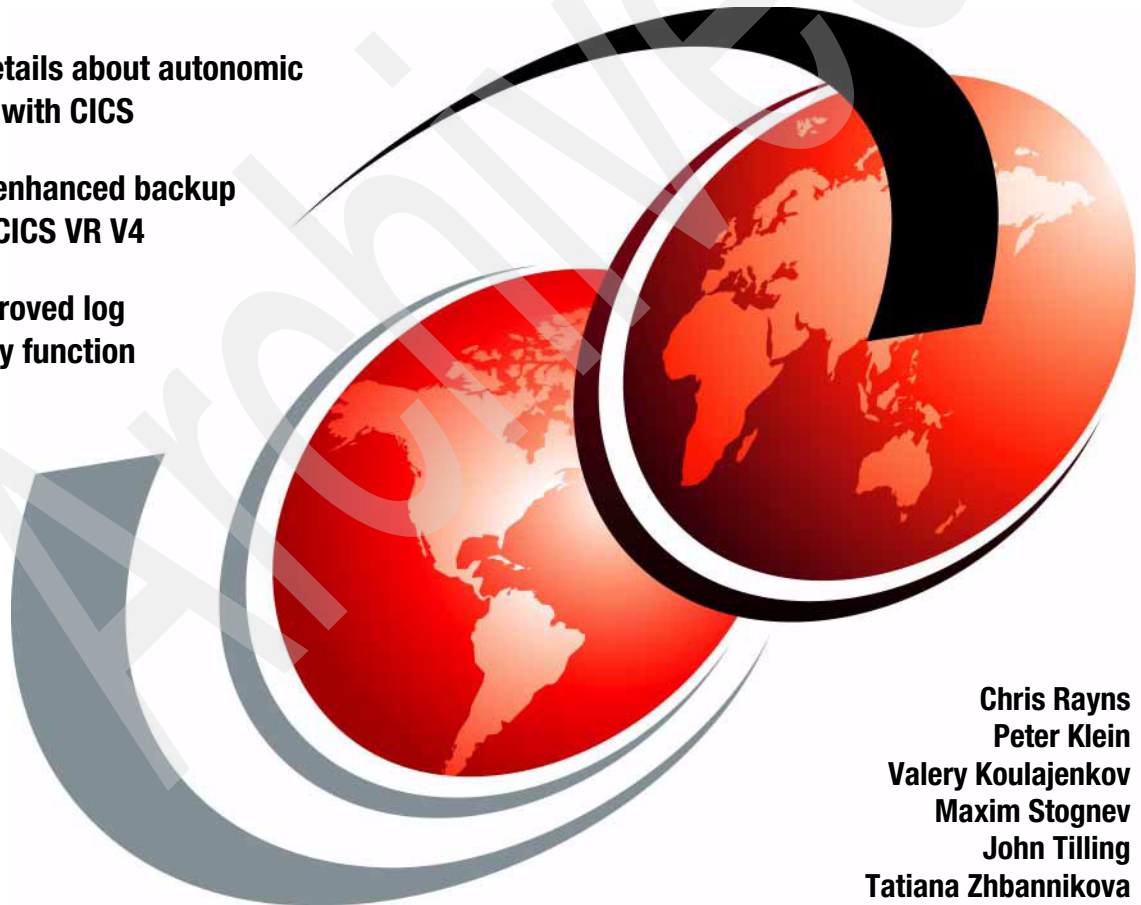# IBM

CICS VR Version 4

Provides details about autonomic interaction with CICS

Discusses enhanced backup support in CICS VR V4

Covers improved log stream copy function

<div align="right">

Chris Rayns
Peter Klein
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Maxim Stognev
John Tilling
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International Technical Support Organization

CICS VR Version 4

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Contents

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Preface

IBM® CICS® VSAM Recovery Version 4.2 (CICS VR) can help you to recover CICS and batch VSAM data from physical or logical corruption. CICS VR allows you to recover from errors quickly, reduces the risk that off-line processing might exceed its batch window, and improves the availability of your online CICS systems.

With CICS VR, you can:

► Perform automated recovery, with two complementary functions:

    – Automated notification to CICS VR when backout failure is detected in CICS.

    – Optional automatic recovery for online CICS VSAM data sets.

► Invoke the backup process from the CICS VR panel interface to allow both sharp and fuzzy backups (when enabled).

► Pre-allocate the target data set prior to restoring from a backup to support backups by REPRO (a DFSMS™ data set copy utility in z/OS®) and other backup types where restore does not include data set allocation.

► Manage authorization for the panel interface to limit access to specific tasks by user ID.

► Test forward recovery and backout procedures to enable testing of recovery processes without affecting production data.

► Create disaster recovery reports to allow customers to review and validate what is needed at a remote site.

► Manage log streams.

CICS VR is a member of the CICS Tools family. It recovers CICS and batch VSAM data from physical or logical corruption.

This IBM Redbooks® publication reviews how to install, customize, and implement CICS VR in your environment. It also looks at usage scenarios and new functions that are available with CICS VR 4.2.

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The team that wrote this book

This book was produced by a team of specialists from around the world working at the RSTL in Moscow.

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Part 1

CICS VR functionality

In this part of the book, we look at the setup of CICS VR, concentrating on installation and usage.

1

An introduction to CICS VR

In this chapter, we provide a brief introduction to CICS VSAM Recovery (CICS VR) and its capabilities.

We discuss the following topics in this chapter:

► What is CICS VR
► The basic components and programs of CICS VR
► How you can use CICS VR

You can order CICS VR V4 R2 as a separate product (product number 5655-P30). For more information about the Toolkit, refer to:

http://www-3.ibm.com/software/ts/cics/library

3

1.1 What is CICS VR

CICS VSAM Recovery (CICS VR) is an automated recovery product. With CICS VR you can recover lost or physically damaged VSAM data sets.

