted to remove the updates made by the batch job step that was in progress during the abend.

Displaying the currently active backout control parameter

To dynamically display the currently active backout control parameter, you can issue the SETSMS CICSVR_BACKOUT_CONTROL(DISPLAY string) command from the operator console.

The command has the following options:

SETSMS CICSVR_BACKOUT_CONTROL(DISPLAY CONTROL)
Displays the active CICS VR backout control string for the system in which the command is processed.

SETSMS CICSVR_BACKOUT_CONTROL(DISPLAY CONTALL)
Displays the active CICS VR backout control strings on all systems in the sysplex that belong to the same CICS VR XCF group in which the command is processed.

This is an example of the output produced when the SETSMS CICSVR_BACKOUT_CONTROL(DISPLAY CONTROL) command is issued to display the active CICS VR backout control string on the system.

```
DWW591I DISPLAY CONTROL

DISPLAY CONTROL - BATCH BACKOUT CONTROL STRINGS

  SYSNAME:  SYSTEM1   SUBMIT NONE
```

Figure 38. Output from the SETSMS CICSVR_BACKOUT_CONTROL(DISPLAY CONTROL) command

Dynamically changing a CICS VR undo logging parameter in SYS1.PARMLIB

You can dynamically change the value of any of the CICS VR undo logging PARMLIB parameters specified in the active IGDSMS*xx* member without updating the member itself. The SETSMS operator command, followed by the CICS VR parameter name and value, can be issued for each of the CICS VR undo logging parameters to change the current setting. However, some of the dynamically changed parameters are not used by CICS VR until the next time the CICS VR server address space is started.

Any values changed by issuing the SETSMS command are no longer available after a system has been reinitialized (re-IPL'd). The first time that the CICS VR server address space is started on a system after the system has been re-IPL'd, CICS VR uses the settings specified in the active IGDSMSxx member of SYS1.PARMLIB.

These are the available SETSMS commands that can be issued to change CICS VR undo logging parameters without updating the active IGDSMS*xx* member:

```
SETSMS CICSVR_UNDOLOG_PREFIX(prefix)
SETSMS CICSVR_UNDOLOG_CONTROL(string)
SETSMS CICSVR_BACKOUT_CONTROL(string)
```

Examples

SETSMS CICSVR_UNDOLOG_PREFIX(DWWPROD)
The next time the CICS VR address space is started, when the default undo log is required, CICS VR writes before-image log records to the log stream named DWWPROD.UNDOLOG.

SETSMS CICSVR_UNDOLOG_CONTROL(ENABLE CONT)
Enable CICS VR undo logging for all VSAM spheres defined with FRLOG ALL or UNDO and allow a client application (batch job) to continue when a logging error occurs. The VSAM sphere updates are not synchronized with CICS VR undo logging. The specified value is activated immediately and used for all subsequent batch jobs.

SETSMS CICSVR_BACKOUT_CONTROL(SUBMIT ABEND)
CICS VR automatically submits a batch backout job when a batch job encounters a system or user abend. The specified value is activated immediately and used for all subsequent batch jobs.

Issuing the SETSMS command only changes the CICS VR parameter setting on the system that processes the command. Use the ROUTE command to issue the SETSMS command on multiple systems. For example, issuing the following command changes the CICSVR_UNDOLOG_PREFIX setting on all systems in the sysplex the next time each of the systems are reinitialized.

```
ROUTE *,ALL,SETSMS CICSVR_UNDOLOG_PREFIX(DWW)
```

See *z/OS MVS System Commands* for further information about the ROUTE command.

Multi-system considerations

Issuing the SETSMS command only changes the CICS VR parameter setting on the system that processes the command.

Use the ROUTE command to issue the SETSMS command on multiple systems. For example, issuing the following command changes the CICSVR_UNDOLOG_PREFIX setting on all systems in the sysplex the next time each of the systems are reinitialized.

```
ROUTE *,ALL,SETSMS CICSVR_UNDOLOG_PREFIX(DWW)
```

See *z/OS MVS System Commands* for further information about the ROUTE command.

Chapter 6. CICS VR security

Security has been enhanced to protect the RCDS from being updated by any user. It is possible to specify that the users security profile must be checked before allowing certain information in the RCDS to be added, changed, or deleted.

This section describes:

- Activating CICS VR security
- The effects of activating CICS VR security
- The mandatory creation of a profile for the security product
- The access permissions required by the profile to perform tasks

Activating CICS VR security

To activate CICS VR security, when the panel interface is used, specify the SECURITY YES value for the CICSVR_GENERAL_CONTROL parameter.

The SECURITY function controls the activation of CICS VR security when the panel interface is used. The function takes a YES or NO parameter. The parameter value is registered in the RCDS as the value of the global security default, and is unique for the CICS VR XCF group.

A value of YES indicates that the default is for security checking to be performed. A value of NO indicates that the default is for no security checking.

To activate CICS VR security, when using the CICS VR server address space, specify the SERVSEC YES value for the CICSVR_GENERAL_CONTROL parameter.

SERVSEC controls the activation of CICS VR security when you use the CICS VR server address space. SERVSEC has a YES or NO parameter. The parameter value is registered in the RCDS as the value of the global server security default, and is unique for the CICS VR XCF group.

If security is activated various checks are done before the CICS VR database RCDS is updated from the ISPF interface or CICS VR server address space.

The security profile

A new profile DWWCICSVR needs to be defined to the FACILITY class in your security product. The security administrator can then permit various levels of access to this profile for all users of CICS VR.

In general, a user can have NONE, READ, UPDATE, CONTROL or ALTER as the permitted level of access for a particular task. If the user tries to perform a function without the proper level of access, a pop-up message is displayed on the panel, advising that the user is not authorized to perform this function, and must contact the security administrator requesting access. This table shows the access levels required in the DWWCICSVR profile for a user to perform particular tasks:

Table 3. Access levels required to perform tasks

Task	Access level	Class
Changing any retention periods for automatic backup deregister, automatic mvslog deregister or automatic CA deregister	ALTER	FACILITY
Register or deregister a VSAM sphere entry from RCDS, using the sphere list panel	CONTROL (for the sphere to be registered or deregistered)	DATASET

Table 3. Access levels required to perform tasks (continued)		
Task	**Access level**	**Class**
Deregister a log entry from the CICS VR log stream list	CONTROL	FACILITY
Register or deregister a log of logs entry from the CICS VR log of logs list	CONTROL	FACILITY
Deregister a CICS backout failed sphere entry from the CICS Backout Failed sphere list	CONTROL	FACILITY
Change the CICS VR automation level	ALTER	FACILITY
Setting CICS VR server address space defaults or scavenger parameters	ALTER	FACILITY

Note: Less strict access control is required for a user to deregister a CICS backout failed sphere because the sphere remains registered in RCDS as a VSAM sphere.

Example

```
RDEFINE FACILITY DWWCICSVR
PERMIT DWWCICSVR ACCESS(READ) CLASS(FACILITY) ID(userid)
```

Server security profiles

So that various access levels can be permitted for CICS VR users you are required to define a new profile to the FACILITY class in your security product. The access levels required to perform particular functions is provided in a table.

The security administrator can permit various levels of access to these profiles for any users of CICS VR. In general, a user can have NONE, READ, UPDATE, CONTROL or ALTER as the permitted level of access for a particular function, (external service request to the CICS VR server address space from batch jobs). If the user tries to perform a function without the correct level of access, the function is rejected with a return code 8 and a reason code of 71313E03 which states that the user is not authorized to perform this function. The user can contact the security administrator to request the correct access. In this case, the return code and the reason code can be displayed in the appropriate message, for example; in the message DWW8152I, ADR927E and IEC161I.

Table 4. Access levels required to perform particular functions			
Function	**Profile**	**Access level**	**Class**
VSAM batch logging	CICSVRLOGGING	CONTROL	FACILITY
Logical backup notification	CICSVRBACKUP	CONTROL	FACILITY
File copy notification	CICSVRFILECOPY	CONTROL	FACILITY
CICS backout failed notification	CICSVRCBFAILED	CONTROL	FACILITY

Example

```
RDEFINE FACILITY CICSVRLOGGING
PERMIT CICSVRLOGGING ACCESS(CONTROL) CLASS(FACILITY) ID(userid)
```

Automated recovery and security

When automated recovery and security is used, specific tasks and permissions are required.

If RACF or similar security product is in place, ensure that the DWWCBINF, DWWCBRRG, and DWWCBRRY tasks are started within RACF. The tasks must be assigned a user ID with appropriate authorization to obtain access to data sets explicitly defined via DD statements in the DWWCBINF, DWWCBRRG, and DWWCBRRY samples, and to browse their outputs. For example, you can run:

```
RDEFINE STARTED CICSVR.* STDATA(USER(SYSTASK))
SETR RACLIST(STARTED) REFRESH
RDEFINE STARTED DWWCBRRY.* STDATA(USER(userid))
RDEFINE STARTED DWWCBRRG.* STDATA(USER(userid))
RDEFINE STARTED DWWCBINF.* STDATA(USER(userid))
SETR RACLIST(STARTED) REFRESH
```

For RACF details see the *z/OS Security Server RACF System Programmer's Guide*.

Chapter 7. Setting up CICS VR for CICS TS

The tasks you need to do to set up CICS VR for CICS TS.

The following sections are described:

- Set up your CICS VR ISPF environment
- Understand the recovery control data set
- Decide which VSAM spheres to protect
- Register or deregister your log of logs data sets
- Set up the retention periods for your log stream blocks
- Set up log of logs scan to run at regularly scheduled times
- Set up CICS VR change accumulation (CA)
- Decide if you want to use shadow copies

You can also use CICS VR VSAM batch logging when your CICS region is down. For more information, see Chapter 5, “Setting up CICS VR VSAM batch logging,” on page 63.

Setting up your CICS VR ISPF environment

Using the CICS VR panel interface can significantly reduce the amount of effort and time required to recover your VSAM data.

From the CICS VR panel interface, you can select the VSAM spheres you want to recover and the backups you want to restore. Then, using information stored in the RCDS along with your entered parameters, the CICS VR panel interface builds a recovery job to restore the VSAM spheres from the selected backups and perform a forward recovery on the restored spheres. Additionally, the CICS VR panel interface can be used to view information stored in the RCDS about VSAM spheres and related entities, such as log streams and log stream copies, and view and change various CICS VR settings, such as automatic deregistration.

CICS VR dialogs run under ISPF, so you must set up an appropriate ISPF environment. If you are not familiar with ISPF dialogs, see *z/OS ISPF Dialog Developer's Guide and Reference* or *OS/390 ISPF Dialog Developer's Guide and Reference*.

To set up your ISPF environment, perform these steps:

1. Allocate ISPF data sets to the TSO session.
2. Run the CICS VR ISPF dialog interface.
3. Edit the CICS VR JCL skeleton.

CICS VR provides the VSAMREC line operator and list command that can be issued from the ISMF data set list. Use the ISMF data set list feature to group VSAM spheres based on user-defined selection criteria. Issue VSAMREC from the ISMF data set list to start the CICS VR panels, allowing you to create a recovery job for individual or all data sets in the list. See Chapter 20, “VSAMREC CLIST,” on page 347 for more information.

Allocating data sets to your TSO session

A table that shows the data sets that you must allocate to the TSO session to run the CICS VR ISPF dialog interface.

Table 5. ISPF dialog data sets

ddname	CICS VR	Created by
DWWCON1	CICS VR recovery control data set	See Note 5.

Table 5. ISPF dialog data sets (continued)		
ddname	**CICS VR**	**Created by**
DWWCON2	CICS VR recovery control data set	See Note 5.
DWWCON3	CICS VR recovery control data set	See Note 5.
DWWMSG	CICS VR message data set	See Note 1.
DWWPRINT	CICS VR report data set	See Note 2.
DWWLLIB	Load Library	See Note 4.
DWWSLIB	JCL skeleton library	See Note 4.
ISPFILE	File tailoring output and your JCL skeleton	Your existing ISPF data set. See note 3.
ISPLLIB	Load library	
ISPMLIB	Message library	
ISPPLIB	Panel library	
ISPPROF	User-session defaults, read/write tables	Your existing ISPPROF data set.
ISPSLIB	JCL skeleton library	See Note 3.
ISPTLIB	Read tables (default)	
DWWDUMP	CICS VR diagnostics data set	See Note 6
DWWDMSG	CICS VR prolog and epilog data set	See Note 6

Note:

1. DWWMSG defines the output data set that contains the CICS VR messages. Use a different data set name than the one used on this system by the CICS VR server address space.

   The DCB parameters for this data set are RECFM=FBA and LRECL=133. The block size can be provided on the DWWMSG DD statement and must be a multiple of 133. The default is 27930.
2. DWWPRINT defines the report data set that contains the reports produced by CICS VR. Use a different data set name than the one used on this system by the CICS VR server address space.
3. Ensure that the library containing your own CICS VR JCL skeletons is allocated to both the ISPSLIB and ISPFILE DD statements.
4. Since CICS VR uses LMFIND to locate a member in ISPLLIB and ISPSLIB, only four data sets can be concatenated in these libraries. Since this might be a problem for some users, CICS VR supports alternate names: DWWLLIB for ISPLLIB and DWWSLIB for ISPSLIB. CICS VR uses DWWLLIB in place of ISPLLIB and DWWSLIB in place of ISPSLIB.
5. DWWDMSG and DWWDUMP define the output data sets to which CICS VR writes diagnostics and abend information. If these data sets are not allocated, this information is unavailable.

Running the CICS VR ISPF dialog interface

There are three different methods for invoking the CICS VR dialog.

- Modify an existing ISPF selection menu
- Select the CICS VR main menu directly from TSO
- Use the ISPF select service

Modifying an existing ISPF selection menu

You can start CICS VR simply by including CICS VR as an option on the existing primary option menu (ISR@PRIM) that is shipped in ISP.SSPPENDU or on another selection menu.

Insert the statements that are marked on the right with an arrow (**<====**):

```
)BODY
⋮
    1  ....... - ............
    2  ....... - ............
    .  ....... - ............
    0  CICSVR  - CICS VSAM Recovery         <====
    .  ....... - ............
)PROC

⋮
&ZSEL = TRANS(TRUNC(&ZCMD,'.')
    1 , ....
    2 , ....
    . , ....
    0 , 'PGM(DWWPM) NEWAPPL(DWW) PASSLIB'         <====
    . , ....
⋮
)END
```

Figure 39. Modifying the ISPF selection menu for CICS VR

Specify that you want to receive all write-to-programmer messages (including the message ID), at your terminal. This helps you to analyze any problems that might occur while setting up the CICS VR ISPF dialog interface. To do this, enter this TSO command:

```
PROFILE WTPMSG MSGID
```

Before you can start CICS VR, you must allocate the CICS VR data sets. You can allocate these data sets through the TSO logon procedure, or by executing a command list (CLIST) after TSO logon. See Chapter 19, “Sample CLIST (DWWCLIST),” on page 343.

Selecting the CICS VR main menu directly from TSO

How to select the "CICS VR main menu" directly from TSO.

Enter this TSO command:

```
 ISPSTART PGM(DWWPM) NEWAPPL(DWW)
```

Remember that you must allocate the CICS VR ISPF dialog interface data sets before running this command. If you select the "CICS VR main menu" directly from TSO, you cannot split the screen to run two CICS VR sessions.

If you use this method to start the dialog the "CICS VR main menu" panel is the first ISPF panel displayed:

```
Help
-------------------------------------------------------------------------------
DWWPPMEN                        CICSVR main menu
Select one and press Enter.



                          1.  List of VSAM spheres
                          2.  List of log streams
                          3.  List of registered log of logs
                          4.  Automatic deregister criteria
                          5.  JCL skeleton
                          6.  Browse messages
                          7.  List of CICS Backout Failed spheres
                          8.  CICSVR Settings



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Command ===>
 F1=Help      F3=Exit     F10=Menu bar F12=Cancel
```

Figure 40. CICS VR main menu panel

Using the ISPF select service

Another method of starting the CICS VR ISPF dialog interface is to issue the SELECT command from a CLIST, or from a program.

A sample CLIST (DWW.SDWWCNTL(DWWCLIST)) is provided on the product tape and is shown in Chapter 19, “Sample CLIST (DWWCLIST),” on page 343. Modify DWWCLIST according to your site requirements. See your ISPF manuals for more information about these methods.

Editing the CICS VR JCL skeleton

If you select option 5 from the "CICS VR main menu" panel the JCL skeleton secondary window opens and starts the ISPF/PDF editor.

```
)CM    @BANNER_START                          01
)CM    Licensed Materials - Property of IBM
)CM
)CM    5655-GY1              DWWUJOB
)CM
)CM    (C) Copyright IBM Corp. 2005, 2014
)CM    (C) Copyright HCL Technologies Ltd. 2025
)CM
)CM    @BANNER_END
)CM  $L0= CVR410  410 050909 ......... Changed
)CM  $L1= CVR430  430 080109 ......... Changed
)CM       R71977  520 130920 ......... Customization
)CM  ************************************************************
)CM
)CM   Add the JOB statement to meet your system requirements.
)CM
)CM   Do not remove the &CJOBCHAR variable in the JOB name.
)CM
)CM   You must use double ampersands (&&) to produce a character
)CM   string starting with an ampersand (&) in a generated job.
)CM   For example: NOTIFY=&&SYSUID
)CM
)CM   Set symbolic parameters according your requirements:
)CM    HLQ  - high level qualifier for CICS VR libraries
)CM    CICSEXCI - CICS SDFHEXCI data set name
)CM
)CM   Uncomment STEPLIB DD if CICS VR libraries are not specified
)CM   in LNKLST.
)CM   Note: For running IVP, DWWEXLD data set must be specified
)CM   in STEPLIB.
)CM  ************************************************************
)CM
)SET HLQ = DWW.V610
)SET CICSEXCI = CTS510.CICS680.SDFHEXCI
//TSTGFS&CJOBCHAR JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=&&SYSUID,
//             MSGCLASS=X,CLASS=A,REGION=4M )SEL &CUTIL NE BACKUP
//DWW      PROC
//&CUTIL   EXEC PGM=&CPROG,COND=(8,LE)
//*STEPLIB  DD DSN=&HLQ..SDWWLOAD,DISP=SHR
//*         DD DSN=&HLQ..SDWWLENU,DISP=SHR
//*         DD DSN=&HLQ..DWWEXLD,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWDUMP  DD SYSOUT=*
//         PEND
//* END OF PROC
)ENDSEL
```

Figure 41. JCL skeleton secondary window

Here you can edit the CICS VR JCL skeleton information to conform to your organization's standards. Use F3 to leave the editor and return to the "CICS VR main menu".

You must edit the JCL skeleton and modify the following information:

- The job card, TSTGFS&CJOBCHAR, (do not remove the &CJOBCHAR variable)
- The CICS VR load library, STEPLIB

Understanding the recovery control data set

The CICS VR recovery control data set (RCDS) contains essential information for recovering your VSAM spheres.

The RCDS contains information on the following:

- CICS VR ISPF dialog interface default values
- MVS log streams
- MVS log stream copies

- Registered logical backups
- Change accumulation data sets
- CICS VR VSAM batch logging
- Shadows

This information is stored in three identical linear VSAM data sets. Three data sets are used to reduce the possibility of data loss. CICS VR regularly checks to make sure the three data sets are consistent.

The information in the RCDS is updated under the following conditions:

- Through the CICS VR ISPF dialog
- By using the log of logs scan, with CICS TS
- By using log stream copy, with CICS TS
- Automatically by CICS VR, with change accumulation
- Automatically by CICS VR, with VSAM batch logging
- Automatically by doing a shadow forward recovery
- Automatically when the CICS VR server address space is active
- Automatically when CICS VR is notified of a logical backup created for a VSAM data set
- Automatically when CICS VR is notified of a VSAM backout failure, and recovery or reorganization is requested.

You can reduce the likelihood of your RCDS becoming full by deregistering old information from the RCDS. You can set up automatic deregistration for your log streams (log stream copies or the log-tail), registered backups, and change accumulation data sets using the CICS VR panel interface. In addition, you can instantly deregister the following using the CICS VR dialog interface:

- Log streams
- SAM copies of a log
- Log of logs
- Registered logical backups

Deregistration is triggered by running scan or automatically by the CICS VR server address space. Once deregistered, CICS VR automatically reuses the freed space in the RCDS; you never need to manually recover free space. For more information on automatic deregistration, see “Understanding CICS VR automatic deregistration” on page 117.

The RCDS must be allocated to a recover job for batch REDO after images unless the recover being run also specifies the REMOTE keyword.

Note: CICS VR issues an ENQ for each of the RCDSs with *QNAME DWWCON,RNAME datasetname*, and with scope *SYSTEMS*.

Creating and maintaining the RCDS when not using the CICS VR server address space

An explanation of RCDS creation and maintenance in an environment that cannot activate the CICS VR server address space.

If you plan on using the CICS VR server address space, see Chapter 4, “Activating the CICS VR server address space,” on page 29.

In general, you can use the following information for creating and maintaining the RCDSs. The following sections describe how to:

- Size the RCDS
- Create the RCDS
- Maintain the RCDS

Sizing the RCDS

Use this formula to estimate the size of your RCDS.

```
nvsam × nopen × ndays × 8192 bytes
```

Where:

- **nvsam** is the number of VSAM data sets
- **nopen** is the average number of times a VSAM file is opened or closed per day
- **ndays** is the number of days of log information you want to keep

For example, if you have 100 VSAM data sets that are opened or closed 10 times each per day and the information is kept for 30 days, calculate the approximate size of the RCDS as follows:

```
100 x 10 x 30 x 8192 bytes = 245,760,000 bytes
```

You can estimate the size of your RCDS as 245 megabytes.

IBM recommends that you make one of the recovery control data sets smaller than the other two. If the smaller one becomes full, CICS VR issues messages warning you that your smaller RCDS is full, then continues using the larger RCDSs. This warning notifies you that your RCDS needs maintenance and lets you take action before all three RCDSs are full and halts recovery. See “Maintaining the RCDS” on page 91 for more information.

Creating the RCDS

The three RCDSs are linear VSAM data sets. They contain identical copies of essential information CICS VR needs to recover your VSAM spheres.

To reduce the possibility of losing all three copies of the RCDSs, IBM recommends that you create each RCDS on separate volumes, disk controllers, and channels. In addition, your VSAM spheres must be on different volumes, disk controllers and channels from your RCDSs. These precautions prevent a single hardware failure from making all three RCDSs unusable, or from making the RCDS and the VSAM sphere to be recovered unusable. CICS VR regularly checks the consistency of data between the three data sets. If one or two of the RCDSs are temporarily lost, for example; the unavailability of a disk path, CICS VR automatically copies the data from the remaining RCDS the next time the other data sets are available.

The sample AMS commands to define three RCDSs:

```
//ALLOC    EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
  DEFINE CLUSTER                              -
      (NAME('DWW.DWWCON1')                    -
       VOLUMES(TSOL01)                        -
       CYLINDERS(60 20)                       -
       LINEAR                                 -
       SHR(3 3))

  DEFINE CLUSTER                              -
      (NAME('DWW.DWWCON2')                    -
       VOLUMES(TSO007)                        -
       CYLINDERS(60 20)                       -
       LINEAR                                 -
       SHR(3 3))

  DEFINE CLUSTER                              -
      (NAME('DWW.DWWCON3')                    -
       VOLUMES(TSOL02)                        -
       CYLINDERS(30 20)                       -
       LINEAR                                 -
       SHR(3 3))
/*
```

Figure 42. AMS Commands to define the CICS VR RCDS

Accessing the RCDS from more than one system

You must have Global Resource Serialization (GRS) or a similar product installed to access the RCDS from more than one MVS system.

The RCDS must be created and cataloged in a globally shared catalog. All systems in the sysplex need to have write access to all the RCDSs.

CICS VR issues an ENQ for the QNAME DWWCON and a RNAME of each of the RCDSs. This ENQ is issued with a scope of SYSTEMS when accessing the RCDSs. If you are using GRS for resource serialization, then you do not need to do anything for GRS because this ENQ is propagated to all systems within a GRSplex. If you are using GRS, you must not have an entry for this QNAME in the GRS Exclusion list, Conversion list, or Inclusion list because this might cause serialization problems and possibly damage your RCDSs. If you are using a product other than GRS for resource serialization, you need to ensure that the ENQ's issued by CICS VR are propagated to all systems sharing the RCDS to avoid damaging or corrupting your RCDSs.

Allocating the RCDS

Examples of allocating RCDS.

The ddnames for the RCDSs are DWWCON1, DWWCON2, and DWWCON3. An example of allocating the RCDS in the CICS VR recovery job.:

```
//DWWCON1  DD DSN=DWW.DWWCON1,DISP=SHR
//DWWCON2  DD DSN=DWW.DWWCON2,DISP=SHR
//DWWCON3  DD DSN=DWW.DWWCON3,DISP=SHR
```

Figure 43. Allocating the RCDS for the CICS VR Run

An example of allocating the RCDS to the CICS VR ISPF dialog interface:

```
ALLOC FI(DWWCON1)  DA('DWW.DWWCON1') SHR REUSE
ALLOC FI(DWWCON2)  DA('DWW.DWWCON2') SHR REUSE
ALLOC FI(DWWCON3)  DA('DWW.DWWCON3') SHR REUSE
```

Figure 44. Allocating the RCDS to the CICS VR ISPF Dialog Interface

Maintaining the RCDS

How to repair your RCDS if one or more RCDSs become full or damaged.

If your RCDS is full

In this situation, you have received the DWW1605I DWWCONx is full informational message and you want to increase the size of your RCDSs before all the RCDSs become full.

The following two jobs show how you can:

- Create temporary VSAM data sets with more space than the original data sets.
- Use the AMS REPRO command to copy the old VSAM data sets to the temporary data sets.
- Check the results of the REPRO.
- Delete the original VSAM data sets.
- Rename the temporary VSAM data sets to the original names.

The AMS commands to create new temporary data sets and how to copy the information in the old VSAM data sets to the temporary data sets:

```
//DEFCLUS1 EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
  DEFINE CLUSTER               -
      (NAME(DWW.DWWTEMP1)      -
       VOLUMES(TSOL01)         -
       CYLINDERS(100 30)       -
       LINEAR                  -
       SHR(3 3))

    DEFINE CLUSTER                              -
       (NAME('DWW.DWWTEMP2')                    -
        VOLUMES(TSO007)                         -
        CYLINDERS(100 30)                       -
        LINEAR                                  -
        SHR(3 3))

    DEFINE CLUSTER                              -
       (NAME('DWW.DWWTEMP3')                    -
        VOLUMES(TSOL02)                         -
        CYLINDERS(75 30)                        -
        LINEAR                                  -
        SHR(3 3))

   REPRO                                        -
     INDATASET('DWW.DWWCON1')                   -
     OUTDATASET('DWW.DWWTEMP1')

   REPRO                                        -
     INDATASET('DWW.DWWCON2')                   -
     OUTDATASET('DWW.DWWTEMP2')

   REPRO                                        -
     INDATASET('DWW.DWWCON3')                   -
     OUTDATASET('DWW.DWWTEMP3')
 /*
```

Figure 45. Increasing the size of the RCDS (steps 1 and 2)

Verify that all the AMS REPRO steps are successful before proceeding.

This example shows the AMS commands to delete the original data sets and rename the new data sets.

```
//DEFCLUS2 EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
  DELETE 'DWW.DWWCON1'
  DELETE 'DWW.DWWCON2'
  DELETE 'DWW.DWWCON3'

    ALTER                                      -
     'DWW.DWWTEMP1'                           -
     NEWNAME('DWW.DWWCON1')

   ALTER                                       -
     'DWW.DWWTEMP1.DATA'                       -
     NEWNAME('DWW.DWWCON1.DATA')

   ALTER                                       -
     'DWW.DWWTEMP2'                            -
     NEWNAME('DWW.DWWCON2')

   ALTER                                       -
     'DWW.DWWTEMP2.DATA'                       -
     NEWNAME('DWW.DWWCON2.DATA')

   ALTER                                       -
     'DWW.DWWTEMP3'                            -
     NEWNAME('DWW.DWWCON3')

   ALTER                                       -
     'DWW.DWWTEMP3.DATA'                       -
     NEWNAME('DWW.DWWCON3.DATA')
 /*
```

Figure 46. Increasing the size of the RCDS (steps 4 and 5)

You must rename the cluster and the data components of the data sets.

If your RCDS is damaged

Assume that your DWWCON3 RCDS is damaged and you want to delete it and create a new replacement RCDS.

The AMS commands to delete the damaged RCDS and define a new one:

```
//DELETE   EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
  DELETE 'DWW.DWWCON3'

  DEFINE CLUSTER               -
      (NAME(DWW.DWWCON3 )  -
       VOLUMES(TSOL02)         -
       CYLINDERS(30,20)       -
       LINEAR                   -
       SHR(3 3))
/*
```

Figure 47. AMS command to delete and define DWWCON3

Deciding which VSAM spheres to protect

You want to be able to forward recover all VSAM spheres that are defined as CICS files. Data sets that are read-only or browse-only do not need forward recovery or backout, however, back them up regularly in case they become unusable.

Ensure that you define your VSAM base clusters and alternate index data sets with SHAREOPTION 1 or SHAREOPTION 2. You can do this by using the SHAREOPTION parameter of the appropriate access method services (AMS) command, such as the DEFINE CLUSTER command or the ALTER command. SHAREOPTION 3 and SHAREOPTION 4 are not suitable for CICS, because CICS cannot prevent concurrent write access to the data sets by other CICS regions or by batch jobs.

If you must use SHAREOPTION 3 or SHAREOPTION 4 with multiple CICS regions sharing the same VSAM sphere, you must use unique ddnames across different systems. Unique ddnames ensures the correct sequencing and enables CICS VR to correctly process the log records for forward recovery. See the SHAREOPTION description in *z/OS DFSMS Access Method Services* for more information about the risks involved with SHAREOPTION 3.

Creating groups of VSAM spheres

When you have decided which VSAM spheres to protect, you can create groups of VSAM spheres that share common attributes, such as spheres that reside on the same volume or are updated by the same application, into groups.

These groups allow for a quicker and simplified recovery process when the VSAM spheres in a group need to be recovered.

CICS VR provides multiple ways of creating groups of VSAM spheres. These groups can then be used by CICS VR to create a recovery job for the VSAM spheres in the group. The grouping feature of CICS VR can be divided into three sections as described.

ISMF data set lists

The ISMF data set list feature allows you to create a list (group) of data sets based on a vast array of selection criteria.

For example, you can create a list of VSAM sphere base clusters that reside on a particular volume and match a specific data set naming convention. The produced ISMF data set list can then be saved for use at a later time. If a situation occurs that corrupts all data sets in the created list, such as a volume failure, you can display the saved ISMF data set list and call CICS VR to recover the VSAM spheres in the list.

From the ISMF Data Set List panel, you can create a recovery job for the VSAM spheres by entering the VSAMREC command against individual data sets or against the entire list. Issue this command to display the proper CICS VR panels and build a recovery job for the VSAM spheres. This example shows how to issue the VSAMREC list command to create a recovery job for all of the data sets in the ISMF data set list. VSAMREC also can be issued as a line operator to recover individual data sets within the list.

```
   Panel  List  Dataset  Utilities  Scroll  Help
------------------------------------------------------------------------------
                              DATA SET LIST
Command ===> VSAMREC                        Scroll ===> HALF
                                                Entries 1-6 of 6
Enter Line Operators below:                     Data Columns 3-4 of 39

     LINE                                                 ALLOC   ALLOC
     OPERATOR                DATA SET NAME                SPACE   USED
    ---(1)----  --------------------(2)--------------------- --(3)-- --(4)--
                EXMPHLQ.CLUSTER1                           ------- -------
                EXMPHLQ.CLUSTER2                           ------- -------
                EXMPHLQ.CLUSTER3                           ------- -------
                EXMPHLQ.CLUSTER4                           ------- -------
                EXMPHLQ.CLUSTER5                           ------- -------
                EXMPHLQ.CLUSTER6                           ------- -------
    ----------  ------  -----------  BOTTOM  OF  DATA  ----- -------  ---- ----




F1=Help    F2=Split   F3=End     F4=Return  F7=Up      F8=Down    F9=Swap
F10=Left   F11=Right  F12=Cursor
```

Figure 48. Example of executing VSAMREC to create a recovery job for every data set in the ISMF data set list.

ISMF also allows you to save the selection criteria that was entered to produce an ISMF data set list as a query. Saving the selection criteria allows you to regenerate ISMF data set lists quickly. For example, you can initially create and save an ISMF data set list that contains all VSAM sphere base clusters that are updated by a certain application and follow the same naming convention. If, at a later time this application fails, you might need to create a recovery job for every VSAM sphere that was updated by the application. If a long time has passed since the initial ISMF data set list was created, it is possible that new VSAM spheres were added to the application since the original list was created. If you saved the original selection criteria as a query, you can regenerate the ISMF data set list from the saved query. This regenerated ISMF data set list contains a current list of all data sets that are updated by the application. You can then call CICS VR to create a recovery job for the VSAM spheres.

See *CICS VR User's Guide* for a detailed description of creating groups of data sets with ISMF and using them with CICS VR.

See Chapter 20, “VSAMREC CLIST,” on page 347 for more information about VSAMREC.

CICS VR data set list feature

Another way you can create groups of VSAM spheres for use with CICS VR is with the CICS VR data set list feature.

This feature allows you to enter the name of a data set that contains a list of VSAM spheres as input to CICS VR. The data set can be either sequential or a member of a Partitioned Data Set (PDS). The CICS VR dialog interface then guides you through the creation and submission of a recovery job for the VSAM spheres that were listed in the entered data set

The CICS VR data set list feature allows a more flexible way of grouping VSAM spheres because you can create and populate the data set list using any method you want, for example; ISPF or JCL. Create either a sequential data set or a member of a PDS for each group you want to define. Then, simply add the name of each VSAM sphere you want to include in the group as a separate record into the data set. Next, enter the name the data set on the "CICS VR VSAM sphere list include" secondary window. CICS VR guides you through the creation and submission of a recovery job for the VSAM spheres in the group.

```
                     CICSVR VSAM sphere list include
 Command ===> ____________________________________________________________

 Specify VSAM sphere list search criteria, then press Enter.

 VSAM sphere . . . . . . . *_____________________________________________


                                    OR

 Specify the name of a data set that contains a list of VSAM spheres,
 then press Enter.

 Data Set Name . . . EXAMPLE.DATA.SET.LIST(MEMBER)_____________________________

  F1=Help
F12=Cancel
```

Figure 49. CICS VR VSAM sphere list include secondary window

See *CICS VR User's Guide* for a detailed description of the CICS VR data set list feature.

Default recovery parameters

Using groups of VSAM spheres with CICS VR simplifies the recovery process of the VSAM spheres in the group. CICS VR accomplishes this by allowing you to enter only one set of default recovery parameters that are used for every selected VSAM sphere.

CICS VR applies the entered default recovery parameters against every selected sphere and produces a recovery job for the VSAM spheres. This feature prevents you from having to enter the recovery parameters for every selected VSAM sphere individually.

On the "CICS VR VSAM sphere list" panel, enter a Y in the **Use default parameters for selected spheres** field, select the VSAM spheres you want to recover, and then choose a recovery action. CICS VR displays the appropriate panel to enter one set of default recovery parameters. The entered recovery parameters are applied to every selected VSAM sphere.

```
                     Administrate  Utilities  Tools  List  View
Help
------------------------------------------------------------------------------
                           CICSVR VSAM sphere list            Row 1 to 4 of 4
Command ===> ____________________________________________________________

Select one or more VSAM spheres, then select an action.

  Y  Use default parameters for selected spheres

  S  VSAM sphere                                  Scan time(Local) RR bit
  S  EXMPHLQ.CLUSTER1                             02.158 13:02:54
  S  EXMPHLQ.CLUSTER4                             02.158 13:02:54
  S  EXMPHLQ.CLUSTER5                             02.158 13:02:54
  S  EXMPHLQ.CLUSTER6                             02.158 13:02:54
****************************** Bottom of data ********************************



 F1=Help      F3=Exit      F5=FwdRec    F6=Backout   F7=Bkwd
 F8=Fwd      F10=Menu bar F11=Dereg
F12=Cancel
```

Figure 50. CICS VR VSAM sphere list with the Use default parameters for selected spheres field

See the *CICS VR User's Guide* for a detailed description on how to specify default recovery parameters.

Registering or deregistering your log of logs data sets

All log of logs data sets must be registered in the RCDS for CICS VR to know about them.

Use the CICS VR ISPF dialog interface to register or deregister your log of logs.

Registering your log of logs data sets

When you define a new log of logs, you must register it by selecting option 3, **List of registered log of logs** (CICS TS), from the "CICS VR main menu" panel.

Then, use the **Administrate** menu from the "CICS VR log of logs list" panel and select option 1, **Register**. The "CICS VR log of logs register" panel is displayed as shown:

```
                      CICSVR log of logs register

Specify a log of logs. If required, enter a start scan point, then press
Enter to register the log of logs. Or, press F12 to cancel the request.

  Log of logs  . . . . ____________________________

  Start scan point . . _____________  (YY.DDD HH:MM:SS)

Command ===> ____________________________________________________________
 F1=Help    F12=Cancel
```

Figure 51. Log of logs register secondary window

Deregistering your log of logs data sets

By deregistering deleted log of logs, you can help to keep the RCDS from becoming larger than necessary.

You can delete the log of logs first and then deregister it or vice versa; the order is not important. Select option 3, **List of registered log of logs** (CICS TS), from the "CICS VR main menu" panel. Select the log of logs that you want to deregister from the "CICS VR log of logs list" panel, then use the **Administrate** menu and select option 2, **Deregister**. The "CICS VR log of logs deregister" panel is displayed as shown:

```
                      CICSVR log of logs deregister

Press Enter to deregister the log of logs. Or, press F12 to cancel the
request.

  Log of logs  . . . : CICS10.LOGOFLOG

Command ===> ____________________________________________________________
 F1=Help  F12=Cancel
```

Figure 52. Log of logs deregister secondary window

Setting up the log of logs scan utility (scan)

The LOGOFLOGS scan utility scans all the log of logs that are registered in the RCDS, gathers information, and updates the RCDS with this information.

When you use the CICS VR ISPF dialog interface to perform a forward recovery or a complete recovery, scan runs automatically. If scan has not run recently, it can take a significant amount of time for it to finish.

If you only want CICS VR to scan a subset of the log of logs that are registered to CICS VR, you can create a batch job to only scan the log of logs that you have specified. Then, change the CICS VR ISPF dialog interface settings to bypass the automatic LOGOFLOGS SCAN of all the log of logs registered to CICS VR. See Chapter 21, “Using selective scan,” on page 355 for more information.

Improving forward recovery performance using the scan utility

You can significantly improve the performance of your forward recoveries by setting up scan to run as a batch job that runs at regularly scheduled times.

If your system is setup as part of a sysplex, you might need to run scan on more than one system, depending on whether you use coupling facility log streams or DASD-only log steams, or a combination of both types of log streams.

Coupling facility logging

If coupling facility logging is used on all the systems in the sysplex, then you only need to run scan on one system to update the RCDS. Scan connects to all the log streams registered in the RCDS on all the systems it has access to using the coupling facility.

If both coupling facility logging and DASD-only logging are used on systems connected to the sysplex, the two types of logging must be handled separately. You only need to run scan on one of the systems using coupling facility logging to update the RCDS. You must run scan on each of the DASD-only logging systems to update the RCDS. Scan cannot connect to systems with DASD-only logging from another system in the sysplex on those systems.

If you want to access the RCDS from more than one MVS system, you must have Global Resource Serialization (GRS) installed.

DASD-only logging

If DASD-only logging is used, you must run scan to update the RCDS on each system.

Each system is independent of the next system, so separate log of logs, RCDS, and log streams must be defined on each system. Scan cannot connect to systems with DASD-only logging from another system in the sysplex.

For more information on DASD-only logging, see *z/OS MVS Setting Up a Sysplex* or *OS/390 MVS Setting Up a Sysplex*.

Setting up the scan utility to run as a batch job

Set up scan as a batch job that can be run at regularly scheduled times as shown in the sample.

Run scan several times a day, for example; every four hours, on all the necessary systems to keep the RCDS current. If you have multiple log streams, for example; more than one system using DASD-only logging, or if you use both coupling facility logging and DASD-only logging, consider scheduling your batch scan jobs so that they run at different times to avoid contention, that is, system level enqueues.

```
//JOBSCN2  JOB MSGCLASS=X,CLASS=A,MSGLEVEL=(1,1),REGION=0M
//* CICSVR PROGRAM
//STEP1    EXEC PGM=DWWAR
//* LIBRARY CONTAINING CICSVR PROGRAMS
//STEPLIB DD DSN=DWW.SDWWLOAD,DISP=SHR
// DD DSN=DWW.SDWWLENU,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//* CICSVR RECOVERY CONTROL DATA SET NAMES
//DWWCON1  DD DSN=DWW.DWWCON1,DISP=SHR
//DWWCON2  DD DSN=DWW.DWWCON2,DISP=SHR
//DWWCON3  DD DSN=DWW.DWWCON3,DISP=SHR
//DWWIN    DD *
  LOGOFLOGS SCAN
```

Figure 53. Sample scan job you can run at regularly scheduled times

The LOGOFLOGS command in this sample instructs CICS VR to scan all the log of logs that are registered in the RCDS. All the information needed for recovery is stored in the RCDS. In addition, CICS VR automatic deregistration is performed if it has been turned on through the CICS VR panel interface. Use the CICS VR panel interface to set or change the CICS VR automatic deregistration settings.

Each time that scan is run, CICS VR begins at the point in which the last scan ended. For more information on scan see the LOGOFLOGS command in “LOGOFLOGS: Process a log of logs” on page 260.

Understanding the log of logs scan utility report

A CICS VR log of logs scan utility report is produced every time the scan utility runs.

Optionally, you can run the LOGOFLOGS REPORTONLY command that only produces a report of the contents in the registered log of logs. The RCDS is not updated when the LOGOFLOGS REPORTONLY command is run. See “LOGOFLOGS REPORTONLY: produce a report of log of logs information” on page 263 for more information.

The log of logs scan report is followed by descriptions of the fields in the report.

```
CICSVR -  LOG OF LOGS SCAN UTILITY                 DATE : 01/06/08     TIME : 11:01:09
PAGE : 1

STATISTICS FOR A LOG OF LOGS SCAN
=================================

LOG OF LOGS NAME       : CICSVR1.MVSLOG.LOL1
FIRST TIME GMT         : 01.157 12:00:59
LAST TIME GMT          : 01.159 12:00:59
FIRST TIME LOCAL       : 01.157 12:00:59
LAST TIME LOCAL        : 01.159 12:00:59
FIRST BLOCK ID         :                43282
LAST BLOCK ID          :                67382


VSAM DATA SET STATISTICS
========================

VSAM DATA SET NAME           CICSID    FCT NAME  OPEN DATE/TIME   CLOSE DATE/TIME  MVS LOG
STREAM NAME
---------------------------- --------  --------  ---------------  ---------------
------------------
CICSPROD.ACC.VSAMA           CICSPROD  BASEA     01.158 12:00:00  01.158 12:11:10
CICSVR1.MVSLOG
CICSPROD.ACC.VSAMB           CICSPROD  BASE2     01.158 12:00:00
CICSVR1.MVSLOG
CICSPROD.ACC.VSAMC           CICSPROD  BASE3     01.158 12:00:00
CICSVR1.MVSLOG

       -  LOG OF LOGS SCAN UTILITY                 DATE : 01/06/08     TIME : 11:01:09
PAGE : 2

INFORMATION FOR A FORWARD RECOVERY OF CICSPROD.ACC.VSAMA
========================================================

JOB STEP 1

START TIME GMT    STOP TIME GMT
----------------  ---------------
01.157 12:00:00   01.158 12:11:10
MVS LOG STREAMS NEEDED
----------------------
CICSVR1.MVSLOG
CICSVR -  LOG OF LOGS SCAN UTILITY                 DATE : 01/06/08     TIME : 11:01:09
PAGE : 3

INFORMATION FOR A FORWARD RECOVERY OF CICSPROD.ACC.VSAMB
========================================================

JOB STEP 1

START TIME GMT    STOP TIME GMT
----------------  ---------------
01.157 12:00:00   01.158 11:01:11
MVS LOG STREAMS NEEDED
----------------------
CICSVR1.MVSLOG
CICSVR -  LOG OF LOGS SCAN UTILITY                 DATE : 01/06/08     TIME : 11:01:09
PAGE : 4

INFORMATION FOR A FORWARD RECOVERY OF CICSPROD.ACC.VSAMC
========================================================

JOB STEP 1

START TIME GMT    STOP TIME GMT
----------------  ---------------
01.157 12:00:00   01.158 11:01:11
MVS LOG STREAMS NEEDED
----------------------
CICSVR1.MVSLOG
```

Figure 54. Log of logs scan report

Log of logs name
The name of the MVS log of logs.

First time GMT
The first time recorded on the log of logs in GMT format.

Last time GMT
The last time recorded on the log of logs in GMT format.

First time LOCAL
The first time recorded on the log of logs in local time format.

Last time LOCAL
The last time recorded on the log of logs in local time format.

First block ID
The first block ID on the log of logs.

Last block ID
The last block ID on the log of logs.

VSAM data set name
The unique data set name for each tie-up record.

CICSID
The CICS APPLID.

FCT name
The ddname of the data set, as defined in the FCT.

Open date/time
The date and time the log of logs was opened.

Close date/time
The date and time the log of logs was closed.

MVS log stream name
The name of the MVS log stream.

Information for a Forward Recovery:

This information is provided if you request a recovery report from the LOGOFLOGS utility:

Start time GMT
The start time for the recovery of this data set, in GMT format.

Stop time GMT
The stop time for the recovery of this data set, in GMT format.

MVS log streams needed
The MVS log streams needed for the recovery of this data set.

The LOGOFLOGS utility might produce error or information messages in the DWWMSG file.

Automatic and manual log of logs scanning

Within the CICS VR server address space, the log of logs scan utility can take place automatically, or when started manually.

The log of logs scan utility scans all the log of logs that are registered in the RCDS. Information is gathered for recovery, and the RCDS is updated with this information. If a scan has not run recently, it might take some time to finish the forward recovery. It is helpful to set up a scan as a batch job that can be run at regularly scheduled times to keep the RCDS as up-to-date as possible.

CICS VR can run the log of logs scan automatically, at regularly scheduled times. CICS VR can also run the log of logs scan manually, at more convenient times.

Automatic log of logs scanning

The log of logs scan can be run automatically at regularly scheduled times, once a day. If specified, the first automatic log of logs scan starts twenty-four hours after the CICS VR server is activated. The LOLSCAN function can be specified in one of three ways.

1. As a CICSVR_GENERAL_CONTROL parameter in the active IGDSMSxx member of SYS1.PARMLIB, where it takes effect during system initialization.
2. In the SETSMS CICSVR_GENERAL_CONTROL operator command, the CICS VR address space is notified immediately to refresh control defaults. The first automatic log of logs scan starts twenty-four hours after the CICS VR is activated and continues to run every twenty-four hours.

   (OR)

   Use CICS VR Panel to customize log of log scan schedule. For more information, see Automatic log of log scan schedule in the User Guide.
3. Using the "CICS VR panel interface".

For more information, see “Defining a CICS VR general control parameter” on page 33.

Manual log of logs scanning

The log of logs scan can be run manually, when required. The SCAN function can be specified in one of three ways.

1. As a CICSVR_GENERAL_CONTROL parameter in the active IGDSMSxx member of SYS1.PARMLIB, where it takes effect during system initialization.
2. In the SETSMS CICSVR_GENERAL_CONTROL operator command, where it takes effect immediately.
3. Using the "CICS VR panel interface".

For more information, see “Defining a CICS VR general control parameter” on page 33.

Log of logs scan JCL skeleton

CICS VR uses a customized version of the log of logs scan JCL skeleton to run the log of logs scan at regularly scheduled times and to run the scan manually at convenient times. The skeleton is located in member DWWARSCA of the CICS VR library SDWWCNTL. An example is shown in Figure 55 on page 102. Modify the log of logs scan JCL skeleton to conform to the environment standards by commenting out JOB statement, symbolic parameters and keep “LOGOFLOGS SCAN” command in DWWIN. Copy the updated DWWARSCA member into PROCLIB library. If RACF or a similar security product is in place, define the DWWARSCA started task to RACF and assign it to a user ID with the appropriate authorization to browse the output of the log of logs scan job.

```
//DWWARSCA JOB (ACCOUNT),MSGLEVEL=(1,1),MSGCLASS=H,REGION=4M
//*******************************************************************/
//*                                                                 */
//* @BANNER_START                                                   */
//* Licensed Materials - Property of IBM                           */
//*                                                                 */
//* 5655-GY1              DWWARSCA                                  */
//*                                                                 */
//* Copyright IBM Corp. 2014                                        */
//* Copyright HCL Technologies Ltd. 2025                            */
//* @BANNER_END                                                     */
//*                                                                 */
//*******************************************************************/
//*                                                                 */
//*   CHANGE ACTIVITY:                                              */
//*                                                                 */
//* $AL= CVR420  420 060914 KVV                                 @ALA*/
//*      LOG OF LOGS SCAN AUTOMATION                            @ALA*/
//*                                                                 */
//*******************************************************************/
//*
//*  SET SYMBOLIC PARAMETERS
//*
//SETPREF  SET PREF=DWW                  ! CICSVR RCDS NAME PREFIX
//SETSUFF  SET SUFF=PROD                 ! CICSVR XCF GROUP NAME SUFFIX
//*
//SETDEREG SET DEREG=NO                  ! AUTOMATIC DEREGISTRATION
//SETREP   SET REP=NO                    ! RECOVERY REPORT PRODUCING
//*
//*  INVOKE CICSVR LOG OF LOGS SCAN UTILITY TO SCAN
//*  ALL LOG OF LOGS THAT ARE REGISTERED IN RCDS
//*  AND UPDATE RCDS WITH INFORMATION
//*  FROM THOSE LOG OF LOGS
//*
//LOLSCAN  EXEC PGM=DWWAR,PARM='AUTODEREG(&DEREG) RECOVERYREPORT(&REP)'
//DWWMSG   DD SYSOUT=*                    ! MESSAGE DATA SET
//DWWPRINT DD SYSOUT=*                    ! REPORT DATA SET
//DWWCON1  DD DISP=SHR,DSN=&PREF..DWWCON1.GRP&SUFF ! RCDS DATA SET
//DWWCON2  DD DISP=SHR,DSN=&PREF..DWWCON2.GRP&SUFF ! RCDS DATA SET
//DWWCON3  DD DISP=SHR,DSN=&PREF..DWWCON3.GRP&SUFF ! RCDS DATA SET
//DWWIN    DD *                           ! COMMAND DATA SET
  LOGOFLOGS SCAN AUTODEREG(NO) RECOVERYREPORT(NO)
```

Figure 55. Log of logs scan JCL skeleton

Setting up CICS VR change accumulation

CICS VR CA reduces the time it takes to perform a forward recovery.

CICS VR CA consolidates forward recovery log records into a CA data set. CICS VR uses the CA data set in conjunction with the forward recovery log to reduce the number of log records that CICS VR needs to apply to return the sphere to the exact state before the data was lost.

CICS VR change accumulation consolidates all log records written for VSAM spheres since their latest backups were taken. The consolidated log records are then written to a change accumulation data set. For example, if 100 updates were made to the same record in a VSAM sphere, this would produce 100 after-image log records. CICS VR change accumulation processing can then sort and filter these log records, copying only the most recent after-image into the CA data set. CICS VR then can use this CA data set (instead of reading the 100 after-images) during forward recovery processing.

CICS VR CA processing only processes log records written since the latest backups were taken for the spheres. When CICS VR finds that new backups have been taken for VSAM spheres, the old CA data sets for the spheres are invalidated. If CICS VR is aware of logical backups that are taken for the spheres, the process of invalidating outdated CA data sets is automated. If CICS VR is not aware of backups created for the spheres, the latest backup dates and times must be manually entered into the CA batch jobs before execution.

Note: CICS VR is aware of logical backups if they have either been registered in the CICS VR RCDS through backup notification, or if they are registered in DFSMShsm's inventory.

CA is a two step process. The next two sections cover both of these steps.

Step 1: Set up change accumulation batch jobs

The first step is to create batch jobs that define CA groups and identify the spheres in each group.

This example shows the commands necessary to define a CA group and the sphere names associated with that group when CICS VR is aware of the logical backups created for the spheres.

```
//JOBCA1   JOB MSGCLASS=X,CLASS=A,MSGLEVEL=(1,1),REGION=0M
//* CICSVR PROGRAM
//STEP1    EXEC PGM=DWWCA
//* LIBRARY CONTAINING CICSVR PROGRAMS
//STEPLIB DD DSN=DWW.SDWWLOAD,DISP=SHR
// DD DSN=DWW.SDWWLENU,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWSORT  DD SYSOUT=*
//* CICSVR RECOVERY CONTROL DATA SET NAMES
//DWWCON1  DD DSN=DWW.DWWCON1,DISP=SHR
//DWWCON2  DD DSN=DWW.DWWCON2,DISP=SHR
//DWWCON3  DD DSN=DWW.DWWCON3,DISP=SHR
//SORTWK01 DD UNIT=SYSDA,SPACE=(CYL,(100,25))
//SORTWK02 DD UNIT=SYSDA,SPACE=(CYL,(100,25))
//SORTWK03 DD UNIT=SYSDA,SPACE=(CYL,(100,25))
//DWWIN    DD *
  CA -
           GROUP(MYCAGROUP1) -
           PREFIX(CA)        -
           VOLUME(123456)
           UNIT(3390)
  SPHERE -
           NAME(PROD.PAYROLL1)
  SPHERE -
           NAME(PROD.PAYROLL2)
```

Figure 56. Change accumulation batch job when CICS VR is aware of logical backups created for the spheres in the group

The CA command:

- Defines a CA group name, MYCAGROUP1
- Specifies that the high level qualifier, CA, is used for the dynamically created CA output data set
- Specifies the volume serial number for the CA output data set if it is not an SMS-managed data set
- Specifies the device type for the CA output data set if it is not an SMS-managed data set

The SPHERE command:

- Identifies the spheres in that group, PROD.PAYROLL1 and PROD.PAYROLL2

Choose VSAM spheres that have the same backup requirements when you create your CA group. IBM recommends that you backup all the spheres in a CA group at the same time and then run the CA batch job.

When this job is run, CA calls DFSORT, or an equivalent product with equivalent support, to sort the forward recovery log stream records for PROD.PAYROLL1 and PROD.PAYROLL2. See Chapter 17, “Diagnosing change accumulation and DFSORT problems,” on page 335 for information on eliminating common errors. When the records are sorted, CA consolidates the records by applying the log records for PROD.PAYROLL1 and PROD.PAYROLL2 to a CICS VR dynamically created CA data set.

Every time the CA job is run, the CA data set is updated with the information from the next forward recovery log range.

You do not need to create or keep track of the CA output data set. CICS VR dynamically creates and registers a unique CA output data set using the naming convention, *prefix*.CAOUTPUT.D*yyyyddd*.*Thhmmsst*, where:

prefix
Is the CICS VR data set name, *CICSVR_DSNAME_PREFIX*, defined in the IGDSMSxx PARMLIB member or the prefix specified in the CA command. If both are present and different, the prefix in the CA command is used.

CAOUTPUT
Is a constant to mark this as a CA output data set.

D
Is the abbreviation for the date.

yyyy
Is the year.

ddd
Is the day of the year, in Julian format.

T
Is the abbreviation for the time.

hh
Is the hour of the day, based on a 24-hour clock.

mm
Is the number of minutes.

ss
Is the number of seconds.

t
Is the tenths of a second.

When the CA batch job is run again, CA obtains the latest information about the backups. If a new backup has been taken, CA determines that the information in the CA data set for PROD.PAYROLL1 is no longer valid and does not use it. Instead, CA collects the log records from the forward recovery log for PROD.PAYROLL1 and the log records from the CA data set and the forward recovery log for PROD.PAYROLL2 and calls DFSORT to sort the records. When the records are sorted, CA consolidates the records by applying the log records for PROD.PAYROLL1 and PROD.PAYROLL2 to the CA data set.

It is important that you run the CA batch job immediately after a backup is taken for any of the spheres in the MYCAGROUP1 group so the CA information for that sphere is invalidated and is not used by CICS VR if a recovery is requested. Run the CA batch job for MYCAGROUP1 over and over again so that the CA data set is kept up-to-date. CA significantly speeds up forward recovery processing by consolidating the log stream records before a recovery is needed.

For information on diagnosing DFSORT problems see Chapter 17, “Diagnosing change accumulation and DFSORT problems,” on page 335.

This example shows the commands necessary to define a CA group and the sphere names associated with that group when CICS VR is not aware of the logical backups created for the spheres in the group.

```
//JOBCA2   JOB MSGCLASS=X,CLASS=A,MSGLEVEL=(1,1),REGION=0M
//* CICSVR PROGRAM
//STEP1 EXEC PGM=DWWCA
//* LIBRARY CONTAINING CICSVR PROGRAMS
//STEPLIB  DD DSN=DWW.SDWWLOAD,DISP=SHR
// DD DSN=DWW.SDWWLENU,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWSORT  DD SYSOUT=*
//* CICSVR RECOVERY CONTROL DATA SET NAMES
//DWWCON1  DD DSN=DWW.DWWCON1,DISP=SHR
//DWWCON2  DD DSN=DWW.DWWCON2,DISP=SHR
//DWWCON3  DD DSN=DWW.DWWCON3,DISP=SHR
//SORTWK01 DD UNIT=SYSDA,SPACE=(CYL,(100,25))
//SORTWK02 DD UNIT=SYSDA,SPACE=(CYL,(100,25))
//SORTWK03 DD UNIT=SYSDA,SPACE=(CYL,(100,25))
//DWWIN    DD *
 CA -
         GROUP(MYCAGROUP2) -
         VOLUME(123456) -
         UNIT(3490)
 SPHERE -
         NAME(PROD.PAYROLL1) -
         BACKUPTIME(dateandtime,GMT)
 SPHERE -
         NAME(PROD.PAYROLL2) -
         BACKUPTIME(dateandtime,GMT)
 SPHERE -
         NAME(PROD.PAYROLL3) -
         BACKUPTIME(dateandtime,GMT)
 SPHERE -
         NAME(PROD.PAYROLL4) -
         BACKUPTIME(dateandtime,GMT)
```

Figure 57. Change accumulation batch job when CICS VR is not aware of logical backups created for the spheres in the group

The CA command defines a CA group name, MYCAGROUP2, and the SPHERE command identifies the spheres in that group, PROD.PAYROLL1, PROD.PAYROLL2, PROD.PAYROLL3, and PROD.PAYROLL4. You must specify the date and time of the most recent backup for the sphere in the BACKUPTIME field. CA only collects records for the VSAM sphere that occur after the backup was made. You can run this job multiple times for the VSAM spheres until a new backup is made. When a new backup is made for a VSAM sphere, you must update the BACKUPTIME field and run this job again. When you run this job, CA calls DFSORT to sort the forward recovery log stream records for PROD.PAYROLL1, PROD.PAYROLL2, PROD.PAYROLL3, and PROD.PAYROLL4. When the records are sorted, CA records are written to a CICS VR dynamically created CA data set on tape volume 123456.

Understanding the change accumulation utility report

A CICS VR CA utility report is produced every time the CA command is issued.

This figure shows the CA utility report.

```
CICSVR - CHANGE ACCUMULATION UTILITY        DATE : 2008/05/30   TIME : 17:50:36

CHANGE ACCUMULATION STATISTICS FOR CA GROUP
==========================================
CA GROUP NAME                 : CICSMVS

CURRENT VSAM DATA SETS IN THIS CA GROUP  PREVIOUS VSAM DATA SETS IN THIS CA GROUP
======================================  ======================================
CICS1.PROD1.BASE                        CICS1.PROD1.BASE
CICS1.PROD2.BASE                        CICS1.PROD2.BASE
CICS1.PROD3.BASE

INPUT CA DATA SET STATISTICS
============================
INPUT CA DATA SET NAME        : A12345.B6789.C12345
FIRST RECORD TIMESTAMP, LOCAL : 2008.030 14.10.30
FIRST RECORD TIMESTAMP, GMT   : 2008.030 16.10.30
LAST RECORD TIMESTAMP, LOCAL  : 2008.030 14.10.35
LAST RECORD TIMESTAMP, GMT    : 2008.030 16.10.35
NUMBER OF RECORDS READ        :       20

VSAM DATA SETS STATISTICS FOR INPUT CA DATA SET OF THIS CA GROUP
================================================================
BASE CLUSTER NAME             : CICS1.PROD1.BASE
START DATE AND TIME LOCAL     : 2008.030 14:00:23
START DATE AND TIME GMT       : 2008.030 16:00:23
STOP DATE AND TIME LOCAL      : 2008.030 14:10:18
STOP DATE AND TIME GMT        : 2008.030 16:10:18
LAST BACKUP TIME LOCAL        : 2008.030 14:05:00
LAST BACKUP TIME GMT          : 2008.030 16:05:00

----------------------------------------------------------------

BASE CLUSTER NAME             : CICS1.PROD2.BASE
START DATE AND TIME LOCAL     : 2008.030 14:00:23
START DATE AND TIME GMT       : 2008.030 16:00:23
STOP DATE AND TIME LOCAL      : 2008.030 14:10:18
STOP DATE AND TIME GMT        : 2008.030 16:10:18
LAST BACKUP TIME LOCAL        : 2008.030 14:05:00
LAST BACKUP TIME GMT          : 2008.030 16:05:00
----------------------------------------------------------------

CICSVR - CHANGE ACCUMULATION UTILITY        DATE : 2008/05/30   TIME : 17:50:36

JOURNAL STATISTICS
==================
JOURNAL NAME                  : CICSPROD.DFHJ02A
FIRST TIME LOCAL              : 2008.030 14.15.30
LAST TIME LOCAL               : 2008.030 14.15.35
NUMBER OF RECORDS READ        :       20

JOURNAL STATISTICS
==================
JOURNAL NAME                  : CICSPROD.DFHJ02B
FIRST TIME LOCAL              : 2008.030 14.15.35
LAST TIME LOCAL               : 2008.030 14.15.40
NUMBER OF RECORDS READ        :
30
```

Figure 58. Change accumulation output, page 1 of 2

This Figure shows CA output for an MVS log stream.

```
LOGSTREAM STATISTICS
====================
LOGSTREAM NAME                : CICSVR1.MVSLOG.LOL1
FIRST TIME GMT                : 2008.030 16.15.30
LAST TIME GMT                 : 2008.030 16.15.35
FIRST TIME LOCAL              : 2008.030 14.15.30
LAST TIME LOCAL               : 2008.030 14.15.35
FIRST BLOCK ID                :          737
LAST BLOCK ID                 :          994
NUMBER OF RECORDS READ        :       20


CICSVR - CHANGE ACCUMULATION UTILITY        DATE : 2008/05/30   TIME : 17:50:36

OUTPUT CA DATA SET STATISTICS
=============================
OUTPUT CA DATA SET NAME       : A12345.B6789.C12345
VOLUME                        : 123456
UNIT                          : 3490
FIRST RECORD TIMESTAMP, LOCAL : 2008.030 14.10.35
FIRST RECORD TIMESTAMP, GMT   : 2008.030 16.10.35
LAST RECORD TIMESTAMP, LOCAL  : 2008.030 14.10.40
LAST RECORD TIMESTAMP, GMT    : 2008.030 16.10.40
NUMBER OF RECORDS WRITTEN     :      277

VSAM DATA SETS STATISTICS FOR OUTPUT CA DATA SET OF THIS CA GROUP
=================================================================
BASE CLUSTER NAME             : CICS1.PROD1.BASE
START DATE AND TIME LOCAL     : 2008.030 14:19:23
START DATE AND TIME GMT       : 2008.030 16:19:23
STOP DATE AND TIME LOCAL      : 2008.030 16:47:18
STOP DATE AND TIME GMT        : 2008.030 18:47:18
LAST BACKUP TIME LOCAL        : 2008.030 14:19:00
LAST BACKUP TIME GMT          : 2008.030 16:19:00
NUMBER OF RECORDS WRITTEN     :       120

---------------------------------------------------------------

BASE CLUSTER NAME             : CICS1.PROD2.BASE
START DATE AND TIME LOCAL     : 2008.030 14:21:37
START DATE AND TIME GMT       : 2008.030 16:21:37
STOP DATE AND TIME LOCAL      : 2008.030 17:23:27
STOP DATE AND TIME GMT        : 2008.030 19:23:27
LAST BACKUP TIME LOCAL        : 2008.030 12:23:27
LAST BACKUP TIME GMT          : 2008.030 14:23:27
NUMBER OF RECORDS WRITTEN     :       39

---------------------------------------------------------------

BASE CLUSTER NAME             : CICS1.PROD3.BASE
START DATE AND TIME LOCAL     : 2008.030 14:44:02
START DATE AND TIME GMT       : 2008.030 16:44:02
STOP DATE AND TIME LOCAL      : 2008.030 16:23:05
STOP DATE AND TIME GMT        : 2008.030 18:23:05
LAST BACKUP TIME LOCAL        : 2008.030 13:23:05
LAST BACKUP TIME GMT          : 2008.030 15:23:05
NUMBER OF RECORDS WRITTEN     :       98

---------------------------------------------------------------
```

Figure 59. Change accumulation output, page 2 of 2

CA utility report fields description:

CA group name
The group name from the CA command. The CA Group name must be unique and is used by CICS VR to identify the specified group of data sets in the RCDS. The group name is a maximum of 36 characters.

Input CA data set name
The name of the CA data set dynamically created during the previous CA utility run for this CA group.

First record timestamp, local
The first time recorded on the input CA data set, in the local time format.

First record timestamp, GMT
The first time recorded on the input CA data set, in the GMT format.

Last record timestamp, local
The last time recorded on the input CA data set, in the local time format.

Last record timestamp, GMT
The last time recorded on the input CA data set, in the GMT format.

Number of records read
The number of records read from the input CA data set.

Base cluster name
The base VSAM data set name from the input CA data set of this CA group.

Start date and time local
The first VSAM data set timestamp recorded on the input CA data set, in the local time format.

Start date and time GMT
The first VSAM data set timestamp recorded on the input CA data set, in the GMT format.

Stop date and time local
The last VSAM data set timestamp recorded on the input CA data set, in the local time format.

Stop date and time GMT
The last VSAM data set timestamp recorded on the input CA data set, in the GMT format.

Last backup time local
The VSAM data set backup time used when the input CA data set was created, in the local time format.

Last backup time GMT
The VSAM data set backup time used when the input CA data set was created, in the GMT format.

Journal name
The input journal name if CICS logs are used for this CA group.

First time local
The first time recorded on this journal, in the local time format only, GMT format is not applicable.

Last time local
The last time recorded on this journal, in the local time format only, GMT format is not applicable.

Number of records read
The number of records read from this journal.

Logstream name
The name of the MVS log stream used for CICS TS logging or VSAM batch logging.

First time GMT
The first time recorded on this log stream, in the GMT format.

Last time GMT
The last time recorded on this log stream, in the GMT format.

First time local
The first time recorded on this log stream, in the local time format.

Last time local
The last time recorded on this log stream, in the local time format.

First block ID
The first block ID on the log stream.

Last block ID
The last block ID on the log stream.

Number of records read
The number of records read from this log stream.

Output CA data set name
The name of the CA data set dynamically created during the current CA utility run for this CA group.

Volume
The volume serial number from the CA command. It must be specified if the output CA data set is not a SMS-managed data set.

Unit
The device type from the CA command. It must be specified if the output CA data set is not a SMS-managed data set.

First record timestamp, local
The first time recorded on the output CA data set, in the local time format.

First record timestamp, GMT
The first time recorded on the output CA data set, in the GMT format.

Last record timestamp, local
The last time recorded on the output CA data set, in the local time format.

Last record timestamp, GMT
The last time recorded on the output CA data set, in the GMT format.

Number of records written
The number of records written to the output CA data set.

Base cluster name
The base VSAM data set name for the output CA data set of this CA group.

Start date and time local
The first VSAM data set timestamp recorded on the output CA data set, in the local time format.

Start date and time GMT
The first VSAM data set timestamp recorded on the output CA data set, in the GMT format.

Stop date and time local
The last VSAM data set timestamp recorded on the output CA data set, in the local time forma).

Stop date and time GMT
The last VSAM data set timestamp recorded on the output CA data set, in the GMT format.

Last backup time local
The VSAM data set backup time used when the output CA data set was created, in the local time format.

Last backup time GMT
The VSAM data set backup time used when the output CA data set was created, in the GMT format.

Number of records written
The number of records written to the output CA data set for this VSAM data set.

Step 2: Use the change accumulation data sets in a forward recovery

The second step occurs automatically when you use the CICS VR ISPF dialog interface to forward recover a sphere.

When you use the ISPF dialog to forward recover a sphere, CICS VR automatically generates the APPLYCA keyword on the RECOVER command in the forward recovery job. APPLYCA tells CICS VR to apply the records in the CA data set to the restored VSAM sphere, then apply the remaining log range from the forward recovery log, to pick up the most recent changes. If no CA data set exists, CICS VR ignores the APPLYCA keyword.

Using the CA data set can significantly improve the performance of your forward recovery runs. If there is a specific reason you do not want to use the CA data set for a forward recovery run, you can manually delete the APPLYCA lines from the forward recovery job. If the APPLYCA keywords are deleted, CICS VR does not use the CA data set and it only applies the records from the forward recovery log.

Note: To allow for CICS VR to perform a selective forward recovery by specifying the EXCLUDE and INCLUDE commands on a recovery job, be sure to save the log records for the time period you want to cover. CICS VR cannot use change accumulation data sets when performing selective forward recovery. CICS VR must use log records from an MVS log stream or log stream copy to perform selective forward

recovery. See “INCLUDE: Only use specific log records” on page 256 and “EXCLUDE: Exclude specific log records” on page 254 for more information.

```
//JOB7     JOB MSGCLASS=X,CLASS=A,MSGLEVEL=(1,1),REGION=0M
//DWW      PROC
//*CICSVR PROGRAM
//RECOVER  EXEC PGM=DWWCO
//*
//*LIBRARY WITH CICSVR PROGRAM
//STEPLIB DD DISP=SHR,DSN=DWW.SDWWLOAD
// DD DISP=SHR,DSN=DWW.SDWWLENU
//*
//*MESSAGE LIBRARY
//DWWMSG   DD SYSOUT=*
//*
//*PRINT LIBRARY
//DWWPRINT DD SYSOUT=*
//*
//*RCDS
//DWWCON1  DD DSN=DWW.DWWCON1,DISP=SHR
//DWWCON2  DD DSN=DWW.DWWCON2,DISP=SHR
//DWWCON3  DD DSN=DWW.DWWCON3,DISP=SHR
//            PEND
//* END OF PROC
//DWW001 EXEC DWW
//DWWIN    DD   *
  RECOVER -
    ONLY -
    APPLYCA -
    STARTTIME(08.245/17:07:42) -
    STOPTIME(08.245/17:10:38) -
    STARTAT(DSNAME) -
    VERSION(001) -
    SPHERE(DATASETNAME1)
  RECOVER -
    ONLY -
    APPLYCA -
    STARTTIME(08.245/17:07:42) -
    STOPTIME(08.245/17:10:38) -
    STARTAT(DSNAME) -
    VERSION(001) -
    SPHERE(DATASETNAME2)
  MVSLOG -
    NAME(LOGSTREAMNAME1)
```

Figure 60. Sample ISPF dialog generated forward recovery job with APPLYCA

Using change accumulation in a remote site recovery scenario

If you want to periodically create change accumulation data sets and send them for use during forward recovery processing at a remote recovery site, you can consider using change accumulation with the options described in this section.

Up to this point, the process of change accumulation has been described in a way that is mainly suitable for creating change accumulation data sets for use during forward recovery processing at the primary site.

The sample CA job Figure 61 on page 111 is an example of running a change accumulation job with options that consolidates all log records found for all VSAM spheres on MVS log stream SAMPLE.FWDRECV.LOGSTRM.

The first time this change accumulation job is run, all log records found for all VSAM spheres from the beginning of the log stream, up to the time the job was submitted, are consolidated.

Every subsequent time this job is run, all log records found for all VSAM spheres from the point on the log stream where the previous CA job ended, up to the time the current job was submitted, are consolidated.

The consolidated log records are placed in the change accumulation data set specified in the DWWCA DD statement. See the sections following this example job for a further description of the change accumulation options.

```
//JOB1 JOB ACCOUNTING INFORMATION,REGION=0M                    1
//COMMAND  EXEC PGM=DWWCA                                      2
//STEPLIB  DD DSN=DWW.SDWWLOAD,DISP=SHR                        3
//DWWCON1  DD DSN=DWW.DWWCON1,DISP=SHR                         4
//DWWCON2  DD DSN=DWW.DWWCON2,DISP=SHR                         5
//DWWCON3  DD DSN=DWW.DWWCON3,DISP=SHR                         6
//DWWMSG   DD SYSOUT=*                                         7
//DWWPRINT DD SYSOUT=*                                         8
//DWWSORT  DD SYSOUT=*                                         9
//SORTWK01 DD UNIT=SYSDA,SPACE=(CYL,(100,25))                  10
//SORTWK02 DD UNIT=SYSDA,SPACE=(CYL,(100,25))                  11
//SORTWK03 DD UNIT=SYSDA,SPACE=(CYL,(100,25))                  12
//DWWCA    DD DSN=SAMPLE.CA.DATASET.ONE,DISP=(NEW,CATLG),      13
//            UNIT=3390,VOL=SER=VOLUM1,SPACE=(CYL,(10,10)),
//            DCB=(RECFM=VB,LRECL=32752,BLKSIZE=32756)
//DWWIN   DD *                                                 14
   CA GROUP(GROUPONE)       -                                  15
        ONLY(SAMPLE.FWDRECV.LOGSTRM)
   SPHERE                   -                                  16
        ALL
/*
//
```

Figure 61. Example CA job with remote site recovery options

1

The JOB statement defines a CICS VR job.

2

The EXEC statement defines a CICS VR job step. This specifies that the CICS VR change accumulation program DWWCA is to be run. The prefix DWW always refers to a component of CICS VR.

3

The STEPLIB DD statement specifies the name of the CICS VR load library, for example, DWW.SDWWLOAD, used for this job step.

4 , 5, 6

DWWCON1, DWWCON2 and DWWCON3 define the three CICS VR recovery control data sets. If you are running the CICS VR server, you must use the RCDS naming convention described in Chapter 4, “Activating the CICS VR server address space,” on page 29.

7

DWWMSG defines the output data set that contains the CICS VR messages. This is usually defined as a SYSOUT data set. The DCB parameters for this data set are RECFM=FBA and LRECL=133. The block size can be provided on the DWWMSG DD statement and must be a multiple of 133. The default is 27930.

8

DWWPRINT defines the output data set that contains the reports produced by CICS VR. This is usually defined as a SYSOUT data set. The DCB parameters for this data set are RECFM=FBA and LRECL=133. The block size can be provided on the DWWPRINT DD statement and must be a multiple of 133. The default is 27930.

9

DWWSORT defines the output data set that contains the CICS VR messages produced during sort processing. This is usually defined as a SYSOUT data set. The DCB parameters for this data set are RECFM=FBA and LRECL=133. The block size can be provided on the DWWSORT DD statement and must be a multiple of 133. The default is 27930.

10 , 11, 12

SORTWK01, SORTWK02 and SORTWK03 define work data sets required by DFSORT.

13

DWWCA defines the output change accumulation data set that contains the consolidated log records. The record format for this data set is RECFM=VB. The record length and block size can be provided on the DWWCA DD statement. The default record length is 32752 and the default block size is 32756.

14
DWWIN defines the data set that contains the CICS VR commands. You can either specify a sequential data set with 80-byte, fixed-length records, or include the CICS VR commands in-stream as shown.

15
On the CA command:

- The GROUP keyword defines a change accumulation group, GROUPONE.
- The ONLY keyword specifies that only log records from the portion of log stream SAMPLE.FWDRECV.LOGSTRM read by CICS VR are consolidated.

16
On the SPHERE command:

- The ALL keyword specifies that all log records for all VSAM spheres found on the portion of the log stream read by CICS VR are consolidated.

Specifying change accumulation options for remote site recovery

The options used for change accumulation and remote site recovery.

The ONLY keyword on the CA command
If you add the ONLY keyword as input to the CA command of the change accumulation utility, CICS VR only consolidates log records from the portion of the log stream that is read for the VSAM spheres in the change accumulation group. You can periodically run change accumulation batch jobs with the ONLY keyword specified, to produce change accumulation data sets that can be sent to a remote recovery site. Change accumulation data sets produced in this way do not contain overlapping data, and so the amount of data sent to the remote recovery site is reduced.

The log stream parameter for the ONLY keyword on the CA command
The first time you run a change accumulation batch job for a change accumulation group with the ONLY keyword specified, you must also specify the name of the log stream that contains the log records to be consolidated. The log stream name must be specified as a parameter to the ONLY keyword.

CICS VR associates the specified log stream with the change accumulation group and stores this information. You do not need to specify the log stream name for any subsequent CA runs for the same change accumulation group, unless you need to change the log stream name that CICS VR has associated with the CA group.

The DWWCA DD statement in the JCL for the batch job
If the ONLY keyword is specified, you must also specify the name of the output change accumulation data set in the DWWCA DD statement of the change accumulation batch job JCL. The record format of the change accumulation data set must be VB. CICS VR uses the following default DCB values if they are not specified on the DD statement:

- Record length: 32752
- Block size: 32756

Note: When the ONLY keyword is specified, CICS VR does not dynamically create the output change accumulation date set. Create the data set prior to running the change accumulation job, or specify the DISP=NEW parameter in the DWWCA DD statement allocation.

The ALL keyword on the SPHERE command
Each VSAM sphere that you want to include in a change accumulation group, can be specified as input to the change accumulation utility using the NAME keyword of the SPHERE command. However, you can also have CICS VR consolidate all log records for all VSAM spheres found on a particular log stream, without having to enter the name of each sphere individually. Specify the ALL keyword on the SPHERE command as input to the change accumulation utility, to have CICS VR consolidate all log records found for all VSAM spheres on the portion of the log stream that is read by CICS VR.

Note: The ALL keyword can only be specified on the SPHERE command if the ONLY keyword is specified on the CA command.

Understanding change accumulation sequencing

The first time a change accumulation batch job is run with the ONLY keyword specified for a change accumulation group, CICS VR consolidates log records from the beginning of the specified log stream up to the time the job was submitted.

The next time the same change accumulation job is run, CICS VR consolidates log records from the time that the last change accumulation job stopped, up to the time the current job was submitted. The table Table 6 on page 113 summarizes change accumulation sequencing for a sample CA group:

Table 6. Change accumulation sequencing for a sample CA group

Job run	First consolidated log record	Last consolidated log record
First run	First log record on the log stream	Last log record with a time stamp earlier than or equal to current job's submission time
All other runs	First log record with a time stamp later than previous job's submission time	Last log record with a time stamp earlier than or equal to current job's submission time

Note: A date and time can be entered as a parameter of the BACKUPTIME keyword in the SPHERE command. If BACKUPTIME is specified, CICS VR uses the entered data and time when determining the first log record to consolidate. Only log records that have a time stamp equal to or later than the specified date and time are consolidated. A separate BACKUPTIME keyword can be added for the ALL keyword and each NAME keyword in the SPHERE command if desired.

Using change accumulation data sets during forward recovery at a remote recovery site

If you have periodically created change accumulation data sets using CA batch jobs with the ONLY keyword specified, you can use them to forward recover VSAM spheres at a remote recovery site, without having to send a copy of the primary site's RCDS to the remote recovery site.

To forward recover VSAM spheres from these change accumulation data sets, create a standard CICS VR forward recovery job and add the MVSLOG command with the CA keyword specified.

The example Figure 62 on page 113 is of a CICS VR recovery job that forward recovers a VSAM sphere from three change accumulation data sets. See the sections following this example job for a further description of the recovery options.

```
//JOB1 JOB ACCOUNTING INFORMATION,REGION=0M                  1
//COMMAND  EXEC PGM=DWWCO                                    2
//STEPLIB  DD DSN=DWW.SDWWLOAD,DISP=SHR                      3
// DD DSN=DWW.SDWWLENU,DISP=SHR
//DWWCON1  DD DSN=DWW.DWWCON1,DISP=SHR                       4
//DWWCON2  DD DSN=DWW.DWWCON2,DISP=SHR                       5
//DWWCON3  DD DSN=DWW.DWWCON3,DISP=SHR                       6
//DWWMSG   DD SYSOUT=*                                       7
//DWWPRINT DD SYSOUT=*                                       8
//DWWLOG   DD DSN=SAMPLE.CA.DATASET.ONE,DISP=SHR             9
//         DD DSN=SAMPLE.CA.DATASET.TWO,DISP=SHR
//         DD DSN=SAMPLE.CA.DATASET.THREE,DISP=SHR
//DWWIN   DD *                                              10
   RECOVER -                                                11
        DSN(SAMPLE.VSAM.SPHERE)
   MVSLOG CA                                                12
/*
//
```

Figure 62. Example remote site recovery job with CA options

1
The JOB statement defines a CICS VR job.

2
The EXEC statement defines a CICS VR job step. This specifies that the CICS VR recovery program DWWCO is to be run. The prefix DWW always refers to a component of CICS VR.

3
The STEPLIB DD statement specifies the name of the CICS VR load library, for example, DWW.SDWWLOAD, used for this job step.

4 , 5, 6
DWWCON1, DWWCON2 and DWWCON3 define the three CICS VR recovery control data sets. In this scenario, these VSAM data sets can be unique to the remote recovery site, and can also be empty.

7
DWWMSG defines the output data set that contains the CICS VR messages. This is usually defined as a SYSOUT data set. The DCB parameters for this data set are RECFM=FBA and LRECL=133. The block size can be provided on the DWWMSG DD statement and must be a multiple of 133. The default is 27930.

8
DWWPRINT defines the output data set that contains the reports produced by CICS VR. This is usually defined as a SYSOUT data set. The DCB parameters for this data set are RECFM=FBA and RECL=133. The block size can be provided on the DWWPRINT DD statement and must be a multiple of 133. The default is 27930.

9
DWWLOG defines the change accumulation data sets that CICS VR uses to forward recover the specified VSAM sphere.

10
DWWIN defines the data set that contains the CICS VR commands. You can either specify a sequential data set with 80-byte, fixed-length records, or include the CICS VR commands in-stream as shown.

11
The RECOVER command specifies that VSAM sphere SAMPLE.VSAM.SPHERE is forward recovered by CICS VR.

12
On the MVSLOG command:

- The CA keyword specifies that only change accumulation data sets specified in the DWWLOG DD statement are used to forward recover the specified VSAM sphere. See “Using change accumulation in a remote site recovery scenario” on page 110 for an example of a batch job that creates the required change accumulation data sets.

Specifying the MVSLOG command with the CA keyword

Specifying the MVSLOG command with the CA keyword indicates to CICS VR that the VSAM spheres are to be recovered entirely from change accumulation data sets. The names of the change accumulation data sets that CICS VR uses during forward recovery must be specified in the DWWLOG DD statement of the recovery job JCL. Only change accumulation data sets listed in the DWWLOG DD statement are used during forward recovery processing when the MVSLOG command is specified with the CA keyword.

In general, specify in the DWWLOG DD statement all change accumulation data sets that:

- contain information about the VSAM spheres being recovered.
- were created after the backups that were used to restore the VSAM spheres at the remote recovery site were taken.

If you are performing CICS VR SHADOW processing, specify in the DWWLOG DD statement all change accumulation data sets that:

- Contain information about the VSAM spheres being recovered.
- Were created after the last SHADOW job for the spheres was run.

The change accumulation data sets are listed in ascending order with the CA data set that contains the earliest time stamp listed first. For example, the following change accumulation data sets for a CA group were created on the dates shown here:

```
SAMPLE.CA.DATASET.ONE        03.145 09:15:2003
SAMPLE.CA.DATASET.TWO        03.146 10:12:2003
SAMPLE.CA.DATASET.THREE      03.147 11:14:2003
```

Those CA data sets are displayed in the DWWLOG DD statement in ascending order, as follows:

```
//DWWLOG   DD DSN=SAMPLE.CA.DATASET.ONE,DISP=SHR
//         DD DSN=SAMPLE.CA.DATASET.TWO,DISP=SHR
//         DD DSN=SAMPLE.CA.DATASET.THREE,DISP=SHR
```

Note: When the MVSLOG command is specified with the CA keyword, the APPLYCA keyword is ignored by CICS VR. Do not specify the APPLYCA keyword when the MVSLOG command is specified with the CA keyword.

Deciding if you want to use shadow copies

You can reduce the time it takes to forward recover a VSAM file by creating a shadow copy of it.

With a shadow copy, you:

- Create a copy of the VSAM sphere.
- Regularly run a CICS VR shadow forward recovery job to update that copy with all the log entries up to the current time.

If the shadow forward recovery job is run often, the shadow copy of the VSAM sphere is kept up-to-date. If the VSAM sphere is damaged, only a few updates need to be made to the shadow copy to return it to the same state as the original VSAM sphere.

Shadow forward recovery is intended for users who want to maintain a copy of critical data sets to reduce the forward recovery time.

Shadow copies are also useful at remote recovery sites when using products such as Remote Recovery Data Facility (RRDF).

The following topics are discussed in this section:

- Preparing for shadow forward recovery
- Replacing the original sphere with a shadow copy

Preparing for shadow forward recovery

How to create a shadow copy of your VSAM sphere.

- Use IDCAMS to create a new, empty VSAM sphere.
- Copy the original VSAM sphere into the new VSAM sphere. The new VSAM sphere is your shadow copy.
- Set up a CICS VR shadow forward recovery job to regularly update the shadow copy.

You can set up a shadow forward recovery job to update a shadow copy of your VSAM file. Figure Sample scan and shadow forward recovery job shows an example of using LOGOFLOGS SCAN to update the RCDS with the latest information from the log of logs and the forward recovery job to update the shadow copy. Run this job regularly so that the shadow is kept as up-to-date as possible.

```
//SHADEX   JOB ACCOUNTING INFORMATION,REGION=0M
//*-------------------------------------------------------------------*/
//* Scan the logoflogs                                                */
//*-------------------------------------------------------------------*/
//SCANLOG  EXEC PGM=DWWAR
//STEPLIB  DD DSN=DWW.SDWWLOAD,DISP=SHR
// DD DSN=DWW.SDWWLENU,DISP=SHR
//SYSUDUMP DD   SYSOUT=*
//DWWDUMP  DD   SYSOUT=*
//DWWMSG   DD   SYSOUT=*
//DWWPRINT DD   SYSOUT=*
//DWWCON1  DD   DSN=DWW.DWWCON1,DISP=SHR
//DWWCON2  DD   DSN=DWW.DWWCON2,DISP=SHR
//DWWCON3  DD   DSN=DWW.DWWCON3,DISP=SHR
//DWWIN    DD   *
     LOGOFLOGS SCAN RECOVERYREPORT(YES)
/*
//*-------------------------------------------------------------------*/
//* Update the shadow copy                                            */
//*-------------------------------------------------------------------*/
//RECOVER   EXEC PGM=DWWCO
//STEPLIB   DD DSN=DWW.SDWWLOAD,DISP=SHR
// DD DSN=DWW.SDWWLENU,DISP=SHR
//DWWDMSG   DD   SYSOUT=*
//DWWPRINT  DD   SYSOUT=*
//DWWMSG    DD   SYSOUT=*
//DWWCON1   DD   DSN=DWW.DWWCON1,DISP=SHR
//DWWCON2   DD   DSN=DWW.DWWCON2,DISP=SHR
//DWWCON3   DD   DSN=DWW.DWWCON3,DISP=SHR
//DWWIN     DD   *
   MVSLOG NAME(DWW.SH.FILELOG)
   RECOVER SPHERE(R40SH010.BL.ESDS01) -
     NEWSPHERE(R40SH010.BL.SHADOW)-
     SHADOW
/*
```

Figure 63. Sample scan and shadow forward recovery job

Note: Consider the following point if the REMOTE keyword is added to the shadow recovery job, you are using the CICS VR VSAM batch logger to log updates made to VSAM spheres by batch jobs, and one of the following conditions is true:

- The RCDSs that were allocated to CICS VR when the batch jobs were run are not available to the shadow recovery job.
- You are running the shadow recovery job while the CICS VR VSAM batch logger is concurrently logging updates being made to the spheres by batch jobs.

If the previous items are true, ensure that you are not deleting log records that have a timestamp later than the timestamp of the latest log record that has been applied by the latest execution of the shadow recovery job. The timestamp of the latest log record that is applied by a shadow recovery job is listed in the report produced by a shadow recovery job. This timestamp can be earlier than the actual submission date and time of the shadow recovery job.

For example, if the previous conditions are true, consider a scenario where:

- A shadow recovery job is submitted at 04.253 09:59:59
- The timestamp of the latest log record applied by the shadow recovery job is 04.253 07:32:57

In this scenario, be sure not to delete the log stream blocks or copies with a timestamp later than 04.253 07:32:57. CICS VR might need to read log records immediately after this timestamp during the next execution of the shadow recovery job.

Replacing the original sphere with a shadow copy

When a problem occurs, you can replace the original sphere with the updated shadow copy.

Using the shadow copy can reduce the time it takes to perform a forward recovery because most of the log records have already been applied.

Follow these basic steps to recover from a shadow copy if the sphere is accessed as an RLS data set:

1. Run shadow forward recovery one more time to be sure that the shadow has all updates applied. If any change accumulation data sets are available, they are used in addition to the forward recovery log.
2. Run IDCAMS SHCDS with the FRSETRR keyword to mark the original sphere as being under maintenance. This makes it unavailable and also allows the following unbind operation to succeed.
3. Run IDCAMS SHCDS with the FRUNBIND keyword to unbind any retained locks against the original sphere. This enables SMS/VSAM to preserve the locks ready for re-binding later to the recovered sphere.
4. Run IDCAMS DELETE to delete the original sphere and define an empty sphere with the same name.
5. Run IDCAMS SHCDS with the FRSETRR keyword to mark the new empty sphere as being under maintenance. This makes it unavailable while the REPRO from the shadow copy is in progress. This is also necessary to allow the later re-bind operation to succeed.
6. Run IDCAMS REPRO to copy the shadow copy to the empty sphere, hereafter called the recovered sphere.
7. Run IDCAMS BLDINDEX to rebuild the alternate indexes for the recovered sphere. This step is only needed if the shadow copy was created with non-reusable alternate indexes. It can be skipped if the shadow copy was created with reusable alternate index.
8. Run IDCAMS SHCDS with the FRBIND keyword to re-bind to the recovered sphere all the retained locks that were unbound from the original sphere.
9. Run IDCAMS SHCDS with the FRRESETRR keyword after the re-bind to reset the maintenance flag and enable the recovered sphere for use.

Note: If your shadow copy is not accessed as an RLS data set, you only need to perform steps 1, 4, 6, and 7.

Understanding CICS VR automatic deregistration

During the execution of various CICS VR utilities, log of logs scan, backup notification, change accumulation, and so on. CICS VR stores information in the RCDS.

The information that CICS VR stores in the RCDS is necessary for proper recovery job creation. However, CICS VR only needs to store information in the RCDS that coincides with the time intervals that you wish to be able to recover VSAM spheres from update activity. For example, if your requirements specify that you need to be able to recover VSAM spheres from updates made only during the last five days, certain information that was stored in the RCDS six or more days ago is no longer required.

If outdated information is never removed from the RCDS, the RCDS eventually reaches its maximum size and becomes full. Once the RCDS becomes full, you would either have to manually deregister information from the RCDS or allocate a larger RCDS.

To help you avoid a situation where the RCDS becomes full, CICS VR offers the automatic deregistration function. This function periodically removes outdated information from the RCDS based on retention criteria that you set. Optionally, CICS VR also can delete and uncatalog certain entities when they are deregistered from the RCDS.

The following sections further explain how to use CICS VR automatic deregistration.

Setting automatic deregistration criteria

CICS VR provides an automatic deregistration function to prevent situations where the RCDS becomes full.

This function periodically removes outdated information from the RCDS, based on retention criteria that the customer sets. CICS VR can delete and uncatalog certain entities when they are deregistered from the RCDS.

You can specify a separate retention period for each of the entities known, including log streams, log streams copies, backups, and change accumulation data sets (CA), and control the automatic deregister criteria from one functional panel.

Select option 4 from the "CICS VR main menu" to open the "CICS VR automatic deregister criteria menu":

```
Help
--------------------------------------------------------------------------------
DWWPPADC              CICSVR automatic deregister criteria menu

Select one and press Enter.




                         1.  Automatic log stream deregister
                         2.  Automatic backup deregister
                         3.  Automatic change accumulation deregister




Command ===>
 F1=Help      F3=Exit     F10=Menu bar F12=Cancel
```

Figure 64. The CICS VR automatic deregister criteria menu

Automatic log stream deregister
Select option 1 to set the criteria for Automatic log stream deregistration. Further information on the available settings is provided in “Setting automatic log stream deregistration criteria” on page 118.

Automatic backup deregister
Select option 2 to set the criteria for Automatic backup deregistration. Further information on the available settings is provided in “Setting automatic backup deregistration criteria” on page 121.

Automatic change accumulation deregister
Select option 3 to set the criteria for Automatic change accumulation deregistration. Further information on the available settings is provided in “Setting automatic change accumulation deregistration criteria” on page 122.

Setting automatic log stream deregistration criteria

Using the CICS VR panel interface, you can set separate retention periods for MVS log streams and log stream copies.

MVS log streams
A retention period that is specified for MVS log streams applies to all forward recovery and log of logs log streams that are registered to CICS VR.

Log stream copies
A retention period that is specified for log stream copies applies to all sequential data set log stream copies that were registered to CICS VR during execution of the CICS VR log stream copy utility.

You can set the retention period for log streams or log stream copies by carrying out the following steps.

1. Call the CICS VR panel interface.
2. Select option 4, Automatic deregister criteria, from the "CICS VR main menu" and press enter, the "CICS VR automatic deregister criteria menu" opens.
3. Select option 1, **Automatic log stream deregister**, and press enter. The "CICS VR automatic log stream deregister" secondary window opens:

```
                  CICSVR automatic log stream deregister
Command ===>

Specify the automatic deregister criteria for log stream blocks and log
stream copies, then press ENTER. Or, leave all fields blank, then press
ENTER to turn off the automatic deregister function. Press F11 to view or
specify individual deregistration criteria for logstreams.

  Automatic deregister  . . . .: OFF

  Retention period for blocks    ___  (Number of days)

  Retention period for copies    ___  (Number of days)

  Uncatalog and delete . . . . . _  (1=Yes, 2=No)

  Automatic individual deregister . . : OFF

 F1=Help       F11=IndDereg   F12=Cancel
```

Figure 65. CICS VR automatic log stream deregister secondary window with default values

The IBM default values for the log stream blocks and log stream copies retention periods are blanks. Therefore, automatic log stream deregistration is initially turned off. While the automatic log stream deregistration setting remains OFF, no information that relates to log streams or log stream copies is deregistered periodically by CICS VR.

The **Automatic individual deregister** field shows whether an individual retention period is specified for any log stream. If set to ON, a log stream does have an individual retention period specified. If set to OFF, no log streams registered to CICS VR have individual deregistration criteria specified.

You can change the automatic log stream deregistration setting to ON by specifying a value 0 - 999 for one or both of the retention period settings and pressing enter. Once the automatic log stream deregistration setting is changed to ON, CICS VR periodically deregisters, and optionally uncatalogs and deletes, information that is older than the specified retention period values.

An example of the "CICS VR automatic log stream deregister" secondary window after retention periods are entered:

```
                  CICSVR automatic log stream deregister
Command ===>

Specify the automatic deregister criteria for log stream blocks and log
stream copies, then press ENTER. Or, leave all fields blank, then press
ENTER to turn off the automatic deregister function. Press F11 to view or
specify individual deregistration criteria for logstreams.

  Automatic deregister  . . . .: ON

  Retention period for blocks    099  (Number of days)

  Retention period for copies         (Number of days)

  Uncatalog and delete . . . . . .    (1=Yes, 2=No)

  Automatic individual deregister . . : OFF

 F1=Help       F11=IndDereg   F12=Cancel
```

Figure 66. CICS VR automatic log stream deregister secondary window with values entered

If you entered the values that are shown in "CICS VR automatic log stream deregister" secondary window with those values entered, CICS VR automatic deregistration performs the following actions:

- Deletes information from the RCDS that relates to information on MVS log stream blocks that are older than five days.
- Deletes MVS log stream blocks that are older than five days.
- Deletes information from the RCDS that relates to log stream copies where the latest information in the log stream copy is older than seven days.

- Uncatalogs and deletes all registered log stream copies where the latest information in the log stream copy is older than seven days.

Setting individual deregistration criteria for log streams

Using the CICS VR panel interface, you can set individual retention periods for registered MVS log streams.

You can set individual retention periods for log streams and log of logs streams registered to CICS VR by carrying out the following steps.

1. Call the CICS VR panel interface.
2. Select option 4, **Automatic deregister criteria**, from the "CICS VR main menu" and press Enter; the "CICS VR automatic deregister criteria menu" opens.
3. Select option 1, **Automatic log stream deregister**, and press Enter. The "CICS VR automatic log stream deregister" secondary window opens, as shown in "CICS VR individual log stream deregister" secondary window.
4. Press F11(IndDereg). The "CICS VR individual log stream deregister" secondary window is displayed:

```
                  CICSVR individual log stream deregister   Row 1 to 6 of 6
Command ===>

Type the number of days for the Retention period field to specify
individual deregistration criteria for logstreams and log-of-logs. Or,
leave the Retention period field blank to switch off individual
deregisration. Then press Enter to save changes in the RCDS.


    Log stream name             Type  Retention Period
    FILELOG1_WITH_FFFF_RETP     LS    000
    FILELOG1_WITH_FFFF_RETP     LOL   000
    FILELOG1_WITH_0000_RETP     LS
    FILELOG1_WITH_99_RETP       LS    099
    LOGOFLOGS_WITH_0000_RETP    LOL
    LOGOFLOGS_WITH_0550_RETP    LOL   550
****************************** Bottom of data ******************************



 F1=Help     F7=Bkwd     F8=Fwd     F12=Cancel
```

Figure 67. CICS VR individual log stream deregister secondary window

The "CICS VR individual log stream deregister" secondary window shows all log streams registered to CICS VR. The type field contains the value LS for MVS log streams and the value LOL for log of logs streams.

To set the individual deregistration criteria, type the number of days for the retention period of the specific log streams, and press Enter.

To switch off individual deregistration for the specific log streams, leave the retention period field blank.

MVS log stream retention period

If you want CICS VR periodically to deregister and delete information related to forward recovery and log of logs log steams, specify a number between 0 and 999 in the Retention period for blocks field and press enter.

Once a retention period for blocks has been specified, CICS VR periodically deletes information from the RCDS that relates to information on MVS log stream blocks that are older than the specified retention period. In addition, CICS VR deletes any MVS blocks on all registered log streams; forward recovery and log of logs log streams, that are older than the specified retention period.

The retention period for blocks value applies to all registered forward recovery and log of logs log streams that are registered to CICS VR. You can specify a separate retention period for individual forward recovery or log of logs log streams using the CICS VR individual log stream deregister secondary window. See

“Understanding what is deregistered and deleted by CICS VR automatic deregistration” on page 124 for more information about what CICS VR deregisters and delete when automatic deregistration is turned on.

Log stream copy retention period

If you want CICS VR periodically to deregister information from the RCDS related to log stream copies, specify a number between 0 and 999 in the Retention period for copies field and press enter.

Once a retention period for copies has been specified, CICS VR periodically deregisters information from the RCDS that relates to information on log stream copies that is older than the specified retention period. Information about log stream copies only are deregistered when the latest information in the log stream copy is older than the specified retention period.

In addition, CICS VR can uncatalog and delete the log stream copies by specifying a value of 1 (Yes) in the Uncatalog and delete field. CICS VR only uncatalogs and deletes a log stream copy when the latest information in the log stream copy is older than the specified retention period.

CICS VR uncatalogs only non-SMS logstream copies on tape. See “Understanding what is deregistered and deleted by CICS VR automatic deregistration” on page 124 for more information about what CICS VR deregisters and deletes when automatic deregistration is turned on.

Setting automatic backup deregistration criteria

Using the CICS VR panel interface, you can specify retention criteria for all logical backups that are registered in the CICS VR RCDS.

A backup is registered in the CICS VR RCDS when CICS VR is notified that a backup has been created for a VSAM data set. See “Understanding CICS VR backup support” on page 136 for more information about backup registration.

You can set retention criteria for registered backups by carrying out the following steps:

1. Call the CICS VR panel interface.
2. Select option 4, **Automatic deregister criteria**, from the "CICS VR main menu" and press Enter; the "CICS VR automatic deregister criteria menu" opens.
3. Select option 2, **Automatic backup deregister**, and press Enter. The "CICS VR automatic backup deregister" secondary window opens:

```
                     CICSVR automatic backup deregister

 Turn automatic deregistration for backups ON by specifying a value for
 Backup retention period, Use log retention period and Use catalog
 information, then press Enter. Turn automatic deregistration for backups
 OFF by leaving all fields blank, then press
Enter.

   Automatic backup deregister  . . . . . : OFF

   Backup retention period  . . . . . _    (Number of days)

   Use log retention period . . : (005) . . _    (1=Yes, 2=No)

   Use catalog information  . . . . . _    (1=Yes, 2=No)

   Uncatalog and delete . . . . . _    (1=Yes, 2=No)



 Command ===> ____________________________________________________________
  F1=Help    F12=Cancel
```

Figure 68. CICS VR automatic backup deregister secondary window with default values

The default values for the automatic backup deregistration settings are blank. Therefore, automatic backup deregistration is initially turned off. While the automatic backup deregister setting remains 0FF, no information about registered backups is automatically deregistered periodically by CICS VR. You can

change the automatic backup deregister setting to ON by specifying values for the input fields to select at least one of the following deregistration criteria and pressing enter:

Backup Retention period
An integer between 0 and 999 entered in the **Backup retention** field specifies the number of days CICS VR keeps information about backups in the RCDS. CICS VR deregisters a backup after it has existed longer than the value of Backup retention period. CICS VR uses the backup creation date, not backup registration date, when performing the comparison.

Use log retention period
A value of 1, Yes, specifies that CICS VR deregisters the backup from the RCDS when coinciding log data that is also deregistered by the CICS VR automatic log stream deregistration function. All backups that are older than the largest value of the specified log stream and log stream copy retention period settings, if both are specified, are deregistered from the RCDS. The integer enclosed in the brackets shows the largest of the specified retention periods for log stream blocks and log stream copies, or blank if the Automatic log stream deregister function is turned off.

Use catalog information
A value of 1, Yes, specifies that CICS VR deregisters the backup from the RCDS when an entry for the backup is not returned from the ICF catalog. This option does not apply to registered DFSMShsm backups.

Automatic backup deregistration function is set on, if at least one of the following conditions is met:

- An integer between 0 and 999 is specified for the **Backup retention period** field.
- The value of 1, YES, is specified for the **Use log retention period** field.
- The value of 1, YES, is specified for the **Use catalog information** field.

To set **Automatic backup deregister** ON, you can specify any combination of those values. For example, to specify an integer for **Backup retention period** and 1 for **Use catalog information** means that CICS VR applies both criteria for deregistration backups, that is, all backups older than number of days specified, or not cataloged, is deregistered.

Setting automatic change accumulation deregistration criteria

Using the CICS VR panel interface, you can specify retention criteria for all change accumulation (CA) data sets registered in the CICS VR RCDS.

See “Setting up CICS VR change accumulation” on page 102 for more information.

You can set retention criteria for change accumulation data sets by carrying out the following steps:

1. Call the CICS VR panel interface.
2. Select option 4, **Automatic deregister criteria**, from the "CICS VR main menu" and press Enter; the "CICS VR automatic deregister criteria menu" opens.
3. Select option 3, **Automatic change accumulation deregister**, and press Enter.

The "CICS VR automatic change accumulation deregister" panel opens, allowing you to set the automatic deregister criteria for CA data sets.

```
                    CICSVR automatic change accumulation deregister

Command ===>

Specify the automatic deregister criteria for CA, then press Enter. Or
leave both fields blank, then press Enter to turn off the automatic
deregister function.

  Automatic deregister . . : OFF

  Retention period . . . . .      (Number of days)

  Uncatalog and delete . . .    (1=Yes, 2=No)




 F1=Help    F12=Cancel
```

Figure 69. The CICS VR automatic change accumulation deregister panel

Automatic deregister
Set this field to ON to enable automatic change accumulation deregistration. Set this field to OFF to disable automatic change accumulation deregistration.

Retention period
Enter the number of days that CA data sets are retained in the RCDS, before deregistration occurs; if enabled.

Uncatalog and delete
This field determines whether CA data sets are uncataloged and deleted when deregistration occurs.

Turning off automatic deregistration

If you want to turn off CICS VR automatic deregistration for log streams, backups, or change accumulation data sets, perform the following steps:

1. Call the CICS VR panel interface.
2. From the "CICS VR main menu", select option 4, **Automatic deregistration criteria**.
3. From the "CICS VR Automatic deregistration criteria menu", select one of **log stream, backup** or **change accumulation deregistration**.

The corresponding deregistration secondary window opens, depending on which option you chose.

Specify blanks in all input fields in the deregistration secondary windows, then press Enter.

Specifying a value of zero for the retention period fields does not turn off CICS VR automatic deregistration. A retention period value of zero indicates that CICS VR immediately deregisters, and optionally deletes, all information related to the retention period setting during the next execution of CICS VR automatic deregistration.on.

Understanding when CICS VR automatic deregistration occurs

When CICS VR automatic deregistration of log streams, backups or change accumulation data sets has been turned on, CICS VR automatically deregisters, and optionally deletes, outdated information.

See “Setting automatic deregistration criteria” on page 117, CICS VR automatically deregisters, and optionally deletes, outdated information during execution of the following processes:

- Inventory scavenger
- Log of logs scan batch job

The following sections elaborate on the CICS VR processes that perform automatic deregistration.

Inventory scavenger

The CICS VR inventory scavenger is automatically run at regularly scheduled times as described in the *CICS VR User's Guide*. Every time the inventory scavenger is run, CICS VR automatic deregistration occurs.

CICS VR uses a customized version of the inventory scavenger JCL skeleton to run the inventory scavenger job at regularly scheduled times, or manually at convenient times. The skeleton is located in member DWWARSCI of the CICS VR library SDWWCNTL. Edit the JOB statement in the inventory scavenger JCL skeleton to conform to the environment standards. Copy the updated DWWARSCI member into the PROCLIB library. If RACF, or a similar security product is in place, define the DWWARSCI started task to RACF and assign it to a user ID with the appropriate authorization to browse the output of the inventory scavenger job.

The start of the inventory scavenger job is preceded by a message DWW246I:

```
DWW246I APPLICATION INVSCAV ( DWWXXXXX ) SUCCESSFULLY RAN.
```

where DWWXXXXX is a unique job name across a sysplex.

Log of logs scan batch job

In a CICS TS environment, IBM recommends that a CICS VR log of logs scan batch job is submitted during regular intervals to update CICS VR with the latest VSAM sphere update activity.

At the end of every CICS VR log of logs scan batch job, CICS VR performs automatic deregistration if automatic deregistration is turned on and the following criteria is met:

- If the optional NAME keyword is omitted from the log of logs scan batch job all registered log of logs are scanned. CICS VR performs automatic deregistration when the NAME keyword is omitted if, in the log of logs scan batch job, the AUTODEREG(YES) keyword is specified or the AUTODEREG keyword is omitted (YES is the default value).
- If the optional NAME keyword is specified in the log of logs scan batch job only specific log of logs are scanned. CICS VR performs automatic deregistration when the NAME keyword is specified if, in the log of logs scan batch job, the AUTODEREG(YES) keyword is specified.

Note:

1. CICS VR APAR PQ82873 changed the AUTODEREG default value to NO when the optional NAME keyword is specified in a log of logs scan batch job.
2. CICS VR automatic deregistration is not performed when a log of logs scan is submitted dynamically through the CICS VR panel interface.

Understanding what is deregistered and deleted by CICS VR automatic deregistration

CICS VR automatic deregistration deregisters, and optionally deletes, information that relates to the retention settings that have been set.

The following summarizes what is deregistered and deleted when the corresponding retention settings are specified:

Retention period for blocks

- All MVS blocks on all registered forward recovery and log of logs log streams that are older than the specified retention period are deleted. CICS VR issues the IXGDELET service to mark the outdated blocks for deletion.
- All VSAM sphere update activity that is older than the specified retention period is deregistered from the RCDS if no correspond log stream copies are still registered to CICS VR.

Retention period for copies

- All registered log stream copies where the latest time stamp in the copy is older than the specified retention period are deregistered from the RCDS.

- All VSAM sphere update activity that is older than the specified retention period is deregistered from the RCDS if the corresponding forward recovery log stream blocks also have been deleted.
- If the Uncatalog and delete setting is 1 (Yes), all registered log stream copies where the last time stamp in the copy is older than the specified retention period are uncataloged and deleted. If a non-SMS log stream copy resides on tape, it is uncataloged, but not deleted

Retention period for Change accumulation

- All change accumulation information that is older than the specified retention period is deregistered from the RCDS.
- If the Uncatalog and delete setting is 1 (Yes), all change accumulation information that is older than the specified retention period is uncataloged and deleted.

Retention setting for backups (*Backup retention period*, *Use log retention period*, or *Use catalog information*)

All information about backups that meet the specified automatic backup deregistration setting is deleted from the RCDS.

If the Uncatalog and delete setting for automatic backup deregistration is 1 (Yes), CICS VR attempts to uncatalog and delete all registered non-DFSMShsm and non-ABARS backups backups that are automatically deregistered from the RCDS. Non-SMS backups that reside on tape are uncataloged but not deleted.

Any retention period setting

If you have specified a retention period for MVS blocks, log stream copies, or backups, CICS VR automatic deregistration deregisters the following additional information from the RCDS:

- All information about CICS VR recovery job steps that were created before the maximum retention period value is deregistered from the RCDS.
- All VSAM sphere entries that no longer have any associated backups or update activity registered in the RCDS are deregistered from the RCDS.

CICS VR uses the largest retention period setting when determining whether to delete this information. For example, if you specified a retention period value of two days for MVS blocks, five days for log stream copies, and five days for backups, CICS VR uses the maximum retention period value of five days.

Implementing CICS VR automatic deregistration

The retention period values that you enter for CICS VR automatic deregistration reflect your current environment and requirements.

However, you might want to consider the following IBM recommendations before implementation.

MVS blocks compared with log stream copies

In order to limit the amount of data that is kept in the forward recovery and log of logs log streams, you might want to consider creating CICS VR log stream copies of the forward recovery log streams.

Then, you can set a retention period for MVS blocks that is smaller than the retention period setting for log stream copies.

For example, if your environment limits the amount of data that can be kept in forward recovery log streams to three days, but you want to be able to recover VSAM data sets from updates made over the past seven days, you might want to consider the following setup:

- Set a retention period value of three for MVS blocks.
- Set a retention period value of seven for log stream copies.
- Be sure new backups for the data sets are created at least every seven days. Therefore, you can also specify a backup retention period of seven days.
- Create CICS VR log stream copies of the forward recovery log streams every other day.

- At a minimum, scan all log of logs every other day.

By setting an MVS blocks retention period that is smaller than the log stream copies retention period, you can limit the amount of data retained in the MVS log streams without losing the ability to recover VSAM spheres from updates made over the required amount of days. However, be sure you are creating and keeping backups according to your recovery requirements.

Automatic backup deregistration considerations

The first step when recovering a VSAM sphere from a corruption is restoring the sphere from a backup.

Therefore, thoughtful planning is required prior to specifying an automatic backup retention period through the CICS VR panel interface. A few items to consider during this planning are:

Backup creation interval

Do not specify a backup retention period that is smaller than your backup creation interval. This could result in unrecoverable updates. For example, consider the following scenario:

- Backups are taken for all spheres every eight days
- Log data is retained for eight days
- Backups are retained for six days

In the backup creation interval scenario, a backup might be deleted before a new one for the same VSAM data set is created. Therefore, if the data set become corrupted, it might not be recoverable because a backup does not exist. Even though log data exists since the last backup was taken, recovery must always begin with restoring the data set from a backup.

If you specify an automatic backup retention period through the CICS VR panel interface, IBM recommends that:

- If all your data sets are backed up during the same interval, at a minimum, the specified backup retention period is one day greater than the backup interval.
- If your data sets are backed up with varying intervals, at a minimum, the specified backup retention period is one day greater than the largest backup interval.

Note: The specified CICS VR automatic backup deregistration criteria applies to all registered backups for all registered VSAM spheres. Also, it might be desirable to keep multiple backups for each VSAM sphere if you have a problem restoring one of the backups, as long as corresponding log data still exists for the backups.

Log data relation

For recovery purposes, backups are only valuable if log records that were written for updates made to the data set immediately after the backup was created, up to the time of corruption, still exist, either on the forward recovery log stream, change accumulation data set, or log stream copy. Therefore, when log data is deleted from the log stream, change accumulation data set, and log stream copy, backups that were created prior to the deleted log data can also be deregistered and deleted.

If you have specified an automatic log stream deregistration retention period, you can also specify 'Use log retention period' as the automatic backup deregistration retention criteria. This causes CICS VR automatic deregistration processing to deregister, and optionally uncatalog and delete, any backups that are older than the automatically deregistered log data.

Individual backup retention periods

Any specified CICS VR automatic backup deregistration setting applies to all registered backups for all registered VSAM spheres. You might therefore consider using other software to manage the deletion of your backups, when your environment requires you to specify individual or different retention criteria for your backups. However, if your backups are being deleted outside of CICS VR by another product, they must also be deregistered from the CICS VR RCDS, to avoid the RCDS becoming full and outdated information being displayed through the CICS VR panel interface. You can dynamically deregister backups individually through the CICS VR panel interface. However, you can also specify **Use catalog information** as the automatic backup deregistration criteria. This causes

CICS VR automatic deregistration processing to query the ICF catalog for all registered backups. All backups for which the ICF catalog does not return an entry is automatically deregistered from the RCDS.

The **Use catalog information** automatic backup deregistration criteria can also be useful in disaster recovery scenarios. For example, you might have sent several items, including log copies, backups, and a copy of the RCDS to your remote recovery site. However, you might have only sent a subset of all registered backups to your remote site. Therefore, prior to building the recovery job, at your remote recovery site you might want to specify the **Use catalog information** automatic backup deregistration criteria, then run automatic deregistration. This results in the CICS VR panel interface only displaying the registered backups that have been sent and cataloged at the remote recovery site.

Chapter 8. Setting up your CICS TS environment

This section describes the tasks you need to do to set up your CICS TS environment for CICS VR.

If you were using a previous release of CICS VR, many or all of the tasks might have already been done.

The following sections describe what you need to do to set up your CICS TS environment:

- Understand logging with CICS TS for z/OS
- Establish procedures to backup and recover your VSAM spheres
- Understand CICS VR backup and restore support
- Understand nonrecoverable versus recoverable
- Make the CICS System Definition (CSD) Data Set recoverable
- Decide on your naming conventions.

Understanding logging with CICS TS for z/OS

CICS log manager.

All CICS system logging and journaling is controlled by the CICS log manager, which uses MVS system logger log streams to store its output.

CICS logging and journaling

CICS logging and journaling can be divided into four broad types of activity.

System Logging: CICS maintains a system log to support transaction backout for recoverable resources. System logging is implemented by CICS TS automatically, but you can define the log stream as DUMMY to inhibit the function. If you specify TYPE(DUMMY) for the system log, CICS TS runs without any transaction backout facilities and without any restart capability.

Forward Recovery Logging: CICS supports forward recovery logs for VSAM data sets. A forward recovery log is a general log stream managed by the MVS system logger. CICS writes the after images of changes made to a data set to a forward recovery log. Forward recovery logging is not automatic. You must specify that you want this facility for your files and also define the forward recovery log streams. You must specify this information in the ICF catalog if you want RLS mode; if you do not want RLS mode, you can specify this information in either the file resource definition or ICF catalog.

Autojournaling: CICS supports autojournaling of file control data and terminal control messages. Autojournaling is generally used for audit trails. CICS VR can forward recover a VSAM data set from log records produced by CICS TS autojournaling. However, IBM recommends only using log records produced by CICS TS forward recovery logging with CICS VR. More information about autojournaling can be found in Chapter 22, “Using CICS TS autojournaling,” on page 357.

User journaling: CICS supports programming interfaces to let CICS applications write user-defined records to user journals, which are held on general log streams. CICS VR does not support forward recovery of a CICS TS VSAM data set using a user journal.

Note: User journals play no part in VSAM recovery.

The CICS log manager writes the data associated with these logging and journaling activities to MVS log streams, which the log manager controls as two types of log streams:

System log streams
: These are used by the CICS log manager and the CICS recovery manager for unit of work (UOW) recovery purposes. Each system log is unique to a CICS region and cannot be merged with any other system log.

General log streams
: These are used by the CICS log manager for all other types of logging and journaling.

Understanding MVS log streams

Coupling facility log streams reside in the coupling facility and in either a data space in the IXGLOGR address space or in staging data sets. DASD-only log streams reside in a data space in the IXGLOGR address space and in staging data sets.

All log streams that are needed by CICS must be defined to the MVS system logger before CICS can use them. You can either define log streams explicitly, or you can let CICS create them dynamically when they are first used. To enable CICS to create log streams dynamically, you first define model log streams to the MVS system logger. To define explicit log streams and model log streams, use the MVS IXCMIAPU utility.

For information about the coupling facility and defining log structures, see *z/OS MVS Setting Up a Sysplex*. For information about defining coupling facility log structures and MVS log streams for use by CICS Transaction Server, see *CICS System Definition Guide*.

Defining system log streams

You must define a system log if you want to preserve data integrity in the event of unit of work failures and CICS failures.

A system log is mandatory for the following situations:

- The backout of recoverable resources changed by failed units of work.
- Cold starts, to enable CICS to restore units of work that were shunted at the time of the shutdown.
- Warm restarts, to enable CICS to restore the region to its state at the previous shutdown, including units of work that were shunted at the time of the shutdown.
- Emergency restarts, to enable CICS to perform the following tasks:
  - Restore the region to its state at the previous shutdown, including units of work that were shunted at the time of the shutdown.
  - Recover units of work that were in-flight at the time of the CICS failure and perform backout of recoverable resources that were updated before the failure.

CICS log manager connects to its log stream automatically during system initialization, unless it is defined as TYPE(DUMMY) in a CICS JOURNALMODEL resource definition.

Defining forward recovery log streams

VSAM data sets that are defined as recoverable files must have associated forward-recovery logs. In the event of physical failure or corruption, CICS VR can reapply the updates.

Specify forward recovery attributes in either the Integrated Catalog Facility (ICF) or in the CICS file resource definitions. For more information on specifying recovery attributes, see "Defining recovery attributes for RLS and non RLS files" on page 131.

Note: Define a data set as recoverable if you want forward recovery logging. Neither CICS nor VSAM provides any support for forward recovery logging for a nonrecoverable data set.

Defining the log of logs

The log of logs is an MVS log stream created by CICS TS that contains records that are written each time a file is opened or closed.

At file-open time, a tie-up record is written that identifies the following:

- The name of the file
- Underlying VSAM data set name
- Forward recovery log stream name
- CICS region that performed the file open

At file-close time, a tie-up record is written that identifies the following:

- The name of the file
- CICS region that performed the file close

The log of logs helps CICS VR maintain an index of log data sets. CICS VR scans the log of logs and saves information needed for recovery in the RCDS.

Define a log-of-logs log stream that is shared among all CICS regions in the Parallel Sysplex®. This must be explicitly defined, because CICS does not support model log streams for dynamic creation of this log stream. Also define a journal model resource definition that references the log-of-logs log stream.

For more information about logging in CICS Transaction Server, see *CICS System Definition Guide*.

Understanding VSAM RLS

Record level sharing (RLS) is a VSAM function provided by DFSMS/MVS Version 1 Release 3 that is exploited by the CICS Transaction Server. RLS lets VSAM data sets be shared, with update capability between many applications in many CICS regions.

With VSAM RLS, CICS regions that share VSAM data sets can reside in one or more MVS images within an MVS parallel sysplex. Whether or not the data set is accessed as an RLS data set is determined at OPEN time by the ACB macro setting or by a JCL parameter. To enable RLS, use the MACRF=RLS ACB macro setting.

CICS VR can recover VSAM data sets accessed in RLS-mode; however, CICS VR VSAM batch logging cannot perform logging for VSAM data sets that are accessed in RLS mode. See Chapter 5, “Setting up CICS VR VSAM batch logging,” on page 63 for more information.

Defining recovery attributes for RLS and non RLS files

How to define the recovery attributes for files managed by CICS file control.

You specify recovery options, including forward recovery, either in the integrated catalog facility (ICF) catalog or in the CICS file resource definition, as follows:

1. If your VSAM data sets are accessed by CICS in RLS mode, define the recovery attributes in the ICF catalog. The recovery options on the CICS file resource definitions (RECOVERY, FWDRECOVLOG, and BACKUPTYPE) are ignored if the file definition specifies RLS mode.
2. If your VSAM data sets are accessed by CICS in non-RLS mode, define the recovery attributes in either the file resource definition or the ICF catalog. If you use the ICF catalog to define attributes for data sets accessed in non-RLS mode, the ICF catalog entry recovery attributes override the CICS file resource definition.

   Note: CICS uses the ICF catalog definitions only when you specify RLS=YES as a system initialization parameter. If you specify RLS=NO, recovery attributes are always taken from the CICS file definition.

VSAM files accessed in RLS mode

If you specify file definitions that open a data set in RLS mode, you must specify the recovery options in the ICF catalog.

The recovery options on the CICS file resource definitions (RECOVERY, FWDRECOVLOG, and BACKUPTYPE) are ignored if the file definition specifies RLS access.

The VSAM parameters LOG and LOGSTREAMID on the access methods services DEFINE CLUSTER and ALTER commands, determine recoverability for the entire sphere. Locating these recovery attributes in the ICF catalog enforces the same attributes, for all CICS regions in the sysplex, for all the files opened against a given sphere.

LOG({NONE | UNDO| ALL})
Specifies the type of recovery required for the VSAM sphere. Specify the LOG parameter for data sets that are to be used by CICS in RLS mode:

NONE
The sphere is not recoverable.

UNDO
The sphere is recoverable. CICS must maintain system log records for backout purposes.

ALL
The sphere is recoverable for both backout and forward recovery. CICS must maintain system log records (as for UNDO) and forward recovery log records. If you specify LOG(ALL), also specify LOGSTREAMID to indicate the name of the forward recovery log. Use LOG(ALL) for files that you want to recover using CICS VR.

Note: Forward recovery support is available for recoverable files only–you cannot have forward recovery without backout recovery.

LOGSTREAMID(*log_stream_name*)
Specifies the name of the MVS log stream to be used for forward recovery log records when LOG(ALL) is defined. Note that IDCAMS does not check for the presence of the LOGSTREAMID during DEFINE processing. CICS checks for an MVS log stream name when it attempts to open a data set in RLS mode. The open fails if the log stream is not defined and cannot be created dynamically.

BWO(TYPECICS | TYPEIMS | TYPEOTHER | NO)
TYPECICS specifies that CICS BWO support is required. This is the equivalent of BACKUPTYPE(DYNAMIC) in the CSD. The other values refer to non-CICS support.

If you omit the LOG parameter when you define your VSAM data sets, recovery is assumed to be UNDEFINED, and the data set cannot be opened in RLS mode. You can also set the UNDEFINED status explicitly by specifying NULLIFY(LOG).

For information about these ICF parameters, see *z/OS DFSMS Access Method Services*.

Inquiring on recovery attributes

You can use CEMT, or EXEC CICS, INQUIRE FILE, and INQUIRE DSNAME commands to determine the recovery options that are specified for files and data sets.

The INQUIRE FILE command shows the options from the CICS file definition until the first file for the data set is opened. If the options are obtained from the ICF catalog when the first file is opened, the ICF catalog values are returned. The INQUIRE DSNAME commands returns values from the VSAM base cluster block (BCB). However, because base cluster block (BCB) recovery values are not set until the first open, if you issue an INQUIRE DSNAME commands before the first file is opened, CICS returns NOTAPPLIC for RECOVSTATUS.

VSAM files accessed in non-RLS mode

Because the VSAM files are accessed in non-RLS mode, define recovery attributes in the file resource definition. You can specify support for both forward and backward recovery for VSAM files using the RECOVERY and FWDRECOVLOG options.

You define the type of data set backup that you want using the BACKUPTYPE parameter.

RDO Format

```
CEDA DEFINE FILE(name) GROUP(groupname)
     .
     .
     DSNAME(data set name)
     .
     .
     RECOVERY(NONE|BACKOUTONLY|ALL)
     FWDRECOVLOG(NO|1-99)
     BACKUPTYPE(STATIC|DYNAMIC)
     .
     .
```

RECOVERY(NONE | BACKOUTONLY | ALL)
Defines the recovery requirements for the file. For CICS TS, this parameter is valid only for files defined with RLSACCESS(NO). For files that are accessed in RLS mode, you must specify the recovery parameters with the data set definition in the ICF catalog. For more information about RLS recovery parameters, see *CICS Transaction Server for z/OS*.

NONE
Causes CICS not to write before-images or after-images. CICS VR cannot forward recover or back out such a file. Do not specify the FWDRECOVLOG option if you specify RECOVERY(NONE).

BACKOUTONLY
Causes CICS to record images for backout only. CICS VR cannot forward recover such a file. If you specify this option, do not specify the FWDRECOVLOG option.

ALL
Requests before-images, for backout, to be recorded on the system log, and after-images, for forward recovery, to be recorded on the log specified in the FWDRECOVLOG parameter. Before-images are always recorded on the system log.

Records written to the FWDRECOVLOG are totally independent of the automatic logging options that might be set.

Note: For CICS VR purposes, use the RECOVERY(ALL) option for all VSAM data set types.

FWDRECOVLOG(NO | 1–99)
Specifies the log ID to which the after-images for forward recovery are written. CICS uses this value only if RECOVERY(ALL) is specified.

Specify the same recovery options and the same forward-recovery log ID for all CICS files that point to the same VSAM sphere. Whenever CICS opens a file for update, it checks that all other files that have been opened for update for the VSAM sphere have the same recovery options and forward-recovery log ID. See *CICS Recovery and Restart Guide* for more information about what happens if CICS finds a mismatch.

BACKUPTYPE(STATIC | DYNAMIC)
Defines the eligibility of files for backup-while-open processing.

STATIC
Defines the file as not being eligible for backup-while-open processing.

DYNAMIC
Causes the file to be eligible for backup-while-open processing.

You can set other options of the RDO entry for whatever you require. See *CICS Resource Definition Guide* for more information.

RLS locks

For files opened in RLS mode, VSAM maintains a single central lock structure using the lock-assist mechanism of the MVS coupling facility. This central lock structure provides sysplex-wide locking at a record level.

The locks for files accessed in non-RLS mode, the scope of which is limited to a single CICS region, are CI locks. However, the CICS enqueue domain also holds a record lock for the record accessed within the CI.

For coupling facility data tables that are updated under the locking model, the coupling facility data table server stores the lock with its record in the CFDT. As in the case of RLS locks, storing the lock with its record in the coupling facility list structure that holds the coupling facility data table ensures sysplex-wide locking at record level.

For both RLS and non-RLS recoverable files, CICS releases all locks on completion of a unit of work. For recoverable coupling facility data tables, the locks are released on completion of a unit of work by the CFDT server.

Active and retained states for locks

When a lock is first acquired, it is an active lock. It remains an active lock until successful completion of the unit of work, until it is released, or until it is converted into a retained lock if the unit of work fails or for a CICS or SMSVSAM failure.

CICS supports *active* and *retained* states for locks.

- If a unit of work fails, RLS VSAM or the CICS enqueue domain continues to hold the record locks that were owned by the failed unit of work for recoverable data sets, but converted into retained locks. Retaining locks ensures that data integrity for those records is maintained until the unit of work is completed.
- If a CICS region fails, locks are converted into retained locks to ensure that data integrity is maintained while CICS is being restarted.
- If an SMSVSAM server fails, locks are converted into retained locks, with the conversion being carried out by the other servers in the sysplex, or by the first server to restart if all servers have failed. This means that a unit of work (UOW) that held active RLS locks holds retained RLS locks following the failure of an SMSVSAM server.

Converting active locks into retained locks not only protects data integrity. It also ensures that new requests for locks owned by the failed unit of work do not wait, but instead are rejected with the LOCKED response.

Forward recovery log failure

If a general log that is being used by CICS as a forward recovery log (or for automatic logging) fails, CICS ensures that any files that were using that log are closed, and that appropriate messages are issued to warn operators.

For example, if there is a hardware failure that affects a forward recovery log, CICS prevents access to all the files for all the data sets that are using that log. How CICS prevents access to the files depends on whether they are open in RLS or non-RLS mode:

RLS access-mode files
CICS uses its RLS quiesce mechanism to initiate the closure actions across the sysplex.

Non-RLS access-mode files
A CICS region detecting the failure closes only its own open ACBs. It also marks the data set as unavailable.

The associated messages recommend that a new backup of the affected data sets must be made. This is because the failure of the forward recovery log means that it cannot be used if forward recovery becomes necessary. New backup copies of the actual data sets, which at this stage are unaffected by the failure, ensure that the failed logs are redundant.

When backup copies have been made, processing can resume with different forward recovery logs.

Establishing procedures to backup and recover your VSAM spheres

It is very important that you establish procedures to backup your VSAM spheres that you need to protect on a regular basis.

CICS VR uses the backup copy of your VSAM sphere as the starting point of the forward recovery.

Deciding how often to make backups

Set up a backup strategy for your VSAM spheres.

Making daily backups of your VSAM spheres

If you make daily backups of your VSAM spheres, then if one of them is damaged, CICS VR can easily recreate it using the backup. Since the backup is recent, CICS VR only needs to apply the changes that

were made that day to bring the VSAM sphere back to the exact state before the data was lost. You can speed up forward recovery processing even more by using CICS VR change accumulation. See “Setting up CICS VR change accumulation” on page 102 for more information on change accumulation.

Making nondaily backups of your VSAM spheres

If you do not make daily backups of your VSAM spheres, CICS VR can still easily recreate it using the backup. CICS VR needs to apply more changes, perhaps several days' worth of transactions, to bring the VSAM sphere back to the exact state before the data was lost. You can significantly speed up forward recovery processing for nondaily backups by using CICS VR change accumulation. See “Setting up CICS VR change accumulation” on page 102 for more information on change accumulation.

Deciding when to make additional backups

Even if you make regular backups, you might need to make an additional backup of your VSAM spheres. Here are several examples of when to make a new backup of your VSAM sphere:

- If you change the physical characteristics of a VSAM sphere, such as the control interval (CI) size, or the length or location of a key field.
- If you successfully recover your VSAM sphere.
- If you are using CICS VR forward recovery logging for batch updates and your batch job receives a 3999 condition code.

Deciding how to group your backups

If you use CICS VR CA, IBM recommends that you create CA groups containing VSAM spheres that have the same backup requirements.

- First, schedule backups for all the VSAM spheres in a CA group at the same time.
- Second, when all the backups have completed successfully, rerun the CA batch job for that CA group. See “Setting up CICS VR change accumulation” on page 102 for more information.

Use this process for all the CA groups you have defined. This process prevents CICS VR from reading all the records in the CA data set and not applying any of them because they occurred prior to the backup.

Scheduling backups to minimize your CICS TS down time

Your CICS TS online system might be running 24 hours a day or it might only be running during certain hours. Schedule backups so that they do not affect your online CICS TS users.

If you have CICS applications that depend on data sets being open for update over a long period of time, deciding when to schedule backups can be tricky. Normally, you cannot make a backup of the data set while the data set is open. Thus, if a failure occurs that requires forward recovery, all updates that have been made to the data set since it was opened must be recovered. This means that you must keep all forward recovery logs that have been produced since the data set was opened. A heavily used data set that has been open for update for several days or weeks might need much forward recovery.

The backup-while-open (BWO) facility, together with other system facilities and products, allows you to make a backup copy of a VSAM data set while it remains open for update. Then, only the updates that have been made since the last backup copy was taken need be recovered. This could considerably reduce the amount of forward recovery that is needed. For more information on taking a backup copy of a VSAM data set while it is open for update, see “Understanding the backup-while-open (BWO) facility” on page 166.

Deciding which VSAM spheres to protect

Ensure that you define your VSAM base clusters and alternate index data sets with SHAREOPTION 1 or SHAREOPTION 2.

You can do this by using the SHAREOPTION parameter of the appropriate access method services (AMS) command, such as the DEFINE CLUSTER command or the ALTER command. If you need to be able to access VSAM spheres from multiple address spaces with update intent, then the spheres must be accessed via VSAM RLS which provides data integrity for multiple updating address spaces and is supported by CICS VR.

CICS VR VSAM batch logging does not provide logging for data sets accessed in RLS mode.

If you plan to make your ESDSs recoverable, remember that when recovering an ESDS, CICS VR acquires large areas of storage.

Understanding CICS VR backup support

CICS VR supports backups created by a variety of products.

However, the amount and type of support for the backup products differ. This section further discusses each of the backup types supported by CICS VR.

Using DFSMShsm as your backup utility

If your VSAM spheres are managed by DFSMS/MVS, DFSMShsm logical backups provide the most support with the least amount of effort required to set up for use with CICS VR.

DFSMShsm logical backups can be created for an entire VSAM sphere, not just the base cluster. CICS VR recovery and change accumulation fully support DFSMShsm logical backups. CICS VR can dynamically query DFSMShsm's inventory (BCDS) to retrieve and display a list of all DFSMShsm logical backups that exist for VSAM spheres. In this case CICS VR server is not required.

Note: Because DFSMShsm's inventory contains backup timestamps in the LOCAL format only, this method could be used for recovery with timestamps in the LOCAL format.

Additionally, CICS VR fully supports DFSMShsm logical backups that are created while the data set remains online and open to CICS for update, using the backup-while-open (BWO) facility. Using the BWO facility with DFSMShsm could allow you to increase the amount of backups taken for your VSAM spheres, while decreasing the time your spheres are unavailable to CICS for update. See “Understanding the backup-while-open (BWO) facility” on page 166 for more information.

DFSMShsm logical backup notification

As previously mentioned, CICS VR can dynamically query the DFSMShsm inventory to retrieve and display a list of all DFSMShsm logical backups that exist for VSAM spheres.

If the CICS VR server address space is active, CICS VR can also be notified when DFSMShsm logical backups are created for registered VSAM spheres. Information about all DFSMShsm logical backups of which CICS VR is notified is then registered in the RCDS. This allows you to view the backup creation date and time in both local and GMT formats.

If change accumulation is enabled for the VSAM sphere for which the backup was created, then this notification occurs automatically. If change accumulation is not enabled for the VSAM sphere, you can still enable notification, although this is not required for DFSMShsm logical backups, by following the steps outlined in the section “Restoring a DFSMShsm logical backup” on page 137. However, please note that regardless of whether notification is enabled for DFSMShsm logical backups, if the CICS VR server address space is active, some additional tasks are required to set up DFSMShsm for use with CICS VR, as described in Chapter 4, “Activating the CICS VR server address space,” on page 29.

Restoring a DFSMShsm logical backup

When a DFSMShsm logical backup is selected for restore through the CICS VR panel interface, CICS VR automatically adds an additional keyword to the RECOVER command.

This additional keyword causes CICS VR recovery processing to call DFSMShsm services to restore the selected backup when the recovery job is run.

Recording DFSMShsm backup times in GMT format

If change accumulation is enabled for a VSAM sphere, CICS VR is notified of DFSMShsm logical backups created for the VSAM sphere. You can then view the backup times of the DFSMShsm logical backups in both local and GMT format through the CICS VR panel interface.

However, if change accumulation is not enabled for a VSAM sphere, you can only view the DFSMShsm logical backup times in local format through the CICS VR panel interface. If you want to view the DFSMShsm logical backup times in GMT format, and do not want to activate change accumulation for the sphere, you can perform the following tasks for each sphere:

1. Create an initial DFSMShsm backup of the VSAM sphere, if none currently exists. An example of creating a DFSMShsm logical backup is shown in step STEP1:
2. Run the FIXCDS command for the VSAM sphere, as shown in step STEP2:

```
//*-------------------------------------------------------------------*/
//* ISSUE DFSMSHSM HBACKDS  (BACKUP DATA SET)                         */
//*-------------------------------------------------------------------*/
//STEP1    EXEC PGM=IKJEFT01
//SYSPRINT DD SYSOUT=*
//SYSTSPRT DD SYSOUT=*
//SYSTSIN  DD *
 HBACKDS  'CICS33N.HSM' WAIT
 HLIST DSNAME ('CICS33N.HSM') BCDS SYSOUT(H)
/*
//*-------------------------------------------------------------------*/
//* ISSUE DFSMSHSM HSEND FIXCDS TO ENABLE CICSVR NOTIFICATION         */
//*-------------------------------------------------------------------*/
//STEP2    EXEC PGM=IKJEFT01
//SYSPRINT DD SYSOUT=*
//SYSTSPRT DD SYSOUT=*
//SYSTSIN  DD *
 HSEND FIXCDS B CICS33N.HSM  PATCH(X'2E' BITS(.....1..))
 HLIST DSNAME ('CICS33N.HSM') BCDS SYSOUT(H)
/*
```

Figure 70. Creating a DFSMShsm logical backup and running the FIXCDS command

Issuing the FIXCDS command enables CICS VR to be notified of all further DFSMShsm backups made for the sphere. The notification includes the backup times in both GMT and local time formats.

Note: DFSMShsm logical backups created with the Backup-While-Open (BWO) facility for non-RLS VSAM spheres must use the recovery syncpoint in local time format. Therefore, the backup and recovery times of BWO non-RLS DFSMShsm logical backups is available only in local format, even if these steps are followed.

Using DFSMShsm full volume dumps

CICS VR provides limited support for DFSMShsm full volume dumps. Unlike DFSMShsm logical backups, CICS VR cannot dynamically retrieve and display a list of full volume dumps on which the VSAM sphere is backed up.

However, during recovery construction, the CICS VR panel interface allows you to select full volume dump as the backup type, and enter the date on which the full volume dump from which you want to restore the VSAM sphere was created. CICS VR then automatically adds an additional keyword to the RECOVER command. This additional keyword causes CICS VR recovery processing to call DFSMShsm services to restore the VSAM sphere from the entered full volume dump when the recovery job is run.

CICS VR change accumulation does not support DFSMShsm full volume dumps. Therefore, you would need to manually enter the latest backup creation date in the change accumulation job before execution.

Using DFSMSdss as your backup utility

DFSMSdss logical copies and dumps are fully supported by CICS VR recovery and change accumulation.

DFSMSdss does not keep its own inventory of logical copies and dumps. CICS VR therefore provides the ability to keep an inventory of DFSMSdss logical copies and dumps in the RCDS. CICS VR also contains support to display and restore the registered DFSMSdss logical copies and dumps.

DFSMSdss logical copy and dump notification

The CICS VR server address space must be active for CICS VR to keep an inventory of DFSMSdss. Logical copies and dumps are created for VSAM data sets.

Additionally, a few keywords, as described in the following sections, must be added to your copy and dump jobs. These keywords specify to DFSMSdss that the copy or dump is for use by CICS VR.

The ISMF panels that can be used to create a logical copy or dump for VSAM spheres also support CICS VR notification. When you enter the COPY or DUMP line operator or list command from ISMF, set the **CICS VR backup** input field to Y. This adds the appropriate keywords to the copy or dump job indicating the copy or dump is for use by CICS VR. See the *CICS VR User's Guide* for further information about ISMF support.

When the appropriate keywords have been added to the copy or dump job, DFSMSdss automatically notifies CICS VR about the logical copy or dump that was created for the VSAM data set. CICS VR receives this notification and stores information about the logical copy or dump in the RCDS. Additionally, CICS VR also provides a unique data set name to the copy job for all DFSMSdss logical copies of which it is notified.

Note: Notification of DFSMSdss logical copies and dumps is automatically performed by DFSMSdss. There is no need to call the CICS VR file copy notification service, as described in Chapter 9, “Using the CICS VR file copy notification service,” on page 173, for DFSMSdss logical copies or dumps.

Note: The CICSVRBACKUP DFSMSdss keyword required for CICS VR notification is mutually exclusive with the SPHERE keyword. Therefore, only a copy or dump of the VSAM base cluster can be created for use with CICS VR.

Restoring a DFSMSdss logical copy or dump

Because CICS VR can keep an inventory of DFSMSdss logical copies and dumps in the RCDS, a list of all registered copies and dumps is available through the CICS VR panel interface.

When a DFSMSdss logical copy or dump is selected for restore through the CICS VR panel interface, CICS VR automatically adds commands from a restore skeleton to the produced recovery job. CICS VR provides the DFSMSdss logical copy and dump skeletons in the SDWWSENU PDS. In most cases, you do not need to make any changes to these skeletons. The substituted skeleton opens as a separate step in the produced recovery job, prior to the forward recovery job step.

The next two sections describe the specific changes that must be made to your DFSMSdss logical copy and dump jobs to indicate that they are for use by CICS VR and must be registered in the CICS VR RCDS.

Using DFSMSdss COPY

You can use the DFSMSdss COPY command to make copies of VSAM data sets for use by CICS VR.

This data set copy shows how to use the CICSVRBACKUP and the RENAMEU(**,CICSVR.**) keywords to notify DFSMSdss that the copies are for use by CICS VR.

```
//JOB6     JOB  accounting information,REGION=nnnnK
//STEP1    EXEC PGM=ADRDSSU
//SYSPRINT DD   SYSOUT=*
//SYSIN    DD   *
  COPY DATASET(         -
    INCLUDE(USER1.**))       /* FILTER ON DS W/1ST LEV Q USER1  */ -
    OUTDYNAM((339001),(339002),(339003)) /* DYNAM ALLOC VOLS */ -
    RENAMEU(**,CICSVR.**) -
    CICSVRBACKUP
/*
```

Figure 71. DFSMSdss data set copy for use with CICS VR

This example is different than an ordinary DFSMSdss COPY job. The INCLUDE and the OUTDYNAM keywords operate like the normal DFSMSdss keywords causing all data sets with the high-level qualifier USER1 that are in the standard order of search to be copied to the target volumes that are labeled 339001, 339002, and 339003. Since CICSVRBACKUP is specified, RENAMEU(**,CICSVR.**) does not cause the INCLUDE data sets to be renamed with the CICS VR high level qualifier. Instead, CICS VR provides DFSMSdss with a unique data set name for each copy using the naming convention, `prefix.DSOiinnn.Dyyyyddd.Thhmmsst`, where:

prefix
Is the CICS VR data set name, *CICSVR_DSNAME_PREFIX*, defined in the IGDSMSxx PARMLIB member.

DS
Is the abbreviation for DFSMSdss.

O
Is the abbreviation for output.

ii
Is the system identifier in the sysplex. It is used to guarantee unique names across the sysplex.

nnn
is a unique request number code (001–999) for each request which arrives within the same tenth of a second time interval.

D
Is the abbreviation for the date.

yyyy
Is the year.

ddd
Is the day of the year, in Julian format.

T
Is the abbreviation for the time.

hh
Is the hour of the day, based on a 24-hour clock.

mm
Is the number of minutes.

ss
Is the number of seconds.

t
Is the tenths of a second.

You do not need to remember the names of the backup copies that DFSMSdss creates. Instead, when you use the CICS VR dialog, you only need to know the name of the original VSAM sphere and you can select the desired DFSMSdss backup copy from a list of backups. To view all the backup copies for a VSAM sphere from the CICS VR dialog:

- Select a VSAM sphere that you have created a DFSMSdss copy for from the CICS VR VSAM sphere list.
- Press F5 for forward recovery only.
- Put the cursor in the backup time field and press F4 to list all the backups for the selected VSAM sphere.

All the backup copies of the spheres are listed, including the DFSMSdss backups.

Note: The RENAMEU keyword must be specified as "RENAMEU(**,CICSVR.**)" for DFSMSdss to create backup copies for CICS VR.

Using DFSMSdss DUMP

If you want to use DFSMSdss DUMP, you must create a batch job and set it up so that it is regularly submitted with a production planning system such as OPC/ESA.

The DUMP job must include the CICSVRBACKUP keyword so that CICS VR is notified of the produced logical dump. Your output data set name must be unique each time the job is run so that you can maintain multiple backup copies of your VSAM data sets. Three methods of providing a unique output data set name are discussed:

- Using a batch REXX procedure to modify and submit the JCL
- Using a started task
- Using a generation data group (GDG)

Using a batch REXX procedure to generate a unique output data set name

Sample JCL which show how to use the REXX procedure.

The sample JCL to put date and time in the JCL and run DFSMSdss DUMP shows a sample of how to put date and time in the JCL to generate unique names for the output data set each time the job is run:

```
//JOB7     JOB MSGCLASS=X,CLASS=A,MSGLEVEL=(1,1),REGION=0M
//DSS EXEC  PGM=ADRDSSU
//DD1 DD UNIT=3590,VOL=SER=TAPE04,
//         LABEL=(1,SL),DISP=(NEW,CATLG),
//         DSN=BACKUP.A&DATE.A&TIME
//SYSPRINT DD SYSOUT=*
//SYSIN    DD    *
     DUMP OUTDD(DD1) -
     DS(INCLUSER1.DATASET1)) -
     CICSVRBACKUP
/*
```

Figure 72. Sample JCL to put date and time in the JCL and run DFSMSdss DUMP

Sample JCL to start REXX procedure, JCL1 (input/output files in the proc) and Sample JCL to start REXX procedure, JCL2 (input/output files in the JCL) show two samples of how to start a batch REXX procedure to modify and submit the JCL in Sample JCL to put date and time in the JCL and run DFSMSdss DUMP.

Sample JCL to start REXX procedure, JCL1 (input/output files in the proc) calls the REXX procedure in Sample REXX procedure JCL1 for dynamic allocation to replace the &DATE and &TIME values in Sample JCL to put date and time in the JCL and run DFSMSdss DUMP with the real date and time values. You must customize the input and output DD names, library, and member names in the REXX procedure.

```
//JOB8     JOB MSGCLASS=X,CLASS=A,MSGLEVEL=(1,1),REGION=0M
//TSO   EXEC  PGM=IKJEFT01,PARM='JCL1'
//SYSPROC  DD DSN=USER1.CLIST,DISP=SHR
//SYSTSPRT DD SYSOUT=*
//SYSTSIN  DD DUMMY
```

Figure 73. Sample JCL to start REXX procedure, JCL1 (input/output files in the proc)

Sample JCL to start REXX procedure, JCL2 (input/output files in the JCL) calls the REXX procedure in Sample REXX procedure JCL2 for dynamic allocation to replace the &DATE and &TIME values in Sample JCL to put date and time in the JCL and run DFSMSdss DUMP with the real date and time values. This is similar to Sample JCL to start REXX procedure, JCL1 (input/output files in the proc), but the input and output DD names, library, and member names are specified in the JCL instead of the REXX procedure. You must customize the input and output DD names, library, and member names in the JCL.

```
//JOB9     JOB MSGCLASS=X,CLASS=A,MSGLEVEL=(1,1),REGION=0M
//TSO   EXEC  PGM=IKJEFT01,PARM='JCL2'
//SYSPROC  DD DSN=USER1.CLIST,DISP=SHR
//DDI      DD DSN=USER1.CNTL(DFDSS),DISP=SHR
//DDO      DD DSN=USER1.CNTL(TEMP),DISP=SHR
//SYSTSPRT DD SYSOUT=*
//SYSTSIN  DD DUMMY
```

Figure 74. Sample JCL to start REXX procedure, JCL2 (input/output files in the JCL)

For both samples, the REXX procedure must be placed in the data set allocated to SYSPROC.

Here is the REXX procedure, JCL1 (input and output files in the procedure):

```
/*REXX: ************************************************************/
/*                                                                  */
/* This REXX procedure obtains the system date and time and replace     */
/* &DATE and &TIME in the input member with current date and time    */
/* and write all changed and unchanged lines to the output member.  */
/*                                                                  */
/* Input is taken from the data set specified in variable dsni and   */
/* member specified in inmem.                                       */
/*                                                                  */
/* Output is written to the dataset specified in variable dsno and  */
/* member specified in outmem.                                      */
/* After conversion the output is submitted.                        */
/*                                                                  */
/* The indd and outdd names are used to allocate the datasets to    */
/* ddnames. They are freed in the end of this procedure.            */
/*                                                                  */
/* Customize the names below to get the correct input and output.   */
/*                                                                  */
/********************************************************************/
/********************************************************************/
/* DATASETNAMES                                                     */
/********************************************************************/
dsni  = "USER1.CNTL"       /* INPUT LIBRARY                         */
dsno  = "USER1.CNTL"       /* OUTPUT LIBRARY                        */

indd  = 'DDI'                       /* input ddname                 */
outdd = 'DDO'                       /* output ddname                */
/********************************************************************/
/*                  MEMBERS                                         */
/********************************************************************/
inmem   = 'DFDSS'                   /* Input JCL                    */
outmem  = 'TEMP'                    /* Output JCL                   */

/********************************************************************/
/* Allocate datasets                                                */
/********************************************************************/

"ALLOC DSN('" || dsni || "(" || inmem || ")') FILE(" || indd || ")"

"ALLOC DSN('" || dsno || "(" || outmem || ")') FILE(" || outdd || ")"

/********************************************************************/
/* Read all lines                                                   */
/********************************************************************/

"EXECIO * DISKR" indd "1 (FINIS STEM IN.)"

/********************************************************************/
/* Get system date and time.                                        */
/* Date is saved as yymmdd                                          */
/* Time is saved as hhmmss                                          */
/********************************************************************/

date = date('S')
date = substr(date,3)

time = time('N')
time = substr(time,1,2) || substr(time,4,2) || substr(time,7,2)

/********************************************************************/
/* Check all lines for &DATE or &TIME and replace them with the     */
/* saved values in date and time.                                   */
/********************************************************************/
```

Figure 75. Sample REXX procedure JCL1 for dynamic allocation

```
o = 0                                  /* init                    */

do i = 1 to in.0                       /* do for all input        */
  o = o + 1                            /* one more line for output */
  out.o = in.i                         /* copy to output          */

  ind = pos('&DATE',out.o)             /* any date?               */
  do while ind > 0                     /* do while date found     */
    out.o = insert(' ',out.o,ind,1)    /* insert a blank since    */
    out.o = overlay(date,out.o,ind)    /* overlay is one longer   */
    ind = pos('&DATE',out.o)           /* any more?               */
  end                                  /*                         */

  ind = pos('&TIME',out.o)             /* any time?               */
  do while ind > 0                     /* do while time found     */
    out.o = insert(' ',out.o,ind,1)    /* insert a blank since    */
    out.o = overlay(time,out.o,ind)    /* overlay is one longer   */
    ind = pos('&TIME',out.o)           /* any more?               */
  end                                  /*                         */

end
/*********************************************************************/
/* Write all lines to output dataset                                 */
/*********************************************************************/

"EXECIO * DISKW" outdd "(FINIS STEM OUT.)"

/*********************************************************************/
/* Free the allocated datasets                                       */
/*********************************************************************/
"FREE FILE(" || indd || ")"
"FREE FILE(" || outdd || ")"

/*********************************************************************/
/* Submit the changed job and return                                 */
/*********************************************************************/

"SUBMIT '" || dsno || "(" || outmem || ")'"

return
```

Here is the REXX procedure, JCL2 (input and output files in the JCL):

```
/*REXX: ************************************************************/
/*                                                                  */
/* This REXX procedure obtains system date and time and replace     */
/* &DATE and &TIME in the input member with current date and time   */
/* and write all changed and unchanged lines to the output member.  */
/*                                                                  */
/* Input is taken from the dataset specified in the JCL for the     */
/* ddname given in variable indd, in this example DDI               */
/*                                                                  */
/* Output is written to the dataset specified in the JCL for the    */
/* ddname given in variable outdd, in this example DDO              */
/* After conversion the output is submitted and the member used     */
/* for that is in variable outmem, in this example TEMP             */
/*                                                                  */
/* Customize the names below to get the correct input and output.   */
/*                                                                  */
/********************************************************************/
/********************************************************************/
/* DDNAMES and member                                               */
/********************************************************************/

outmem = 'TEMP'                      /* output member given in JCL  */

indd  = 'DDI'                        /* input ddname                */
outdd = 'DDO'                        /* output ddname               */

/********************************************************************/
/* Read all lines                                                   */
/********************************************************************/

"EXECIO * DISKR" indd "1 (FINIS STEM IN.)"

/********************************************************************/
/* Get system date and time.                                        */
/* Date is saved as yymmdd                                          */
/* Time is saved as hhmmss                                          */
/********************************************************************/

date = date('S')
date = substr(date,3)

time = time('N')
time = substr(time,1,2) || substr(time,4,2) || substr(time,7,2)

/********************************************************************/
/* Check all lines for DATE or TIME and replace them with the       */
/* saved values in date and time.                                   */
/********************************************************************/

o = 0                                /* init                        */

do i = 1 to in.0                     /* do for all input            */

  o = o + 1                          /* one more line for output    */
  out.o = in.i                       /* copy to output              */

  ind = pos('DATE',out.o)            /* any date?                   */
  do while ind > 0                   /* do while date found         */
    out.o = insert(' ',out.o,ind,1)  /* insert a blank since        */
    out.o = overlay(date,out.o,ind)  /* overlay is one longer       */
    ind = pos('DATE',out.o)          /* any more?                   */
  end                                /*                             */
```

Figure 76. Sample REXX procedure JCL2 for dynamic allocation

```
  ind = pos('TIME',out.o)              /* any time?                */
  do while ind > 0                     /* do while time found      */
    out.o = insert(' ',out.o,ind,1)    /* insert a blank since     */
    out.o = overlay(time,out.o,ind)    /* overlay is one longer    */
    ind = pos('TIME',out.o)            /* any more?                */
  end                                  /*                          */

end
/*********************************************************************/
/* Write all lines to output dataset                                 */
/*********************************************************************/

"EXECIO * DISKW" outdd "(FINIS STEM OUT.)"

/*********************************************************************/
/* Get datasetname for output                                        */
/*********************************************************************/
x = LISTDSI(outdd "FILE")

/*********************************************************************/
/* Submit the changed job and return                                 */
/*********************************************************************/

"SUBMIT '" || sysdsname || "(" || outmem || ")'"

return
```

The job submitted by the previous procedures looks like:

```
//JOB10     JOB MSGCLASS=X,CLASS=A,MSGLEVEL=(1,1),REGION=0M
//DSS   EXEC  PGM=ADRDSSU
//DD1   DD UNIT=3480,VOL=SER=TAPE04,
//         LABEL=(1,SL),DISP=(NEW,CATLG),
//         DSN=BACKUP.A001103.A141213
//SYSPRINT DD SYSOUT=*
//SYSIN    DD    *
     DUMP OUTDD(DD1) -
     DS(INCL(USER1.DATASET1)) -
     CICSVRBACKUP
/*
```

Figure 77. Job submitted by REXX procedure JCL1 and JCL2

Using a started task to generate unique output data set names

The job could also be run as a started task with this JCL.

```
//DFDSS PROC
//DSS   EXEC  PGM=ADRDSSU
//DD1   DD UNIT=3480,VOL=SER=TAPE04,
//         LABEL=(1,SL),DISP=(NEW,CATLG),
//         DSN=BACKUP.A&LYYMMDD.A&LHHMMSS
//SYSPRINT DD SYSOUT=*
//SYSIN DD DSN=SYS1.SYSIN(DFDUMP),DISP=SHR
```

Figure 78. Sample JCL to start a task

JES2 replaces the &LYYMMDD and &LHHMMSS with local date and time. Note that this works only if the job is started as a started task.

Using a GDG to generate unique output data set names

The user can also define a GDG for each dump job and specify the generation data sets (GDS) as the output dump data set name. The GDG must specify scratch and 255 as the maximum number of data sets.

This sample JCL shows a how to define a GDG:

```
//JOB11     JOB MSGCLASS=X,CLASS=A,MSGLEVEL=(1,1),REGION=0M
//STEP1    EXEC   PGM=IDCAMS
//GDGMOD   DD     DSNAME=GDG01,DISP=(,KEEP),
//         SPACE=(TRK,(0)),UNIT=DISK,VOL=SER=VSER03,
//         DCB=(RECFM=FB,BLKSIZE=7892,LRECL=100)
//SYSPRINT DD SYSOUT=*
//SYSIN    DD     *
DEFINE GENERATIONDATAGROUP -
       (NAME(GDG01) -
        EMPTY -
        SCRATCH -
        LIMIT(255) )
/*
```

Figure 79. Sample JCL to define a GDG

This sample JCL shows a sample of how to create a GDG entry:

```
//JOB12     JOB MSGCLASS=X,CLASS=A,MSGLEVEL=(1,1),REGION=0M
//DSS      EXEC  PGM=ADRDSSU
//GDGDD1   DD DSNAME=GDG01+1),DISP=(NEW,CATLG),
//         UNIT=3480,VOL=SER=TAPE04,
//         LABEL=(1,SL)
//SYSPRINT DD SYSOUT=*
//SYSIN    DD    *
      DUMP OUTDD(GDGDD1) -
      DS(INCL(USER1.DATASET1)) -
      CICSVRBACKUP
/*
```

Figure 80. Sample JCL to use the GDG

Note: CICS VR does not support more than 255 GDS data sets for a GDG because non-SMS GDG data sets beyond the 255th data set are not cataloged. CICS VR requires that all associated data sets be cataloged.

Using ABARS as your backup utility

ABARS backups are fully supported by CICS VR for recovery and change accumulation. CICS VR provides the ability to keep an inventory of ABARS backups in the RCDS. CICS VR also contains support to display and restore the registered backups.

Prior to using ABARS as your backup utility, you must use the supplied version from the load module DWWUIXIT included in the SDWWLOAD to replace a dummy version of the DFSMSdss Options Installation Exit Routine (ADRUIXIT) as described in z/OS DFSMS Installation Exits. You can use the supplied sample

DWWUIXIT included in the SDWWCNTL to change the load module name from DWWUIXIT to ADRUIXIT as required for DFSMSdss.

Creating ABARS backups

With CICS VR you can initiate backups using ABARS for VSAM data sets registered in the RCDS.

Use the CICS VR panel interface to initiate creating backups using ABARS for VSAM data sets registered in the RCDS, as shown in this example:

```
                    CICSVR VSAM sphere backup parameters
Command ===>

Type the backup name or aggregate group name for the selected VSAM sphere,
then specify backup product name. Choose backup type. Press Enter to
continue.

 VSAM sphere . . . . . . : CICSVR.ABARS.CVRTESTX.ESDS01

 VSAM sphere backup name

 Aggregate group name  . . CVRTESTX

 Backup product name . . . ABARS  (HSMLB, ABARS, DSSLC, DSSLD or other)

 Backup type . . . . . . . 3  (1-CICS Online, 2-CICS Offline, 3-non-CICS)

 CICS APPLID . . . . . . .


 F1=Help        F7=PrevVSAM   F12=Cancel
```

Figure 81. Creating backups using ABARS

To initiate creating backups by ABARS, you must specify:

- The aggregate group name, not the backup name.
- The backup product name, in this case ABARS. This is used to locate the appropriate skeleton supplied with CICS VR.
- Other parameters if required.

ABARS uses the DFSMSdss logical dump function to create backups for all of the active, non migrated, data sets of aggregate groups. This means that all the capabilities supported for DFSMSdss logical dumps, for example BWO, are supported for ABARS backups.

Listing ABARS backups registered in RCDS

The CICS VR backup list includes ABARS backups registered in RCDS for selected VSAM data sets.

For ABARS backups, CICS VR additionally displays the copy numbers and version numbers. You can also select to display the backup and recovery point times in local format or in Greenwich Mean Time (GMT) format.

```
                          CICSVR backup list             Row 1 to 6 of 6
Command ===>

Press Enter to show the backup list for the next selected VSAM sphere. Or,
press F12 to cancel the list sequence.

  VSAM sphere  . . . : CICSVR.ABARS.CVRTESTX.ESDS01

  -------------------- Data set backup information --------------------
  Date    Time      Gen  Ver   Online  Rp Date Rp Time   Type   Product
  08.118  16:38:28  01   0014  NO                       LOCAL  ABARS
  08.117  18:21:19  01   0013  NO                       LOCAL  ABARS
  08.117  10:06:29  01   0012  NO                       LOCAL  ABARS
  08.116  20:22:45  01   0011  NO                       LOCAL  ABARS
  08.116  19:36:46  01   0010  NO                       LOCAL  ABARS
  08.104  00:01:35  00   0001  NO                       LOCAL  HSMLB
****************************** Bottom of data ******************************


 F1=Help     F5=Local    F6=GMT      F7=Bkwd     F8=Fwd     F12=Cancel
```

Figure 82. CICS VR backup list including ABARS backups

```
                  CICSVR registered backup names list      Row 1 to 5 of 5
Command ===>

Press Enter to show the registered backup names list for the next selected
VSAM sphere. Or, press F12 to cancel the list sequence. Select a backup
and press F10 (Info) to obtain optional backup information, or F11 (Dereg) to
deregister the backup from the RCDS and optionally uncatalog and delete
the backup.

VSAM sphere  . . . : CICSVR.ABARS.CVRTESTX.ESDS01

--------------------- Data set backup information ----------------------
S  Date    Time      Type   Backup data set name
   08.118  16:38:28  LOCAL  CICSVR.ABARS.CVRTESTX.D.C01V0014
   08.117  18:21:19  LOCAL  CICSVR.ABARS.CVRTESTX.D.C01V0013
   08.117  10:06:29  LOCAL  CICSVR.ABARS.CVRTESTX.D.C01V0012
   08.116  20:22:45  LOCAL  CICSVR.ABARS.CVRTESTX.D.C01V0011
   08.116  19:36:46  LOCAL  CICSVR.ABARS.CVRTESTX.D.C01V0010
 F1=Help     F5=Local    F6=GMT      F7=Bkwd     F8=Fwd     F10=Info
F11=Dereg   F12=Cancel
```

Figure 83. CICS VR registered backup names list including ABARS backups

```
                   CICSVR backup optional information
Command ===>

Press Enter to show the optional backup information for the next selected
backup data set. Or, press F12 to cancel the list sequence.

  VSAM sphere  . . . . : CICSVR.ABARS.CVRTESTX.ESDS01

  Backup data set name : CICSVR.ABARS.CVRTESTX.D.C01V0014

  Product identifier . : ABARS


  --------------------- Optional information ---------------------

****************************** Bottom of data ******************************

 F1=Help     F7=Bkwd     F8=Fwd     F12=Cancel
```

Figure 84. CICS VR backup optional information including ABARS backups

Restoring ABARS backups

ABARS backups registered in the RCDS can be used to restore selected VSAM data sets.

For ABARS backups, CICS VR additionally displays the copy numbers and version numbers. You can also select to display the backup and recovery point times in local format or in Greenwich Mean Time (GMT) format.

ABARS backups are identified by the product identifier ABARS in the CICS VR backup prompt list, as shown in Figure 85 on page 149. When you select an ABARS backup, the corresponding restore skeleton, which is supplied with CICS VR, is added to the generated recovery job. This skeleton deletes the target data set, if it exists, then restores and renames the selected VSAM data sets from the selected ABARS backup.

```
                        CICSVR backup prompt list           Row 1 to 6 of 6
Command ===>

Select one backup time, then press Enter.

VSAM sphere  . . . : CICSVR.ABARS.CVRTESTX.ESDS01

--------------------- Data set backup information ----------------------
   Date    Time(GMT) Gen  Ver   Online  Rp Date Rp Time   Type   Product
   08.118  16:38:28  01   0014  NO                        LOCAL  ABARS
   08.117  18:21:19  01   0013  NO                        LOCAL  ABARS
   08.117  10:06:29  01   0012  NO                        LOCAL  ABARS
   08.116  20:22:45  01   0011  NO                        LOCAL  ABARS
   08.116  19:36:46  01   0010  NO                        LOCAL  ABARS
   08.104  00:01:35  00   0001  NO                        LOCAL  HSMLB
*************************** Bottom of data ******************************


 F1=Help     F7=Bkwd     F8=Fwd     F12=Cancel
```

Figure 85. CICS VR backup prompt list

In most cases, you do not need to make any changes to this skeleton. The substituted skeleton opens as a separate job step in the generated recovery job, prior to the forward recovery job step. The restore job step contains the DFSMSdss RESTORE command to perform a restore of the selected VSAM data sets from the selected ABARS backup, which is a DFSMSdss logical dump.

ABARS backup deregistration

ABARS backups can be deregistered from the RCDS.

You can deregister ABARS backups from the RCDS in the same way as backups created by other currently supported backup products, using the panel interface as shown in this example:

```
                 CICSVR backup deregister verification
Command ===>

Select an action and press Enter to deregister the backup. Or, press F12
to cancel the request.

Backup name . . . . . : CICSVR.ABARS.CVRTESTX.D.C01V0010

Backup date and time
(Local format)  . . . : 08.116 19:36:46

           1   1.  Deregister the backup from the CICSVR RCDS
               2.  Deregister the backup from the CICSVR RCDS and
                   uncatalog and delete the backup




 F1=Help    F12=Cancel
```

Figure 86. Deregistering ABARS backups from the RCDS

Note: ABARS backups can only be deregistered from the RCDS. ABARS backups cannot be uncataloged and deleted.

Using other products as your backup utility

If you are using another logical backup product (IBM or non-IBM) not previously listed, CICS VR contains general backup support that allows an inventory of the backups to be maintained in the CICS VR RCDS.

The registered logical backups can then be fully supported and used by CICS VR recovery and change accumulation.

Note: Any backup product can be used with CICS VR. However, if you do not register the backup with CICS VR, you must manually restore the backup, then use the CICS VR panel interface to build and submit a forward recovery job; select NONE as the backup type.

CICS VR enhances the file copy notification service by recording file attributes during notification, and then uses these attributes to allocate the target data set dynamically, before restore or recovery processing. For other backup products, CICS VR notification calls can be included by using the PREALLOCATION REQUIRED flag, as discussed in “Optional parameters” on page 194.

General backup notification

The CICS VR server address space must be active for CICS VR to keep an inventory of backups created by other products (IBM or non-IBM) not previously listed.

After a backup is created for a VSAM data set, the CICS VR file copy notification service can be called to notify CICS VR that a new backup has been created for a VSAM data set. The file copy notification service can either be called directly by the backup program, or from a user-specified job step that is run after the backup has been created successfully. Details about the backup, such as backup name and backup type, must be specified as parameters to the file copy notification service.

CICS VR stores information about the notified backup in the RCDS, allowing CICS VR to maintain an inventory of all backups of which it is notified. See Chapter 9, “Using the CICS VR file copy notification service,” on page 173 for further details.

Backup creation through the CICS VR panel interface

CICS VR can create backups that are configured through the panel interface, using a backup skeleton.

The skeleton is stored in SDWWSENU, and contains the details of the job to submit for the specific backup product. A base skeleton is provided in DWWRE1RO, and can be customized for the specific backup product.

Several CICS VR variables are available for use within the backup skeleton, as described in this table:

Table 7. Backup skeleton variables supported by CICS VR

Variable name	Description
&CSPH	The original sphere name
&CBKDSN	The backup sphere name
&CBKCSID	The CICS APPLID, if backup type 2 is specified
&CBKTYPE	The backup type value. This value can be 1, 2, or 3, and is specified on the panel interface

The name of the customized skeleton is in the form DWW*prdnm*, where *prdnm* is a five character product name abbreviation, with the digit '1' in the third place. For example, a product name HSMLB would produce a skeleton name DWWHS1LB. The sample skeleton uses IDCAMS REPRO, and so has the name DWWRE1RO.

Note: The same backup name is used for restore and backup. For example, to restore from a backup made using IDCAMS REPRO, select the REPRO product. Similarly, to make a backup using IDCAMS REPRO, select the REPRO product. CICS VR uses the correct skeleton in the resulting job.

After the backup step within the skeleton, a file copy notification can be performed. This notification is done by running a program that calls the CICS VR File Copy Notification Service.

Note: File copy notification from within the backup skeleton must be performed only if the backup product does not include a call to the CICS VR notification service already.

Restoring a backup that was registered through the file copy notification service

Because CICS VR keeps an inventory of all backups of which it is notified through the file copy notification service, a list of all registered backups is available through the CICS VR panel interface.

All registered backups can therefore be selected for restore through the CICS VR panel interface.

Restore skeletons

When a backup is originally registered through the file copy notification service, a five character product identifier is associated with the backup.

The product identifier is a concatenation of the three character *backup_product* and two character *backup_type* parameters that are specified when the service is called. For example, you can specify a product identifier of 'REPRO' when notifying CICS VR of backups made using the IDCAMS REPRO utility.

Prior to selecting a registered backup for restore, a restore skeleton must be defined to CICS VR for the product identifier associated with the selected backup. The restore skeleton must either be added as a member to the SDWWSENU data set, using the characteristics of this PDS, or as a member of another PDS allocated to the DWWSLIB ddname. The restore skeleton member name must follow this naming convention:

```
DWWxxxxx (where xxxxx is the product identifier)
```

For example, a restore skeleton that was created for the backups registered with the 'REPRO' product identifier must be defined with the DWWREPRO member name.

Note: CICS VR provides a sample DWWREPRO restore skeleton in the SDWWSENU data set.

The restore skeleton must contain the commands required to restore the associated backup type. For example, if the target data set already exists, the restore skeleton associated with backups created by IDCAMS REPRO might contain commands to call REPRO to copy records from the backup data set into the target data set.

To make a restore skeleton usable with all backups of the same type registered for various VSAM spheres, you can include variables within the skeleton. CICS VR supports a number of variables that can be used to retrieve information about the backup and VSAM data set that is stored in the RCDS, such as backup name and data set name, along with parameters specified during recovery creation through the CICS VR panel interface, such as new target data set name, volume, and unit. For example, in the REPRO skeleton, you might include the *&CBUDSN* variable name to retrieve the original backup data set name that is stored in the RCDS, along with other variables.

When a backup that was registered through the file copy notification service is selected for restore through the CICS VR panel interface, CICS VR adds the associated restore skeleton as a step in the produced recovery job. All variables specified in the restore skeleton are substituted with their associated values. For example, when a backup data set that is named 'EXAMPLE.REPRO' is selected for restore, the *&CBUDSN* variable name is substituted with the value EXAMPLE.REPRO.

This table lists all restore skeleton variables that are supported by CICS VR. When specifying a variable in a restore skeleton, be sure to precede the variable name with an ampersand (&).

Table 8. Restore skeleton variables supported by CICS VR

Variable name	Format	Length (Bytes)	Description	Source
CBUDSN	Char	44	Backup data set name.	RCDS
CSPH	Char	44	Name of the original VSAM data set for which the backup was created.	RCDS
CBPROD	Char	3	Backup product identifier as specified in the *backup_product* parameter during notification.	RCDS
CBTYPE	Char	2	Backup type identifier as specified in the *backup_type* parameter during notification.	RCDS
CNEWQ	Char	3	Indicates if a new target data set name was entered for restore and recovery through the CICS VR panel interface during recovery construction. This variable contains one of the following values: YES - A new data set name was specified through the panel interface. NO - A new data set name was not specified through the panel interface.	Generated by CICS VR
CNEWDSN	Char	44	New target data set name entered through the CICS VR panel interface for restore and recovery.	Panel interface
CTODSN	Char	44	The data set name that is used for restore and recovery. If a new data set name was entered through the CICS VR panel interface, this variable contains the new data set name. If a new data set name was not entered through the CICS VR panel interface, this variable contains the original name of the VSAM data set for which the backup was created.	Panel interface or RCDS
CNEWVOLQ	Char	3	Indicates if a new volume and unit was specified for restore through the CICS VR panel interface during recovery construction. This variable contains one of the following values: YES - A new volume and unit was specified for restore processing through the CICS VR panel interface. NO - A new volume and unit was not specified for restore processing through the CICS VR panel interface.	Generated by CICS VR
CNEWUNIT	Char	8	New unit for restore entered through the CICS VR panel interface during recovery construction.	Panel interface

Table 8. Restore skeleton variables supported by CICS VR (continued)

Variable name	Format	Length (Bytes)	Description	Source
CNEWVOL	Char	6	New volume for restore entered through the CICS VR panel interface during recovery construction.	Panel interface
CBVOLTBL	Char	8	Table that contains the volumes on which the backup resides, as entered in the optional *volume_list_area* parameter during notification. This table can be used to reference each volume using the CBVOL variable.	Generated by CICS VR
CBVOLNUM	Char	3	Number of volumes on which the backup resides, as specified in the optional *number_of_volumes* parameter during notification.	RCDS
CBVOL	Char	6	Volume on which the backup resides, as specified in the optional *volume_list_area* parameter during notification. Use this variable with the CBVOLTBL variable to reference each volume name individually.	RCDS
CBUNIT	Char	8	Unit (device type) of the volume(s) on which the backup resides, as specified in the optional *device_type* parameter during notification.	RCDS
CBSEQNUM	Char	4	Sequence number of the backup, as specified in the optional *sequence_number* variable during notification.	RCDS
CBLOCAL	Char	15	Backup date and time in local format, as specified in the *backup_date_local* and *backup_time_local* parameters during notification. The output format of this variable is `yy.ddd hh:mm:ss`	RCDS
CBDATEL	Char	6	Backup date in local format, as specified in the *backup_date_local* parameter during notification. The output format of this variable is `yy.ddd`	RCDS
CBTIMEL	Char	8	Backup time in local format, as specified in the *backup_time_local* parameter during notification. The output format of this variable is `hh:mm:ss`	RCDS
CBGMT	Char	15	Backup date and time in GMT format, as specified in the *backup_date_GMT* and *backup_time_GMT* parameters during notification. The output format of this variable is `yy.ddd hh:mm:ss`	RCDS
CBDATEG	Char	6	Backup date in GMT format, as specified in the *backup_date_GMT* parameter during notification. The output format of this variable is `yy.ddd`	RCDS

Table 8. Restore skeleton variables supported by CICS VR (continued)				
Variable name	**Format**	**Length (Bytes)**	**Description**	**Source**
CBTIMEG	Char	8	Backup time in GMT format, as specified in the *backup_time_GMT* parameter during notification. The output format of this variable is `hh:mm:ss`	RCDS
CBPMODE	Char	1	The processing mode of the notification service, as requested in the PROCESSING MODE bit of the optional *operation_flags* parameter during notification. The value of this variable is one of the following: A - Asynchronous processing mode requested S - Synchronous processing mode requested	RCDS
CBPBWO	Char	1	The value of the PROCESS BWO bit of the optional *operation_flags* parameter specified during notification. The value of this variable is one of the following: Y - Bit was set on during notification N - Bit was set off during notification	RCDS
CBSONWT	Char	1	The value of the SHARP ONLINE BACKUP WITH TIEUP LOG RECORD bit of the optional *status_flags* parameter specified during notification. The value of this variable is one of the following: Y - Bit was set on during notification N - Bit was set off during notification	RCDS
CBFONWT	Char	1	The value of the FUZZY ONLINE BACKUP WITH TIEUP LOG RECORD bit of the optional *status_flags* parameter specified during notification. The value of this variable is one of the following: Y - Bit was set on during notification N - Bit was set off during notification	RCDS
CBSONWOT	Char	1	The value of the SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD bit of the optional *status_flags* parameter specified during notification. The value of this variable is one of the following: Y - Bit was set on during notification N - Bit was set off during notification	RCDS

Table 8. Restore skeleton variables supported by CICS VR (continued)

Variable name	Format	Length (Bytes)	Description	Source
CBFONWOT	Char	1	The value of the FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD bit of the optional *status_flag*s parameter specified during notification. The value of this variable is one of the following: Y - Bit was set on during notification N - Bit was set off during notification	RCDS
CBWOTIME	Char	15	The value of the optional *BWO_timestamp* parameter as specified during notification. The value of the variable, if a value exists, is in the format: `yy.ddd hh:mm:ss`	RCDS
CBRECLOC	Char	15	The value of the optional *recovery_timestamp_local* parameter as specified during notification. The value of the variable, if a value exists, is in the format `yy.ddd hh:mm:ss`	RCDS
CBRECGMT	Char	15	The value of the optional *recovery_timestamp_GMT* parameter as specified during notification. The value of the variable, if a value exists, is in the format `yy.ddd hh:mm:ss`	RCDS
CBOPTTBL	Char	8	Table that contains the value specified for the optional *optional_information* parameter during notification. The specified optional information can contain a maximum of 256 bytes that CICS VR divides into four rows of 64 bytes in this table. This table can be used to reference each 64 bytes of optional information with the CBINFO variable.	Generated by CICS VR
CBINFO	Char	64	Use this variable with the CBOPTTBL variable to reference each row of 64 bytes of the value specified for the optional *optional_information* parameter during notification.	RCDS
CBDDNTBL	Char	8	Table that contains the ddnames, with corresponding APPLIDs, associated with the VSAM data set, as specified in the optional *ddname_and_APPLID* parameter during notification. This table can be used to reference each ddname and associated APPLID using the CBDDN and CBAPPLID variables.	Generated by CICS VR
CBNUMDDN	Char	3	Number of DDNAME/APPLID pairs associated with the VSAM data set, as specified in the optional *number_of_ddnames* parameter during notification.	RCDS

Table 8. Restore skeleton variables supported by CICS VR (continued)				
Variable name	**Format**	**Length (Bytes)**	**Description**	**Source**
CBDDN	Char	8	DDNAME associated with the VSAM data set, as specified in the optional *ddname_and_APPLID* parameter during notification. Use this variable with the CBDDNTBL variable to reference each ddname individually.	RCDS
CBAPPLID	Char	8	APPLID associated with the VSAM data set, as specified in the optional *ddname_and_APPLID* parameter during notification. Use this variable with the CBDDNTBL variable to reference each APPLID individually.	RCDS
CBLSNAME	Char	26	Forward recovery log stream associated with the VSAM data set, as specified in the optional *log_stream_parameter* during notification.	RCDS
CBDSTYPE	Char	1	VSAM data set type, as specified in the optional *data_set_type* parameter during notification. The value of this variable, if a value exists, is one of: K = KSDS E = ESDS R = RRDS V = VRRDS	RCDS
CBCISIZE	Char	6	Control interval size of the VSAM data set, as specified in the optional *CI_size* parameter during notification.	RCDS
CBMAXREC	Char	6	Maximum record length of the VSAM data set, as specified in the optional *maximum_record_length* parameter during notification.	RCDS
CBKEYPOS	Char	6	Key position of the VSAM data set, as specified in the optional *key_position* parameter during notification.	RCDS
CBKEYLEN	Char	6	Key length of the VSAM data set, as specified in the optional *key_length* parameter during notification.	RCDS

Null variable value

CICS VR allows any of the variables described in the table Table 8 on page 152 to be coded in a restore skeleton. However, CICS VR might not contain information about a specified variable in the RCDS. For example, *control_interval_size* is an optional input parameter of the file copy notification service. The CICS VR RCDS does not contain a value for the control interval size associated with a backup if it was not specified during notification. CICS VR substitutes a null string for all specified restore skeleton variables about which CICS VR does not contain information.