CICS VR can provide recovery for VSAM data sets that are updated by CICS applications. In addition, CICS VR can also provide recovery for VSAM data sets that are updated by batch applications using *batch logging*. CICS VR can provide forward recovery and backout.

In any case, updates to VSAM data sets are recorded on an MVS system logger log stream. The writes to the log stream are done by CICS and CICS VR batch logger. These writes are referred to as *after-images* or *redo records*, if made by redo logging, and as *before-images* or *undo records*, if created by undo logging. CICS VR can then use these records to perform forward recovery or backout if your VSAM data sets are lost or corrupted.

> **Note:** The batch logging applies when the VSAM data set is offline to CICS.

CICS VR V4 can be used with z/OS V1R6 and later, if the appropriate dependency PTFs have been applied (see Appendix A, "Additional information about APARS" on page 369).

The supported CICS releases are CICS Transaction Server V2 or V3.

1.2 Terminology used

We use the following common terms throughout this book:

► **After-images**

Records that are written to a forward recovery log to show what the VSAM record will look like after it has been updated by the application. Sometimes referred to as a *redo record*.

► **Back up**

The process of copying a data set to a backup volume.

► **Backup**

The copy of a VSAM data set, either on disk or tape, that you make regularly to protect VSAM data sets.

► **Backup-while-open (BWO)**

This feature 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. This feature can fail if there has been a CI split; in this case, the backup is marked as invalid.

► **Batch backout**

The CICS VR function that removes all changes to the VSAM data sets made by a specific batch job or a step in a batch job. The data set can be a VSAM KSDS, ESDS (supporting Extended Addressability for ESDS as well), RRDS, or VRRDS. The contents of the undo logs are applied to the VSAM data set to return it to its exact state before the unwanted data was written to it.

► **Before-images**

Records that are written to an undo log to show what the VSAM record looked like before it has been updated by the application. Sometimes referred to as an *undo record*.

► **Change accumulation (CA)**

The consolidation of log records into a data set used to reduce the amount of time it takes to forward recover a VSAM data set.

► **Deregistration**

Removing data from the recovery control data set (RCDS). Applicable to backup data, CA data sets information, log stream and its copies data, VSAM data sets data, and VSAM activity intervals.

► **Forward recovery**

The CICS VR function that reapplies all changes to the VSAM data set since the last backup. The data set can be a VSAM KSDS, ESDS (supporting Extended Addressability for ESDS as well), 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 data set to return it to its exact state before the data was lost. With CICS VR forward recovery, CICS VR can restore a backup for you.

► **Log of logs**

A log created by CICS Transaction Server that contains records that are written each time a data set is opened or closed. CICS VR scans the log of logs and saves information needed for recovery in the RCDS.

► **Recovery control data set (RCDS)**

One of three identical linear VSAM data sets that are a repository of the necessary information to create the job to recover VSAM data sets. CICS VR uses three identical RCDSs to reduce the possibility of data loss.

►   **Reorganization**

The CICS VR function that replaces the VSAM data sets by redefining them with more space or with a larger index record size.

►   **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.

►   **VSAM sphere**

A base cluster, together with any alternate indexes defined with it.

> **Note:** In the CICS VR product, the term *VSAM sphere* is used to refer to VSAM data sets, even when they do not have alternate indexes defined. In this book, we use the term *VSAM data set* the same way that *VSAM sphere* is used in the CICS VR product, including VSAM data sets with or without alternate indexes defined.

1.3 The basic components and programs of CICS VR

CICS VR is installed in z/OS outside of the CICS TS environment. There is no direct hook from CICS VR to CICS TS or to batch jobs, except a set of programs for CICS Backout Failed handling. The only means of communication between the two products are the MVS logs, log of logs, and the actual file definitions themselves through IDCAMS or CEDA.

1.3.1 Forward recovery

Figure 1-1 shows the relationship between the various products that are involved in forward recovery management of files in a CICS TS environment. It shows four distinct areas that are related to CICS VR, forward recovery, and batch backout.
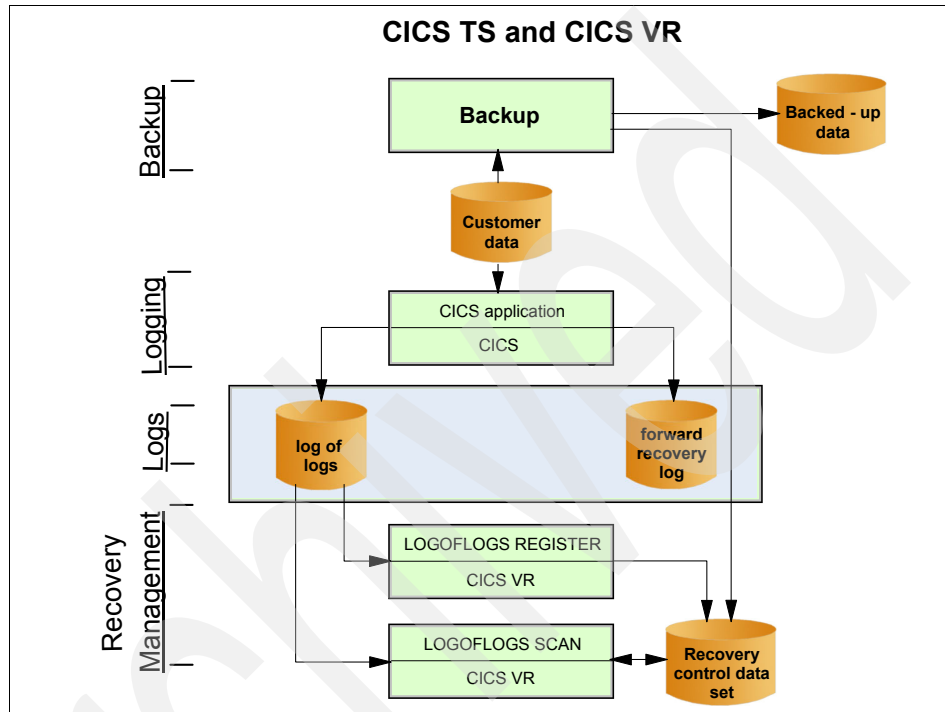
Figure 1-1   Relationships between CICS VR and CICS TS

Backup

The backup process using any backup product, for example DFSMShsm™ or DFSMSdss™, reads the file, whether offline or using Backup While Open (BWO), to create an offline backup copy.