Restore skeleton logic

In most cases, restore skeleton variables can simply be placed within the commands and keywords required to restore the selected backup type. For example, a REPRO skeleton might contain the following statement to include the target data set name within the OUTDATASET keyword:

```
OUTDATASET(&CTODSN.)
```

However, some additional logic might be required within your skeleton to:

- Traverse through a table of similar items, such as volume names.
- Verify the existence of a variable before including it within a command or keyword.

Logic can be coded within your restore skeletons using the statements defined in the *ISPF Dialog Developer's Guide and Reference*. Below are a few examples of the most common logic that can be added to restore skeletons:

Table processing

CICS VR allows a few repeatable parameters, volume list, optional information, and ddname and APPLID list, to be specified to the file copy notification service. CICS VR stores these repeatable values in the RCDS and allows them to be retrieved from a table by a restore skeleton. To process a table within a restore skeleton, use the)DOT and)ENDDOT statements:

```
)DOT tablename
         additional statements
)ENDDOT
```

Figure 87. Table processing restore skeleton sample

Any statements between the)DOT and)ENDDOT statements are processed for each row in the specified table. See “Example using the CICS VR NOTIFY utility and restore skeletons” on page 158 for an example of using the)DOT and)ENDDOT statements.

Variable existence testing

As previously mentioned, information for some optional parameters of the file copy notification service might not have been specified during notification. Therefore, CICS VR might not contain values in the RCDS for all available restore skeleton variables.

To verify the existence or value of a variable before including it in your JCL or commands and keywords, you can use the)SEL and)ENDSEL statements, as shown:

```
)SEL &varname NE &Z
         additional statements
)ENDSEL

Note: &Z is the null string system variable.
```

Figure 88. Variable existence restore skeleton sample

The relational expression (`&varname NE &Z`) is evaluated for a true or false condition. If the condition is true, the skeleton input records between the)SEL and the corresponding)ENDSEL are processed. If the condition is false, these records are skipped. See “Example using the CICS VR NOTIFY utility and restore skeletons” on page 158 for an example of using the)DOT and)ENDDOT statements.

Testing for new information

Code your restore skeletons so that they can process any new information, such as target data set name, volume, and unit, that might have been specified through the CICS VR panel interface during recovery construction. To help simplify the this logic, a few additional variables

are provided by CICS VR. CNEWQ and CNEWVOLQ contain a value of 'YES' if a new value has been specified for either the target data set name or volume and unit respectively though the panel interface. Optionally, you can also use the CTODSN variable. CTODSN contains the new target data set name if it was specified through the panel interface, otherwise it contains the original data set name.

For example, you can code the following select statement to check if a new volume and unit was specified during recovery construction.

```
)SEL &CNEWVOLQ=YES
         volume and unit processing statements
)ENDSEL
```

Figure 89. Example of using &CNEWVOLQ in a restore skeleton

In this example , the processing statements within the)SEL and)ENDSEL statements are only processed if a new volume and unit was specified through the CICS VR panel interface during recovery construction.

See the *ISPF Dialog Developer's Guide and Reference* for further details about coding statements within an ISPF skeleton.

Example using the CICS VR NOTIFY utility and restore skeletons

This section gives an example of using the file copy notification service to register a backup to CICS VR, then restoring the backup with a restore skeleton.

This sample recovery scenario uses backups created by IDCAMS REPRO, but it can also be applied to other backup products. This example performs the following steps:

1. Create a backup of a VSAM data set and register the backup in the RCDS.
2. Restore the data set from the registered backup and perform a forward recovery.

Step 1: Create a backup of a VSAM data set and register it in the CICS VR RCDS

Below is a sample job that creates a backup of a VSAM data set, then registers the backup in the CICS VR RCDS.

```
//TESTNTFY  JOB  ,CICSVR,MSGLEVEL=(1,1),MSGCLASS=H,REGION=6144K
//*-------------------------------------------------------------------*/
//* CREATE BACKUP USING REPRO                                         */
//*-------------------------------------------------------------------*/
//BACKUP    EXEC PGM=IDCAMS
//IN            DD DSN=AAAAAAAA.BBBBBBBB.CCCCCCCC,DISP=OLD
//OUT        DD DSN=AAAAAAAA.BBBBBBBB.CCCCCCCC.BACKUP,DISP=OLD
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
     REPRO INFILE(IN)
           OUTFILE(OUT)
/*
//*------ -------------------------------------------------------------------*/
//* RUN NOTIFY UTILITY                                                        */
//*-------------------------------------------------------------------------*/
//REGISTER   EXEC PGM=DWWNT
//STEPLIB  DD DSNAME=DWW.CICSVR42.SDWWLOAD,DISP=SHR
//                DD DSNAME=DWW.CICSVR42.SDWWLENU,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWIN    DD *
     NOTIFY  DSNAME(AAAAAAAA.BBBBBBBB.CCCCCCCC)  -
                    BACKUPNAME(AAAAAAAA.BBBBBBBB.CCCCCCCC.BACKUP)  -
                    PRODUCT(REPRO)
//
```

Figure 90. Sample job to create a backup of a VSAM data set and register the backup to CICS VR

BACKUP

The BACKUP job step creates a backup of the VSAM data set defined in the INDSN variable using IDCAMS REPRO. The name of the backup is taken from the OUTDSN variable.

Note: In this sample scenario, production and backup data sets are cataloged and SMS-managed. The backup data set is therefore created by specifying the LIKE parameter within the DD JCL statement for the backup data set. See the *MVS JCL Reference* manual for more information about the LIKE parameter and defining data sets in the DD statement.

REGISTER

The REGISTER job step calls the CICS VR NOTIFY utility. The CICS VR NOTIFY utility registers the backup in the CICS VR RCDS.

Step 2: Restore the data set from the registered backup and perform a forward recovery

After performing steps 1 and 2, the backup is now registered in the CICS VR RCDS. Therefore, you can use the CICS VR panel interface to build a job that restores the VSAM data set from the registered backup, then performs a forward recovery on the restored VSAM data set.

As previously mentioned, a restore skeleton must be defined to CICS VR for every different backup type that is registered to CICS VR through the file copy notification service. In this example, all backups that are registered to CICS VR by calling the NOTIFY program is registered with the REPRO product identifier. Therefore, a restore skeleton named DWWREPRO must also be defined to CICS VR. A sample DWWREPRO restore skeleton is included with CICS VR in the SDWWSENU library.

```
)CM*********************************************************************/
)CM                                                                     */
)CM     @BANNER_START                                                   */
)CM      Licensed Materials - Property of IBM                           */
)CM                                                                     */
)CM      5655-GY1                                                       */
)CM                                                                     */
)CM      (C) Copyright IBM Corp. 2014                                   */
)CM      (C) Copyright HCL Technologies Ltd. 2025                       */
)CM     @BANNER_END                                                     */
)CM                                                                     */
)CM*********************************************************************/
)CM
)CM This skeleton can be used to restore a VSAM cluster from
)CM a backup data set created by IDCAMS REPRO.
)CM
)CM This skeleton performs an IDCAMS REPRO of the backup data set
)CM into the target data set.  This skeleton does not create the target
)CM data set.  Therefore, the target data set must exist and be
)CM cataloged prior to using this skeleton.
)CM
)CM If specific volume, unit, and sequence number information was
)CM specified for the backup during notification (for example, if
)CM the backup is not cataloged and/or resides on tape ), CICSVR
)CM retrieves it from the RCDS and add it to the INFILE DD statement.
)CM
)CM The following variables are used in this skeleton.  However,
)CM values for some of the listed variables might not be available if
)CM they were not specified during notification of the backup.
)CM This skeleton contains logic to check for the existence of values
)CM before including the associated variable into the produced JCL.
)CM
)CM  &CBUDSN   - Backup data set name
)CM  &CTODSN   - Data set name that is used for restore
)CM              and recovery
)CM  &CBVOLNUM - Number of volumes the backup resides on.
)CM              This variable contains a value of 0 if
)CM              no volume information was specified during
)CM              notification.
)CM  &CBUNIT   - Device type of the volume(s) that the backup
)CM              resides on (if specified during notification)
)CM  &CBSEQNUM - Sequence number of a backup that resides on tape
)CM              (if specified during notification)
)CM  &CBVOLTBL - Name of the ISPF table that contains the volumes
)CM              that the backup resides on
)CM  &CBVOL    - Variable to extract each volume name entry from the
)CM              &CBVOLTBL table
)CM
)CM*********************************************************************/
//*
//RES00&J  EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//INFILE   DD DISP=SHR,
)SEL &CBVOLNUM GT 0
//         UNIT=&CBUNIT,
)SEL &CBSEQNUM NE &Z
//         LABEL=&CBSEQNUM,
)ENDSEL
)SET I = 1
)DOT &CBVOLTBL
)SEL &CBVOLNUM EQ 1
//         VOLUME=SER=&CBVOL.,
)ENDSEL
)SEL &CBVOLNUM GT 1
)SEL &I NE 1 && &I NE &CBVOLNUM
```

Figure 91. DWWREPRO restore skeleton

```
//         &CBVOL.,
)ENDSEL
)SEL &I EQ 1
//         VOLUME=SER=(&CBVOL.,
)ENDSEL
)SEL &I EQ &CBVOLNUM
//         &CBVOL.),
)ENDSEL
)SET I = &I + 1
)ENDSEL
)ENDDOT
)ENDSEL
//     DSN=&CBUDSN
//SYSIN    DD *
     REPRO     -
       INFILE(INFILE)  -
       OUTDATASET(&CTODSN.)
/*
```

The DWWREPRO restore skeleton supplied by CICS VR performs the following:

- The backup data set is restored by calling the IDCAMS REPRO utility. However, the target data set must exist and be cataloged prior to running the restore and recovery job.

  Note: You can either create the target data set prior to running CICS VR, or you can update the skeleton to include a definition of the target data set.
- This skeleton contains logic to specify the volume, unit, and sequence number as part of the DD statement for a backup that is uncataloged.

  Note: In this example scenario, the NOTIFY program did not pass the volume, unit, and sequence number to the file copy notification service because all backups are cataloged in this example environment.
- This skeleton contains the &CTODSN variable to include either a newly specified target data set name or the original data set name in the OUTDATASET keyword.

If the CICS VR panels are called, and a backup that was registered using this example is selected for restore, CICS VR uses the DWWREPRO restore skeleton and produces a recovery job similar to:

```
//RECOVER  JOB NOTIFY=&SYSUID
//DWW      PROC
//RECOVER  EXEC PGM=DWWCO
//STEPLIB DD DSN=DWW.SDWWLOAD,DISP=SHR
// DD DSN=DWW.SDWWLENU,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWCON1  DD DSN=DWW.DWWCON1.GRPPROD,DISP=SHR
//DWWCON2  DD DSN=DWW.DWWCON2.GRPPROD,DISP=SHR
//DWWCON3  DD DSN=DWW.DWWCON3.GRPPROD,DISP=SHR
//         PEND
//* END OF PROC
//*
//RES001  EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//INFILE   DD DISP=SHR,
//     DSN=PAYROLL.BACKUP.BASE
//SYSIN    DD *
     REPRO             -
       INFILE(INFILE)  -
       OUTDATASET(PAYROLL.RESTORE.BASE)
/*
//DWW001 EXEC DWW
//DWWIN    DD   *
  RECOVER                                    -
    ONLY                                     -
    NEWSPHERE(PAYROLL.RESTORE.BASE)          -
    APPLYCA                                  -
    STARTTIME(05.041/12:47:35)               -
    STOPTIME(05.041/12:47:59)                -
    STARTAT(DSNAME)                          -
    SPHERE(PAYROLL.SOURCE.BASE)
  MVSLOG                                     -
    NAME(SAMPLE.CICS.DFHJ01)
  BLDVRP
//*
//
```

Figure 92. Sample recovery job

In the sample recovery job produced by CICS VR, step RES001 restores the data set by calling the IDCAMS REPRO utility. Step DWW001 then forward recovers the restored data set using the recovery parameters that were specified through the CICS VR panel interface. If the IBM default values were accepted, all updates made after the backup was created, up to the current point-in-time, is applied during recovery processing.

Understanding group restore capability

CICS VR provides group restore capabilities for backup products which create backups containing data for several data sets.

Some backup products can create a backup for a number of data sets. For example, ABARS can create a backup for an aggregate group, containing data for hundreds data sets. Also, a DFSMSdss DUMP backup can include backups of several data sets.

CICS VR provides individual and group restore capability, for IBM and non-IBM backup products, by specifying two types of restore skeletons that differ in their names and constructions. A skeleton for group restoring VSAM spheres from a backup data set has a “0” character in the sixth position of the member name to distinguish it from the corresponding skeleton for an individual restore. For example; if the backup product name is FDRPR, the skeleton member name for an individual restore is DWWFDRPR, and for a group restore is DWWFD0PR.

Individual restore
When an individual restore skeleton is applied, a separate JCL step is generated for the restore of each of the selected VSAM spheres, even if they were backed up in the same backup data set. See “Restoring a backup that was registered through the file copy notification service” on page 151 for detailed information about skeletons for individual restore from a backup.

Group restore
When a group restore skeleton is applied, a single JCL step is generated to restore those selected VSAM spheres that were backed up in the same backup data set. Thus, those selected VSAM spheres

are restored with a single run of the backup product, instead of requiring a run for each individual data set.

If both types of restore skeletons for the same backup product are found in the SDWWSENU PDS, a group restore skeleton, with “0” in the sixth position of the member name, is used during CICS VR recovery construction.

A group restore skeleton implements high level accessibility for dialog variables related to the selected backup data set. The variables listed here are substituted with their values directly when they are specified in a group restore skeleton.

Table 9. Group restore skeleton variables supported by CICS VR

Variable name	Format	Length (Bytes)	Description	Source
CBUDSN	Char	44	Backup data set name.	RCDS
CBPROD	Char	3	Backup product identifier as specified in the *backup_product* parameter during notification.	RCDS
CBTYPE	Char	2	Backup type identifier as specified in the *backup_type* parameter during notification.	RCDS
CBVOLTBL	Char	8	Table that contains the volumes on which the backup resides, as entered in the optional *volume_list_area* parameter during notification. This table can be used to reference each volume using the CBVOL variable.	Generated by CICS VR
CBVOLNUM	Char	3	Number of volumes on which the backup resides, as specified in the optional *number_of_volumes* parameter during notification.	RCDS
CBVOL	Char	6	Volume on which the backup resides, as specified in the optional *volume_list_area* parameter during notification. Use this variable with the CBVOLTBL variable to reference each volume name individually.	RCDS
CBUNIT	Char	8	Unit (device type) of the volume(s) on which the backup resides, as specified in the optional *device_type* parameter during notification.	RCDS
CBSEQNUM	Char	4	Sequence number of the backup, as specified in the optional *sequence_number* variable during notification.	RCDS
CBOPTTBL	Char	8	Table that contains the value specified for the optional *optional_information* parameter during notification. The specified optional information can contain a maximum of 256 bytes that CICS VR divides into four rows of 64 bytes in this table. This table can be used to reference each 64 bytes of optional information with the CBINFO variable.	Generated by CICS VR

Table 9. Group restore skeleton variables supported by CICS VR (continued)				
Variable name	**Format**	**Length (Bytes)**	**Description**	**Source**
CBINFO	Char	64	Use this variable with the CBOPTTBL variable to reference each row of 64 bytes of the value specified for the optional *optional_information* parameter during notification.	RCDS
CBKSPH	Char	8	Table that contains values for dialog variables relating to the VSAM spheres backed up in this backup data set. Each row of the table relates to a specific VSAM sphere and contains all variables listed in Table 8 on page 152.	Generated by CICS VR
CNEWN	Char	3	Indicates if a new target data set name was entered through the "CICS VR panel interface" at least for one VSAM sphere backed in the backup data set. This variable contains one of the following values: **YES** At least one of the backed VSAM spheres has CNEWQ variable set to *YES*. **NO** All VSAM spheres are restored from this backup data set with their original names.	Panel interface
CNEWV	Char	3	Indicates if a new volume and unit was specified for restore through the CICS VR panel interface for at least one VSAM sphere backed in the backup data set. This variable contains one of thefollowing values: **YES** At least one of the backed spheres has CNEWVOLQ variable set to *YES*. **NO** All backed VSAM spheres have the CNEWVOLQ variable set to *NO*.	Panel interface

To obtain access to dialog variables related to VSAM sphere parameters, use the)DOT and)ENDDOT statements:

```
)DOT &CBKSPH
     additional statements
)ENDDOT
```

Any statements between the)DOT and)ENDDOT statements are processed for each row in the specified table. For example; the following fragment generates a list of VSAM spheres backed up in the backup data set:

```
)DOT &CBKSPH
   &CSPH
)ENDDOT
```

CICS VR ships two group restore skeletons in the SDWWSENU data set. These are DWWDS0LD and DWWAB0RS intended for group restoring from DFSMSdss DUMP or DFSMShsm ABARS backups accordingly. These skeletons can be used as samples for creating user-written restore skeletons.

Understanding nonrecoverable versus recoverable resources

With VSAM file recovery, there are two different types of resources, ones that are not recoverable and ones that are recoverable.

Nonrecoverable Data Sets: Nonrecoverable data sets are those for which updates are committed immediately, and therefore cannot be backed out. These data sets can be read and updated by both CICS and batch jobs but neither CICS nor VSAM provides any support for forward recovery logging for a nonrecoverable data set.

Recoverable Data Sets: A recoverable data set is one that participates in syncpoint activity and is eligible for changes to be backed out in the event of a transaction failure. When several changes are made to a recoverable data set from within a unit-of-work (UOW), these changes are either all committed, or all backed out, together.

The ICF catalog recovery option allows you to specify the following requirements:

- No recovery is required; the sphere is not recoverable.
- Backout is required; the sphere is recoverable.
- Backout *and* forward recovery are required; the sphere is recoverable.

If you also require a forward recovery capability for recoverable data sets, you must specify in the ICF catalog the name of the MVS log stream that CICS uses as the forward recovery log. This log stream name must match the name of a log stream that is defined to the MVS system logger.

If you specify forward recovery for a data set (LOG=ALL) VSAM might not check that you have specified the required forward recovery MVS log stream name. However, CICS performs this check when it opens a file against a data set that has an ICF catalog entry that specifies forward recovery. CICS fails the open request if the ICF catalog forward recovery attributes are inconsistent.

The section that follows focuses on recoverable data sets, that is, data sets that can be recovered using CICS VR. The following topics are described:

- Backup-while-open (BWO)
- VSAM RLS
- CICS System Definition data

Understanding CICS VR alternate index processing

CICS VR alternate index processing varies according to the type of backup that the VSAM sphere was restored from.

See the appropriate backup type for a complete description.

DFSMShsm logical backups

DFSMShsm logical backups can be made for the entire VSAM sphere; base cluster, alternate indexes, paths. Therefore, if through the CICS VR panel interface you select a DFSMShsm backup, the entire VSAM sphere is restored. During CICS VR forward recovery, any restored alternate index that is part of the upgrade set is updated appropriately without any additional processing.

If a new sphere name was entered for restore and recovery through the CICS VR panel interface, only the base cluster is restored by DFSMShsm. Any alternate index must therefore be recreated and rebuilt manually after successful recovery processing.

Note: DFSMShsm backups created with the backup-while-open (BWO) facility require additional alternate index processing, as described in “Understanding the backup-while-open (BWO) facility” on page 166.

Backups restored outside of CICS VR or no backups restored
If a backup is not selected for restore through the CICS VR panel interface, no additional alternate index processing is performed by CICS VR. However, any alternate indexes in the upgrade set defined for the VSAM sphere that is being forward recovered is updated appropriately during forward recovery processing.

DFSMSdss logical copies or dumps
CICS VR can be notified of logical copies or dumps created for VSAM spheres. However, only the base cluster can be copied or dumped when CICS VR is notified because the CICSVRBACKUP and SPHERE keywords of the COPY and DUMP commands are mutually exclusive. Therefore, when a DFSMSdss logical copy or dump is selected through the CICS VR panel interface, only the base cluster is restored. Any alternate index must be manually recreated and rebuilt after forward recovery processing.

Backups registered through the file copy notification service

If a backup that was previously registered to CICS VR through the file copy notification service is selected for restore, a restore skeleton for the product identifier associated with the backup must be defined to CICS VR. The restore skeleton must run the appropriate program with the required commands and keywords to restore the selected backup type. The ability to restore the entire VSAM sphere; base cluster, alternate indexes, paths, depends on the restore program.

Offline and sharp online backups
CICS VR does not perform any additional alternate index processing for the following types of backups registered through the file copy notification interface:

- Backups that were taken while the data set remained offline and closed to CICS for update.
- Backups that were taken while the data set remained online and open to CICS for update, but no updates were made to the data set during backup processing, sharp online backup.

Any alternate index in the upgrade set for the VSAM sphere that is being forward recovered is updated appropriately during forward recovery processing.

Fuzzy online backups
For all backups that were registered to CICS VR with a fuzzy online status, indicating that the backup was taken while the data set remained online and open for update, and one or more updates were made to the data set during backup processing, CICS VR performs the additional alternate index processing:

- CICS VR removes all alternate indexes that are reusable and part of the upgrade set prior to forward recovery processing.
- The alternate indexes are rebuilt after successful completion of forward recovery processing.

Note: CICS VR does not rebuild alternate indexes when a new name has been specified for the restoration and forward recovery of a VSAM sphere.

Understanding the backup-while-open (BWO) facility

Many CICS applications depend on their data sets being open for update over a long period of time. Normally, you cannot make a backup of the data set while the data set is open.

If a failure occurs that requires forward recovery, all updates that have been made to the data set since it was opened must be recovered. This means that you must keep all forward recovery logs that have been produced since the data set was opened. A heavily used data set that has been open for update for several days or weeks might require many log records to be applied during forward recovery.

The backup-while-open (BWO) function allows DFSMSdss to make a backup when applications are running in continuous operation while the data set is open for update with full data integrity of copied data. This is only feasible for CICS VSAM file control data sets for which CICS creates forward recovery logs. Only the updates that have been made since the last backup copy was taken need to be recovered. This could significantly reduce the amount of forward recovery that is needed. Long running transactions, automated teller machines, and continuously available applications require the database to be running when the backup is being taken.

DFSMSdss is an optional feature of z/OS and is the primary data mover. When used with supporting hardware, DFSMSdss also provides concurrent copy capability. Concurrent copy lets you copy or backup data while that data is being used; even when control-area and control interval splits and data set additions, new extents or add-to-end, are occurring for VSAM key sequenced data sets.

Eligible data sets for backup-while-open processing

You can use the BWO facility for the following data sets.

- Data sets that reside on SMS-managed storage and that use an ICF catalog.
- VSAM data sets that are accessed by CICS file control, and for the CICS system definition (CSD) data set. ESDS, KSDS, RRDS, and VRRDS are supported. ESDS and KSDS are supported with and without alternate indexes.

Backup-while-open is supported at the VSAM sphere level; thus, you cannot make backup-while-open copies of some sphere components and not others. The first data set that is opened for update against a VSAM base cluster sets the backup-while-open eligibility for the sphere. This includes base clusters that are accessed through a VSAM path key. For example, if the first data set is eligible for backup-while-open processing, CICS fails the file-open operation for a following data set that is opened for update against that cluster and that is not defined as eligible for backup-while-open processing.

You can make BWO volume backups if all data sets that are open for update on the volume are eligible for BWO. The backup-while-open facility does not support physical dumps.

For detailed information on BWO, see *CICS Recovery and Restart Guide*.

Understanding CICS VR alternate index processing for BWO backups

CICS VR performs additional alternate index processing for a DFSMShsm logical backup that was made using the BWO facility.

A VSAM sphere backup made while the sphere was being updated by CICS using the BWO facility can be in a "fuzzy" status. A "fuzzy" status indicates that the backed up base cluster might include some updates that are not reflected in a backed up alternate indexes. For example, the base cluster might have been updated before the backup was made, but the alternate indexes might not have been changed to reflect this same update until after the backup completed.

When a BWO backup in "fuzzy" status is selected through the CICS VR panel interface, CICS VR removes all alternate indexes that are reusable and part of the upgrade set prior to forward recovery processing. The alternate indexes are then rebuilt after successful completion of forward recovery processing.

Note: CICS VR does not rebuild alternate indexes when a new name has been specified for the restoration and forward recovery of a VSAM sphere.

Operation of the BWO facility

To use the backup-while-open facility with CICS VR, define DFSMSdss as the method DFSMShsm uses to move data.

You can specify this using the DFSMShsm SETSYS command:

```
SETSYS DATAMOVER(DSS)
```

When DFSMSdss performs a logical dump, it examines the backup-while-open flags in the integrated catalog facility (ICF) catalog and reports on the success or failure of the backup. For example, if a VSAM control interval (CI) or control area (CA) split is in progress at the start of a backup, the backup is not made. Also, if a split occurs during a backup-while-open backup, or a split is still in progress after a backup, the backup is logically discarded by DFSMShsm. If you are using DFSMSdss without DFSMShsm, examine the reports that DFSMSdss produces to find out if the logical dump has been successful. But, if you use the concurrent copy function with BWO, CI or CA splits do not affect the contents of the copy that is being made. See “Using the concurrent copy function with CICS VR” on page 171 for more information.

Because the process of making backups can lead to increased I/O activity, consider making backups during periods of low activity. This would avoid an effect on the response time of the online application and reduce the probability of CI or CA splits.

For more information about DFSMSdss see *z/OS DFSMSdss Storage Administration Guide*. For more information about DFSMShsm, see *z/OS DFSMShsm Storage Administration Reference*.

The master terminal operator (MTO) must be aware of any new environment. Before the availability of the backup-while-open facility, to backup a VSAM sphere, the MTO would quiesce all transactions that would update the data set, notify the users, and close and deallocate the necessary files. These procedures are not needed with the backup-while-open facility.

With the backup-while-open facility, the MTO receives a message if an application attempts to open a file that is flagged as back level. This check occurs regardless of whether you specify the BACKUPTYPE option DYNAMIC or STATIC for the file. A back-level data set is one that has been:

- Identified by the ICF catalog as corrupt.

  If this situation occurs, the following messages are issued, and the MTO must restore *and* recover the VSAM sphere to ensure data integrity:

  DFHFC5801A
  applid File OPEN has failed for VSAM data set. The BWO values in the ICF catalog indicate that the data set needs to be restored and forward recovered. Data set *'dsname'*.

  DFHFC5806
  applid File OPEN failed. DFHFCAT returned an error response from a BWO action on a VSAM data set. File *'filename'* data set *'dsname'*.
- Restored from a backup copy but not recovered.
- Forward recovered, but the forward-recovery operation has not completed successfully.

  In either of these cases, the following messages are issued, and the MTO must decide if the backup copy had been restored but not recovered, or if recovery has failed:

  DFHFC5802A
  applid File OPEN has failed for VSAM data set. The BWO values in the ICF catalog indicate that data set needs to be restored and forward recovered. Data set *'dsname'*.

  DFHFC5806
  applid File OPEN failed. DFHFCAT returned an error response from a BWO action on a VSAM data set. File *'filename'* data set *'dsname'*.

If recovery was not run, you can run CICS VR to recover the VSAM data set. If the messages are issued because of the failure of CICS VR recovery, the MTO must restore *and* recover the associated VSAM sphere to ensure data integrity.

If an application attempts to open a file that is eligible for backup-while-open processing in the ICF catalog, but is not defined as such in the CICS file definition, the following actions occur:

- The ICF catalog is set to show that the data set is not eligible for backup-while-open processing.
- The recovery point is updated to the time held in the MVS system clock , see “BWO and the recovery point time” on page 170.
- This warning message is issued at the MTO console:

  DFHFC5809
  applid File OPEN warning. BACKUPTYPE attributes conflict with BWO values defined in ICF catalog. BWO values have been updated. File *'filename'* data set *'dsname'*.
- The MTO can use this command to ask whether the first file to be opened against a data set name was indicated as eligible for backup-while-open processing:

  ```
  CEMT INQUIRE DSNAME
  ```

  For more information, see *CICS Supplied Transactions*.

Note: When you are recovering a restored data set that was backed up using the backup-while-open facility, *record not found* and *duplicate record* messages are not reported, but statistics indicating these conditions are in the report. You can analyze and act on these messages if you have provided an error exit for this purpose. The CICS VR error exit is called for all types of VSAM errors.

How you request BWO

There are two ways in which files can be defined as eligible for BWO.

- By specifying the BWO option for the data set using access method services
- By specifying the BWO option on the CICS file resource definition in the CSD

Specifying BWO using access method services

If your data sets are accessed in RLS mode, the BWO option must be defined in the ICF catalog. To define BWO in the ICF catalog, use the BWO parameter on the access method services DEFINE CLUSTER statement.

You can specify the BWO parameter as follows:

TYPECICS
The data set is eligible for BWO in CICS.

NO
The data set is not eligible for BWO.

TYPEIMS
The data set is eligible for BWO in IMS, but CICS treats this as NO.

TYPEOTHER
The data set is eligible for BWO, but CICS treats this as NO.

If you specify BWO(TYPECICS), you must also specify LOG(ALL) and a forward recovery log stream name, LOGSTREAMID*(logstream_name)*

If you omit the BWO parameter from the DEFINE statement, by default it is UNDEFINED in the ICF catalog, and the BWO attribute from the CICS file resource definition is used.

Note: This is recommended only if you are not using RLS.

All other values, including UNDEFINED, are treated by CICS as the equivalent of BACKUPTYPE(STATIC) in a CICS file resource definition. For simplicity, the CICS terms BACKUPTYPE(DYNAMIC) and BACKUPTYPE(STATIC) are used unless it is necessary to specifically mention the access method services BWO parameters.

The BWO options for the CSD are taken from the ICF catalog if they are defined there, and the system initialization parameters (CDSBKUP, CSDRECOV, and CSDFRLOG) are ignored.

Specifying BWO on CICS file resource definitions

You define a file as eligible for BWO with the BACKUPTYPE attribute on a CICS file resource definition in the CSD.

If you specify the BACKUPTYPE(DYNAMIC) option, the file is defined as eligible for BWO when the data set is opened. This definition applies only to the base cluster in a VSAM sphere. If a VSAM data set is accessed through one or more alternate indexes, the path definitions for the alternate index must also be defined as eligible for BWO processing. You must also specify the RECOVERY(ALL) and the FWDRECOVLOG(nn) options to request forward recovery support.

BACKUPTYPE(STATIC), the default, defines a file as not eligible for BWO. In this case, if DFSMShsm is to back up a data set, all CICS files currently open for update against that data set must be closed before the backup can start.

All files that are opened against the same VSAM base cluster must have the same BACKUPTYPE value. That value is established by the first file opened against the cluster; it is stored in the CICS data set name block (DSNB) for the cluster. If the value for a subsequent file does not match, the file-open operation fails.

To use BWO for the CSD file, specify the CSDBKUP=DYNAMIC system initialization parameter. Also specify CSDRECOV=ALL and CSDFRLOG=*nn* to request forward recovery support.

BWO and systems administration

The systems administrator must decide which VSAM user data sets are eligible for BWO, and then set up the appropriate operating procedures for taking the BWO backup copies and for forward recovery.

These procedures include:

- How to forward recover a data set by using the BWO backup copy, the forward recovery log, and CICS VR to bring the data set to a point of consistency. Users must not have access to the file during the recovery process.
- How to forward recover a data set that might have been damaged while allocated to CICS. This operation might require backout of partially committed units of work during CICS emergency restart, after forward recovery has been done.

The procedures are simpler when using BWO than when not, because:

- Backups can be taken more frequently, so there are fewer forward recovery logs to manage. This also reduces the amount of processing that is required to forward recover the data set.
- The point from which forward recovery start is recorded in the ICF catalog. CICS VR uses this value to automate this part of the forward recovery process. This recovery point is saved with the backup copy and subsequently replaced in the ICF catalog when he backup copy is restored.
- During data set restore and forward recovery processing, CICS does not allow files to be opened for the same data set.

BWO data set security

CICS must have RACF ALTER authority for all data sets that are defined as BACKUPTYPE(DYNAMIC), because CICS needs to update the BWO attributes in the ICF catalog.

The authority must apply either to the data set or to the ICF catalog in which the data set is cataloged. For information on defining RACF ALTER authority, see *CICS RACF Security Guide*.

BWO and the recovery point time

To recover a VSAM sphere, CICS VR must have the following information.

- The data set to associate with each record on the logs
- The point to start recovery from

Each data set after-image record on the log is associated with a file name but many files might be associated with the same data set. When a file is opened, the association between the file and the data set is recorded on the log by a tie-up record (TUR). For backups made without the backup-while-open facility, CICS VR uses this TUR to apply the log records to the correct data sets.

For backups made using the backup-while-open facility, CICS VR need not process a log from file-open time. Here, TURs for all open files are regularly written on the log during activity-keypoint processing. To reduce the number of TURs if the activity keypoint frequency is high, CICS ensures that there is at least a 30-minute separation between sets of TURs on the log. The recovery point is a time that can be converted to a position on a forward-recovery log. It is also the point when CICS VR forward recovery starts for VSAM data sets eligible for backup-while-open processing. Recovery of the data set requires only the records that are written after that position. Thus, CICS VR can ignore all previous records.

The recovery point is stored in the ICF catalog. It is set when the first file is opened for update against the data set, and it is updated during activity-keypoint processing and when the file is closed.

The recovery point is not the time of the current keypoint, because there might still be some uncommitted log records that have not been forced. Instead, it is the time of the start of the last keypoint that wrote a complete set of TURs and that completed earlier than the oldest uncommitted write to a forward-recovery log.

Note:

1. Only one new recovery point is calculated during an activity keypoint. It is used for all data sets that are open for update and eligible for backup-while-open processing. A long-running task that updates a data set that uses the backup-while-open facility affects the forward recovery that is needed for all data sets.
2. If you disable activity keypointing in your system; by specifying AKPFREQ=0 in your SIT, backup-while-open support is seriously affected because no more TURs are written and the recovery point is not updated after backup-while-open. Forward recovery of a data set that is eligible for backup-while-open processing must occur from the time that the data set was first opened for update.

CICS VR extracts the recovery point time of the restored backup from the RCDS or ICF catalog. It is not necessary or recommended to specify a STARTTIME keyword in your recovery run.

Using the concurrent copy function with CICS VR

The concurrent copy function provides concurrent and unrestricted access to CICS VSAM data sets during the backup process.

The concurrent copy function provides a point-in-time copy of your CICS data sets while maintaining full update access to the VSAM spheres being copied, once the concurrent copy operation is initialized. This function lets you offer continuous availability of your CICS VSAM spheres.

Making the CICS system definition (CSD) data set recoverable

The CSD VSAM data set is unique in that it is a CICS data set that is managed by CICS file control. If you want to forward recover the CSD data set, you must specify the recovery attributes in the system initialization table (SIT).

```
CSDFRLOG=(NO|1-99)
CSDRECOV=(NONE|ALL|BACKOUTONLY)
CSDBKUP=(STATIC|DYNAMIC)
```

See the *CICS System Definition Guide* for more information on defining the CSD.

Chapter 9. Using the CICS VR file copy notification service

This section primarily documents intended Programming Interface that allow the customer to write programs to obtain the notify service of CICS VR.

The CICS VSAM Recovery file copy notification service allows for CICS VR to be notified when a logical backup is created or deleted for a VSAM data set by an IBM or non-IBM product. The CICS VR file copy notification service resides in data set SDWWCSSL. The file copy notification service can be started from a backup product or a separate user program that issues the CALL DWWCVRN statement, accompanied by a list of required and optional arguments and storage areas. The CICS VR file copy notification service is provided as part of IBM CICS VSAM Recovery and only supports backup products that run on MVS, that is, are not multi-platform.

Note: DFSMShsm and DFSMSdss can automatically notify CICS VR when a logical backup has been created. There is therefore no need to implement the CICS VR file copy notification service for logical backups created by either DFSMShsm or DFSMSdss.

See "Understanding CICS VR backup support" on page 136 for further examples of using the CICS VR file copy notification service to register backups with CICS VR.

Invoking the Service

The following information describes the environment required, restrictions, register information, performance implications, and abend codes for the file copy notification service.

Environment

Minimum authorization:
Problem state or supervisor state, and any PSW key. The caller does not need to be APF-authorized.

Dispatchable unit mode:
Task

Cross memory mode:
PASN=HASN=SASN

AMODE:
31–bit

ACS mode:
Primary

Interrupt status:
Enabled for I/O and external interrupts

Locks:
No locks can be held

Control parameters
Control parameters must be in the primary address space

Programming requirements

- The CICS VR file copy notification service can be started by the high-level languages supported by Language Environment® and by assembler language callers.
- For assistance when coding the CICS VR file copy notification service in assembler language, CICS VR provides the caller with a sample DWWIFCNS which is located in the SDWWSORC library with the non-server related reason code equates.
- The caller of the CICS VR file copy notification service can have an established FRR.

- The CICS VR file copy notification service can be started in one of the following ways:
  - A CALL statement is coded in the invoking application. The invoking application is link-edited with the notification service module DWWCVRN in the library SDWWCSSL.
  - The invoking application can issue a LINK or LOAD/CALL to the CICS VR file copy notification service. This technique ensures that your program always has the latest copy of the service. The library (SDWWCSSL) that contains the file copy notification service must be in the Link List or referenced by JOBLIB, STEPLIB, or the task library of the invoking application.

Note: The sample describes calling the CICS VR file copy notification service from a reentrant program written in assembler language. See *z/OS MVS Programming: Assembler Services Reference, Volume 1 (ABEND-HSPSERV)* for information about using the CALL macro. For information about using CALL in programs written in high-level languages, see the applicable language document.

Restrictions

The CICS VR server address space must be active on the system that requests the CICS VR file copy notification service.

Input register information

Before using the service, the caller does not have to place any information into any register unless using it in register notation for a particular parameter, or using it as a base register.

Output register information

When control returns to the caller, the general purpose registers (GPRs) contain:

Register	Contents
0	Reason code
15	Return code

Some callers depend on register contents remaining the same before and after issuing a service. If the system changes the contents of a register on which the caller depends, the caller must save them before issuing the service, and restore them after the system returns control.

Performance implications

None.

Abend Codes

Callers of the CICS VR file copy notification service might encounter the following ABEND codes:

ABEND CODE	Meaning
0C4	The system cannot properly access a user-provided parameter
B78	The caller was not enabled for I/O and external interrupts.
80A	Insufficient storage available for the service.

CALL DWWCVRN

The file copy notification service can be started from a backup product or a separate user program that issues the CALL DWWCVRN statement, accompanied by a list of required and optional arguments and storage areas.

Format

```
>>-+-------+-CALL-DWWCVRN-,-(-return_code-,-reason_code-,-prob_det-,-backup_product-,----->
   +-label-+

>--backup_type-,-dataset_name-,-backup_name-,-backup_date_local-,-backup_time_local-,----->

>--backup_date_GMT-,-backup_time_GMT-,-+-,-----------------+-+-,-------------+---------->
                                       +-,-operation_flags-+ +-,-status_flags-+

>--+-,---------------+-+-,-------------------------+-+-,-----------------------+-------->
   +-,-BWO_timestamp-+ +-,-recovery_timestamp_local-+ +-,-recovery_timestamp_GMT-+

>--+-,-----------------------------+-+-,---------------------------+---------------------->
   +-,-optional_information_length-+ +-,-optional_information_area-+

>--+-,--------------------+-+-,------------------+-+-,-------------+---------------------->
   +-,-number_of_volumes-+ +-,-volume_list_area-+ +-,-device_type-+

>--+-,------------------+-+-,--------------------+-+-,--------------------+------------------>
   +-,-sequence_number-+ +-,-number_of_ddnames-+ +-,-ddname_and_APPLID-+

>--+-,------------------+-+-,---------------+-+-,---------+-+-,-----------------------+---->
   +-,-log_stream_name-+ +-,-data_set_type-+ +-,-CI_size-+ +-,-maximum_record_length-+

>--+-,--------------+-+-,------------+-)-------------------------------------------------><
   +-,-key_position-+ +-,-key_length-+
```

Figure 93. Syntax of CALL_DWWCVRN

Parameters

Programming notes

Consider the following items considered when writing a call to the CICS VR file copy notification service:

- The *number_of_ddnames*, *ddname_and_APPLID*, *log_stream_name*, *data_set_type*, *CI_size*, *maximum_record_length*, *key_position* and *key_length* optional parameters must only be specified if either the SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD flag or FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD flag of the optional *status_flags* parameter is set.
- When notifying CICS VR of a timestamp, be sure it includes "leap seconds" that can be inserted or deleted due to time-correction standards. This is important because the timestamps of log records written by CICS and CICS VR also include the leap seconds. For example, STCK returns the TOD clock, and this value might need to be adjusted to include leap seconds. Refer to *z/Architecture® Principles of Operation* for more details.
- All registered backup data set names for a VSAM data set must be unique. If CICS VR is notified of a backup with a duplicate name for the same VSAM data set, the existing RCDS entry for the backup is replaced with information from the most recent notification.

  For example, consider the scenario where a backup named SAMPLE.BACKUP1 has been created and registered for VSAM sphere SAMPLE.BASE1 at 04.319 10:34:12. If CICS VR is then notified of a backup with the same name (SAMPLE.BACKUP1) for the same VSAM sphere (SAMPLE.BASE1) at 04.322 01:01:01, all information in the RCDS about the previous backup is replaced with information about the backup registered at 04.322 01:01:01.

Return and reason codes

When DWWCVRN returns control to the calling program, it provides both a return code and a reason code. DWWCVRN can return additional data useful for problem determination in the prob_det array. For assistance when coding the CICS VR file copy notification service in assembler language, CICS VR provides the caller with a sample DWWIFCNS located in the SDWWSORC library with the non-server

related reason code equates. In addition, the CICS VR server address space might return a return and reason code when an error occurs during processing of the CICS VR file copy notification service.

The following table identifies return code and reason code combinations issued by CICS VR when a problem occurs while processing the file copy notification service. For each combination the following table lists the associated equate symbol, explains the meaning, explains what and when additional problem determination data is returned, and recommends what action to take.

Note: Any other return/reason code combination that is encountered and is not listed in this table indicates that an internal CICS VR error has occurred. Capture any CICS VR error messages written to the console and contact the IBM Support Center.

Table 10. DWWCVRN return and reason codes

Return code Hex	Reason Code Hex	Equate Symbol, Meaning, and Action
0	0	Operation is successful.
8	100	**Equate Symbol:** DWWCVRN_ReturnCodeRequired **Meaning:** The *return_code* parameter is not specified. **Action:** Specify the *return_code* parameter in the CALL DWWCVRN statement and retry the request.
8	104	**Equate Symbol:** DWWCVRN_ReasonCodeRequired **Meaning:** The *reason_code* parameter is not specified. **Action:** Specify the *reason_code* parameter in the CALL DWWCVRN statement and retry the request.
8	108	**Equate Symbol:** DWWCVRN_ProbDetRequired **Meaning:** The *prob_det* parameter is not specified. **Action:** Specify the *prob_det* parameter in the CALL DWWCVRN statement and retry the request.
8	10C	**Equate Symbol:** DWWCVRN_BackupProductRequired **Meaning:** The *backup_product* parameter is not specified. **Action:** Specify the *backup_product* parameter in the CALL DWWCVRN statement and retry the request
8	110	**Equate Symbol:** DWWCVRN_BackupTypeRequired **Meaning:** The *backup_type* parameter is not specified. **Action:** Specify the *backup_type* parameter in the CALL DWWCVRN statement and retry the request.
8	114	**Equate Symbol:** DWWCVRN_DataSetNameRequired **Meaning:** The *dataset_name* parameter is not specified. **Action:** Specify the *dataset_name* parameter in the CALL DWWCVRN statement and retry the request.
8	118	**Equate Symbol:** DWWCVRN_BackupNameRequired **Meaning:** The *backup_name* parameter is not specified. **Action:** Specify the *backup_name* parameter in the CALL DWWCVRN statement and retry the request.

Table 10. DWWCVRN return and reason codes (continued)

Return code Hex	Reason Code Hex	Equate Symbol, Meaning, and Action
8	11C	**Equate Symbol:** DWWCVRN_BackupDateLocalRequired **Meaning:** The *backup_date_local* parameter is not specified. **Action:** Specify the *backup_date_local* parameter in the CALL DWWCVRN statement and retry the request.
8	120	**Equate Symbol:** DWWCVRN_BackupTimeLocalRequired **Meaning:** The *backup_time_local* parameter is not specified. **Action:** Specify the *backup_time_local* parameter in the CALL DWWCVRN statement and retry the request.
8	124	**Equate Symbol:** DWWCVRN_BackupDateGMTRequired **Meaning:** The *backup_date_GMT* parameter is not specified. **Action:** Specify the backup_date_GMT parameter in the CALL DWWCVRN statement and retry the request.
8	128	**Equate Symbol:** DWWCVRN_BackupTimeGMTRequired **Meaning:** The backup_time_GMT parameter is not specified. **Action:** Specify the *backup_time_GMT* parameter in the CALL DWWCVRN statement and retry the request.
8	134	**Equate Symbol:** DWWCVRN_OnlineBackupTimestampRequired **Meaning:** The SHARP ONLINE BACKUP WITH TIEUP LOG RECORD, FUZZY ONLINE BACKUP WITH TIEUP LOG RECORD, SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD, or FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD bit is set ON in the *status_flags* parameter, but the *BWO_timestamp* parameter and the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters are not specified. **Action:** Either specify the *BWO_timestamp* parameter or the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters in the CALL DWWCVRN statement, and retry the request if the backup was created with integrity when the data set was open for update.
8	148	**Equate Symbol:** DWWCVRN_OptInfoLengthRequired **Meaning:** The *optional_information_length* parameter is not specified. The *optional_information_length* parameter must be specified when the *optional_information_area* parameter is specified. **Action:** Specify the *optional_information_length* parameter in the CALL DWWCVRN statement and retry the request.

Table 10. DWWCVRN return and reason codes (continued)		
Return code Hex	**Reason Code Hex**	**Equate Symbol, Meaning, and Action**
8	14C	**Equate Symbol:** DWWCVRN_OptInfoAreaRequired **Meaning:** The *optional_information_area* parameter is not specified. The *optional_information_area* parameter must be specified when the *optional_information_length* parameter is specified. **Action:** Specify the *optional_information_area* parameter in the CALL DWWCVRN statement and retry the request.
8	150	**Equate Symbol:** DWWCVRN_NumberOfVolumesRequired **Meaning:** The *number_of _volumes* parameter is not specified. The *number_of _volumes*, *volume_list_area* and *device_type* parameters are all required when specifying volume information. **Action:** Specify the *number_of _volumes* parameter in the CALL DWWCVRN statement and retry the request.
8	154	**Equate Symbol:** DWWCVRN_VolumeListAreaRequired **Meaning:** The *volume_list_area_address* parameter is not specified. The *number_of _volumes*, *volume_list_area* and *device_type* parameters are all required when specifying volume information. **Action:** Specify the *volume_list_area* parameter in the CALL DWWCVRN statement and retry the request.
8	158	**Equate Symbol:** DWWCVRN_DeviceTypeRequired **Meaning:** The *device_type* parameter is not specified. The *number_of _volumes*, *volume_list_area* and *device_type* parameters are all required when specifying volume information. **Action:** Specify the *device_type* parameter in the CALL DWWCVRN statement and retry the request.
8	200	**Equate Symbol:** DWWCVRN_InvalidBackupProductName **Meaning:** An invalid or reserved backup product name is specified in the *backup_product* parameter. The DSS and HSM backup product names are reserved and cannot be specified. **Action:** Change the *backup_product* parameter and retry the request. **Note:** DFSMSdss and DFSMShsm automatically notify CICS VR when a backup is made. There is no need to code the file copy notification service when using DFSMSdss or DFSMShsm.
8	210	**Equate Symbol:** DWWCVRN_InvalidBackupType **Meaning:** An invalid backup type is specified in the *backup_type* parameter. **Action:** Change the *backup_type* parameter, using the required syntax, and retry the request.

Table 10. DWWCVRN return and reason codes (continued)		
Return code Hex	**Reason Code Hex**	**Equate Symbol, Meaning, and Action**
8	220	**Equate Symbol:** DWWCVRN_InvalidDataSetName **Meaning:** An invalid data set name is specified in the *dataset_name* parameter. **Action:** Change the *dataset_name* parameter, using the required syntax, and retry the request.
8	230	**Equate Symbol:** DWWCVRN_InvalidBackupName **Meaning:** An invalid backup name is specified in the *backup_name* parameter. **Action:** Change the *backup_name* parameter, using the required syntax, and retry the request
8	290	**Equate Symbol:** DWWCVRN_InvalidOptInfoLength **Meaning:** Length specified in the *optional_information_length* parameter is greater than 256 or less than or equal to 0. **Action:** Change the *optional_information_length* parameter to an acceptable number and retry the request.
8	2AO	**Equate Symbol:** DWWCVRN_InvalidNumberOfVolumes **Meaning:** The value specified in the *number_of_volumes* parameter is greater than 99 or less than or equal to 0. **Action:** Change the *number_of_volumes* parameter to an acceptable value and retry the request
8	2B0	**Equate Symbol:** DWWCVRN_InvalidSequenceNumber **Meaning:** The value specified in the *sequence_number* parameter is greater than 9999 or less than 0. **Action:** Change the *sequence_number* parameter to an acceptable value and retry the request.
8	15C	**Equate Symbol:** DWWCVRN_NumberOfDDnamesRequired **Meaning:** The SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD or FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD bit is set ON in the *status_flags* parameter, but the *number_of_ddnames* parameter is not specified. **Action:** Specify the *number_of_ddnames* parameter in the CALL DWWCVRN statement and retry the request if the backup was created with integrity when the data set was open for update but a tieup was not written.

Table 10. DWWCVRN return and reason codes (continued)		
Return code Hex	**Reason Code Hex**	**Equate Symbol, Meaning, and Action**
8	160	**Equate Symbol:** DWWCVRN_ddnameAndAPPLIDRequired **Meaning:** The SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD or FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD bit is set ON in the *status_flags* parameter, but the *ddname_and_APPLID* parameter is not specified. **Action:** Specify the *ddname_and_APPLID* parameter in the CALL DWWCVRN statement and retry the request if the backup was created with integrity when the data set was open for update but a tieup was not written.
8	164	**Equate Symbol:** DWWCVRN_LogStreamNameRequired **Meaning:** The SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD or FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD bit is set ON in the *status_flags* parameter, but the *log_stream_name* parameter is not specified. **Action:** Specify the *log_stream_name* parameter in the CALL DWWCVRN statement and retry the request if the backup was created with integrity when the data set was open for update but a tieup was not written.
8	168	**Equate Symbol:** DWWCVRN_DataSetTypeRequired **Meaning:** The SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD or FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD bit is set ON in the *status_flags* parameter, but the *data_set_type* parameter is not specified. **Action:** Specify the *data_set_type* parameter in the CALL DWWCVRN statement and retry the request if the backup was created with integrity when the data set was open for update but a tieup was not written.
8	16C	**Equate Symbol:** DWWCVRN_CISizeRequired **Meaning:** The SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD or FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD bit is set ON in the *status_flags* parameter, but the *CI_size* parameter is not specified. **Action:** Specify the *CI_size* parameter in the CALL DWWCVRN statement and retry the request if the backup was created with integrity when the data set was open for update but a tieup was not written.
8	170	**Equate Symbol:** DWWCVRN_MaxRecLengthRequired **Meaning:** The SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD or FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD bit is set ON in the *status_flags* parameter, but the *maximum_record_length* parameter is not specified. **Action:** Specify the *maximum_record_length* parameter in the CALL DWWCVRN statement and retry the request if the backup was created with integrity when the data set was open for update but a tieup was not written.

Table 10. DWWCVRN return and reason codes (continued)

Return code Hex	Reason Code Hex	Equate Symbol, Meaning, and Action
8	174	**Equate Symbol:** DWWCVRN_KeyPositionRequired **Meaning:** The SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD or FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD bit is set ON in the *status_flags* parameter, but the *key_position* parameter is not specified. **Action:** Specify the *key_position* parameter in the CALL DWWCVRN statement and retry the request if the backup was created with integrity when the data set was open for update but a tieup was not written.
8	178	**Equate Symbol:** DWWCVRN_KeyLengthRequired **Meaning:** The SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD or FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD bit is set ON in the *status_flags* parameter, but the *key_length* parameter is not specified. **Action:** Specify the *key_length* parameter in the CALL DWWCVRN statement and retry the request if the backup was created with integrity when the data set was open for update but a tieup was not written.
8	2C0	**Equate Symbol:** DWWCVRN_InvalidStatusFlags **Meaning:** More than one of the following flags of the *status_flags* parameter were set on: • SHARP ONLINE BACKUP WITH TIEUP LOG RECORD • FUZZY ONLINE BACKUP WITH TIEUP LOG RECORD • SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD • FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD These bits are mutually exclusive. **Action:** Only specify the appropriate flag in the *status_flags* parameter, then retry the request.

Table 10. DWWCVRN return and reason codes (continued)		
Return code Hex	**Reason Code Hex**	**Equate Symbol, Meaning, and Action**
8	2C1	**Equate Symbol:** DWWCVRN_InvalidStatusFlags03 **Meaning:** None of the following flags of the *status_flags* parameter were set ON: • SHARP ONLINE BACKUP WITH TIEUP LOG RECORD • FUZZY ONLINE BACKUP WITH TIEUP LOG RECORD • SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD • FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD However, one or more of the following parameters were specified: • *BWO_timestamp* • *recovery_timestamp_local* • *recovery_timestamp_GMT* The BWO or recovery timestamps can only be specified when CICS VR is being notified of an online backup. **Action:** Specify the appropriate flag in the *status_flags* parameter, then retry the request if the backup was created with integrity when the data set was open for update.
8	2C2	**Equate Symbol:** DWWCVRN_InvalidStatusFlags23 **Meaning:** None of the following flags of the *status_flags* parameter were set ON: • SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD • FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD However, one or more of the following parameters were specified: • *number_of_ddnames* • *ddname_and_APPLID* • *log_stream_name* • *data_set_type* • *CI_size* • *maximum_record_length* • *key_position* • *key_length* **Action:** Specify the appropriate flag in the *status_flags* parameter, then retry the request if the backup was created with integrity when the data set was open for update but a corresponding tieup log record was not written.

Table 10. DWWCVRN return and reason codes (continued)

Return code Hex	Reason Code Hex	Equate Symbol, Meaning, and Action
8	2C4	**Equate Symbol:** DWWCVRN_InvalidBWOorRecoveryTimestamp **Meaning:** Zeroes were specified for either the *BWO_timestamp* parameter or both the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters. A zero value for the *BWO_timestamp* parameter is not allowed. A zero value can be specified for either the *recovery_timestamp_local* or *recovery_timestamp_GMT* parameter, but not both. CICS VR translates the given recovery timestamp into the format of the recovery timestamp that had a value of zeroes. **Action:** Either specify an appropriate timestamp for the *BWO_timestamp* parameter, or one of the recovery timestamp parameters, then retry the request.
8	2C8	**Equate Symbol:** DWWCVRN_InvalidLogStreamName **Meaning:** An invalid log stream name is specified in the *log_stream_name* parameter. **Action:** Change the *log_stream_name* parameter, using the required syntax, and retry the request.
8	2CC	**Equate Symbol:** DWWCVRN_InvalidDataSetType **Meaning:** The specified value for the *data_set_type* parameter is incorrect. It must either be K, E, R, or V. **Action:** Specify an acceptable value for the *data_set_type* parameter and retry the request.
8	2D0	**Equate Symbol:** DWWCVRN_ProcessBWOError **Meaning:** The PROCESS BWO bit of the *operation_flags* parameter was set on. However, none of the following flags of the *status_flags* parameter were set ON: • SHARP ONLINE BACKUP WITH TIEUP LOG RECORD • FUZZY ONLINE BACKUP WITH TIEUP LOG RECORD • SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD • FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD The PROCESS BWO bit only applies to online backups. **Action:** If this is an online backup, specify the appropriate flag in the *status_flags* parameter, then retry the request.
8	2D4	**Equate Symbol:** DWWCVRN_BWOAndRecoveryTimestampError **Meaning:** A value is specified for both the *BWO_timestamp* parameter and the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters. The *BWO_timestamp* field is mutually exclusive with the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters. **Action:** Only specify a value for either the *BWO_timestamp* field or the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters, then retry the request.

Table 11. CICS VR server address space return and reason codes		
Return Code Hex	**Reason Code Hex**	**Equate Symbol, Meaning, and Action**
8	71845448	**Equate Symbol:** DWWCVRN_InvalidBackupDateTimeLocal **Meaning:** An invalid value is specified for the *backup_date_local* or *backup_time_local* parameter. **Action:** Specify a valid value for the *backup_date_local* and *backup_time_local* parameters and retry the request.
8	7184544A	**Equate Symbol:** DWWCVRN_InvalidBackupDateTimeGMT **Meaning:** An invalid value is specified for the *backup_date_GMT* or *backup_time_GMT* parameter. **Action:** Specify a valid value for the *backup_date_GMT* and *backup_time_GMT* parameters and retry the request.
8	7184544C	**Equate Symbol:** DWWCVRN_InvalidBackupDateTime **Meaning:** Inconsistent values are specified for the *backup_date_local*, *backup_time_local*, *backup_date_GMT* or *backup_time_GMT* parameters. For example, the difference between the specified GMT and local dates might be impossible. **Action:** Specify valid values for the *backup_date_local*, *backup_time_local*, *backup_date_GMT* and *backup_time_GMT* parameters and retry the request.
8	7184544E	**Equate Symbol:** DWWCVRN_InvalidOperationFlags **Meaning:** An invalid value is specified for the *operation_flags* parameter. **Action:** Specify a valid value for the *operation_flags* parameter and retry the request.
8	7184544F	**Equate Symbol:** DWWCVRN_InvalidStatusFlags33 **Meaning:** An invalid value is specified for the *status_flags* parameter. **Action:** Specify a valid value for the *status_flags* parameter and retry the request.
8	71845450	**Equate Symbol:** DWWCVRN_InvalidBWOTimestamp **Meaning:** An invalid or unsupported value is specified for the *BWO_timestamp* parameter. **Action:** Specify a valid value for the *BWO_timestamp* parameter and retry the request.
8	71845454	**Equate Symbol:** DWWCVRN_InvalidRecoveryTimestampLocal **Meaning:** An invalid value is specified for the *recovery_timestamp_local* parameter. **Action:** Specify a valid value for the *recovery_timestamp_local* parameter and retry the request.

Table 11. CICS VR server address space return and reason codes (continued)		
Return Code Hex	**Reason Code Hex**	**Equate Symbol, Meaning, and Action**
8	71845455	**Equate Symbol:** DWWCVRN_InvalidRecoveryTimestampGMT **Meaning:** An invalid value is specified for the *recovery_timestamp_GMT* parameter. **Action:** Specify a valid value for the *recovery_timestamp_GMT* parameter and retry the request.
8	71845456	**Equate Symbol:** DWWCVRN_InvalidRecoveryTimestamps **Meaning:** Inconsistent values are specified for the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters. For example, the difference between the specified GMT and local recovery timestamps might be impossible. **Action:** Specify valid values for the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters and retry the request.
8	7184545C	**Equate Symbol:** DWWCVRN_InvalidDeviceType **Meaning:** An invalid value is specified for the *device_type* parameter. **Action:** Specify a valid value for the *device_type* parameter and retry the request.
8	71845460	**Equate Symbol:** DWWCVRN_InvalidNumDDnames **Meaning:** An invalid value is specified for the *number_of_ddnames* parameter. **Action:** Specify a valid value for the *number_of_ddnames* parameter and retry the request.
8	71845461	**Equate Symbol:** DWWCVRN_InvalidDDname **Meaning:** An invalid ddname is specified for the *ddname_and_APPLID* subparameter of the *ddnames_list* parameter. **Action:** Specify valid ddnames for the *ddname_and_APPLID* subparameter and retry the request.
8	71845462	**Equate Symbol:** DWWCVRN_InvalidAPPLID **Meaning:** An invalid APPLID is specified for the *ddname_and_APPLID* subparameter of the *ddnames_list* parameter. **Action:** Specify valid APPLIDs for the *ddname_and_APPLID* subparameter and retry the request.
8	71845469	**Equate Symbol:** DWWCVRN_InvalidCISize **Meaning:** An invalid value is specified for the *CI_size* parameter. **Action:** Specify a valid value for the *CI_size* parameter and retry the request.

Table 11. CICS VR server address space return and reason codes (continued)		
Return Code Hex	**Reason Code Hex**	**Equate Symbol, Meaning, and Action**
8	7184546A	**Equate Symbol:** DWWCVRN_InvalidMaxRecLength **Meaning:** An invalid value is specified for the *maximum_record_length* parameter. **Action:** Specify a valid value for the *maximum_record_length* parameter and retry the request.
8	7184546B	**Equate Symbol:** DWWCVRN_InvalidKeyPosition **Meaning:** An invalid value is specified for the *key_position* parameter. **Action:** Specify a valid value for the *key_position* parameter and retry the request.
8	7184546C	**Equate Symbol:** DWWCVRN_InvalidKeyLength **Meaning:** An invalid value is specified for the *key_length* parameter. **Action:** Specify a valid value for the *key_length* parameter and retry the request.
8	71845471	**Equate Symbol:** DWWCVRN_IncorrectOperationFlags **Meaning:** An invalid combination of flags are specified in the *operation_flags* parameter. **Action:** Specify a valid combination of flags in the *operation_flags* parameter and retry the request.
8	71845472	**Equate Symbol:** DWWCVRN_IncorrectStatusFlags **Meaning:** An unsupported flag is specified in the *status_flags* parameter. **Action:** Specify a valid value for the *status_flags* parameter and retry the request.
8	71845477	**Equate Symbol:** DWWCVRN_IncorrectKeyValues **Meaning:** One of the following error conditions was detected: • The data set is a KSDS and a valid value was not specified for either the *key_position* or *key_length* parameter. • The data set is an ESDS, RRDS, or VRRDS and a non-zero value has been specified for either the *key_position* or *key_length* parameter. **Action:** Specify appropriate values for the *key_position* and *key_length* parameters, then retry the request.

Table 11. CICS VR server address space return and reason codes (continued)		
Return Code Hex	**Reason Code Hex**	**Equate Symbol, Meaning, and Action**
8	7184547A	**Equate Symbol:** DWWCVRN_RCDSError **Meaning:** CICS VR received a request to either: • Register a backup for a data set that had a backup with an identical name already registered in the CICS VR RCDS. • Deregister a backup from the RCDS. However, CICS VR detected an error in the RCDS entry of the registered backup. **Action:** Capture any CICS VR messages that were written to the console and contact the IBM Support Center.
8	7184547C	**Equate Symbol:** DWWCVRN_DuplicateBackupFailure **Meaning:** CICS VR received a request to register a backup for a data set that had a backup with an identical name already registered in the CICS VR RCDS. However, the backup date and time of the registered backup is more recent than the backup date and time specified in the request. CICS VR could not replace the existing backup entry with the backup information specified in the latest request. CICS VR can only register a backup with an identical name if the backup creation date and time in the request is more recent than the creation date and time of the registered backup, the existing entry is replaced. This problem might be the result of submitting multiple registration requests in asynchronous mode. **Action:** CICS VR cannot maintain multiple entries in the RCDS for backups created for the same data set with identical backup names. If you want to register an earlier backup in the RCDS with the same name of an existing registered backup for the same data set, delete the existing backup entry, then retry the request.
4	7184547D	**Equate Symbol:** DWWCVRN_AllocRegisterFailure **Meaning:** The PREALLOCATION REQUIRED bit of the *operation_flags* parameter was set ON. However, CICS VR has detected an error, the data set has not been found in the ICF catalog, the data set is not a VSAM data set, the data set is not a cluster, SHOWCAT system service failure, or CATALOG system service failure, while attempting to extract information from the ICF catalog concerning allocation attributes of the data set. The request processing has been completed successfully, but allocation attributes of the data set has not been registered in the RCDS. Preallocate the target data set manually before restoring the data set. **Action:** Set the PREALLOCATION REQUIRED bit of the *operation_flags* parameter OFF, if it is suitable, or ensure that the data set has been catalogued in the ICF catalog and retry the request, if required.

Table 11. CICS VR server address space return and reason codes (continued)		
Return Code Hex	**Reason Code Hex**	**Equate Symbol, Meaning, and Action**
4	718454E0	**Equate Symbol:** DWWCVRN_SelBkRegSphereNotRegistered **Meaning:** CICS VR has received a request to register a backup for a data set that is not registered in the RCDS although selective backup registration is in effect. When selective backup registration is in effect, CICS VR registers only backups, for which data sets are already registered. **Action:** If you want to register the backup in the RCDS, register the appropriate data set or deactivate the selective backup registration function, then retry the request.
8	71313E03	**Meaning:** CICS VR received a request from a user who is not authorized to perform file copy notification. The request is rejected. **Action:** Contact the security administrator to request the correct access to perform file copy notification.
14	71425400	**Equate Symbol:** DWWCVRN_NotifyServiceNotAvailable **Meaning:** The CICS VR file copy notification service is not available. **Action:** The current version of CICS VR does not support the CICS VR file copy notification service. Contact IBM support for assistance
14	EE01	**Equate Symbol:** DWWCVRN_ServerNotAvailable **Meaning:** The CICS VR server is not available. **Action:** Activate the CICS VR address space server on the system and retry the request.

Examples

A sample DWWIFCNS located in the SDWWSORC library contains a program that calls the CICS VR file copy notification service to notify CICS VR about a backup created for a VSAM data set.

The values passed to the file copy notification service in the sample are explained in the following table:

Table 12. Values passed to the file copy notification service		
Program variable name	**Corresponding file copy notification service variable name**	**Meaning**
RETCODE	return_code	Output area for return code issued by DWWCVRN.
RSNCODE	reason_code	Output area for reason code issued by DWWCVRN.
PROBDET	prob_det	Output area for problem determination information issued by DWWCVRN.
PRODUCT	backup_product	3 character identifier of the product used to create the backup. In this example, 'TST' is used to represent a backup product named TEST.
TYPE	backup_type	2 character identifier of the type of backup created. In this example, 'LC' is used to represent a Logical Copy.

Table 12. Values passed to the file copy notification service (continued)

Program variable name	Corresponding file copy notification service variable name	Meaning
DATASET	dataset_name	Name of the data set for which the backup was created.
BACKUP	backup_name	Name of the backup data set created.
DATELOC	backup_date_local	Date the backup was created in local format. In this scenario, CICS VR is notified immediately after creation of the backup. Therefore, all zeros are specified. CICS VR records the system date in local format at the time of this call to DWWCVRN as the local backup date.
TIMELOC	backup_time_local	Time the backup was created in local format. In this scenario, CICS VR is notified immediately after creation of the backup. Therefore, all zeros are specified. CICS VR records the system time in local format at the time of this call to DWWCVRN as the local backup time.
DATEGMT	backup_date_GMT	Date the backup was created in GMT format. In this scenario, CICS VR is notified immediately after creation of the backup. Therefore, all zeros are specified. CICS VR records the system date in GMT format at the time of this call to DWWCVRN as the GMT backup date.
TIMEGMT	backup_time_GMT	Time the backup was created in GMT format. In this scenario, CICS VR is notified immediately after creation of the backup. Therefore, all zeros are specified. CICS VR records the system time in GMT format at the time of this call to DWWCVRN as the GMT backup time.
OPER	operation_flags	Indicates that the file copy notification service is running in synchronous processing mode.
omitted	status_flags	In this scenario, the backup was created while the data set was offline. Therefore, no status flags are set.
omitted	BWO_timestamp	In this scenario, the backup was created while the data set was offline. Therefore, the BWO_timestamp parameter is omitted.
omitted	recovery_timestamp_local	In this scenario, the backup was created while the data set was offline. Therefore, CICS VR uses information from the RCDS to determine the forward recovery start time. The recovery_timestamp_local parameter is omitted.
omitted	recovery_timestamp_GMT	In this scenario, the backup was created while the data set was offline. Therefore, CICS VR uses information from the RCDS to determine the forward recovery start time. The recovery_timestamp_GMT parameter is omitted.
omitted	optional_information_length	In this scenario, no descriptive information is added for the backup. This field specifies the length of the optional information using the IBM recommended value of 64 byte multiples.
omitted	optional_information_area	In this scenario, no descriptive information is added for the backup. This field contains the optional information.
omitted	number_of_volumes	In this scenario, the backup is cataloged, therefore this field is omitted.

Table 12. Values passed to the file copy notification service (continued)		
Program variable name	**Corresponding file copy notification service variable name**	**Meaning**
omitted	volume_list_area	In this scenario, the backup is cataloged, therefore this field is omitted.
omitted	device_type	In this scenario, the backup is cataloged, therefore this field is omitted.
omitted	sequence_number	In this scenario, the backup is cataloged, therefore this field is omitted.
omitted	number_of_ddnames	In this scenario, the backup was created while the data set was offline, therefore the number_of_ddnames parameter is omitted.
omitted	ddname_and_APPLID	In this scenario, the backup was created while the data set was offline, therefore the ddname_and_APPLID parameter is omitted.
omitted	log_stream_name	In this scenario, the backup was created while the data set was offline, therefore the log_stream_name parameter is omitted.
omitted	data_set_type	In this scenario, the backup was created while the data set was offline, therefore the data_set_type parameter is omitted.
omitted	CI_size	In this scenario, the backup was created while the data set was offline, therefore the CI_size parameter is omitted.
omitted	maximum_record_length	In this scenario, the backup was created while the data set was offline, therefore the maximum_record_length parameter is omitted.
omitted	key_position	In this scenario, the backup was created while the data set was offline, therefore the key_position parameter is omitted.
omitted	key_length	In this scenario, the backup was created while the data set was offline, therefore the key_length parameter is omitted.

Required parameters

return_code

```
TYPE: INTEGER
LENGTH: FULL WORD
```

EXPLANATION: Return code from DWWCVRN. The return code is also returned in register 15. This is a required output parameter and must be defined as an integer. See “Return and reason codes” on page 175 for a further explanation of the possible return codes.

,reason_code

```
TYPE: INTEGER
LENGTH: FULL WORD
```

EXPLANATION: Reason code from DWWCVRN. The reason code is also returned in register 0. This is a required output parameter and must be defined as an integer. See “Return and reason codes” on page 175 for a further explanation of the possible reason codes.

,prob_det

```
TYPE: INTEGER
LENGTH: TWO FULL WORDS
```

EXPLANATION: Problem determination data when DWWCVRN encounters an error. This is a required output parameter and must be defined as a two-element array of integers. See “Return and reason codes” on page 175 for a further explanation of the problem determination data.

,backup_product

```
TYPE: CHARACTER (EBCDIC)
LENGTH: THREE BYTES
```

EXPLANATION: Identifies the product that created the backup. This is required three character input field. The characters can be alphabetic, numeric, or national (@, #, $). No blanks can be specified.

For example, if a product named SAMPLE VSAM BACKUP is used to create the backup of the VSAM data set, you could specify the acronym SVB as input to the *backup_product* parameter. Use a consistent value for the *backup_product* parameter for all backups made by the same product.

CICS VR uses the values specified for the *backup_product* and *backup_type* parameters to produce a five character "product identifier" that CICS VR can use as a reference for further CICS VR processing of the backup.

Note: The following values for the *backup_product* parameter are reserved and cannot be used:

- HSM
- DSS

,backup_type

```
TYPE: CHARACTER (EBCDIC)
LENGTH: TWO BYTES
```

EXPLANATION: Identifies the type of backup that was created by the backup product. This is a required two character input field. The characters can be alphabetic, numeric, or national (@, #, $). No blanks can be specified.

For example, if a product named SAMPLE VSAM BACKUP is used to create two types of backups for VSAM data sets, logical and physical, you can specify LC for the logical backup types and PY for the physical backup types. Use a consistent value for the *backup_type* parameter for all backups of the same type made by the same product.

CICS VR uses the values specified for the *backup_product* and *backup_type* parameters to produce a five character "product identifier" that CICS VR can use as a reference for further CICS VR processing of the backup.

,dataset_name

```
TYPE: CHARACTER (EBCDIC)
LENGTH: 44 BYTES
```

EXPLANATION: Fully qualified base cluster name of the VSAM data set for which the backup was created. This is a required 44 character input field and must be defined as EBCDIC character data. If the data set name is less than 44 characters, left-justify the name in the field and pad it on the right with EBCDIC blanks.

,backup_name

```
TYPE: CHARACTER (EBCDIC)
LENGTH: 44 BYTES
```

EXPLANATION: Fully qualified name of the VSAM data set backup. This is a required 44 character input field and must be defined as EBCDIC character data. If the data set name is less than 44 characters, left-justify the name in the field and pad it on the right with EBCDIC blanks.

Note: All backup names registered in the CICS VR RCDS for a VSAM sphere must be unique. If CICS VR is notified of a backup with a duplicate name for the same VSAM data set, all information about the previously registered backup is replaced.

,backup_date_local

```
TYPE: INTEGER
LENGTH: FULL WORD
```

EXPLANATION: Local date, in Julian format, when the backup was created. This is a required input field and must be in the format *YYYYDDDF*, where:

YYYY
Four digit year the backup was created

DDD
Day of the year, in Julian format, the backup was created

F
The sign F (for positive number)

If the local backup date and time is not available during notification, zeros can be specified for both the *backup_date_local* and *backup_time_local* parameters, and CICS VR performs one of the following actions:

Zeroes for local backup date and time only
If zeroes are specified for the local backup date and time parameters, but non-zero values are specified for the GMT backup date and time parameters, CICS VR translates the date and time specified in the *backup_date_GMT* and *backup_time_GMT* parameters into local format. CICS VR then uses the translated local date and time as values for the *backup_date_local* and *backup_time_local* parameters.

Note: Be sure the system clock is not changed due to daylight saving between backup processing and execution of the CICS VR file copy notification service.

Zeroes for both local and GMT backup date and time
If zeroes are specified for both the local and GMT backup date and time parameters, CICS VR uses the system date and time in both local and GMT format at the time of notification as the values for the *backup_date_local*, *backup_time_local*, *backup_date_GMT*, and *backup_time_GMT* parameters.

However, if zeroes are specified for the local and GMT backup date and time parameters:

- CICS VR is notified immediately after the backup is created.
- It must not be possible for updates to be made to the data set between the time the backup completed and the time CICS VR is notified of the backup.

Note: Local date and time formats are affected by a change in daylight saving time on a system. Therefore, when you later refer to a backup, IBM recommends that you use the GMT date and time format for backups created near a change in daylight saving time.

,backup_time_local

```
TYPE: UNSIGNED PACKED-DECIMAL
LENGTH: FULL WORD
```

EXPLANATION: Local time when the backup was created. This is a required input parameter and must be in the format *HHMMSSTh*, where:

HH
Hour the day the backup was created based on a 24-hour clock

MM
The number of minutes

SS
The number of seconds

T
The tenths of a second

h
The hundredths of a second

If the local backup date and time is not available during notification, zeroes can be specified for both the *backup_date_local* and *backup_time_local* parameters. CICS VR performs one of the actions described in the description for the *backup_date_local* parameter, depending on which parameters are specified with zeroes.

,backup_date_GMT

```
TYPE: INTEGER
LENGTH: FULL WORD
```

EXPLANATION: GMT date, in Julian format, when the backup was created. This is a required input field and must be in the format *YYYYDDDF*, where:

YYYY
Four digit year the backup was created

DDD
Day of the year, in Julian format, the backup was created

F
The sign F (for positive number)

If the GMT backup date and time is not available during notification, zeroes can be specified for both the *backup_date_GMT* and *backup_time_GMT* parameters, and CICS VR performs one of the following actions:

Zeroes for GMT backup date and time only
If zeroes are specified for the GMT backup date and time parameters, but non-zero values are specified for the local backup date and time parameters, CICS VR translates the date and time specified in the *backup_date_local* and *backup_time_local* parameters into GMT format. CICS VR then uses the translated GMT date and time as values for the *backup_date_GMT* and *backup_time_GMT* parameters.

Note: Be sure the system clock is not changed due to daylight saving between backup processing and execution of the CICS VR file copy notification service.

Zeroes for both local and GMT backup date and time
If zeroes are specified for both the local and GMT backup date and time parameters, CICS VR uses the system date and time in both local and GMT format at the time of notification as the values for the *backup_date_local*, *backup_time_local*, *backup_date_GMT*, and *backup_time_GMT* parameters.

However, if zeroes are specified for the local and GMT backup date and time parameters:

- CICS VR is notified immediately after the backup is created.
- It must not be possible for updates to be made to the data set between the time the backup completed and the time CICS VR is notified of the backup.

Note: Local date and time formats are affected by a change in daylight saving time on a system. Therefore, when you later refer to a backup, IBM recommends that you use the GMT date and time format for backups created near a change in daylight saving time.

,backup_time_GMT

```
TYPE: UNSIGNED PACKED-DECIMAL
LENGTH: FULL WORD
```

EXPLANATION: GMT time when the backup was created. This is a required input parameter and must be in the format *HHMMSSTh*, where:

HH
Hour the day the backup was created based on a 24-hour clock MM The number of minutes SS The number of seconds

T
The tenths of a second

h
The hundredths of a second

If the GMT backup date and time is not available during notification, zeroes can be specified for both the *backup_date_GMT* and *backup_time_GMT* parameters. CICS VR performs one of the actions described in the description for the *backup_date_GMT* parameter, depending on which parameters are specified with zeroes.

Optional parameters

,operation_flags

```
TYPE: BINARY
LENGTH: HALF WORD
```

EXPLANATION: This parameter contains a set of optional flags used to indicate how the file copy notification service must be processed. For each flag, 1 is ON and 0 is OFF. This is an optional input parameter. A list of the possible bits along with their associated meanings:

0-7
reserved

8
PROCESSING MODE - Specifies desired processing mode.

ON - synchronous processing
Set this bit on to process the notification request in synchronous processing mode. CICS VR accepts the request, validates parameters, and processes the request before returning control back to the caller.

OFF - asynchronous processing
Set this bit off to process the notification request in asynchronous processing mode. CICS VR accepts the request and validates parameters. Control is then returned to the caller while the request is being processed.

The default value is OFF (asynchronous processing).

Note: Asynchronous processing achieves better performance when compared to synchronous processing. However, synchronous processing must be used when it is mandatory to guarantee the notification completed successfully before the calling program continues.

9
PROCESS BWO - Specifies if the product that created the backup uses the DFSMS backup-while open (BWO) protocols.

ON - The backup was taken while the data set remained open to CICS for update, and the backup product set the BWO STATUS flags and either the BWO TIMESTAMP field or RECOVERY TIMESTAMP fields in the catalog entry of the VSAM data set. When the backup is selected for restore and recovery, CICS VR:

- Checks for the proper setting of the BWO STATUS flags prior to forward recovery processing.
- Sets the BWO STATUS flags to '001' prior to recovery.
- Uses either the value of the BWO TIMESTAMP field or the RECOVERY TIMESTAMP fields in the catalog entry of the data set as the forward recovery start time.
- Set sthe BWO STATUS flags to '000' after a successful recovery.

Note: The backup product sets the BWO status flags to '101' after the backup was restored, indicating an online backup was restored, and needs to be forward recovered before it can be made available to CICS.

The PROCESS BWO bit can only be set on if one of the following status flags is also set on:

- SHARP ONLINE BACKUP WITH TIEUP LOG RECORD
- FUZZY ONLINE BACKUP WITH TIEUP LOG RECORD
- SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD
- FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD

Note: If the PROCESS BWO bit is set, and either the SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD bit or the FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD bit is also set, the ONLINEBACKUPNAME keyword must be added to the RECOVER command for CICS VR to use the BWO protocols during recovery.

OFF - Specifies that either:

- The backup was taken while the data set was offline from CICS.
- The backup was taken while the data set remained available for update to CICS, but the backup product did not use DFSMS BWO protocols (did not set the BWO STATUS flags and the BWO TIMESTAMP field or RECOVERY TIMESTAMP fields in the catalog entry of the VSAM data set).

The default value is OFF.

10

PREALLOCATION REQUIRED - Specifies if the product that created the backup pre-allocates the target data set at the time of the restore.

ON

The product that created the backup does not preallocate the target data set at the time of the restore. CICS VR extracts information from the ICF catalog about the allocation attributes of the data set, and register this information in the RCDS. Subsequently, at the time of the restore, CICS VR uses the registered information to create a restore job which includes a step to preallocate the target data set.

OFF

The product that created the backup pre-allocates the target data set at the time of the restore. So, at the time of the restore, CICS VR creates a restore job which does not include a step to preallocate the target data set.

11-15

reserved

,status_flags

```
TYPE:  BINARY
LENGTH:  HALF WORD
```

EXPLANATION: This parameter contains a set of flags used to indicate various states of the backup. For each flag, 1 is ON and 0 is OFF. This is an optional input parameter. A list of the possible bits along with their associated meanings:

0

SHARP ONLINE BACKUP WITH TIEUP LOG RECORD

Set this bit if:

- The backup was created for a VSAM data set while the data set remained open for update.
- A tieup log record was written to the log stream with a timestamp equal to the time specified in the *BWO_timestamp* parameter or the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters.
- No updates were made to the VSAM data through the base cluster or any paths during the entire duration of backup processing.

If this flag is set on, the backup product must have the ability to successfully create a backup with data integrity while it remains open for update. Also, the timestamp of a tieup log record must be specified in either the *BWO_timestamp* parameter or the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters.

When this bit is set on, CICS VR does not run in "fuzzy" processing mode, meaning that CICS VR treats any log records found for updates that are already reflected in the backup as an error condition.

The FUZZY ONLINE BACKUP WITH TIEUP LOG RECORD, SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD, and FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD bits cannot be set on if this bit is set on.

1

FUZZY ONLINE BACKUP WITH TIEUP LOG RECORD

Set this bit if:

- The backup was created for a VSAM data set while the data set remained open for update.
- A tieup log record was written to the log stream with a timestamp equal to the time specified in the *BWO_timestamp* parameter or the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters.
- One or more updates might have been made to the VSAM data through the base cluster or any paths during the duration of backup processing.

If this flag is set on, the backup product must have the ability to successfully create a backup with data integrity while it remains open for update. Also, the timestamp of a tieup log record must be specified in either the *BWO_timestamp* parameter or the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters.

When this bit is set on, CICS VR runs in "fuzzy" processing mode, meaning that CICS VR reports, but ignores any log records found for updates that are already reflected in the backup.

The SHARP ONLINE BACKUP WITH TIEUP LOG RECORD, SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD, and FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD bits cannot be set on if this bit is set on.

2

SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD

Set this bit if:

- The backup was created for a VSAM data set while the data set remained open for update.
- No updates were made to the VSAM data through the base cluster or any paths during the entire duration of backup processing.
- A new tieup log record for the VSAM data set was not written to the log prior to backup creation, other than when the data set was initially open (CICS writes a tieup log record when a data set is initially open). Standard CICS VR forward recovery always starts by reading a tieup log record. Therefore, if a tieup is not written prior to backup processing, CICS VR would need to start forward recovery from when the data set was initially open.

However, if you have access to the information normally read from a tieup log record, you can set this flag on, and also specify information in the following parameters of this service:

- *ddnames_list*
  - *number_of_ddnames*
  - *ddname_and_APPLID*
- *log_stream_name*
- *data_set_type*
- *CI_size*
- *maximum_record_length*

- *key_position*
- *key_length*

Note: The parameters listed can only be specified when CICS VR is notified of an online backup that does not have a corresponding tieup log record.

A timestamp must also be specified in either the *BWO_timestamp* parameter or the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters. The specified timestamp must accurately reflect when the information in the parameters listed was retrieved. For example, if the list of all opens (*ddnames_list*) against the data set was accurate at the timestamp 04.322 12:15:17, then this must be the timestamp specified in either the *BWO_timestamp* parameter or the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters (in the appropriate time format).

Therefore, if this backup is selected for restore and forward recovery, CICS VR can start recovery at the timestamp specified in either the *BWO_timestamp* parameter or the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters and does not have to start by reading a tieup log record on the log stream.

If this flag is set on, the backup product must have the ability to successfully create a backup with data integrity while it remains open for update. Also, when this bit is set on, CICS VR does not run in "fuzzy" processing mode, meaning that CICS VR treats any log records found for updates that are already reflected in the backup as an error condition.

The SHARP ONLINE BACKUP WITH TIEUP LOG RECORD, FUZZY ONLINE BACKUP WITH TIEUP LOG RECORD, and FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD bits cannot be set on if this bit is set on.

3

FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD

Set this bit if:

- The backup was created for a VSAM data set while the data set remained open for update.
- One or more updates might have been made to the VSAM data through the base cluster or any paths during the duration of backup processing.
- A new tieup log record for the VSAM data set was not written to the log prior to backup creation, other than when the data set was initially open (CICS writes a tieup log record when a data set is initially open). Standard CICS VR forward recovery always starts by reading a tieup log record. Therefore, if a tieup is not written prior to backup processing, CICS VR would need to start forward recovery from when the data set was initially open.

However, if you have access to the information normally read from a tieup log record, you can set this flag on, and specify information in the parameters listed in the description of bit 2, SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD. Also as described for bit 2, a timestamp must be specified in either the *BWO_timestamp* parameter or the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters.

If this flag is set on, the backup product must have the ability to successfully create a backup with data integrity while it remains open for update. Also, when this bit is set on, CICS VR runs in "fuzzy" processing mode, meaning that CICS VR treats any log records found for updates that are already reflected in the backup as an error condition.

The SHARP ONLINE BACKUP WITH TIEUP LOG RECORD, FUZZY ONLINE BACKUP WITH TIEUP LOG RECORD, and SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD bits cannot be set on if this bit is set on.

4-7

reserved

8

BACKUPDELETED - This backup that was previously registered to CICS VR through the file copy notification interface has now been deleted and CICS VR deregisters the backup from the RCDS.

Set this bit on if you want to remove the backup from CICS VR's inventory. The backup must have been previously registered to CICS VR using the file copy notification service. Once CICS VR is notified that the backup must be deregistered, the backup can no longer be displayed and selected through the CICS VR panel interface.

Note: Setting this bit only removes the backup entry from the CICS VR RCDS. It does not perform an actual delete of the backup. You can also deregister backups through the CICS VR panel interface.

9-15
reserved

,BWO_timestamp

```
TYPE:  PACKED-DECIMAL
LENGTH:  TWO FULL WORDS
```

EXPLANATION: This parameter may be specified if the backup created for the VSAM data set was made while the data set remained open for update. The backup product must have the ability to successfully create a backup with data integrity while it remains open for update. If specified, CICS VR uses the value of the *BWO_timestamp* parameter as the forward recovery start time when the backup is selected for restore and recovery.

You can only specify a value for the *BWO_timestamp* parameter if one of the following status flags has been set on:

- SHARP ONLINE BACKUP WITH TIEUP LOG RECORD
- FUZZY ONLINE BACKUP WITH TIEUP LOG RECORD
- SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD
- FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD

If the SHARP ONLINE BACKUP WITH TIEUP LOG RECORD or FUZZY ONLINE BACKUP WITH TIEUP LOG RECORD status flag is set on, the value specified for the *BWO_timestamp* parameter must correspond with the timestamp of a tieup log record written to the forward recovery log stream for the VSAM data set.

If the SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD or FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD status flag is set on, the value specified for the *BWO_timestamp* parameter must reflect when the information in the following parameters was retrieved:

- *ddnames_list*
  - *number_of_ddnames*
  - *ddname_and_APPLID*
- *log_stream_name*
- *data_set_type*
- *CI_size*
- *maximum_record_length*
- *key_position*
- *key_length*

Values cannot be specified for the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters if a value is specified for the *BWO_timestamp* parameter.

The *BWO_timestamp* parameter must be specified in the following format (the specified format is identical to the format used by the BWO TIMESTAMP ICF catalog entry):

- The first word contains the date in packed-decimal format, 0CYYDDDF, where:

0C	The century - 00 represents 19YY, 01 represents 20YY

YY	The last two digits of the year
DDD	The day of the year (Julian format)
F	Constant (F for positive number)

- The second word contains the time in packed-decimal format, HHMMSSTF, where:

HH	Hour of the day based on a 24-hour clock
MM	The number of minutes
SS	The number of seconds
T	The tenth of seconds
F	Constant (F for positive number)

Example: One approach to associate a forward recovery start time with a backup made while the data set remains open for update is to enable the VSAM data set for dynamic backup processing. This approach requires that you either set the BACKUPTYPE parameter in the CICS file definition for the VSAM data set to DYNAMIC or specify the BWO(TYPECICS) parameter in the ICF catalog entry for the VSAM data set. You must also set the CICS activity keypoint frequency (AKPFREQ) to a nonzero number.

After performing the settings, CICS writes a tieup log record to the forward recovery log stream about every 30 minutes. The timestamp of the tieup log record is also recorded in the BWO TIMESTAMP field in the ICF catalog entry for the VSAM data set. When a backup is created for the VSAM data set while it is open to CICS, the timestamp in the BWO TIMESTAMP ICF catalog entry for the VSAM data set is the value that must be specified as the *BWO_timestamp* parameter value.

,recovery_timestamp_local,recovery_timestamp_GMT

```
TYPE:  CHARACTER or INTEGER
LENGTH:  EIGHT BYTES
```

EXPLANATION: The *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters might be specified if the backup created for the VSAM data set was made while the data set remained open for update. The backup product must have the ability to successfully create a backup with data integrity while it remains open for update.

If specified, CICS VR uses the value of the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters as the forward recovery start time when the backup is selected for restore and recovery.

You can only specify a value for the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters if one of the following status flags has been set on:

- SHARP ONLINE BACKUP WITH TIEUP LOG RECORD
- FUZZY ONLINE BACKUP WITH TIEUP LOG RECORD
- SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD
- FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD

If the SHARP ONLINE BACKUP WITH TIEUP LOG RECORD or FUZZY ONLINE BACKUP WITH TIEUP LOG RECORD status flag is set on, the value specified for the *recovery_timestamp_local* or *recovery_timestamp_GMT* parameter must correspond with the timestamp of a tieup log record written to the forward recovery log stream for the VSAM data set.

If the SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD or FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD status flag is set on, the value specified for the *recovery_timestamp_local* or *recovery_timestamp_GMT* parameter must reflect when the information in the following parameters was retrieved:

- *ddnames_list*
  - *number_of_ddnames*

  - *ddname_and_APPLID*
- *log_stream_name*
- *data_set_type*
- *CI_size*
- *maximum_record_length*
- *key_position*
- *key_length*

Values cannot be specified for the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters if a value is specified for the *BWO_timestamp* parameter.

The values of the *recovery_timestamp_local* and *recovery_timestamp_GMT* parameters must be specified in STCK format. If either parameter is specified, a value must also be specified in the other parameter. However, zeroes can be specified for one of the parameters. In this situation, CICS VR translates the value of the parameter where a nonzero value has been specified, into the format, local or GMT, used by the parameter where a zero value has been specified, and uses it as the value for that parameter.

Note: Local date and time formats are affected by a change in daylight saving time on a system. Therefore, when you later refer to a backup, IBM recommends that you use the GMT date and time format for backups created near a change in daylight saving time.

,optional_information

Optional_information contains a set of subparameters that allow for additional information related to the backup or VSAM data set to be registered to CICS VR. This is an optional input parameter.

For example, you might want to enter a small description of the backup, such as "remote site backup", in this optional parameter that is viewable when selecting a backup to restore at a later time.

In another example, you might want to enter some value that is unique to the backup product that is stored with information about the backup; for example, a specific volume name. Then, during restore, this information could be use as input to the restore commands.

The *optional_information* parameter contains the following subparameters.

,optional_information_length

```
TYPE: INTEGER
LENGTH: FULL WORD
```

EXPLANATION: Specifies the length, number of bytes, of the area in storage that contains the optional information. This value must be an integer greater than zero, and cannot be larger than 256 bytes. IBM recommends that the specified optional information length is a multiple of 64 bytes.

,optional_information_area

```
TYPE: CHARACTER
LENGTH: MAXIMUM 256 BYTES
```

EXPLANATION: Contains optional information and must have a length equal to the value that was specified in the *optional_information_length* subparameter. This is an optional character input field. The characters can be alphabetic, numeric, or national (@, #, $).

CICS VR divides and stores the entered optional information in 64 byte groups. For example, if 128 bytes of optional information is specified, CICS VR stores and displays this as two groups of 64 bytes. You can also view each 64 byte group through the CICS VR panel interface, and reference each 64 byte group individually using an appropriate variable in a restore JCL skeleton. You can therefore treat this optional parameter as 4 separate parameters that contain 64 bytes of optional information each, if appropriate.

For example, if you want to record two separate pieces of information, perhaps a data class and a management class, during notification, specify the first piece of information, data class, in the first 64 bytes, and the second piece of information, management class, in the second 64 bytes.

,volume_list

Volume_list is an optional input parameter that contains a set of subparameters that list the volumes on which the backup resides. This parameter must be specified if the backup is not cataloged. The volume_list parameter contains the following subparameters:

,number_of_volumes

```
TYPE: INTEGER
LENGTH: FULL WORD
```

EXPLANATION: This subparameter lists the number of volumes on which the backup resides.

For example, if the backup resides on three volumes, the *number_of_volumes* parameter must contain the integer 3.

,volume_list_area

```
TYPE: CHARACTER
LENGTH: NUMBER OF VOLUMES MULTIPLIED BY 6
```

EXPLANATION: The list of volumes on which the backup resides. The volume area must be EBCDIC character type, and its length must be the number of volumes specified in the *number_of_volumes* subparameter multiplied by six. Each volume must occupy six characters and be padded on the right with EBCDIC blanks if necessary.

For example, if the backup resides on three volumes:

- The *number_of_volumes* subparameter must contain the integer 3
- The *volume_list_area* subparameter must contain the names of the three volumes on which the backup resides.

For example:

```
 'VOL1  VOL2  VOL3  '
```

,device_type

```
TYPE:  CHARACTER
LENGTH:  EIGHT BYTES
```

EXPLANATION: The name or group name of the device type of the previously listed volumes. This is an optional eight character input field and must be defined as EBCDIC character data. If the device type name is less than eight characters, left-justify the name in the field and pad it on the right with EBCDIC blanks.

,sequence_number

```
TYPE:  INTEGER
LENGTH:  HALF WORD
```

EXPLANATION: The sequence number of the backup if the backup resides on tape and is not cataloged. This is an optional half word input field and must be defined as an integer. The minimum value that can be specified is 0 and the maximum value that can be specified is 9999.

,ddnames_list

ddnames_list is an optional input parameter. It contains a set of subparameters, which list all ddnames and corresponding CICS APPLIDs that CICS has used for all active opens against the base cluster and any AIXs of the base cluster.

Note: The *ddnames_list* parameter and its subparameters must only be specified if either the SHARP ONLINE BACKUP WITHOUT TIEUP LOG RECORD flag or FUZZY ONLINE BACKUP WITHOUT TIEUP LOG RECORD flag of the *status_flags* parameter is set.

The *ddnames_list* parameter contains the following subparameters:

,number_of_ddnames

```
TYPE:  INTEGER
LENGTH:  FULL WORD
```

EXPLANATION: This subparameter lists the number of different ddnames that CICS has currently used to open the VSAM base cluster and any AIXs of the base cluster.

For example, if CICS currently has opened the VSAM base cluster with a ddname of PAY1BASE, and CICS has also opened an alternate index of the base cluster, using a path, with a ddname of PAY1AIX, the *number_of_ddnames* subparameter must contain the integer 2.

,ddname_and_APPLID

```
TYPE:  CHARACTER
LENGTH:  NUMBER OF DDNAMES MULTIPLIED BY 16
```

EXPLANATION: This subparameter lists the ddnames and corresponding CICS APPLIDs that are currently used by CICS to open the VSAM base cluster and any alternate indexes of the base cluster. The field must be EBCDIC character type, and its length must be the number of ddnames specified in the *number_of_ddnames* subparameter multiplied by 16. Each ddname and CICS APPLID pair must occupy 16 characters and use the following format:

```
'ddname  (8 characters) CICS APPLID (8 characters)'
```

The ddname must occupy the first 8 characters, padded on the right with EBCDIC blanks if necessary. Then, the CICS APPLID associated with the specified ddname must occupy the next 8 characters, again padded on the right with EBCDIC blanks if necessary.

For example, if a CICS region with an APPLID of CICSPROD currently has the base cluster of the VSAM data set opened with a ddname of PAY1BASE, and a CICS region with an APPLID of CICSPRD2 has an AIX® of the VSAM data set opened with a ddname of PAY1AIX:

- The *number_of_ddnames* subparameter must contain the integer 2.
- The ddname_and_APPLID subparameter must contain two ddname and CICS APPLID pairs. For example:

  ```
  'PAY1BASECICSPRODPAY1AIX CICSPRD2 '
  ```

,log_stream_name

```
TYPE:  CHARACTER
LENGTH:  26 BYTES
```

EXPLANATION: This optional parameter contains the name of the forward recovery log stream to which CICS logging is writing after-images for updates made to the VSAM data set.

This 26 character input field must be defined as EBCDIC character data and padded on the right with EBCDIC blanks if necessary.

,data_set_type

```
TYPE:  CHARACTER
LENGTH:  ONE BYTE
```

EXPLANATION: This optional parameter contains an indication of the type of VSAM data set for which the backup has been created.

This one character input field must be defined as EBCDIC character data and can contain only one of the following values:

```
K    KSDS VSAM sphere
E    ESDS VSAM sphere
```

```
R    RRDS VSAM sphere
V    VRRDS VSAM sphere
```

,CI_size

```
TYPE:  INTEGER
LENGTH:  FULL WORD
```

EXPLANATION: This optional parameter contains the control interval size in bytes, of the VSAM data set for which the backup has been created.

This full word input field must be defined as an integer.

,maximum_record_length

```
TYPE:  INTEGER
LENGTH:  FULL WORD
```

EXPLANATION: This optional parameter contains the maximum record length in bytes, of the VSAM data set for which the backup has been created.

This full word input field must be defined as an integer.

,key_position

```
TYPE:  INTEGER
LENGTH:  FULL WORD
```

EXPLANATION: This optional parameter contains the key position of the VSAM data set if the backup was created for a KSDS VSAM data set. If the backup was created for a non-KSDS VSAM data set, then set this field to 0.

This full word input field must be defined as an integer.

,key_length

```
TYPE:  INTEGER
LENGTH:  FULL WORD
```

EXPLANATION: This optional parameter contains the key length in bytes, of the VSAM data set if the backup was created for a KSDS VSAM data set. If the backup was created for a non-KSDS VSAM data set, then set this field to 0.

This full word input field must be defined as an integer.

Chapter 10. Using CICS VR with CICS TS at your disaster recovery site

This section describes the tasks you need to perform to prepare your primary site and your remote site for disaster recovery using CICS TS and CICS VR.

Planning for remote site disaster recovery

Because the requirements and resources of every CICS VR user can differ, the remote site disaster recovery plan of every user also differs. While no one plan works for every user, there are a few common functions that need to be performed in every plan. By performing these functions, you can use CICS VR to successfully recover VSAM spheres updated by CICS applications, batch applications, or both at the remote site.

The following topics are described:

- Using RCDS reports
- Preparing at the primary site
- Using CICS VR at the remote site
- Sample recovery scenarios
- Using mirroring technology
- Using the log stream copy utility to copy your MVS log streams
- Using the RCDS utility to export your RCDS
- Using the RCDS utility to import your RCDS
- Finding more remote site recovery information

Note: The following steps assume that your remote site disaster recovery plan restores and recovers only the VSAM spheres at the remote site when a failure occurs at the primary site. If your current disaster recovery plan uses a mirroring technology to keep the remote site information identical to the primary site, see “Using mirroring technology” on page 215.

Using recovery reports

CICS VR has a recovery report feature that is helpful in preparing a recovery operation.

The reports enable you to obtain details of the information required to recover a primary or remote site after a disaster, or the information required to keep the site up-to-date.

Report options enable you to generate information about all resources, or just an individual sphere. The CHECK parameter is used to ensure that all the resources required for recovery are available.

For further information about recovery reports, see “RCDS: Create a RCDS report” on page 292.

Preparing your primary site

Perform the following steps at the primary site in preparation for remote site recovery.

1. Create backups of your VSAM spheres:

   Create backups of your VSAM spheres regularly. The more often you create backups and send them to the remote site, the less time it takes to forward recover the VSAM spheres at the remote site. Any utility can be used to create backups of your VSAM spheres, but CICS VR's ability to automatically restore the backups differs based on your backup utility selection.

An important factor to consider when selecting your backup utility is how the backups are restored at the remote site. CICS VR can help to automate this restore process for certain backup utilities. How your backups are restored at the remote site is based on the following types of backup utilities.

DFSMShsm logical backup
If you create DFSMShsm logical backups, use the CICS VR panel interface to create a job that automatically restores the VSAM spheres from their latest backups, then performs a forward recovery on the restored VSAM spheres. You also need to send the DFSMShsm control data sets (CDS) and journal to the remote site, then perform steps to update the remote site's DFSMShsm control data sets. These steps are explained in "DFSMShsm logical backup on tape – at the primary site" on page 211.

DFSMShsm full volume dump
If you create a DFSMShsm full volume dump, use the CICS VR panel interface to create a job that automatically restores the VSAM spheres from the dump, then performs a forward recovery on the restored VSAM spheres. You also need to send the DFSMShsm control data sets (CDS) and journal to the remote site, then perform steps to update the remote site's DFSMShsm control data sets. These steps are explained in "DFSMShsm full volume dump on tape – at the primary site" on page 212.

ABARS (aggregate backup and recovery support)
You can use the CICS VR panel interface to create a job that automatically restores the VSAM spheres from ABARS backups, then performs a forward recovery on the restored VSAM spheres. This applies if *all* the following items are true:

- CICS VR was notified when the ABARS backups were created. This means that the CICS VR address space was active, and the DFSMSdss logical dump registration control default was activated when the ABARS backup job was submitted.
- The ABARS backups were sent to the remote recovery site and cataloged.
- The RCDS EXPORT utility exported ABARS backup information. This means that the BACKUP keyword was specified on the RCDS EXPORT command.

If any of the previous items are not true, you must restore the VSAM spheres manually from their backups made by ABARS at the remote site. After the restore, you can call the CICS VR panel interface to create and submit a forward recovery job.

DFSMSdss
You can use the CICS VR panel interface to create a job that automatically restores the VSAM spheres from DFSMSdss logical copies or dumps, then performs a forward recovery on the restored VSAM spheres if the following items are true:

- CICS VR was notified when the DFSMSdss logical copies or dumps were created, the CICSVRBACKUP keyword was added to the job and the CICS VR address space was active when the copy or dump job was submitted.
- The DFSMSdss backups were sent to the remote recovery site and cataloged.
- The RCDS EXPORT utility exported DFSMSdss backup information, the BACKUP keyword was specified on the RCDS EXPORT command.

If any of the previous items are not true, then the VSAM spheres first must be restored manually at the remote site from the DFSMSdss backups. Then, you can call the CICS VR panel interface to create and submit a forward recovery job.

Backups registered through the file copy notification service
If you want to use the CICS VR panel interface to select backups for restore that were previously registered to CICS VR through the file copy notification service, you need to:

- Send the backups to the remote recovery site.
- Send the associated restore skeletons to the remote recovery site, and define them to CICS VR at the remote recovery site. Restore skeletons can either be added as a member to the SDWWSENU data set, using the characteristics of this PDS), or as a member of another PDS allocated to the DWWSLIB ddname.

- Export backup information from the RCDS. Adding the BACKUP keyword to the RCDS EXPORT command causes CICS VR to add registered backup information to the sequential data set produced by the export utility.

Other backup utilities

If you use any other backup utility not previously mentioned, you must ensure that RCDS information is exported to the remote site, along with the proper restore skeletons and actual backups. The RCDS information is exported using the RCDS command as described in "Using the RCDS utility to export your RCDS" on page 220. When the resources are available on the remote site, the CICS VR panels can be used to create a recovery job, as described in "Using other products as your backup utility" on page 150.

2. Run LOGOFLOGS SCAN:

   After CICS applications have updated the VSAM spheres, call the CICS VR log of logs scan utility. The log of logs scan utility informs CICS VR of the latest updates performed by CICS against VSAM spheres. CICS VR then uses this information to build a recovery job for the VSAM spheres. Run LOGOFLOGS SCAN regularly so that CICS VR has the latest recovery information. This recovery information is stored in the RCDS. See "Setting up the log of logs scan utility (scan)" on page 96 for more information about the log of logs scan utility.

3. Create a log stream copy:

   Start the CICS VR log stream copy utility to copy the log records from an MVS log stream to a sequential data set. Perform this step after your VSAM spheres have been updated by CICS applications, batch applications, or both, and after you have run the log of logs scan utility. Send these log stream copies to the remote site in preparation for remote site recovery.

   Log stream copies must be made regularly. CICS VR at the remote site can only forward recover a VSAM sphere up to the latest log record on the latest log stream copy. If updates were performed against a VSAM sphere, but these log records are never copied from the MVS log stream and sent to the remote site, CICS VR at the remote site can not perform a forward recovery that applies the latest updates. See "Using the log stream copy utility to copy your MVS log streams" on page 215 for more information about the log stream copy utility.

4. EXPORT the RCDS:

   The CICS VR RCDS contains all information required to create a forward recovery job for a VSAM sphere. Information such as when a VSAM sphere was updated and which log stream and log stream copy the log records are located on is stored in the RCDS. Invoking the CICS VR RCDS utility with the EXPORT keyword specified extracts the recovery information from the primary site's RCDS and store it into a sequential data set.

   Optionally, you can also add the CA and BACKUP keywords to the RCDS EXPORT command to extract information related to change accumulation and backups respectively from the RCDS into the sequential data set.

   Note: If you export information related to change accumulation and backups from the RCDS, you must also send the actual change accumulation data sets and backups to the remote recovery site. Catalog the change accumulation data sets and backups prior to invoking any CICS VR utility at the remote recovery site.

   CICS VR at the remote site then can import the contents of this sequential data set into the remote site's RCDS. Then, use the CICS VR panel interface to create and submit a recovery job for the VSAM spheres.

   It is important that you export the RCDS only after the log of logs have been scanned and a log stream copy has been created. Both of these activities update information in the RCDS. Be sure that the RCDS you export has the latest recovery information. If you were to first export the RCDS, then create a log stream copy, CICS VR at the remote site would not be aware of the log stream copy. Therefore, CICS VR could not create a job that uses the latest log stream copy to perform a forward recovery. See "Using the RCDS utility to export your RCDS" on page 220 for more information.

If you use a copy product such as IDCAMS REPRO to create a copy of the RCDS for use at the remote site, be aware that the remote site's copied RCDS assumes that the remote site's environment and resources are exactly the same as they were at the primary site.

Note: It is not mandatory that you send the contents from the primary site's RCDS to the remote site, with the RCDS utility or a copy product. If you do not send the contents of the primary site's RCDS, you need to record all necessary recovery information; for example, log stream copy names or log activity times, manually at the primary site. Then, create and submit the recovery job manually at the remote site, without using the CICS VR panel interface, to recover the VSAM spheres.

5. Send the information to the remote site:

   Now that you have copied all information required by CICS VR at the remote site, you need to send it to the remote site. How you transmit the VSAM sphere backups, log stream copies, and exported RCDS is up to you and must fit into your remote site disaster recovery plan. For example, you might want to place everything on a tape and then physically send this tape to the remote site. Another approach might include the use of a product such as Extended Remote Copy (XRC) to send data to a remote site electronically.

Frequency of steps 1 - 5: Steps 1 through 5 must be repeated on a regular basis. In the event that you have to use the remote site to recover VSAM spheres, CICS VR only recovers the VSAM spheres with the recovery information that was sent to the remote site. Therefore, the recovered VSAM spheres are as current only as the latest remote site recovery information.

Using CICS VR at the remote site

A failure at the primary site might require you to use the remote site to recover any lost data. If you followed the steps 1 through 5, you must perform the next steps at the remote site to recover the VSAM spheres.

1. **Be sure CICS VR is installed at the remote site**

   Ensure that CICS VR is installed at the remote site and an RCDS is allocated. The initial RCDS used at the remote site can be empty because you import the recovery data into it in the next step.

2. **IMPORT the RCDS**

   Use the CICS VR RCDS utility with the IMPORT keyword specified to place the contents from the sequential data set, produced from the RCDS EXPORT job, into the RCDS used at the remote site. While you might have received multiple generations of a sequential data set produced by the RCDS EXPORT job, you only need to import the latest version. Once completed, CICS VR contains the information necessary to build a recovery job for the VSAM spheres. See “Using the RCDS utility to import your RCDS” on page 221 for more information.

3. **Catalog the log stream copies**

   After you receive the log stream copies at the remote site, you need to catalog them. CICS VR contains the names of the log stream copies but can only use them if they are cataloged.

4. **Restore the VSAM spheres**

   The process of restoring VSAM spheres from backups at the remote site is dependent on the type of product that was used to create the backups. See the appropriate backup utility for an explanation of how to restore the backups:

   DFSMShsm logical backup
   If your VSAM spheres can be restored from DFSMShsm logical backups, you do not need to restore the spheres manually. The CICS VR panel interface can create a job that first restores the VSAM spheres, then performs a forward recovery. You need to run the DFSMShsm utilities to update your remote site's DFSMShsm control data sets. These steps are described in “DFSMShsm logical backup on tape – at the primary site” on page 211.

   DFSMShsm full volume dump
   If your VSAM spheres can be restored from a DFSMShsm full volume dump, you do not need to restore the spheres manually. The CICS VR panel interface can create a job that first restores

the VSAM spheres, then performs a forward recovery. You need to run the DFSMShsm utilities to update your remote site's DFSMShsm control data sets. These steps are described in section "DFSMShsm full volume dump on tape – at the primary site" on page 212.

ABARS (aggregate backup and recovery support)
If the backups for the VSAM spheres at the remote site were created by ABARS, you do not need to restore them manually if all the following are true:

- CICS VR was notified when the ABARS backups were created. This means that the CICS VR address space was active and the DFSMSdss logical dump registration control default was activated when the ABARS backup job was submitted.
- The ABARS backups were sent to the remote recovery site and cataloged.
- The RCDS EXPORT utility exported ABARS backup information. This means that the BACKUP keyword was specified on the RCDS EXPORT command.

If all the conditions are true, you can use the CICS VR panel interface to create a job that first restores the VSAM spheres, then performs a forward recovery. If any one of the conditions is not true, you must restore the VSAM spheres manually. Use the ABARS utility to restore the VSAM spheres and be sure to record the date and time of the backup that you are restoring. This means that you must record the date and time the backup was created.

DFSMSdss
If DFSMSdss logical copies or dumps exist for your VSAM spheres, you do not need to restore them manually if:

- CICS VR was notified when the DFSMSdss logical copies or dumps were created, the CICSVRBACKUP keyword was added to the job and the CICS VR address space was active when the copy or dump job was submitted.
- The DFSMSdss backups were sent to the remote recovery site and cataloged.
- The RCDS EXPORT utility exported DFSMSdss backup information, the BACKUP keyword was specified on the RCDS EXPORT command.

The CICS VR panel interface can create a job that first restores the VSAM spheres, then performs a forward recovery.

Otherwise, you must restore the VSAM spheres manually. Use the DFSMSdss utility to restore the VSAM spheres and be sure to record the date and time of the backup that you are restoring, date and time the backup was created.

Backups registered through the file copy notification service
You can use the CICS VR panel interface to select backups for restore that were previously registered to CICS VR through the file copy notification service, if you have performed the following tasks:

- Sent the backups to the remote recovery site and cataloged them.
- Sent the associated restore skeletons to the remote recovery site, and defined them to CICS VR at the remote recovery site. Restore skeletons can either be added as a member to the SDWWSENU data set, using the characteristics of this PDS, or as a member of another PDS allocated to the DWWSLIB ddname.
- Exported backup information from the RCDS, BACKUP keyword added to the RCDS EXPORT command.

If these conditions are true, CICS VR adds the restore skeleton associated with the selected backup as a step in the produced recovery job.

Other backup utilities
If the backups for the VSAM spheres at the remote site were created by any other utility not previously mentioned, restore the VSAM spheres manually. Use the proper utility to restore the VSAM spheres and be sure to record the date and time of the backup that you are restoring, date and time the backup was created.

5. **Start the CICS VR panel interface**

Next, start the CICS VR panel interface to create and submit a recovery job for your VSAM spheres. The utility used to create the VSAM sphere backups dictate how you use the CICS VR panel interface. See the appropriate backup utility for an explanation of how to use the CICS VR panel interface.

DFSMShsm logical backup
If you have DFSMShsm logical backups for your VSAM spheres, CICS VR creates a recovery job that restores each VSAM sphere from its latest DFSMShsm backup and then forward recovers the sphere. Call the CICS VR panel interface, accept the default recovery parameters that CICS VR displays, and specify **QSAM copy** as the log stream type to restore each VSAM sphere from its latest backup and perform a forward recovery on the restored VSAM spheres.

DFSMShsm full volume dump
If the backups for the VSAM spheres you want to recover reside on a DFSMShsm full volume dump, CICS VR creates a recovery job that restores each VSAM sphere from its latest backup and then performs a forward recovery on the restored spheres. Call the CICS VR panel interface, select “Full volume dump” as the backup type, enter the date that the full volume dump was created as both the backup time and the forward recovery start time, and specify **QSAM copy** as the log stream type.

ABARS (aggregate backup and recovery support)
Use the CICS VR panel interface to create a job that automatically restores the VSAM spheres from ABARS backups, then performs a forward recovery on the restored VSAM spheres.

DFSMSdss
If DFSMSdss logical copies or dumps exist for your VSAM spheres, CICS VR creates a recovery job that restores each VSAM sphere from its latest backup and then performs a forward recovery on the restored spheres if:

- CICS VR was notified when the DFSMSdss logical copies or dumps were created, the CICSVRBACKUP keyword was added to the job and the CICS VR address space was active when the copy or dump job was submitted.
- The DFSMSdss backups were sent to the remote recovery site and cataloged.
- The RCDS EXPORT utility exported DFSMSdss backup information, the BACKUP keyword was specified on the RCDS EXPORT command.

If all of these points are true, call the CICS VR panel interface and select the appropriate DFSMSdss logical backup from the VSAM sphere parameters secondary window. Then, specify QSAM copy as the log stream type. CICS VR builds a job to restore the VSAM sphere from the selected backup, then forward recover the restored VSAM sphere.

Note: If you do not send all backups registered to CICS VR to the remote site, you might want to deregister backups that have not been received and cataloged at the remote site from the RCDS. This prevents information about backups that do not reside at the remote site from being displayed through the CICS VR panel interface. See the *CICS VR User's Guide* for more information about invoking automatic backup deregistration from the CICS VR VSAM sphere list **Administrate** menu.

If you did not export backup information from the RCDSs, then the backups must have been restored manually prior to running forward recovery. Call the CICS VR panel interface and enter the date and time each backup was taken as the forward recovery start time. Also, since the backups have already been restored, select **None** as the backup type. Specify **QSAM copy** as the log stream type. CICS VR then creates a job that forward recovers the VSAM spheres.

Backups registered through the file copy notification service
If the tasks listed in step four, **Restore the VSAM spheres**, were followed, call the CICS VR panel interface and select the appropriate backup from the VSAM sphere parameters secondary window. Then specify **QSAM copy** as the log stream type. CICS VR builds a job to restore the VSAM sphere from the selected backup using the associated restore skeleton, then forward recover the restored VSAM sphere.

Note: If you do not send all backups registered to CICS VR to the remote site, you might want to deregister backups that have not been received and cataloged at the remote site from the RCDS. This prevents information about backups that do not reside at the remote site from being displayed

through the CICS VR panel interface. See the *CICS VR User's Guide* for more information about setting automatic backup deregistration from the CICS VR VSAM sphere list **Administrate** menu.

Other backup utilities
If you restored the VSAM spheres from a backup created by any other utility not previously mentioned, then you must call the CICS VR panel interface and enter the date and time the backup was taken as the forward recovery start time. Also, since the backups have already been restored, select **None** as the backup type. Be sure to specify **QSAM copy** as the log stream type, then CICS VR creates a job that forward recovers the VSAM spheres.

These steps are recommendations that must be added to your remote site disaster recovery plan. Implement the steps to fit into your current remote site disaster recovery plan.

Sample recovery scenarios

The following sample scenarios are based on the type of backup utility used.

To help summarize the steps required by CICS VR, here a few sample scenarios.

DFSMShsm logical backup on tape – at the primary site

1. Define and load VSAM spheres.
2. Create DFSMShsm logical backups and specify TAPE as the TARGET.
3. Update the VSAM spheres with CICS applications, batch applications, or both.
4. Perform LOGOFLOGS SCAN.
5. Create log stream copies of the MVS log streams that contain the log records.
6. Perform RCDS EXPORT.
7. Create backups of the DFSMShsm control data sets and journal periodically. To manually create CDS backups, first issue the DFSMShsm QUERY CDSVERSIONBACKUP command. This displays the names of the sequential data sets used to backup the DFSMShsm CDS and journal. Record these names. To backup the DFSMShsm CDS and journal to DASD, you must pre-allocate the listed data sets. To backup the DFSMShsm CDS and journal to TAPE, these data sets are dynamically created. Next, issue the DFSMShsm BACKVOL CDS command to backup the DFSMShsm CDS.
8. If you create copies of the DFSMShsm journal more often than you backup the DFSMShsm CDS, use the copied journal to update the CDS with the latest activity on the journal at the remote site.

   To backup the DFSMShsm journal, first stop DFSMShsm. Then, run the ARCBJRNL utility.
9. **Send the following to the remote site:**
   - DFSMShsm logical backups of the VSAM spheres.
   - Log stream copies.
   - Sequential data set that contains the exported RCDS.
   - DFSMShsm CDS sequential data set backups.
   - DFSMShsm journal backup.

At the remote site:

1. Stop DFSMShsm if it is active.
2. Mount the tapes with the DFSMShsm backups, log stream copies, and exported RCDS.
3. Perform RCDS IMPORT.
4. Catalog the log stream copies.
5. Sort the DFSMShsm journal backup by KEY using the EQUALS parameter.
6. If DFSMSdss was the data mover used to backup the DFSMShsm CDS:
   a. Restore the DFSMShsm CDS from their backups.
   b. Export the restored data sets using the IDCAMS program.

7. Use the ARCIMPRT utility to create the CDS at the remote site using the exported CDS and sorted journal as input.
8. Start DFSMShsm.
9. Call the CICS VR panel interface. Accept the default recovery values and specify **QSAM copy** as the log stream type to create and submit a recovery job that restores the VSAM spheres from their latest backup, then perform a forward recovery. CICS VR can now query DFSMShsm for the latest backups that exist for each VSAM sphere.

See *z/OS DFSMShsm Storage Administration Guide* for more information about DFSMShsm and the enhanced CDS recovery function.

DFSMShsm full volume dump on tape – at the primary site

1. Define and load VSAM spheres. Be sure that the VSAM sphere definitions include a storage class that contains volumes available for full volume dumps to tape and individual data set restores from the dump.
2. Create a DFSMShsm full volume dump on tape for the volume that the VSAM spheres reside on. A full volume dump of an SMS-managed volume can either be started manually with the BACKVOL command or automatically by setting the appropriate DFSMShsm parameters. Be sure to record the date and time that the full volume dump was taken. You can obatin this information by issuing the following DFSMShsm command:

   ```
   HLIST VOLUME(volume_serial) BCDS SYSOUT(H)
   ```
3. Update the VSAM spheres with CICS applications, batch applications, or both.
4. Perform LOGOFLOGS SCAN.
5. Create log stream copies of the MVS log streams that contain the log records.
6. Perform RCDS EXPORT.
7. Create backups of the DFSMShsm control data sets and journal periodically. To manually create CDS backups, first issue the DFSMShsm QUERY CDSVERSIONBACKUP command. This displays the names of the sequential data sets used to backup the DFSMShsm CDS and journal. Record these names. To backup the DFSMShsm CDS and journal to DASD, you must pre-allocate the listed data sets. To backup the DFSMShsm CDS and journal to TAPE, these data sets are dynamically created.

   Next, issue the DFSMShsm BACKVOL CDS command to backup the DFSMShsm CDS.
8. If you create copies of the DFSMShsm journal more often than you backup the DFSMShsm CDS, use the copied journal to update the CDS with the latest activity on the journal at the remote site.

   To backup the DFSMShsm journal, first stop DFSMShsm. Then, run the ARCBJRNL utility.
9. **Send the following to the remote site:**
   - Tape that contains the DFSMShsm full volume dump
   - Log stream copies
   - Sequential data set that contains the exported RCDS
   - DFSMShsm CDS sequential data set backups
   - DFSMShsm journal backup

At the remote site:

1. Stop DFSMShsm if it is active.
2. Mount the tapes with the DFSMShsm full volume dump, log stream copies, and exported RCDS.
3. Perform RCDS IMPORT.
4. Catalog the log stream copies.
5. Sort the DFSMShsm journal backup by KEY using the EQUALS parameter.
6. If DFSMSdss was the data mover used to backup the DFSMShsm CDS:

a. Restore the DFSMShsm CDS from their backups.

b. Export the restored data sets using the IDCAMS program.

7. Use the ARCIMPRT utility to create the CDS at the remote site using the exported CDS and sorted journal as input.
8. Start DFSMShsm.
9. Call the CICS VR panel interface to create and submit a recovery job that restores and forward recover the VSAM spheres. Select “Full volume dump” as the backup type, enter the date the full volume dump was created as the backup time and forward recovery start time, and specify **QSAM copy** as the log stream type.

See *z/OS DFSMShsm Storage Administration Guide* for more information about DFSMShsm and the enhanced CDS recovery function.

ABARS (aggregate backup and recovery support) on tape – at the primary site

1. Define and load VSAM spheres.
2. Create an ABARS backup of the VSAM spheres onto tape. Be sure to record the name, date, and time of the backups.
3. Update the VSAM spheres with CICS applications, batch applications, or both.
4. Perform LOGOFLOGS SCAN.
5. Create log stream copies of the MVS log streams that contain the log records.
6. Perform RCDS EXPORT.
7. Send the following to the remote site:
   - ABARS backup of the VSAM spheres
   - Log stream copies
   - Sequential data set that contains the exported RCDS

At the remote site:

1. Mount the tapes with the log stream copies, ABARS backup, and exported RCDS.
2. Perform RCDS IMPORT.
3. Catalog the log stream copies.
4. Restore the VSAM spheres from the ABARS backup.
5. Use the CICS VR panel interface to create a job that automatically restores the VSAM spheres from ABARS backup, then performs a forward recovery on the restored VSAM spheres.

See *z/OS DFSMShsm Storage Administration Guide* for more information about ABARS.

DFSMSdss logical dump - at the primary site

1. Define and load VSAM spheres.
2. Create a DFSMSdss logical dump of the VSAM spheres. Be sure the dump job includes the CICSVRBACKUP keyword and the CICS VR address space is active when the job is submitted.
3. Update the VSAM spheres with CICS applications, batch applications, or both.
4. Perform LOGOFLOGS SCAN. Create log stream copies of the MVS log streams that contain the log records.
5. Perform RCDS EXPORT and specify the BACKUP keyword on the RCDS EXPORT command.
6. Send the following to the remote site:
   - DFSMSdss logical dump
   - Log stream copies
   - Sequential data set that contains the exported RCDS

At the remote site:

1. Catalog the DFSMSdss logical dump, log stream copies, and sequential data set that contains the exported RCDS.
2. Perform RCDS IMPORT.
3. Call the CICS VR panel interface and select the appropriate DFSMSdss logical dump from the VSAM sphere parameters secondary window. Specify QSAM copy as log stream type. Submit the recovery job that CICS VR creates. The job restores the VSAM spheres from the selected logical backup and forward recover the restored VSAM spheres.

Other backup utilities – at the primary site

1. Define and load VSAM spheres.
2. Create backups of the VSAM spheres onto tape using any backup utility. Be sure to record the name, date, and time of the backups.
3. Update the VSAM spheres with CICS applications, batch applications, or both.
4. Perform LOGOFLOGS SCAN.
5. Create log stream copies of the MVS log streams that contain the log records.
6. Perform RCDS EXPORT.
7. Send the following to the remote site:
   - Backups of the VSAM spheres
   - Log stream copies
   - Sequential data set that contains the exported RCDS

At the remote site:

1. Mount the tapes with the log stream copies, backups, and exported RCDS.
2. Perform RCDS IMPORT.
3. Catalog the log stream copies.
4. Restore the VSAM spheres from their backups.
5. Call the CICS VR panel interface to create and submit a forward recovery job for the VSAM spheres. Specify the date and time the backup was taken as the forward recovery start time, select **None** as the backup type, and specify **QSAM copy** as the log stream type.

DFSMSdss logical copies and change accumulation data sets, no log stream copies - at the primary site:

The following scenario uses change accumulation data sets instead of log stream copies to perform forward recovery at the remote recovery site.

1. Define and load VSAM spheres.
2. Create DFSMSdss logical copies of the VSAM spheres. Be sure the copy jobs include the CICSVRBACKUP and RENAMEU(**,CICSVR.**) keywords and the CICS VR address space is active when the jobs are submitted.
3. Update the VSAM spheres with CICS applications, batch applications, or both.
4. Perform LOGOFLOGS SCAN.
5. Run change accumulation jobs that consolidates log records for all of the VSAM spheres you want to recover at the remote site.
6. Perform RCDS EXPORT and specify the CA and BACKUP keywords on the RCDS EXPORT command.
7. Send the following information to the remote site:
   - DFSMSdss logical copies

- Change accumulation data sets
- Sequential data set that contains the exported RCDS

At the remote site:

1. Catalog the DFSMSdss logical copies, change accumulation data sets, and sequential data set that contains the exported RCDS.
2. Perform RCDS IMPORT.
3. Call the CICS VR panel interface and select the appropriate DFSMSdss logical copy from the VSAM sphere parameters secondary window. Specify **MVS logger log stream** as log stream type, the log streams do not have to exist at the remote site if the change accumulation data sets cover the entire recovery interval. Submit the recovery job that CICS VR creates. The job restores the VSAM spheres from their latest backup and perform forward recovery.

Using mirroring technology

The disaster recovery steps assume that you only use the remote site portion of the plan when a failure occurs at the primary site.

While this might be acceptable for many installations, the amount of time required to fully restore and recover the VSAM spheres at the remote site might not be acceptable for all installations.

For this reason, some installations might be constantly updating their remote site to reflect the activity at the primary site. This can be performed in a variety of ways using some version of mirroring technology. If you have this technology implemented at your installation, the amount of time required to recover VSAM spheres at the remote site compared with the disaster recovery method previously presented is significantly less. However, even though the disaster recovery plan is vastly different, the items CICS VR requires for recovery remain the same. Below is a list of the minimum items required by CICS VR to use the CICS VR panel interface for recovery at the remote recovery site. Be sure your plan includes the following items:

- **RCDS**

  The CICS VR RCDS at the remote recovery site needs to be updated so that it contains the latest VSAM sphere recovery information.
- **MVS log streams or log sream copies**

  Either identical MVS log streams with the appropriate log records or SAM copies of the log streams need to be at the remote site.
- **VSAM sphere backups**

  The first step of a complete recovery always begins with restoring the VSAM spheres from a backup. Recent backups of the VSAM spheres must be at the remote site and the RCDS at the remote site must have correct information about the backups.

Using the log stream copy utility to copy your MVS log streams

When VSAM spheres are updated by CICS applications and batch applications, log records are written to MVS log streams to record this activity.

If a failure occurs, CICS VR uses these log records to forward recover the VSAM spheres. You must create a copy of these log records so that CICS VR can also perform forward recovery at the remote recovery site.

The CICS VR log stream copy utility copies log records from your MVS log streams to a sequential access method (SAM) data set. You cannot use IDCAMS or CICS VR archive to copy an MVS log stream. You can create up to nine sequential data set copies from an MVS log stream in one LOGSTREAMCOPY job, but CICS VR only records the data set name allocated to the DWWCOPY1 ddname in the RCDS. Therefore, be sure to send the data set allocated to the DWWCOPY1 ddname to the remote recovery site. Then, use the CICS VR panel interface to create and submit a recovery job for the VSAM spheres at the remote recovery site.

Use a production planning system, such as Tivoli Workload Scheduler for z/OS, to submit log stream copy jobs and send the SAM log stream copy data sets to your remote recovery site at regularly scheduled times.

This sample JCL that is used to run the CICS VR log stream copy utility, shows a sample LOGSTREAMCOPY job that makes one copy of the specified MVS log stream.

```
//JOB1     JOB  ACCOUNTING INFORMATION,REGION=0M
//COMMAND  EXEC PGM=DWWLC                              (1)
//STEPLIB  DD   DSN=DWW.SDWWLOAD,DISP=SHR              (2)
// DD DSN=DWW.SDWWLENU,DISP=SHR
//DWWCOPY1 DD   DSN=USER1.DWWCOPYL,                    (3)
//              UNIT=3590,VOL=SER=TAPE04,
//              LABEL=(1,SL),DISP=(NEW,KEEP)
//DWWCON1  DD   DSN=DWW.DWWCON1,DISP=SHR               (4)
//DWWCON2  DD   DSN=DWW.DWWCON2,DISP=SHR
//DWWCON3  DD   DSN=DWW.DWWCON3,DISP=SHR
//DWWMSG   DD   SYSOUT=*                               (5)
//DWWPRINT DD   SYSOUT=*                               (6)
//DWWIN    DD   *                                      (7)
           LOGSTREAMCOPY    -                          (8)
             NAME(CICSVR.MVSLOG)   -
             SELECT(CICSVR)        -
             COPIES(1)      -
             MOD
/*
//
```

Figure 94. Sample JCL to run the CICS VR log stream copy utility

Here is a description of the numbered statements:

1. The program to be run is DWWLC. The prefix DWW always refers to a component of CICS VR.
2. This statement supplies the name of the CICS VR load library.
3. This is the DWWCOPY1 DD statement. It specifies the SAM data set USER1.DWWCOPYL, in which the log stream copy is stored. USER1.DWWCOPYL is allocated on a standard label 3590 volume TAPE04 and kept.
4. DWWCON1–DWWCON3 defines the three recovery control data sets. If you are running the CICS VR server, you must use the **hlq.slq** that was defined in the IGDSMS*xx* PARMLIB member for these data sets.
5. DWWMSG defines the output data set that contains the CICS VR messages. This is usually defined as a SYSOUT data set.

   The DCB parameters for this data set are RECFM=FBA and LRECL=133. The block size can be provided on the DWWMSG DD statement and must be a multiple of 133. The default is 27930.
6. DWWPRINT defines the output data set that contains the reports produced by CICS VR. This is usually defined as a SYSOUT data set.

   The DCB parameters for this data set are RECFM=FBA and LRECL=133. The block size can be provided on the DWWPRINT DD statement and must be a multiple of 133. The default is 27930.
7. DWWIN defines the data set that contains the CICS VR commands. You can either specify a sequential data set with 80-byte fixed-length records, or include the CICS VR commands in-stream.
8. The log stream copy utility processes an MVS log stream called CICSVR.MVSLOG. The log records produced by CICS and by CICS VR (for VSAM batch logging) are copied from CICSVR.MVSLOG. One copy of the log is requested; the log records are copied and added to the end of the DWWCOPY1 data set.

Once set up, this job can be run over and over again to update the copy of the log stream.

This log stream copy report shows the log stream copy report, followed by descriptions of the fields in the report.

```
CICSVR -  MVS LOG STREAM COPY UTILITY        DATE : 01/06/08     TIME : 12:51:13     PAGE : 1

STATISTICS FROM THE MVS LOG STREAM COPY UTILITY
===============================================

MVS LOG STREAM NAME    : CICSVR1.MVSLOG
FIRST TIME GMT         : 01.159 12:39:09
LAST TIME GMT          : 01.159 12:39:44
FIRST TIME LOCAL       : 01.159 13:39:09
LAST TIME LOCAL        : 01.159 13:39:44
FIRST BLOCK ID         :              5965196
LAST BLOCK ID          :             11890088
NUMBER OF BLOCKS READ  :                  148
NUMBER OF CICSVR BLOCKS:                  148
NUMBER OF BLOCKS COPIED:                  148
TYPE OF COPY           : ALL
OUTPUT LOG NAME(S)     : CICSVR1.MVSLOG.COPY
PERFORMED ACTIONS      : COPY
```

Figure 95. Log stream copy report

MVS log stream name
The name of the MVS log stream.

First time GMT
The first time recorded on the MVS log stream in GMT format.

Last time GMT
The last time recorded on the MVS log stream in GMT format.

First time LOCAL
The first time recorded on the MVS log stream in local time format.

Last time LOCAL
The last time recorded on the MVS log stream in local time format.

First block ID
The first block ID on the MVS log stream.

Last block ID
The last block ID on the MVS log stream.

Number of blocks read
The number of blocks read from the MVS log stream.

Number of CICS blocks read
The number of CICS and CICS VR-specific blocks read from the MVS log stream.

Number of blocks copied
The number of blocks copied to the SAM copy of the MVS log stream.

Type of copy
The type of copy requested (CICS AND CICSVR or ALL).

CICS AND CICSVR specifies records produced by CICS and CICS VR batch logging were copied from the MVS log stream. ALL specifies all records were copied from the MVS log stream.

Output log name(s)
The name of the SAM copy data set.

Performed actions
The action that the log stream copy utility has performed on the log stream:

COPY
The log stream blocks were successfully copied.

COPY and DELETE
The log stream blocks were successfully copied and the log stream tail was deleted.

DELETE
The “start of copy” cursor was repositioned to the browse cursor and the log stream tail up to the browse cursor was deleted.

NO ACTIONS
No actions were performed on the log stream, or the only action was that the “start of copy” cursor was repositioned to the browse cursor.

On rare occasions, you might want to make a copy of a portion of a log stream. Use the STARTTIME and STOPTIME keywords, the STARTBLKID and STOPBLKID keywords, or the STARTTOD and STOPTOD keywords.

With the STARTTIME and STOPTIME keywords, CICS VR copies records from the time specified on the STARTTIME keyword up to the time specified on the STOPTIME keyword, as shown in the following example.

```
LOGSTREAMCOPY NAME(CICSVR1.MVSLOG)  -
     SELECT(ALL)                    -
     COPIES(3)                      -
     STARTTIME(96159/07:30:00,GMT)  -
     STOPTIME(96249/07:30:00,GMT)   -
     MOD
```

Figure 96. Sample LOGSTREAMCOPY command with STARTTIME and STOPTIME

The LOGSTREAMCOPY command in the previous example specifies that CICS VR makes three copies of the MVS log stream. These copies are made to the data sets that are specified on the ddnames DWWCOPY1, DWWCOPY2, and DWWCOPY3. Records are copied to the end of the data sets that are specified in the DWWCOPY*n* ddnames. All records are copied from the MVS log stream between the start and the stop time specified in the command.

To specify the start and the stop time in a more granular format, you can use the STARTTOD and STOPTOD keywords in place of STARTTIME and STOPTIME.

Use this method only when you need a one-time-copy for test data. Do not use it for copying consecutive portions of the log, because the time values are not precise enough to prevent gaps in the log.

With the STARTBLKID and STOPBLKID keywords, CICS VR copies records from the STARTBLKID to the STOPBLKID. Use the CICS DWWJUP program to find out the MVS block identifier you can use as the STARTBLKID and the STOPBLKID. This method is not easy to use and is not recommended. If you require more information on DWWJUP, see the “PRINT: print information about records logged on an MVS log” on page 284.

You can use the DELETE keyword to avoid log stream overloading by deleting the log stream blocks after they have been successfully copied. The LOGSTREAMCOPY command specifies that CICS VR makes one copy of the specified MVS log stream and deletes copied blocks.

Log stream block deletion is performed only if CICS VR permits it; see “LOGSTREAMCOPY: Copy an MVS log stream ” on page 265.

```
LOGSTREAMCOPY NAME(CICSVR1.MVSLOG)  -
     SELECT(ALL)                    -
     COPIES(1)                      -
     STOPTIME(96249/07:30:00,GMT)   -
     DELETE                         -
     MOD
```

Figure 97. Sample LOGSTREAMCOPY command with DELETE

The SETBRCUR, REPBRCUR and MOVBRCUR keywords provide another method for automatic continuous log stream copying, as you do not need to include date and time information in your log stream copy job. Using these keywords ensures that the beginning and end of your copy are precisely defined, and the copy is repeatable.

Note that log streams to be processed in this way must be defined as AUTODELETE(NO) RETPD(0), to avoid unexpected loss of data.

You must not run more than one job per log stream using a SETBRCUR, REPBRCUR or MOVBRCUR keyword with the same RCDS at any one time in your SYSPLEX. If you run more than one such job simultaneously, they update the same cursor in the CICS VR RCDS, and then your copy would not be repeatable. You can run jobs that use only non-cursor related keywords of the LOGSTREAMCOPY command with the same RCDS at the same time as a job using one of the cursor-related keywords (SETBRCUR, REPBRCUR or MOVBRCUR), as the other log stream copying keywords do not affect the position of the cursors.

The following sequence is recommended for using the SETBRCUR, REPBRCUR and MOVBRCUR keywords for log stream copying:

1. Run a job using the SETBRCUR keyword, to copy a set of log records, record this copy in the RCDS, and then set the browse cursor at the last record copied. The following LOGSTREAMCOPY command does this:

```
          LOGSTREAMCOPY NAME(CICSVR1.MVSLOG)  -
               SELECT(ALL)                    -
               SETBRCUR
```

Figure 98. Sample LOGSTREAMCOPY command with SETBRCUR

2. If the job fails, you can repeat the job with the SETBRCUR keyword.
3. If you want to copy the same set of records again, for example, if you need more copies in addition to 9 copies provided by the log stream copy utility, run a job using the REPBRCUR keyword. This keyword does not change the position of any cursors. The following LOGSTREAMCOPY command does this:

```
          LOGSTREAMCOPY NAME(CICSVR1.MVSLOG)  -
               SELECT(ALL)                    -
               REPBRCUR
```

Figure 99. Sample LOGSTREAMCOPY command with REPBRCUR

4. If the job fails or you want to copy the same set of log records again, you can repeat the job using the REPBRCUR keyword.
5. To repeat the whole copying process so far for any reason, you can now start again at Step 1 with the SETBRCUR keyword. If you restart the process, any new data that has been placed on the log stream can be picked up.
6. If the copying process has been successful, you can run a job using the MOVBRCUR keyword to set the "start of copy" cursor at the end of the records you have just copied. The following LOGSTREAMCOPY command does this:

```
          LOGSTREAMCOPY NAME(CICSVR1.MVSLOG)  -
               SELECT(ALL)                    -
               MOVBRCUR
```

Figure 100. Sample LOGSTREAMCOPY command with MOVBRCUR

   If you are certain that you no longer need the records that you have copied, run a job using both the MOVBRCUR and DELETE keywords, to delete the records that you have copied. Make sure that CICS VR permits the log stream deletion.
7. If the job fails, you can repeat the job using the MOVBRCUR keyword (with or without the DELETE keyword).

You have now copied a set of records, and if wanted, deleted them from the log stream. You can repeat the whole process to copy a new set of log stream records.

Using the RCDS utility to export your RCDS

The CICS VR RCDS contains recovery information required by the CICS VR panel interface to construct a recovery job.

Invoking the RCDS utility with the EXPORT keyword specified extracts recovery information from the RCDS related to VSAM spheres, update activity, and MVS log streams and log stream copies. This information is essential to create a forward recovery job for VSAM spheres at a remote recovery site using the CICS VR panel interface. Optionally, you can specify keywords CA and BACKUP on the RCDS EXPORT command to extract information related to change accumulation and backups respectively from the RCDS.

Note: Note: If you export information related to change accumulation and backups from the RCDS, you must also send the actual change accumulation data sets and backups to the remote recovery site. Catalog the change accumulation data sets and backups prior to invoking any CICS VR utility at the remote recovery site.

The information extracted by CICS VR, when the RCDS command with the EXPORT keyword is run, is copied into the SAM data set that is specified on the DWWCOPY1 DD statement. This sample RCDS EXPORT job creates a SAM data set with recovery information that can be sent to your remote site.

```
//RCDSEX1 JOB ACCOUNTING INFORMATION,REGION=0M                  01
//EXPORT   EXEC PGM=DWWGJCDS                                   02
//STEPLIB  DD   DSN=DWW.SDWWLOAD,DISP=SHR                       03
// DD DSN=DWW.SDWWLENU,DISP=SHR
//DWWCOPY1 DD   DSN=USER1.DWWCOPYR,                             04
//              UNIT=3590,VOL=SER=TAPE04,                       05
//              LABEL=(1,SL),DISP=(NEW,KEEP)                    06
//DWWCON1  DD   DSN=DWW.DWWCON1,DISP=SHR                        07
//DWWCON2  DD   DSN=DWW.DWWCON2,DISP=SHR                        08
//DWWCON3  DD   DSN=DWW.DWWCON3,DISP=SHR                        09
//DWWMSG   DD   SYSOUT=*                                        10
//DWWPRINT DD   SYSOUT=*                                        11
//DWWIN    DD   *                                               12
           RCDS EXPORT                                          13
/*
//
```

Figure 101. Sample RCDS EXPORT job to copy the RCDS for the remote recovery site

Here is a description of each of the numbered statements:

Line
Explanation

01
JOB statement defines a CICS VR job

02
EXEC statement defines a CICS VR job step. Specifies that program DWWGJCDS is to be run. The prefix DWW always refers to a component of CICS VR.

03
STEPLIB DD statement. Specifies the name of the CICS VR load library, for example, DWW.SDWWLOAD, used for this job step.

04–06
DWWCOPY1 DD statement. Specifies the SAM data set, USER1.DWWCOPYR, in which the EXPORTed RCDS information is stored. USER1.DWWCOPYR is allocated on a standard label 3590 volume TAPE04 and kept.

07–09
DWWCON1–DWWCON3 defines the three recovery control data sets. If you are running the CICS VR server, you must use the **hlq.slq** that was defined in the IGDSMSxx PARMLIB member for these data sets. Pertinent information from these data sets is copied into the data set that is specified on the DWWCOPY1 DD statement.

Note: CICS VR uses three identical RCDS data sets to provide fault tolerance and improved reliability.

10
DWWMSG defines the output data set that contains the CICS VR messages. This is usually defined as a SYSOUT data set.

The DCB parameters for this data set are RECFM=FBA and LRECL=133. The block size can be provided on the DWWMSG DD statement and must be a multiple of 133. The default is 27930.

11
DWWPRINT defines the output data set that contains the reports produced by CICS VR. This is usually defined as a SYSOUT data set.

The DCB parameters for this data set are RECFM=FBA and LRECL=133. The block size can be provided on the DWWPRINT DD statement and must be a multiple of 133. The default is 27930.

12
DWWIN DD statement. Specifies the data set that contains the CICS VR commands. You can either specify a sequential data set with 80-byte, fixed-length records, or include the CICS VR commands in-stream, as shown.

13
RCDS EXPORT command. Specifies that all the necessary RCDS information is copied to the USER1.DWWCOPYR data set.

Using the RCDS utility to import your RCDS

The primary site sends the remote site SAM data sets that contain extracted recovery information from the primary site's RCDS regularly.

These SAM data sets must have been created by the RCDS utility. They contain recovery information required by the CICS VR panel interface to create a recovery job for the VSAM spheres at the remote site. Start the RCDS utility with the IMPORT keyword specified to put the contents of the latest SAM data set into the remote site's RCDS.

Note: When using the remote recovery site to recover VSAM spheres, start with an empty RCDS at the remote site and only import the latest RCDS SAM data set.

Use the RCDS command with the IMPORT keyword specified to tell CICS VR to copy recovery information from the SAM data set that is specified on the DWWCOPY1 DD statement into the RCDS specified in the DWWCON1, DWWCON2, and DWWCON3 DD statements. Recovery information from the SAM data set is merged into the remote site's RCDS.

Below is a sample RCDS IMPORT job that updates the remote site's RCDS with the recovery information from the SAM data set. The SAM data set specified must be a data set that was produced by a previous RCDS EXPORT job.

```
//RCDSIM  JOB (ACCT),'USER',CLASS=A,NOTIFY=,MSGLEVEL=(1,1)     01
//IMPORT   EXEC PGM=DWWGJCDS                                   02
//STEPLIB  DD   DSN=DWW.SDWWLOAD,DISP=SHR                      03
// DD DSN=DWW.SDWWLENU,DISP=SHR
//DWWCOPY1 DD   DSN=USER1.DWWCOPYR,                            04
//              UNIT=3590,VOL=SER=TAPE04                       05
//DWWCON1  DD   DISP=SHR,DSN=DWW.DWWCON1                       06
//DWWCON2  DD   DISP=SHR,DSN=DWW.DWWCON2                       07
//DWWCON3  DD   DISP=SHR,DSN=DWW.DWWCON3                       08
//DWWMSG   DD   SYSOUT=*                                       09
//DWWPRINT DD   SYSOUT=*                                       10
//DWWIN    DD   *                                              11
           RCDS IMPORT                                         12
/*
//
```

Figure 102. Sample RCDS IMPORT job to update the remote recovery site's RCDS

Here is a description of each of the numbered statements:

Line
Explanation

01
JOB statement defines a CICS VR job.

02
EXEC statement defines a CICS VR job step. Specifies that the program DWWGJCDS is to be run. The prefix DWW always refers to a component of CICS VR.

03
STEPLIB DD statement. Specifies the name of the CICS VR load library, for example, DWW.SDWWLOAD, used for this job step.

04–05
This is the DWWCOPY1 DD statement. It specifies the SAM data set, USER1.DWWCOPYR, from which the IMPORTed RCDS information is extracted and stored into the RCDS data sets specified on the DWWCON1–DWWCON3 DD statements. USER1.DWWCOPYR is on a standard label 3590 volume TAPE04.

06–08
DWWCON1–DWWCON3 defines the three recovery control data sets. If you are running the CICS VR server, you must use the **hlq.slq** that was defined in the IGDSMSxx PARMLIB member for these data sets.

Note: CICS VR uses three identical RCDS data sets to provide fault tolerance and improved reliability.

09
DWWMSG defines the output data set that contains the CICS VR messages. This is usually defined as a SYSOUT data set.

The DCB parameters for this data set are RECFM=FBA and LRECL=133. The block size can be provided on the DWWMSG DD statement and must be a multiple of 133. The default is 27930.

10
DWWPRINT defines the output data set that contains the reports produced by CICS VR. This is usually defined as a SYSOUT data set.

The DCB parameters for this data set are RECFM=FBA and LRECL=133. The block size can be provided on the DWWPRINT DD statement and must be a multiple of 133. The default is 27930.

11
This is the DWWIN DD statement. It specifies the data set that contains the CICS VR commands. You can either specify a sequential data set with 80-byte, fixed-length records, or include the CICS VR commands in-stream, as shown.

12
This is the RCDS IMPORT command. It specifies that all the RCDS information is copied from the USER1.DWWCOPYR data set to the RCDS data sets, specified on DWWCON1–DWWCON3 DD statements.

Chapter 11. Automated Recovery and Reorganization

This section describes the tasks to perform when enabling automated recovery in CICS VR V4R1.

If a VSAM data set in use by CICS fails, perhaps because of physical damage to a disk, CICS VR is used to perform forward recovery of the data set.

Prior to CICS VR V4R2 the forward recovery task had to be started manually. The CICS VR dialog interface, via ISPF, was used to create a recovery job using the corresponding panels.

Similarly, if a VSAM data set needed reorganization, for example due to NOSPACE or AIX Full condition, corresponding manual steps had to be performed to create a reorganization job.

In CICS VR V4R2 the creation of recovery or reorganization jobs is provided, in addition to the existing recovery or reorganization procedures.

Note: When using automated recovery in a secured system, specific tasks and permissions are required. See "Automated recovery and security" on page 81 for more details.

Automated Recovery Overview

CICS VR automated recovery support provides several functions.

- Within CICS, the corruption of a VSAM data set, or the need for a VSAM data set reorganization, produces an alert for CICS VR to take action.
- Within CICS VR, recovery or reorganization jobs can be created and submitted automatically. This automation is optional.
- Within a CICS VR recovery or reorganization job, extra steps is included automatically to request that CICS take the data set offline from CICS before the forward recovery or reorganization begins, and to bring the data set back online following the forward recovery or reorganization. These steps enable CICS to retry its backout.

The automation is for CICS online processes only. The automation cannot be used for batch processes. Automated recovery jobs can be created for forward recovery or reorganization, but not for both in the same job.

Note: Batch backout for failed batch processes can be automated.

When CICS detects that a VSAM file has been corrupted in a way that would usually require recovery or file reorganization, it informs CICS VR. CICS VR detects the event and take appropriate action.

The error detection process is fully automatic, but the user can specify whether the subsequent recovery is fully automatic so that no intervention is required, or non-automatic, so that the recovery job is started from the panel interface. This feature is enabled using the CBAUTO parameter, as described in "Preparing for Automated Recovery" on page 224.

The skeletons used for restore or recovery are generally the same for both automatic and manual jobs. The exception is the DWWAJOB skeleton used in automatic recovery job construction. For manual recovery job construction, the DWWUJOB skeleton is used instead.

If the construction of an automatic recovery job fails, DWWMSG and DWWPRINT contains corresponding error messages. If failure occurs during manual job construction, the error is described by pop-up messages on panels. If the recovery job itself fails, a corresponding error message is issued to the system console, and also recorded in the CICS job log. For more information about the messages and appropriate actions to be taken, see *CICS VR Messages and Problem Determination*.

Preparing for Automated Recovery

Perform the following steps to prepare for Automated Recovery.

Procedure

1. At CICS cold start, the RCDS must not contain any incomplete CICS backout fail requests. This is because backout failed entries that remain in RCDS during a previous CICS run blocks new CICS Alerts for the same VSAM data sets, if any occur after the cold start. Use the CICS VR CICS Backout Failed sphere list panel to deregister any incomplete requests before CICS cold start. There might also be security considerations. See Chapter 6, “CICS VR security,” on page 79.
2. Ensure that the default for job generation is set to the value that you require. CBAUTO must be set to YES for automated job generation. CBAUTO must be set to NO for manual job generation. The current setting for CBAUTO can be determined as described in “Defining a CICS VR general control parameter” on page 33. If CBAUTO is set to YES, the automatically generated job is put into the data set defined by the ISPFILE DD statement in DWWCBRRY. The job is then automatically submitted. In the DWWCBRRY sample included with the product, the ISPFILE DD statement defines a temporary data set which is deleted after the job is submitted. Change the current default setting for CBAUTO using the Administrate menu from the main menu, as described in the *CICS VSAM Recovery User's Guide*.
3. Add resource definitions to the CICS CSD. The DWWCSD sample as shown in the figure "The DFHCSDUP job sample to create resource definitions for Automated Recovery" which creates two resource groups, DWWCICVR and DWWEXCI. Before using this sample job replace the default parameter values with the values of your CICS installation.
   a) Install the group DWWCICVR, which contains the definitions needed for CICS VR Automated Recovery operation. The recommended way is to add the group to the current grouplist for the CICS region.
   b) If the CICS region does not have a EXCI generic connection defined, install the group DWWEXCI. This group contains definitions for the EXCI generic connection and session needed. The installation of group DWWEXCI fails if there is already an EXCI generic connection installed. If you do add this second group you need a DELETE GROUP(DWWEXCI) at the start.
4. Check that the CICS initialization parameter IRCSTRT is set to YES. This is a requirement for CICS EXCI.
5. Enable the DWWXFCBF exit program at the XFCBFAIL exit point. The exit is enabled in one of three ways:
   - CICS VR provides an enable program called DWWEFCBF which can be run at CICS startup through a program list table (PLT). A sample list DWWPLTI1 is provided in the CICS VR SDWWCNTL library, and is shown in the DFHCSDUP job sample to create resource definitions for Automated Recovery. This sample list specifies that the DWWEFCBF program must be run in the first PLT phase of CICS start up. The list is included at initialization time by using the PLTPI=I1 system initialization parameter.
   - The exit program itself, DWWXFCBF, can be specified to be enabled by CICS using the TBEXITS=(,,DWWXFCBF) CICS initialization parameter.
   - The enable program DWWEFCBF can be run after CICS has initialized using the CVRE transaction or by using EXEC CICS LINK.

     Note: To disable DWWXFCBF dynamically when CICS is up and running run CICS transaction CVRD or EXEC CICS LINK to program DWWDFCBF.
6. Add the CICS VR load library SDWWLOAD to the CICS RPL library list.
7. Ensure that the proper CICS EXCI library SDFHEXCI is available to CICS VR generated jobs. This can be done in one of two :
   - Include your CICS EXCI library SDFHEXCI in the proper LNKLST list in your PARMLIB. A default version of the EXCI options table DFHXCOPT is shipped in SDFHEXCI. If SDFHEXCI is included in the link list, the default table is used automatically. If you need DFHXCOPT to use modified

EXCI options, you must include the library with your DFHXCOPT table in the link list, in front of SDFHEXCI library, to ensure your version of the table is picked up.

- Alternatively, you can specify your CICS SDFHEXCI library in STEPLIB DD statements of CICS VR-shipped skeletons. For that you must uncomment the STEPLIB DD statements in the skeletons that CICS VR uses for job generation, and change the value of the DSN parameters to the proper name of the SDFHEXCI library on your CICS installation. It is recommended that you create your own private skeleton library, copy the DWWFIMNG, DWWPUJ and DWWRPUJ members from the CICS VR SDWWSENU library into your library, edit them, and include your library in CICS VR CLIST as the first in the ISPSLIB concatenation with the SDWWSENU library.

8. Modify the DWWCBINF, DWWCBRRY and DWWCBRRG jobs according to the installation requirements. Details of possible customization are included in the jobs themselves.

   The following started tasks are required for Automated recovery:

   - DWWCBINF
   - DWWCBRRY
   - DWWCBRRG

   Note: Normally, the started task DWWCBRRG does not run if CICS signals that Forward Recovery is required. However, CICS might signal that Reorganization is required, and so DWWCBRRG must be set up in advance to be ready for use.

   Since the source JCL for these started tasks are jobs, the members containing these jobs must be parts of a data set in the IEFPDSI DD or the IEFJOBS DD concatenation of the Master JCL MSTJCLxx. It is recommended that a new data set is defined in MSTJCLxx. The IEFJOBS DD statement must point to this new data set. The data set must have copies of the DWWCBINF, DWWCBRRY and DWWCBRRG jobs from the SDWWCNTL library.

   Note: Further details about setting up started tasks can be found in the section “Understanding the master scheduler job control language” of the *z/OS MVS Initialization and Tuning Reference*.

9. If RACF or a similar security product is in place, and you are using CICS VR automated recovery, ensure that the started tasks DWWCBINF, DWWCBRRY and DWWCBRRG are defined in the security product.

   Note: Assign a user ID with appropriate authorization to access the data sets that are explicitly defined using DD statements in the DWWCBINF, DWWCBRRY and DWWCBRRG jobs. The user ID must also be permitted to browse the output from these jobs.

10. You can activate the CICS VR server during CICS Stage 3 initialization using CICS second phase PLTP1 program DWWSFCBF. DWWSFCBF provides the following:

    - The ability to determine the status of the CICS VR server address space.
    - If the CICS server is inactive, it initiates startup of the server by submitting a job to the internal reader using CICS spool commands. This requires CICS to be running with the SIT parameter SPOOL=YES.
    - A message is issued to CSMT to indicate that a startup of the CICS VR server was initiated.

    The sample PLT table DWWPLTI1 is updated with a new entry for DWWSFCBF after the DFHDELIM entry.

Example

```
//DWWCSD   JOB (ACCOUNT),MSGLEVEL=(1,1),MSGCLASS=H
//*****************************************************************/
//* Function:                                                     */
//*                                                               */
//* This is the sample of the DFHCSDUP job to create the resource    */
//* definitions required for CICSVR automated recovery support.      */
//* It defines two resource groups:                               */
//*    DWWCICVR contains definitions needed for CICSVR operation;    */
//*    DWWEXCI contains definitions for the EXCI generic connection  */
//*    and session needed.                                        */
//* The user must install group DWWCICVR, he is recommended to add   */
//* group DWWCICVR to his current grouplist for the CICS region.     */
//* Group  DWWEXCI need only be installed if the user does not       */
//* have a EXCI generic connection defined. The installation of group*/
//* DWWEXCI fails if there is already an EXCI generic connection */
//* installed.                                                    */
//*                                                               */
//* Before using this sample job replace the default parameter       */
//* values with the values of your CICS installation.             */
//*                                                               */
//*****************************************************************/
//*- - SET SYMBOLIC PARAMETERS                                   -*/
//*
//SETLOAD SET CICSLOAD=CTS510.CICS680.SDFHLOAD ! SDFHLOAD
//SETCSD SET DFHCSD=TTCICS3.CICS.DFHCSD        ! CICS CSD
//DFHCSDUP EXEC PGM=DFHCSDUP,REGION=4M
//STEPLIB DD DISP=SHR,DSN=&CICSLOAD
//DFHCSD DD DISP=SHR,DSN=&DFHCSD
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
*
  DELETE  GROUP(DWWCICVR)
*
  DEFINE TRANSACTION(CVRD) GROUP(DWWCICVR) PROGRAM(DWWDFCBF)
  DESCRIPTION(CICS Server Transaction required by CICSVR)
     PROFILE(DFHCICSA)
*
  DEFINE TRANSACTION(CVRE) GROUP(DWWCICVR) PROGRAM(DWWEFCBF)
  DESCRIPTION(CICS Server Transaction required by CICSVR)
     PROFILE(DFHCICSA)
*
  DEFINE TRANSACTION(CVRX) GROUP(DWWCICVR) PROGRAM(DFHMIRS)
  DESCRIPTION(CICS Server Transaction required by CICSVR)
     PROFILE(DFHCICSA)
*
```

Figure 103. The DWWCSD job sample to create resource definitions for Automated Recovery

```
* Programs
*
  DEFINE PROGRAM(DWWAUXCS) GROUP(DWWCICVR) LANGUAGE(ASSEMBLER)
  DESCRIPTION(CICS Server Program required by CICSVR)
       DATALOCATION(ANY) EXECKEY(USER)
*
  DEFINE PROGRAM(DWWDFCBF) GROUP(DWWCICVR) LANGUAGE(ASSEMBLER)
  DESCRIPTION(Program to disable CICSVR GLUE at exit point XFCBFAIL)
       DATALOCATION(ANY) EXECKEY(USER)
*
  DEFINE PROGRAM(DWWEFCBF) GROUP(DWWCICVR) LANGUAGE(ASSEMBLER)
  DESCRIPTION(Program to enable CICSVR GLUE at exit point XFCBFAIL)
       DATALOCATION(ANY) EXECKEY(USER)

*
  DEFINE PROGRAM(DWWSFCBF) GROUP(DWWCICVR) LANGUAGE(ASSEMBLER)
  DESCRIPTION(Program to issue CICSVR activation request)
       DATALOCATION(ANY) EXECKEY(USER)
*
  DEFINE PROGRAM(DWWXFCBF) GROUP(DWWCICVR) LANGUAGE(ASSEMBLER)
  DESCRIPTION(CICSVR global user exit program for XFCBFAIL)
       DATALOCATION(ANY) EXECKEY(CICS) CONCURRENCY(THREADSAFE)
*
*
  DELETE  GROUP(DWWEXCI)
*
  DEFINE CONNECTION(DWWG)       GROUP(DWWEXCI)
  DESCRIPTION(EXCI Generic connection required by CICSVR)
    ACCESSMETHOD(IRC)      SINGLESESS(NO)
    PROTOCOL(EXCI)         CONNTYPE(GENERIC)
    DATASTREAM(USER)       RECORDFORMAT(U)        AUTOCONNECT(NO)
    INSERVICE(YES)         ATTACHSEC(IDENTIFY)
*
  DEFINE SESSIONS(DWWG)         GROUP(DWWEXCI)
  DESCRIPTION(EXCI Generic sessions definition required by CICSVR)
    CONNECTION(DWWG)       PROTOCOL(EXCI)         MAXIMUM(0,0)
    RECEIVEPFX(RG)         RECEIVECOUNT(10)
    SENDSIZE(4096)         RECEIVESIZE(4096)
    SESSPRIORITY(0)        AUTOCONNECT(NO)
    BUILDCHAIN(YES)        IOAREALEN(4096,4096)   RELREQ(NO)
    DISCREQ(NO)            NEPCLASS(0)
    RECOVOPTION(SYSDEFAULT)
*
/*
//
```

```
*********************************************************************
*                                                                   *
* MODULE NAME = DWWPLTI1                                            *
*                                                                   *
* DESCRIPTIVE NAME = list of programs to be executed during CICS    *
*                    system initialization                          *
*                                                                   *
*                                                                   *
* FUNCTION =                                                        *
*                                                                   *
*   This list specifies the CICSVR DWWEFCBF program to be executed  *
*   during CICS TS system initialization in order to enable         *
*   the CICSVR GLobal User Exit (GLUE) program DWWXFCBF for the File*
*   Control backout failure exit XFCBFAIL, if the CICSVR Automated  *
*   forward recovery / reorganization is used.                      *
*   This program required system initialization parameter           *
*   PLTPI=I1.                                                       *
*                                                                   *
*                                                                   *
*-------------------------------------------------------------------*

*********************************************************************
*
*
   DFHPLT TYPE=INITIAL,SUFFIX=I1
*
   DFHPLT TYPE=ENTRY,PROGRAM=DWWEFCBF
*
*  Programs specified before the DFHDELIM program  are run
*  during second initialization stage.
*  Programs should also be defined to CICS by DFHCSDUP or RDO
*
   DFHPLT TYPE=ENTRY,PROGRAM=DFHDELIM
*
*  Programs that should be run in the third initialization
*  phase (if any) can be specified below.
*  Programs should also be defined to CICS by DFHCSDUP or RDO
*
   DFHPLT TYPE=ENTRY,PROGRAM=DWWSFCBF
*                                                              @L1A
   DFHPLT TYPE=FINAL
*
   END
```

Figure 104. The DWWPLTI1 sample list to execute the DWWEFCBF program in the first PLT phase

Reorganization Overview

Reorganization is required when more space is needed.

CICS notifies CICS VR that an error occurred during a backout attempt. The error condition could be that a data set is out of storage, or that there is no space in a non-unique alternate index.

By default, spheres is reallocated with their space increased by 10%, rounded up to the unit of allocation. This 10% default value is defined in the DWWCBRRG reorganization job skeleton as:

```
//SETINCR SET INC=10    ! 10% INCREMENT AT REORG
```

Modifying the value of this parameter changes the space increment from the default 10%.

Note: The actual increment is limited according to the VSAM limits defined for the MAXRECORDSIZE attribute.

The following steps take place during reorganization:

1. The original sphere attributes are retrieved from the ICF catalog.
2. A new sphere is defined using the attributes, updated for the space increase
3. REPRO is used to copy data from the original sphere to the new sphere
4. Alternate indexes are built for the new sphere

5. The original sphere is deleted
6. The new sphere component names are renamed to the original sphere component names

Note: The IDCAMS processor performs the reorganization steps. For RLS spheres, the RLS protocols are used.

The DWWRG reorganization program is called during the reorganization job created by CICS VR. This applies to both automatic and manual jobs.

Preparing for Reorganization

When preparing for reorganization, the started tasks DWWCBINF, DWWCBRRY and DWWCBRRG are defined.

Before you begin

See sections “Preparing for Automated Recovery” on page 224, and step “Preparing for Automated Recovery” on page 224 onwards, for more information.

Chapter 12. CICS VR command reference

Descriptions of the CICS VR command rules and how to read the syntax diagrams.

Command rules

CICS VR commands are made up of the command name, one or more keywords, and one or more values for the keywords.

Commands can be in the CICS VR job stream or in a data set, as defined by the DWWIN DD statement, and must be entered between columns 1 and 72. You can enter the commands in free format. There are no special column rules to follow, but only blanks and comments can precede the command name. The constituents of the command must be separated by one or more blanks or comments, or a combination of blanks and comments. Each command must start on a new line.

Values must be enclosed in parentheses. Between values, you can have a comma, blanks, or comments. If a value contains a special character, enclose the value in single quotes.

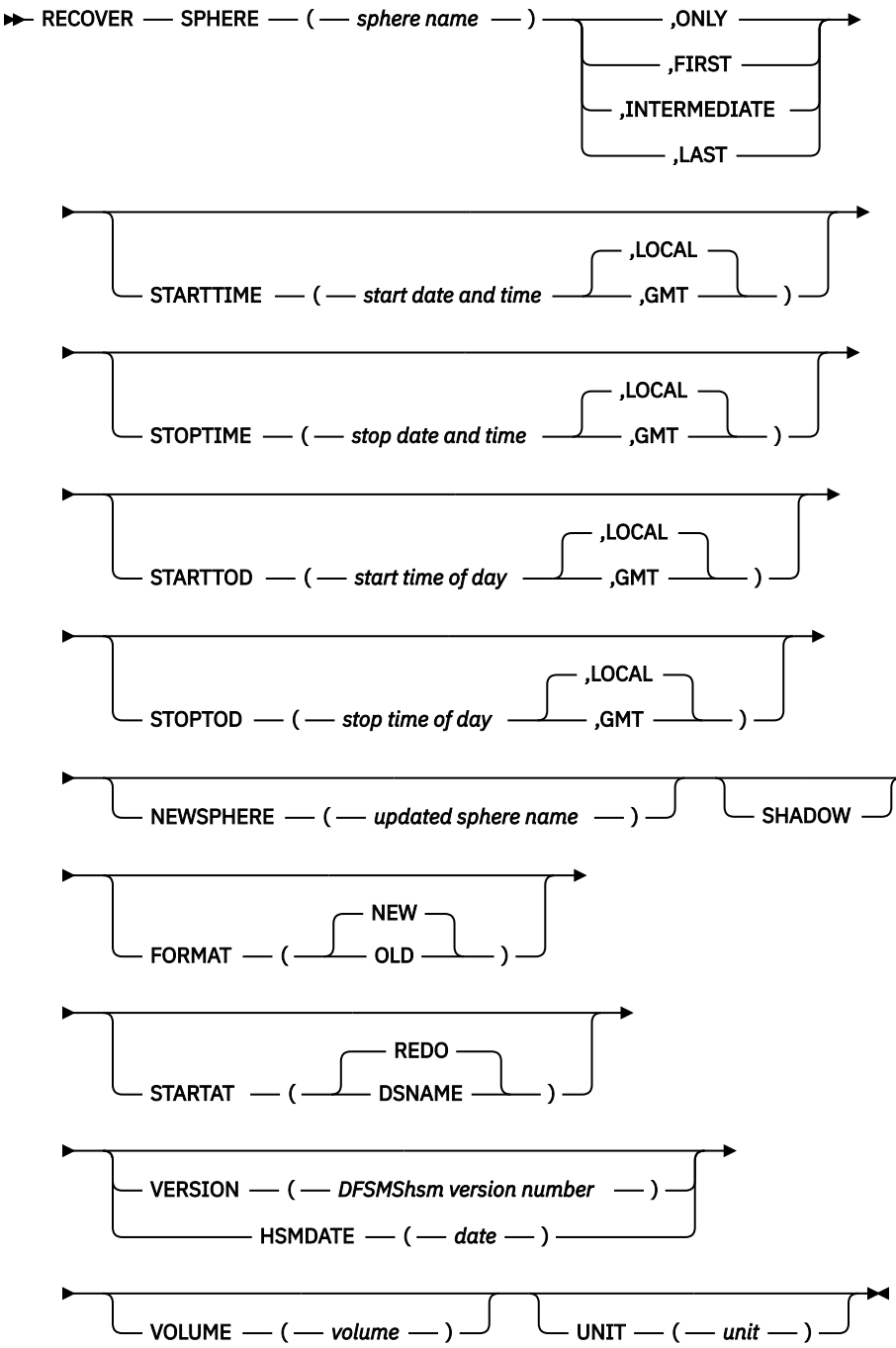
You can insert comments between the parts of a command, and between values. Comments must be enclosed by /* and */ and must not be nested. That is, a comment cannot contain another comment.

The continuation character is a hyphen (-). It must be in column 1–72, after the last character on a line.

How to read the syntax diagrams

Syntax described using diagrams.

Throughout this section, syntax is described using diagrams such as the one shown here, which describes the RECOVER command:



The symbols used in syntax diagrams have this meaning:

►►———
The statement begins here.

———►
The statement is continued on the next line.

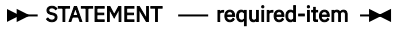
►———
The statement is continued from a previous line.

———►◄
The statement ends here.

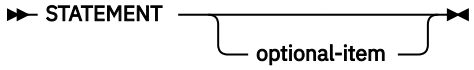
Read the syntax diagrams from left to right and from top to bottom, following the path of the line.

These are the conventions used in the diagrams:

- Required items appear on the horizontal line (main path):

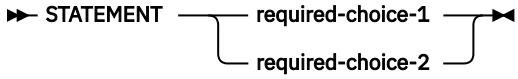


- Optional items appear below the main path:

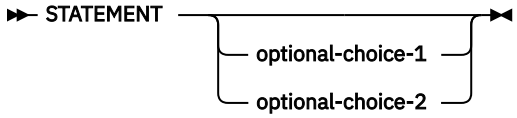


- If you can choose from two or more items, they appear vertically, in a stack.

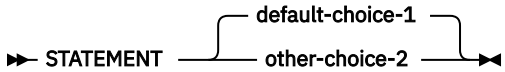
  If you must choose one of the items, one item of the stack appears on the main path.



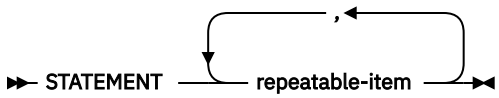
  If choosing one of the items is optional, the entire stack appears below the main path.



- Keywords that are above the main line are default keywords.



- An arrow returning to the left above the item shows an item that you can repeat. Required items appear on the main line and optional items appear below the main line.



  A repeat arrow shows that you can make more than one choice from the stacked items, or repeat a single item. If a separator is required between items, it is shown as a comma in the repeat arrow.
- Keywords appear in uppercase; for example, STATEMENT).
- Parentheses and commas must be entered as part of the command syntax as shown.

Synonyms for all commands and keywords

A summary of all the synonyms that you can use rather than the complete command names.

Table 13. Command Synonyms

Command name	Synonyms	Description
ALLOCATE	ALLOC	Allocate a journal.
BACKOUT	BO	Back out a sphere.
BLDVRP	BVRP	Set VSAM BLDVRP values.
DEFEXIT	X, DX, EXIT, EXITS	Define CICS VR exits.
FCTCOMP	FCTC, FCTCOMPLEMENT	Pass FCT record-format information.
MIGRATE	MIG, MI	Migrate RCDS from a previous release.

Table 13. Command Synonyms (continued)		
Command name	**Synonyms**	**Description**
RECOVER	RO, RECO, RECONLY, RECOV	Forward recover a sphere.
RELATE	REL	Relate a path to the base cluster.
SEQCHKL	SEQL, LDS	Define sequence check for log data sets.
SEQCHKR	SEQR, LREC	Define sequence check for log records.

A summary of all the synonyms that you can use rather than the keyword names and values shown in the command descriptions.

Table 14. Keyword and Keyword Value Synonyms	
Keyword name or value	**Synonyms**
B1K	B1024
B2K	B2048
B4K	B4096
B8K	B8192
B12K	B12288
B16K	B16384
B20K	B20480
B24K	B24576
B28K	B28672
B32K	B32768
BACKUPNAME	BACKUP, BN
BACKUPTIME	BTIME, TIME
CICSID	CID
CATALOG	CAT, CTLG
DSNAME	NAME, DSN
ERROR	ERR
ESDSDELETE	ESDSDEL, EDEL
EXPORT	EX
FCTNAME	FCT
FILEID	DD, DDNAME
FIXED	FXD
GAPINSEQUENCE	GAPINSEQ, GAP
IMPORT	IM
JOURNALID	JID

Table 14. Keyword and Keyword Value Synonyms (continued)	
Keyword name or value	**Synonyms**
LOG	JOURNAL, JNL
NEWPATH	NEWDATASETNAME, NEWDSNAME, NEWDSN
NEWSPHERE	NEWSPH, NEWDATASETNAME, NEWDSNAME, NEWDSN
OUTOFSEQUENCE	OUTOFSEQ, OUT
PATH	DATASETNAME, DSNAME, DSN
PREALLOC	ALLOC
PREAPPLY	PREAPP, PRE
PRODUCT	PROD
RECFORM	RECFM, RECORDFORMAT
RESETSEQUENCE	RESETSEQ, RESET
SPHERE	SPH, DATASETNAME, DSNAME, DSN
STARTTIME	STARTDATETIME, STARTDATE, START
STOPTIME	STOPDATETIME, STOPDATE, STOP
TERMID	TERMINALID
TERMINATION	TERM
TRANSID	TRANSACTIONID
VARIABLE	VAR
VERSION	VER
VOLUME	VOL

CICS VR program names

You must use the specific CICS VR program name when you call CICS VR to perform a certain function.