Logging

The CICS region is up and running with the file open and enabled, processing the file, logging all activity to the forward recovery log, undo log, or both. If the file is defined as BWO, then backups can run concurrently. Otherwise, the file is taken offline (closed in CICS) to make a backup.

Logs

The forward recovery log, which includes after images of the recoverable file, the undo log with before images, and the log of logs, is used to manage the status and activity of the file. The logs are MVS logger log streams that are updated by CICS or CICS VR batch logging and that are used as input to the recovery process by CICS VR. No changes are required to the batch job to enable CICS VR batch logging.

> **Note:** The forward recovery log that is used for batch can be the same as that used for CICS forward recovery logging when the file is online to CICS. The undo log for batch, however, is separate from the CICS system log.

Recovery management

CICS VR is used to register and scan the log of logs, through the TSO/ISPF panels, updating the RCDS with the file status and activity.

1.3.2 Forward recovery and backout

The batch process is very much like the CICS TS process, with the CICS VR address space replacing the logging functions that CICS TS provides. The only difference is that the CICS VR address space directly updates the RCDS instead of using a log of logs. Figure 1-2 shows the relationship between the various products that are involved in the forward recovery and the backout of files in a batch environment and the three distinct areas that are related to CICS VR and batch forward recovery.
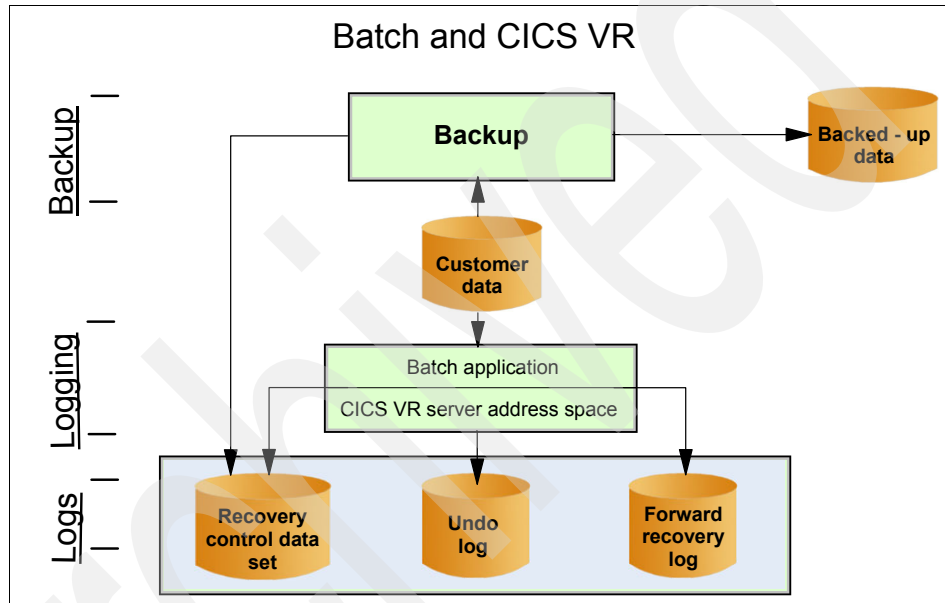
Figure 1-2   Relationship between CICS VR and batch

Backup
The backup process, using any backup product, reads the file to create an offline backup copy. The new backup can be registered to CICS VR for the further activities that involve it.

Logging
The CICS VR address space is up and running, logging after images and before images of all file activity performed by the batch job. The CICS VR server also updates the RCDS with file activity information directly, instead of going through a log of logs.

Logs

The forward recovery log and the undo log, managed by the CICS VR address space and the RCDS that takes the place of the log of logs, is used to manage the status and activity of the file. Both logs are the MVS logger log streams and are updated by the CICS VR address space.

Recovery management

In the batch environment, the CICS VR address space performs all the recovery management functions automatically. The CICS VR address space updates the RCDS directly with the information that normally is pulled from the log of logs in a CICS environment through log of logs scans.

Figure 1-3 shows the relationships between the various products that are involved in the forward recovery process using CICS VR.
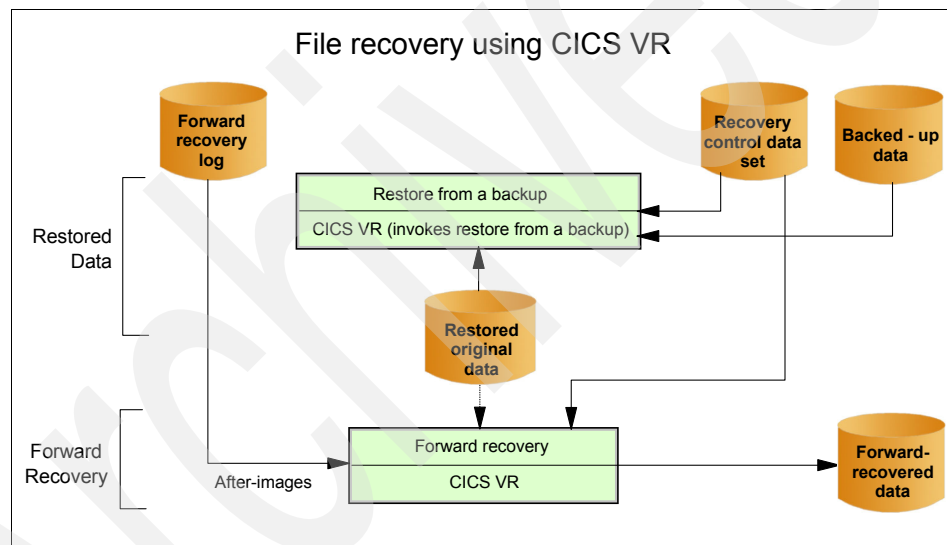
Figure 1-3   Relationships between CICS VR and forward recovery

The recovery process is completely managed by CICS VR using SMS services and the RCDS to gather the information that is required to build your recovery job.