In most cases, use the CICS VR ISPF dialog interface so that CICS VR generates the correct CICS VR program name when it generates the JCL for the job. CICS VR program names for the various CICS VR functions:

Table 15. CICS VR program names	
CICS VR program name	**Associated command name or utility**
DWWAR	LOGOFLOGS command
DWWBACK	BATCHBACK command
DWWCO	RECOVER command LOGOFLOGS command
DWWCA	CA command
DWWLC	LOGSTREAMCOPY command

Table 15. CICS VR program names (continued)	
CICS VR program name	**Associated command name or utility**
DWWGJCDS	RCDS command
DWWMIW	Migration Utility
DWWNT	NOTIFY utility
DWWRB	RESETBWO command

Chapter 13. CICS VR commands

A table of descriptions of CICS VR functions and commands used with CICS TS.

Table 16. CICS VR commands used with CICS TS

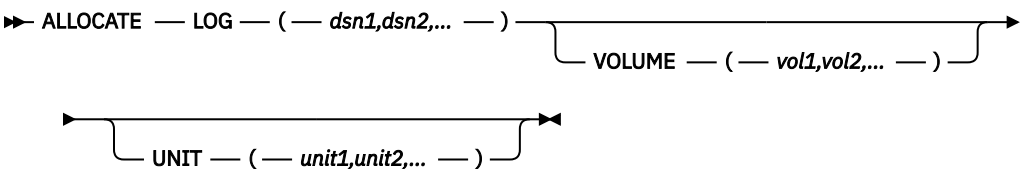
Function	Commands
Forward recovery	ALLOCATE BLDVRP DEFEXIT EXCLUDE INCLUDE MVSLOG RECOVER VSAMSTART VSAMEND
Log stream copy	DEFEXIT LOGSTREAMCOPY MVSLOG
Log of logs scan	LOGOFLOGS
Change accumulation	CA SPHERE
Export or import the RCDS	RCDS
Batch Backout	BATCHBACK DEFEXIT MVSLOG
Migrate RCDS	MIGRATE
Notify CICS VR then a VSAM sphere backup is created	NOTIFY
Preventing duplicate recovery runs	CHECK

ALLOCATE: Allocate a log

Use the ALLOCATE command to identify the CICS log or log stream copy that you want CICS VR to read.

Do not use ALLOCATE for MVS log streams. For MVS log streams, use the MVSLOG command.

Format



Keywords

LOG(*dsn1,dsn2,...*)
Specifies the logs in ascending time order, with the earliest specified first. The LOG keyword is required.

dsn1,dsn2,...
Specifies the log data set name, which is 1–44 characters. You can specify one or more logs.

VOLUME(*vol1,vol2,...*)
Specifies the first volume serial number that the log resides on. The VOLUME keyword is required only if at least one of the logs specified is not cataloged. If specifying more than one log, where some are cataloged and some are not, use an asterisk (*) to denote the volume for the cataloged logs.

vol1,vol2,...
Specifies the volume field, which is either 1–6 characters, or an asterisk (*) to denote the volume for the cataloged logs. You can specify one or more volumes that correspond to the number of logs you have specified.

UNIT(*unit1,unit2,...*)
Specifies the device type that the log resides on. The UNIT keyword is required only if at least one of the logs specified is not cataloged. If specifying several logs, where some are cataloged and some are not, use an asterisk (*) to denote the unit for the cataloged logs.

unit1,unit2,...
Specifies the unit name, which is 1–8 characters, use an asterisk (*) to denote the volume for the uncataloged logs. You can specify one or more unit types, corresponding to the number of logs you have specified.

Usage notes

Consider the following information when you use the ALLOCATE command:

- You can specify these types of logs to CICS VR:
  - CICS VR SAM copies of MVS log streams
- You can specify the log in a DWWLOG DD instead of specifying the ALLOCATE statement.
- You cannot specify MVS log streams using the ALLOCATE command. You must use the MVSLOG command, see “MVSLOG: Specify an MVS Log Stream” on page 279.
- You cannot use CICS Transaction Server logs for backout. CICS Transaction Server provides online backout failure support.
- If you use the ALLOCATE command to tell CICS VR to read a log stream copy, you must also specify the MVSLOG command to tell CICS VR it is a SAM copy of an MVS log stream.
- If you build a recovery job manually, you must also know and specify the proper forward recovery start time based on the backup that was restored. If you use the CICS VR panel interface, CICS VR automatically uses the proper forward recovery start time based on the selected backup.
- Base and path updates must be recorded on the same sequence of logs for a given sphere.
- You have the option of allocating your logs through dynamic allocation, with the ALLOCATE command, or through ddnames in the CICS VR JCL.
- If you use the ALLOCATE command to specify your logs, keep each uncataloged archived log on a single volume.
- All logs that are needed for CICS VR recovery must be provided in a single step.

Attention: Do not split the logs needed for recovery into several CICS VR steps. This might cause loss of data integrity without warning.

- Only one ALLOCATE command is permitted per CICS VR step.

Examples

There is a positional correspondence between the ALLOCATE keyword values. That is, if three log data set names are supplied, there must be three VOLUME and UNIT keywords, if one or more of the logs are uncataloged.

```
ALLOCATE LOG(CICSA.ARCH1 CICSA.NARCH1 CICSA.ARCH2)  - 1
         VOLUME(* * 123456)  -                        2
         UNIT(* * TAPE)                               3
```

Here is an explanation of each of the ALLOCATE commands:

1
The ALLOCATE command describes three logs.

2
The VOLUME command describes the first two logs as being cataloged; the third log is uncataloged and resides on volume serial number 123456.

3
The UNIT command describes the first two logs as being cataloged; the third log is uncataloged and resides on tape.

Synonyms

The ALLOCATE synonyms table provides the ALLOCATE commands or keywords along with acceptable synonyms that can be used in place of the commands or keywords:

Table 17. ALLOCATE synonyms

Command or keyword	Synonyms
ALLOCATE	ALLOC
LOG	JOURNAL, JNL
VOLUME	VOL

BATCHBACK: Remove updates to VSAM spheres

Use the BATCHBACK command to remove updates that were made to VSAM spheres by one or more steps in a batch job.

CICS VR undo logging must have been performed for the VSAM spheres when the batch job was originally run to allow for CICS VR batch backout processing.

By default CICS VR will backout the whole of a job or step. In this case STOPTIME or STOPTOD is not specified and backout stops after the last relevant before-image is found.

You can perform a partial backout of a step or a job by adding STOPTIME or STOPTOD keywords to the command input in the DWWIN dd statement. The use of these keywords relies on correctly calculating the required time that you want CICS VR to stop. Use the STOPTIME and STOPTOD keywords with caution, it is not recommended for most users because CICS VR will stop at the time you have calculated regardless of the point in processing. If you perform a partial backout of a step or a job, upon successful completion take a new backup of the sphere for forward recovery purposes and discard all previous backups. The new backup is required because CICS VR will not process REDO records for partial units of work and does produce REDO records during the backout process.

Format

```
>>-BATCHBACK--JOB--(--jobname--)--+--------------------+------->
                                 '-JOBID--(--job ID--)-'

>--+-----------------------------------------+----+---------+->
   '-FAILED----------------------------------'    '--CHECK--'
   '-STEP(stepname)-+-------------------------+
                    '--PROCSTEP(procstepname)--'

>--+-----------------------------------------------------+------->
   '-DSNEXTENSION--(--alternate data set name suffix--)-'

>--+---------------+----------+-----------+--------------------->
   |       .-YES-. |          |           |
   '-RCDS--+-NO--+-'          '-MSGRC(rc)-'

>--+-------------------------------------+--------------------->
   |                .-,--------------.    |
   |                V                |    |
   '-SPHERENAME--(------spherename---+--)-'

>--+-----------------------------------------+--------------><
   +-STOPTIME(stop date and time, LOCAL | GMT)-+
   '-STOPTOD(stop block TOD,LOCAL | GMT)-------'
```

Keywords

CHECK
Specifies that CICS VR must list all applied records keys. CHECK is an optional keyword.

DSNEXTENSION(*alternate data set name suffix*)
Specifies a 1 - 8 character suffix that CICS VR appends to the end of the data set names of the VSAM spheres that CICS VR backs out. CICS VR performs all backout processing for the VSAM spheres that were updated by the specified batch job step(s) on VSAM spheres with the specified extension appended to it. The VSAM spheres with the specified extension appended to the spheres' data set names must exist prior to CICS VR batch backout processing, CICS VR does not create them.

alternate data set name suffix
Specifies the 1 - 8 character suffix that has been added to previously created copies of the VSAM spheres that CICS VR performs backout processing against. The specified extension must follow MVS data set naming conventions.

Note: If a value is entered for the DSNEXTENSION optional keyword, the data set with the appended extension must exist prior to backout processing. CICS VR does not create this data set.

FAILED
Specifies that CICS VR must back out all updates that were made by the step that encountered a failure during the latest execution of the batch job that was specified in the JOB keyword. The failed step for the specified batch job must have been the last step run by the specified job.

FAILED is an optional keyword. If FAILED is specified, the STEP(stepname) keyword cannot be specified. If FAILED and STEP(stepname) are not specified, CICS VR backs out all updates that were made by the latest execution of the entire batch job specified in the JOB keyword.

JOB(*jobname*)
Specifies the name of the job that performed the updates that you want CICS VR to back out. JOB is a required keyword and only one JOB keyword can be specified per BATCHBACK command.

jobname
Specifies the 1 - 8 character jobname specified in the JOB JCL statement of the batch job. The jobname is 1 through 8 alphanumeric or national ($, #, @) characters. The first character must be alphabetic or national ($, #, @).

JOBID(*job ID*)
When a JOBID is specified, only the steps of the specified JOB name with a matching *JES job ID* is backed out. JOBID is an optional keyword. JOBID is processed when the RCDS is specified in the batch backout job, and also when the RCDS is not available to the batch backout job.

MSGRC(rc)

Specifies that the Batch backout program should issue RC = rc for CICS VR messages: DWW1709S, DWW1710S, DWW1707S, DWW1711S, DWW1721S, and DWW1708S. The valid values for the parameter is 4 through 12. MSGRC is optional keyword. If MSGRC is not specified the Batch backout program issues the error RC = 12.

PROCSTEP(procstepname)

PROCSTEP(procstepname) is specified when CICS VR must back out all updates that were made beginning from the specified step in procedure called by STEP(stepname), and all subsequent steps during the latest execution of the batch job specified in the JOB keyword. PROCSTEP is optional and requires that STEP(stepname) is specified .

procstepname

Specifies the 1 - 8 character stepname specified in the EXEC PROC step statements. The procstepname value is 1 through 8 alphanumeric or national ($, #, @) characters. The first character must be alphabetic or national ($, #, @).

RCDS(YES | NO)

Specifies if CICS VR uses information stored in the RCDSs specified on the DWWCONx DD statements during batch backout processing. The RCDS parameter is optional, and if it is not specified, CICS VR uses information from the RCDSs specified on the DWWCONx DD statements during batch backout processing.

YES

Specifies that CICS VR must use information stored in the RCDSs specified on the DWWCONx DD statements during batch backout processing. The RCDSs specified on the DWWCONx DD statements must be the same RCDSs that were allocated to the CICS VR server address space during execution of the batch job that performed the updates that you want to back out. IBM recommends using information stored in the RCDSs during batch backout processing to allow for enhanced error checking and backout processing performance. YES is the default value.

If RCDS(YES) is specified or if the RCDS keyword is omitted:

- You do not have to specify the name of the undo log that is used during batch backout processing. CICS VR automatically determines and uses the appropriate undo log.
- On the DWWCONx DD statements in the batch backout job, you must specify the names of the RCDSs that were allocated to the CICS VR server address space during execution of the batch job you want to back out.

NO

Specifies that CICS VR uses only information stored in the log records on the undo log stream during batch backout processing. IBM recommends only specifying NO when the RCDSs that were allocated to the CICS VR server address space during execution of the batch job that performed the updates that you want to back out are no longer available. CICS VR performs additional error checking and more efficient backout processing when the RCDSs are used during batch backout processing.

If RCDS(NO) is specified, you must specify the name of the undo log that must be used during batch backout processing in the MVSLOG NAME(log stream name) command. See page 224 for more information about the MVSLOG command.

SPHERENAME(*spherename*)

If SPHERENAME is specified, only the VSAM spheres listed is backed out. SPHERENAME is an optional keyword. Any number of spheres can be specified, using the syntax SPHERENAME(sphere1, sphere2, ...).

STEP(*stepname*)

Specifies that CICS VR must back out all updates that were made by the specified step, and all subsequent steps during the latest execution of the batch job specified in the JOB keyword.

stepname
Specifies the 1 - 8 character stepname specified on the EXEC JCL statement. The stepname is 1 through 8 alphanumeric or national ($, #, @) characters. The first character must be alphabetic or national ($, #, @).

STEP(stepname) is an optional keyword. If STEP(stepname) is specified, the FAILED keyword cannot be specified. If STEP(stepname) and FAILED are not specified, CICS VR backs out all updates that were made by the latest execution of the entire batch job specified in the JOB keyword.

STOPTIME(*stop date and time*, LOCAL | GMT)
Specifies the earliest timestamp of the before-images that you want to use for backout. CICS VR ignores any before-images with an earlier timestamp than the time specified in the STOPTIME keyword. CICS VR reads the log backwards and applies all before-images, for the VSAM spheres, up to this place in the log. Only one STOPTIME keyword is allowed for each BATCHBACK control statement. When the partial backout of the step or job has successfully completed you must take a new backup of the sphere.

stop date and time
Must be in the format **yyyy/ddd/hh/mm/ss**, where:

- **yyyy** is the year
- **ddd** is the day of the year (001–366)
- **hh** is the hour of the day (00–23)
- **mm** is the number of minutes (00–59)
- **ss** is the number of seconds (00–59)

You can separate these values with a slash (/), period (.), or colon (:). You can also omit the separator character. For example:

```
STOPTIME(2007.159/00:30:00)
```

You cannot substitute commas, blanks, and so on, for the time values, but you can omit values from the right. For example, you can specify day 2007159, time 00:00:00, as follows:

```
STOPTIME(2007.159)
```

If you specify this, CICS VR assumes that the day is 2007365 and the time is 00:00:00:

LOCAL
Specifies that the date and time are in local format. LOCAL is the default value.

GMT
Specifies that the date and time are in GMT format.

Keyword	Synonyms
STOPTIME	STOPDATETIME, STOPDATE and STOP

STOPTOD(*stop block TOD*,LOCAL | GMT)
Specifies the earliest timestamp, in hexadecimal time-of-day (TOD) format, that you want to use for backout. CICS VR ignores any before-images on the log with an earlier timestamp than the time specified in the STOPTOD keyword. CICS VR reads the log backwards and applies all before-images, for the VSAM spheres, up to this place in the log.

Only one STOPTOD keyword is allowed for each BATCHBACK control statement. If STOPTOD or STOPTIME is not specified, backout stops after the last relevant before-image found. Use the STOPTOD keyword only if the STOPTIME keyword value is not precise enough for your backout stop time. The STOPTOD keyword has no synonyms. When the partial backout of the step or job has successfully completed you must take a new backup of the sphere.

stop time of day
Must be 16 hex characters. Here is an example of a STOPTOD keyword:
STOPTOD(AC47C0403792C101)

LOCAL
Specifies that the TOD value is in local format. LOCAL is the default value.

GMT
Specifies that the TOD value is in GMT format.

Usage Notes

Consider the following points when using the BATCHBACK command:

- Use STOPTIME or STOPTOD with caution. In most cases these parameters are not required.
- Only one BATCHBACK command can be specified per job step that starts the DWWBACK program.
- CICS VR backs out all updates made to all VSAM spheres that had CICS VR undo logging enabled when the batch job specified was originally run. If some VSAM spheres did not have undo logging enabled when the specified batch job was originally run, CICS VR does not back out the updates made by the batch job to those VSAM spheres. Because CICS VR is unaware of any batch update activity for VSAM data sets that do not have logging enabled, a message warning of this situation is not produced.
- To perform proper batch backout processing, be sure that no updates were made to the VSAM spheres after execution of the specified batch job or be sure that they were previously backed out.
- If batch backout processing is to back out records that were added by the specified batch job to one or more ESDS VSAM spheres, you must specify the name of an ESDS delete exit as a keyword to the DEFEXIT ESDSDELETE(ESDS *delete exit name*) command.
- Batch backout processing only accesses the VSAM sphere through the base cluster. If the complete upgrade set exists during batch backout processing, the alternate indexes are updated by VSAM while CICS VR updates the base cluster. If only the base cluster exists during batch backout, or the alternate indexes are not part of the upgrade set, recreate the alternate indexes and rebuild them using the access method service's (AMS) BLDINDEX command after batch backout processing completes successfully.
- Batch backout processing can only back out updates made to VSAM spheres accessed in non-RLS mode by batch jobs.
- Batch backout processing does not back out updates made by CICS.
- The VSAM sphere which is the subject of the BATCHBACK command must be allocated to the job with disposition OLD.
- If STEP(stepname) and PROCSTEP(procstepname) are specified then stepname in STEP specifies the step name on the EXEC PROC statement, and procstepname in PROCSTEP specifies the procedure step name in this procedure. Nested calls are not allowed.

Examples

- Remove all updates made by the step that encountered an abend during the last execution of batch job TEST1:

```
BATCHBACK JOB(TEST1) FAILED
```

- Remove all updates made by step STEP3 and all subsequent steps during the last execution of batch job TEST2:

```
BATCHBACK JOB(TEST2) STEP(STEP3)
```

- Remove all updates made by the last execution of batch job TEST3. Because the RCDSs that were allocated to CICS VR when TEST3 was run are no longer available, RCDS(NO) is specified and the name of the log stream that contains the proper before-image log records is added to the MVSLOG command.

```
BATCHBACK JOB(TEST3)
MVSLOG(DWW.UNDOLOG)
```

- You might want to use the DSNEXTENSION optional parameter to periodically, or after installation, test CICS VR's batch backout function without affecting your production data sets. For this example, lets

examine a scenario where a batch job named JOB1 has just completed. This batch job updates only one production data set named ACCOUNT.DATASET.ONE. To test CICS VR batch backout without affecting the contents of your production data set, you can perform the following steps:

- Create a new VSAM sphere named `ACCOUNT.DATASET.ONE.TEST` using the same attributes of `ACCOUNT.DATASET.ONE`.
- Copy the contents of `ACCOUNT.DATASET.ONE` into `ACCOUNT.DATASET.ONE.TEST`.
- Create a CICS VR batch backout job to remove all updates made by the last step of the batch job JOB1, by specifying the following parameters:

```
JOB(JOB1) STEP(name of last step in JOB1)
DSNEXTENSION(TEST)
```

When the batch backout job is submitted, CICS VR reads all of the before-image log records that were written when ACCOUNT.DATASET.ONE was updated by the last step of JOB1. However, the before-image log records is applied to ACCOUNT.DATASET.ONE.TEST, therefore not affecting your production data set. After batch backout processing completes, you can then check the results to verify successful processing.

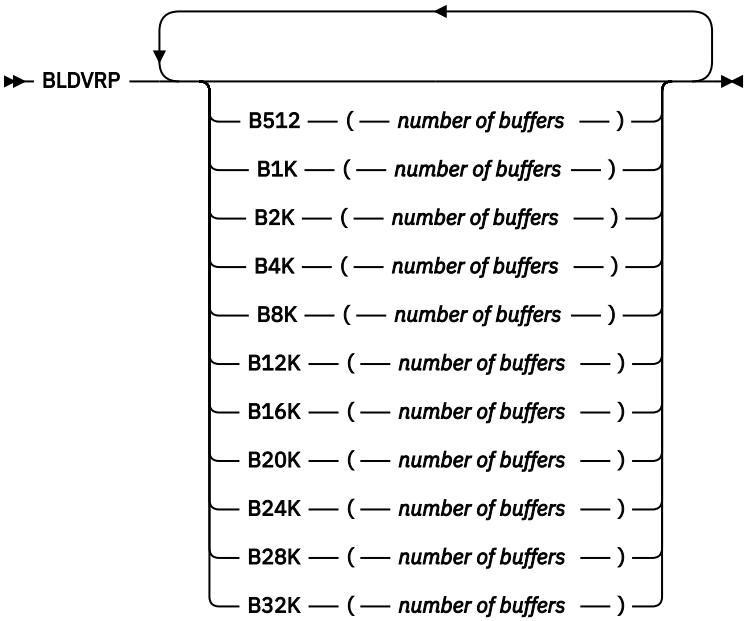
BLDVRP: Build the VSAM resource pool

Use the BLDVRP command to request CICS VR to issue the build VSAM resource pool (BLDVRP) VSAM macro for a forward-recovery run.

This causes VSAM to generate a local shared resource (LSR) pool, which is a set of index and data buffers that are to be shared by all VSAM files participating in the CICS VR run. You can improve the performance of your CICS VR run by using the BLDVRP command to specify the size and number of VSAM buffers.

Specify BLDVRP with no keywords to have CICS VR automatically calculate the LSR buffer space for you. In this case, CICS VR calculates the buffer space automatically and issues the DWW0617I message indicating the size and number of buffers that are calculated.

Format



Keywords

No keywords

BLDVRP with no keywords specifies that CICS VR automatically calculates the appropriate number of buffers for each buffer pool based on the VSAM spheres being recovered in the CICS VR recovery job.

B512(*number of buffers*)...,B32K(*number of buffers*)

Defines the size and number of buffers in each buffer pool within the VSAM resource pool. A VSAM file uses the buffer pool whose buffer size exactly matches the file's CI size, or if this CI size is not available, the buffer pool with the next–larger buffer size. You can only specify each buffer pool once.

number of buffers

Specifies the number of buffers to be defined for each buffer pool. The number of buffers must be in the range 3–65 535.

Usage Notes

Consider the following information when you use the BLDVRP command:

- Use the BLDVRP command to improve the performance of VSAM for a CICS VR run.
- The LSR is divided into subpools, each representing a different control interval size. Before reading the data and index control intervals, the buffers are scanned to see whether the request can be satisfied from the LSR pool. The BLDVRP command improves the performance of VSAM by reducing I/Os to disk.
- You can specify only one BLDVRP per CICS VR step.
- The BLDVRP command is optional. If you specify BLDVRP, it applies to the entire CICS VR step.
- Use the AMS LISTCAT command to determine the CI size of the data and index components of the VSAM data set or specify BLDVRP with no keywords to have CICS VR automatically calculate the LSR buffer space.

Attention: If you are going to specify the size and number of buffers in the BLDVRP command, familiarize yourself with the technique of specifying local shared resources before using the BLDVRP command in your CICS VR run; otherwise, you could inadvertently degrade performance. The more buffers you allocate, the greater the number of data and index control intervals that can be held in virtual storage. Over allocation can lead to severe paging on your system and can also increase the CPU time because of long buffer searches. With some investigation, you can find an optimal buffer size.

Examples

```
BLDVRP B4K(50) B2K(200)
```

This BLDVRP command defines 50 buffers of 4K and 200 buffers of 2K in the VSAM resource pool.

Synonyms

The BLDVRP synonyms table provides the BLDVRP commands or keywords along with acceptable synonyms that can be used in place of the commands or keywords:

Table 18. BLDVRP synonyms

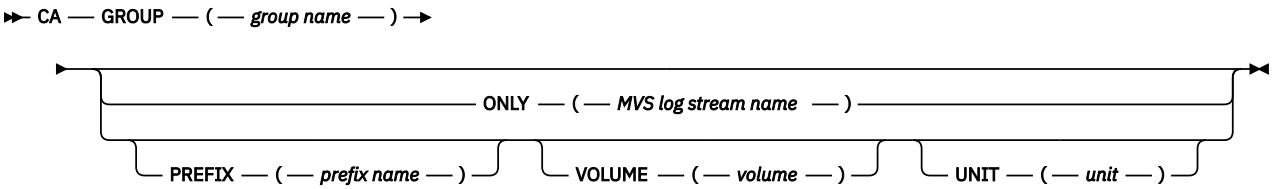
Command or keyword	Synonyms
BLDVRP	BVRP
B1K	B1024
B2K	B2048
B4K	B4096
B8K	B8192

Table 18. BLDVRP synonyms (continued)	
Command or keyword	**Synonyms**
B12K	B12288
B16K	B16384
B20K	B20480
B24K	B24576
B28K	B28672
B32K	B32768

CA: Process all the log records

Use the CA command to define an existing change accumulation group and create or update the change accumulation data set for that group. Use an automated timer process, such as OPC, to regularly submit your change accumulation job.

Format



Keywords

GROUP(*group name*)
Identifies the name of the change accumulation group. The GROUP keyword is required. Only one GROUP keyword is allowed for each CA control statement.

group name
Defines the name of the change accumulation group. This name is 1–36 characters.

ONLY(*MVS log stream name*)
Specifies that CICS VR must consolidate only log records for the VSAM spheres in the change accumulation group from the portion of the log stream that is read. Log records from change accumulation data sets previously created for the same CA group are not used during change accumulation processing.

MVS log stream name
Specifies the name of the MVS log stream that contains the log records that must be consolidated by the CICS VR change accumulation utility. The MVS log stream name is 1–26 characters.

PREFIX(*prefix name*)
Identifies the name of the high level qualifier that is used for the dynamically created change accumulation output data set.

CA creates a unique data set name for each CA output data set using the naming convention, `prefix.CAOUTPUT.Dyyyyddd.Thhmmsst`, where:

prefix
Is the CICS VR data set name, *CICSVR_DSNAME_PREFIX*, defined in the IGDSMSxx PARMLIB member or the prefix specified in the CA command. If both are present and different, the prefix in the CA command is used.

CAOUTPUT
Is a constant to mark this as a CA output data set.

D
Is the abbreviation for the date.

yyyy
Is the year.

ddd
Is the day of the year, in Julian format.

T
Is the abbreviation for the time.

hh
Is the hour of the day, based on a 24-hour clock.

mm
Is the number of minutes.

ss
Is the number of seconds.

t
Is the tenths of a second.

PREFIX is optional. If specified, it overrides any value specified to the CICS VR server address space. Only one PREFIX keyword is allowed for each CA control statement.

prefix name
Defines the name of the high level qualifier that is used for the dynamically created change accumulation output data set. This name is 1 to 8 characters.

VOLUME(*volume*)
Specifies the volume serial number that the change accumulation data set resides on. The VOLUME keyword is required if the output data set is not a SMS-managed data set. The data set name generated by CICS VR change accumulation starts with the prefix specified in the user prefix.

volume
Specifies the volume field, which is 1 - 6 characters.

UNIT(*unit*)
Specifies the device type that the change accumulation data set resides on. The UNIT keyword is required if the output data set is not a SMS-managed data set. The data set name generated by CICS VR change accumulation starts with the prefix specified in the user prefix.

unit
Specifies the unit name, which is 1 - 8 characters.

Usage Notes

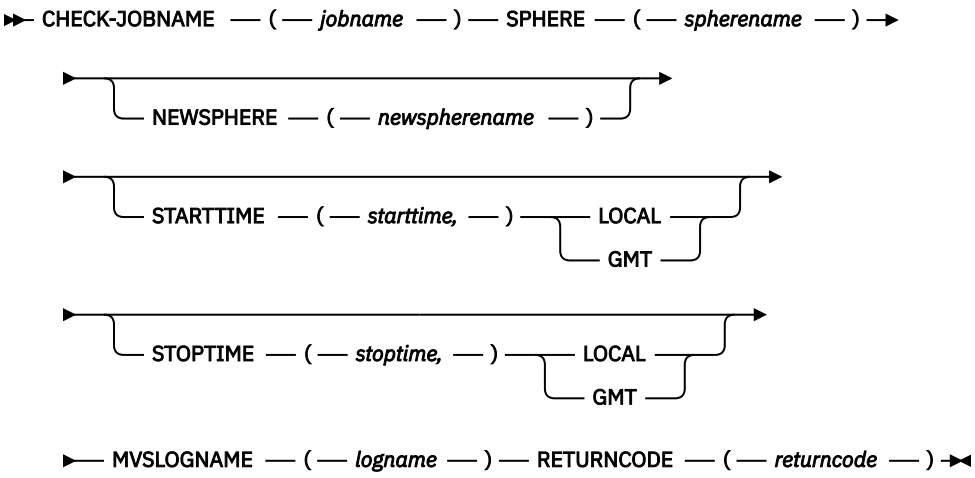
Consider these points when you use the CA command:

- If the CA command is specified, at least one SPHERE command must be specified in the same job.
- You can specify only one CA command per CICS VR change accumulation group run.
- Use CICS VR change accumulation for CICS forward recovery logs; CICS TS autojournals are not supported.
- If the ONLY keyword is specified, the PREFIX, VOLUME, and UNIT keywords cannot be specified.
- If the ONLY keyword is specified, the name of the change accumulation data set must be specified in the DWWCA DD statement in the change accumulation batch job JCL.
- The MVS log stream name parameter only needs to be specified in the ONLY keyword if:
  - This is the first time a CA job for the specified CA group has been submitted with the ONLY keyword specified.
  - The log stream name has changed for the specified CA group.

CHECK: Prevent duplicate recovery runs

Use the CHECK command to prevent a recovery job from running twice in a row.

A step using the CHECK command appears in the generated job automatically if the **Prevent duplicate runs** option is selected on the CICS VR interface panels.



Keywords

JOBNAME (*jobname*)
Specifies a 1– to 8 character name of the job containing the step with the recovery utility to be secured from running twice. JOBNAME is a required keyword.

jobname
Specifies the 1– to 8 character *jobname* specified in the JOB JCL statement of the batch job. The *jobname* is 1 through 8 alphanumeric or national ($, #, @) characters. The first character must be alphabetic or national ($, #, @).

SPHERE (*spherename*)
Specifies the same sphere name as in the following recovery utility step, keyword SPHERE. SPHERE is a required keyword.

STARTTIME(*start date and time*, LOCAL | GMT)
Specifies the same start time value as in following recovery utility step, keyword STARTTIME.

start date and time

Must be in the format yyyy/ddd/hh/mm/ss, where:

- yyyy is the year
- ddd is the day of the year (001 – 366)
- hh is the hour of the day (00 – 23)
- mm is the number of minutes (00 – 59)
- ss is the number of seconds (00 – 59)

You can separate these values with a slash (/), period (.), or colon (:). You can also omit the separator character. For example:

STARTTIME(2007.159/00:30:00)

You cannot substitute commas, blanks, or other similar characters, for the time values, but you can omit values from the right. For example, you can specify day 2007159, time 00:00:00, as follows:

STARTTIME(2007.159)

If you specify the time like this, CICS VR assumes that the day is 2007365 and the time is 00:00:00:

LOCAL
Specifies that the date and time are in local format. LOCAL is the default value.

GMT
Specifies that the date and time are in GMT format.

STOPTIME(*stop date and time*, LOCAL | GMT)
Specifies the same stop time value as in following recovery utility step, keyword STOPTIME.

stop date and time

Must be in the format yyyy/ddd/hh/mm/ss, where:

- yyyy is the year
- ddd is the day of the year (001 – 366)
- hh is the hour of the day (00 – 23)
- mm is the number of minutes (00 – 59)
- ss is the number of seconds (00 – 59)

You can separate these values with a slash (/), period (.), or colon (:). You can also omit the separator character. For example:

STOPTIME(2007.159/00:30:00)

You cannot substitute commas, blanks, or other similar characters, for the time values, but you can omit values from the right. For example, you can specify day 2007159, time 00:00:00, as follows:

STOPTIME(2007.159)

If you specify the time like this, CICS VR assumes that the day is 2007365 and the time is 00:00:00:

LOCAL
Specifies that the date and time are in local format. LOCAL is the default value.

GMT
Specifies that the date and time are in GMT format.

MVSLOGNAME (*logname*)
Specifies the same MVS log name as in following recovery utility step, command MVSLOG, keyword NAME. MVSLOGNAME is a required keyword.

logname

Specifies the name of the MVS log stream. The name is 1 – 26 characters.

RETURNCODE (*returncode*)
Specifies the lowest threshold for the return code of the recovery job, to prevent the following recovery steps from running. For example, if a return code of 4 is specified by this keyword, the following recovery step will not run, if the previous run of the same job completed with return code 4 or higher.

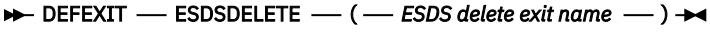
To prevent any duplicate run of the job, specify a return code of 0. RETURNCODE is a required keyword.

Note: To cancel checking for the duplicate runs, you must remove the specific steps with CHECK invocations from the job.

DEFEXIT: Define CICS VR exit names for batch backout

Use the DEFEXIT ESDSDELETE command to request CICS VR batch backout processing to call the specified exit when attempting to back out a record that was added to a VSAM ESDS.

Format



Keywords

ESDSDELETE(*ESDS delete exit name*)

Specifies the name of the ESDS delete exit that CICS VR batch backout processing must call when attempting to back out a record that was added to a VSAM ESDS by a batch job. This exit program updates the record so it is marked-for-deletion. The exit program returns an action code, indicating what action CICS VR batch backout processing must take. The ESDSDELETE keyword must be specified when the specified batch backout processing backs out one or more records that were added to a VSAM ESDS. Refer to Chapter 15, "Implementing exits for forward recovery and backout," on page 317 for more information about creating an ESDS delete exit for use with CICS VR batch backout processing.

ESDS delete exit name

Specifies the name of the ESDS delete exit program load module. The name is 1 through 8 alphanumeric or national ($, #, @) characters. The first character must be alphabetic or national ($, #, @).

Usage Notes

Consider the following points when using the DEFEXIT ESDSDELETE command:

- Only one DEFEXIT ESDSDELETE command can be specified per job step that starts the DWWBACK program.
- DEFEXIT ESDSDELETE must be specified when the specified batch backout processing attempts to back out at least one record that was added to a VSAM ESDS.
- If the exit program is not in the Link List, the exit program must reside in a data set that is defined to the JOBLIB, STEPLIB, or DWWLOAD ddname. You also can keep the exit program in your CICS VR load library.

Examples

- Call the ESDSDEL exit program every time CICS VR batch backout processing must back out a record that was added to a VSAM ESDS:

```
DWWEXIT ESDSDELETE(ESDSDEL)
```

Synonyms

The DEFEXIT synonyms table provides the CICS VR batch backout DEFEXIT commands and keywords along with acceptable synonyms that can be used in place of the full command or keyword name:

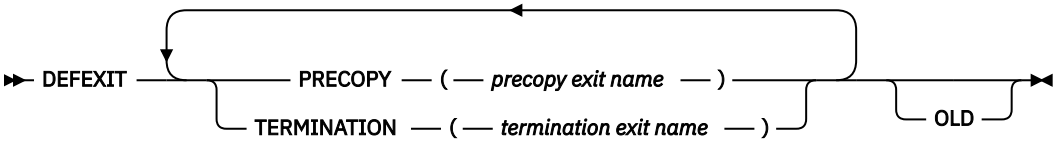
Table 19. DEFEXIT synonyms

Command or keyword	Synonyms
DEFEXIT	X, DX, EXIT, EXITS
ESDSDELETE	ESDSDEL, EDEL

DEFEXIT: Define CICS VR exit names for the log stream copy utility

Use the DEFEXIT command to request CICS VR archive or the log stream copy utility to call one or both of the exits.

Format



Keywords

PRECOPY(*precopy exit name*)
Specifies that the precopy exit must be used. This exit gains control before every log record is written to the output data sets. You can suppress copying log records to the DWWCOPYn output data set if you specify the COPIES(0) keyword in the previous LOGSTREAMCOPY command. You can then use your copy of this record for any purpose. You cannot change the original log record. The PRECOPY keyword is optional; only one PRECOPY keyword is allowed for each DEFEXIT control statement.

precopy exit name
Defines the name of the load module for the precopy exit. This name is 1–8 characters.

TERMINATION(*termination exit name*)
Specifies that the termination exit must be used, and gives the name of the exit program that CICS VR must call. This exit is called when CICS VR archive or the log stream copy utility is about to terminate normally. The TERMINATION keyword is optional; only one TERMINATION keyword is allowed for each DEFEXIT control statement.

termination exit name
Defines the name of the load module for the termination exit. This name is 1–8 characters.

OLD
Specifies that the log stream copy utility provides compatibility for old exit routines implemented in earlier CICS VR releases, that is CICS VR V3R3 and earlier, and CICS VR V4R1 without PK28852 applied. When this keyword is specified, the precopy and termination exits are handled as follows:

- For the precopy exit, the log stream copy utility starts the exit in 24-bit addressing mode, and parameters are passed as pointers to the CICS VR log stream copy record and to the 128-byte work area.
- For the termination exit, CICS VR passes the parameter as a pointer to the 128-byte work area.

Usage Notes

Consider these points when you use the DEFEXIT command:

- This command is optional.
- Do not include a DEFEXIT command automatically in every archive or log stream copy run. Write an exit program for a specific purpose, usually for a specific situation that you have investigated.
- If the exit program is not in the link list, it must reside in a data set that is defined to the JOBLIB, STEPLIB, or DWWLOAD ddname. You also can keep the exit program in your CICS VR load library.
- You can only specify one DEFEXIT command per CICS VR archive or log stream copy run.

Examples

```
DEFEXIT PRECOPY(PRECOPX)                    (1)

DEFEXIT TERMINATION(TERMX)                  (2)
```

Here is an explanation of these DEFEXIT commands:

1
In this CICS VR run, the precopy exit is given control before every log record is copied to the output data sets.

2
In this CICS VR run, the termination exit is given control when CICS VR is about to terminate.

Synonyms

The DEFEXIT Synonyms table provides DEFEXIT commands or keywords and the acceptable synonyms to use in place of those commands or keywords.

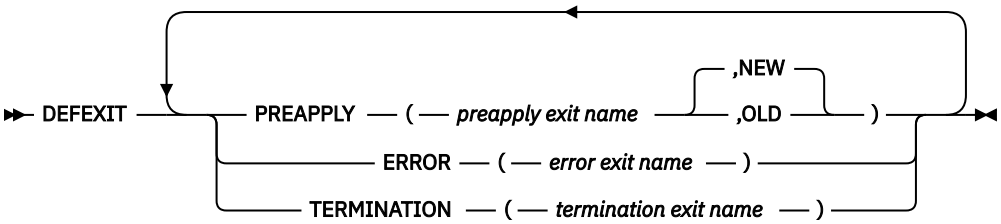
Table 20. DEFEXIT Synonyms

Command or keyword	Synonyms
DEFEXIT	X, DX, EXIT, EXITS
PRECOPY	COPY
TERMINATION	TERM

DEFEXIT: Define CICS VR exit names for forward recovery

Use the DEFEXIT command to request CICS VR to call one or more of the exits.

Format



Keywords

PREAPPLY(*preapply exit name*,NEW | OLD)
Specifies that the preapply exit must be used and gives the name of the exit program that CICS VR must call. Before every update that is made to the VSAM data set, CICS VR passes the log record and the corresponding data set record, unless the update is an add, to the exit program. The exit program, which can change the log record, must return an action code telling CICS VR which action to take. The PREAPPLY keyword is optional, and only one PREAPPLY keyword is allowed for each DEFEXIT command.

***preapply exit name*,NEW | OLD**
Defines the name of the load module for the preapply exit. This name is 1–8 characters.

The NEW and OLD keywords are optional; if neither are specified, the default preapply exit type of NEW is used. If you are using CICS Transaction Server logs, specify NEW or use the default.

ERROR(*error exit name*)
Specifies that the error exit must be used, and gives the name of the exit program that CICS VR must call. When an I/O error occurs, CICS VR passes an error code and relevant error information to the exit program. The exit program must return an action code telling CICS VR which action to take. The ERROR keyword is optional, and only one ERROR keyword is allowed for each DEFEXIT command. If CICS VR meets a serious error and no error exit is provided, CICS VR issues the following message and terminates:

DWW0212S
Preceding I/O error has forced termination.

error exit name
Defines the name of the load module for the error exit. This name is 1–8 characters.

TERMINATION(*termination exit name*)
Specifies that the termination exit must be used, and gives the name of the exit program that CICS VR must call. When CICS VR is about to end normally, CICS VR passes the completion code to the exit program. The exit program can then change the completion code and return an action code telling CICS VR what action to take. The TERMINATION keyword is optional; only one TERMINATION keyword is allowed for each DEFEXIT command.

termination exit name
Defines the name of the load module for the termination exit. This name is 1–8 characters.

Usage Notes

Consider the following when using the DEFEXIT command:

- This command is optional.
- You can only specify one DEFEXIT command per CICS VR step.
- Do not include a DEFEXIT command automatically in every recovery run

  Write an error exit program that is appropriate for that situation.
- If the exit program is not in the link list, it must reside in a data set that is defined to the JOBLIB, STEPLIB, or DWWLOAD ddname. You also can keep the exit program in your CICS VR load library. If CICS VR cannot find the exit program, the following message is issued and CICS VR ends:

  DWW0206S
  The exit load module *xxxx* cannot be found.

Examples

```
DEFEXIT PREAPPLY(PREAPP)              (1)

DEFEXIT ERROR(ERRX) -                 (2)
       TERMINATION(TERMX)
```

Here is an explanation of these DEFEXIT commands:

1
The PREAPPLY keyword specifies the name of the preapply exit program, PREAPP. CICS VR passes the log record and the file to PREAPP. PREAPP can modify the record if needed, update the log, and return an action code back to CICS VR.

2
The ERROR keyword specifies the name of the error exit program, ERRX. CICS VR calls ERRX when an I/O error occurs and passes it information about the error. If there are logical errors on a VSAM sphere, ERRX might be able to correct them and then pass an appropriate action code back to CICS VR.

The TERMINATION keyword specifies the name of the termination program, TERMX. CICS VR calls TERMX just before CICS VR terminates. If, in the same run, an I/O error occurs while CICS VR is reading one of the logs or processing a VSAM file, TERMX might be able to recover, change the completion code accordingly, and return an action code back to CICS VR.

Synonyms

The DEFEXIT Synonyms table provides the DEFEXIT commands or keywords and the acceptable synonyms that can be used in place of those commands or keywords:

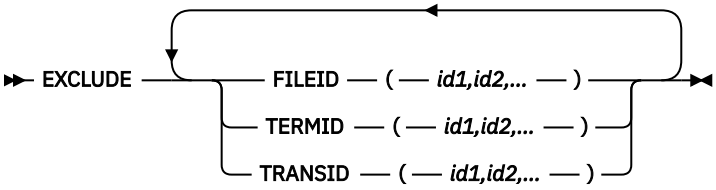
Table 21. DEFEXIT Synonyms

Command or keyword	Synonyms
DEFEXIT	X, DX, EXIT, EXITS
ERROR	ERR
ESDSDELETE	ESDSDEL, EDEL
PREAPPLY	PREAPP, PRE
TERMINATION	TERM

EXCLUDE: Exclude specific log records

Use the EXCLUDE command to eliminate specific log records, after images, from the forward recovery processing, logstreamcopy processing or journal print processing.

Format



Keywords

FILEID(*id1,id2,...*)

Specifies that CICS VR must ignore any log records, after images, with these file IDs when performing the forward recovery. If more than one keyword is specified, for example, EXCLUDE FILEID(DD1),TERMID(TST1), the log record must match both IDs specified for it to be excluded.

id1,id2,...

Specifies the file ID defined to CICS. id1, id2, for example, can be 1-8 characters. Up to 99 IDs can be specified for one FILEID. If more than one ID is specified on the FILEID keyword, a log record only needs to match one of the specified file IDs to be excluded.

TERMID(*id1,id2,...*)

Specifies that CICS VR must ignore any log records, after images, with these terminal IDs when performing the forward recovery. If more than one keyword is specified, for example, EXCLUDE FILEID(DD1),TERMID(TST1), the log record must match both IDs specified for it to be excluded.

id1,id2,...

Specifies the terminal ID defined to CICS. id1, id2, for example, can be 1-4 characters. Up to 99 IDs can be specified for one TERMID. If more than one ID is specified on the TERMID keyword, a log record only needs to match one of the specified terminal IDs to be excluded.

TRANSID(*id1,id2,...*)

Specifies that CICS VR must ignore any log records, after images, with these transaction IDs when performing the forward recovery. If more than one keyword is specified, for example, EXCLUDE TRANSID(APQ1),TERMID(TST1), the log record must match both IDs specified for it to be excluded.

id1,id2,...

Specifies the transaction ID defined to CICS. id1, id2, for example, can be 1-4 characters. Up to 99 IDs can be specified for one TRANSID. If more than one ID is specified on the TRANSID keyword, a log record only needs to match one of the specified transaction IDs to be excluded.

Usage Notes

Consider the following when using the EXCLUDE command:

- At least one keyword must be specified for each EXCLUDE command.
- Multiple EXCLUDE commands and INCLUDE commands can be specified in the same job step. When this occurs, CICS VR processes a log record against all EXCLUDE commands before it processes the log record against all INCLUDE commands. For each log record, if the EXCLUDE criteria is met, the record is excluded. If the EXCLUDE criteria is not met, then CICS VR matches the log record against the next EXCLUDE command. When the log record has been examined against all the EXCLUDE commands, CICS VR examines the log record against the first INCLUDE command, if the log record was not excluded by any of the EXCLUDE commands. If the INCLUDE criteria is met, then the record is applied to the VSAM sphere being recovered. If it is not met, CICS VR matches the record against the next INCLUDE command. If the log record does not match any of the INCLUDE commands, this log record is not applied to the VSAM sphere being recovered. CICS VR repeats this process for the next log record by first matching it against the EXCLUDE commands, then the INCLUDE commands.
- If one or more EXCLUDE commands are entered and no INCLUDE commands are entered, all log records that do not match the entered exclude criteria is applied. For example, if you specify:

  ```
  EXCLUDE FILEID(DD1),TERMID(T1)
  ```

  CICS VR ignores log records that have a file ID of DD1 **and** terminal ID of T1. If you want CICS VR to ignore log records that have a file ID of DD2 **or** terminal ID of T2, you must specify two EXCLUDE commands as follows:

  ```
  EXCLUDE FILEID(DD2)
  EXCLUDE TERMID(T2)
  ```

- There is no limitation on the number of EXCLUDE (and INCLUDE) commands that can be specified.
- You can specify up to 99 IDs on each keyword.
- If you specify INCLUDE or EXCLUDE commands that eliminate all of the records, no records are applied.
- Avoid specifying EXCLUDE and INCLUDE criteria that conflict (for example, INCLUDE FILEID(DD1) and EXCLUDE FILEID(DD1)). If conflicting criteria is specified, no records are applied to the VSAM sphere being recovered. No error messages are produced.

CICS VR cannot perform a selective forward recovery using change accumulation data sets. Verify that the APPLYCA keyword is not specified on the RECOVER command when the EXCLUDE or INCLUDE command is specified in the same job step.

Examples

```
EXCLUDE FILEID(DD3) TRANSACTIONID(APQ4)             |1|
EXCLUDE TERMINALID(TST2)                            |2|
```

Assume these two EXCLUDE commands are specified in one job step. The two EXCLUDE commands tell CICS VR to:

```
|1| Exclude all records that have both a file id of DD3 and
      transaction id of APQ4,  or
|2| Exclude all records that have a terminal id of TST2.
```

```
INCLUDE FILEID(DD1,DD2)                              |3|
INCLUDE FILEID(DD3) TERMINALID(TST1)                 |4|
INCLUDE FILEID(DD4) TRANSACTIONID(APQ1,APQ2,APQ3)    |5|
EXCLUDE FILEID(DD3) TRANSACTIONID(APQ4)              |1|
EXCLUDE TERMINALID(TST2)                             |2|
```

Assume these five commands are specified in one job step. Since multiple EXCLUDE and INCLUDE commands are specified in one step, CICS VR process es a log record against all EXCLUDE commands before the log record is processed against all INCLUDE commands.

```
|1| Exclude all records that have both a file id of DD3 and
      transaction id of APQ4, or
|2| Exclude all records that have a terminal id of TST2.
```

So far, this example is exactly the same as the previous example. When the log record has been processed using the exclude criteria, it is processed using the include criteria. If the log record was not excluded by the EXCLUDE command:

```
|3| Include all records that have a file id of DD1
      or DD2, or
|4| Include all records that have a file id of DD3
      and terminal id of TST1, or
|5| Include all records that have a fileid of DD4 and
      transaction id of APQ1, APQ2, or APQ3
```

Synonyms

The EXCLUDE synonyms table provides the EXCLUDE commands or keywords along with acceptable synonyms that can be used in place of the commands or keywords:

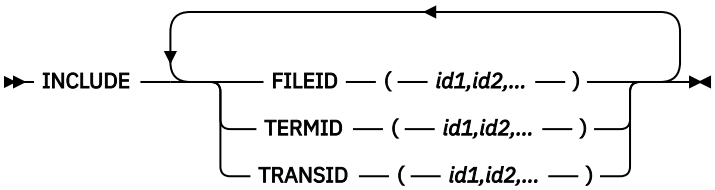
Table 22. EXCLUDE synonyms

Command or keyword	Synonyms
FILEID	DD, DDNAME
TERMID	TERMINALID
TRANSID	TRANSACTIONID

INCLUDE: Only use specific log records

Use the INCLUDE command to selectively include specific log records, after images, in the forward recovery processing, logstreamcopy processing or journal print processing.

Format



Keywords

FILEID(*id1,id2,...*)

Specifies that CICS VR must use only log records, after images, with these file IDs when performing the forward recovery. If more than one keyword is specified, for example, INCLUDE FILEID(DD1),TERMID(TST1), the log record must match both IDs specified for it to be included.

id1,id2,...
Specifies the file ID defined to CICS. id1, id2, for example, can be 1-8 characters. Up to 99 IDs can be specified for one FILEID. If more than one ID is specified on the FILEID keyword, a log record only needs to match one of the specified file IDs to be included.

TERMID(*id1,id2,...*)
Specifies that CICS VR must use only log records, after images, with these terminal IDs when performing the forward recovery. If more than one keyword is specified, for example, INCLUDE FILEID(DD1),TERMID(TST1), the log record must match both IDs specified for it to be included.

id1,id2,...
Specifies the terminal ID defined to CICS. id1, id2, for example, can be 1-4 characters. Up to 99 IDs can be specified for one TERMID. If more than one ID is specified on the TERMID keyword, a log record only needs to match one of the specified terminal IDs to be included.

TRANSID(*id1,id2,...*)
Specifies that CICS VR must use only log records, after images, with these transaction IDs when performing the forward recovery. If more than one keyword is specified, for example, INCLUDE TRANSID(DD1),TERMID(TST1), the log record must match both IDs specified for it to be included.

id1,id2,...
Specifies the transaction ID defined to CICS. id1, id2, for example, can be 1-4 characters. Up to 99 IDs can be specified for one TRANSID. If more than one ID is specified on the TRANSID keyword, a log record only needs to match one of the specified transaction IDs to be included.

Usage Notes

Consider the following when using the INCLUDE command:

- Multiple INCLUDE commands and EXCLUDE commands can be specified in the same job step. When this occurs, CICS VR processes a log record against all EXCLUDE commands before it processes the log record against all INCLUDE commands. For each log record, if the EXCLUDE criteria is met, the record is excluded. If the EXCLUDE criteria is not met, then CICS VR matches the log record against the next EXCLUDE command. When the log record has been examined against all the EXCLUDE commands, CICS VR examines the log record against the first INCLUDE command, if the log record was not excluded by any of the EXCLUDE commands. If the INCLUDE criteria is met, or if no INCLUDE commands were specified, then the record is applied to the VSAM sphere being recovered. If it is not met, then CICS VR matches the record against the next INCLUDE command. If the log record does not match any of the INCLUDE commands, this log record is not applied to the VSAM sphere being recovered. CICS VR repeats this process for the next log record by first matching it against the EXCLUDE commands, then the INCLUDE commands.
- If one or more INCLUDE commands are entered and no EXCLUDE commands are entered, all log records that match the entered include criteria is applied. For example, if you specify:

  ```
  INCLUDE FILEID(DD1),TERMID(T1)
  ```

  CICS VR uses log records that only have a file ID of DD1 **and** terminal ID of T1. If you want CICS VR to only use log records that have a file ID of DD1 **or** terminal ID of T1, you must specify two INCLUDE commands as follows:

  ```
  INCLUDE FILEID(DD1)
  INCLUDE TERMID(T1)
  ```

- There is no limitation on the number of INCLUDE (and EXCLUDE) commands.
- You can specify up to 99 IDs on each keyword.
- If you specify INCLUDE or EXCLUDE commands that eliminate all of the records, no records are applied.
- Avoid specifying INCLUDE and EXCLUDE criteria that conflict (for example, INCLUDE FILEID(DD1) and EXCLUDE FILEID(DD1)). If conflicting criteria is specified, no records are applied to the VSAM sphere being recovered. No error messages are produced.

CICS VR cannot perform a selective forward recovery using change accumulation data sets. Verify that the APPLYCA keyword is not specified on the RECOVER command when the INCLUDE or EXCLUDE command is specified in the same job step.

Examples

```
INCLUDE FILEID(DD3) TRANSACTIONID(APQ4)      |1|
INCLUDE TERMINALID(TST2)                     |2|
```

Assume these two INCLUDE commands are specified in one job step. The two INCLUDE commands tell CICS VR to:

```
|1| Include all records that have both a file id of DD3
      and transaction id of APQ4, or
|2| Include all records that have a terminal id of TST2.
```

```
INCLUDE FILEID(DD1,DD2)                              |3|
INCLUDE FILEID(DD3) TERMINALID(TST1)                 |4|
INCLUDE FILEID(DD4) TRANSACTIONID(APQ1,APQ2,APQ3)    |5|
EXCLUDE FILEID(DD3) TRANSACTIONID(APQ4)              |1|
EXCLUDE TERMINALID(TST2)                             |2|
```

Assume these five commands are specified in one job step. Since multiple EXCLUDE or INCLUDE commands are specified in one step, CICS VR processes a log record against all EXCLUDE commands before the log record is processed against all INCLUDE commands.

```
|1| Exclude all records that have both a file id of DD3 and
      transaction id of APQ4, or
|2| Exclude all records that have a terminal id of TST2.
```

If the log record was not excluded by any of the EXCLUDE commands, it is processed using the include criteria. For the remaining records, the log records that were not excluded by the EXCLUDE command.

```
|3| Include all records that have a file id of DD1 or DD2, or
|4| Include all records that have a file id of DD3 and
      terminal id of TST1, or
|5| Include all records that have a fileid of DD4 and transaction
      id of APQ1, APQ2, or APQ3.
```

Synonyms

The EXCLUDE synonyms table provides the INCLUDE commands or keywords along with acceptable synonyms that can be used in place of the commands or keywords:

Table 23. EXCLUDE synonyms

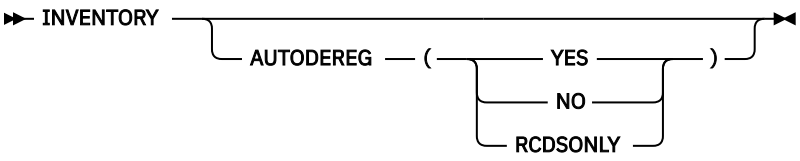
Command or keyword	Synonyms
FILEID	DD, DDNAME
TERMID	TERMINALID
TRANSID	TRANSACTIONID

INVENTORY: Start automatic deregistration

Use the INVENTORY command to start CICS VR automatic deregistration function.

For more information about automatic deregistration, see “Understanding CICS VR automatic deregistration” on page 117.

Format



Keywords

AUTODEREG(YES | NO | RCDSONLY)
Specifies if the automatic deregistration function must be started. The automatic deregistration parameters must be set in the CICS VR dialog if you want automatic deregistration of RCDS entries that are older than the specified retention criteria.

YES
Specifies that automatic deregistration is to be started. The default value is YES.

NO
Specifies that automatic deregistration must not be started.

RCDSONLY
Specifies that automatic deregistration is to be started, but MVS log blocks will not be deleted.

Note: AUTODEREG is an optional keyword. The default value is **YES**.

Synonyms

The INVENTORY Synonyms table provides AUTODEREG commands or keywords along with acceptable synonyms to use in place of the commands or keywords:

Table 24. INVENTORY Synonyms

Keyword	Synonyms
INVENTORY	INV
AUTODEREG	DEREG

Usage notes

1. Use the INVENTORY command if you want to run the CICS VR automatic deregistration function without previously scanning a log of logs because the LOGOFLOGS command scans a log of logs. For more information about the LOGOFLOGS command, “LOGOFLOGS: Process a log of logs” on page 260.
2. If AUTODEREG(RCDSONLY) is specified, it works when CICS VR finds the retention criteria for logstream blocks, or individual retention periods for logstreams are met. For other retention criteria, for example, backup, or change accumulation, CICS VR can delete and uncatalog certain entities when they are deregistered from the RCDS.

This sample JCL shows how to run CICSVR automatic deregistration function.

```
------------------------------------------------------------------------------------------------
//JOBINVN JOB MSGCLASS=X,CLASS=A,MSGLEVEL=(1,1),REGION=0M
//* CICSVR PROGRAM
//STEP1 EXEC PGM=DWWAR
//* LIBRARY CONTAINING CICSVR PROGRAMS
//STEPLIB DD DSN=DWW.SDWWLOAD,DISP=SHR
// DD DSN=DWW.SDWWLENU,DISP=SHR
//DWWMSG DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//* CICSVR RECOVERY CONTROL DATA SET NAMES
//DWWCON1 DD DSN=DWW.DWWCON1,DISP=SHR
//DWWCON2 DD DSN=DWW.DWWCON2,DISP=SHR
//DWWCON3 DD DSN=DWW.DWWCON3,DISP=SHR
//DWWIN DD *
 INVENTORY AUTODEREG(YES)
------------------------------------------------------------
```

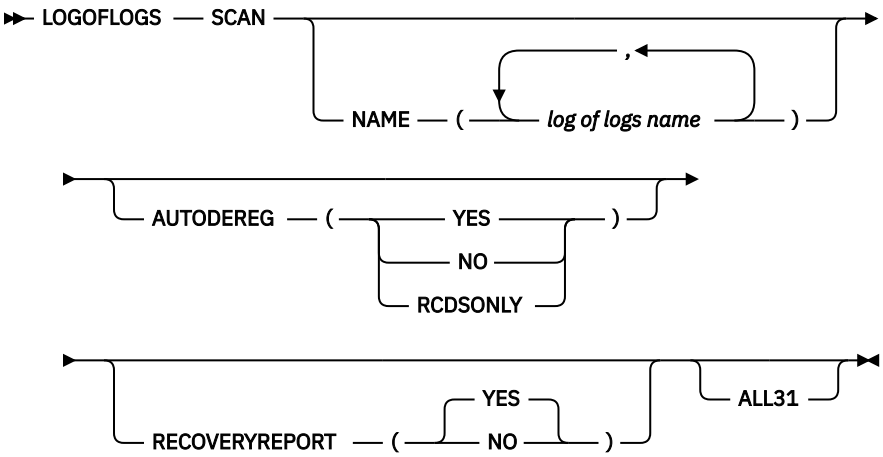
Figure 105. Sample job to run the INVENTORY command

LOGOFLOGS: Process a log of logs

Use the LOGOFLOGS command to scan a CICS TS log of logs, register the VSAM spheres in the RCDS, and store other essential recovery information in the RCDS.

See "Defining the log of logs" on page 130 for a description of the information in a log of logs.

Format



Keywords

SCAN

Scans all log of logs that are registered in the RCDS and updates the RCDS with the information from those log of logs.

NAME*(log of logs name)*

Specifies that only the listed log of logs must be scanned. The NAME keyword is optional. If the NAME keyword is not specified, all of the log of logs registered to CICS VR is scanned. The NAME keyword is only valid when the SCAN keyword is specified on the LOGOFLOGS command.

(log of logs name)

Specifies the name of the log of logs to be scanned. Up to 256 log of logs names can be specified. Each listed log of logs name must be registered to CICS VR.

AUTODEREG(YES | NO | RCDSONLY)

Specifies if the automatic deregistration function must be started. The automatic deregistration parameters must be set in the CICS VR dialog if you want automatic deregistration of RCDS entries that are older than the specified retention criteria.

YES
Specifies that automatic deregistration is to be started.

NO
Specifies that automatic deregistration must not be started.

RCDSONLY
Specifies that the automatic deregistration is to be started, but MVS log blocks will not be deleted.

Note: AUTODEREG is an optional keyword. The default value is determined by the presence or absence of the optional NAME keyword. If the NAME keyword has not been specified the default value is **YES**. If the NAME keyword is specified the default value is **NO**.

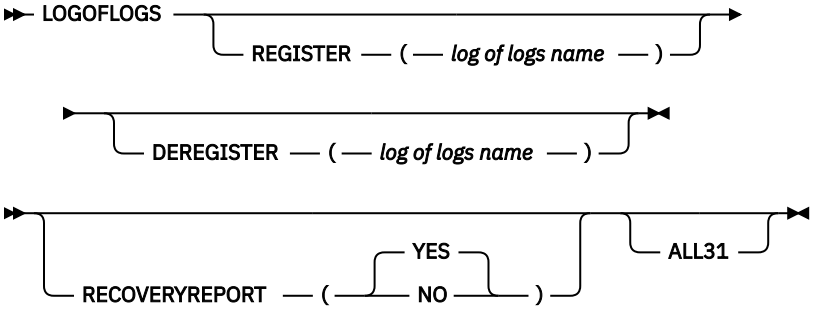
RECOVERYREPORT(YES | NO)
Specifies if the recovery report must be printed. The RECOVERYREPORT keyword is only valid when the SCAN keyword is specified on the LOGOFLOGS command.

NO
Specifies no report is required.

YES
Specifies that a recovery report is produced for all the spheres on all the log of logs that are also registered in the RCDS. The report contains all the changes to the spheres since the last LOGOFLOGS SCAN was run. Yes is the default value.

ALL31
This is an optional parameter. It specifies that the report utility can carve memory up to the bar i.e., up to 2GB storage to generate the report. It's recommended using this parameter to avoid S878 abend during the process.

Format



Keywords

REGISTER*(log of logs name)*
Registers a log of logs in the RCDS

log of logs name
Is the name of the log of logs. The name is 1–26 characters.

DEREGISTER*(log of logs name)*
Deregisters the log of logs from the RCDS. DEREGISTER removes all information about the log of logs from the RCDS.

log of logs name
Is the name of the log of logs. The name is 1–26 characters.

ALL31
This is an optional parameter, specifies the report utility can carve memory up to the bar i.e., up to 2GB storage to generate the report. It's recommended using this parameter to avoid S878 abend during the process.

Usage Notes

Consider these points when using the LOGOFLOGS command:

- The LOGOFLOGS command is started by the CICS VR module DWWAR. Each time that scan is run, CICS VR begins at the point in which the last scan ended.
- Never run scan at your disaster recovery site unless your disaster recovery site has been converted to your primary site and CICS is actively running and recording open and close information in the log of logs.
- You can also process a log of logs using the ISPF dialog interface. For more information about processing the log of logs using the ISPF dialog interface, refer to *CICS VR User's Guide*.
- For more information about log of logs, see "Defining the log of logs" on page 130.
- To keep your RCDS up-to-date, set up a batch log of logs scan job so that it is submitted regularly with a production planning system, such as Tivoli Workload Scheduler for z/OS. See "Setting up the log of logs scan utility (scan)" on page 96 for more information on log of logs scan.
- You must register a log of logs in the RCDS the first time it is used by CICS VR. You can register, or deregister, log of logs entries in the RCDS through the ISPF dialog interface or through a batch job.
- If the log of logs is switched to another log stream, ensure that you have completed the scan on all the records in the previous log stream before you change the scan to run on the new log stream. If the scan is not completed on the previous log stream, log record changes might be skipped on VSAM data set forward recovery.

Examples

```
LOGOFLOGS SCAN                                    1

LOGOFLOGS SCAN AUTODEREG(NO)     -            2
          RECOVERYREPORT(YES)

LOGOFLOGS SCAN NAME(LOGOFLOG.J01,LOGOFLOG.J02)     3
```

Here is an explanation of each of these LOGOFLOGS commands:

1
Scan all the log of logs that are registered in the RCDS.

2
Scan all the log of logs registered in the RCDS. Because AUTODEREG is set to NO, CICS VR automatic deregistration does not occur. A recovery report is produced for all the log of logs that are scanned and registered in the RCDS.

3
Only the *LOGOFLOG.J01* and *LOGOFLOG.J02* log of logs is scanned.

Synonyms

The LOGOFLOGS Synonyms table provides LOGOFLOGS commands or keywords along with acceptable synonyms to use in place of the commands or keywords:

Table 25. LOGOFLOGS Synonyms

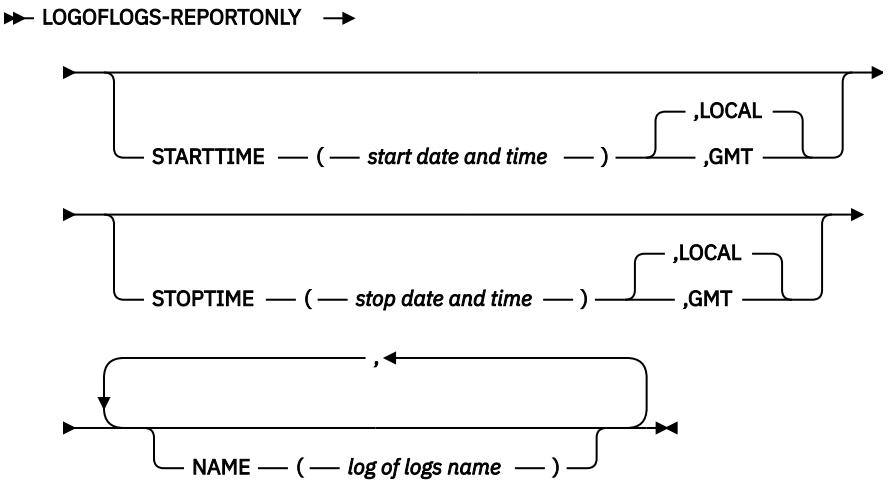
Command, keyword or value	Synonyms
LOGOFLOGS	LOL
RECOVERYREPORT	RECREP
AUTODEREG	DEREG

Table 25. LOGOFLOGS Synonyms (continued)	
Command, keyword or value	**Synonyms**
REGISTER	REG
DEREGISTER	DEREG

LOGOFLOGS REPORTONLY: produce a report of log of logs information

Use the LOGOFLOGS REPORTONLY command to produce a report of the contents of the log of logs. The LOGOFLOGS REPORTONLY command does not update the RCDS with recovery information or run automatic deregistration.

Format



Keywords

STARTTIME(*start date and time*, LOCAL | GMT)

Specifies the earliest timestamp of the log records that CICS VR must read from the log of logs and include in the output report. STARTTIME is an optional keyword, and if it is omitted, CICS VR begins reading the first log record that appears in the log of logs.

start date and time

Must be in the format yyyy/ddd/hh/mm/ss, where:

yyyy - four digits of the year (1900 - 2999)
ddd - day of the year (001 - 366)
hh - hour of the day (00 - 23)
mm - number of minutes (00 - 59)
ss - number of seconds (00 - 59)

You can separate these values with a slash(/), period(.), colon(:), or space.

LOCAL

Specifies the date and time are in local format. LOCAL is an optional keyword, and is the default value.

GMT

Specifies the date and time are in Greenwich Mean Time (GMT) format. GMT is an optional keyword.

STOPTIME(*stop date and time*, LOCAL | GMT)
Specifies the latest timestamp of the log records that CICS VR must read from the log of logs and include in the output report. STOPTIME is an optional keyword, and if it is omitted, CICS VR reads log records from either the start date and time, if STARTTIME is specified, or the beginning of the log of logs, if STARTTIME is not specified, to the end of the log of logs.

stop date and time
Must be in the format yyyy/ddd/hh/mm/ss, where:

yyyy - four digits of the year (1900 - 2999)
ddd - day of the year (001 - 366)
hh - hour of the day (00 - 23)
mm - number of minutes (00 - 59)
ss - number of seconds (00 - 59)

You can separate these values with a slash(/), period(.), colon(:), or space.

LOCAL
Specifies the date and time are in local format. LOCAL is an optional keyword, and is the default value.

GMT
Specifies the date and time are in Greenwich Mean Time (GMT) format. GMT is an optional keyword.

NAME(*log of logs name*)
Specifies that CICS VR must only produce a report of the listed log of logs. The NAME keyword is optional, and if it is omitted, all of the log of logs registered to CICS VR is read by CICS VR.

log of logs name
Specifies the name of the log of logs that CICS VR must read as input to the produced report. A maximum of 256 log of logs names can be specified. Each listed log of logs must be registered to CICS VR.

Usage Notes

The LOGOFLOGS REPORTONLY command produces a report only of the log records that were read on the log of logs by CICS VR. The RCDS is not updated, and automatic deregistration is not run.

Examples

This example produces a report of the log records read on all registered log of logs that have a timestamp between 2007.325/11:59:59 and 2008.012/11:59:59 in local format.

```
LOGOFLOGS REPORTONLY STARTTIME(2007.325/11:59:59)   -
                     STOPTIME(2008.012/11:59:59)
```

Synonyms

The LOGOFLOGS REPORTONLY Synonym table shows LOGOFLOGS REPORTONLY command with acceptable synonym:

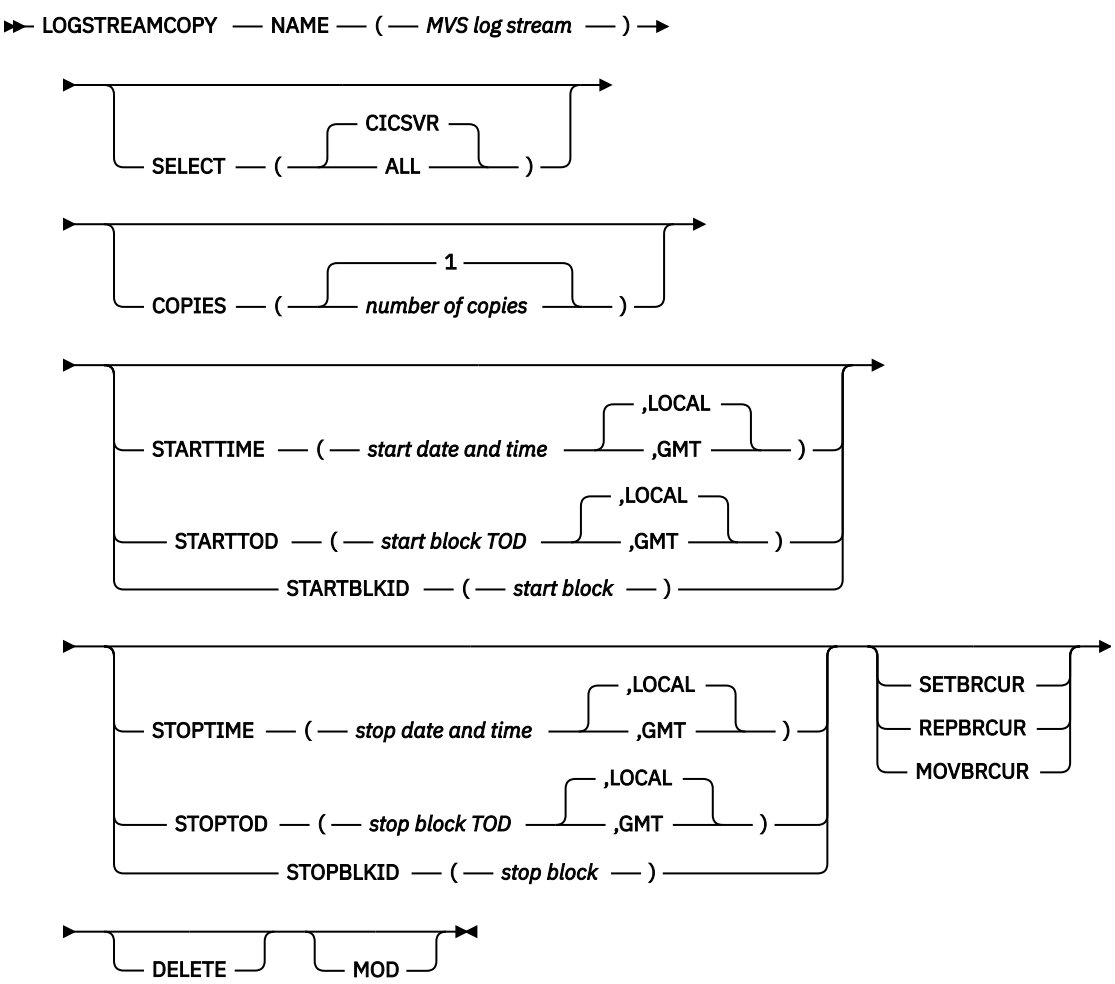
Table 26. LOGOFLOGS REPORTONLY Synonym

Command, keyword or value	Synonyms
LOGOFLOGS	LOL

LOGSTREAMCOPY: Copy an MVS log stream

Use the LOGSTREAMCOPY command to copy an MVS log stream to a sequential access method (SAM) data set. Information about the copy is stored in the RCDS.

Format



Keywords

NAME(*MVS log stream*)
Specifies the name of the MVS log stream.

MVS log stream
Is the name of the MVS log stream. The name is 1–26 characters.

SELECT(CICSVR|ALL)
Specifies the records that you want to copy. You can specify one of the following values: (CICSVR) or (ALL).

CICSVR
Specifies records produced by CICS and CICS VR batch logging are to be copied from the MVS log stream. **CICSVR** is the default value. For compatibility purposes, the value **CICS** is also accepted for the SELECT keyword, **CICS** has the same meaning as the value **CICSVR**.

ALL
Specifies all records are to be copied from the MVS log stream.

COPIES(1 | *number of copies*)
Specifies whether the MVS log stream is to be copied to another data set.

number of copies
Specifies the number of copies to be made from the input MVS log stream. The COPIES keyword is optional; if it is not specified, the default value of 1 is used.

- If COPIES(0) is specified, no copy is made, and a report is produced, see Figure 54 on page 99. For example, you could use this keyword if you do not need to create a copy of the log stream, but you want to process the log stream records using your own exit program, see "DEFEXIT: Define CICS VR exit names for the log stream copy utility" on page 251. "Usage Notes" on page 271 has more information about the use of COPIES(0).
- If the number of copies specified is greater than zero, the MVS log stream is copied to the data sets named on the corresponding ddnames, DWWCOPY*n*, where *n* is a number, 1–9, that you specify on the COPIES keyword.

STARTTIME(*start date and time*,LOCAL | GMT)
Identifies the earliest timestamp that you want to copy the MVS log stream from. CICS VR ignores all records for this MVS log stream whose timestamp is earlier than the time specified in the STARTTIME keyword. CICS VR copies records from this place in the log.

Only one STARTTIME keyword is allowed for each LOGSTREAMCOPY control statement. You only need to specify STARTTIME the first time you run the log stream copy utility. Following log stream copy runs continues from the point on the MVS log stream after the last copy.

If you do not specify STARTTIME, STARTTOD, or STARTBLKID, the MVS log stream is copied from the beginning of the log, or after the point of the last copy.

Do not use the STARTTIME keyword with the SETBRCUR, REPBRCUR, or MOVBRCUR keywords.

start date and time
Must be in the format **yy/ddd/hh/mm/ss**, where:

- **yy** is the last two digits of the year (00–99)
- **ddd** is the day of the year (001–366)
- **hh** is the hour of the day (00–23)
- **mm** is the number of minutes (00–59)
- **ss** is the number of seconds (00–59)

You can separate these values with a slash (/), period (.), or colon (:). You can also omit the separator character. For example:

```
STARTTIME(08.159/22:23:00)
```

You cannot substitute commas, blanks, and so on, for the time values, but you can omit values from the right. For example, if you specify STARTTIME(01.159), CICS VR assumes that the time segment is 00:00:00.

CICS VR interprets year values (**yy**) in the range 00–85 to be years 2000–2085, and year values in the range 86–99 to be years 1986–1999.

LOCAL
Specifies that the date and time are in local format. LOCAL is the default value.

GMT
Specifies that the date and time are in Greenwich mean time (GMT) format.

STARTTOD(*start block TOD*,LOCAL | GMT)
Identifies the earliest timestamp that you want to copy the MVS log stream from. STARTTOD lets you specify this in a more granular format than STARTTIME. CICS VR ignores all records for this MVS log stream whose TOD timestamp is earlier than the time specified in the STARTTOD keyword. CICS VR copies records from this place in the log.

Only one STARTTOD keyword is allowed for each LOGSTREAMCOPY control statement. You only need to specify STARTTOD the first time you run the log stream copy utility. Following log stream copy runs continue from the point on the MVS log stream after the last copy.

If you do not specify STARTTIME, STARTTOD, or STARTBLKID, the MVS log stream is copied from the beginning of the log, or after the point of the last copy.

Do not use the STARTTOD keyword with the SETBRCUR, REPBRCUR, or MOVBRCUR keywords.

start block TOD
A timestamp in the TOD format, for example:

```
STARTTOD(BF1758AE97C2A000)
```

LOCAL
Specifies that the TOD timestamp is in local format. LOCAL is the default value.

GMT
Specifies that the TOD timestamp is in Greenwich mean time (GMT) format.

STARTBLKID(*start block*)
Identifies the block ID from which the records are to be copied. CICS VR ignores all records for this MVS log stream before the block ID specified in the STARTBLKID keyword.

Only one STARTBLKID keyword is allowed for each LOGSTREAMCOPY control statement.

If you do not specify STARTBLKID, STARTTOD, or STARTTIME, the MVS log stream is copied from the beginning of the log.

Do not use the STARTBLKID keyword with the SETBRCUR, REPBRCUR, or MOVBRCUR keywords.

start block
Is the block ID on the MVS log stream. You must specify the exact block ID.

STOPTIME(*stop date and time*,LOCAL | GMT)
Identifies the latest timestamp that you want to copy the MVS log stream from. CICS VR ignores all records for this MVS log stream whose timestamp is later than the time specified in the STOPTIME keyword. CICS VR copies records up to this place in the log.

Only one STOPTIME keyword is allowed for each LOGSTREAMCOPY control statement.

If you do not specify STOPTIME, STOPTOD, or STOPBLKID, the copy ends at job run time.

Do not use the STOPTIME keyword with the REPBRCUR or MOVBRCUR keywords.

stop date and time
Must be in the format **yy/ddd/hh/mm/ss**, where:

- **yy** is the last two digits of the year (00–99)
- **ddd** is the day of the year (001–366)
- **hh** is the hour of the day (00–23)
- **mm** is the number of minutes (00–59)
- **ss** is the number of seconds (00–59)

You can separate these values with a slash (/), period (.), or colon (:). You can also omit the separator character. For example:

```
STOPTIME(01.159/00:30:00)
```

You cannot substitute commas, blanks, and so on, for the time values, but you can omit values from the right. For example, you can specify day 01159, time 23:59:59, as follows:

```
STOPTIME(01.159)
```

If you specify this, CICS VR assumes that the day is 01365 and the time is 23:59:59:

```
STOPTIME(01)
```

CICS VR assumes that these values are for day 01159, and time 16:59:59:

```
STOPTIME(0115916)
```

CICS VR interprets year values (**yy**) in the range 00–85 to be years 2000–2085, and year values in the range 86–99 to be years 1986–1999.

LOCAL
Specifies that the date and time are in local format. LOCAL is the default value.

GMT
Specifies that the date and time are in GMT format.

STOPTOD(*stop block TOD*,LOCAL | GMT)
Identifies the latest timestamp that you want to copy the MVS log stream from. STOPTOD lets you specify this in a more granular format than STOPTIME. CICS VR ignores all records for this MVS log stream whose TOD timestamp is later than the TOD time specified in the STOPTOD keyword. CICS VR copies records up to this place in the log.

Only one STOPTOD keyword is allowed for each LOGSTREAMCOPY control statement.

If you do not specify STOPTIME, STOPTOD, or STOPBLKID, the copy ends at job run time.

Do not use the STOPTOD keyword with the REPBRCUR or MOVBRCUR keywords.

stop block TOD
A timestamp in the TOD format, for example:

```
STOPTOD(BF1788BCFDD2A000)
```

LOCAL
Specifies that the TOD timestamp is in local format. LOCAL is the default value.

GMT
Specifies that the TOD timestamp is in Greenwich mean time (GMT) format.

STOPBLKID(*stop block*)
Identifies the block ID at which CICS VR is to stop copying records. CICS VR ignores all records for this MVS log stream after the block ID specified in the STOPBLKID keyword.

Only one STOPBLKID keyword is allowed for each LOGSTREAMCOPY control statement.

If you do not specify STOPBLKID, STOPTOD, or STOPTIME, the copy ends at job run time.

Do not use the STOPBLKID keyword with the REPBRCUR or MOVBRCUR keywords.

stop block
Is the block ID on the MVS log stream. You must specify the exact block ID.

SETBRCUR
Specifies that the starting point of the records to be read from the log stream is the position where a “start of copy” cursor was last set by the log stream copy utility that used the MOVBRCUR keyword.

The first time you use SETBRCUR, the MVS log stream is copied from the beginning of the log. Records are read from the beginning of the log or from the “start of copy” cursor, to the youngest block in the log stream, or to another position that you have specified using the STOPTIME, STOPTOD, or STOPBLKID keyword. When the required records have been read, a browse cursor is positioned at the last record read.

To ensure that you are not reading the same records twice, after you run each job that uses the SETBRCUR keyword, run a job that uses the MOVBRCUR keyword to reposition the “start of copy” cursor at the last copied record. If you do not reposition the “start of copy” cursor, any subsequent job using SETBRCUR starts to read from the same record as the first job.

If you do want to copy the same set of records twice, run a job using the SETBRCUR keyword followed by a job using the REPBRCUR keyword. This combination of jobs produces two copies of the same records.

If you run a job using the SETBRCUR keyword, but the log stream has been changed, redefined or deleted using another utility, so that it does not contain the active block where the “start of copy” cursor was positioned, the log stream is copied from the beginning of the log, from its first active block.

Do not use the SETBRCUR keyword with the STARTTIME, STARTBLKID, STARTTOD, DELETE, or COPIES(0) keyword.

REPBRCUR

Specifies that records are to be read from the log stream from the position where a “start of copy” cursor was last set by the log stream copy utility that used the MOVBRCUR keyword, to the position where a browse cursor was last set by the log stream copy utility that used the SETBRCUR keyword.

REPBRCUR repeats the same log stream data that was processed last time you ran the log stream copy utility using the SETBRCUR keyword, if the “start of copy” cursor has not been moved since that copying. The “start of copy” cursor and browse cursor are not changed by running the log stream copy utility using the REPBRCUR keyword.

The REPBRCUR keyword can be used to produce several copies of the same log stream records. To do this, run a job using the SETBRCUR keyword followed by a series of jobs using the REPBRCUR keyword.

If you run a job using the REPBRCUR keyword, but the log stream has been changed, redefined or deleted using another utility, so that it does not contain the active block where the “start of copy” cursor was positioned, the log stream is copied from the beginning of the log, from its first active block, and copying ends at the newest block at or before the position where a browse cursor was last set.

Do not use the REPBRCUR keyword with the STARTTIME, STARTBLKID, STARTTOD, STOPTIME, STOPBLKID, STOPTOD, DELETE, or COPIES(0) keywords.

MOVBRCUR

Specifies that the “start of copy” cursor is to be placed at the position where the browse cursor was set. No log stream records are copied from the log stream when this keyword is used.

To ensure that you are not reading the same records twice, after you run each job that uses the SETBRCUR keyword, run a job using the MOVBRCUR keyword to reposition the “start of copy” cursor. If you do not reposition the “start of copy” cursor, any subsequent job using SETBRCUR starts to read from the same record as the first job.

If you do want to read the same set of records twice, run a job using the REPBRCUR keyword, before you run a job using the MOVBRCUR keyword to reposition the “start of copy” cursor.

Do not use the MOVBRCUR keyword with any other LOGSTREAMCOPY keywords, except for the NAME and DELETE keywords.

DELETE

Specifies that log stream records are to be deleted from the log stream. The log stream itself is not deleted and remains available for use.

If the DELETE keyword is used without the MOVBRCUR keyword, log stream records are deleted from the log stream from the oldest log stream block, the beginning of the log, up to the last successfully copied block. If the DELETE keyword is used with the MOVBRCUR keyword, log stream records are deleted from the log stream from the oldest log stream block, the beginning of the log, up to the block in the position where a browse cursor was last set by the log stream copy utility that used the SETBRCUR keyword.

CICS VR protects log stream blocks from casual deletion, so the deletion of the log stream blocks is performed only if CICS VR permits it. CICS VR permits the log stream copy utility to perform deletion of log stream blocks if the CICS VR global default LCDEL is set to YES. Otherwise the log stream utility considers that the deletion is prohibited and ignores the DELETE keyword. Ensure that the default for log stream deletion is set to the wanted value. LCDEL must be set to YES to perform log stream block deletion. LCDEL must be set to NO to ignore log stream block deletion requests. “Defining a CICS VR general control parameter” on page 33 explains how to determine the current setting for LCDEL.

The DELETE keyword is also ignored if the copy was not completed, or if no blocks were found and copied, or if the COPIES(0) keyword was specified.

If the log stream has been changed, redefined or deleted using another utility, so that it does not contain either the last successfully copied active block, if you are not using the MOVBRCUR keyword, or the active block in the position where a browse cursor was last set, if you are using the MOVBRCUR keyword, no log stream records are deleted from the log stream.

Do not use the DELETE keyword with the SETBRCUR and REPBRCUR keywords.

MOD

Indicates that records are to be added to the end of the data set specified in the DWWCOPY*n* ddname. Use the MOD keyword if you specified DISP=MOD for any of the DWWCOPY*n* ddnames.

EXCLUDE(specific log records)

Use the EXCLUDE command to eliminate specific log records from the Logcopy function.

Format

EXCLUDE FILEID (id1,id2,...) TERMID (id1,id2,...) TRANSID (id1,id2,...)

Keywords

FILEID(id1,id2,...)

Specifies that the utility must ignore any log records with these FILEIDs when copying records. If more than one keyword is specified, for example; EXCLUDE FILEID(DD1),TERMID(TST1), the log record must match both IDs specified for it to be excluded.

Id1,id2,...

Specifies the FILEID defined to CICS. id1, id2, for example, can be 1 to 8 characters. Up to 99 IDs can be specified for one FILEID. If more than one ID is specified on the FILEID keyword, a log record needs to match only one of the specified FILEIDs to be excluded.

TERMID(id1,id2,...)

Specifies that the utility must ignore any log records with these TERMINALIDs when copying records. If more than one keyword is specified, for example, EXCLUDE FILEID(DD1),TERMID(TST1), the log record must match both IDs specified for it to be excluded.

Id1,id2,...

Specifies the TERMINALID defined to CICS. For example; id1, id2, can be 1 to 4 characters. Up to 99 IDs can be specified for one TERMID. If more than one ID is specified on the TERMID keyword, a log record only needs to match one of the specified terminal IDs to be excluded.

TRANSID(id1,id2,...)

Specifies that the utility must ignore any log records with these TRANSACTIONIDs when copying records. If more than one keyword is specified, for example, EXCLUDE TRANSID(APQ1),TERMID(TST1), the log record must match both IDs specified for it to be excluded.

Id1,id2,...

Specifies the TRANSACTIONID defined to CICS. id1, id2, for example, can be 1 - 4 characters. Up to 99 IDs can be specified for one TRANSID. If more than one ID is specified on the TRANSID keyword, a log record only needs to match one of the specified TRANSACTIONIDs to be excluded.

INCLUDE(specific log records)

Use the INCLUDE command to selectively include specific log records from the Logcopy function.

Format

INCLUDE FILEID (id1,id2,...) TERMID (id1,id2,...) TRANSID (id1,id2,...)

Keywords

FILEID(id1,id2,...)

Specifies that the Logcopy function use log records only with these file IDs. If more than one keyword is specified, for example; INCLUDE FILEID(DD1),TERMID(TST1), the log record must match both IDs specified for it to be included.

Id1,id2,...
Specifies the FILEID defined to CICS. For example; id1, id2, can be 1 - 8 characters. Up to 99 IDs can be specified for one FILEID. If more than one ID is specified on the FILEID keyword, a log record needs to match only one of the specified file IDs to be included.

TERMID(id1,id2,...)
Specifies that the Logcopy function use log records only with these terminal IDs. If more than one keyword is specified, for example; `INCLUDE FILEID(DD1),TERMID(TST1)`, the log record must match both IDs specified for it to be included.

Id1,id2,...
Specifies the TERMINALID defined to CICS.For example; id1, id2, can be 1 - 4 characters. Up to 99 IDs can be specified for one TERMID. If more than one ID is specified on the TERMID keyword, a log record needs to match only one of the specified terminal IDs to be included.

TRANSID(id1,id2,...)
Specifies that the Logcopy function uses log records only with these transaction IDs. If more than one keyword is specified, for example; `INCLUDE TRANSID(DD1),TERMID(TST1)`, the log record must match both IDs specified for it to be included.

Id1,id2,...
Specifies the TRANSACTIONID defined to CICS. id1, id2, for example, can be 1 - 4 characters. Up to 99 IDs can be specified for one TRANSID. If more than one ID is specified on the TRANSID keyword, a log record needs to match only one of the specified transaction IDs to be included.

Usage Notes

- If the forward recovery log is a DASDONLY logstream, the LOGSTREAMCOPY jobs must be run on the same LPAR as the CICS region which produced it. If the forward recovery logstream is a Coupling Facility logstream, the LOGSTREAMCOPY job can be run on any LPAR.
- In general, log stream copies are made for use at a disaster recovery site. For more information about what is needed at a disaster recovery site, see Chapter 10, “Using CICS VR with CICS TS at your disaster recovery site ,” on page 205.
- After the first log stream copy run, subsequent runs automatically begin copying after the point on the MVS log stream that the last copy finished. Use the same RCDS data sets in the subsequent log stream copy jobs to provide log stream copying without gaps. The use of CICS VR server's RCDS is recommended, see “Understanding the recovery control data sets (RCDSs)” on page 53.
- The log stream copy utility is started by the CICS VR module, DWWLC, see Figure 94 on page 216.
- You can have only one LOGSTREAMCOPY command in a single CICS VR job step.
- LOGSTREAMCOPY keywords can be coded in any sequence.
- You can copy the entire MVS log stream or just the records produced by CICS and CICS VR batch logging.
- LOGSTREAMCOPY copies the MVS log stream to a maximum of nine data sets and stores information about the first copy in the RCDS.
- You start the log stream copy utility by running the required JCL, and providing the statements you need as parameters on the DWWIN DD statement.
- You define the data sets to which the MVS log stream is to be copied on the DWWCOPY1—DWWCOPY9 DD statements. See Figure 94 on page 216 for an example of the JCL to run the log stream copy utility.
- Before the log stream copy utility copies the MVS log stream record to the output data set a precopy exit can be called. This exit lets you inspect and act on a copy of the record before it is written to the output data set. This exit must be defined during the LOGSTREAMCOPY run by the DEFEXIT command.
- Before the log stream copy utility terminates, a **termination** exit can be called. This exit lets you terminate actions that were performed.
- Use the MOD keyword if you specified DISP=MOD for any of the DWWCOPY*n* ddnames.

- Only the MVS log stream copied to DWWCOPY1 is registered in the RCDS. An exception is copies produced by the LOGSTREAMCOPY command with the REPBRCUR keyword, which are never registered in the RCDS.
- If you want to process a part of the MVS log stream without having an impact on further CICS VR log stream processing, specify COPIES(0) and run the CICS VR log stream copy utility without the RCDS data sets. For example, you might want to process this part of the log stream using your own exit program, or you might want to examine the log stream copy report for the MVS log stream state. Your action is not recorded in the RCDS.
- If you want to process a part of the MVS log stream by your own methods but also reflect this action in CICS VR, specify COPIES(0) and run the CICS VR log stream copy utility with the RCDS data sets. For example, you might want to process this part of the log stream using only your own exit program without copying it, or you might want to skip this part of the log stream. Your action is recorded in the RCDS and might affect further CICS VR log stream processing.
- If you use the SETBRCUR, REPBRCUR, MOVBRCUR, or DELETE keywords on the LOGSTREAMCOPY command, you must specify the RCDS data sets in the log stream copy job.
- The values of the “start of copy” cursor and browse cursor are kept in the RCDS. To avoid any confusion, use the same RCDS when using subsequent SETBRCUR, REPBRCUR, and MOVBRCUR keywords with the same MVS log stream.
- For more information about using LOGSTREAMCOPY, see “Using the log stream copy utility to copy your MVS log streams” on page 215.

Consider the following when using the **EXCLUDE** command:

- The RCDS is not updated if **EXCLUDE** or **INCLUDE** or **EXCLUDE** and **INCLUDE** commands are used so the logcopy made is not used in automatic forward recovery. This is because the logcopy might be missing some vital records because not all records are copied. The copy can be used in manual forward recovery if you are sure that no relevant records are missing.
- At least one keyword must be specified for each **EXCLUDE** command.
- Multiple **EXCLUDE** commands and **INCLUDE** commands can be specified in the same job step. The Logcopy function processes a log record against all **EXCLUDE** commands before it processes the log record against all INCLUDE commands.
- For each log record, if the **EXCLUDE** criteria is met, the record is excluded. If the **EXCLUDE** criteria is not met, the Logcopy function matches the log record against the next **EXCLUDE** command.
- When the log record has been examined against all the **EXCLUDE** commands, the utility examines the log record against the first **INCLUDE** command (if the log record was not excluded by any of the **EXCLUDE** commands).
- If the **INCLUDE** criteria is met the record is used in the utility. If it is not met, the Logcopy function matches the record against the next **INCLUDE** command.
- If the log record does not match any of the **INCLUDE** commands, the log record is not used. Logcopy function repeats this process for the next log record by matching it first against the **EXCLUDE** commands and then the INCLUDE commands.
- If one or more **EXCLUDE** commands are entered and no **INCLUDE** commands are entered, all log records that do not match the entered exclude criteria are copied. For example, if you specify:

  ```
  EXCLUDE FILEID(DD1),TERMID(T1)
  ```

  The utility ignores log records that have a FILEID of DD1 and TERMINALID of T1. If you want to ignore log records that have a FILEID of DD2 or TERMINALID of T2, specify two **EXCLUDE** commands as follows:

  ```
  EXCLUDE FILEID(DD2)
  EXCLUDE TERMID(T2)
  ```

  There is no limit on the number of **EXCLUDE** (and **INCLUDE**) commands that you can specify.
- You can specify up to 99 IDs on each keyword.

- If you specify **INCLUDE** or **EXCLUDE** commands that eliminate all of the records, no records are copied.
- Do not specify **EXCLUDE** and **INCLUDE** criteria that conflict. For example; **INCLUDE** FILEID(DD1) and EXCLUDE FILEID(DD1). If conflicting criteria is specified, no records are copied and no error messages are produced.

Consider the following when using the **INCLUDE** command:

- The RCDS is not updated with information if **EXCLUDE** or **INCLUDE** or **EXCLUDE** and **INCLUDE**commands are used so the logcopy made is not used in automatic forward recovery. This is because the logcopy might be missing some vital records because not all records are copied. The copy can be used in manual forward recovery if you are sure that no relevant records are missing.
- Multiple **INCLUDE** commands and **EXCLUDE** commands can be specified in the same job step. The Logcopy function processes a log record against all **EXCLUDE** commands before it processes the log record against all **INCLUDE** commands.
- For each log record, if the **EXCLUDE** criteria is met, the record is excluded. If the **EXCLUDE** criteria is not met, the Logcopy function matches the log record against the next **EXCLUDE** command.
- When the log record has been examined against all the **EXCLUDE** commands, the Logcopy function examines the log record against the first **INCLUDE** command (if the log record was not excluded by any of the **EXCLUDE** commands).
- If the **INCLUDE** criteria is met, or if no **INCLUDE** commands were specified, then the record is copied.
- If the criteria it is not met, the Logcopy function matches the record against the next **INCLUDE** command. If the log record does not match any of the **INCLUDE** commands, the log record is not copied. The Logcopy function repeats this process for the next log record by first matching it against the **EXCLUDE** commands, then the **INCLUDE** commands.
- If one or more **INCLUDE** commands are entered and no **EXCLUDE** commands are entered, all log records that match the entered include criteria is copied. For example, if you specify:

  ```
  INCLUDE FILEID(DD1),TERMID(T1)
  ```

  The Logcopy function only uses log records that have a FILEID of DD1 and TERMINALID of T1. If you want the Logcopy function to use log records that have a FILEID of only DD1 or TERMINALID of T1, specify two **INCLUDE** commands as follows:

  ```
  INCLUDE FILEID(DD1)
  INCLUDE TERMID(T1)
  ```

  There is no limitation on the number of **INCLUDE** (and **EXCLUDE**) commands.
- You can specify up to 99 IDs on each keyword.
- If you specify **INCLUDE** or **EXCLUDE** commands that eliminate all of the records, no records are copied.
- Avoid specifying **INCLUDE** and **EXCLUDE** criteria that conflict (for example, `INCLUDE FILEID(DD1)` and `EXCLUDE FILEID(DD1)`). If conflicting criteria is specified, no records are copied. No error messages are produced.

Examples

The following LOGSTREAMCOPY command tells CICS VR to make three copies of the MVS log stream. These copies are made to the data sets specified on the ddnames DWWCOPY1, DWWCOPY2, and DWWCOPY3. Records are copied to the end of the data sets specified in the DWWCOPY*n* ddnames. Records are copied from the beginning of the MVS log stream or the first record after the end of the previous LOGSTREAMCOPY and stop at current time of this job or when the end of the log stream is reached. CICS VR remembers where the log stream copy stopped; so this same job could be run over and over to continuously copy the MVS log stream. This is the best way to do a log stream copy.

```
LOGSTREAMCOPY NAME(CICSVR1.MVSLOG)   -
         SELECT(ALL)     -
         COPIES(3)       -
         MOD
```

The following LOGSTREAMCOPY command tells CICS VR to make two copies of the MVS log stream. These copies are made to the data sets specified on the ddnames DWWCOPY1, DWWCOPY2. Records are copied to the end of the data sets specified in the DWWCOPY*n* ddnames. Records are copied from the MVS log stream at the start time specified and stop at the current time of this job or when the end of this log stream is reached. CICS VR remembers where the log stream copy stopped Because a start time was specified, you must update the STARTTIME when a new backup is taken.

```
LOGSTREAMCOPY NAME(CICSVR1.MVSLOG)   -
         SELECT(ALL)     -
         COPIES(2)       -
         STARTTIME(01159/07:30:00,GMT)   -
         MOD
```

The following LOGSTREAMCOPY command tells CICS VR to make three copies of the MVS log stream. These copies are made to the data sets specified on the ddnames DWWCOPY1, DWWCOPY2, and DWWCOPY3. Records are copied to the end of the data sets specified in the DWWCOPY*n* ddnames. Records are copied from the beginning of the MVS log stream or the first record after the end of the previous LOGSTREAMCOPY and stop at the specified stop time. CICS VR remembers where the log stream copy stopped. This could be used to control the size of the output.

```
LOGSTREAMCOPY NAME(CICSVR1.MVSLOG)   -
         SELECT(ALL)     -
         COPIES(3)       -
         STOPTIME(01249/07:30:00,GMT)   -
         MOD
```

The following LOGSTREAMCOPY command tells CICS VR to make three copies of the MVS log stream. These copies are made to the data sets specified on the ddnames DWWCOPY1, DWWCOPY2, and DWWCOPY3. Records are copied to the end of the data sets specified in the DWWCOPY*n* ddnames. All records are copied from the MVS log stream between the start and the stop time specified in the command. CICS VR remembers where the log stream copy stopped. This is not a recommended method to copy the log unless this is a one time copy to produce test data. Do not use this method to make consecutive copies because the time values are not precise enough to prevent gaps.

```
LOGSTREAMCOPY NAME(CICSVR1.MVSLOG)   -
         SELECT(ALL)     -
         COPIES(3)       -
         STARTTIME(01159/07:30:OO,GMT) -
         STOPTIME(01249/07:30:00,GMT) -
         MOD
```

The following LOGSTREAMCOPY command tells CICS VR to make one copy of the MVS log stream blocks. This copy is made to the data set specified on the ddname DWWCOPY1. Records are copied starting from the first block of the MVS log stream whose TOD timestamp, in the Local time format, is equal to or greater than the TOD value specified in the STARTTOD keyword. Copying stops at the block whose TOD timestamp (in the GMT time format) is greater than the TOD value specified in the STOPTOD keyword, or when the end of the log stream is reached.

```
LOGSTREAMCOPY NAME(CICSMVS.V42BLK.FILELOG) –
              SELECT(CICSVR)     -
              STARTTOD(BE87C2EA57000000,LOCAL) –
              STOPTOD(BE8B8882B9000000,GMT) -
              COPIES(1)
```

The following LOGSTREAMCOPY command tells CICS VR to make a copy of the MVS log stream and position a browse cursor at the last record copied. The copy is made to the data set specified on the ddname DWWCOPY1. Records are copied starting from the beginning of the MVS log stream, if this is the first time when the cursor is set, or from the “start of copy” cursor. Copying stops at the block specified in the STOPBLKID keyword, or when the end of the log stream is reached.

```
LOGSTREAMCOPY NAME(CICSMVS.V42BLK.FILELOG) –
              STOPBLKID(1900)      –
              SETBRCUR             -
              COPIES(1)
```

The following LOGSTREAMCOPY command must be run immediately after the previous example. It tells CICS VR to make the same copy of the MVS log stream as the previous example did. This copy is made to the data set specified on the ddname DWWCOPY1. Records are copied starting from the beginning of the MVS log stream, if this is the first time when the cursor is set, or from the “start of copy” cursor. Copying stops at the block specified in the browse cursor. Note that this copy is not registered in the RCDS.

```
LOGSTREAMCOPY NAME(CICSMVS.V42BLK.FILELOG) –
              REPBRCUR             -
              COPIES(1)
```

The following LOGSTREAMCOPY command must be run immediately after the previous two examples. It tells CICS VR not to make a copy of the MVS log stream, but just to reposition the “start of copy” cursor to the browse cursor. Next time you run the log stream copy utility with the SETBRCUR keyword, it starts copying from the new log position specified in the “start of copy” cursor.

```
LOGSTREAMCOPY NAME(CICSMVS.V42BLK.FILELOG) –
              MOVBRCUR
```

The following LOGSTREAMCOPY command tells CICS VR to make one copy of the MVS log stream blocks. This copy is made to the data set specified on the ddname DWWCOPY1. Records are copied starting from the specified start time, and copying stops at the specified stop time. CICS VR remembers where the log stream copy stopped. The log stream block tail up to the last copied block is deleted if CICS VR permits the log stream deletion.

```
   LOGSTREAMCOPY NAME(CICSMVS.V42BLK.FILELOG) –
              SELECT(ALL)     -
              STARTTOD(BE87C2EA57000000,LOCAL) –
              STOPTIME(06085/07:30:00,GMT) –
              DELETE                       -
              COPIES(1)
```

The following LOGSTREAMCOPY command tells CICS VR not to make a copy of the MVS log stream, but just to reposition the “start of copy” cursor to the browse cursor, and delete the log stream block tail up to the position of the browse cursor. The deletion is done only if CICS VR permits it.

```
     LOGSTREAMCOPY NAME(CICSMVS.V42BLK.FILELOG) –
              DELETE           -
              MOVBRCUR
```

The Logcopy function filtering is started by adding **EXCLUDE** and **INCLUDE**, or **EXCLUDE** or **INCLUDE** commands to the command input in the DWWIN dd statement.

Assume the following two **EXCLUDE** commands are specified in one job step. The two **EXCLUDE** commands tell the Logcopy function to exclude all records that have both a FILEID of DD3 and TRANSACTIONID of APQ4, or, exclude all records that have a TERMINALID of TST2

```
EXCLUDE FILEID(DD3) TRANSACTIONID(APQ4)
EXCLUDE TERMINALID(TST2)
```

Assume the following five commands are specified in one job step. Since multiple **EXCLUDE** and **INCLUDE** commands are specified in one step, the Logcopy function processes a log record against all **EXCLUDE** commands before the log record is processed against all **INCLUDE** commands.

```
INCLUDE FILEID(DD1,DD2)
INCLUDE FILEID(DD3) TERMINALID(TST1)
INCLUDE FILEID(DD4) TRANSACTIONID(APQ1,APQ2,APQ3)
EXCLUDE FILEID(DD3) TRANSACTIONID(APQ4)
EXCLUDE TERMINALID(TST2)
```

Exclude all records that have both a FILEID of DD3 and TRANSACTIONID of APQ4, or exclude all records that have a TERMINALID of TST2.

This example is exactly like the previous example. When the log record has been processed using the exclude criteria, it is processed using the include criteria. If the log record was not excluded by the **EXCLUDE** command:

Include all records that have a FILEID of DD1 or DD2, or include all records that have a FILEID of DD3 and TERMINALID of TST1, or Include all records that have a FILEID of DD4 and TRANSACTIONID of APQ1, APQ2, or APQ3.

Assume the following two **INCLUDE** commands are specified in one job step. The two **INCLUDE** commands tell the Logcopy function to include all records that have both a FILEID of DD3 and TRANSACTIONID of APQ4, or, include all records that have a TERMINALID of TST2

```
INCLUDE FILEID(DD1)
INCLUDE TERMID(T1)
```

Assume the following five commands are specified in one job step. Since multiple **INCLUDE** or **EXCLUDE** commands are specified in one step, the Logcopy function processes a log record against all **EXCLUDE** commands before the log record is processed against all **INCLUDE** commands.

```
INCLUDE FILEID(DD1,DD2)
INCLUDE FILEID(DD3) TERMINALID(TST1)
INCLUDE FILEID(DD4) TRANSACTIONID(APQ1,APQ2,APQ3)
EXCLUDE FILEID(DD3) TRANSACTIONID(APQ4)
EXCLUDE TERMINALID(TST2)
```

Exclude all records that have both a FILEID of DD3 and TRANSACTIONID of APQ4, or Exclude all records that have a TERMINALID of TST2.

If the log record was not excluded by any of the **EXCLUDE** commands, it is processed using the include criteria. For the remaining records (the log records that were not excluded by the **EXCLUDE** command).

Include all records that have a FILEID of DD1 or DD2, or| Include all records that have a FILEID of DD3 and TERMINALID of TST1, or Include all records that have a FILEID of DD4 and TRANSACTIONID of APQ1, APQ2, or APQ3.

Format

The format of the log stream copy starts and ends with writing a special record.

Layout of the first log stream copy record table describes the layout of first record:

Table 27. Layout of the first log stream copy record.

Attribute	Format	Description
constant (104)	fixed (32)	Length of the rest of this record
constant ('>DWW')	char (4)	Type of record
constant (1)	fixed (31)	Version number
*	char (8)	Reserved
blkid	char (8)	Block ID of the first block read
*	char (8)	Reserved
gmttime	char (8)	GMT time of the first block read, time-of-day (TOD) format
localtime	char (8)	Local time of the first block read, time-of-day (TOD) format
*	char (8)	Reserved

Table 27. Layout of the first log stream copy record. (continued)		
Attribute	**Format**	**Description**
logname	char (26)	MVS log name
*	char (22)	Reserved

The Layout of last record table describes the layout of last record:

Table 28. Layout of last record		
Attribute	**Format**	**Description**
constant (104)	fixed (32)	Length of the rest of this record
constant ('>DWW')	char (4)	Type of record
constant (1)	fixed (31)	Version number
*	char (8)	Reserved
blkid	char (8)	Block ID of the last block read
*	char (8)	Reserved
gmttime	char (8)	GMT time of the last block read, time-of-day (TOD) format
localtime	char (8)	Local time of the last block read, time-of-day (TOD) format
*	char (8)	Reserved
logname	char (26)	MVS log name
*	char (22)	Reserved

The Layout of all other records table describes the layout of all other records:

Table 29. Layout of all other records.		
Attribute	**Format**	**Description**
length	fixed (32)	Length of the prefix(24) + length of the MVS log block read, for example, length of the rest of this record
blkid	char (8)	Block ID of the MVS block read
gmttime	char (8)	GMT time of the MVS block read, time-of-day (TOD) format
localtime	char (8)	Local time of the last block read, time-of-day (TOD) format
block	char (*)	The MVS log block read

Note: All of the previous records are written to a SAM file using the following spanned format:

The Spanned format for records using a SAM file table describes the spanned format for records using a SAM file.

Table 30. Spanned format for records using a SAM file.		
Attribute	**Format**	**Description**
length	fixed (16)	Total length of this block, including this field
bb	fixed (16)	Block indicator
record	char (*)	A whole or part of one of the previous records

The block indicator can be one of the following values:

00
The whole record is contained in this block

01
First part of the record is contained in this block

02
Last part of the record is contained in this block

03
A middle part of the record is contained in this block

One of the reasons for this is that an MVS block can be up to 64K, but the largest SAM block that can be written is 32K.

Synonyms

The LOGSTREAMCOPY Synonyms table provides LOGSTREAMCOPY commands or keywords along with acceptable synonyms to use in place of the commands or keywords:

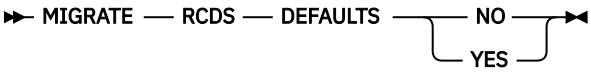
Table 31. LOGSTREAMCOPY Synonyms	
Command, keyword, or value	**Synonyms**
LOGSTREAMCOPY	LOGCOPY
SELECT	SEL
COPIES	CPS
STARTBLKID	STARTBLK
STOPBLKID	STOPBLK

Table 32. Synonyms for EXCLUDE and INCLUDE commands or keywords	
Keyword	**Synonyms**
FILEID	DD, DDNAME
TERMID	TERMINALID
TRANSID	TRANSACTIONID

MIGRATE RCDS: Specify migration option

The MIGRATE RCDS command specifies whether you want the CICS VR Server AS defaults to be migrated from the RCDS of a previous CICS VR release.

Format



Keywords

DEFAULTS(YES|NO)
Specifies whether CICS VR Server AS defaults are copied from the RCDS of a previous CICS VR release.

YES
Specifies that CICS VR Server AS defaults are copied (along with other RCDS records of a previous release).

NO
Specifies that CICS VR Server AS defaults are skipped at migration from a previous release. The value DEFAULTS(NO) coincides with the cases when the input data set specified in the DWWIN DD, is empty or dummy.

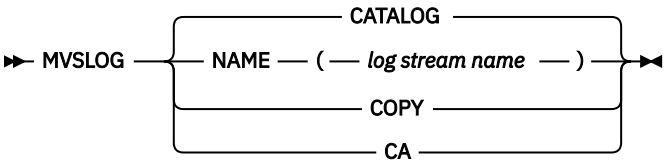
Usage notes

- Use the MIGRATE RCDS command with DEFAULTS(YES) if you want to copy CICS VR Server AS defaults from the RCDS of previous releases.
- If you miss the MIGRATE command DEFAULTS(NO) is specified.
- The DWWIN DD is required for a migration job, specify //DWWIN DD DUMMY if you do not want to explicitly specify a migration option.

MVSLOG: Specify an MVS Log Stream

Use the MVSLOG command to specify the name of an MVS log stream to CICS VR.

Format



Keywords

CATALOG
Specifies that the MVS log stream name must be obtained from the MVS catalog. All data sets to be recovered in one step must have the same MVS log stream name. The CATALOG keyword is the default.

NAME(*log stream name*)
Identifies the data set name of the MVS log stream for this recovery step.

log stream name
Specifies the name of the MVS log stream. The name is 1–26 characters. The NAME keyword is optional.

COPY
Indicates that the logs specified as input by the CICS VR ALLOCATE command, or the logs specified by the DWWLOG ddname, are QSAM copies of MVS log streams. The COPY keyword is optional.

CA
Specifies that CICS VR must use only the change accumulation data sets specified in the DWWLOG DD statement during forward recovery processing of the specified VSAM spheres.

Usage Notes

Consider these points when using the MVSLOG command:

- You can specify only one MVSLOG command in a single recovery step. The MVS log stream you specify must contain all relevant records for all data sets to be recovered in this step.
- If you switch between a CICS log and an MVS log stream, you must process these different log types in separate CICS VR job steps.
- You can specify an active MVS log stream or a QSAM copy of an MVS log stream in the MVSLOG command. If you specify a QSAM copy, the data set name of the copy must be specified in either the CICS VR ALLOCATE command, or by the DWWLOG ddname.
- If the CA keyword is specified, one or more change accumulation data sets must be listed in the DWWLOG DD statement of the recovery job JCL.
- The CA keyword can only be specified when the RECOVER command also is specified.
- If the CA keyword is specified, CICS VR ignores the APPLYCA keyword of the RECOVER command if it also is specified.
- The name of the relevant undo log stream must be specified in the MVSLOG NAME() command for a batch backout job that specifies RCDS(NO).

Examples

```
MVSLOG  CATALOG                                    1

MVSLOG  NAME(SYSA.MVSLOG1)                         2

MVSLOG  COPY                                       3

MVSLOG  CA                                         4
```

Here is an explanation of each of these MVSLOG commands:

1
The name of the MVS log stream for this CICS VR step must be obtained from the MVS catalog.

2
The name of the MVS log stream for this CICS VR recovery step is SYSA.MVSLOG1.

3
The MVS log stream specified for this CICS VR step is a QSAM copy of an MVS log stream. The name of the QSAM copy is specified in either the CICS VR ALLOCATE command, or by the DWWLOG ddname.

4
Only change accumulation data sets specified in the DWWLOG statement of the recovery job JCL must be used during forward recovery processing of the specified VSAM spheres.

Synonyms

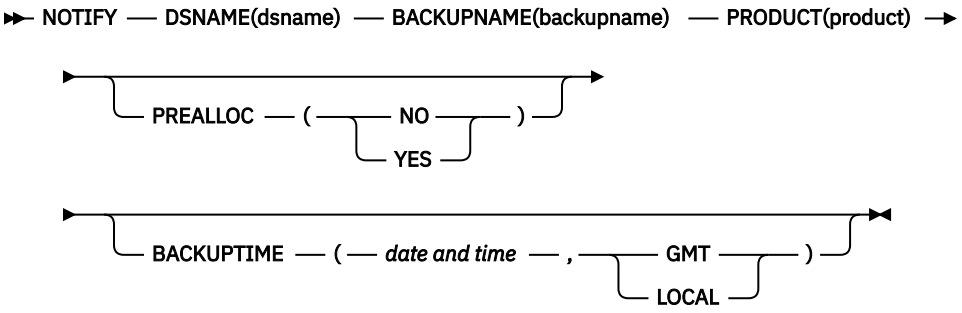
The MVSLOG synonyms table provides the MVSLOG commands or keywords along with acceptable synonyms that can be used in place of the commands or keyword:

Table 33. MVSLOG synonyms	
Command or keyword	**Synonyms**
CATALOG	CAT, CTLG

NOTIFY: Notify CICS VR when a VSAM sphere backup is created

This command notifies CICS VR when a backup for a VSAM sphere is created by an IBM or non-IBM product.

Format



This command is used when any backup of a VSAM sphere is created by an IBM or non-IBM product. CICS VR registers information about the backup in the CICS VR RCDS. The information about the backup can then the seen through the CICS VR panel interface.

Keywords

DSNAME (*dsname*)
Specifies the fully qualified base cluster name of the VSAM data set that the backup was created for. DSNAME is a required keyword. Only one DSNAME keyword can be specified in a NOTIFY command.

dsname
Specifies the name of the VSAM data set using EBCDIC character data. The name is from 1 to 44 characters in length.

BACKUPNAME (*backupname*)
Specifies the fully qualified name of the VSAM data set backup. BACKUPNAME is a required keyword. Only one BACKUPNAME keyword can be specified in a NOTIFY command.

backupname
Specifies the name of the VSAM data set backup using EBCDIC character data. The name is from 1 to 44 characters in length.

PRODUCT (*product*)
Identifies the product that created the VSAM data set backup. PRODUCT is a required keyword. Only one PRODUCT keyword can be specified in a NOTIFY command.

product
Identifies the product with a five character "product identifier". CICS VR uses this as a reference for working with the backup. The name identifier is five characters in length, and cannot contain blanks.

BACKUPTIME (*date and time*, LOCAL | GMT)
Identifies the date and time of backup. BACKUPTIME is an optional parameter.

date and time
This must be in the format `yyyy/ddd/hh/mm/ss`, where:

yyyy
A four digit year number, for example 2006.

ddd
The day of the year, in the range 001 to 366.

hh
The hour of the day, in the range 00 to 23.

mm
The number of minutes, in the range 00 to 59.

ss
The number of seconds, in the range 00 to 59.

The values can be separated with a slash (/), period (.), or colon (:) character. You can omit the separator character. An example is: `BACKUPTIME(2001.159/01:23:00)`

LOCAL
Specifies that the date and time are in local format.

GMT
Specifies that the date and time are given in Greenwich Mean Time (GMT) format. GMT is the default value.

PREALLOC(YES|NO
Specifies if the product that created the backup preallocated the target data set at the time of the restore. PREALLOC is an optional parameter.

YES
The product that created the backup does not preallocate the target data set at the time of the restore. CICS VR extracts information from the ICF catalog about the allocation attributes of the data set, and register this information in the RCDS. At restore time, CICS VR uses the registered information to create a restore job which includes a step to preallocate the target data set.

NO
The product that created the backup preallocates the target data set at the time of the restore. At restore time, CICS VR creates a restore job which does not include a step to preallocate the target data set.

Synonyms

The "Synonyms for NOTIFY commands or keywords" table shows the acceptable synonyms that can be used in place of the NOTIFY commands or keywords:

Table 34. Synonyms for NOTIFY commands or keywords

Keyword	Synonyms
BACKUPNAME	BACKUP, BN
BACKUPTIME	BTIME, TIME
DSNAME	NAME, DSN
PREALLOC	ALLOC
PRODUCT	PROD

Usage notes

1. DFSMShsm and DFSMSdss can automatically notify CICS VR when a logical backup has been created. There is no need to use the NOTIFY command for logical backups created by either DFSMShsm or DFSMSdss.

2. The DWWNT program can be added to the backup job as a job step that is run when the backup completes successfully. You must set the data set disposition to OLD in such a backup job, to avoid any data set updates.
3. For an explanation of the return and reason codes returned from the DWWNT program, refer to "Return and reason codes" on page 175.
4. The REXX procedure DWWBKNT is shipped in SDWWCNTL as an example of how to perform multiple calls of the NOTIFY utility for IDCAMS REPRO backups. See Chapter 25, "DWWBKNT REXX procedure," on page 367 for more information.

Example 1

```
//TESTNTFY  JOB  ,CICSVR,MSGLEVEL=(1,1),MSGCLASS=H,REGION=6144K
//*-------------------------------------------------------------------*/
//* CREATE BACKUP USING REPRO                                         */
//*-------------------------------------------------------------------*/
//STEP1     EXEC PGM=IDCAMS
//IN            DD DSN=AAAAAAAA.BBBBBBBB.CCCCCCCC,DISP=OLD
//OUT        DD DSN=AAAAAAAA.BBBBBBBB.CCCCCCCC.BACKUP,DISP=OLD
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
     REPRO INFILE(IN)
           OUTFILE(OUT)
/*
//*------ ------------------------------------------------------------------*/
//* RUN NOTIFY UTILITY                                                      */
//*-------------------------------------------------------------------------*/
//STEP2      EXEC PGM=DWWNT
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWIN    DD *
     NOTIFY  DSNAME(AAAAAAAA.BBBBBBBB.CCCCCCCC)  -
                    BACKUPNAME(AAAAAAAA.BBBBBBBB.CCCCCCCC.BACKUP)  -
                    PRODUCT(REPRO)
//
```

Example 2

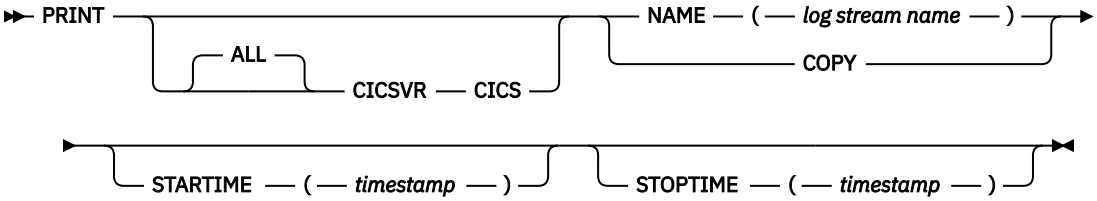
You can specify any keyword as the input parameter. In this example, the DSNAME keyword is specified in the EXEC statement as an input parameter.

```
//TESTNTFY  JOB  ,CICSVR,MSGLEVEL=(1,1),MSGCLASS=H,REGION=6144K
//*-------------------------------------------------------------------*/
//* CREATE BACKUP USING REPRO                                         */
//*-------------------------------------------------------------------*/
//STEP1     EXEC PGM=IDCAMS
//IN            DD DSN=AAAAAAAA.BBBBBBBB.CCCCCCCC,DISP=OLD
//OUT        DD DSN=AAAAAAAA.BBBBBBBB.CCCCCCCC.BACKUP,DISP=OLD
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
     REPRO INFILE(IN)
           OUTFILE(OUT)
/*
//*------ ------------------------------------------------------------------*/
//* RUN NOTIFY UTILITY                                                      */
//*-------------------------------------------------------------------------*/
//STEP1      EXEC PGM=DWWNT,PARM='DSNAME(AAAAAAAA. BBBBBBBB.CCCCCCCC)'
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWIN    DD *
     NOTIFY  BACKUPNAME(AAAAAAAA.BBBBBBBB.CCCCCCCC.BACKUP)  -
                    PRODUCT(REPRO)
//
```

PRINT: print information about records logged on an MVS log

Use the PRINT command to print the contents of MVS logs, and to find information about records logged on them.

Format



Keywords

ALL
This is the default.

This specifies that the utility must print information about all records found on the MVS log. This keyword is mutually exclusive with the CICS and CICSVR keywords.

CICSVR
This specifies that the utility must print only information about records logged by CICS VR

CICS
This specifies that the utility must print only information about records logged by CICS, including forward recovery and autojournalled records. Printing of records from the CICS system log, such as CICS undo records, is not supported by this utility.

NAME(log stream name)
This keyword identifies the data set name of the MVS log stream used by the utility.

log stream name
Specifies the name of the MVS log stream. The name is 1 to 26 characters long.

The NAME keyword is optional. If NAME is omitted from the command, the COPY keyword must be specified.

COPY
This indicates that the logs specified by the DWWCOPY1 ddname are QSAM copies of MVS log streams. The COPY keyword is optional. If COPY is omitted from the command, the NAME keyword must be specified. If the COPY keyword is specified in the command, a DWWCOPY1 ddname is required for input.

STARTTIME(timestamp)
If present, this keyword specifies the time that the utility uses as a start time when reading blocks from the MVS log. If STARTTIME is missing, the utility starts with the first block.

STOPTIME(timestamp)
If present, this keyword specifies the time that the utility uses to stop reading blocks from the MVS log. If omitted, the utility runtime is used as the stop time.

timestamp
Must be in the format **yyyy/ddd/hh/mm/ss**, where:

yyyy
Is the four digit year number (2001)

ddd
Is the day of the year (001–366)

hh
Is the hour of the day (00–23)

mm
Is the number of minutes (00–59)

ss
Is the number of seconds (00–59)

You can separate these values with a slash (/), period (.), or colon (:). You can also omit the separator character. For example:

```
STARTTIME(2001.159/:23:00)
```

You cannot substitute commas, blanks, and so on, for the time values, but you can omit values from the right. For example, if you specify STARTTIME(2001.159), CICS VR assumes that the time segment is 00:00:00.

EXCLUDE(specific log records)
Use the EXCLUDE command to eliminate specific log records from the Journal Print utility.

Format
EXCLUDE FILEID (id1,id2,...) TERMID (id1,id2,...) TRANSID (id1,id2,...)

Keywords

FILEID(id1,id2,...)
Specifies that the utility must ignore any log records with these file IDs when printing records. If more than one keyword is specified, for example; EXCLUDE FILEID(DD1),TERMID(TST1), the log record must match both IDs specified for it to be excluded.

Id1,id2,...
Specifies the FILEID defined to CICS. id1, id2, for example, can be 1-8 characters. Up to 99 IDs can be specified for one FILEID. If more than one ID is specified on the FILEID keyword, a log record only needs to match one of the specified file IDs to be excluded

TERMID(id1,id2,...)
Specifies that the utility must ignore any log records with these terminal IDs when printing records. If more than one keyword is specified, for example, EXCLUDE FILEID(DD1),TERMID(TST1), the log record must match both IDs specified for it to be excluded

Id1,id2,...
Specifies the TERMINALID defined to CICS. id1, id2, for example, can be 1 to 4 characters. Up to 99 IDs can be specified for one TERMID. If more than one ID is specified on the TERMID keyword, a log record needs to match only one of the specified terminal IDs to be excluded.

TRANSID(id1,id2,...)
Specifies that the utility must ignore any log records with these transaction IDs when printing records. If more than one keyword is specified, for example, EXCLUDE TRANSID(APQ1),TERMID(TST1), the log record must match both IDs specified for it to be excluded.

Id1,id2,...
Specifies the TRANSACTIONID defined to CICS. id1, id2, for example, can be 1 to 4 characters. Up to 99 IDs can be specified for one TRANSID. If more than one ID is specified on the TRANSID keyword, a log record only needs to match one of the specified TRANSACTIONIDs to be excluded.

INCLUDE(specific log records)
Use the INCLUDE command to selectively include specific log records from the Journal Print utility.

Format
INCLUDE FILEID (id1,id2,...) TERMID (id1,id2,...) TRANSID (id1,id2,...)

Keywords

FILEID(id1,id2,...)
Specifies that the Journal Print utility use log records only with these file IDs. If more than one keyword is specified, for example; INCLUDE FILEID(DD1),TERMID(TST1), the log record must match both IDs specified for it to be included.

Id1,id2,...
Specifies theFILEID defined to CICS. For example; id1, id2,can be 1 to 8 characters. Up to 99 IDs can be specified for one FILEID. If more than one ID is specified on the FILEID keyword, a log record needs to match only one of the specified file IDs to be included.

TERMID(id1,id2,...)
Specifies that the Journal Print utility use log records only with these terminal IDs. If more than one keyword is specified, for example; INCLUDE FILEID(DD1),TERMID(TST1), the log record must match both IDs specified for it to be included.

Id1,id2,...
Specifies the TERMINALID defined to CICS.For example; id1, id2, can be 1 to 4 characters. Up to 99 IDs can be specified for one TERMID. If more than one ID is specified on the TERMID keyword, a log record needs to match only one of the specified terminal IDs to be included.

TRANSID(id1,id2,...)
Specifies that the Journal Print utility use log records only with these transaction IDs. If more than one keyword is specified, for example; INCLUDE TRANSID(DD1),TERMID(TST1), the log record must match both IDs specified for it to be included.

Id1,id2,...
Specifies the TRANSACTIONID defined to CICS. id1, id2, for example, can be 1 to 4 characters. Up to 99 IDs can be specified for one TRANSID. If more than one ID is specified on the TRANSID keyword, a log record needs to match only one of the specified transaction IDs to be included.

Usage notes

Sample output reports are provided in the *CICS VR User's Guide*.

Consider the following when using the **EXCLUDE** command:

- At least one keyword must be specified for each **EXCLUDE** command.
- Multiple **EXCLUDE** commands and **INCLUDE** commands can be specified in the same job step. The Journal Print utility processes a log record against all **EXCLUDE** commands before it processes the log record against all INCLUDE commands.
- For each log record, if the **EXCLUDE** criteria is met, the record is excluded. If the **EXCLUDE** criteria is not met, the Journal Print utility matches the log record against the next **EXCLUDE** command.
- When the log record has been examined against all the **EXCLUDE** commands, the utility examines the log record against the first **INCLUDE** command, (if the log record was not excluded by any of the **EXCLUDE** commands).
- If the **INCLUDE** criteria is met the record is used in the utility. If it is not met, the Journal Print utility matches the record against the next **INCLUDE** command.
- If the log record does not match any of the **INCLUDE** commands, do not use the log record. Journal Print utility repeats this process for the next log record by matching it first against the **EXCLUDE** commands and then the INCLUDE commands.
- If one or more **EXCLUDE** commands are entered and no **INCLUDE** commands are entered, all log records that do not match the entered exclude criteria are printed. For example, if you specify:

  ```
  EXCLUDE FILEID(DD1),TERMID(T1)
  ```

  The utility ignores log records that have a FILEID of DD1 and TERMINALID of T1. If you want to ignore log records that have a FILEID of DD2 or TERMINALID of T2, specify two **EXCLUDE** commands as follows:

  ```
  EXCLUDE FILEID(DD2)
  EXCLUDE TERMID(T2)
  ```

  There is no limit on the number of **EXCLUDE** (and **INCLUDE**) commands that you can specify.
- You can specify up to 99 IDs on each keyword.

- If you specify **INCLUDE** or **EXCLUDE** commands that eliminate all of the records, no records are printed.
- Do not specify **EXCLUDE** and **INCLUDE** criteria that conflict. For example; **INCLUDE** FILEID(DD1) and EXCLUDE FILEID(DD1). If conflicting criteria is specified, no records are printed and no error messages are produced.

Consider the following when using the **INCLUDE** command:

- Multiple **INCLUDE** commands and **EXCLUDE** commands can be specified in the same job step. The Journal Print utility processes a log record against all **EXCLUDE** commands before it processes the log record against all **INCLUDE** commands.
- For each log record, if the **EXCLUDE** criteria is met, the record is excluded. If the **EXCLUDE** criteria is not met, the Journal Print utility matches the log record against the next **EXCLUDE** command.
- When the log record has been examined against all the **EXCLUDE** commands, the Journal Print utility examines the log record against the first **INCLUDE** command (if the log record was not excluded by any of the **EXCLUDE** commands).
- If the **INCLUDE** criteria is met, or if no **INCLUDE** commands were specified, the record is printed.
- If the criteria it is not met, the Journal Print utility matches the record against the next **INCLUDE** command. If the log record does not match any of the **INCLUDE** commands, the log record is not printed. The Journal Print utility repeats this process for the next log record by first matching it against the **EXCLUDE** commands and then the **INCLUDE** commands.
- If one or more **INCLUDE** commands are entered and no **EXCLUDE** commands are entered, all log records that match the entered include criteria is printed. For example, if you specify:

  ```
  INCLUDE FILEID(DD1),TERMID(T1)
  ```

  The Journal Print utility only uses log records that have a FILEID of DD1 and TERMINALID of T1. If you want the Journal Print utility to use log records that have a FILEID of only DD1 or TERMINALID of T1, specify two **INCLUDE** commands as follows:

  ```
  INCLUDE FILEID(DD1)
  INCLUDE TERMID(T1)
  ```

  There is no limitation on the number of **INCLUDE** (and **EXCLUDE**) commands.
- You can specify up to 99 IDs on each keyword.
- If you specify **INCLUDE** or **EXCLUDE** commands that eliminate all of the records, no records are printed.
- Avoid specifying **INCLUDE** and **EXCLUDE** criteria that conflict (for example, `INCLUDE FILEID(DD1)` and `EXCLUDE FILEID(DD1)`). If conflicting criteria is specified, no records are printed. No error messages are produced.

Examples

The CICS VR Journal Print Utility can be started by submitting a batch job that runs the utility program, DWWJUP.

The following example shows the use of the `PRINT ALL` command to print the named data set from the MVS log:

```
//*-------------------------------------------------------*/
//* Print the mvslog                                      */
//*-------------------------------------------------------*/
//PRIINT   JOB ,CICSVR,MSGCLASS=H,CLASS=A,MSGLEVEL=(1,1),
//             REGION=4096K,NOTIFY=USERID
//PRINTLOG EXEC PGM=DWWJUP
//STEPLIB  DD DSN=DWW.SDWWLOAD,DISP=SHR   /* CICSVR LOADLIB */
// DD DSN=DWW.SDWWLENU,DISP=SHR
//DWWPRINT DD SYSOUT=*
//DWWMSG   DD SYSOUT=*
//DWWIN    DD *
   PRINT ALL NAME(CICS.MVSLOG1)
//*
```

Figure 106. Print the MVS log

The following example shows the use of the PRINT CICSVR COPY command to print a QSAM copy of the MVS log, specified by the DWWCOPY1 ddname:

```
//*-------------------------------------------------------*/
//* Print the copy of the mvslog                          */
//*-------------------------------------------------------*/
//PRIINT   JOB ,CICSVR,MSGCLASS=H,CLASS=A,MSGLEVEL=(1,1),
//             REGION=4096K,NOTIFY=USERID
//PRINTLOG EXEC PGM=DWWJUP
//STEPLIB  DD DSN=DWW.SDWWLOAD,DISP=SHR   /* CICSVR LOADLIB */
// DD DSN=DWW.SDWWLENU,DISP=SHR
//DWWPRINT DD SYSOUT=*
//DWWMSG   DD SYSOUT=*
//DWWCOPY1 DD DSN=DWW.LOGCOPY,DISP=SHR      /* COPY OF THE MVSLOG */
//DWWIN    DD *
   PRINT CICSVR COPY
//*
```

Figure 107. Print a QSAM copy of the MVS log

The Journal Print Utility filtering is started by adding **EXCLUDE** and **INCLUDE**, or **EXCLUDE** or **INCLUDE** commands to the command input in the DWWIN dd statement.

Assume these two **EXCLUDE** commands are specified in one job step. The two **EXCLUDE** commands tell the Journal Print utility to exclude all records that have both a FILEID of DD3 and TRANSACTIONID of APQ4, or, exclude all records that have a TERMINALID of TST2

```
EXCLUDE FILEID(DD3) TRANSACTIONID(APQ4)
EXCLUDE TERMINALID(TST2)
```

Assume these five commands are specified in one job step. Since multiple **EXCLUDE** and **INCLUDE** commands are specified in one step, the Journal Print utility processes a log record against all **EXCLUDE** commands before the log record is processed against all **INCLUDE** commands.

```
INCLUDE FILEID(DD1,DD2)
INCLUDE FILEID(DD3) TERMINALID(TST1)
INCLUDE FILEID(DD4) TRANSACTIONID(APQ1,APQ2,APQ3)
EXCLUDE FILEID(DD3) TRANSACTIONID(APQ4)
EXCLUDE TERMINALID(TST2)
```

Exclude all records that have both a FILEID of DD3 and TRANSACTIONID of APQ4, or exclude all records that have a TERMINALID of TST2.

This example is exactly like the previous example. When the log record has been processed using the exclude criteria, it is processed using the include criteria. If the log record was not excluded by the **EXCLUDE** command:

Include all records that have a FILEID of DD1 or DD2, or include all records that have a FILEID of DD3 and TERMINALID of TST1, or Include all records that have a FILEID of DD4 and TRANSACTIONID of APQ1, APQ2, or APQ3

Assume the two **INCLUDE** commands below are specified in one job step. The two **INCLUDE** commands tell the Journal Print utility to include all records that have both a FILEID of DD3 and TRANSACTIONID of APQ4, or, include all records that have a TERMINALID of TST2

```
INCLUDE FILEID(DD1)
INCLUDE TERMID(T1)
```

Assume the five commands below are specified in one job step. Since multiple **INCLUDE** or **EXCLUDE** commands are specified in one step, the Journal Print utility processes a log record against all **EXCLUDE** commands before the log record is processed against all **INCLUDE** commands.

```
INCLUDE FILEID(DD1,DD2)
INCLUDE FILEID(DD3) TERMINALID(TST1)
INCLUDE FILEID(DD4) TRANSACTIONID(APQ1,APQ2,APQ3)
EXCLUDE FILEID(DD3) TRANSACTIONID(APQ4)
EXCLUDE TERMINALID(TST2)
```

Exclude all records that have both a FILEID of DD3 and TRANSACTIONID of APQ4, or Exclude all records that have a TERMINALID of TST2.

If the log record was not excluded by any of the **EXCLUDE** commands, it is processed using the include criteria. For the remaining records (the log records that were not excluded by the **EXCLUDE** command).

Include all records that have a FILEID of DD1 or DD2, or| Include all records that have a FILEID of DD3 and TERMINALID of TST1, or Include all records that have a FILEID of DD4 and TRANSACTIONID of APQ1, APQ2, or APQ3

Synonyms

Table 35. Synonyms for EXCLUDE and INCLUDE commands or keywords

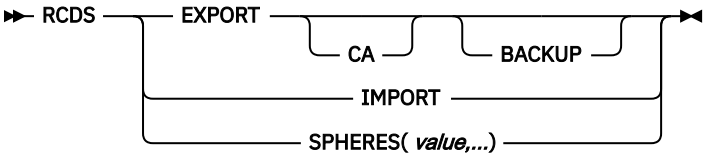
Keyword	Synonym
FILEID	DD, DDNAME
TERMID	TERMINALID
TRANSID	TRANSACTIONID

RCDS: Create a RCDS copy

Use the RCDS command to create a copy of the RCDS that can be sent (exported) to a remote site and used to update (import) the RCDS at the remote site, to keep the remote site RCDS in synchronization with the RCDS at the primary site.

Only RCDS records that are significant to the remote site are used to update the remote site's RCDS.

Format



Keywords

EXPORT
Specifies that the information, which is stored in the RCDS, is copied into the SAM data set specified on the DWWCOPY1 DD statement.

CA
Optional: Specifies that information related to change accumulation that is stored in the RCDS (in addition to recovery information) is copied into the SAM data set specified on the DWWCOPY1 DD statement.

BACKUP
Optional: Specifies that information related to backups stored in the RCDS (in addition to recovery information) is copied into the SAM data set specified on the DWWCOPY1 DD statement.

IMPORT
Specifies that the information, which was previously exported, is loaded from the SAM data set specified on the DWWCOPY1 DD statement into the RCDS.

SPHERES
Specifies the data sets that are included in the EXPORT file which is used with IMPORT to load a new RCDS. The values in the keyword specifies the names of the data sets for which the information is copied. When the SPHERES keyword is specified, all the information in the RCDS about the datasets that match the value or values in the SPHERES keyword are copied for information that are specific to the datasets. All information that are not data set specific is also copied. Generic characters can be used to specify the data set names:

- ** means that any number of characters can be replaced.
- * means that characters are replaced up to one whole data set level but not for two or more levels.
- % means that one character is replaced.

Examples:

- **TEST

  All data sets which end with TEST, for example; CICSVR.TEST, CICS.V41.TEST or TEST.
- TEST**

  All data sets which begin with TEST, for example; TEST.CICSVR, TEST.V41.CICSVR or TEST.
- **TEST**

  All data sets which have TEST anywhere in the name, for example; A.A.TEST, TEST.A.A, A.ATESTA.A or TEST.
- **TEST**CICS**

  All data sets which have TEST, before CICS, anywhere in the name, and then CICS, for example; TEST.CICSVR, ATEST.V41.CICSVR or TESTCICS.
- *TEST.CICSVR

  All data sets which have TEST in the end of the first level and then CICS VR in the second and last level, for example; AATEST.CICSVR or TEST.CICSVR but not A.TEST.CICSVR or TEST.CICSVR.V1.
- TEST.*.*.CICSVR

  All data sets which have TEST as the first level and CICS VR in the fourth and last level, for example; TEST.A.A.CICSVR but not TEST.CICSVR or TEST.V1.V2.V3.CICSVR
- TEST.**.CICSVR

  All data sets which have TEST as the first level and CICS VR in the last level, for example; TEST.AA.CICSVR, TEST.CICSVR or TEST.V1.V2.CICSVR
- %TEST%.%%

  All data sets which have first level with TEST in position 2 to 5 and length 6 and a second level with length 2, for example; ATEST1.V1

Usage notes

Consider these points when you use the RCDS command:

- To use the RCDS utility, run the CICS VR module DWWGJCDS.
- You can only have one RCDS command in a single job step.
- You start the RCDS utility by running the required JCL.
- You must specify the SAM data set that contains the output of the EXPORT or the input for the IMPORT on the DWWCOPY1 DD STATEMENT.
- Before you use the RCDS utility on a remote site, you need to install CICS VR V4R2 or later and you must allocate an RCDS.
- Keywords CA, BACKUP and SPHERES can only be specified if the EXPORT keyword also is specified.

Examples

```
RCDS EXPORT                    1

RCDS IMPORT                    2

RCDS EXPORT CA                 3

RCDS EXPORT BACKUP             4

RCDS EXPORT CA BACKUP          5
```

Here is an explanation of each of these RCDS commands:

1
This RCDS command tells CICS VR to copy all the necessary RCDS information to the SAM data set specified on the DWWCOPY1 DD statement. The SAMdata set can be sent to a remote recovery site.

2
This RCDS command tells CICS VR to import the information, stored in the SAM data set specified on the DWWCOPY1 DD statement, into the RCDS. The information in the SAM data set must have been created using the RCDS EXPORT command.

3
This RCDS command tells CICS VR to copy information related to change accumulation, in addition to the necessary recovery information, from the RCDS into the SAM data set specified on the DWWCOPY1 DD statement. The SAM data set then can be sent to the remote recovery site.

4
This RCDS command tells CICS VR to copy information related to backups, in addition to the necessary recovery information, from the RCDS into the SAM data set specified on the DWWCOPY1 DD statement. The SAM data set then can be sent to the remote recovery site.

5
This RCDS command tells CICS VR to copy information related to change accumulation and backups, in addition to the necessary recovery information, from the RCDS into the SAM data set specified on the DWWCOPY1 DD statement. The SAM data set then can be sent to the remote recovery site.

Synonyms

The RCDS Synonyms table provides RCDS commands or keywords along with acceptable synonyms to use in place of the commands or keywords:

Table 36. RCDS Synonyms

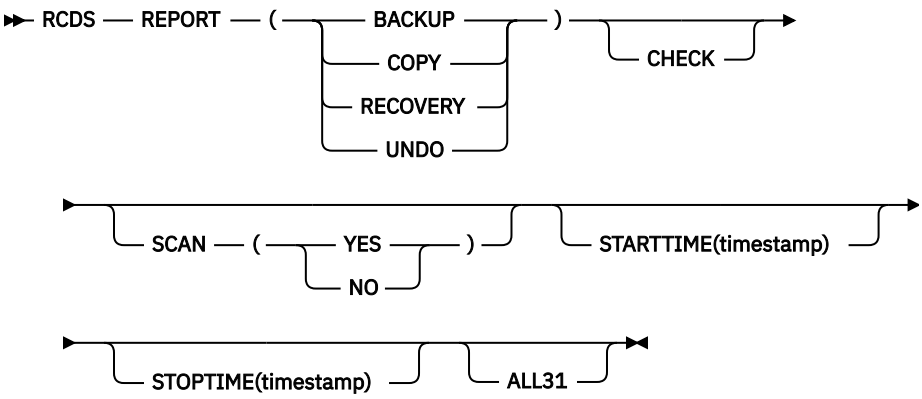
Command, keyword or value	Synonyms
EXPORT	EX
IMPORT	IM

Table 36. RCDS Synonyms (continued)	
Command, keyword or value	**Synonyms**
BACKUP	BACK

RCDS: Create a RCDS report

Use the RCDS REPORT keyword to create a detailed report containing the information requested by options of the command.

Format



Keywords

BACKUP
A report is written with information about each registered backup in the RCDS. This can be used to see which backups are available for forward recovery.

COPY
A report is written with information about each registered mvslog copy in the RCDS. This can be used to see which mvslog copies can be used for forward recovery.

RECOVERY
A report is written with information about each registered VSAM sphere in the RCDS when the sphere was opened and closed. This can be used to see when spheres were active and to specify start and stop times for forward recovery.

UNDO
A report is written with information about undo logging made for each batch job/step.

CHECK
This parameter is used to ensure that a check is made that all the resources required for forward recovery are cataloged.

When used with the BACKUP parameter, all the backups are checked to see if they are cataloged or not.

When used with the COPY parameter, all log copies are checked to see if they are cataloged or not.

When used with the RECOVERY parameter, all VSAM spheres that are printed in the recovery report are checked to see if they are cataloged or not.

When used with the UNDO parameter, CHECK is ignored.

SCAN (YES, NO)
CICS VR might need to perform a log-of-logs scan to get the latest information for a recovery report. SCAN(YES) allows a log-of-logs scan. SCAN(NO) prevents a log-of-logs scan. The default is SCAN(YES).

Note: This keyword can only be specified together with the RECOVERY parameter.

STARTTIME(timestamp)
This parameter specifies the time that the utility uses as a start time for the data lookup. This can be useful to limit the amount of data produced in the report. If STARTTIME is missing, the RCDS REPORT uses all information that is older than the specified STOPTIME.

timestamp
Must be in the format **yyyy/ddd/hh/mm/ss**, where:

yyyy
Is the four digit year number (2001)

ddd
Is the day of the year (001–366)

hh
Is the hour of the day (00–23)

mm
Is the number of minutes (00–59)

ss
Is the number of seconds (00–59)

You can separate these values with a slash (/), period (.), or colon (:). You can also omit the separator character. For example:

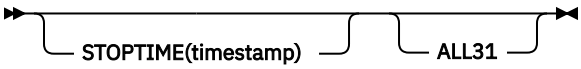
```
STARTTIME(2001.159/:23:00)
```

You cannot substitute commas, blanks, and so on, for the time values, but you can omit values from the right. For example, if you specify STARTTIME(2001.159), CICS VR assumes that the time segment is 00:00:00.

STOPTIME(timestamp)
This parameter specifies the time that the RCDS REPORT uses to stop the data lookup. If the parameter is omitted, the RCDS REPORT uses the current time as the stop time. The timestamp must have the same format as used for STARTTIME.

ALL31
This is an optional parameter. It specifies that the report utility can carve memory up to the bar i.e., up to 2GB storage to generate the report. It's recommended using this parameter to avoid S878 abend during the report generation process.

Format



Keywords

ALL31
This is an optional parameter. It specifies that the report utility can carve memory up to the bar i.e., up to 2GB storage to generate the report. It's recommended using this parameter to avoid S878 abend during the report generation process.

Usage notes

Sample output reports are provided in the *CICS VR User's Guide*.

Example

This example produces a recovery report, containing all information from RCDS that is older than the current time.

```
RCDS REPORT(RECOVERY)
```

A sample job to create this report is as follows:

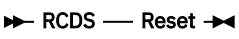
```
//*-------------------------------------------------------*/
//* Produce a report for recovery                         */
//*-------------------------------------------------------*/
//REPORT   JOB ,CICSVR,MSGCLASS=H,CLASS=A,MSGLEVEL=(1,1),
//            REGION=4096K,NOTIFY=USERID
//PRINTREP EXEC PGM=DWWGJCDS
//STEPLIB  DD DSN=DWW41.SDWWLOAD,DISP=SHR   /* CICSVR LOADLIB */
//DWWPRINT DD SYSOUT=*
//DWWMSG   DD SYSOUT=*
//DWWCON1  DD DSN=DWW.DWWCON1,DISP=SHR      /* RCDS */
//DWWCON2  DD DSN=DWW.DWWCON2,DISP=SHR      /* RCDS */
//DWWCON3  DD DSN=DWW.DWWCON3,DISP=SHR      /* RCDS */
//DWWIN    DD *
   RCDS REPORT(RECOVERY)
/*
```

RCDS: Reset RCDS error flags

During various CICS VR processing, the Recovery Control Data Sets (RCDSs) are checked for various error conditions to help ensure integrity of the data within the RCDSs. If an error condition is found, CICS VR reports the error and sets an error flag in the RCDS that marks it as unusable. CICS VR processing can no longer access an RCDS that has an error flag set on.

When an RCDS error condition is reported, the problem must be investigated and resolved before using the RCDS again. After the RCDS error is resolved and the accuracy of the data in the RCDS has been verified, you can make the RCDS available to CICS VR again by issuing the RCDS RESET command against the RCDS. The RCDS RESET command resets any error flags in the specified RCDS, therefore allowing CICS VR processing to again access the data within the RCDS.

Format



Keywords

RESET
Specifies that the RCDS utility must reset any error flags in the Recovery Control Data Sets specified on the DWWCONx DD statements in the JCL.

Usage notes

- The RESET keyword resets only any error flags, it does not fix any problems that caused the flags to be set.
- Specify the names of the RCDSs that you want to reset on the DWWCONx DD statements in the JCL.

Examples

```
RCDS RESET                    1
```

This RCDS command tells CICS VR to:

1
Reset any error flags in the RCDSs specified on the DWWCONx DD statements in the JCL.

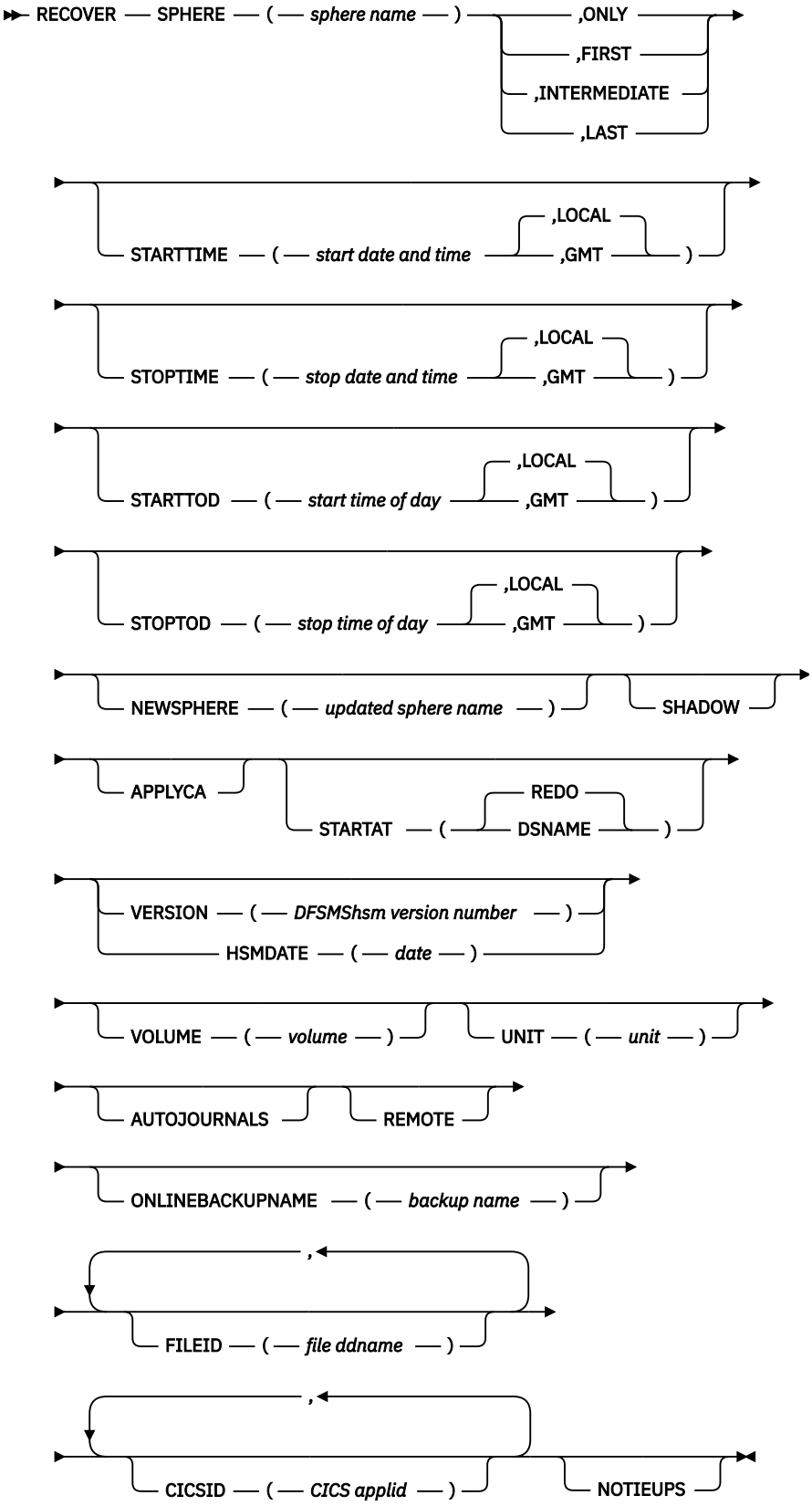
RECOVER: Forward recover a VSAM sphere

Use the RECOVER command to tell CICS VR to forward recover a VSAM sphere.

Use the CICS VR dialog interface to generate the CICS VR jobs and do not code the CICS VR statements directly. The CICS VR dialog interface performs the following tasks:

- Runs the log of logs scan to get the latest information about the logs and updates the CICS VR RCDS with this information.
- Restores the DFSMShsm or DFSMSdss backup automatically.
- Generates the necessary CICS VR statements automatically.

Format


RECOVER
SPHERE
(sphere name)
,ONLY
,FIRST
,INTERMEDIATE
,LAST
STARTTIME (start date and time ,LOCAL ,GMT)
STOPTIME (stop date and time ,LOCAL ,GMT)
STARTTOD (start time of day ,LOCAL ,GMT)
STOPTOD (stop time of day ,LOCAL ,GMT)
NEWSPHERE (updated sphere name)
SHADOW
APPLYCA
STARTAT (REDO DSNAME)
VERSION (DFSMShsm version number)
HSMDATE (date)
VOLUME (volume)
UNIT (unit)
AUTOJOURNALS
REMOTE
ONLINEBACKUPNAME (backup name)
,
FILEID (file ddname)
,
CICSID (CICS applid)
NOTIEUPS

Keywords

SPHERE(*sphere name*)
Specifies the VSAM sphere to be forward recovered. It is the name as recorded on the log. Only one SPHERE keyword is allowed for each RECOVER control statement. The SPHERE keyword is required.

sphere name
Specifies the MVS data set name of the VSAM sphere to be forward recovered. This name is 1–44 characters.

ONLY | FIRST | INTERMEDIATE | LAST
Specifies the relative order of the steps in a job. These keywords are mutually exclusive. One of these keywords must be specified on a forward recovery command when the NEWSPHERE keyword has not be specified. A forward recovery job is composed of one or more steps. CICS VR must know the relative forward recovery step that is executing. If there is only one forward recovery step then specify ONLY. If there are two forward recovery steps, then specify FIRST on the first step and specify LAST on the last step. When there are more than two steps, specify INTERMEDIATE on all the intermediate forward recovery steps (the steps that are not the first or the last). This is handled automatically for you through the CICS VR panels.

STARTTIME(*start date and time*,LOCAL | GMT)
Specifies the earliest timestamp of the after-images that you want to recover the VSAM sphere from. CICS VR ignores all after-images on the logs until it finds an after-image for this VSAM sphere, whose timestamp is the same as, or later than, the time specified in the STARTTIME keyword. CICS VR applies all after-images for this VSAM sphere, from this place in the log, if a tie-up record (TUR) has been encountered on the log. Only one STARTTIME keyword is allowed for each RECOVER control statement. If you do not specify STARTTIME or STARTTOD, recovery starts at the first after-image encountered on the logs, after the first TUR.

For VSAM data sets that were restored from a product that used backup-while-open facilities, STARTTIME is the recovery point time. When you use the CICS VR dialog interface CICS VR automatically retrieves the recovery point time from the integrated catalog facility (ICF) catalog, so you do not need to specify STARTTIME in this situation.

start date and time
Must be in the format **yy/ddd/hh/mm/ss**, where:

yy
Is the last two digits of the year (00–99)

ddd
Is the day of the year (001–366)

hh
Is the hour of the day (00–23)

mm
Is the number of minutes (00–59)

ss
Is the number of seconds (00–59)

You can separate these values with a slash (/), period (.), or colon (:). You can also omit the separator character. For example:

```
STARTTIME(01.159/22:23:00)
```

You cannot substitute commas, blanks, and so on, for the time values, but you can omit values from the right. For example, if you specify STARTTIME(01.159), CICS VR assumes that the time segment is 00:00:00.

CICS VR interprets year values (**yy**) in the range 00–85 to be years 2000–2085, and year values in the range 86–99 to be years 1986–1999.

LOCAL
Specifies that the date and time are in local format. You can specify LOCAL if you are using MVS log streams. LOCAL is the default value.

GMT
Specifies that the date and time are in Greenwich mean time (GMT) format. You can specify GMT only if you are using MVS log streams.

STOPTIME(*stop date and time*,LOCAL | GMT)
Specifies the latest timestamp of the after-images that you want to recover the VSAM sphere from. CICS VR ignores all after-images on the logs after it finds an after-image for this VSAM sphere, whose timestamp is later than the time specified in the STOPTIME keyword. CICS VR applies all after-images for this VSAM sphere up to this place in the log. Only one STOPTIME keyword is allowed for each RECOVER control statement. If STOPTIME or STOPTOD is not specified, recovery stops after the last supplied log.

stop date and time
Must be in the format **yy/ddd/hh/mm/ss**, where:

yy
Is the last two digits of the year (00–99)

ddd
Is the day of the year (001–366)

hh
Is the hour of the day (00–23)

mm
Is the number of minutes (00–59)

ss
Is the number of seconds (00–59)

You can separate these values with a slash (/), period (.), or colon (:). You can also omit the separator character. For example:

```
STOPTIME(01.159/00:30:00)
```

You cannot substitute commas, blanks, and so on, for the time values, but you can omit values from the right. For example, you can specify day 01159, time 23:59:59, as follows:

```
STOPTIME(01.159)
```

If you specify this, CICS VR assumes that the day is 01365 and the time is 23:59:59:

```
STOPTIME(01)
```

CICS VR assumes that these values are for day 01159, and time 16:59:59:

```
STOPTIME(0115916)
```

CICS VR interprets year values (**yy**) in the range 00–85 to be years 2000–2085, and year values in the range 86–99 to be years 1986–1999.

LOCAL
Specifies that the date and time are in local format. You can specify LOCAL if you are using MVS log streams. LOCAL is the default value.

GMT
Specifies that the date and time are in GMT format. You can specify GMT only if you are using MVS log streams.

STARTTOD(*start time of day*,LOCAL | GMT)
Identifies the earliest time, in hexadecimal time-of-day (TOD) format, of the after-images that you want to recover the VSAM sphere from. CICS VR ignores all after-images on the logs until it finds an after-image for this VSAM sphere, whose TOD value is the same as, or later than, the time specified in

the STARTTOD keyword. CICS VR applies all after-images for this VSAM sphere, from this place in the log, if a tie-up record (TUR) has been encountered on the log. Only one STARTTOD keyword is allowed for each RECOVER control statement. If you do not specify STARTTOD or STARTTIME, recovery starts at the first after-image encountered on the logs, after the first TUR.

Use the STARTTOD keyword only if the STARTTIME keyword value is not precise enough for your recovery stop time. The STARTTOD keyword has no synonyms.

start time of day
Must be 16 hex characters. Here is an example of a STARTTOD keyword:

```
STARTTOD(AC47C0403792C101)
```

LOCAL
Specifies that TOD value is in local format. You can specify LOCAL if you are using MVS log streams. LOCAL is the default value.

GMT
Specifies that the TOD value is in GMT format.

STOPTOD(*start time of day*,LOCAL | GMT)
Identifies the latest time, in hexadecimal time-of-day (TOD) format, of the after-images that you want to recover the VSAM sphere from. CICS VR ignores all after-images on the logs after it finds an after-image for this VSAM sphere, whose TOD value is later than the time specified in the STOPTOD keyword. CICS VR applies all after-images for this VSAM sphere up to this place in the log. Only one STOPTOD keyword is allowed for each RECOVER control statement. If STOPTOD or STOPTIME is not specified, recovery stops after the last supplied log.

Use the STOPTOD keyword only if the STOPTIME keyword value is not precise enough for your recovery stop time. The STOPTOD keyword has no synonyms.

stop time of day
Must be 16 hex characters. Here is an example of a STOPTOD keyword:

```
STOPTOD(AC47C0403792C101)
```

LOCAL
Specifies that TOD value is in local format. You can specify LOCAL if you are using MVS log streams. LOCAL is the default value.

GMT
Specifies that the TOD value is in GMT format.

NEWSPHERE(*updated sphere name*)
Specifies the name of the target VSAM sphere to be recovered. The specified name can be 1-44 characters.

This keyword is optional, except when the SHADOW keyword is also specified, because SHADOW processing must always be performed against a copy of the VSAM sphere.

If NEWSPHERE is specified, CICS VR forward recovery processing applies all log records written for the VSAM data set specified on the SPHERE keyword to the data set specified on the NEWSPHERE keyword.

If NEWSPHERE is omitted, CICS VR forward recovery processing applies all log records written for the VSAM data set specified on the SPHERE keyword, to that same data set.

If the VERSION or HSMDATE keyword has also been specified, CICS VR calls DFSMShsm utilities to restore the sphere to the name specified in the NEWSPHERE keyword.

updated sphere name
Specifies the MVS data set name of the VSAM sphere to be recovered. This name can be 1–44 characters.

SHADOW
The SHADOW keyword is optional and has no synonyms.

The concept is that the first time (run 1) that you run a shadow forward recovery, the backup is restored and some amount of the forward recovery log is applied. Subsequent shadow forward recovery runs (2 - n) apply more of the forward recovery log with the intent to keep the shadow copy as current as possible.

CICS VR saves the status of the shadow forward recovery in the RCDS, so the subsequent shadow forward recovery runs (2 - n) must not specify a start and stop time and must be run frequently, so as to minimize the log records to be applied.

When a problem occurs and a real forward recovery is required, the CICS VR shadow can be copied to replace the user data set.

If you are using the CICS VR VSAM batch logger to log the updates that are made to VSAM spheres by batch jobs, you must also add the REMOTE keyword to the RECOVER command. The REMOTE keyword specifies that the log records written by the CICS VR VSAM batch logger must be included during shadow recovery processing.

APPLYCA
The APPLYCA keyword is optional and has no synonyms.

APPLYCA indicates to CICS VR that there is change accumulation data that is relative to this data set that needs to be applied during forward recovery processing. If there is no change accumulation data set or CICS VR detects an error with the CA data set, the APPLYCA keyword is ignored.

STARTAT(REDO | DSNAME)
Specifies where on the log the recovery begins.

REDO
Specifies all after-images found after the time specified in the STARTTIME keyword is used in this recovery, provided a TUR has been found on the log for this VSAM sphere.

DSNAME
Specifies the first TUR found on the log after the time specified in the STARTTIME keyword is used. All after-images after this TUR and before the time specified in the STOPTIME keyword is used in the recovery. So any after-images found after the time specified in the STARTTIME keyword, and before the TUR for this VSAM sphere is ignored.

The STARTAT keyword is optional; if it is not specified, the default of REDO is used.

If you use the STARTAT keyword without the STARTTIME keyword, STARTAT is ignored.

The STARTAT keyword has no synonyms.

Note: When a file is opened, the association between the file name and the data set name is recorded on the log by a TUR.

HSMDATE(*date*)
Identifies the date of the DFSMShsm full volume dump which is to be used to restore the VSAM sphere. For more information about the DFSMShsm restore process, refer to *z/OS DFSMShsm Storage Administration Guide*.

date
Specifies the DFSMShsm full volume dump date. The date must be in the format **yyddd**.

VERSION(*DFSMShsm version number*)
DFSMShsm version number identifies the version number of the DFSMShsm backup that is to be restored. The version number can be 0-999. For more information about the DFSMShsm restore process, refer to *z/OS DFSMShsm Storage Administration Guide*.

DFSMShsm version number
Identifies the version number of the DFSMShsm backup that is to be restored. The version number can be 0–999.

VOLUME(*volume*)
Specifies the volume serial number where the DFSMShsm backup of the VSAM sphere is restored to. This keyword can only be used if you have specified VERSION. If you specify VOLUME you must also

specify the UNIT keyword. For more information about the DFSMShsm restore process, refer to *z/OS DFSMShsm Storage Administration Guide*.

volume
Identifies the volume which is to be used for the DFSMShsm restore of the VSAM sphere. The volume is 1–6 characters.

UNIT(*unit*)
Specifies the unit name where the DFSMShsm backup of the VSAM sphere is restored to. This keyword can only be used if you have specified VERSION. If you specify UNIT you must also specify the VOLUME keyword. For more information about the DFSMShsm restore process, refer to *z/OS DFSMShsm Storage Administration Guide*.

unit
Identifies the unit name which is to be used for the DFSMShsm restore of the VSAM sphere

AUTOJOURNALS
Specifies that CICS VR must apply only log records produced by CICS TS autojournaling to the VSAM spheres during forward recovery processing.

The AUTOJOURNALS keyword is optional, and if it is not specified, CICS VR only applies log records produced by CICS TS forward recovery logging, Transactional VSAM, and CICS VR batch logging during forward recovery processing.

The AUTOJOURNALS keyword is only valid for VSAM spheres that were updated by CICS TS, and it is ignored when recovering VSAM spheres that were not updated by CICS TS.

REMOTE
Specifies that shadow recovery processing must include log records that were written by the CICS VR VSAM batch logger. You must add the REMOTE keyword to the RECOVER command when both of the following conditions are true:

- The SHADOW keyword has also been added to the RECOVER command.
- You want to ensure that shadow recovery processing includes all log records that were written by the CICS VR VSAM batch logger when the VSAM spheres were updated by batch jobs.

The REMOTE keyword must not be added to the RECOVER command if the SHADOW keyword has not been added.

ONLINEBACKUPNAME(*backup name*)
Specifies the name of the online backup from which the VSAM data set being recovered was restored.

The ONLINEBACKUPNAME keyword is optional and must only be specified if:

- The data set being recovered was previously restored from a backup that was registered to CICS VR through the file copy notification service.
- The backup was taken while the data set remained online and open to CICS for update.
- The backup product did **not** use backup-while-open (BWO) facilities.
- The RCDS is available and allocated to the RECOVER job.

If these conditions are true, specify the ONLINEBACKUPNAME keyword to ensure that CICS VR uses the proper forward recovery start time. CICS VR uses the forward recovery start time that is stored in the RCDS for the specified backup. The STARTTIME keyword is therefore optional when the ONLINEBACKUPNAME keyword is specified.

The CICS VR panel interface automatically adds the ONLINEBACKUPNAME keyword to the produced RECOVER command if the backup selected for restore meets the criteria specified.

backup name
The fully qualified data set name of the online backup from which the VSAM data set was restored. The backup data set name can be 1-44 characters.

FILEID(*file ddname*)
An optional keyword specifying the ddname that CICS used to allocate the data set being recovered at the forward recovery start time specified in the RECOVER command.

A CICS file definition associates a unique 1-8 character ddname with every VSAM data set defined to the region. When a VSAM data set is opened, CICS writes the full data set name and corresponding ddname (along with other information) into a tieup (TUR) log record. In all subsequent after-image log records, only the ddname is used to reference the data set.

CICS VR forward recovery therefore always begins by reading a tieup log record. This allows CICS VR to relate all after-image log records to the appropriate VSAM sphere.

In rare cases when a tieup log record does not exist for a VSAM data set, traditional CICS VR recovery is not able to associate after-image log records with a VSAM sphere. The optional FILEID and CICSID keywords can be specified to inform CICS VR of this file ddname and data set name relation for each CICS region that is normally obtained from a tieup log record.

Note: Specifying the FILEID and CICSID keywords causes CICS VR to bypass some additional error checking that is normally performed during recovery processing when tieup log records are available. You must specify only the FILEID and CICSID keywords in rare cases when the tieup log records are not available and the keywords are absolutely necessary for recovery processing.

file ddname
The 1-8 character ddname used by CICS to allocate the data set being recovered at the start time specified in the RECOVER command.

More than one file ddname can be specified, separated by a comma. For each file ddname specified, a corresponding CICS applid must be specified in the CICSID keyword. CICS VR does not limit the number of file ddname and CICS applid pairs that can be specified.

For example, if at the specified forward recovery start time, components of the VSAM sphere were opened in two separate CICS regions, the following FILED and CICSID keywords might be specified:

```
FILEID(ACCTBASE, ACCTAIX1)
CICSID(CICSPRD1, CICSPRD2)
```

CICS VR forward recovery processing interprets this example as follows:

- CICS region CICSPRD1 had the VSAM sphere opened at the forward recovery start time with a ddname of ACCTBASE.
- CICS region CICSPRD2 had the VSAM sphere opened at the forward recovery start time with a ddname of ACCTAIX1.

To ensure proper forward recovery when a tieup log record is not available, all active opens, against all of the VSAM sphere components, base cluster and alternate indexes, from all CICS regions, at the specified forward recovery start time, must be specified in the FILEID and CICSID fields.

CICSID(*CICS applid*)
An optional keyword that specifies the CICS region APPLID associated with each of the file ddnames specified in the optional FILEID keyword.

Refer to the FILEID keyword description for information about how and when to use the FILEID and CICSID optional keywords.

Note: Specifying the FILEID and CICSID keywords causes CICS VR to bypass some additional error checking that is normally performed during recovery processing when tieup log records are available. You must specify the FILEID and CICSID keywords only in rare cases when the tieup log records are not available and the keywords are absolutely necessary for recovery processing.

CICS applid
The 1-8 character CICS region APPLID associated with the specified file ddname(s) in the FILEID keyword.

More than one CICS applid can be specified, separated by a comma. For each file ddname specified, a corresponding CICS applid must be specified in the CICSID keyword. CICS VR does not limit the number of file ddname and CICS applid pairs that can be specified. The FILEID keyword description has an example of how CICS VR interprets multiple file ddname and CICS applid pairs.

To ensure proper forward recovery when a tieup log record is not available, all active opens, against all of the VSAM sphere components, base cluster and alternate indexes, from all CICS regions, at the specified forward recovery start time, must be specified in the FILEID and CICSID fields.

NOTIEUPS

A backup is taken to forward recover the VSAM sphere specified in this RECOVER command. If no tieups were written when the backup was taken, this keyword must be specified.

If NOTIEUPS is specified, CICS VR uses information gathered during a log-of-log scan to determine which logged records to use during forward recovery. If you use this keyword, make sure that a log-of-log scan has been performed after the STARTTIME specified for this vsam sphere.

Usage notes

Consider these points when you use the RECOVER command:

- You can use multiple RECOVER commands in a single job step providing all the necessary criteria is met; for example, the after images for each sphere are on the same log stream, as defined on the MVSLOG command, etc. The CICS VR dialog interface performs this consolidation automatically.
- It is assumed that the VSAM sphere to be recovered has been restored and is in a usable state. The VERSION or HSMDATE keyword can be added to the RECOVER command to have CICS VR call DFSMShsm utilities to restore a DFSMShsm backup prior to recovery processing. Other backups must be restored in a job step prior to the RECOVER job step. The CICS VR panel interface can automatically build the restore job step for known backups.
- Only use the STARTTOD and STOPTOD keywords if the STARTTIME and STOPTIME values are not precise enough for your recovery run. You can print the MVS log stream to get the TOD values that you need for the recovery.
- RECOVER processing sequentially applies all changes that are found on the specified logs. It uses information in the dsname records to decide which after-images to apply. These records contain the file names of every data set that was opened for the base cluster or path. RECOVER applies the after-images to the VSAM sphere as follows:
  - Records that were updated are overwritten by their after-images.
  - Records that were added are added using their after-images.
  - Records that were deleted are deleted.
- You must specify the FCTCOMP command in your recovery run if you are using CICS V2 logs and recovering a file that is defined in the CICS FCT as being fixed record format.
- If the forward recovery run fails after starting to update the VSAM sphere, you must restore a new copy of the VSAM sphere before rerunning CICS VR.
- The base cluster specified in NEWSPHERE must have the same data set characteristics as the base cluster specified in SPHERE, regarding:
  - Control interval size
  - Maximum record size
  - Key length and offset
  - Data set format; that is, RRDS, VRRDS, KSDS, or ESDS)
- The AUTOJOURNALS keyword is only valid for VSAM spheres that were updated by CICS TS. CICS TS autojournaling must be correctly defined in the CICS file definitions of the VSAM spheres to allow CICS VR to forward recover the spheres from log records produced by CICS TS autojournaling. Refer to Chapter 22, “Using CICS TS autojournaling,” on page 357 for more information about enabling autojournaling. However, note that you must use log records produced by CICS TS autojournaling for audit purposes only, and not for forward recovery.

Examples

```
RECOVER                    -
  ONLY                     -
  VERSION(01)              -
  APPLYCA                  -
  SPHERE(PAYROLL.MONTH5.BASE)
```

Figure 108. RECOVER with DFSMShsm backup

Forward recovery processing is requested for the VSAM sphere named in the SPHERE keyword.

Because no STARTTIME or STARTTOD keyword is specified, recovery starts after the first TUR at the first after-image that is encountered on the logs for that VSAM sphere.

Because no STOPTIME or STOPTOD keywords are specified, recovery stops when all logs have been exhausted.

The ONLY keyword tells CICS VR that only one RECOVER step is needed.

The VERSION keyword tells CICS VR to restore the VSAM sphere from DFSMShsm backup Version 1.

The APPLYCA keyword tells CICS VR to apply the change accumulation data if a change accumulation data set exists.

```
RECOVER                          -
  ONLY                           -
  STARTTIME(08.001/11:59:59)     -
  STOPTIME(08.002/11:59:59)      -
  APPLYCA                        -
  STARTAT(DSNAME)                -
  SPHERE(CA.BASE02)
```

Figure 109. RECOVER with no DFSMShsm or DFSMSdss backup

Forward recovery processing is requested for the VSAM sphere that is named in the SPHERE keyword.

The ONLY keyword tells CICS VR that only one RECOVER step is needed.

Because no VERSION or HSMDATE keywords are specified, CICS VR assumes that the user has restored a backup copy of the VSAM sphere using a product other than DFSMShsm; for example, using DFSMSdss, prior to the forward recovery. The STARTTTIME value must be prior to the initial tie-up record in the forward recovery log.

The STARTTIME keyword tells CICS VR to start the recovery on 01.001 at 11:59:59.

The STOPTIME keyword tells CICS VR to stop the recovery on 01.002 at 11:59:59.

The APPLYCA keyword tells CICS VR to apply the change accumulation data if a change accumulation data set exists.

The STARTAT keyword tells CICS VR to start the recovery at the first TUR after the time specified that is in the STARTTIME keyword.

```
RECOVER                          -
  ONLY                           -
  STARTTOD(B5E727FC28544000)     -
  VERSION(1)                     -
  VOLUME(TSO001)                 -
  UNIT(3390)                     -
  APPLYCA                        -
  SPHERE(CA.BASE02)
```

Figure 110. RECOVER with DFSMShsm backup and STARTTOD

Forward recovery processing is requested for the VSAM sphere named in the SPHERE keyword.

The ONLY keyword tells CICS VR that only one RECOVER step is needed.

The STARTTOD keyword tells CICS VR to begin the recovery at the value specified by the hex TOD STARTTOD keyword. This value is in the default, local format.

Because no STOPTIME or STOPTOD keywords are specified, recovery stops when all logs have been exhausted.

The VERSION keyword tells CICS VR to restore the VSAM sphere from DFSMShsm backup Version 1.

The VOLUME and UNIT keywords tell CICS VR that the VSAM sphere is restored to volume TSO001 on a 3390 disk.

The APPLYCA keyword tells CICS VR to apply the change accumulation data if a change accumulation data set exists.

```
RECOVER                              -
  SHADOW                             -
  NEWSPHERE(PAYROLL.MONTH5.SHADOW)   -
  SPHERE(PAYROLL.MONTH5.BASE)
```

Figure 111. RECOVER with SHADOW copy

Forward recovery processing is requested for the VSAM sphere named in the SPHERE keyword.

The SHADOW keyword tells CICS VR that the data set specified with NEWSPHERE is a shadow copy of the data set specified on the SPHERE keyword. You can use a shadow copy as a replacement to the user's VSAM sphere.