Restored data

The first step in the forward recovery process is to restore that data set from a backup made by DFSMShsm, DFSMSdss, or any other backup product. CICS VR interfaces with SMS services to build the JCL that is used to recover the data set from the backup that you specify.

Forward recovery

Using the restored copy of the data set and the forward recovery logs that are create, CICS VR then performs forward recovery reading and applies logged after images to the restored copy of the file, bringing it up to the specifications that are stated in the recovery job build process.

CICS VR supports forward recovery in the following environments:

► Data set is online to CICS. CICS produces forward recovery records (after-images) that CICS VR can use if forward recovery is subsequently required.

► Data set is offline to CICS and is updated by batch. CICS VR produces after-images that CICS VR can use if forward recovery is subsequently required.

► Data set is online to CICS and is updated at the same time by batch jobs using DFSMStvs. CICS and DFSMStvs produce after-images which CICS VR can use if forward recovery is subsequently required.

Batch backout

Using the undo logs that are created by CICS VR batch undo, logging CICS VR can perform a backwards recovery, or *backout*, of all the batch updates made by a specific job or step.

In the next few sections, we go over all the various concepts and review the steps that are necessary to create, modify, or set up the resources that are required to manage the recovery of VSAM spheres.

1.3.3 Programs used by CICS VR

Table 1-1 shows the programs that are used by CICS VR.

Table 1-1   CICS VR programs

CICS VR program name	Associated command name or utility
DWWAR	LOGOFLOGS SCAN command
DWWCO	RECOVER command
DWWCA	CA command
DWWLC	LOGSTREAMCOPY command
DWWGJCDS	RCDS command
DWWMIW	Migration utility program
DWWNT	Notify utility
DWWJUP	Journal print utility

For further information about these programs, see *CICSVR V4R2 Implementation Guide,* SC34-6802.

1.3.4 DD names used by CICS VR

Each DD name identifies a data set that is used for a specific function. Table 1-2 shows the DD names list.

Table 1-2   CICS VR DD names

CICS VR DD name	Description
DWWCON1-3	CICS VR recovery control data set (RCDS).
DWWIN	Data set that contains the CICS VR commands. You can either specify a sequential data set with 80-byte fixed records or include the CICS VR commands in-stream.
DWWLOAD	Load library for CICS VR exits.
DWWLOG	Used to allocate log data sets when not using the CICS VR ALLOCATE command.
DWWMSG	Output data set containing CICS VR messages. It is used by the CICS VR server address space, the CICS VR ISPF dialog box, and by CICS VR batch jobs.
DWWSORT	Output data set that contains sort messages and control statements from the change accumulation job. Usually specified as SYSOUT=*.
DWWPRINT	Output data set that contains the reports produced by CICS VR. It is used by the CICS VR ISPF dialog box and by CICS VR batch jobs.
DWWDMSG	Output data set that contains tracing and diagnostic information produced by individual CICS VR subroutines, as requested by CICS VR. It is used by the CICS VR server address space, by the CICS VR ISPF dialog box, and by CICS VR batch jobs.
DWWDUMP	Output data set that contains tracing and diagnosis information, as requested by CICS VR. It is used by the CICS VR server address space, the CICS VR ISPF dialog box, and by CICS VR batch jobs.

1.4 How you can use CICS VR

In this section, we provide a short introduction to the CICS VR components and functions.

1.4.1 CICS VR ISPF dialog boxes

With CICS VR, you can recover the VSAM data sets by navigating ISPF dialog boxes. From the ISPF panels, you can select the VSAM data sets that you want to recover and the backup data sets to use. CICS VR executes the LOGOFLOGS SCAN command in the background to get the latest information about your VSAM data sets from CICS.

The ISPF dialog boxes generate the restore and forward recovery job.

Also, you can choose to re-organize or to back up the selected VSAM data sets. In this case the ISPF dialogs will generate reorganization or backup job respectively.

1.4.2 VSAM forward recovery

Before doing a forward recovery, you need to restore the damaged VSAM data set from its most recent backup copy. If you use DFSMShsm, DFSMSdss, or ABARS for backing up VSAM data sets, CICS VR restores the latest backup copy. If you use another backup or restore product, CICS VR still can restore the VSAM data sets from that backup, using the custom restore skeleton. CICS VR then builds the forward recovery job, which you can submit when you are ready.

The next step is to use the CICS VR ISPF dialog boxes to generate the forward recovery job. This job invokes the DWWCO program to do the recovery. This program reads the after-images of the VSAM records from the log stream and applies them in the same sequence in which they were originally written to the VSAM data set. When it has completed, the VSAM data set is in the exact state that it was at the point of failure.

1.4.3 VSAM batch backout

The batch backout program reads the before-images of the VSAM records from the undo log and applies them in the opposite sequence to that which they were originally written to the VSAM data set. When it has completed, the VSAM data set is in the exact state that it was before the unwanted data was applied to it.

1.4.4 CICS VR VSAM batch logging

You can use batch logging to log batch updates to VSAM data sets that are not accessed in record level sharing mode (RLS). Any data sets that are required for batch logging must be closed to CICS.