The NEWSPHERE keyword tells CICS VR that the VSAM sphere to be recovered has a different data set name than the one recorded on the log.

Note: This RECOVER command must be run at regularly scheduled intervals so that the shadow copy is up-to-date with the user's VSAM sphere.

```
RECOVER                              -
 SPHERE(PROD.SALES)                  -
 AUTOJOURNALS                        -
 STARTTIME(07.325/11:59:59)
```

Figure 112. RECOVER with AUTOJOURNALS keyword

Forward recovery processing is requested for the VSAM sphere named in the SPHERE keyword.

The AUTOJOURNALS keyword tells CICS VR to forward recover the VSAM sphere PROD.SALES only from log records produced by CICS TS autojournaling.

The STARTTIME keyword tells CICS VR to use only log records that have a time stamp later than or equal to 03.325/11:59:59 (local time format).

Note: You must use log records produced by CICS TS autojournaling for audit purposes only, and not for forward recovery. Refer to Chapter 22, “Using CICS TS autojournaling,” on page 357 for more information.

Synonyms

The following table provides the RECOVER commands or keywords along with acceptable synonyms that can be used in place of the commands or keywords.

Table 37. RECOVER synonyms

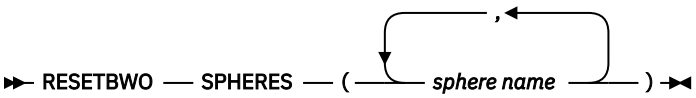
Command or keyword	**Synonyms**
RECOVER	RO, RECO, RECONLY, RECOV
CICSID	APPLID
FILEID	DDNAME
NEWSPHERE	NEWSPH, NEWDATASETNAME, NEWDSNAME, NEWDSN

Table 37. RECOVER synonyms (continued)	
Command or keyword	**Synonyms**
ONLINEBACKUPNAME	BACKUPDATASETNAME, BACKUPNAME, BACKUPDATASET
SPHERE	SPH, DATASETNAME, DSNAME, DSN
STARTTIME	STARTDATETIME, STARTDATE, START
STOPTIME	STOPDATETIME, STOPDATE, STOP
VERSION	VER

RESETBWO: Reset BWO bits to zero

Use the **RESETBWO** command to reset BWO bits to zero in the ICF catalog for selected VSAM spheres.

Format



Keywords

SPHERES (sphere name)

Specifies list of VSAM sphere names to be reset BWO bits to zero in the ICF catalog . Up to 256 VSAM sphere names can be specified.

Usage Notes

To use the RESETBWO command, run the CICS VR program DWWRB.

Examples

The sample JCL shows how to run CICSVR RESETBWO command:

Figure 113. Sample job to run the RESETBWO command.

```
//JOBRBWO JOB MSGCLASS=X,CLASS=A,MSGLEVEL=(1,1),REGION=0M
//* CICSVR PROGRAM
//STEP1 EXEC PGM=DWWRB
//* LIBRARY CONTAINING CICSVR PROGRAMS
//STEPLIB DD DSN=DWW.SDWWLOAD,DISP=SHR
// DD DSN=DWW.SDWWLENU,DISP=SHR
//DWWMSG DD SYSOUT=*
//DWWIN DD *
 RESETBWO   SPHERES(CICSMVS.KSDS01,    -
                    CICSMVS.KSDS02,    -
                    CICSVR.REDO.ESDS01, -
                    CICSMVS.RB)
```

Synonyms

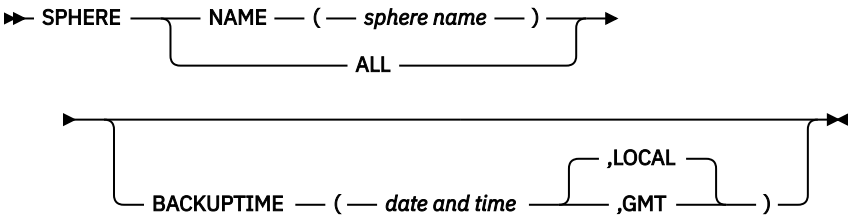
The RESETBWO Synonyms table provides RESETBWO commands or keywords along with acceptable synonyms to use in place of the commands or keywords:

Table 38. RESETBWO synonyms	
Command or keyword	**Synonyms**
RESETBWO	RBWO
SPHERES	SPHERE

SPHERE: Define spheres

Use the SPHERE command to define which spheres are in the CA group.

Format



Keywords

NAME(*sphere name*)
Identifies the name of the sphere in the change accumulation group. Recovery information is collected in the change accumulation data set for each sphere that is listed. At least one SPHERE keyword is required for each CA control statement.

sphere name
Defines the name of the sphere. This name is 1–44 characters.

ALL(*sphere name*)
Specifies that CICS VR must consolidate all log records for all VSAM spheres that are read on the log stream by CICS VR.

BACKUPTIME(*date and time*,LOCAL|GMT)
Identifies the date and time of the backup.

This parameter is optional and only needs to be specified if CICS VR is unaware of logical backups created for the data set. CICS VR is aware of backups that are either registered in the RCDS through notification or exist in DFSMShsm's inventory. If this parameter is specified, you must update this date and time each time you create a new data set backup.

date and time
Must be in the format **yyyy/ddd/hh/mm/ss**, where:

yyyy
Is the four digit year number (2001)

ddd
Is the day of the year (001–366)

hh
Is the hour of the day (00–23)

mm
Is the number of minutes (00–59)

ss
Is the number of seconds (00–59)

You can separate these values with a slash (/), period (.), or colon (:). You can also omit the separator character. For example:

```
BACKUPTIME(2001.159/:23:00)
```

You cannot substitute commas, blanks, and so on, for the time values, but you can omit values from the right. For example, if you specify STARTTIME(2001.159), CICS VR assumes that the time segment is 00:00:00.

LOCAL
Specifies that the date and time are in local format. You can specify LOCAL if you are using MVS log streams. LOCAL is the default value.

GMT
Specifies that the date and time are in Greenwich mean time (GMT) format. You can specify GMT only if you are using MVS log streams.

Usage notes

Consider the following when you use the SPHERE command:

- This command is required if the CA command is specified.
- You can specify up to 50 SPHERE commands for each CA command.
- Do not specify duplicate sphere names for a CA group.
- If the ALL keyword is specified, the ONLY keyword must be specified in the CA command.
- You can specify the BACKUPTIME keyword with the ALL keyword, the NAME keyword, or keywords, or both. When specified, CICS VR uses the entered backup times as the earliest time stamp of log records that must be consolidated.
- If both LOCAL and GMT is specified for the BACKUPTIME in the Change Accumulation job step, CICS VR ignores specified BACKUPTIME values as search value on the mvslog and starts from the beginning of the logstream. Any records for spheres that are before the specified backuptime are not used in the Change Accumulation process.

TEST: Run without updates to VSAM spheres

Use the TEST command to run a forward recovery or backout job, without doing any updates to the VSAM spheres or the RCDS. The TEST command produces a report.

Format

Keywords

None.

Usage notes

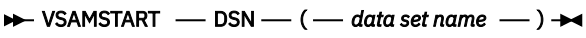
Multiple TEST commands are not allowed. If more than one TEST command is entered, a message is written and the utility stops.

VSAMSTART: Start passing AMS commands to VSAM

Use the VSAMSTART command to tell CICS VR to start passing AMS commands to VSAM after a VSAM sphere has been recovered.

The VSAMSTART command has no synonyms.

Format



Keywords

DSN(*data set name*)
Specifies the data set for which recovery must be successfully completed before the AMS commands are passed to VSAM. The DSN keyword is required. You can only specify this keyword once per VSAMSTART command.

data set name
Specifies the data set name, which is 1–44 characters.

Usage notes

Consider the following when using the VSAMSTART command:

- The DSN keyword must be on the same line as the VSAMSTART command.
- You can use the VSAMSTART/VSAMEND combination to rebuild alternate indexes after a successful forward recovery.

Examples

```
VSAMSTART  DSN(TEST.PAYROLL.BASE)
  BLDINDEX                       -
     INDATASET(TEST.PAYROLL.BASE)    -
     OUTDATASET(TEST.PAYROLL.PATH)
VSAMEND    DSN(TEST.PAYROLL.BASE)
```

This pair of VSAMSTART and VSAMEND commands tells CICS VR to pass the AMS BLDINDEX command to VSAM when the recovery of TEST.PAYROLL.BASE has successfully completed. The alternate index for TEST.PAYROLL.BASE is built by VSAM when CICS VR has recovered TEST.PAYROLL.BASE.

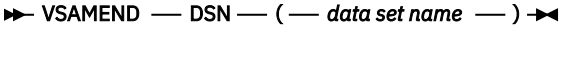
For details of the VSAMEND command, see "VSAMEND: Stop passing AMS commands to VSAM" on page 309.

VSAMEND: Stop passing AMS commands to VSAM

Use the VSAMEND command to tell CICS VR to stop passing AMS commands to VSAM.

The VSAMEND command has no synonyms.

Format



Keywords

DSN(*data set name*)
Specifies the data set in the corresponding VSAMSTART command. The DSN keyword is required. You can only specify this keyword once per VSAMEND command.

data set name
Specifies the data set name, which is 1–44 characters.

Usage notes

Consider the following when using the VSAMEND command:

- The DSN keyword must be on the same line as the VSAMEND command.

- You can use the VSAMSTART/VSAMEND combination to rebuild alternate indexes after a successful forward recovery.

Examples

```
VSAMSTART  DSN(TEST.PAYROLL.BASE)
  BLDINDEX                          -
     INDATASET(TEST.PAYROLL.BASE)    -
     OUTDATASET(TEST.PAYROLL.PATH)
VSAMEND    DSN(TEST.PAYROLL.BASE)
```

This pair of VSAMSTART and VSAMEND commands tells CICS VR to pass the AMS BLDINDEX command to VSAM when the recovery of TEST.PAYROLL.BASE has successfully completed. The alternate index for TEST.PAYROLL.BASE is built by VSAM when CICS VR has recovered TEST.PAYROLL.BASE.

For details of the VSAMSTART command, see "VSAMSTART: Start passing AMS commands to VSAM" on page 308.

Chapter 14. Using the CICS VR archive exits

Documentation of intended Programming Interfaces that assist you to write exits for CICS VR archive and log stream copy utilities.

This section discusses the CICS VR exit programs that you can use with the archive utility and the log stream copy utility and also discusses the exit interfaces. For information about the exits for forward recovery and backout, see Chapter 15, “Implementing exits for forward recovery and backout,” on page 317.

What you can use the exits for

The CICS VR archive and log stream copy exits let you perform special processing at two different exit points.

These optional exits and their uses are:

Precopy
Copy each log record

Termination
Terminate operations performed by the precopy exit

User processing before copying the log record

Use the **precopy exit** to copy each log record to another data set before it is copied to the output data set

Terminating operations performed by the precopy exit

Use the **termination exit** to terminate operations that were performed by the precopy exit.

How the archive exits work

Before you start using an exit, you must know how it works with the CICS VR archive utility and log stream copy utility. The interface conventions for passing control and information between the archive utility or the log stream copy utility and the exit programs are described here.

For examples of exit coding, see the installation material provided with CICS VR.

Calling the exits

The CICS VR archive utility or log stream copy utility calls exit programs only if you supply a **DEFEXIT** command

Exit programs

You can write exit programs in any programming language, if you follow the standard assembler register conventions.

The exits get control in 31-bit addressing mode. Link-edit each exit program as a separate load module and then place the load modules in a load library that is accessible to the CICS VR job. If the exit program is not in the link list, it must reside in a data set that is defined to the JOBLIB, STEPLIB, or DWWLOAD ddname. You also can keep the exit program in your CICS VR load library. For more information about DWWLOAD ddname, see Chapter 16, “CICS VR ddnames,” on page 331.

Register conventions

Register values that apply at entry to the exit program.

- Register 1 contains the address of the exit parameter list.

- Register 13 contains the address of the register save area. The exit program saves and restores the registers that it modifies, using the save area addressed by register 13.
- Register 14 contains the return address that the exit program branches to when it completes its work.
- Register 15 contains the entry address of the exit program.

Parameter lists

Communication from the exit programs to CICS VR occurs through the parameters.

All communication between CICS VR and the exit programs is through parameters. When the archive utility or the log stream copy utility calls an exit, register 1 points to a parameter list containing the addresses of the parameters. The parameter list is an area whose length depends on the number of parameters to be passed. For each parameter, it consists of one fullword containing the address of the parameter.

Each exit has a different parameter list. You can find these lists and descriptions of the parameters, in the exit descriptions starting on page “Precopy exit: process a copy of the log record” on page 312.

Parameters

One parameter is used by both exits:

Work area
A 128-byte work area. The exit programs can use this area as a common work area. The address of this work area is passed to both the exit programs, enabling them to pass information among themselves. This area contains binary zeros at the first exit invocation.

Precopy exit: process a copy of the log record

Use the precopy exit to copy each log record to another data set, before the archive utility or log stream copy utility copies the record to the output data set

When the exit is called

This exit is called just before each log record is copied to the output data sets.

Parameter list

The parameter list that is passed to the precopy exit.

```
Log record, work area
```

Precopy exit parameters show how you find the parameters from the contents of register 1.

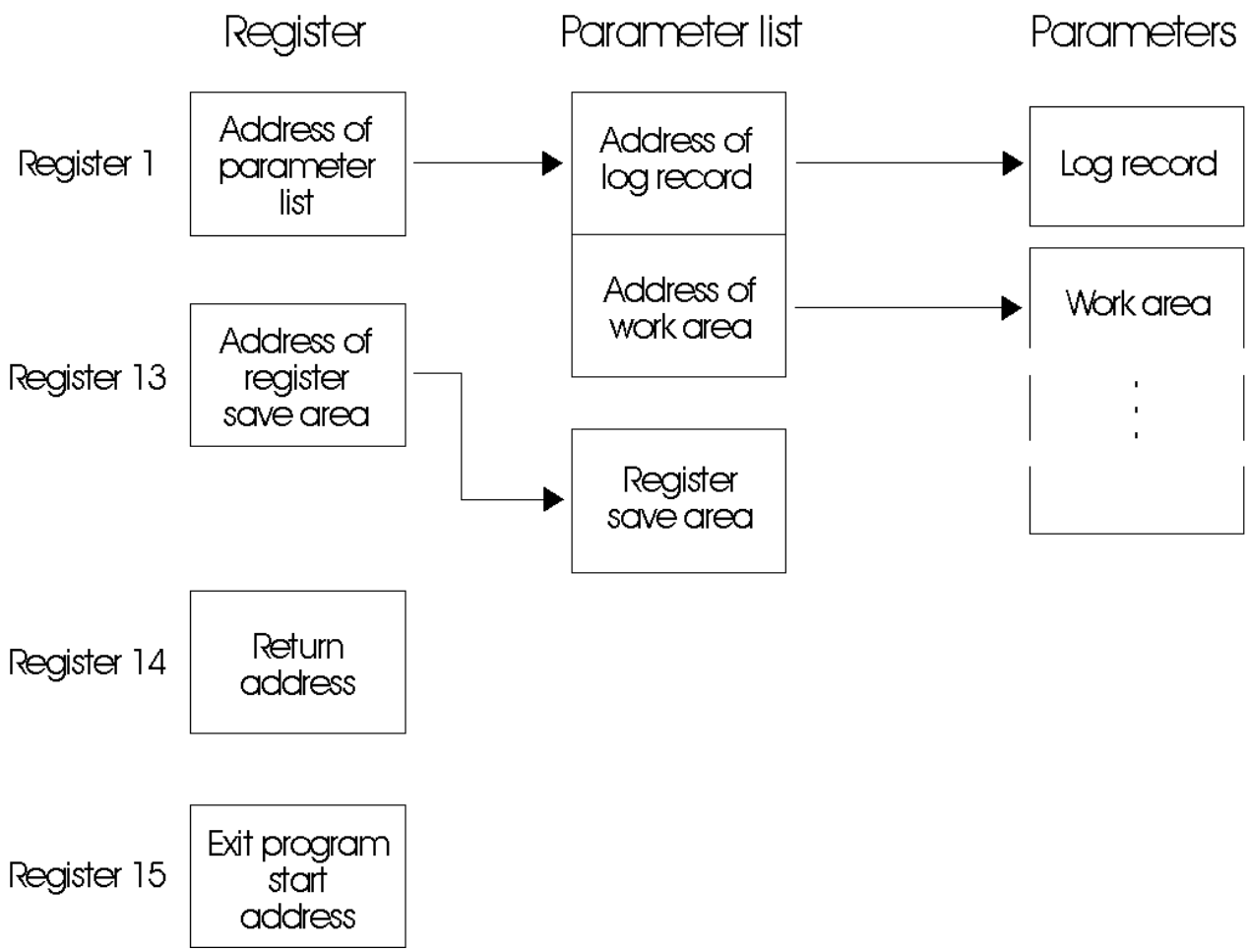


Figure 114. Precopy exit parameters

The figure shows the precopy exit parameters when the exit is defined without the OLD keyword. This is the recommended way to define the exit. With the OLD keyword specified, there is an extra level of indirection. "Log record" in the figure is the address of the log record, and "Work area" in the figure is the address of the work area. The OLD keyword allows compatibility with exits written for earlier CICS VR releases, such as CICS VR V3R3 and earlier, and CICS VR V4R1 without apar PK28852 applied.

Parameters passed to the exit program

The parameters that are passed to the exit program.

Log record

The log record is a log stream record or a service record which contains log stream block or copy log information. The copy log information records are passed to the precopy exit as the first and the last records. “Additional records in the log stream copy ” on page 315 describes the structure of this record.

If you do not specify the keyword OLD on the DEFEXIT statement, the structure of the log record depends on the value of the SELECT keyword on the LOGSTREAMCOPY command.

If the SELECT keyword specifies the value CICS VR, the log stream copy utility passes a single general log stream record instead of a full logger block. This figure Figure 115 on page 314 shows the log records which are passed to the precopy exit when SELECT(CICSVR) is specified.

```
1 CICSVR Copy log info record
    2 Log info record (LOGI DSECT)
1 First general log block
    2 Block header (LGBH_BLOCK_HEADER DSECT)
    2 Return block INFO area (IXGBRMLT_RETINFO DSECT)
    2 End marker, 17 characters: "0<<<LOGGERINFO>>>"
1 First CICS record in the block
    2 Record header (GLRH_RECORD_HEADER DSECT)
    2 Caller data(SOR/TIEUP/REDOS/...)
1 Next CICS record in the block
    2 ...
1 Last CICS record in the block
    2 ...
1 Next general log block
    2 ...
...
...
...
1 CICSVR End copy log info record
    2 Log info record (LOGI DSECT)
```

Figure 115. Records passed to the precopy exit when CICS VR is selected

If the SELECT keyword specifies the value ALL, the log stream copy utility passes a full logger block. This figure Figure 116 on page 314 shows the log records which are passed to the precopy exit when SELECT(ALL) is specified.

```
1 CICSVR Copy log info record
    2 Log info record (LOGI DSECT)
1 First general log block, prefixed with Return block information area
    2 Return block info area (IXGBRMLT_RETINFO DSECT)
    2 First general log block
        3 Block header (LGBH_BLOCK_HEADER)
        3 First CICS record in the block
            4 Record header (GLRH_RECORD_HEADER DSECT)
            4 Caller data(SOR/TIEUP/REDOS/...)
        3 Next CICS record in the block
            4 ...
        ...
        3 Last CICS record in the block
            4 ...
1 Next general log block, prefixed with Return block information area
    2 ...
...
...
...
1 CICSVR End copy log info record
    2 Log info record (LOGI DSECT)
```

Figure 116. Records passed to the precopy exit when ALL is selected

The sample precopy exit routine, which is the DWWXPREC member of the DWW.SDWWSORC data set, contains DSECTs that provide maps for log record headers and service log stream copy records.

The map of the record header that prefixes the general log stream record is provided in the GLRH_RECORD_HEADER DSECT of the DFHLGGFD macro.

Work area

A 128-byte work area that can be used to pass information between exit programs. See the description in “Parameter lists” on page 312.

Parameter returned from the exit program

The parameter that is returned from the exit program.

Work area
The 128-byte work area that can be used to pass information between exit programs.

Additional records in the log stream copy

When a log stream copy (DWWLC) is performed, the records in the MVS log stream are copied to a sequential data set. In addition to the records in the MVS log stream, DWWLC writes two additional records to the output file, the first record and the last record, both called LOGI records.

The layout of the LOGI record is as follows:

```
1 LOGI
  2 LOGITYPE            CHAR(4)  , /* >DWW                        */
  2 LOGIVERS           FIXED(31), /* 0001                        */
  2 *                  CHAR(8)  , /* RESERVED                    */
  2 LOGIBLKID          CHAR(8)  , /* BLOCKID                     */
  2 *                  CHAR(8)  , /* RESERVED                    */
  2 LOGITIME                    , /* TIME BLOCK                  */
    3 LOGIGMT          CHAR(8)  , /* TIME BLOCK WRITTEN GMT   TOD*/
    3 LOGILOCAL        CHAR(8)  , /* TIME BLOCK WRITTEN LOCAL TOD*/
  2 *                  CHAR(8)  , /* RESERVED                    */
  2 LOGINAME           CHAR(26) , /* MVS LOG NAME                */
  2 *                     CHAR(6)  , /* RESERVED                    */
  2 *                  CHAR(16) ; /* RESERVED                    */
```

Figure 117. LOGI record

Use a precopy exit if you want to examine the records before they are written to the output data set.

Termination exit: terminate operations from the precopy exit

Use the termination exit to stop the actions that were performed by the precopy exit, such as closing the data set that the precopy exit copied the log records to.

When the exit is called

This exit is called when the CICS VR archive utility or log stream copy utility is ready to terminate.

Parameter list

The parameter that is passed to the termination exit.

```
Work area
```

This figure shows how to find the parameters from the contents of register 1.

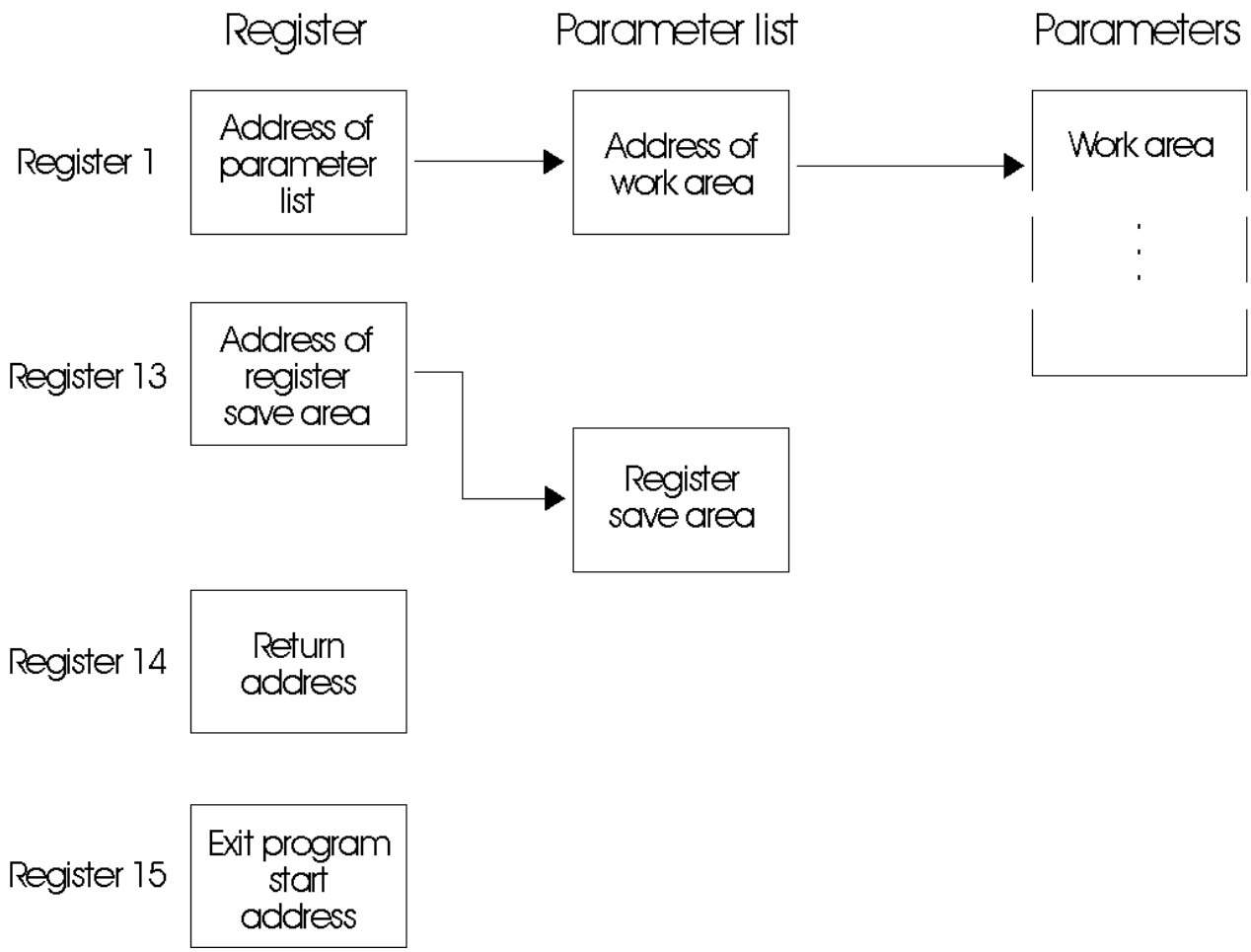


Figure 118. Termination Exit Parameters

Parameter passed to the exit program

This parameter is passed to the exit program:

Work area
A 128-byte work area that can be used to pass information between exit programs. See the description in "Parameter lists" on page 312.

Parameter returned from the exit program

The parameter that is returned from the exit program.

Work area
The 128-byte work area that can be used to pass information between exit programs.

Chapter 15. Implementing exits for forward recovery and backout

Description of intended Programming Interfaces that allow you to write exits for CICS VR forward recovery and backout.

This section discusses the CICS VR exit programs that you can use for forward recovery and backout and also discusses the exit interfaces. For information about exits for the CICS VR archive utility, see Chapter 14, “Using the CICS VR archive exits,” on page 311.

What you can use the exits for

The special processing that the CICS VR exits allow you to perform at four different exit points.

These optional exits and their uses are:

Error
Handle I/O errors

ESDS delete
Logically delete ESDS records

Preapply
Perform logical recovery

Termination
Change the CICS VR return code

These sections describe these exits and their uses.

The improper use of exits can cause loss of data integrity. All exits except the termination exit let you skip or modify records. Use exits only in well-controlled, familiar situations.

User processing after an I/O error

You can use the **error exit** if an uncorrectable data validity error occurs when CICS VR is reading a log, or if an error occurs when CICS VR is accessing a VSAM data set.

If you provide an error exit program, you can tell CICS VR to continue processing after an I/O error. CICS VR passes information about the error to the exit program. The exit program can tell CICS VR to ignore the record that caused the error and to continue processing with the next record.

Recovering an ESDS

You must specify the **ESDS delete exit** if you use the CICS VR batch backout function to back out records that were added to one or more VSAM ESDSs.

You cannot physically delete a record from an ESDS, so you must update the existing record to indicate that it is *marked for deletion*. You insert a marked-for-deletion code in the record. This code is known to the applications that are accessing the ESDS. But, CICS VR does not know which field to amend. When CICS VR must back out a record that was added, it takes the ESDS delete exit. The exit program then returns the ESDS record, containing the marked-for-deletion code, that was required by the application.

If you must back out an ESDS that contains logged adds, you must provide an ESDS delete exit program. If you do not provide an exit program, CICS VR terminates. The ESDS delete exit is taken for every add to an ESDS that is to be backed out.

CICS VR passes information about the ESDS record, including the length of that record, to the exit program. CICS VR obtains this information from the log. The exit program can modify the VSAM data part of the log record, to add the marked-for-deletion code that is recognized by your applications, and CICS

VR updates the record in the ESDS. The exit can alternatively tell CICS VR to ignore this record, or even to terminate processing.

Note: The format of the ESDS delete exit to be used with earlier versions of CICS backout processing slightly differs from the format of the ESDS delete exit to be used with CICS VR batch backout. Please see the appropriate ESDS delete exit format description based on your required CICS VR processing.

Note: You might consider using the EXCLUDE and INCLUDE commands to perform logical recovery.

Logical recovery

The **preapply exit** is taken for each after-image that is applied to a VSAM data set, before CICS VR applies the change, for data sets that are recovered in this CICS VR run.

For forward recovery, it is taken for every update, if the original VSAM record has been successfully read, or for every add that falls within the default or specified start and stop times.

CICS VR passes the record that is read from the log and, where applicable, the VSAM record that is updated, to the exit program. The exit program can modify the log record. It can also tell CICS VR to ignore the log record and continue with the next record.

This exit gives you the opportunity to perform selective processing of records, depending on your special requirements. This type of processing is useful to help in **logical recovery**; that is, recovering from logical errors in the VSAM data set that are caused by an application, or by transactions that did not work correctly. The preapply exit lets you use CICS VR for this purpose.

If you try to perform logical recovery, there are situations that cannot be corrected by this exit. Although logical recovery might have recovered the data set to the state you require, other applications, online or offline, might have accessed the data set during the time it contained incorrect data.

You can use the preapply exit to:

- Tell CICS VR not to process certain after-images.

  You can do this to avoid updates that were made by an application or a transaction, or that were made during a specific time period.
- Modify certain after-images before CICS VR applies them to the VSAM data set.

  You can check the content of the log record and the content of the VSAM record to be updated, and then modify the VSAM data and key fields in the log record in the way you require.

Changing the CICS VR return code

You can use the **termination exit** to change the CICS VR completion code just before CICS VR terminates.

For example, there might be times when you want to accept CICS VR results for further processing, even when CICS VR found errors during processing. CICS VR passes the completion code to the exit program, and the exit program can change the code to a desired code.

How the exits work

Before you start using an exit, you must know how it works with CICS VR.

The interface conventions for passing control and information between CICS VR and the exit programs are described here.

For examples of exit coding, see the installation material provided with your CICS VR order.

Calling the exits

To tell CICS VR to call an exit, specify the member name for the exit in the "CICS VR exits" secondary window.

```
                              CICSVR exits

Specify member names for the CICSVR exits. Press Enter to use the
displayed member names in the recovery.

  Preapply  . . . ________
  Error . . . . . ________
  ESDS delete . . ________
  Termination . . ________


Command ===> ____________________________________________________________
 F1=Help     F5=Getdef   F6=SaveDef F12=Cancel
```

Figure 119. Exits secondary window

For a description of the CICS VR ISPF dialog interface functions, see *CICS VR User's Guide*.

If you do not use the ISPF dialog to create a recovery job, or if you are defining exits to be used with the CICS VR archive utility or the CICS VR batch backout utility, CICS VR calls an exit program only if the DEFEXIT command is added to the job that starts CICS VR.

Exit programs

You can write exit programs in any programming language, if you follow the standard assembler register conventions.

The exits get control in 31-bit addressing mode. Link-edit each exit program as a separate load module, see "Sample assemble and link-edit JCL" on page 320, and then place the load modules in a load library that is accessible to the CICS VR job. If the exit program is not in the link list, it must reside in a data set that is defined to the JOBLIB, STEPLIB, or DWWLOAD ddname. You also can keep the exit program in your CICS VR load library. For more information about DWWLOAD ddname, see Chapter 16, "CICS VR ddnames," on page 331.

Register conventions

Register values that apply at entry to the exit program.

- Register 1 contains the address of the exit parameter list.
- Register 13 contains the address of the register save area. The exit program saves and restores the registers that it modifies, using the save area addressed by register 13.
- Register 14 contains the return address that the exit program branches to when it completes its work.
- Register 15 contains the entry address of the exit program.

Parameter lists

Communication from the exit programs to CICS VR occurs through the parameters. An action parameter is always needed to tell CICS VR what action to take. For some exits, the exit program might update one of the input parameters and return it to CICS VR.

All communication between CICS VR and the exit programs is through parameters. When CICS VR calls an exit, register 1 points to a parameter list containing the addresses of the parameters. The parameter list is an area, the length of which depends on the number of parameters to be passed. For each parameter, it consists of one fullword containing the address of the parameter. Each exit has a different parameter list. You can find these lists and descriptions of the parameters, in the exit descriptions starting on page "Error exit: pass I/O error information" on page 320.

Parameters

Two parameters are used by all exits, Work area and Action.

Work area
A 128-byte work area. The exit programs can use this area as a common work area. The address of this work area is passed to all the exit programs, enabling them to pass information among themselves. This area contains binary zeros at the first exit invocation.

Action
A 1-byte character field containing a code that indicates what action CICS VR takes after receiving control back from the exit. Every exit program must return an action code. Below is a list of possible exit codes accepted for the CICS VR exits:

C
Continue as if no exit program was provided.

U
Use the record that the exit program just updated.

I
Ignore the log record and read the next log record.

S
Terminate CICS VR processing (CICS VR batch backout ESDS delete exit only).

Refer to the individual description of each CICS VR exit for a list of acceptable action codes for that exit.

Sample assemble and link-edit JCL

A sample JCL is provided in the member DWWASMLI in the library SDWWCNTL to assemble and link-edit your CICS VR exits.

Error exit: pass I/O error information

You can use the error exit to make CICS VR continue processing after an I/O error.

When the exit is called

The error exit is called in the following circumstances.

- A data validity error occurs when CICS VR is reading a log
- A physical error occurs when CICS VR is reading a log
- A logical error occurs when CICS VR is processing a VSAM data set
- A physical error occurs when CICS VR is processing a VSAM data set

If used, the error exit is called by CICS VR when a VSAM error occurs during these CICS operations:

- Adding a record to the base cluster
- Deleting a record from the base cluster
- Updating an existing record on the base cluster

But, if the error can be corrected by CICS VR, the error exit is not called. This is true even if an I/O error message is produced.

For backup-while-open certain *normal* VSAM errors can occur. They are identified by these error codes:

Operation	Possible error codes
Adding a record Deleting a record Updating a record	008 004, 016, 032, 116 004, 016, 032, 096, 116

These errors are considered to be *serious*:

- VSAM error codes (except those in the preceding table)
- Log READ errors

If you do not provide an exit routine and the error is serious, CICS VR terminates recovery.

Parameter list

The parameter list that is passed to the error exit.

Data set name, error type, error information, length of error data, error data, work area, action code

This figure shows how you find the parameters from the contents of register 1.

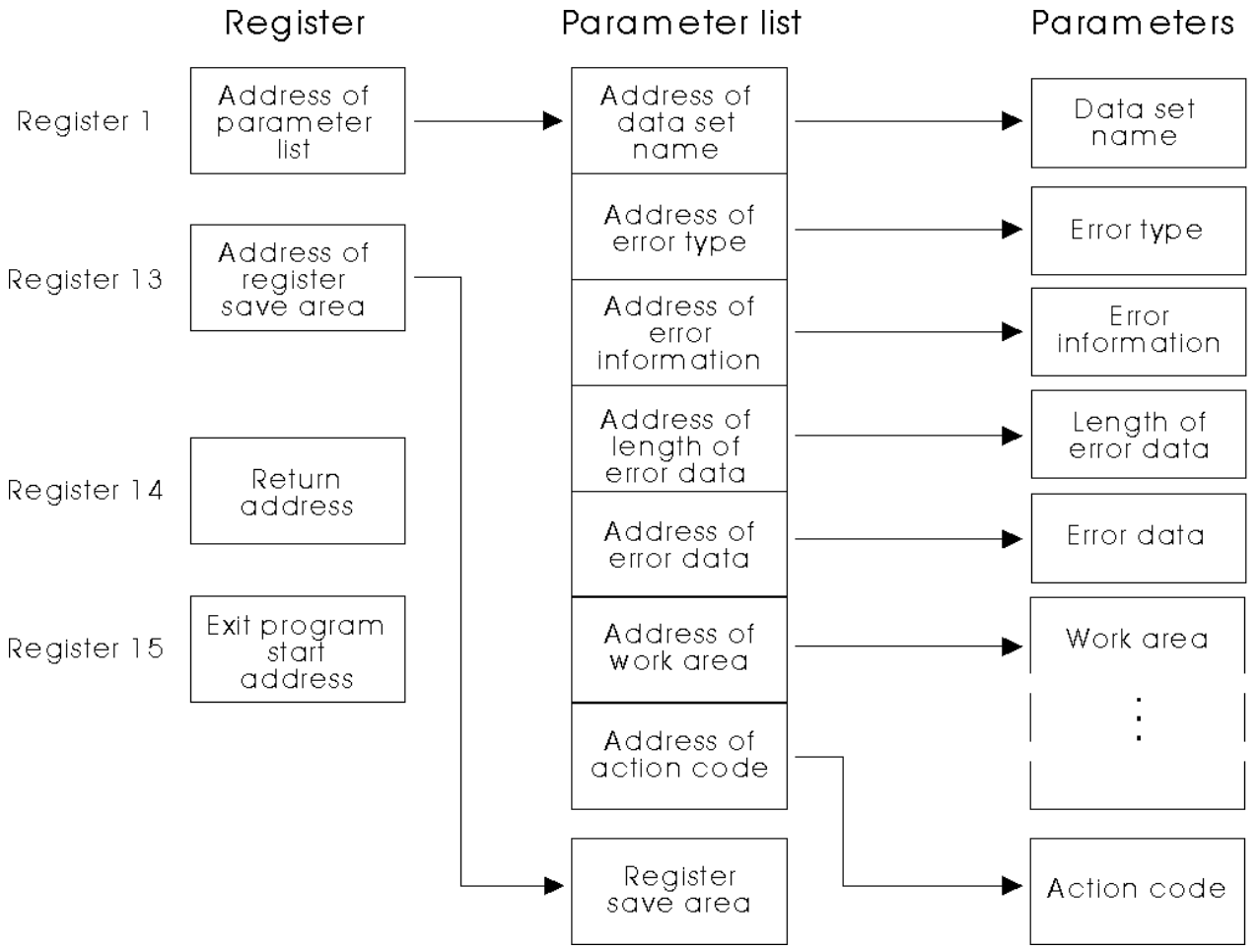


Figure 120. Error Exit Parameters

Parameters passed to the exit program

The parameters that are passed to the exit program.

Data set name
The data set name is dependent on these error types:

01-02
Shows that the data set name is for a log

11–14, 16, 17
Shows that the data set name is for the original VSAM base cluster

15
Shows that the data set name is for a VSAM path

The field is left-aligned and is padded with blanks.

Error type
A 2-byte character field that tells the exit which type of I/O processing was occurring when the error occurred. It can contain:

01
Log physical read

02
Log logical read

11
VSAM GET

12
VSAM PUT (new)

13
VSAM PUT (update)

14
VSAM ERASE

15
VSAM GET on a path

17
VSAM ERASE when the relative byte address (RBA) already exists

Error information
A character field that provides information about the error.

For error type 01 (a log physical-read error), it is a 78-byte character field, containing bytes 50–127 of the SYNADF message buffer. This buffer contains information such as the ddname and error description.

For error type 02 (a log logical-read error), it is a 4-byte binary field that contains the current block ID count while reading forward or backward.

For error types 11–15 (a VSAM error), it is an 8-byte character field, containing:

Bytes 0–1
The second byte from the feedback field in the VSAM request parameter list (RPL). This field contains the return code (register 15). The contents are related to bytes 2–3, are described as follows:

Bytes 2–3
The last 2 bytes from the feedback field in the VSAM RPL. This field contains the VSAM function code and feedback code.

Byte 4
A 1-character code indicating log type:

3
Indicates a CICS/ESA V4R1 log

Byte 5
A 1-character code showing the status of the sphere being recovered:

N
The sphere was restored from a normal backup copy.

B
The sphere was restored from a copy made using the backup-while-open facility.

Bytes 6–7
Not used.

For error type 16 (a VSAM insert error to an ESDS base), it is a 4-byte binary field containing the actual RBA used on the VSAM file. This error type only occurs when you are recovering from a CICS/ESA V4R1 log where the logged RBA differs from the real RBA.

Note: The record has been appended to the file.

Length of error data
A fullword containing the length of the error data parameter.

Error data
Contains more data about the error.

For error types 01 and 02 (a log read error), this field contains the last log record that was read successfully.

For error types 11 and 15 (a VSAM GET error) and error type 14 (a VSAM delete error), it contains the key of the record to retrieve.

For error types 12, 13, and 16 (a VSAM insert or update error), it contains the record to process.

Work area
A 128-byte work area that can be used to pass information between exit programs. See the description in “Parameters” on page 320.

Parameters returned from the exit program

The parameters that are returned from the exit program.

Work area
The 128-byte work area that can be used to pass information between exit programs.

Action code
A 1-byte character field that tells CICS VR what action to take. The action code can be:

C
Continue as if the exit had not been taken, issue message DWW0211, and end processing with a return code of 12.

I
Ignore this log record or this VSAM error, issue message DWW0210, and continue processing.

Note: For error type 02, CICS VR ignores the returned action code and issue message DWW0211 before terminating.

Sample CICS VR error exit

In the CICS VR library SDWWSORC, member DWWERREX contains a sample CICS VR error exit program.

Batch backout ESDS delete exit: pass ESDS deletion records

You must use a CICS VR batch backout ESDS delete exit when you request CICS VR batch backout to back out one or more records that were added to a VSAM ESDS by a batch job.

When the exit is called

The CICS VR batch backout ESDS delete exit is called when CICS VR batch backout processing encounters a log record indicating that a record was added to a VSAM ESDS.

Parameter list

The parameter list that is passed to the CICS VR batch backout ESDS delete exit.

Base cluster name, ESDS record length, ESDS record, work area, action code

This figure shows how you find the parameters from the contents of register 1:

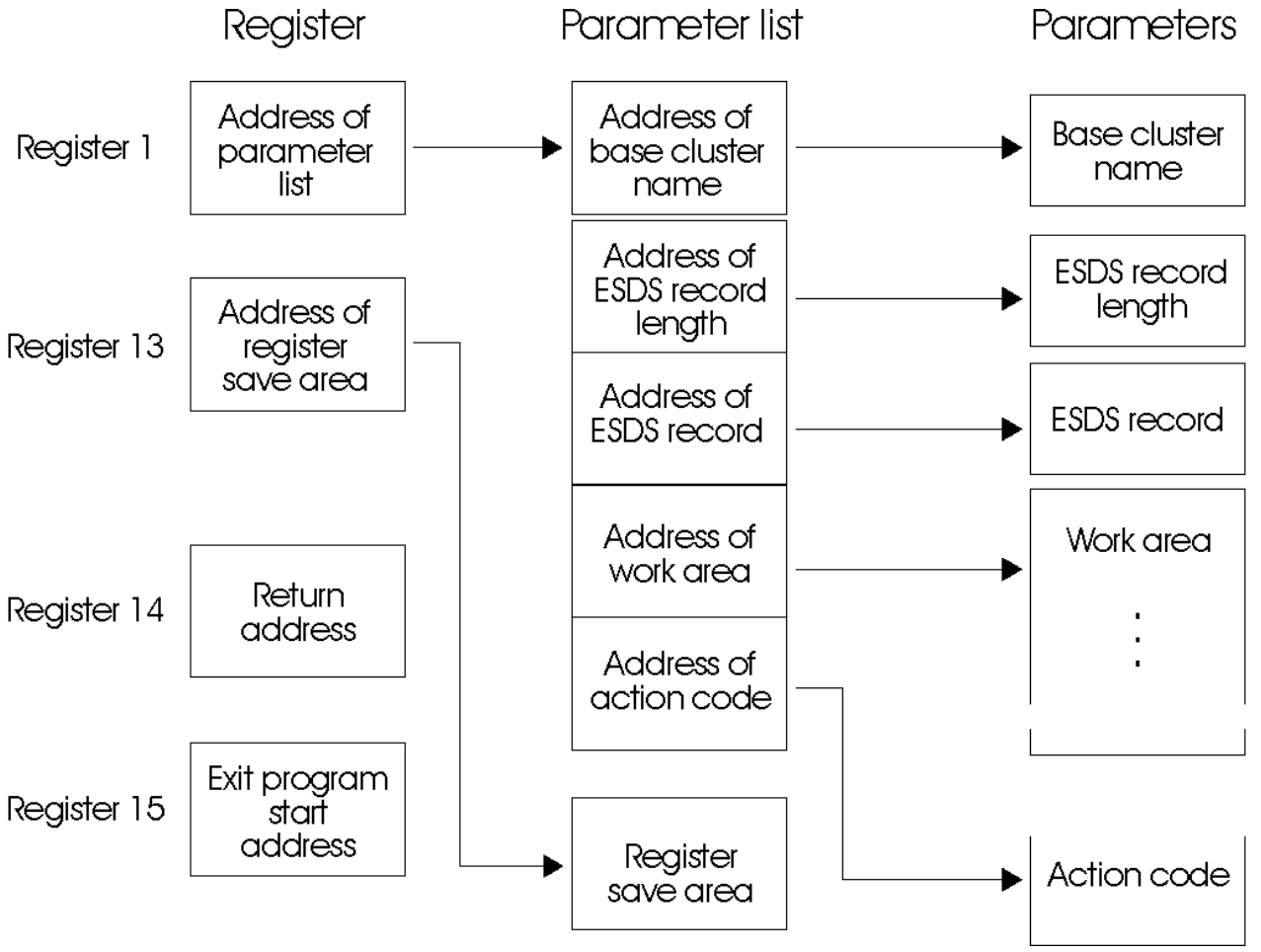


Figure 121. ESDS Delete Exit Parameters

Parameters Passed to the Exit Program

The parameters that are passed to the exit program.

Base cluster name
The name of the base cluster in question. The field is left justified and is padded with blanks.

Length of ESDS record
A fullword containing the length of the ESDS record.

ESDS record
The ESDS record on the log that is deleted.

Work area
A 128-byte work area that can be used to pass information between exit programs. See the description in "Parameters" on page 320.

Parameters Returned from the Exit Program

The parameters that are returned from the exit program.

VSAM record
The ESDS record on the log that has been marked for deletion. CICS VR replaces the record in the VSAM ESDS with the returned VSAM record.

Work area
The 128-byte work area that can be used to pass information between exit programs.

Action code
A 1-byte character field that tells CICS VR what action to take. The action code can be:

S
Terminate batch backout processing

U
Use the log record returned by the exit program to update the ESDS.

I
Ignore this log record; do not process it. The record remains on the VSAM ESDS in its original form.

Sample CICS VR batch backout ESDS delete exit

In the CICS VR library SDWWSORC, member DWWESDEL contains a sample CICS VR batch backout ESDS delete exit program.

Preapply exit: pass Log Records and VSAM Records

You can use the preapply exit to modify an after-image that is applied to a VSAM data set.

When the Exit Is Called

The preapply exit is called before CICS VR updates a VSAM data set with the after-image for forward recovery for data sets that are being recovered in this CICS VR run.

For forward recovery, the exit is taken for every update, if the original VSAM record has been successfully read, or for every add that falls within the default or specified start and stop times.

Parameter List

The parameter list that is passed to the preapply exit.

```
Base cluster name, log record, VSAM record length, VSAM record,
work area, action code, format
```

This figure shows how you find the parameters from the contents of register 1.

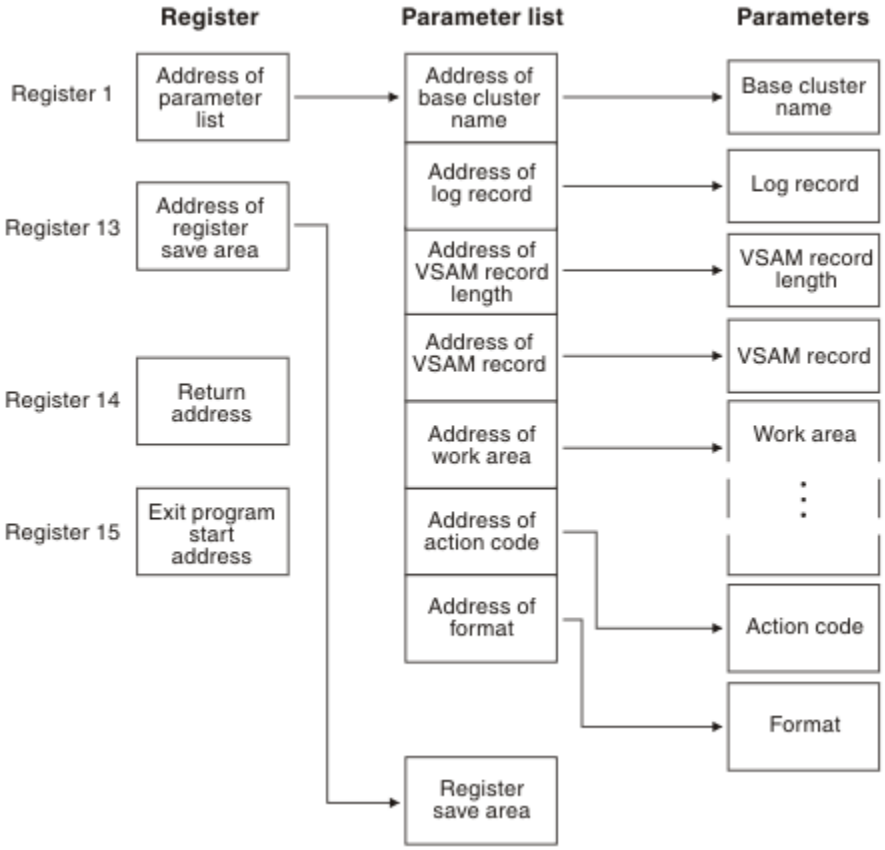


Figure 122. Preapply Exit Parameters

Parameters passed to the exit program

The parameters that are passed to the exit program.

Base cluster name
The name of the base cluster in question. The field is left justified and is padded with blanks.

Log record
The complete log record, containing the after-image to be written to the VSAM data set. For CICS Transaction Server records, the first four bytes are the length of the log record.

For CICS/ESA V3 and V4R1, the first two bytes are the length of the log record, and the next two bytes are X'00'.

Length of VSAM record
A fullword containing the length of the VSAM record. In the case where CICS VR adds a record to the VSAM data set, the length is 0.

VSAM record
The VSAM record that is going to be updated or deleted. For forward recovery, this is the before-image. In the case where CICS VR adds a record to the VSAM data set, this parameter contains zeros.

Work area
A 128-byte work area that can be used to pass information between exit programs. See the description in “Parameters” on page 320.

Format
Indicates the format of the CICS log record.

5.1
For CICS Transaction Server log records

ESA
For CICS/ESA V4R1 log records

Parameters returned from the exit program

The parameters that are returned from the exit program.

Log record
The complete log record, which can be optionally modified by the exit program. The VSAM record key and data fields in this record is used by CICS VR in further processing. Other fields in this record are not used; instead, CICS VR uses these fields as they are listed in the record when it was passed to the exit program.

Work area
The 128-byte work area that can be used to pass information between exit programs.

Action code
A 1-byte character field that tells CICS VR what action to take. The action code can be:

C
Continue processing using the log record that was passed to the exit program.

U
Use the log record returned by the exit program.

I
Ignore this log record; do not apply it to the VSAM data set.

Note: For details of the old-style preapply exit, refer to earlier information..

Sample CICS VR preapply exit

In the CICS VR library SDWWSORC, member DWWPREEX contains a sample CICS VR preapply exit program.

Termination exit: pass CICS VR return code

You can use the termination exit to modify the CICS VR return code.

When the exit is called

The termination exit is called when CICS VR is ready to end.

Parameter list

The parameter list that is passed to the termination exit.

```
Completion code, work area, action code
```

This figure shows how you find the parameters from the contents of register 1:

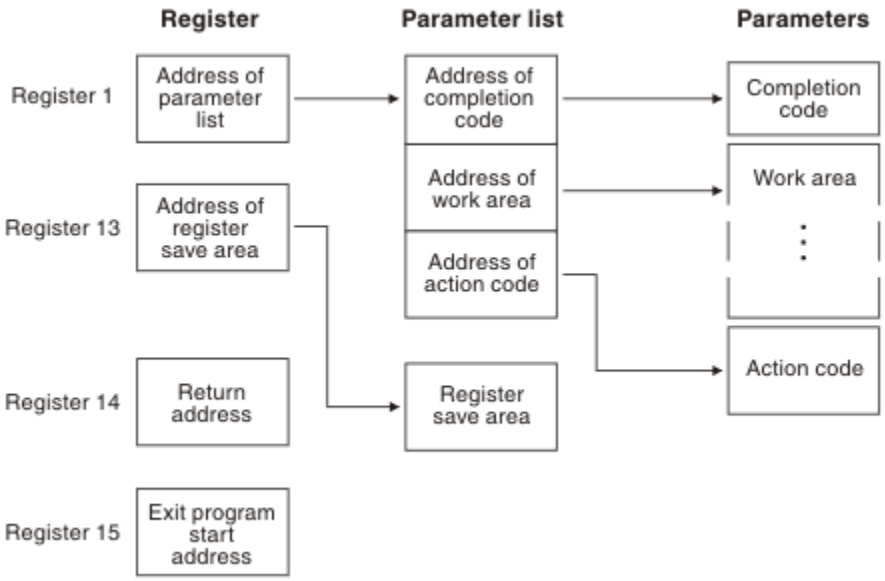


Figure 123. Termination Exit Parameters

Parameters passed to the exit program

The parameters that are passed to the exit program.

Completion code
A fullword field containing the completion code that CICS VR terminates with if the termination exit does not return its own value.

The code can be one of these:

00
Successful completion.

04
One or more warning messages have been issued.

08
One or more error messages have been issued.

12
CICS VR has terminated because of a severe error.

Work area
A 128-byte work area that can be used to pass information between exit programs. See the description in "Parameters" on page 320.

Parameters returned from the exit program

The parameters that are returned from the exit program.

Completion code
The fullword completion code as optionally changed by the termination exit program. The range is 0–4095; values outside this range causes CICS VR to reset the modified completion code to 12.

Work area
The 128-byte work area that can be used to pass information between exit programs.

Action code
A 1-byte character field that tells CICS VR what action to take. The action code can be:

C
Continue processing using the original completion code.

U

Use the completion code returned by the exit program.

Sample CICS VR termination exit

In the CICS VR library SDWWSORC, member DWWTERMX contains a sample CICS VR termination exit program.

Chapter 16. CICS VR ddnames

A table that contains the ddnames for CICS VR.

Table 39. CICS VR ddnames

CICS VR ddname	Description
DWWARC1	Input log for the archive utility.
DWWCA	Allocates the name of the output change accumulation data set into which CICS VR places the consolidated log records when running change accumulation for disaster recovery purposes.
DWWCON1-3	CICS VR recovery control data sets (RCDS). If you are going to activate the CICS VR server address space, the RCDSs must be created using the RCDS naming convention described in Chapter 4, "Activating the CICS VR server address space," on page 29. If you do not plan on activating the CICS VR server address space, see "Creating and maintaining the RCDS when not using the CICS VR server address space" on page 88 for information on creating the RCDS.
DWWCOPYn	Output copies for the archive utility and log stream copy utility. Output and input copies for the RCDS utility.
DWWDMSG	Output data set that contains a trace table of prologs and epilogs of the latest called modules. This ddname is used by the CICS VR server address space, the CICS VR dialog, and by CICS VR batch jobs. The DCB parameters for this data set are RECFM=VBA and LRECL=84. The default block size is 3120 bytes. CICS VR server address space: During activation of the CICS VR server address space, CICS VR attempts to dynamically create, catalog, and allocate a data set to the DWWDMSG ddname if one does not already exist (using a specified naming convention). Tracing information then can be written to the allocated data set must the CICS VR server address space encounter a problem. See Chapter 4, "Activating the CICS VR server address space," on page 29 for further information. CICS VR dialog: The data set that is allocated to the DWWDMSG ddname for the CICS VR dialog (in a CLIST or TSO/E logon procedure) must differ from the data sets that are allocated to the DWWDMSG ddname for the CICS VR server address space and by CICS VR batch jobs. Any valid data set name can be used. CICS VR batch jobs: Specify SYSOUT=* for the DWWDMSG ddname allocation in CICS VR batch jobs. You might also allocate a data set to the DWWDMSG ddname in CICS VR batch jobs, but this data set must differ from the data sets allocated to the DWWDMSG ddname for the CICS VR server address space and CICS VR dialog.

Table 39. CICS VR ddnames (continued)

CICS VR ddname	Description
DWWDUMP	Output data set that contains tracing and diagnostic information, as requested by CICS VR. This ddname is used by the CICS VR server address space, the CICS VR dialog, and by CICS VR batch jobs. The DCB parameters for this data set are RECFM=VBA and LRECL=84. The default block size is 3120 bytes. CICS VR server address space: During activation of the CICS VR server address space, CICS VR attempts to dynamically create, catalog, and allocate a data set to the DWWDUMP ddname if one does not already exist (using a specified naming convention). Dumps then can be written to the allocated data set if the CICS VR server address space encounter a problem. See Chapter 4, “Activating the CICS VR server address space,” on page 29 for further information CICS VR dialog: The data set that is allocated to the DWWDUMP ddname for the CICS VR dialog (in a CLIST or TSO/E logon procedure) must differ from the data sets that are allocated to the DWWDUMP ddname for the CICS VR server address space and by CICS VR batch jobs. Any valid data set name can be used. CICS VR batch jobs: Specify SYSOUT=* for the DWWDUMP ddname allocation in CICS VR batch jobs. You might also allocate a data set to the DWWDUMP ddname in CICS VR batch jobs, but this data set must differ from the data sets allocated to the DWWDUMP ddname for the CICS VR server address space and CICS VR dialog.
DWWIN	Data set that contains the CICS VR commands. You can either specify a sequential data set with 80-byte, fixed-length records, or include the CICS VR commands in-stream.

DWWLOAD	DWWLOAD is optional, and defines the alternative load libraries to STEPLIB and the link list, after the top module from the EXEC statement has been loaded. After the top module initialization, all following module loads, supplementary CICS VR modules, and CICS VR exits are from these alternative load libraries. For example:
	
	`//DWWLOAD DD DISP=SHR,DSN=DWW.SDWWLOAD`
	`//        DD DISP=SHR,DSN=DWW.SDWWLENU`
	`//        DD DISP=SHR,DSN=exits load library name`

DWWLOG	ddname used to allocate log data sets when not using the CICS VR ALLOCATE command. DWWLOG can also be used to specify the names of change accumulation data sets that are used during forward recovery processing.

Table 39. CICS VR ddnames (continued)

CICS VR ddname	Description
DWWMSG	Output data set containing CICS VR messages. This ddname is used by the CICS VR server address space, the CICS VR dialog, and by CICS VR batch jobs. The DCB parameters for this data set are RECFM=FBA and LRECL=133. The block size must be a multiple of 133. CICS VR server address space: During activation of the CICS VR server address space, CICS VR attempts to dynamically create, catalog, and allocate a data set to the DWWMSG ddname if one does not already exist (using a specified naming convention). CICS VR server address space processes can then write various messages to the allocated data set. See Chapter 4, "Activating the CICS VR server address space," on page 29 for further information. CICS VR dialog: The data set that is allocated to the DWWMSG ddname for the CICS VR dialog (in a CLIST or TSO/E logon procedure) differs from the data sets allocated to the DWWMSG ddname for the CICS VR server address space and CICS VR batch jobs. Any valid data set name can be used. CICS VR batch jobs: Specify SYSOUT=* for the DWWMSG ddname allocation in CICS VR batch jobs. You might also allocate a data set to the DWWMSG ddname in CICS VR batch jobs, but this data set must differ from the data sets allocated to the DWWMSG ddname for the CICS VR server address space and CICS VR dialog.
DWWPRINT	Output data set that contains the reports produced by CICS VR. This ddname is used by the CICS VR dialog and by CICS VR batch jobs. The DCB parameters for this data set are RECFM=FBA and LRECL=133. The block size must be a multiple of 133. CICS VR dialog: The data set that is allocated to the DWWPRINT ddname for the CICS VR dialog (in a CLIST or TSO/E logon procedure) must differ from the data set allocated to the DWWPRINT ddname for CICS VR batch jobs. Any valid data set name can be used. CICS VR batch jobs: Specify SYSOUT=* for the DWWPRINT ddname allocation in CICS VR batch jobs. You might also allocate a data set to the DWWPRINT ddname in CICS VR batch jobs, but this data set must differ from the data set allocated to the DWWPRINT ddname for the CICS VR dialog.
DWWSORT	Output data set that contains sort messages and control statements from the change accumulation job. Usually specified as SYSOUT=*.

Chapter 17. Diagnosing change accumulation and DFSORT problems

Change accumulation calls DFSORT, or an equivalent sort product, to sort the log records before it updates the current change accumulation data set with the next log range.

If DFSORT cannot process the records, CICS VR issues the following message:

DWW0905S
Unexpected result from the external sort product. The sort return code is nn.

This section explains how to obtain DFSORT messages and dumps as well as how to identify and eliminate other common errors.

How to obtain DFSORT messages

To diagnose problems using DFSORT, you must be able to see the DFSORT messages and control statements in the DWWSORT message data set.

DFSORT messages start with 'ICE'. If you receive a condition code of 20 or do not see the DFSORT messages and control statements, add the following to your change accumulation JCL:

```
//DWWSORT DD SYSOUT=A
```

and resubmit your job.

If you still do not see the DFSORT messages and control statements in the DWWSORT message data set, add the following to your change accumulation JCL:

```
//SORTDIAG DD DUMMY
```

to force out the DFSORT messages and control statements, and resubmit your job.

How to eliminate other common errors

DFSORT needs intermediate storage to sort the log records.

IBM recommends that you specify DFSORT work data sets in your change accumulation JCL as follows:

```
//SORTWK01 DD UNIT=SYSDA,SPACE=(CYL,(100,25))
//SORTWK02 DD UNIT=SYSDA,SPACE=(CYL,(100,25))
//SORTWK03 DD UNIT=SYSDA,SPACE=(CYL,(100,25))
```

SPACE=(CYL,(100,25)) is a good starting point for the space allocation. It provides 100 primary cylinders and 25*15 secondary allocation cylinders for each of the three DFSORT work data sets. If DFSORT is unable to sort the log records with this amount of intermediate storage, it terminates with error message:

```
ICE046A SORT CAPACITY EXCEEDED - RECORD COUNT: n
```

In this case, increase the SPACE values or add additional work data sets, as appropriate, and resubmit your job.

Note: Tape sort work data sets are not supported.

If your site does not have enough work space available, you can reduce the amount of space and run the change accumulation job more frequently.

How to obtain a DFSORT dump

To obtain an DFSORT dump when an abend occurs, add the JCL and program control statements, shown in this table, to your change accumulation JCL.

Table 40. Obtaining a dump

If you received	Then use
A user or system abend code	//SYSUDUMP DD SYSOUT=A

A condition code 16	//SYSUDUMP DD SYSOUT=A
	//DFSPARM DD *
	DEBUG ABEND,ESTAE

Common system abends related to storage

The items are listed by system abend code.

This table shows common system abend codes that might occur when abends result from errors in storage parameters. For details on DFSORT's use of storage and storage parameters, see *DFSORT Installation and Customization R14* and *DFSORT Application Programming Guide R14*.

Table 41. Common system abends related to storage

Abend Code	Problem
106	There was not sufficient storage to load a module. Ensure that the values for REGION, MAINSIZE, SIZE, RESALL or RESINV are sufficient.
804, 80A	The amount of storage requested exceeded that available. Ensure that the values for REGION, MAINSIZE, SIZE, RESALL or RESINV are sufficient.
878	User exits required more storage than was available. Ensure that the values for REGION, MAINSIZE, SIZE, RESALL or RESINV are sufficient.
D37	A SORTWK or SORTOUT data set was specified with insufficient primary space allocation and no secondary allocation. Increase the primary allocation, or include a value for secondary allocation.
E37	A SORTOUT data set was allocated on a primary volume that had either insufficient storage or excessive fragmentation, and no secondary volume was specified. Specify more than one volume in the VOLSER parameter for the SORTOUT data set or compress the volume to allow it to contain the full 16 extents.

For more information on debugging and correcting problems using DFSORT, see *DFSORT Messages, Codes and Diagnosis Guide R14*. For general information on DFSORT, see *DFSORT Application Programming Guide R14*.

Chapter 18. Diagnosing logging problems

If you encounter a wait which you believe to be logging related, look at the MVS console for messages prefixed with “IXG”.

These are the MVS system logger messages and might provide further information about the cause of the wait. The MVS system console might also reveal evidence of resource contention within MVS.

Logging problem categories

Categories of problem, in order of ascending impact on the user, that can be encountered by CICS VR.

1. Those problems within the MVS system logger that the MVS system logger resolves for itself. CICS VR has no involvement in this category and can experience the problem only as an increase in response times.
2. The MVS system logger is unable to satisfy the CICS VR request immediately. This problem state can be encountered on a 'STRUCTURE FULL' condition where the coupling facility has reached its capacity before offloading data to storage. CICS VR is able to recognize this situation, issues message DWW838I, and tries the request again every 3 seconds until the request is satisfied. Typically, this action can take up to a minute.
3. If the MVS system logger fails, CICS VR attempts to trap the error and issues a 3999 condition code. The 3999 condition code indicates that no batch logging occurred for the sphere. Operator messages DWW251I - DWW262I or DWW266I indicate the reason for the termination. Since no batch logging has occurred, and if this problem occurred during forward recovery logging, you must take a backup of your VSAM spheres to ensure recoverability

   IBM recommends that you set up your batch logging jobs to take a backup of your VSAM sphere if you receive a 3999 condition code from CICS VR VSAM batch logging.

   This example shows a sample job step that takes a DFSMShsm backup of PAYROLL.FILE72 when a 3999 condition code is detected for STEP03.

```
//MYJOB   JOB  .....
     ....
     //STEP03  EXEC PGM=....
     //*  PAYROLL IS THE VSAM SPHERE DEFINED AS FRLOG(REDO)
     //PAYROLL  DD   DISP=SHR,DSN=PAYROLL.FILE72
     ....
     //*  BLBAD RUNS IF LOGGING TERMINATED AT STEP03 IS DETECTED
     //BLBAD    EXEC PGM=ARCINBAK,COND=(3999,NE,STEP03)
     //ARCPRINT DD SYSOUT=*
     //ARCSNAP  DD SYSOUT=*
     //BACK01   DD DSN=PAYROLL.FILE72,DISP=SHR
```

Figure 124. Example of a DFSMShsm backup if 3999 condition code occurs

   This example shows a sample job step that takes a DFSMSdss backup (logical dump) of PAYROLL.FILE72 when a 3999 condition code is detected for STEP03.

```
//MYJOB   JOB  .....
     ....
     //STEP03  EXEC PGM=....
     //*  PAYROLL IS THE VSAM SPHERE DEFINED AS FRLOG(REDO)
     //PAYROLL  DD   DISP=SHR,DSN=PAYROLL.FILE72
     ....
     //*  BLBAD RUNS IF BATCH LOGGING TERMINATED IS DETECTED AT STEP03
     //BLBAD    EXEC PGM=ADRDSSU,COND=(3999,NE,STEP03)
     //SYSPRINT DD   SYSOUT=*
     //DDUMPOUT DD   DISP=(,CATLG),DSN=PAYROLL.FILE72.BACKUP,
     //         UNIT=3390,VOL=SER=USRPAK,
     //         SPACE=(CYL,(5,1),RLSE)
     //SYSIN    DD   *
        DUMP -
           DS(INCL(PAYROLL.FILE72))     -
           OPT(4)                        -
           COMPRESS                      -
           CICSVRBACKUP                  -
           SPHERE                        -
           OUTDDNAME (DDUMPOUT)
     /*
```

Figure 125. Example of a DFSMSdss backup if 3999 condition code occurs

If the MVS system logger fails and CICS VR cannot trap the error, the CICS VR server address space might terminate.

MVS system logger availability

CICS VR checks for the availability of the MVS system logger.

If it detects that the MVS system logger is not available, the following occurs:

- CICS VR issues DWW252I ATTEMPT TO CONNECT TO CICSVR ADDRESS SPACE FAILED.
- CICS VR returns a non-zero return code to VSAM OPEN.
- VSAM OPEN issues IEC161I with reason code 002 and SFI code indicating the reason CICS VR VSAM batch logging was not provided.
- CICS VR sets the condition code to 3999 for this job step.

For all batch jobs that start forward recovery logging, you must set up the batch jobs to detect a 3999 condition code and trigger a backup of your VSAM spheres to ensure recoverability. See Figure 124 on page 337 for a DFSMShsm example or Figure 125 on page 338 for a DFSMSdss example.

If there is a problem with the log stream, you might need to delete it and redefine it.

Diagnosis of MVS System Logger Problems

Extended waits by CICS VR for logging can be caused by problems within the MVS system logger or other areas of MVS.

You can investigate these by looking at the MVS console messages. Look at the following information:

- Console messages and dumps

  Look for the following information:

  - Outstanding WTOR messages
  - IXG*xxx* messages
  - Allocation, catalog and HSM error messages
  - I/O errors for log stream data sets and/or LOGR couple data sets
  - IXC*xxx* messages, indicating problems with the coupling facility structure or couple data sets
  - 1C5 abends, and other abends from the IXGLOGR address space

Log stream data sets are of the form IXGLOGR.stream_name.Annnnnnn. The high level qualifier (IXGLOGR) might be different if the HLQ parameter was specified when the log stream was defined.

- Global resource serialization (GRS) resource contention

  To check GRS resource contention by displaying GRS enqueues and latch usage on all machines in the sysplex, issue either of the following MVS commands:

```
D GRS,C
D GRS,RES=(SYSZLOGR,*)
```

  A normal response looks like:

```
D GRS,C

ISG020I 12.06.49 GRS STATUS 647
NO ENQ CONTENTION EXISTS
NO LATCH CONTENTION EXISTS

D GRS,RES=(SYSZLOGR,*)

ISG020I 14.04.28 GRS STATUS 952
NO REQUESTORS FOR RESOURCE  SYSZLOGR *
```

  A response showing GRS contention looks like this:[1]

```
D GRS,C

ISG020I 12.06.31 GRS STATUS 619
LATCH SET NAME:  SYS.IXGLOGER_LCBVT
CREATOR JOBNAME: IXGLOGR   CREATOR ASID: 0202
  LATCH NUMBER:  7
    REQUESTOR  ASID  EXC/SHR    OWN/WAIT
    IXGLOGR    0202  EXCLUSIVE  OWN
    IXGLOGR    0202  SHARED     WAIT

D GRS,RES=(SYSZLOGR,*)

ISG020I 19.58.33 GRS STATUS 374
S=STEP    SYSZLOGR  91
SYSNAME         JOBNAME         ASID     TCBADDR   EXC/SHR  OWN/WAIT
MV26      MSLDELC1           002F       008F6370 EXCLUSIVE   OWN
S=STEP    SYSZLOGR  93
SYSNAME         JOBNAME         ASID     TCBADDR   EXC/SHR  OWN/WAIT
MV26      MSLWRTC1           002E       008DED90 EXCLUSIVE   OWN
MV26      MSLWRTC1           002E       008DB990 EXCLUSIVE   WAIT
MV26      MSLWRTC1           002E       008DB700 EXCLUSIVE   WAIT
MV26      MSLWRTC1           002E       008F60C8 EXCLUSIVE   WAIT
S=SYSTEMS SYSZLOGR LPAYROL.TESTLOG.TLOG1
SYSNAME         JOBNAME         ASID     TCBADDR   EXC/SHR  OWN/WAIT
MV27      IXGLOGR            0011       008F7398 EXCLUSIVE   OWN
MV26      IXGLOGR            0011       008F7398 EXCLUSIVE   WAIT
```

  This shows which tasks have exclusive enqueues on the log streams, and which tasks are waiting for them. It is quite normal for enqueues and latches to be obtained, occasionally with contention. They are indications of a problem only if they last for more than a minute or so.

  Long term enqueuing on the SYSZLOGR resource can be a sign of problems even if there is no contention.

  You can choose to display only those log streams exclusively enqueued on, or being waited on, by CICS VR jobs in the sysplex. Issue the following MVS command:

```
D GRS,RES=(DFHSTRM,*)
```

  A typical response to this command looks like this:

```
ISG020I 14.51.28 GRS STATUS 541
S=SYSTEMS DFHSTRM  PAYROL.CICSVRVR.DFHLGLOG
SYSNAME         JOBNAME         ASID     TCBADDR   EXC/SHR  OWN/WAIT
MV29      PAYROL91           0042       007D9108   SHARE     OWN
```

[1] You might also see latch set name SYS.IXGLOGER_MISC.

```
MV29      PAYROL93           0044       007D9138   SHARE     OWN
S=SYSTEMS DFHSTRM  PAYROL.FWDRECOV.UTL3
SYSNAME        JOBNAME         ASID     TCBADDR   EXC/SHR  OWN/WAIT
MV29      PAYROL91           0042       007D9108   SHARE     OWN
MV29      PAYROL93           0044       007D9138   SHARE     OWN
S=SYSTEMS DFHSTRM  PAYROL.IYK8ZET1.DFHJ02
SYSNAME        JOBNAME         ASID     TCBADDR   EXC/SHR  OWN/WAIT
MV29      PAYROL91           0042       007D9108   SHARE     OWN
S=SYSTEMS DFHSTRM  PAYROL.IYK8ZET1.DFHLOG
SYSNAME        JOBNAME         ASID     TCBADDR   EXC/SHR  OWN/WAIT
MV29      PAYROL91           0042       007D9108 EXCLUSIVE   OWN
S=SYSTEMS DFHSTRM  PAYROL.IYK8ZET1.DFHSHUNT
SYSNAME        JOBNAME         ASID     TCBADDR   EXC/SHR  OWN/WAIT
MV29      PAYROL91           0042       007D9108 EXCLUSIVE   OWN
S=SYSTEMS DFHSTRM  PAYROL.IYK8ZET3.DFHJ02
SYSNAME        JOBNAME         ASID     TCBADDR   EXC/SHR  OWN/WAIT
MV29      PAYROL93           0044       007D9138   SHARE     OWN
S=SYSTEMS DFHSTRM  PAYROL.IYK8ZET3.DFHLOG
SYSNAME        JOBNAME         ASID     TCBADDR   EXC/SHR  OWN/WAIT
MV29      PAYROL93           0044       007D9138 EXCLUSIVE   OWN
S=SYSTEMS DFHSTRM  PAYROL.IYK8ZET3.DFHSHUNT
SYSNAME        JOBNAME         ASID     TCBADDR   EXC/SHR  OWN/WAIT
MV29      PAYROL93           0044       007D9138 EXCLUSIVE   OWN
```

- Coupling facility status

  To display the MVS system logger couple data set status, issue the following MVS command:

  ```
  D XCF,CPL,TYPE=LOGR
  ```

  A normal response looks like this:

  ```
  D XCF,CPL,TYPE=LOGR
  IXC358I  14.47.51  DISPLAY XCF 391
  LOGR COUPLE DATA SETS
  PRIMARY    DSN: SYS1.SYSPLEX2.SEQ26.PLOGR
             VOLSER: P2SS05     DEVN: 230D
             FORMAT TOD         MAXSYSTEM
             12/20/95 09:25:48          8
  ALTERNATE  DSN: SYS1.SYSPLEX2.SEQ26.ALOGR
             VOLSER: P2SS06     DEVN: 2C10
             FORMAT TOD         MAXSYSTEM
             12/20/95 09:27:45          8
  LOGR IN USE BY ALL SYSTEMS
  ```

  If the response shows that LOGR is not in use by all systems, there might be a problem to investigate. Look for IXCxxx messages which might indicate the cause of the problem and issue the following command to attempt reconnection to the couple data set:

  ```
  SETXCF CPL,TYPE=(LOGR),PCOUPLE=(couple_dataset_name)
  ```

  To display all structures with Failed_persistent connections, issue the following MVS command:

  ```
  D XCF,STR,STRNM=*,STATUS=FPCONN
  ```

  The MVS system logger resolves any failed connections.

- SMF and RMF statistics

  SMF 88 log stream statistics records and RMF coupling facility usage reports are useful for analyzing problems that are affecting performance. Increasing the amount of coupling facility storage allocated to a structure can improve both MVS system logger performance and CICS VR performance.

Collecting diagnosis information

If you suspect that there is a problem within the MVS system logger that is not a result of some other resolvable problem, you might need to collect additional diagnostic information.

The dumps generated by CICS VR generally do not contain sufficient information about the MVS system logger.

A dump of XCF and MVS system logger address spaces from all systems are useful in the diagnosis of such problems. Issue the following series of MVS commands:

```
DUMP COMM=(meaningful dump title)
R ww,JOBNAME=(IXGLOGR,XCFAS,CICSVR_jobname),DSPNAME=('XCFAS'.*),CONT
R xx,STRLIST=(STRNAME=structure,(LISTNUM=ALL),ACC=NOLIM),CONT
R yy,REMOTE=(SYSLIST=*('XCFAS','IXGLOGR'),DSPNAME,SDATA),CONT
R zz,SDATA=(COUPLE,ALLNUC,LPA,LSQA,PSA,RGN,SQA,TRT,CSA,GRSQ,XESDATA),END
```

Use the R xx,STRLIST=(STRNAME=structure,(LISTNUM=ALL),ACC=NOLIM),CONT instruction only where you suspect a problem with the coupling facility structure.

Error records written to the MVS LOGREC data set might also be useful

Restarting the MVS system logger address space

If the MVS system logger address space has failed, it can be restarted using the S IXGLOGRS command. Note the 'S' at the end--IXGLOGRS restarts IXGLOGR as a system address space.

CAUTION: If you forcibly cancel the MVS system logger address space (by issuing a FORCE IXGLOGR,ARM command) and coupling facility structures used by the MVS system logger (by issuing a SETXCF FORCE,CON,STRNAME=structname,CONNAME=ALL command), CICS VR sets the condition code to 3999 for this job step and no CICS VR VSAM batch logging is performed. You must set up your batch jobs that start CICS VR forward recovery logging so they detect 3999 condition codes and trigger a backup of your VSAM spheres to ensure recoverability. See “Logging problem categories” on page 337 for a DFSMShsm example and a DFSMSdss example.

Chapter 19. Sample CLIST (DWWCLIST)

A sample command list (CLIST) that you can use to start the CICS VR ISPF dialog interface. This sample CLIST is member DWWCLIST of the SDWWCNTL data set.

If you used CICS VR JCL customization, run DWWCLIST from customized data set SDWWCNTL.OUT. For more information, see “Running CICS VR JCL customization” on page 7.

If you want to capture tracing and diagnostic information while running the CICS VR dialog, add allocations for the DWWDUMP ddnames to the CLIST. The DCB for this data set is (RECFM=VBA,LRECL=84,BLKSIZE=3120).

```
PROC 0
CONTROL   FLUSH NOPROMPT    MSG
/* ------------------------------------------------------------- */
/*                                                               */
/*  @BANNER_START                           01                   */
/*  Licensed Materials - Property of IBM                         */
/*                                                               */
/*  5655-GY1              DWWCLIST                               */
/*                                                               */
/*  (C) Copyright IBM Corp. 1991, 2014                           */
/*  (C) Copyright HCL Technologies Ltd. 2025                     */
/*                                                               */
/*                                                               */
/*  @BANNER_END                                                  */
/*        PN= REASON  REL YYMMDD ID:       REMARKS               */
/*       $L0= ....... 000 910101 ......... Creation              */
/*       $L1= CVR410  410 050909 ......... SDWWLENU Added        */
/*       $L2= CVR420  420 060909 ......... Hlq variables Added   */
/*       $L3= CVR430  430 080520 ......... Hlq and Suff for RCDS  */
/*            D55179  510 120711 ......... default hlq changed    */
/*            R63746  520 130420 ......... default hlq changed    */
/*            R71977  520 130920 ......... customization          */
/* ------------------------------------------------------------- */
/*                                                               */
/*   FUNCTION:  SAMPLE CLIST TO INVOKE THE CICSVR ISPF DIALOG.   */
/*              (ENGLISH)                                        */
/* ------------------------------------------------------------- */
 ISPEXEC CONTROL ERRORS RETURN       /* RETURN IPF ERRORS TO CLIST */
 ISPEXEC VGET ZUSER SHARED           /* GET USERID                 */

/* ------------------------------------------------------------- */
/*  Replace the value of the HLQ variable with what you have     */
/*  specified for @hlq@ in the DWWALLOC job.                     */
/* ------------------------------------------------------------- */

  SET HLQ = DWW.V610               /* HIGH LEVEL QUALIFIER FOR     */
                                   /* CICSVR LIBRARIES             */
/* ------------------------------------------------------------- */
/*  Replace the value of the UHLQ variable with the high level   */
/*  qualifier that you have used for allocation the following    */
/*  data sets:                                                   */
/*               &uhlq..DWWMSG                                   */
/*               &uhlq..DWWPRINT                                 */
/*               &uhlq..DWWDMSG                                  */
/*               &uhlq..ISPFILE                                  */
/* ------------------------------------------------------------- */
 SET UHLQ = DWW.&ZUSER              /* HIGH LEVEL QUALIFIER FOR    */
                                   /* USER DATA SETS              */
/* ------------------------------------------------------------- */
/*  Replace the values for the PREF and the SUFF variables       */
/*  to what you have specified in DWWRCDEF sample job to allocate */
/*  the RCDS data sets:                                          */
/*                     &pref.DWWCON1.GRP&suff                    */
/*                     &pref.DWWCON2.GRP&suff                    */
/*                     &pref.DWWCON3.GRP&suff                    */
/* ------------------------------------------------------------- */
 SET PREF = DWW.V610                /* RCDS PREFIX               */
 SET SUFF = PROD                    /* RCDS SUFFIX               */
/* ------------------------------------------------------------- */
```

Figure 126. Sample DWWCLIST

```
ISPEXEC VGET ZPFSHOW PROFILE        /* CHANGE PFSHOW SO THAT      */
 SET PFSAVE = &ZPFSHOW               /* PF-KEY ARE DISPLAYED DURING*/
 SET PFCMD  = &STR(PFSHOW ON)        /* CICSVR DIALOG INTERFACE    */
 ISPEXEC DISPLAY COMMAND(PFCMD)

 ISPEXEC LIBDEF ISPFILE
 ISPEXEC LIBDEF ISPPLIB
 ISPEXEC LIBDEF ISPMLIB
 ISPEXEC LIBDEF ISPTLIB
 FREE FI(DWWCON1,DWWCON2,DWWCON3,DWWMSG,DWWPRINT,MYFILE,ISPFILE)
 FREE FI(DWWSLIB,DWWLLIB,DWWDMSG)
 FREE FI(DWWLOAD)

/* ------------------------------------------------- DWWCON1  */
 ALLOC FI(DWWCON1) DA('&PREF..DWWCON1.GRP&SUFF') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWCON1
    GOTO SETMSG3
 END
/* ------------------------------------------------- DWWCON2  */
 ALLOC FI(DWWCON2) DA('&PREF..DWWCON2.GRP&SUFF') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWCON2
    GOTO SETMSG3
END
/* ------------------------------------------------- DWWCON3  */
 ALLOC FI(DWWCON3) DA('&PREF..DWWCON3.GRP&SUFF') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWCON3
    GOTO SETMSG3
 END /
* ------------------------------------------------- DWWMSG   */
 /** ALLOC FI(DWWMSG) SYSOUT(X) DEST(XXXX)  ***/
 ALLOC FI(DWWMSG) DA('&UHLQ..DWWMSG') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWMSG
    GOTO SETMSG3
 END
/* ------------------------------------------------- DWWPRINT */
 /** ALLOC FI(DWWPRINT) SYSOUT(X) DEST(XXXX) ***/
 ALLOC FI(DWWPRINT) DA('&UHLQ..DWWPRINT') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWPRINT
    GOTO SETMSG3
 END
/* ------------------------------------------------- DWWDMSG  */
 /** ALLOC FI(DWWDMSG) SYSOUT(X) DEST(XXXX) ***/
 ALLOC FI(DWWDMSG) DA('&UHLQ..DWWDMSG') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWDMSG
    GOTO SETMSG3
 END
```

```
/* ------------------------------------------------- ISPLLIB  */
/*  The following line (LIBDEF for ISPLLIB) is added only if     */
/*  the CICSVR LOADLIB'S are not allocated to ISPLLIB in the     */
/*  TSO LOGON PROC.                                              */
/* ------------------------------------------------------------ */
 ISPEXEC LIBDEF ISPLLIB DATASET ID('&HLQ..SDWWLOAD',   +
                                   '&HLQ..SDWWLENU')
/* ------------------------------------------------- DWWLOAD  */
/*  The following allocation is required only if the CICSVR      */
/*  LOADLIB'S are not allocated to ISPLLIB in the TSO LOGON      */
/*  PROC.                                                        */
/* ------------------------------------------------------------ */
 SET &LIBS = &STR('&HLQ..SDWWLOAD')
 SET &DSN  = &STR('&HLQ..SDWWLENU')
 SET &LIBS = &STR(&LIBS , &DSN)
 ALLOC FI(DWWLOAD) DA(&LIBS) SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWLOAD
    GOTO SETMSG3
END

/* ------------------------------------------------- DWWLLIB  */
 SET &LIBS = &STR('&HLQ..SDWWLOAD')
 SET &DSN1 = &STR('&HLQ..SDWWLENU')
 SET &LIBS = &STR(&LIBS , &DSN1 )
 ALLOC FI(DWWLLIB) DA(&LIBS) SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWLLIB
    GOTO SETMSG3
 END

/* ------------------------------------------------- ISPPLIB  */
 ISPEXEC LIBDEF ISPPLIB DATASET ID('&HLQ..SDWWPENU')
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = ISPPLIB
    GOTO SETMSG3
END
/* ------------------------------------------------- ISPMLIB  */
 ISPEXEC LIBDEF ISPMLIB DATASET ID('&HLQ..SDWWMENU')
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = ISPMLIB
    GOTO SETMSG3
 END
/* ------------------------------------------------- ISPTLIB  */
 ISPEXEC LIBDEF ISPTLIB DATASET ID('&HLQ..SDWWTENU')
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
 SET DDNAME = ISPTLIB
 GOTO SETMSG3
 END
/* -------------------------------------------------  DWWSLIB  */
 SET &LIBS = &STR('&UHLQ..ISPFILE')
 SET &DSNO= &STR('&HLQ..SDWWSENU')
 SET &LIBS = &STR(&LIBS , &DSNO)
 ALLOC FI(DWWSLIB) DA(&LIBS) SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWSLIB
    GOTO SETMSG3
 END /
```

```
* ------------------------------------------------- ISPFILE  */
 ALLOC FI(MYFILE) DA('&UHLQ..ISPFILE') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = MYFILE
    GOTO  SETMSG3
 END

 ALLOC FI(ISPFILE) DA('&UHLQ..ISPFILE') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = ISPFILE
    GOTO  SETMSG3
 END


/*************************************************************/
/*  INVOKE CICSVR DIALOG PROGRAM.                            */
/*************************************************************/
 ISPEXEC SELECT PGM(DWWPM) NEWAPPL(DWW) PASSLIB

 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN    +
    SET ZERRLM = &STR(CICSVR DIALOGS COMPLETED, RC = &RCSAVE)
 GOTO FINISH

 /*************************************************************/
/*   SET ERROR MESSAGE IF ANY, TO BE DISPLAYED ON ISPF PANEL. */
/*************************************************************/
 SETMSG3:   +
  SET ZERRLM = &STR(ALLOCATE OF DDNAME &DDNAME FAILED WITH RC= &RCSAVE)

 FINISH:    +
 ISPEXEC LIBDEF ISPFILE
 ISPEXEC LIBDEF ISPPLIB
 ISPEXEC LIBDEF ISPMLIB
 ISPEXEC LIBDEF ISPTLIB
 ISPEXEC LIBDEF ISPLLIB           /** ONLY IF NOT IN LOGON PROC **/
 FREE FI(DWWCON1,DWWCON2,DWWCON3,DWWMSG,DWWPRINT,MYFILE,ISPFILE)
 FREE FI(DWWSLIB,DWWLLIB,DWWDMSG)
 FREE FI(DWWLOAD)
 IF &RCSAVE = 0 THEN    +
    SET ZERRHM = &STR(ISR00003)   /* SET TO TOP ISPF TUTOR PANEL */
 IF &RCSAVE = 0 THEN    +
    GOTO EXIT1                    /* NORMAL EXIT                */

 SETERROR:  +
 SET ZERRMSG = &STR(ISRZ002)      /* USE THIS ISPF MESSAGE NUMBER.*/
 SET ZERRALRM = &STR(YES)         /* BEEP AT USER                 */
 SET ZERRNM = &STR(ISR00003)      /* SET TO TOP ISPF TUTOR PANEL  */
 EXIT1:   +
 SET PFCMD = &STR(PFSHOW &PFSAVE) /* RESTORE PFKEY DISPLAY TO     */
 ISPEXEC DISPLAY COMMAND(PFCMD)   /*   PREVIOUS STATUS            */
 EXIT CODE(&RCSAVE)
```

Chapter 20. VSAMREC CLIST

VSAMREC is the name of a list command and line operator that can be issued from the ISMF Data Set List panel. Use the ISMF data set list feature to group VSAM spheres based on user-defined selection criteria.