For batch logging to work, the CICS VR server *must* be active. In addition, all VSAM data sets that require batch logging must be SMS-managed and must be defined with the FRLOG(REDO), FRLOG(UNDO), or FRLOG(ALL) parameters. If FRLOG(REDO) or FRLOG(ALL) is used, the LOGSTREAMID(*logstreamname*) parameter must also be specified.

If a problem occurs with the VSAM data sets after the batch process, you can use CICS VR to forward recover the updates that are recorded on the MVS system logger log stream. Alternatively, you can back out the last changes made by specific batch job or batch job step.

1.4.5 Remote recovery site commands

The following RCDS commands can assist you in maintaining a remote disaster recovery site:

EXPORT   Copies the RCDS information before sending it to a remote site.

IMPORT   Reloads the previously exported RCDS information.

1.4.6 Change accumulation processing

Forward recovery records can be sorted into *change accumulation* data sets. Change accumulation processing can speed up forward recovery if individual VSAM records have been updated many times.

1.4.7 Reorganization

You can use reorganization to replace a data set by redefining the data set with more space or a larger index record size. There are two ways to build the reorganization job:

► Using the ISPF dialog boxes by selecting Reorganization for the utility

► Have the job set up to run automatically in case of CICS Backout Failed for the VSAM data set.

1.4.8 Automated recovery

CICS VR automated recovery helps 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 the following 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 registered automatically in the CICS VR RCDS.

3. (Optional) A job stream for forward recovery or reorganization of the affected VSAM sphere is built and submitted automatically.

> **Note:** A job to perform forward recovery or reorganization can also be created and submitted manually using the CICS VR ISPF dialog box.

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.

1.4.9 Backup

The backup of the VSAM data set can be requested in ISPF dialog boxes. In this case, CICS VR constructs a backup job using the specified backup product. For the backup product to be used, the backup skeleton must be placed into the DWWSLIB library concatenation. The backup skeletons for DFSMShsm, DFSMSdss logical copy, DFSMSdss logical dump, ABARS, and IDCAMS REPRO are supplied with CICS VR.

1.4.10 NOTIFY utility

You can use the NOTIFY utility for any backup of a VSAM data set that is created by an IBM or non-IBM product. When notified, CICS VR registers information about the backup in the CICS VR RCDS. Information about the backup is visible through the CICS VR panel interface.

1.4.11 Journal print utility

Use this utility to print the contents of MVS logs and to find information that is logged on them. CICS VR can print records that are logged by CICS VR or CICS on MVS logs.

2

CICS VR panels

In this chapter, we discuss the CICS VR panels. For our discussion, we assume that you have installed the CICS VR product code and have activated the CICS VR panels.

In this chapter, we discuss the following topics:

► Panels overview
► The main menu, panel layout, and facilities
► Customize the default JCL skeleton
► List VSAM spheres
► List CICS TS log streams
► List CICS TS Log of Logs
► Specify criteria for automatic deregistration
► List CICS Backout Failed spheres list
► CICS VR Settings

2.1 Panels overview

From the ISPF interactive dialog interface, select the CICS VR option that you want to use. From here, enter the main menu. The main menu includes eight options. Each option supports specific CICS VR tasks and might offer secondary options.

2.2 The main menu, panel layout, and facilities

The CICSVR main menu is the top level entry panel from the ISPF interactive dialog interface. When you start CICS VR, the main menu displays. From this panel, you choose the option that you want to use (as shown in Figure 2-1):

1. A list of VSAM spheres registered to CICS VR
2. A list of log streams registered to CICS VR
3. A list of log of logs registered to CICS VR
4. The automatic deregister criteria for various assets
5. A JCL skeleton that is used in all jobs submitted
6. The messages data set
7. A list of VSAM spheres registered to CICS VR that have experienced a CICS backout failure
8. A set of CICS VR options

```
 Help
 ---------------------------------------------------------------------------
                             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 2-1   CICSVR main menu

We recommend that you customize the JCL skeleton for your CICS VR setup when you use CICS VR for the first time. To do this, select option **5. JCL skeleton** from the main menu. For more information, see 2.3, "Customize the default JCL skeleton" on page 27.

The other options are for performing specific CICS VR tasks. For example, select option **1. List of VSAM spheres** and press Enter to begin work on a list of registered VSAM spheres.

2.2.1 Panel layout

Each panel in the interface consists of several components. To help explain these components, Figure 2-2 shows an example of the CICSVR VSAM sphere list panel.

```
 Administrate  Utilities  Tools  List  View  Help

 -------------------------------------------------------------------------------
                             CICSVR VSAM sphere list         Row 2 to 11 of
14

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

   N  Use default parameters for selected spheres
                                                     Last time      RLS RR
   S  VSAM sphere                                    referenced     flag on
   _  JTILLI1.CICSTS32.FILEA                          07.324 13:19:41  N
   _  JTILLI1.CICSVR.FILE1                            00.001 00:00:00  N
   _  JTILLI1.CICSVR.FILE2                            00.001 00:00:00  N
   _  JTILLI1.CICSVR.FILE3                            00.001 00:00:00  N
   _  JTILLI1.CICSVR.FILE4                            00.001 00:00:00  N
   _  JTILLI1.CICSVR.HR.FILE1                         00.001 00:00:00  N
   _  JTILLI1.CICSVR.HR.FILE2                         00.001 00:00:00  N
   _  JTILLI1.CICSVR.HR.FILE3                         00.001 00:00:00  N
   _  JTILLI1.CICSVR.HR.FILE4                         00.001 00:00:00  N
   _  JTILLI1.CICSVR.PAYROLL.FILE1                    00.001 00:00:00  N


 Command ===> _____
  F1=Help     F3=Exit     F4=Reorg     F5=FwdRec    F6=Backup    F7=Bkwd
   F8=Fwd      F10=Menu bar F11=Dereg    F12=Cancel
```

Figure 2-2   Components of a CICS VR panel

Panel components

A panel can consist of the following components:

Menu bar   The Menu bar is at the top of the panel. It consists of a list of choices, or pull-down menus, that represent groups of related actions.

Command line   The input area lets you enter system commands or CICS VR shortcut commands without leaving the CICS VR ISPF panel.

Scrollable area   This is the area where you interact with the dialog box. it occupies most of the panel or secondary window and can contain selection fields, display fields, and entry fields.

Function key area This is the area at the bottom of the panel that describes the allowable actions by pressing a function key.

Menu bar pull-down menus

A pull-down menu appears when you move the cursor to a menu bar task item and press Enter. It overlays a part of the panel under the choice. Figure 2-3 shows the Utilities menu from the CICSVR VSAM sphere list panel.

```
 Administrate  Utilities  Tools  List  View  Help
 --------------+-------------------------------+---------------------------
               |    1. Reorganization...    F4 |t Row 1 to 11 of 23
               |    2. Forward recovery...  F5 |
 Select one or |    3. Backup...            F6 | ction.
               +-------------------------------+
   N  Use default parameters for selected spheres
                                                Last time         RLS RR
   S  VSAM sphere                               referenced        flag on
      CICSVR.BL01.KSDS01                        00.001 00:00:00   N
      CICSVR.R40BL010.BL.ESDS01                 00.001 00:00:00   N
      CICSVR.R40BL010.BL.ESDS02                 00.001 00:00:00   N
      JTILLI1.CICSTS32.FILEA                    07.334 13:08:06   N
      JTILLI1.CICSVR.ESDS01                     00.001 00:00:00   N
      JTILLI1.CICSVR.ESDS02                     00.001 00:00:00   N
      JTILLI1.CICSVR.FILE1                      00.001 00:00:00   N
      JTILLI1.CICSVR.FILE2                      00.001 00:00:00   N
      JTILLI1.CICSVR.FILE3                      00.001 00:00:00   N
      JTILLI1.CICSVR.FILE4                      00.001 00:00:00   N
      JTILLI1.CICSVR.HR.FILE1                   00.001 00:00:00   N


 Command ===>
  F1=Help      F3=Exit     F4=Reorg     F5=FwdRec    F6=Backup     F7=Bkwd
  F8=Fwd      F10=Menu bar F11=Dereg    F12=Cancel
```

Figure 2-3   An example of a menu bar pull-down menu

Common pull-down menus have shortcut function keys so that you can perform the chosen action directly. For example, F5 equals Forward Recovery. For this reason, we recommend that you keep PFSHOW on so that you can take advantage of these shortcut keys.

In this example, the pull-downs you can select from the CICSVR VSAM sphere List panel are:

Administrate   Lets you manage VSAM spheres and logs. It is available from the following panels: CICSVR VSAM Sphere List, CICSVR Log of Logs List, CICSVR Log Streams List, CICS Backout Failed Sphere List, and CICSVR Undo logs assignment.

Utilities   Lets you specify the type of CICS VR utility that you want to use. The source panels are: CICSVR VSAM Sphere List, CICS Backout Failed Sphere List, and CICSVR Log of Logs List.

Tools   Lets you run VSAM Record Level Sharing (RLS) functions and set the Scan option. This pull-down menu is available on the CICSVR VSAM sphere list panel.

List	Lets you list different objects that are relevant to the panel from which you select it.
View	Lets you restrict or sort the list of objects that appear on the panel.
Help	Gives you relevant help information. This menu task item is on the following panels: CICSVR VSAM Sphere List, CICSVR Log of Logs List, CICSVR Log Streams List, Automatic Deregister Criteria, CICS Backout Failed Sphere List, CICSVR Settings, and CICSVR Undo Logs Assignment.

Secondary windows

When you select an option from a pull-down menu, a secondary window displays. A secondary window does not have a menu bar. Figure 2-4 shows the CICSVR log stream details list secondary window.