Issue VSAMREC from the ISMF data set list to call CICS VR panels, allowing you to create a recovery job for individual or all data sets in the list. See *CICS VR User's Guide* for more information.

VSAMREC is actually an alias for data set DWWRECVR. VSAMREC is a member of the SDWWCNTL data set. Before VSAMREC can be started, you must tailor the VSAMREC member to match your specific installation.

VSAMREC must be allocated to the SYSPROC ddname. You must either allocate the entire SDWWCNTL PDS to the SYSPROC ddname (possibly in the TSO/E logon procedure) or you must copy the VSAMREC member to a PDS that is already allocated to the SYSPROC ddname. Enter the TSO ISRDDN command to display all ddnames allocated to your current TSO session. See *z/OS TSO/E CLISTs* for more information.

The VSAMREC CLIST, verifies that it was issued as an ISMF line operator or by list command from the ISMF data set list panel. The VSAMREC CLIST then allocates the data sets required for the execution of the CICS VR dialog interface. Edit these data set allocations to match your CICS VR installation. Refer to the comments before each allocation for further description. If you have included these allocations in your TSO/E logon procedure, you can remove or “comment-out” these allocations in the VSAMREC CLIST. The VSAMREC CLIST then starts the CICS VR dialog interface, passing the appropriate variables to indicate if it was started as a line operator or list command.

If you want to capture tracing and diagnostic information while executing the CICS VR dialog, add allocations for the DWWDUMP and DWWDMSG ddnames to VSAMREC. The DCB for these data sets is (RECFM=VBA,LRECL=84,BLKSIZE=3120).

```
PROC 0  TEST(NO) LIST(NO)
/*************************************************************************/
/*                                                                       */
/*  $MAC(DWWRECVR) COMP(GY101): INVOKE CICSVR TO RECOVER THE             */
/*                              REQUESTED DATA SET(S)                    */
/*                                                                       */
/* @BANNER_START                          01                             */
/* Licensed Materials - Property of IBM                                  */
/*                                                                       */
/* 5655-GY1              DWWRECVR                                        */
/*                                                                       */
/* (C) Copyright IBM Corp. 2002, 2014                                    */
/* (C) Copyright HCL Technologies Ltd. 2025                              */
/*                                                                       */
/* @BANNER_END                                                           */
/*                                                                       */
/*                                                                       */
/*   DESCRIPTIVE NAME: CLIST TO INVOKE THE CICSVR DIALOG                 */
/*                     FROM THE ISMF DATA SET LIST PANEL.                */
/*                                                                       */
/*   ALIAS:            VSAMREC IS THE ALIAS FOR THE DWWRECVR CLIST.      */
/*                                                                       */
/*   STATUS: CICS VSAM RECOVERY VERSION 6 RELEASE 1                      */
/*                                                                       */
/*   FUNCTION:                                                           */
/*     THIS CLIST CAN BE INVOKED AS A LINE OPERATOR OR LIST COMMAND.     */
/*     IT WILL INVOKE THE CICSVR ISPF INTERFACE TO CREATE A RECOVERY     */
/*     JOB FOR THE SELECTED VSAM DATA SETS.                              */
/*       1. DISABLE ATTENTION DURING CICSVR DIALOG EXECUTION             */
/*       2. ISSUE A CONTROL STATEMENT TO SET RUN OPTIONS                 */
/*       3. ISSUE ISPF VGET TO OBTAIN REQUIRED VARIABLES FROM SHARED     */
/*          VARIABLE POOL:                                               */
/*            - APPLICATION ID                    &ZAPPLID             */
/*            - PANEL ID                          &ZPANELID            */
/*            - CMD/LINEOP INDICATOR              &DGTTYPEC            */
/*            - NAME OF COMMAND                   &DGTCMDNM            */
/*       4. ENSURE VSAMREC IS INVOKED ONLY FROM DATA SET APPLICATION     */
/*       5. DISPLAY VARIABLE NAMES AND VALUES THEN RETURN IF TEST MODE   */
/*       6. ALLOCATE REQUIRED DATA SETS FOR THE CICSVR ISPF INTERFACE    */
/*       7. INVOKE CICSVR PASSING THE APPROPRIATE PARAMETERS             */
/*       8. FREE ALL ALLOCATIONS MADE FOR THE CICSVR ISPF INTERFACE      */
/*       9. PLACE VARIABLES AND MESSAGES INTO SHARED VARIABLE POOL       */
/*                                                                       */
/*   INPUT:                                                              */
/*           1-TEST PARAMETER: &TEST                                     */
/*           2-LIST PARAMETER: &LIST                                     */
/*           3-COMMAND NAME: &DGTCMDNM                                   */
/*           4-ISMF SHARED POOL VARIABLES: &XXXXXXXX                     */
/*                                                                       */
/*   OUTPUT:                                                             */
/*           TEST MODE: ALL CLIST VARIABLES                              */
/*           NON TEST MODE:                                              */
/*             RCSAVE:                                                   */
/*               0        = FUNCTION PERFORMED                         */
/*               4        = VSAM SPHERE NOT FOUND                      */
/*               >4       = FUNCTION FAILED                            */
/*             SHORT ERROR MESSAGE           (DGTCSMSG)                */
/*             LONG ERROR MESSAGE            (DGTCLMSG)                */
/*             CONTINUE LIST PROCESSING FLAG (DGTCONTN)                */
/*             LINEOP HISTORY UPDATE FLAG    (DGTLISTC)                */
/*                                                                       */
```

Figure 127. VSAMREC CLIST

```
/*                                                                   */
/*   MESSAGES:                                                       */
/*        SHORT MESSAGE: "VSAMREC ERROR"                             */
/*        LONG MESSAGE:                                              */
/*            "CICSVR DIALOG COMPLETED, RC = X"                      */
/*              - IF ERROR > 4 FROM CICSVR DIALOG EXECUTION          */
/*            "ALLOCATE OF DDNAME XXXXXXXX FAILED WITH RC= XX"       */
/*              - IF ERROR FROM ALLOCATIONS OF DATA SETS FOR CICSVR   */
/*                                                                   */
/*   PROCESSOR: TSO CLIST PROCESSOR                                  */
/*                                                                   */
/*   NOTE: PLEASE UPDATE THE CICSVR DATA SET ALLOCATIONS TO REFLECT   */
/*         YOUR CICSVR INSTALLATION.  YOU MAY REMOVE OR              */
/*         "COMMENT-OUT" THESE ALLOCATIONS IF THEY ARE INCLUDED IN    */
/*         YOUR ISPF LOGON PROCEDURE.                                */
/*                                                                   */
/*   CHANGE ACTIVITY:                                                */
/*        PN= REASON  REL YYMMDD ID:       REMARKS                   */
/*       $L0= ....... 320 020101 ......... Creation                  */
/*       $L1= ....... 410 050916 ......... Added SDWWLENU            */
/*       $L2= ....... 510 120707 ......... Update for release 5.1.0   */
/*       $L3= ....... 520 130420 ......... Update for release 5.2.0   */
/*       R71977       520 130930 hd-oam:   CICSVR customization      */
/*********************************************************************/
 ISPEXEC VGET ZUSER SHARED           /* GET USERID                  */
/* ------------------------------------------------------------- */
/*  Replace the value of the HLQ variable with what you have     */
/*  specified for @hlq@ in the DWWALLOC job.                     */
/* ------------------------------------------------------------- */

 SET HLQ = DWW.V610                /* HIGH LEVEL QUALIFIER FOR     */
                                   /* CICSVR LIBRARIES             */
/* ------------------------------------------------------------- */
/*  Replace the value of the UHLQ variable with the high level   */
/*  qualifier that you have used for allocation the following    */
/*  data sets:                                                   */
/*               &uhlq..DWWMSG                                   */
/*               &uhlq..DWWPRINT                                 */
/*               &uhlq..DWWDMSG                                  */
/*               &uhlq..ISPFILE                                  */
/* ------------------------------------------------------------- */

 SET UHLQ = DWW.&ZUSER              /* HIGH LEVEL QUALIFIER FOR   */
                                   /* USER DATA SETS             */
/* ------------------------------------------------------------- */
/*  Replace the values for the PREF and the SUFF variables       */
/*  to allocate the RCDS data sets:                              */
/*                     &pref.DWWCON1.GRP&suff                    */
/*                     &pref.DWWCON2.GRP&suff                    */
/*                     &pref.DWWCON3.GRP&suff                    */
/* ------------------------------------------------------------- */
 SET PREF = DWW.V610                          /* RCDS PREFIX   */
 SET SUFF = PROD                              /* RCDS SUFFIX   */
/* ------------------------------------------------------------- */
 SET &DGTCSMSG = &STR()
 SET &DGTCLMSG = &STR()
/*********************************************************************/
```

```
/* DISABLE ATTENTION KEY SO CICSVR DIALOG WILL TERMINATE NORMALLY     */
/*********************************************************************/

 ATTN +
  DO
   RETURN
  END

/*********************************************************************/
/* SET THE RUN OPTIONS VIA CONTROL STATEMENT                         */
/*********************************************************************/
IF &STR(&LIST) EQ &STR(YES) THEN +
  CONTROL LIST MSG  SYMLIST CONLIST NOPROMPT NOFLUSH
 ELSE +
  CONTROL NOLIST NOMSG NOPROMPT NOFLUSH

/*********************************************************************/
/* GET NEEDED VARIABLES FROM SHARED VARIABLE POOL                    */
/*********************************************************************/
ISPEXEC  VGET (ZAPPLID DGTTYPEC DGTCMDNM ZPANELID) SHARED
SET &DGTCMDNM = &STR(VSAMREC)

/*********************************************************************/
/* ENSURE VSAMREC IS INVOKED ONLY FROM DATA SET APPLICATION          */
/*********************************************************************/

IF (&ZPANELID NE &STR(DGTLGP11) &&  &ZPANELID NE &STR(DWWPPVLT)) +
   | (&SUBSTR(1:3,&ZAPPLID) NE &STR(DGT)) THEN +
  DO                                  /* NOT DATA SET LIST */
    ISPEXEC LIBDEF ISPMLIB
    ISPEXEC LIBDEF ISPMLIB DATASET ID('&HLQ..SDWWMENU')
    SET &COMMAND = &STR(VSAMREC )
    IF &SUBSTR(1:3,&ZAPPLID) NE &STR(DGT) THEN +
      ISPEXEC SETMSG MSG(DWWP705)       /* NOT ISMF */
    ELSE +
      ISPEXEC SETMSG MSG(DWWP706)       /* ISMF BUT NOT DATA SET LIST */

    ISPEXEC LIBDEF ISPMLIB
    SET &RCSAVE = 8
    GOTO  TERM
 END

/*********************************************************************/
/* DISPLAY VARIABLE VALUES AND RETURN IF TEST MODE IS INVOKED        */
/*********************************************************************/
IF &STR(&TEST) EQ &STR(YES) THEN +
  DO
     WRITE
     WRITE    CLIST "VSAMREC" RECEIVED CONTROL.
     WRITE
     WRITE          VARIABLE    CURRENT
     WRITE            NAME       VALUE
     WRITE          ________    _______
     WRITE          ZAPPLID     &ZAPPLID
     WRITE          DGTCMDNM    &DGTCMDNM
     WRITE          DGTTYPEC    &DGTTYPEC
     WRITE
     ISPEXEC LIBDEF ISPMLIB
     ISPEXEC LIBDEF ISPMLIB DATASET ID('&HLQ..SDWWMENU')
     ISPEXEC GETMSG MSG(DWWP707) SHORTMSG(SHMSG)  /* Tested mode */
     ISPEXEC GETMSG MSG(DWWP707) LONGMSG(LONGMSG)
     IF &DGTTYPEC = &STR(C) THEN +
      DO
        SET &DGTCONTN = &STR(N)
        SET &DGTLISTC = &STR(N)
     END
   ISPEXEC LIBDEF ISPMLIB
   SET &RCSAVE = 8
   GOTO  ENDCLIST
 END

/*********************************************************************/
```

```
/* THE FOLLOWING WILL ALLOCATE THE REQUIRED DATA SETS FOR THE         */
/* INVOCATION OF THE CICSVR ISPF INTERFACE.  PLEASE UPDATE THE CICSVR */
/* DATA SET ALLOCATIONS TO REFLECT YOUR CICSVR INSTALLATION.  YOU     */
/* MAY REMOVE OR "COMMENT-OUT" THESE ALLOCATIONS IF THEY ARE INCLUDED */
/* IN YOUR ISPF LOGON PROCEDURE.                                      */
/**********************************************************************/
 ISPEXEC CONTROL ERRORS RETURN       /* RETURN ISPF ERRORS TO CLIST */


 ISPEXEC VGET ZPFSHOW PROFILE        /* CHANGE PFSHOW SO THAT THE   */
 SET PFSAVE = &ZPFSHOW               /* PF-KEYS ARE DISPLAYED DURING*/
 SET PFCMD  = &STR(PFSHOW ON)        /* THE CICSVR DIALOG INTERFACE */
 ISPEXEC DISPLAY COMMAND(PFCMD)
 ISPEXEC LIBDEF ISPFILE
 ISPEXEC LIBDEF ISPPLIB
 ISPEXEC LIBDEF ISPMLIB
 ISPEXEC LIBDEF ISPTLIB
 FREE FI(DWWCON1,DWWCON2,DWWCON3,DWWMSG,DWWPRINT,MYFILE,ISPFILE)
 FREE FI(DWWSLIB,DWWLLIB,DWWDMSG)
 FREE FI(DWWLOAD)

/* ------------------------------------------------- DWWCON1  */
 ALLOC FI(DWWCON1) DA('&PREF..DWWCON1.GRP&SUFF') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWCON1
    GOTO SETMSG3
 END

/* ------------------------------------------------- DWWCON2  */
 ALLOC FI(DWWCON2) DA('&PREF..DWWCON2.GRP&SUFF') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWCON2
    GOTO SETMSG3
 END

/* ------------------------------------------------- DWWCON3  */
 ALLOC FI(DWWCON3) DA('&PREF..DWWCON3.GRP&SUFF') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWCON3
    GOTO SETMSG3
 END

/* ------------------------------------------------- DWWMSG   */
 ALLOC FI(DWWMSG) DA('&UHLQ..DWWMSG') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWMSG
     GOTO SETMSG3
 END
/* ------------------------------------------------- DWWPRINT */
 ALLOC FI(DWWPRINT) DA('&UHLQ..DWWPRINT') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWPRINT
     GOTO SETMSG3
 END
```

```
/* ------------------------------------------------- DWWDMSG  */
 /** ALLOC FI(DWWDMSG) SYSOUT(X) DEST(XXXX) ***/
 ALLOC FI(DWWDMSG) DA('&UHLQ..DWWDMSG') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWDMSG
     GOTO SETMSG3
 END

/* ------------------------------------------------- ISPLLIB  */
 ISPEXEC LIBDEF ISPLLIB DATASET ID('&HLQ..SDWWLOAD',   +
                                   '&HLQ..SDWWLENU')

/* ------------------------------------------------- DWWLOAD  */
 SET &DSN  = &STR('&HLQ..SDWWLENU')
 SET &LIBS = &STR('&HLQ..SDWWLOAD')
 SET &LIBS = &STR(&LIBS , &DSN)
 ALLOC FI(DWWLOAD) DA(&LIBS) SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWLOAD
    GOTO SETMSG3
 END

/* ------------------------------------------------- DWWLLIB  */
 SET &LIBS = &STR('&HLQ..SDWWLOAD')
 SET &DSN1 = &STR('&HLQ..SDWWLENU')
 SET &LIBS = &STR(&LIBS , &DSN1 )
 ALLOC FI(DWWLLIB) DA(&LIBS) SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWLLIB
    GOTO SETMSG3
 END

/* ------------------------------------------------- ISPPLIB  */
 ISPEXEC LIBDEF ISPPLIB DATASET ID('&HLQ..SDWWPENU')
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = ISPPLIB
    GOTO SETMSG3
 END

/* ------------------------------------------------- ISPMLIB  */
 ISPEXEC LIBDEF ISPMLIB DATASET ID('&HLQ..SDWWMENU')
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = ISPMLIB
    GOTO SETMSG3
 END

/* ------------------------------------------------- ISPTLIB  */
 ISPEXEC LIBDEF ISPTLIB DATASET ID('&HLQ..SDWWTENU')
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = ISPTLIB
    GOTO SETMSG3
END
```

```
/* ------------------------------------------------  DWWSLIB  */
 SET &LIBS = &STR('&UHLQ..ISPFILE')
 SET &DSNO= &STR('&HLQ..SDWWSENU')
 SET &LIBS = &STR(&LIBS , &DSNO)
 ALLOC FI(DWWSLIB) DA(&LIBS) SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = DWWSLIB
    GOTO SETMSG3
 END

/* ---------------------------------------- MYFILE AND ISPFILE  */
 ALLOC FI(MYFILE) DA('&UHLQ..ISPFILE') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = MYFILE
    GOTO  SETMSG3
 END

 ALLOC FI(ISPFILE) DA('&UHLQ..ISPFILE') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE NE 0 THEN DO
    SET DDNAME = ISPFILE
    GOTO  SETMSG3
 END

/*****************************************************************/
/*  BASED ON IF VSAMREC WAS ISSUED AS A LINE OP OR A LIST     */
/*  COMMAND, THE APPROPRIATE CICSVR PARAMETER IS SET          */
/*****************************************************************/

 IF &DGTTYPEC = C THEN  +
   SET &PARMVAL = &STR(ISMFLCMD) /* THIS IS A LIST COMMAND  */
 IF &DGTTYPEC = L THEN  +
   SET &PARMVAL = &STR(ISMFLIOP) /* THIS IS A LINE OPERATOR */

/*****************************************************************/
/*  EXECUTE CICSVR AND SET RETURN CODE                        */
/*****************************************************************/

 ISPEXEC SELECT PGM(DWWPM) PARM(&PARMVAL) +
  NEWAPPL(DWW) PASSLIB

 SET RCSAVE = &LASTCC
 SET LONGMSG = &STR(CICSVR DIALOG COMPLETED WITH RC = &RCSAVE)
 GOTO FINISH

/*****************************************************************/
/*  SET ALLOCATION ERROR MESSAGE IF IT OCCURRED               */
/*****************************************************************/
 SETMSG3:   +
  SET LONGMSG = &STR(ALLOCATE OF DDNAME &DDNAME FAILED WITH RC= &RCSAVE)

/*****************************************************************/
/*  CLEANUP ALL CICSVR DATA SET ALLOCATIONS                   */
/*****************************************************************/
```

```
 FINISH:    +
 ISPEXEC LIBDEF ISPFILE
 ISPEXEC LIBDEF ISPPLIB
 ISPEXEC LIBDEF ISPMLIB
 ISPEXEC LIBDEF ISPTLIB
 ISPEXEC LIBDEF ISPLLIB           /** ONLY IF NOT IN LOGON PROC **/
 FREE FI(DWWCON1,DWWCON2,DWWCON3,DWWMSG,DWWPRINT,MYFILE,ISPFILE)
 FREE FI(DWWSLIB,DWWLLIB,DWWDMSG)
 FREE FI(DWWLOAD)
 IF &RCSAVE NE 0 THEN    +
    SET SHMSG = &STR(&DGTCMDNM ERROR)

 SET PFCMD = &STR(PFSHOW &PFSAVE) /* RESTORE PFKEY DISPLAY TO     */
 ISPEXEC DISPLAY COMMAND(PFCMD)   /*   PREVIOUS STATUS            */

/*************************************************************/
/*  IF VSAMREC ISSUED AS A LIST COMMAND                      */
/*    DON'T CONTINUE PROCESSING EACH ITEM IN THE LIST        */
/*    DON'T UPDATE LINE OP VALUE                             */
/*************************************************************/

 IF &DGTTYPEC EQ &STR(C) THEN +
   DO
    SET &DGTCONTN = &STR(N)
    SET &DGTLISTC = &STR(N)
   END

/*************************************************************/
/*  SET SHORT AND LONG MESSAGE FOR ISMF DATA SET LIST        */
/*************************************************************/

 ENDCLIST: +
   SET &DGTCSMSG = &STR(&SHMSG)
   SET &DGTCLMSG = &STR(&LONGMSG)
   ISPEXEC VPUT (DGTCONTN DGTLISTC DGTCSMSG DGTCLMSG) SHARED
 TERM:     +
   EXIT CODE(&RCSAVE) .
```

Figure 128. VSAMREC CLIST

Chapter 21. Using selective scan

When you use the CICS VR ISPF dialog interface to create a recovery job, by default CICS VR automatically scans all log of logs that are registered to CICS VR.

CICS VR scans all log of logs to make sure the RCDS contains all of the latest update activity prior to creating the recovery job. However, in some cases you might know that only specific log of logs contain the necessary update activity information for the VSAM spheres you want to recover.

You can have CICS VR only scan specific log of logs by using one of the following methods:

- Run a batch job and specify the names of the log of logs to be scanned on the LOGOFLOGS command. The LOGOFLOGS command in Figure 129 on page 355 tells CICS VR to only scan log of logs LOGLFLOG.J01 and LOGOFLOG.J02. Both of these log of logs must be registered in the RCDS.

```
//JOBSCN2  JOB MSGCLASS=X,CLASS=A,MSGLEVEL=(1,1),REGION=0M
//* CICSVR PROGRAM
//STEP1    EXEC PGM=DWWAR
//* LIBRARY CONTAINING CICSVR PROGRAMS
//STEPLIB DD DSN=DWW.SDWWLOAD,DISP=SHR
// DD DSN=DWW.SDWWLENU,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//* CICSVR RECOVERY CONTROL DATA SET NAMES
//DWWCON1  DD DSN=DWW.DWWCON1,DISP=SHR
//DWWCON2  DD DSN=DWW.DWWCON2,DISP=SHR
//DWWCON3  DD DSN=DWW.DWWCON3,DISP=SHR
//DWWIN    DD *
  LOGOFLOGS SCAN NAME(LOGOFLOG.J01,LOGOFLOG.J02)
```

Figure 129. Sample LOGOFLOGS SCAN job for selected log of logs

- Start the CICS VR panel interface, and from the "CICS VR main menu" select option 3, **List of registered log of logs**. You then can dynamically call a log of logs scan that scans:
  - all registered log of logs
  - only selected log of logs
  - only listed log of logs

  See the *CICS VR User's Guide* for more information.

After you verify that all log of logs that contain update activity for the VSAM spheres have been scanned, you can then tell CICS VR to bypass the automatic log of logs scan that occurs when creating a recovery job through the CICS VR panel interface. You can bypass the automatic log of logs scan by performing the following steps:

- From the "CICS VR VSAM sphere list", select the Tools menu. ""
- Select option 6, **Set scan option**, from the Tools menu.
- Select option 2, **No scan is needed**, from the "CICS VR Set scan option" secondary window and press enter.
- Then, continue to create your recovery job.

```
                            CICSVR scan option

Specify if CICSVR must scan the registered log of logs before the
recovery job is constructed.  Only select option 2 if you are sure that
CICSVR already has all of the information necessary to construct a
recovery job for the previously selected VSAM spheres.

  Specify if CICSVR
  must scan the log
  of logs  . . . . . 2   1.  Perform LOGOFLOGS SCAN
                         2.  No scan is needed


Command ===> ____________________________________________________________
 F1=Help    F12=Cancel
```

Figure 130. Set scan option secondary window.

Note: CICS VR resets the scan option to 1, Perform LOGOFLOGS SCAN, after you create or cancel the recovery job, then return to the VSAM sphere list.

Chapter 22. Using CICS TS autojournaling

CICS TS supports the automatic journaling (autojournaling) of file control data to a specified general log stream. Parameters specified in the CICS definitions of VSAM files determine whether or not autojournaling is to be performed, and the types of operations (add, read, or others) that are recorded.

IBM recommends that the log records produced by CICS TS autojournaling must only be used for audit purposes, for the following reasons:

- When a failure occurs during forward recovery logging, CICS performs certain actions to prevent loss of data, but these actions are not performed when a failure occurs during autojournaling. Therefore it cannot be guaranteed that a VSAM sphere is completely and correctly recovered from log records produced by CICS TS autojournaling.
- During forward recovery logging, CICS writes specific log records for the VSAM spheres that are eligible for backup-while-open (BWO) processing. These log records are required by CICS VR to perform a proper restore and forward recovery of VSAM spheres from BWO backups. CICS does not write these BWO-specific log records during CICS TS autojournaling.
- CICS TS autojournaling does not contain proper RLS support. This means that log records produced by CICS TS autojournaling cannot be guaranteed to correctly recover a VSAM sphere that was opened and updated using RLS.

Despite the known risks, some users want to use log records produced by CICS TS autojournaling to forward recover VSAM spheres, because this process has the following advantages over forward recovery logging:

- It eases the transition from CICS/ESA V4R1 to CICS TS (because you do not need to update the CICS file definitions with forward recovery logging information).
- It eliminates some of the overhead that occurs with forward recovery logging.

With these possible limitations, CICS VR can forward recover a VSAM sphere from log records produced by CICS TS autojournaling. However, note again that IBM recommends using log records produced by CICS forward recovery logging to recover VSAM spheres. Also, please note the following restrictions when log records produced by CICS TS autojournaling are used for the forward recovery of VSAM spheres:

- CICS VR change accumulation does not support log records produced by CICS TS autojournaling.
- CICS forward recovery logging must **not** be enabled for the VSAM spheres that you want to forward recover from log records produced by CICS TS autojournaling. This means that the CICS VR VSAM batch logger cannot at present be used to log updates made to the same spheres by batch jobs.

The following sections explain the steps required to enable CICS TS autojournaling for VSAM spheres and to set up CICS VR to forward recover the spheres from the autojournal log records.

Enabling CICS TS autojournaling

Parameters specified in the CICS definitions of VSAM files determine whether or not autojournaling is to be performed, and the types of operations (add, read, or others) that are recorded.

The following parameters must be set in the CICS file definitions of every VSAM sphere that you want CICS VR to forward recover from log records produced by CICS TS autojournaling. See *CICS Resource Definition Guide* for a further explanation of the listed parameters.

JOURNAL(*number*)
: Specifies that you want automatic journaling for this file. The journaled data is in the format of the VSAM record. The data to be journaled is identified by the JNLADD, JNLREAD, JNLSYNCREAD, JNLSYNCWRITE, and JNLUPDATE attributes. *number* is the number that identifies the journal that CICS is to use for the autojournal. CICS journal names are of the form DFHJ*nn*, where *nn* is in the range 1 through 99.

  Note:

1. Automatic journaling is independent of logging to the system and forward recovery logs, as specified by the RECOVERY and FWDRECOVLOG attributes.
2. When specifying CICS TS autojournaling for use with CICS VR, the automatic journaling log stream that is specified must **not** also be written to by CICS forward recovery logging.
3. In releases prior to CICS Transaction Server for OS/390 Release 1, DFHJ01 was the system log, but that is not now the case.

JNLADD(AFTER)
Specifies that CICS journals the file control write operation after the VSAM I/O operation on the journal nominated by the JOURNAL attribute.

JNLUPDATE(YES)
Specifies that REWRITE and DELETE operations must be recorded on the journal nominated by the JOURNAL attribute.

JNLSYNCWRITE({YES|NO})
Specifies whether you want the automatic journaling records, which are written for WRITE operations to the journal specified by JOURNAL, to be written synchronously or asynchronously.

During forward recovery processing, CICS VR applies the log records produced by CICS TS autojournaling in the order that they are listed on the log. If JNLSYNCWRITE is set to NO, log records might not be written to the log in the correct time sequence. This could cause undesirable results during forward recovery processing. However, setting JNLSYNCWRITE to YES might cause some additional overhead to occur during CICS TS autojournaling. One of the primary reasons to use CICS TS autojournaling instead of CICS forward recovery logging is the possibility of avoiding some overhead, so this benefit can be reduced when JNLSYNCWRITE is set to YES.

Note: CICS forward recovery logging is the recommended logging method for use with CICS VR. However, if you choose to use log records produced by CICS TS autojournaling for the forward recovery of VSAM spheres, you must **not** have CICS forward recovery logging enabled for the same spheres. Enabling both logging methods for forward recovery purposes for the same VSAM sphere, could result in duplicate information being stored in the RCDS, causing unpredictable results during recovery job creation.

Informing CICS VR of autojournal log records

When autojournaling has been enabled for VSAM spheres, CICS VR must be informed of the autojournaling activity, if you want to use the CICS VR panel interface to build a job that recovers VSAM spheres from log records produced by CICS TS autojournaling.

You can use the existing CICS VR log of logs utilities to store information about autojournaling activity in the RCDS. To do this:

1. Use the CICS VR LOGOFLOGS REGISTER utility to register to CICS VR the MVS log streams that contain the log records produced by CICS TS autojournaling.
   a. Start the CICS VR panel interface and select option 3, **List of registered log of logs** (CICS TS), from the "CICS VR main menu".
   b. From the "CICS VR log of logs list" panel, select option 1, **Register**, from the **Administrate** menu. The "CICS VR log of logs register" secondary window is displayed (see “Registering your log of logs data sets” on page 96).
   c. In the **Log of logs** input field, type the name of a log stream that contains log records produced by CICS TS autojournaling , and press Enter.

   For more information about the CICS VR LOGOFLOGS REGISTER utility, see “Registering your log of logs data sets” on page 96.

   Note: You also can call the CICS VR LOGOFLOGS REGISTER utility from a batch job. See the LOGOFLOGS REGISTER command description (“LOGOFLOGS: Process a log of logs” on page 260) for more information.
2. Scan the registered logs with the CICS VR LOGOFLOGS SCAN utility. A log of logs scan batch job (see “Setting up the scan utility to run as a batch job ” on page 97) must be created and then submitted at

regular intervals. CICS VR reads data from all logs that were registered using the CICS VR LOGOFLOGS REGISTER utility, and stores recovery information found on the logs in the RCDS. See "Setting up the log of logs scan utility (scan)" on page 96 for more information about the LOGOFLOGS SCAN utility.

Building a recovery job through the CICS VR panel interface

The CICS VR panel interface can be used to build and submit a recovery job for a VSAM sphere that forward recovers the sphere from log records produced by CICS TS autojournaling.

CICS VR User's Guide explains how to build a recovery job for VSAM spheres using the CICS VR panel interface. No additional steps are required to build a recovery job through the CICS VR panel interface that recovers VSAM spheres from log records produced by CICS TS autojournaling. CICS VR automatically determines if the log records associated with the VSAM spheres selected for recovery were produced by CICS TS autojournaling, based on information previously stored in the RCDS during a log of logs scan. CICS VR then automatically adds the AUTOJOURNALS keyword and the name of the log stream that contains the autojournal log records to the recovery job.

Building a recovery job manually

If you are building a recovery job manually, you must add the following keyword to the recovery job to have CICS VR apply log records produced by CICS TS autojournaling to the VSAM spheres during forward recovery processing.

AUTOJOURNALS
The AUTOJOURNALS keyword must be added to the RECOVER command. The AUTOJOURNALS keyword specifies that CICS VR must only apply log records produced by CICS TS autojournaling to the VSAM spheres during forward recovery processing.

The following example recovery job recovers VSAM sphere SAMPLE.VSAM.SPHERE only from log records produced by CICS TS autojournaling with a timestamp equal to or later than 03.325 11:59:59.

```
//JOB1 JOB ACCOUNTING INFORMATION,REGION=0M
//COMMAND  EXEC PGM=DWWCO
//STEPLIB  DD DSN=DWW.SDWWLOAD,DISP=SHR
//         DD DSN=DWW.SDWWLENU,DISP=SHR
//DWWCON1  DD DSN=DWW.DWWCON1,DISP=SHR
//DWWCON2  DD DSN=DWW.DWWCON2,DISP=SHR
//DWWCON3  DD DSN=DWW.DWWCON3,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWIN   DD *
       RECOVER -
            SPHERE(SAMPLE.VSAM.SPHERE)   -
            AUTOJOURNALS                 -              (1)
            STARTTIME(03.325/11:59:59)
       MVSLOG NAME(AUTOJRNL.LOG.DFHJ01)                 (2)
/*
//
```

Figure 131. Example recovery job with CICS TS autojournal options

1. The AUTOJOURNALS keyword specifies that CICS VR must apply only log records produced by CICS TS autojournaling during forward recovery processing.
2. The MVSLOG command with the NAME keyword specifies the name of the log stream that contains the log records produced by CICS TS autojournaling that CICS VR must apply to the VSAM sphere.

For more information about the manual creation of CICS VR recovery jobs, see "Running CICS(r) VR manually" in the *CICS VR User's Guide*.

Chapter 23. UNDO log structure overview

Every undo log block consists of a Block Header (MVSLogBlockHeader type), followed by log records. Every log record includes a standard General Log Header (GenLogRecord type), followed by record data.

Record data consists of a fixed part (the prefix), and an optional variable part (the caller data).

The logical substream of Undo log records related to a job step consist of:

1. One Undo Start record (first in the substream)
2. Zero or more Undo Read-for Update/Erase records
3. Zero or more Undo Write-for-Add records
4. One Undo End record (last in the substream).

Undo Start and Undo End records (record data) consist of only a fixed prefix. Undo Read-for-Update/Erase and Undo Write-for-Add records (the record data) contain caller data as well.

General log header

The General log record header is present in all Undo Start, Undo Read-for-Update/Erase, Undo Write-for-Add, Undo End, and Start-of-Run (SOR) log records.

Fields

glrh_length_info - 12 bytes
Information about length of log record.

glrh_record_length - 4 bytes
Length of entire log record.

glrh_header_length - 4 bytes
Length of the general header.

glrh_rec_data_len - 4 bytes
Length of data following the header.

glrh_timestamps - 16 bytes
Time stamps (in GMT and Local format) of the log record build.

glrh_GMT - 8 bytes
Time stamp of the log record build in GMT format.

glrh_LOCAL - 8 bytes
Time stamp of the log record build in local format.

RESERVED - 12 bytes
Reserved bytes.

glrh_record_id - 12 bytes
Record and source identification.

glrh_rec_type - 2 bytes
Record type indicator.

glrh_rec_compid - 2 bytes
CICS VR subcomponent/module identification.

RESERVED - 12 bytes
Reserved bytes.

Undo logging record prefix

The Undo logging record prefix is present in all Undo Start, Undo Read-for-Update/Erase, Undo Write-for-Add, and Undo End log records (record data).

The Start-of-Run (SOR) log record does not include this prefix.

Fields

unlr_eyecatcher - 8 bytes
A constant 'DWWUNLR ', written in all undo log records, except the start of run (SOR) log record.

unlr_rec_type - char(1)
Identifies the type of undo log record that is written. The allowable values are shown in Table 42 on page 362.

Table 42. Identifiers for undo log record type

Undo type	Code
Undo start	X'8C'
Undo read-for-update	X'81'
Undo write-for-add	X'83'
Undo end	X'8D'

unlr_rec_flags - char(3)
Contains a set of flags that indicate various states encountered during undo logging.

RESERVED - 4 bytes
Reserved bytes.

unlr_source_info - 40 bytes
Contains a set of subparameters that specify identifier information related to undo logging. All undo log record types must specify a value for each of the subparameters.

unlr_cicsvrid - 8 bytes
The name of the CICS VR instance that processed this log record.

unlr_jobid - 8 bytes
The JES job identifier of the batch job that started this instance of CICS VR undo logging.

unlr_jobname - 8 bytes
The name of the batch job that started this instance of CICS VR undo logging.

unlr_stepname - 8 bytes
The name of the batch job step that started this instance of CICS VR undo logging.

unlr_procstepname - 8 bytes
The name of the batch job procedure step that started this instance of CICS VR undo logging.

unlr_source_info2 - 16 bytes
Contains an additional set of subparameters that specify identifier information related to undo logging.

unlr_ddname - 8 bytes
DDname of data set.

Reserved - 8 bytes
Reserved bytes.

Undo log record caller data

Caller data is present in all Undo Read-for-Update/Erase and Undo Write-for-Add log records.

Note: `unlr_ESDS_RBA` and `unlr_RRDS_RRN` contain 8 byte XRBA for the extended ESDS VSAM record.

Fields

unlr_data_length - 4 bytes
Length of the caller data.

unlr_base_name_length - 1 byte
Length of the VSAM base cluster name for this log record. This field is specified for all undo read-for-update and undo write-for-add log records.

unlr_base_name - 44 bytes
Name of the VSAM base cluster for this log record. This field is specified for all undo read-for-update and undo write-for-add log records.

unlr_dsorgtype - 1 byte
A set of flags that indicate the data set organization of the VSAM base cluster for this log record.

unlr_KSDS_key_info - 8 bytes
Information related to the primary key of the KSDS VSAM base cluster for this log record.

unlr_ESDS_RBA - 4 bytes
Specifies the RBA of the ESDS VSAM sphere record for this log record.

unlr_RRDS_RRN - 4 bytes
Specifies the RRN of the RRDS or VRRDS VSAM base cluster record for this log record.

unlr_record_length - 4 bytes
The length of the VSAM sphere record that immediately follows this field.

Chapter 24. SETSMS commands

The scope of CICS VR SETSMS commands, and when they take effect.

SETSMS command	Scope	Effective
CICSVR_BACKOUT_CONTROL(SUBMIT NONE)	Local	Immediately
CICSVR_BACKOUT_CONTROL(SUBMIT ABEND)	Local	Immediately
CICSVR_BACKOUT_CONTROL(DISPLAY CONTROL)	Local	Immediately
CICSVR_BACKOUT_CONTROL(DISPLAY CONTALL)	Local	Immediately
CICSVR_DSNAME_PREFIX(hlq.slq)	Local	After server restart
CICSVR_GENERAL_CONTROL(CBAUTO value)	Global	Immediately
CICSVR_GENERAL_CONTROL(DSSLDREG value)	Global	Immediately
CICSVR_GENERAL_CONTROL(LCDEL value)	Global	Immediately
CICSVR_GENERAL_CONTROL(LOLSCAN value)	Local	Immediately
CICSVR_GENERAL_CONTROL(REALDDN value)	Global	Immediately
CICSVR_GENERAL_CONTROL(REDORC value)	Global	Immediately
CICSVR_GENERAL_CONTROL(SCAN value)	Local	Immediately
CICSVR_GENERAL_CONTROL(SCAVENGE value)	Local	Immediately
CICSVR_GENERAL_CONTROL(SCAVSYNC value)	Local	Immediately
CICSVR_GENERAL_CONTROL(SECURITY value)	Global	Immediately
CICSVR_GENERAL_CONTROL(SELBKREG value)	Global	Immediately
CICSVR_GENERAL_CONTROL(SERVSEC value)	Global	Immediately
CICSVR_GENERAL_CONTROL(SETUP value)	Local	After server restart
CICSVR_GENERAL_CONTROL(SYSTEMID value)	Local	Immediately
CICSVR_GENERAL_CONTROL(DISPLAY CBAUTO)	Local	Immediately
CICSVR_GENERAL_CONTROL(DISPLAY DSSLDREG)	Local	Immediately
CICSVR_GENERAL_CONTROL(DISPLAY LCDEL)	Local	Immediately
CICSVR_GENERAL_CONTROL(DISPLAY LOLSCAN)	Local	Immediately
CICSVR_GENERAL_CONTROL(DISPLAY REALDDN)	Local	Immediately
CICSVR_GENERAL_CONTROL(DISPLAY REDORC)	Local	Immediately
CICSVR_GENERAL_CONTROL(DISPLAY SECURITY)	Local	Immediately
CICSVR_GENERAL_CONTROL(DISPLAY SELBKREG)	Local	Immediately
CICSVR_GENERAL_CONTROL(DISPLAY SERVSEC)	Local	Immediately
CICSVR_GENERAL_CONTROL(DISPLAY SETUP)	Local	Immediately
CICSVR_GENERAL_CONTROL(DISPLAY SYSTEMID)	Local	Immediately
CICSVR_GENERAL_CONTROL(DISPLAY CONTALL)	Local	Immediately
CICSVR_GENERAL_CONTROL(DISPLAY CONTROL)	Local	Immediately

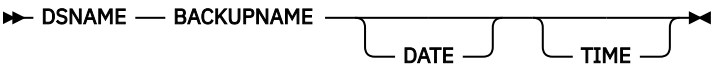
SETSMS command	Scope	Effective
CICSVR_GENERAL_CONTROL(DISPLAY DEFAULTS)	Local	Immediately
CICSVR_GRPNAME_SUFFIX(suffix)	Local	After server restart
CICSVR_INIT(value)	Local	After server restart
CICSVR_RCDS_PREFIX(hlq.slq)	Local	After server restart
CICSVR_UNDOLOG_PREFIX(prefix)	Local	After server restart
CICSVR_UNDOLOG_CONTROL(ENABLE CONT)	Local	Immediately
CICSVR_UNDOLOG_CONTROL(ENABLE TERM)	Local	Immediately
CICSVR_UNDOLOG_CONTROL(ENABLE SYNC)	Local	Immediately
CICSVR_UNDOLOG_CONTROL(DISABLE)	Local	Immediately
CICSVR_UNDOLOG_CONTROL(DISPLAY CONTROL)	Local	Immediately
CICSVR_UNDOLOG_CONTROL(DISPLAY CONTALL)	Local	Immediately
CICSVR_ZZVALUE_PARM(CLEAR)	Local	Immediately
CICSVR_ZZVALUE_PARM(DISPLAY)	Local	Immediately
CICSVR_ZZVALUE_PARM(START)	Local	Immediately
CICSVR_ZZVALUE_PARM(STOP)	Local	Immediately
CICSVR_ZZVALUE_PARM(FLUSH)	Local	Immediately
CICSVR_ZZVALUE_PARM(RESET)	Local	Immediately
CICSVR_ZZVALUE_PARM(FDMSG)	Local	Immediately
CICSVR_ZZVALUE_PARM(RDMSG)	Local	Immediately
CICSVR_ZZVALUE_PARM(FDUMP)	Local	Immediately
CICSVR_ZZVALUE_PARM(RDUMP)	Local	Immediately
CICSVR_ZZVALUE_PARM(FLUSHMSG)	Local	Immediately
CICSVR_ZZVALUE_PARM(RESETMSG)	Local	Immediately
CICSVR_ZZVALUE_PARM(FLUSHALL)	Local	Immediately
CICSVR_ZZVALUE_PARM(RESETALL)	Local	Immediately

Chapter 25. DWWBKNT REXX procedure

The REXX procedure DWWBKNT performs multiple calls of the CICS VR NOTIFY utility DWWNT for IDCAMS REPRO backups listed in the input data set. It can be used in TSO and in a batch environment.

DWWBKNT has the following three parameters on call:

Input data set name
Specifies the data set with backups list. Each line in the data set has the following format:



DSNAME
Specifies the fully qualified base cluster name of the VSAM data set that the backup was created for.

BACKUPNAME
Specifies the fully qualified name of the VSAM data set backup.

DATE
Local date in format YYYY/MM/DD.

TIME
Local time in format HHMMSS.

High level qualifier
Specifies the high level qualifier for SDWWLOAD data set.

Preallocation
Specifies (YES or NO) if the product that created the backup preallocated the target data set at the time of the restore. It is an optional parameter, default value is NO.

```
/*REXX: ************************************************************/
/*                                                                  */
/* Licensed Materials - Property of IBM                             */
/*                                                                  */
/* 5655-P30             DWWBKNT                                     */
/*                                                                  */
/* (C) Copyright IBM Corp. 2014                                     */
/* (C) Copyright HCL Technologies Ltd. 2025                         */
/*                                                                  */
/* $MAC(DWWBKNT) COMP(P3001): MULTIPLE BACKUP NOTIFICATION          */
/*                                                                  */
/* FUNCTION:  Sample REXX to perform multiple calls of DWWNT        */
/*            for backups listed in the input data set.             */
/*                                                                  */
/* INPUT:                                                           */
/*  1. DSNI - Input data set name                                   */
/*      Layout of each line:                                        */
/*       Sphere data set name       char(44)                        */
/*       One or more blanks                                         */
/*       Backup data set name       char(44)                        */
/*       One or more blanks                                         */
/*       Creation Date (YYYY/MM/DD) char(10)  (e.g., 2013/04/25)    */
/*       One or more blanks                                         */
/*       Creation Time (HHMMSS)     char(6)   (e.g., 030534)        */
/*       One or more blanks                                         */
/*  2. HLQ  - high level qualifier for SDWWLOAD data set            */
/*  3. ALLOCP - YES/NO (default is NO), input parameter for DWWNT   */
/*                                                                  */
/* OUTPUT:                                                          */
/*  Zero return code after successful completion.                   */
/*  Non-zero return code if an error was encountered or             */
/*   DWWNT returns non-zero return code.                            */
/*                                                                  */
/* NOTES:                                                           */
/*  - Creation Date and Creation Time are optional parameters.      */
/*    If specified it is local date and time.                       */
/*  - ALLOCP is optional parameter.                                 */
/*  - Product identifier is set to REPRO for VSAM data set backup.  */
/*                                                                  */
/* EXAMPLES:                                                        */
/*  1. Invoking the REXX from TSO:                                  */
/*                                                                  */
/*  EXEC 'DWW.CVR520.SDWWCNTL(DWWBKNT)' 'CICSVR.IN DWW.CVR520 YES'  */
/*                                                                  */
/*  2. Invoking the REXX in batch:                                  */
/*                                                                  */
/*  //XXXXXXXX JOB ...                                            */
/*  //SETPARM  SET DSNI=CICSVR.IN                                   */
/*  //         SET HLQ=DWW.CVR520                                   */
/*  //         SET ALLOCP=YES                                       */
/*  //REXXDEF  EXEC PGM=IKJEFT01,REGION=0M,                        */
/*  // PARM='DWWBKNT &DSNI &HLQ &ALLOCP'                           */
/*  //SYSEXEC  DD DSN=DWW.CVR520.SDWWCNTL,DISP=SHR                  */
/*  //SYSTSPRT DD SYSOUT=*                                         */
/*  //DWWMSG   DD SYSOUT=*                                         */
/*  //SYSTSIN  DD DUMMY                                            */
/*                                                                  */
/********************************************************************/
/* CHANGE ACTIVITY:                                                 */
/*                                                                  */
/*  REASON  REL YYMMDD ID        REMARKS                           */
/*  R14088  520 120116           Creation                          */
/*                                                                  */
/********************************************************************/
Subcom TSO
If RC \= 0 Then Do
  Say "*** Couldn't initialize TSO environment"
  Exit 8
End

Address TSO
Arg DSNI HLQ ALLOCP
HLQ = Strip(HLQ)
DSNI = Strip(DSNI)
ALLOCP = Strip(ALLOCP)
If ALLOCP = '' Then ALLOCP = 'NO'
If (DSNI = '')|(HLQ = '')|((ALLOCP \= 'YES')&(ALLOCP \= 'NO')) Then Do
  Say "*** Please, check the parameters specified"
  Exit 8
End
"FREE  FI(INLIST,DWWIN)"
"ALLOC FI(DWWMSG) TRACKS SPACE(1,1) LRECL(80)"
"ALLOC FI(DWWIN) TRACKS SPACE(1,1) LRECL(80)"
"ALLOC FI(INLIST) DSN('"DSNI"') SHR"
RCC = RC
If RCC > 0 Then Do
  Say '*** Input data set cannot be allocated'
```

Chapter 26. Customization parameters

The table lists parameters that you can specify on the DWWCST01 panel to customize members of &HLQ.SDWWCNTL.OUT and &HLQ.SDWWSENU/SJPN.OUT data sets.

Table 43. Customization parameters

Parameter name on panel DWWCST01	Description	Variable name in SET statement
OUTPUT DSN FOR SDWWCNTL	The output data set that will contain the modified SDWWCNTL members . The default is &HLQ.SDWWCNTL.OUT. REQUIRED	
OUTPUT DSN FOR SDWWSENU/SJPN	The output data set that will contain the modified SDWWSENU/SJPN members . The default is &HLQ.SDWWSENU/SJPN.OUT. REQUIRED	
OUTPUT DEVICE TYPE	The device type that will be used for allocation of the output data sets. It will be ignored for SMS managed data sets. OPTIONAL	
Job card for sample jobs:	These JCL cards will replace the JCL JOB statement in the sample jobs. If the value _DEFAULT is specified for a JOB name, all modified samples will contain a job name matched with their member names. REQUIRED	
RCDS PREFIX	The first level qualifier, and optional second level qualifier for the DWWCON1, DWWCON2, and DWWCON3 recovery control data sets. REQUIRED	&PREF
GRPNAME SUFFIX	The CICS VR XCF group name suffix. REQUIRED	&SUFF
RCDS VOLUME	The volume for allocation RCDS data sets in the DWWRCDEF sample job. OPTIONAL	&RVOL
CUSTOMIZE CICS VR SERVER DEFAULTS (YES/NO)	Specifies if you want to customize the DWWRMDFS sample job. REQUIRED	
CUSTOMIZE IVP JOBS (YES/NO)	Specifies if you want to customize IVP sample jobs according to parameters entered. REQUIRED	

Table 43. Customization parameters (continued)

Parameter name on panel DWWCST01	Description	Variable name in SET statement
HLQ FOR VSAM DATA SETS	High level qualifier for test VSAM data sets. Required if YES specified for **CUSTOMIZE IVP JOBS**	&THLQ
SMS STORAGE CLASS	SMS storage class used for allocation of test VSAM data sets. OPTIONAL	&STRCLAS
SMS MANAGEMENT CLASS	SMS management class used for allocation of test VSAM data sets. OPTIONAL	&MGMCLAS
LOG STREAM NAME	Forward recovery log stream name for the VSAM data sets. REQUIRED if YES specified for **CUSTOMIZE IVP JOBS**.	&LOGSTRM
MACLIB DSNAME	System maclib data set name used in DWWASMLI job. REQUIRED if YES specified for **CUSTOMIZE IVP JOBS**.	&MACLIB
CUSTOMIZE JOBS RELATED TO AUTOMATED RECOVERY(YES/NO)	Specifies if you want to customize samples related to automated recovery. REQUIRED	
USE STEPLIB DD FOR CICS LIBRARIES(YES/NO)	Specifies if the STEPLIB DD statement will be used in all samples and skeletons related to automated recovery. REQUIRED if YES specified for **CUSTOMIZE JOBS RELATED TO AUTOMATED RECOVERY**.	
HLQ FOR CICS LIBRARIES	High level qualifier for CICS libraries. REQUIRED if YES specified for **CUSTOMIZE JOBS RELATED TO AUTOMATED RECOVERY**.	Part of &CICSEXCI and &CICSLOAD
SUFFIX FOR CICS LIBRARIES	Suffix for CICS libraries. REQUIRED if YES specified for **CUSTOMIZE JOBS RELATED TO AUTOMATED RECOVERY** .	Part of &CICSEXCI and &CICSLOAD
HLQ FOR USER DATA SETS (ISPFILE, DWWMSG, etc)	High level qualifier for TSO user data sets: DWWMSG, DWWPRINT, DWWDUMP, DWWDMSG, ISPFILE. REQUIRED	&UHLQ

Table 43. Customization parameters (continued)

Parameter name on panel DWWCST01	Description	Variable name in SET statement
USE STEPLIB DD FOR CICS VR LIBRARIES (YES/NO)	Specifies if the STEPLIB DD statement will be used in the JCL skeleton for SDWWLOAD and SDWWLENU. REQUIRED	
USE CICS VR EXIT LOAD LIBRARY (YES/NO)	Specifies if the &HLQ.DWWEXLD loadlib will be used in the STEPLIB DD concatenation. REQUIRED	
Job card for JCL skeleton:	These JCL cards will replace the JCL JOB statement in the JCL skeleton. REQUIRED	

Chapter 27. User replaceable JCL skeleton

You can replace the CICS VR supplied JCL skeleton DWWUJOB with one of your own ones that satisfies your requirements.

CICS VR 6.1 provides members DWWURJOB and DWWURIM in the SDWWSENU/SDWWSJPN data set as a sample for JCL customization at ISPF recovery construction. To use these samples, take the following actions:

1. Copy members DWWURJOB and DWWURIM from the SDWWSENU/SJPN data set and edit them according to your requirements. Rename DWWURJOB to DWWUJOB.
2. Add your data set with the edited DWWURJOB and DWWURIM, to DWWSLIB concatenation in DWWCLIST after the ISPFILE.
3. Make sure that your ISPFILE data set does not contain an old DWWUJOB.

```
)CM    @BANNER_START                           01
)CM    Licensed Materials - Property of IBM
)CM
)CM    5655-GY1              DWWURJOB
)CM
)CM    (C) Copyright IBM Corp. 2014
)CM    (C) Copyright HCL Technologies Ltd. 2025
)CM
)CM    @BANNER_END
)CM       R71977  520 140127 ......... Customization
)CM  ************************************************************
)CM
)CM   This is a sample to show how to modify the CICSVR JCL
)CM   skeleton to satisfy your requirements.
)CM
)CM   The imbedded skeleton DWWURIM adds the JOB statement
)CM   and sets three variables:
)CM     HLQ  - high level qualifier for CICS VR libraries
)CM     SUF  - suffix for CICS VR libraries (optional)
)CM     CICSEXCI - CICS SDFHEXCI data set name
)CM
)CM   Uncomment STEPLIB DD if CICS VR libraries are not specified
)CM   in LNKLST.
)CM   Note: For running IVP, DWWEXLD data set must be specified
)CM   in STEPLIB.
)CM  ************************************************************
)CM
)IM DWWURIM
)SEL &CUTIL NE BACKUP
//DWW      PROC
//&CUTIL   EXEC PGM=&CPROG,COND=(8,LE)
//STEPLIB  DD DSN=&HLQ..SDWWLOAD&SUF,DISP=SHR
//         DD DSN=&HLQ..SDWWLENU&SUF,DISP=SHR
//*        DD DSN=&HLQ..DWWEXLD,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWDUMP  DD SYSOUT=*
//         PEND
//* END OF PROC
)ENDSEL
```

Figure 133. DWWURJOB sample

Note:

1. DWWCONx DD statements must not be specified in this skeleton. The CICS VR recovery construction uses the same RCDS names, which are specified in the DWWCLIST.
2. Variables &CUTIL and &CPROG are substituted by the CICS VR recovery construction and depend on the selected function.
   - For forward recovery, &CUTIL = FORWARD, &CPROG = DWWCO.
   - For reorganization, &CUTIL=REORG, &CPROG=DWWRG.

```
)CM    5655-GY1              DWWURIM
)CM
)CM    (C) Copyright IBM Corp. 2014
)CM    (C) Copyright HCL Technologies Ltd. 2025
)CM
)CM    @BANNER_END
)CM       R71977  520 140127 ......... Customization
)CM  ************************************************************
)CM   This is a sample of skeleton that adds the JOB statement.
)CM
)CM   Use the &CJOBCHAR variable in the JOB name.
)CM
)CM   It also sets the following symbolic parameters:
)CM     HLQ  - high level qualifier for CICS VR libraries
)CM     SUF  - suffix for CICS VR libraries (optional)
)CM     CICSEXCI - CICS SDFHEXCI data set name
)CM  ************************************************************
)CM
)SET REXXVAR = CJOBCHAR,CICSEXCI,HLQ,SUF
)SET REXXVAR = &REXXVAR,JCL1,JCL2
)REXX &REXXVAR
USER    = Sysvar('SYSUID');
SYSNAME = Mvsvar('SYSNAME');
/*------------- Logic ----------------------*/
If SYSNAME = "MVV1" Then
  Do;
   HLQ    = "DWW.CICSVR42";
   CICSEXCI = 'CTS420.CICS670.SDFHEXCI';
   SUF = '.STAGE01';
   _CLASS = '1';
  End;
 Else
  Do;
   HLQ    = "DWW.V610";
   CICSEXCI = 'CTS510.CICS680.SDFHEXCI';
   SUF = '.STAGE02';
   _CLASS = 'A';
  End;
_JOBNAME = Left(USER||CJOBCHAR,8);
/*------------------------------------------*/
 JCL1 = "//"_JOBNAME" JOB (ACCOUNT),MSGLEVEL=(1,1),"
 JCL2 = "//   NOTIFY=&SYSUID,MSGCLASS=X,REGION=4M,CLASS="_CLASS
 )ENDREXX
&JCL1
&JCL2
```

Figure 134. DWWURIM sample

Note:

1. As the DWWURIM is embedded at the CICS VR recovery construction, the variable SYSNAME is the system name where the TSO user (&USER) runs the CICS VR ISPF dialog.
2. The CICSEXCI variable is optional. It is used at a job construction if you select the following functions:
   - Reorganization with option **CICS-offline**
   - Back up with option **CICS-offline**
   - Recovery, Recovery and Backup, or Reorganization are selected for CICS Backout Failed spheres.

This figure shows the recovery job that is generated when you select option 1 **Recover** from the Utility drop-down menu of the **CICS Backout Failed sphere list** panel. TSO user is VNDR69O, which is logged on system MVV1.

```
//VNDR69O1 JOB (ACCOUNT),MSGLEVEL=(1,1),
//   NOTIFY=&SYSUID,MSGCLASS=X,REGION=4M,CLASS=1
//DWW      PROC
//MRECOVER   EXEC PGM=DWWCO,COND=(8,LE)
//STEPLIB  DD DSN=DWW.CICSVR42.SDWWLOAD.STAGE01,DISP=SHR
//         DD DSN=DWW.CICSVR42.SDWWLENU.STAGE01,DISP=SHR
//*        DD DSN=DWW.CICSVR42.DWWEXLD,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWDUMP  DD SYSOUT=*
//         PEND
//* END OF PROC
//*
//* APPLID  = CICSVR
//* ERRTYPE = IOERROR
//* RLS     = YES
//*
//SETSPH   SET SPH=CICSVR.BASE.SPH1
//*
//DWW001 EXEC DWW,COND=(8,LT)
//DWWCON1  DD DISP=SHR,DSN=DWW.DWWCON1.GRPTSTF
//DWWCON2  DD DISP=SHR,DSN=DWW.DWWCON2.GRPTSTF
//DWWCON3  DD DISP=SHR,DSN=DWW.DWWCON3.GRPTSTF
//DWWIN    DD   *
  RECOVER                 -
    ONLY                -
    APPLYCA         -
    STARTTIME(14.048/15:15:14)       -
    STOPTIME(14.048/15:17:14)         -
    STARTAT(DSNAME)          -
    VERSION(001)        -
     SPHERE(CICSVR.BASE.SPH1)
   MVSLOG                     -
     NAME(CICSVR.TEST.FILELOG)
   BLDVRP
//*
//STEP3EX  EXEC  PGM=DWWAUXCC,
// COND=(8,LE),
// PARM='RETRY,CICSVR,&SPH,QUIESCED,RLSYES,IOERROR'
//STEPLIB  DD DISP=SHR,DSN=CTS420.CICS670.SDFHEXCI
//DWWEXLOG DD DUMMY
//*
//STEP4EX  EXEC  PGM=DWWAUXCC,
// COND=((0,LE,STEP3EX),EVEN),
// PARM='WARNRER,CICSVR,&SPH,QUIESCED,RLSYES,IOERROR'
//STEPLIB  DD DISP=SHR,DSN=CTS420.CICS670.SDFHEXCI
//DWWEXLOG DD DUMMY
//*
```

Glossary

The terms in this glossary are defined as they pertain to the CICS VSAM Recovery documentation.

If you do not find the term you are looking for, view the *Glossary of Computing Terms* located at:

http://www.ibm.com/ibm/terminology/

This glossary includes terms and definitions from:

- The *American National Standard Dictionary for Information Systems*, ANSI X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI). Copies can be purchased from the American National Standards Institute, 11 West 42nd Street, New York, New York 10036. Definitions are identified by the symbol (A) after the definition.
- The *Information Technology Vocabulary* developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC JTC1/SC1). Definitions of published part of this vocabulary are identified by the symbol (I) after the definition; definitions taken from draft international standards, committee drafts, and working papers being developed by ISO/IEC JTC1/SC1 are identified by the symbol (T) after the definition, indicating that final agreement has not yet been reached among the participating National Bodies of SC1.
- The *IBM Dictionary of Computing*, New York: McGraw-Hill, 1994.

The following cross-reference is used in this glossary:

See:
This refers the reader to (a) a related term, (b) a term that is the expanded form of an abbreviation or acronym, or (c) a synonym or more preferred term.

A

access method services (AMS)
A utility program for the definition and management of VSAM data sets.

after-image
Records that CICS writes to a forward recovery log to show what the VSAM record will look like after it has been updated by the application. (Throughout the CICS VR library, the forward recovery log is referred to as the log.)

Advanced Interactive eXecutive (AIX)
Operating system designed to deliver outstanding scalability, reliability, and manageability.

AMS
Access method services.

APAR
Authorized program analysis report.

application identifier (APPLID)
The name that identifies a CICS region to VTAM®. It can be a maximum of 8 characters.

APPLID
Application identifier.

archive utility
The CICS VR utility that registers details of a log on the RCDS and optionally copies it to a backup.

authorized program analysis report (APAR)
A report of a problem that is suspected to be caused by a defect in a current, unaltered release of a program.

automatic journal archiving
A function provided by CICS. When a disk log, defined to use this function is ready for archiving, CICS automatically creates and submits an archive job. The log data set is not reused until archiving is complete, and CICS ensures that the archive jobs are submitted promptly.

B

back up
The process of copying a data set to a backup volume.

backout
The CICS VR function that you can use if CICS fails in the attempt to back out uncommitted changes on a VSAM sphere. Using information from the RCDS, CICS VR constructs a job to back out uncommitted changes on a VSAM KSDS, ESDS, or RRDS, as indicated on the log. Refer to batch backout to remove updates made by batch job steps.

backout failing log record (BOFLGREC)
The record that CICS stores on the system log (throughout the CICS VR library, the system log is referred to as the log). This allows CICS VR to start and stop its scan of the log in the correct places and to locate the relevant before-images. CICS issues a BOFLGREC the first time a backout failure is detected. CICS issues following BOFLGRECs if the same task suffers a backout failure through a different file, or if a different task suffers a backout failure. So, there is a BOFLGREC for each combination of file and task that fails backout.

backup
The copy of the VSAM sphere, either on disk or tape, that you make at regular intervals as a minimum precaution to protect a VSAM sphere.

backup-while-open facility (BWO)
The facility supported by DFSMS/MVS, CICS and CICS VR, that lets CICS VSAM data sets be backed up while CICS is concurrently updating them. The data sets can then be recovered if data is lost. For the software levels required to use this facility, refer to *CICS VR Implementation Guide and Reference*.

base cluster
A key-sequenced or entry-sequenced data set that one or more alternate indexes can be built over, or a relative-record data set.

basic catalog structure (BCS)
The name of the catalog structure in the integrated catalog facility environment. See also *ICF catalog*.

batch backout
A CICS VR function that will remove updates made to VSAM spheres by one or more batch job steps. CICS VR undo logging must be performed for the affected VSAM spheres to allow for batch backout processing. CICS VR batch backout supports KSDS, ESDS, RRDS, and VRRDS VSAM spheres.

BCS
Basic catalog structure.

before-image
The copy of a VSAM record that CICS saves in the system log before CICS updates the record (throughout the CICS VR library, the system log is referred to as the log). Before-images are used to back out incomplete or incorrect changes if a failure occurs.

BOFLGREC
Backout failing log record

buffer
An area of processing storage that is used to hold a block of data while it is waiting to be processed or written to an I/O device.

BWO
Backup-while-open facility.

C

CA
See *change accumulation*.

CA
Control area.

CBIPO
Custom-Built Installation Process Offering.

CBPDO
Custom-Built Product Delivery Offering.

CEDA
The main CICS-supplied transaction used to define resources online. When you use CEDA, you can update the CICS system definition (CSD) data set, and the running CICS region.

CEMT
A CICS-supplied transaction used to invoke all the master terminal functions. These functions include inquiring and changing the value of parameters used by CICS, altering the status of system resources, terminating tasks, and shutting down CICS. Refer to *CICS Supplied Transactions* or *CICS/MVS CICS-Supplied Transactions*

CF
Coupling Facility.

change accumulation
A CICS VR utility that reduces the time it takes to perform a forward recovery. CICS VR change accumulation consolidates forward recovery log records into a CA data set. CICS VR uses the CA data set in conjunction with the forward recovery log to reduce the number of log records that CICS VR needs to apply to get the sphere back to the exact state before the data was lost.

CI
Control interval.

CICS
Customer Information Control System.

CICS session
The time period during which a user has access to a CICS region.

CICS system definition (CSD) data set
A VSAM KSDS cluster with alternate paths. The CSD data set contains a resource definition record for every record defined to CICS using resource definition online (RDO).

CICSplex
(1) A CICS complex. A CICSplex consists of two or more regions that are linked using CICS intercommunications facilities. The links can be either intersystem communication (ISC) or interregion communication (IRC) links, but within a CICSplex are more usually IRC. Typically, a CICSplex has at least one terminal-owning region (TOR), more than one application-owning region (AOR), and might have one or more regions that own the resources that are accessed by the AORs. (2) In CICSPlex® SM, a management domain. The largest set of CICS regions or systems to be manipulated as a single CICSPlex SM entity. CICS regions in a CICSPlex SM CICSplex do not need to be connected to each other.

CICSPlex SM
IBM CICSPlex System Manager for z/OS. An IBM CICS system management product that provides a single system image and a single point of control for one or more CICSplexes, including CICSplexes on heterogeneous operating systems.

CICS VR
CICS VSAM Recovery.

cluster
In VSAM, a named structure consisting of a group of related components. For example, when the data is key sequenced, the cluster contains the data and index components; for data that is entry sequenced, the cluster contains only a data component. See also *base cluster* and *alternate index*.

cold start
The standard CICS initialization sequence performed without regard for prior system activity.

Common User Access (CUA)
Guidelines for the interface between a user and a workstation or terminal.

complete recovery
The CICS VR function that consists of forward recovery followed by backout, if needed. In CICS VR complete recovery, CICS VR restores a DFSMShsm backup for you.

concurrent copy
The facility supported by DFSMS/MVS, CICS, and CICS VR that increases the availability of data by letting you make a consistent backup or copy of data, concurrent with normal application program processing.

control area (CA)
A group of VSAM control intervals used as a unit for formatting a data set before adding records to it.

control area split
The movement of the contents of some VSAM control intervals in a control area to a newly created control area, to aid the insertion, or lengthening of a record when no free control intervals remain in the original control area.

control interval (CI)
A fixed-length area of auxiliary-storage space where VSAM stores records and distributes free space. It is the unit of information that is transmitted to or from auxiliary storage, by VSAM.

control interval split
The movement of some stored records in a VSAM control interval to a free control interval, to aid the insertion, or lengthening of a record that will not fit in the original control interval.

Coupling Facility (CF)
The hardware that provides high-speed caching, list processing, and locking functions in a sysplex.

CSD
CICS system definition data set.

CUA
Common User Access.

D

Data Facility Product
See *DFP*.

Data Facility Storage Management Subsystem data facility product (DFSMSdfp)
A DFSMS/MVS functional component that provides functions for storage management, data management, program management, device management, and distributed data access.

Data Facility Storage Management Subsystem data set services (DFSMSdss)
A DFSMS/MVS functional component used to copy, move, dump, and restore data sets and volumes.

Data Facility Storage Management Subsystem hierarchical storage manager (DFSMShsm)
A DFSMS/MVS functional component used for backing up and recovering data, and managing space on volumes in the storage hierarchy.

Data Facility Storage Management Subsystem removable media manager (DFSMSrmm)
A DFSMS/MVS functional component that manages removable media.

Data Facility Storage Management Subsystem/MVS (DFSMS/MVS)
An IBM licensed program that together with z/OS SP compose the base z/OS operating environment. DFSMS/MVS consists of DFSMSdfp, DFSMSdss, DFSMShsm, and DFSMSrmm.

data integrity
The quality of data that exists as long as accidental destruction, change, or loss

ddname
Data definition name.

deregister
The CICS VR function that removes a VSAM sphere name from the RCDS, or removes all references to a log from the RCDS.

DFDSS
Referred to in this book by its new product name. See *DFSMSdss*.

DFHCSDUP
CICS system definition (CSD) data set utility program. It provides offline services for the CSD. You can invoke DFHCSDUP as a batch program, or from a user-written program running in batch mode, or under TSO.

DFHJCRDS
The CICS journal-control record-mapping macro.

DFHSM
Referred to in this book by its new product name. See *DFSMShsm*.

DFP
Referred to in this book by its new product name. See *DFSMSdfp*.

DFSMSdfp
Data Facility Storage Management Subsystem data facility product.

DFSMSdss
Data Facility Storage Management Subsystem data set services.

DFSMShsm
Data Facility Storage Management Subsystem hierarchical storage manager.

DFSMSrmm
Data Facility Storage Management Subsystem removable media manager.

DFSMS/MVS
Data Facility Storage Management Subsystem/MVS.

dsname record
A record on a log that equates an FCT file name to a data set.

DTB
Dynamic transaction backout.

dynamic transaction backout (DTB)
The process of canceling changes that a transaction makes to a VSAM data set after the transaction fails, for whatever reason.

E

emergency restart
Initialization of the CICS region following an abnormal end, where the information recorded on the system log is used to recover the data files of all interrupted transactions, to the condition they were in when the transactions started. (Throughout the CICS VR library, the system log is referred to as the log.)

entry-sequenced data set (ESDS)
A VSAM data set whose records are physically in the same order in which they were added to the data set. An ESDS is processed by addressed direct access, or addressed sequential access and has no index. Records are added at the end of the data set.

ESA
Enterprise Systems Architecture.

ESDS
Entry-sequenced data set.

Extended Recovery Facility (XRF)
A related set of programs that lets an installation reach a higher level of CICS availability to end users. Availability is improved by having a pair of CICS regions: an active system and a partially initialized alternate system. The alternate system stands by to continue processing if failures occur on the active system.

F

FCT
File control table.

file
A CICS entity that relates to a data set. File names are 1–8 characters.

file control table (FCT)
CICS table containing the characteristics of the files accessed by CICS file control.

FMID
Function modification identifier.

forward recovery
The CICS VR function that reapplies all changes to the VSAM sphere since the last backup. The sphere can be a KSDS, ESDS, RRDS, or VRRDS. CICS VR gets the information it needs to construct the recovery job from the RCDS. The contents of the logs are applied to the VSAM sphere to return it to its exact state before the data was lost.

forward recovery log
A log that is being used for implementing forward recovery. (Throughout the CICS VR library, the forward recovery log is referred to as the log.)

function modification identifier
A seven-character ID used to identify the release of a product.

G

GDG
Generation data group.

generation data group (GDG)
A collection of data sets kept in chronological order; each data set is a generation data set.

global user exit
A point in a CICS module at which CICS can pass control to a program that you have written (an *exit* program) and then resume control when your program has finished. When an exit program is enabled for a particular exit point, the program is called every time the exit point is reached.

I

ICF catalog
Integrated catalog facility catalog.

in-flight transaction
A transaction that has uncommitted updates at the time of an abnormal CICS end.

instance
An instance of CICS VR starts when transaction VSAM is initialized as part of SMSVSAM address space initialization or enabled by operator command. It ends when transactional VSAM enters a quiesced or disabled state, or when the SMSVSAM address space is terminated.

integrated catalog facility (ICF) catalog
A catalog that consists of a basic catalog structure (BCS) and its related volume table of contents (VTOCs), and VSAM volume data sets (VVDSs). The ICF catalog is the only catalog that is supported by DFSMS/MVS. See also *basic catalog structure (BCS), volume table of contents (VTOC), and VSAM volume data set (VVDS)*.

Interactive System Productivity Facility (ISPF)
The MVS interactive facility that serves as a full-screen editor and dialog manager. ISPF can be used for writing application programs. It is used by CICS VR to provide an interactive dialog between the CICS VR user and the CICS VR functions.

I/O
Input/output.

ISPF
Interactive System Product Facility.

J

JACD
Journal archive control data set.

JCT
Journal control table.

journal
See *log*.

journal control table (JCT)
The way by which the characteristics of the logs are described to CICS for access through journal control. The JCT contains journal information and operating system control blocks describing each log.

journaling
The recording of information onto a journal (including the system log) for processing by CICS VR. Also known as *logging*.

journal-label-record
A special record type that is the first record written out by CICS in a block of log records.

JPDS
Journal partitioned data set.

K

keypoint
The periodic recording of system information and control blocks on the system log (throughout the CICS VR library, the system log is referred to as the log).

key-sequenced data set (KSDS)
A VSAM data set whose records are loaded in key sequence and controlled by an index.

KSDS
Key-sequenced data set.

L

linear data set
A VSAM data set that contains data but no control information. A linear data set can be accessed as a byte-addressable string in virtual storage. See *recovery control data set*.

link pack area (LPA)
In MVS, an area of virtual storage that contains re-enterable routines that are loaded at IPL time and that can be used concurrently by all tasks in the system.

local shared resources (LSR)
Files that share a common pool of buffers and a common pool of strings; that is, control blocks supporting I/O operations.

log
A set of one or more sequential data sets to which records are written during a CICS session in these circumstances:

- By CICS, to implement user-defined resource protection (logging to the system log)
- By CICS, to implement user-defined automatic logging (to an MVS log stream, including the system log)
- Explicitly, by the JOURNAL command (or macro), from an application program (to an MVS log stream, including the system log)

(Throughout the CICS VR library, all journals are referred to as logs.)

log manager
A CICS domain introduced in CICS Transaction Server, which replaces the CICS journal control management function of earlier CICS versions. The CICS log manager uses MVS system logger services to write CICS systems logs, forward recovery logs, and user journals to log streams managed by the MVS system logger. (Throughout the CICS VR library, system logs, forward recovery logs, and MVS log streams are referred to as logs.)

log of logs
A log created by CICS Transaction Server that contains records that are written each time a file is opened or closed. CICS VR scans the log of logs and saves information needed for recovery in the RCDS.

log tail
In CICS VR, the oldest log record of interest. Log tail deletion is the process of deleting unneeded records that are older than the oldest record of interest to CICS VR.

local shared resources (LSR)
Files that share a common pool of buffers and a common pool of strings; that is, control blocks supporting I/O operations.

logical unit of work (LUW)
A sequence of processing actions (for example, changes to a base cluster) that must be completed before the individual actions can be regarded as committed. Every CICS task that affects a recoverable resource consists of one or more LUWs. When changes are committed (by successful completion of the LUW and recording of the sync point on the system log), they need not be backed out after a later failure of the transaction or system. The end of an LUW is marked in a transaction by a sync point, issued either by the user program or by CICS when the transaction ends. In the absence of user sync points, the entire task is an LUW.

LPA
Link pack area.

LSR
Local shared resource.

LUW
Logical unit of work.

M

master terminal operator (MTO)
A CICS operator who is authorized to use the master-terminal-functions transaction.

menu bar
The area at the top of a window that contains choices that let the CICS VR user access the actions available in that window.

migration utility
The utility provided by CICS VR that helps you upgrade your RCDS.

MTO
Master terminal operator.

O

object action
A process sequence in which the user selects an object and then selects an action to apply to that object.

online
Pertaining to a user's access to a computer through a terminal. The term *online* is also used in this book to describe a resource (for example, a data set) being used by a user through a terminal.

P

path
A data set name for the relationship between an alternate index and its base cluster, or an alias for a VSAM data set.

PDF
Program Development Facility.

PMR
Problem management record.

problem management record (PMR)
A record on the RETAIN database where all activity about your CICS VR problem is recorded.

program temporary fix (PTF)
A temporary solution, or by-pass of a problem, diagnosed by IBM as resulting from a defect in a current, unaltered release of a program.

program update tape (PUT)
A tape or cartridge on which IBM places PTFs so that you can install them on your system.

PTF
Program temporary fix.

pull-down menu
A list of choices associated with a choice on the menu bar. The CICS VR user selects a choice from the menu bar, and a pull-down appears in the secondary window, under the choice.

PUT
Program update tape.

R

RBA
Relative byte address.

RCDS
Recovery control data set.

RDO
Resource definition online.

record level sharing
See *VSAM record level sharing*.

recovery
(1) The process of reapplying updates to a lost or damaged VSAM data set. (2) In DFSMShsm, the process of copying a backup version of a data set from a backup volume to a specified volume, possibly to the volume from which the backup version was made.

Recovery and Backup function
The Recovery and Backup function builds a job to: take the sphere offline from CICS, forward recover the sphere, take a backup of the sphere, put the sphere back online to CICS, and instruct CICS to retry its backout.

recovery control
In CICS VR, the collective name for the functions that keep track of all the information needed to forward recover and back out protected VSAM spheres.

recovery control data set (RCDS)
One of three identical linear VSAM data sets that contain information about the contents of archived logs and the ISPF dialog interface default values. CICS VR uses this stored information to construct recovery jobs. CICS VR uses three identical RCDSs to reduce the possibility of data loss.

Recovery function
The Recovery function builds a job to: take the sphere offline from CICS, forward recover the sphere, put the sphere back online to CICS, and instruct CICS to retry its backout.

recovery point time
The point in time that forward recovery starts from for VSAM data sets that were restored from a backup made using the backup-while-open facility. With the backup-while-open facility, recovery point time is a maximum of 30 minutes before the *actual* backup time.

register
See *archive function*.

relative byte address (RBA)
The displacement of a stored record or control interval from the beginning of the storage space allocated to the VSAM data set to which it belongs.

relative-record data set (RRDS)
A VSAM data set whose records are loaded into fixed-length slots. The records are accessed by a relative record number (RRN).

Remote Technical Assistance Information Network
See *RETAIN*.

Reorganization function
The Reorganization function builds a job to: take the sphere offline from CICS, delete and redefine the sphere with more space or a bigger alternate index record size, and instruct CICS to retry its backout.

request parameter list (RPL)
In ACF/VTAM, a control block that contains the parameters needed for processing a request for data transfer.

resource definition macro
A method of defining resources to CICS using macros. You code and assemble special macro instructions, and then provide CICS with these assembled tables at initialization time.

resource definition online (RDO)
The recommended method of defining resources to CICS by creating resource definitions interactively, or using the utility DFHCSDUP, and then storing them in the CICS system definition (CSD) data set. These definitions are then installed as CICS resources, by specifying a list of definitions at CICS initialization time. Using the CEDA transaction, resource definitions can be installed while CICS is active, so they can be used immediately.

restore
The process of copying a backup version of a VSAM data set from backup media, to the same media from which the backup version was created, or to another media. This restored copy can then be used in CICS VR forward recovery.

RETAIN
A software system used by IBM Support Centers and other IBM offices to solve problems with IBM products. RETAIN is used to document each problem and the correction developed for it.

RPL
Request parameter list.

RLS
VSAM record level sharing.

RRDS
Relative-record data set.

S

SAA
Systems Application Architecture®.

secondary window
The window you get when you select an option from a pull-down. A secondary window does not have a menu bar.

SIT
System initialization table.

SNA
System Network Architecture.

SMF
System Management Facility.

SMS
Storage Management Subsystem.

sphere
See *VSAM sphere*.

storage management subsystem (SMS)
A DFSMS/MVS facility used to automate and centralize the management of storage. Using SMS, a storage administrator describes data allocation characteristics, performance and availability goals, backup and retention requirements, and storage requirements to the system through data class, storage class, management class, and ACS routine definitions.

sync point
See *synchronization point*.

synchronization point (sync point)
A point in the processing of a task at which changes to recoverable resources are regarded as committed.

sysplex
A set of MVS systems communicating and cooperating with each other through certain multi-system hardware components and software services to process customer workloads.

system initialization table (SIT)
A CICS control table required for the system to be operational. The SIT controls the capability of the system through a set of system initialization parameters.

system log
A CICS log (ID=01) that is used by CICS to log changes to resources for backout. (Throughout the CICS VR library, the system log is referred to as the log.)

system logger
A central logging facility provided by z/OS. The z/OS system logger provides an integrated MVS logging facility that can be used by system and subsystem components. For example, it is used by the CICS Transaction Server log manager.

System Management Facility (SMF)
An MVS component that collects and records system and job-related information.

Systems Application Architecture (SAA)
A formal set of rules that enables applications to be run without modification, in different computer environments.

T

task
In CICS, a single instance of the execution of a transaction. Contrast with *transaction.*

tie-up record (TUR)
The association between the file and data set, as recorded on the log.

transaction
Can be regarded as a unit of processing (consisting of one or more application programs) initiated by a single request, often from a terminal. A transaction might require the initiation of one or more tasks for its execution. Contrast with *task.*

transaction backout
The cancelation, because of a transaction failure, of all updates performed by a task.

TUR
Tie-up record.

U

uncommitted updates
The updates from an incomplete LUW that are left on the &sphere when a task or CICS abends.

upgrade set
All the alternate indexes that VSAM has been instructed to update whenever there is a change to the data part of the base cluster.

V

variable relative-record data set (VRRDS)
A VSAM data set whose records are loaded into variable-length slots. The records are accessed by a relative record number (RRN).

volume table of contents (VTOC)
A table on a direct access volume that describes each data set on the volume.

VRRDS
Variable relative-record data set

VSAM
Virtual Storage Access Method.

VSAM record level sharing (VSAM RLS)
An extension to VSAM which provides direct record level sharing of VSAM data sets from multiple address spaces across multiple systems. Record level sharing utilizes the z/OS Coupling Facility to provide cross system locking, local buffer invalidation, and cross system data caching. With VSAM RLS, CICS regions that share VSAM data sets can reside in one or more MVS images within a parallel sysplex.

VSAM sphere
A base cluster, together with any alternate indexes defined with it.

VSAM volume data set (VVDS)
A data set that describes the characteristics of VSAM data sets and system-managed data sets residing on a given disk; part of an ICF catalog.

VSAMREC
A line operator and list command that can be issued from the ISMF DATA SET LIST panel to create a recovery job for VSAM spheres.

VTOC
Volume table of contents.

VVDS
VSAM volume data set.

X

XA
Extended Architecture.

XRF
Extended Recovery Facility.

Where to find more information

IBM provides access to unlicensed CICS VR softcopy books on the Internet.

To find CICS VR books on the Internet, go to the Support home page, where you can search for CICS VR softcopy books: http://www.ibm.com/support/entry/portal/documentation.

Publication Title	Order Number
CICS VR 6.1 Implementation Guide and Reference	SC31-5760-00
CICS VR 6.1 Messages and Problem Determination	SC31-5761-00
CICS VR 6.1 User's Guide	SC31-5762-00
CICS VR 6.1 Program Directory	GI13-6705-00

The following online CICS VR books are distributed on CD-ROM:

Publication Title	Order Number
z/OS Software Products Collection	SK3T-4270
OS/390 Collection	SK2T-6700
OS/390 PDF Library Collection	SK2T-6718
IBM Transaction Processing and Data Collection	SK2T-0730

Referenced documents

A list of the publications are referenced in this information.

Publication Title	Order Number
z/OS MVS Setting Up a Sysplex	*SA22-7625*
z/OS DFSMShsm Storage Administration Guide	*SC35-0421*
z/OS DFSMShsm Storage Administration Reference	*SC35-0422*
z/OS DFSMShsm User Commands Reference Summary	*SX35-5063*
z/OS DFSMSdss Storage Administration Guide	*SC35-0423*
z/OS DFSMSdss Storage Administration Reference	*SC35-0424*
z/OS DFSMShsm Managing Your Own Data	*SC35-0420*
z/OS MVS Programming: Assembler Services Guide	*SA22-7605*
OS/390 MVS Programming: Assembler Services Guide	*GC28-1762*
z/OS MVS Programming: Assembler Services Reference ABE-HSP	*SA22-7606*
CICS Recovery and Restart Guide	*SC33-1698*
CICS for MVS/ESA: Recovery and Restart Guide	*SC33–1182*
CICS RACF Security Guide	*SC34-5720*
CICS for MVS/ESA: RACF Security Guide	*SC33–1701*
CICS System Definition Guide	*SC34-5725*

Publication Title	Order Number
CICS for MVS/ESA: System Definition Guide	*SC33–1164*
CICS Resource Definition Guide	*SC34-5722*
CICS for MVS/ESA: Resource Definition Guide	*SC33–1166*
DFSORT Application Programming Guide R14	*SC33-4035*
z/OS DFSMS Access Method Services	*SC26-7394*
z/OS MVS Initialization and Tuning Reference	*SA22-7592*

Accessing z/OS documents on the Internet

In addition to making softcopy documents available on CD-ROM, IBM provides access to unlicensed z/OS softcopy documents on the Internet.

To find z/OS documents on the Internet, first go to the z/OS home page:

http://www.ibm.com/servers/eserver/zseries/zos

From this Web site, you can link directly to the z/OS softcopy documents by selecting the Library icon. You can also link to IBM Direct to order printed documentation.

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Using LookAt to look up message explanations

LookAt is an online facility that allows you to look up explanations for most messages you encounter, as well as for some system abends and codes. Using LookAt to find information is faster than a conventional search because in most cases LookAt goes directly to the message explanation.

You can access LookAt from the Internet at: **http://www.ibm.com/eserver/zseries/zos/bkserv/lookat/**

Alternatively, you can access LookAt from anywhere in z/OS where you can access a TSO/E command line (for example, TSO/E prompt, ISPF, z/OS UNIX System Services running OMVS). You can also download code from the *z/OS Collection* (SK3T-4269) and the LookAt Web site that will allow you to access LookAt from a handheld computer (Palm Pilot VIIx suggested).

To use LookAt as a TSO/E command, you must have LookAt installed on your host system. You can obtain the LookAt code for TSO/E from a disk on your *z/OS Collection* (SK3T-4269) or from the **News** section on the LookAt Web site.

Some messages have information in more than one document. For those messages, LookAt displays a list of documents in which the message appears.

Accessibility

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use software products successfully.

The major accessibility features in CICS VR enable users to:

- Use assistive technologies such as screen-readers and screen magnifier software
- Operate specific or equivalent features using only the keyboard
- Customize display attributes such as color, contrast, and font size

Using assistive technologies

Assistive technology products, such as screen-readers, function with the user interfaces found in CICS VR.

Consult the assistive technology documentation for specific information when using it to access CICS VR interfaces.

Keyboard navigation of the user interface

Users can access CICS VR user interfaces using TSO/E or ISPF.

Refer to *z/OS TSO/E Primer*, *z/OS TSO/E User's Guide*, and *z/OS ISPF User's Guide Volume I* for information about accessing TSO/E and ISPF interfaces. These guides describe how to use TSO/E and ISPF, including the use of keyboard shortcuts or function keys (F keys). Each guide includes the default settings for the F keys and explains how to modify their functions.

CICS VR secondary window resize

Throughout the CICS VR panel interface, CICS VR displays numerous secondary windows that allow you to get help information, enter parameters, etc.

The secondary windows overlay the main CICS VR panels that they relate to. However, when using screen reading software with the CICS VR panel interface, it might be possible that the screen reading software does not differentiate between the background CICS VR panel and the foreground CICS VR secondary window. Therefore, when a CICS VR secondary window appears, the text read by the screen reading software might cause confusion (for example, two sets of F-key definitions might be read).

To resolve this issue, IBM recommends entering the RESIZE command on the command line of every CICS VR secondary window that appears. Entering the RESIZE command will transform the CICS VR secondary window into a full size panel, therefore allowing the screen reading software to correctly interpret all text.

Sending your comments to IBM

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Programming Interface information
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