```
+------------------------------------------------------------------------------+
|                        CICSVR log stream details list                        |
| Command ===> _____         |
|                                                                              |
| Select one or more errors, then press Enter to get more information. Or,      |
| press Enter to show the log stream details list for the next selected log    |
| stream. Or, press F12 to cancel the list sequence.                           |
|                                                                              |
|   Log stream . . . . : SCSCPAA9.DFHJ01                                        |
|   First block number :        0                                              |
|   Last block number  :        0                                              |
|   First time copied  : 00.001 00:00:00  (local)                              |
|                        00.001 00:00:00  (GMT)                                |
|   Last time copied . : 00.001 00:00:00  (local)                              |
|                        00.001 00:00:00  (GMT)                                |
|   Last copy time . . : 00.001 00:00:00  (GMT)                                |
|                                                                              |
|    S  Information & error                                                     |
| **************************** Bottom of data ****************************** |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|  F1=Help     F7=Bkwd     F8=Fwd     F12=Cancel                               |
+------------------------------------------------------------------------------+
```

Figure 2-4   An example of a secondary window

2.2.2 Online help

Online help is available that is comprehensive and context sensitive. The kind of help that you get depends on the task that you are doing when you request the help as well as the position of the cursor.

If the cursor is on a part of a panel or secondary window, the help gives general information about the tasks that you can perform at this point of the ISPF dialog interface.

Pressing F1 when the cursor is on a specific input field displays a help panel with information about that particular field. Pressing F2 when the field help panel is displayed or moving the cursor to anywhere other than an input field on the panel and pressing F1 displays a help panel with general information about the panel.

Help displays as a choice on the menu bar of the following panels:

- ► CICSVR Main Menu
- ► CICSVR VSAM Sphere List
- ► CICSVR Log of Logs List
- ► CICSVR Log Stream List
- ► Automatic Deregister Criteria
- ► CICS Backout Failed Sphere List
- ► CICSVR Settings
- ► CICSVR Undo Logs Assignment.

The associated help pull-down menu choices are:

Using help	Tells you how to use CICS VR online help.
General help	Gives general information about the panel and the tasks that you can perform on the panel.
Index	Contains a list of available help information, in alphabetical order.
Keys help	Displays a list of function key assignments for a panel.
Command help	Displays a list of commands that are available during a panel session.
Product information	Provides product copyright information.

2.2.3 Function keys and shortcuts

There are three groups of function keys in the CICS VR ISPF dialog interface:

- ► Standard function keys
- ► Other function keys
- ► Shortcut function keys

Standard function keys

Standard function keys are available in all panels and secondary windows.

When you run CICS VR under ISPF/Program Development Facility (ISPF/PDF), you can also use the standard ISPF function keys to split the screen (F2) and to switch to another screen (F9).

F1= Help	Allows you to get specific information about an item or field, or the help facility itself.
F12=Cancel	Exits the current panel or secondary window.

Other function keys

These function keys are available in some CICS VR panels and secondary windows in the ISPF dialog interface. They are only available in the panels and windows that contain objects to which they refer. They are:

F3= Exit	Ends a function and removes from the screen the panel that is associated with that function. The exit key is available in panels with a menu.
F4=Prompt	Provides a secondary window that contains a list of input values from which you can select an item for input.
F4=SwSort	Loops through the sort types of the undo log associations. The loop sequence is Value, Type, and Undo log name.
F4=SwType	Loops through the types of the Reorganization (NOSPACE or AIXFULL) on Reorganization parameters panel. Also loops through the types of an undo log association (USERID, JOBNAME, or HLQ) on Undo logs management panel.
F5=GetDef	Lets you set the input fields to the CICS VR default value. This function key is available in secondary windows where defaults are used.
F5=Local	Switches the time format to Local on backup-related panels.
F6=GMT	Switches the time format to GMT on backup-related panels.
F6=SaveDef	Lets you save the displayed values in a secondary window.

F7=Bkwd	Scrolls the information in the panel or secondary window one screen backward.
F7=PrevItem	Steps back to the parameters of a previous association selected to be altered on Undo logs assignment panel.
F7=PrevVSAM	Steps back to the parameters of a previous VSAM sphere selected for the Recovery or Backup utility on CICSVR VSAM sphere list panel.
F8=Fwd	Scrolls the information in the panel or secondary window one screen forward.
F10=Menu bar	Moves the cursor to and from the menu bar.
F10=AutoNo	Lets you disable Automatic LSR buffers on the CICSVR VSAM buffer pools panel.
F11=AutoYes	Lets you enable Automatic LSR buffers on the CICSVR VSAM buffer pools panel.

Shortcut function keys

Press these keys to perform an action that is available from a menu:

F4=Reorg	Is the same function as the Reorganization option of the Utilities menu.
F4=ListDet	Is the same function as the List details option on the List menu of the panel from which you press F4. It is available on the following panels: CICSVR Log of Logs List, CICSVR SAM Copy List, CICSVR Log Stream List, CICS Backout Failed Sphere List
F5=Add	Opens the Undo logs management panel to allow the registration of a new undo log association. Available on the Undo logs assignment panel.
F5=FwdRec	Is the same function as the Forward recover option on the Utilities menu.
F5=ListSAM	Is the same function as the List SAM copies option on the List menu.
F5=Relate	Lets you relate a new VSAM path to an old path.
F6=Alter	Opens the Undo logs management panel to allow the modification of the selected undo log associations. Available the on Undo logs assignment panel.
F6=Backup	Is the same function as the Backup option on the Utilities menu.

F6=Register	Is the same function as the Register option on the Administrate menu.
F10=Info	Displays optional information about the backups.
F11=Dereg	Lets you deregister an item from the recovery control data set (RCDS). It is available in the following panels: CICSVR VSAM Sphere List, CICSVR Log List, CICSVR Log of Logs List, CICSVR Log Stream List, CICSVR registered backup names list
F11=Delete	Lets you delete a registered association from the undo logs assignment list.

Shortcut commands

You can input these commands on the command line to perform an action from a menu option:

Backup	Same function as the Backup option on the Utilities menu. It applies to the CICSVR VSAM sphere list panel only.
Dereg	Same function as the Deregister option on the Administrate menu. It applies to the panels that contains items that can be deregistered.
FwdRec	Same function as the Forward Recover only option on the Utilities menu. It applies to the CICSVR VSAM sphere list panel only.
ListDet	Same function as the List details option on the List menu.
ListSAM	Same function as the List SAM option on the List menu. It can only be used on the CICSVR log stream list panel.
Recov	Same function as the Recovery option on the Utilities menu. It applies to the CICS Backout Failed sphere list panel only.
Register	Same function as the Register option on the Administrate menu. It can only be used on the CICSVR VSAM log of logs panel.
Reorg	Same function as the Reorganization option on the Utilities menu. It applies to the CICSVR VSAM sphere list panel and CICS Backout Failed sphere list panel.
Scan	Same function as the Scan option on the Utilities menu. It can only be used on the CICSVR log of logs list panel.

Other commands

The following other commands are available:

Remmsg   Removes the message currently displayed.

Panelid   Toggles the system names of the panels on or off.

Pfshow   Toggles the PF keys on or off.

2.3 Customize the default JCL skeleton

We recommend that you customize the JCL skeleton when you access the CICS VR ISPF panels for the first time. If you select option 5 from the CICSVR main menu and press Enter, the JCL skeleton secondary window shown in Figure 2-5 on page 28 displays and invokes the ISPF/PDF editor. For more details about customizing the JCL skeleton, refer to *CICSVR V4R2 Implementation Guide and Reference,* SC34-6802.

```
)CM     @BANNER_START                                    01
)CM     Licensed Materials - Property of IBM
)CM
)CM     5655-P30               DWWSJOB
)CM
)CM     (C) Copyright IBM Corp. 2005
)CM
)CM
)CM
)CM
)CM     @BANNER_END
)CM  $LO= CVR410  410 050909 ......... Changed
)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     Change the DSN value in STEPLIB DD to the name of your
)CM     CICSVR library.
)CM
)CM     Change RCDS DSN name in DWWCON1, DWWCON2, and DWWCON3 DDs
)CM     to what you have defined.
)CM
)CM  ************************************************************
)CM
//TSTGFS&CJOBCHAR JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=JTILLI1,
//             MSGCLASS=H,CLASS=A,REGION=4M
)SEL &CUTIL NE REORG  && &CUTIL NE BACKUP
//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
)ENDSEL
```

Figure 2-5   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 CICSVR main menu.

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 on the STEPLIB DD statement

► The data set names for the following statements:
  – CICS VR RCDS
  – DWWCON1
  – DWWCON2
  – DWWCON3 DD

You might also want to add DD cards for DWWDUMP and DWWDMSG for problem determination.

2.4 List VSAM spheres

This option allows you to work with a list of VSAM spheres that are registered to CICS VR. When you select option 1 from the main menu, a secondary window displays (as shown in Figure 2-6).

```
Help
 +------------------------------------------------------------------------------+
 |                          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 . . . . . . _____          |
 |                                                                              |
 |   F1=Help    F12=Cancel                                                      |
 +------------------------------------------------------------------------------+

 (C) Copyright IBM Corp. 1991, 2007. All rights reserved.

 Command ===>
  F1=Help       F3=Exit      F10=Menu bar F12=Cancel
```

Figure 2-6   VSAM Sphere List Include for inputting search criteria

This is the window to filter the VSAM spheres that are displayed on the CICSVR VSAM sphere list. You can either specify VSAM sphere search criteria, which has a default wild card of asterisk (*), or a fixed block (FB) sequential data set, which is cataloged and resides on DASD, that contains records of the names of VSAM spheres. (Refer to *CICSVR V4R2 Implementation Guide and Reference,* SC34-6802 for more information regarding the registration of VSAM spheres.)

The input fields are:

VSAM sphere   Allows you to enter data set name search criteria that filters the VSAM spheres that are included in the CICSVR VSAM Sphere List. The default value is an asterisk (*). Use this default value to display all the registered VSAM spheres. For online detailed help information, move the cursor to this field and press F1=Help.

Data Set Name Allows you to enter the name of an FB sequential data set that contains records with the names of VSAM spheres. This feature expands your options to create a group of VSAM spheres using any method you choose, such as ISPF panels and JCL. Then you will have the flexibility to save these data sets for future use.

This data set must be cataloged, sequential, have a fixed block record format with 80-byte records, and reside on DASD. It also needs to contain a single VSAM sphere per record (line).

If you provide both inputs, CICS VR uses the Data Set Name input and ignores the VSAM sphere input. Figure 2-7 is an example of the VSAM sphere list panel.

```
  Administrate  Utilities  Tools  List  View  Help
 -----------------------------------------------------------------------------
 ---
                           CICSVR VSAM sphere list          Row 1 to 11 of
 16

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

   N  Use default parameters for selected spheres
                                                  Last time        RLS RR
   S  VSAM sphere                                 referenced       flag on
   _  CICSVR.BL01.KSDS01                          00.001 00:00:00  N
   _  JTILLI1.CICSTS32.FILEA                       07.326 07:07:18  N
   _  JTILLI1.CICSVR.FILE1                         00.001 00:00:00  N
   _  JTILLI1.CICSVR.FILE2                         00.001 00:00:00  ?
   _  JTILLI1.CICSVR.FILE3                         00.001 00:00:00  N
   _  JTILLI1.CICSVR.FILE4                         00.001 00:00:00  N
   _  JTILLI1.CICSVR.HR.FILE1                      00.001 00:00:00  N
   _  JTILLI1.CICSVR.HR.FILE2                      00.001 00:00:00  N
   _  JTILLI1.CICSVR.HR.FILE3                      00.001 00:00:00  N
   _  JTILLI1.CICSVR.HR.FILE4                      00.001 00:00:00  N
   _  JTILLI1.CICSVR.PAYROLL.FILE1                 00.001 00:00:00  N

 Command ===>
  F1=Help      F3=Exit     F4=Reorg     F5=FwdRec    F6=Backup    F7=Bkwd
  F8=Fwd       F10=Menu bar F11=Dereg    F12=Cancel
```

Figure 2-7 CICSVR VSAM Sphere List panel

To select one or more VSAM spheres that are registered to CICS VR, type S or s beside the sphere name. Then choose an action to perform on the selected sphere.

The information displayed for each sphere is:

Last time referenced Shows the last time the sphere was archived.

RLS RR flag on   Shows if record level sharing (RLS) recovery is required.

The "Use default parameters for selected spheres" field allows you to specify whether you want to enter a set of recovery parameters that will be used for every selected VSAM sphere or whether you want to enter recovery parameters individually for every selected VSAM sphere. This option applies to the Forward Recovery action only.

You can specify the following:

Y   To enter one set of default recovery parameters that will be applied to every selected VSAM sphere.

N   To enter the recovery parameters individually for every selected VSAM sphere.

2.4.1 Menus for the VSAM Sphere List panel

To select one or more VSAM spheres that are registered to CICS VR, type s or S beside the VSAM sphere name. Then select an action to perform.

You can move the cursor to a menu bar task item and press Enter to display available menu options. Alternately, you can press the menu bar function key (F10), which puts the cursor at the beginning of the menu bar. Then, you can use the tab key to move the cursor to a desired menu task item and press Enter to obtain the available pull-down options. Some of the common pull-down menus have shortcut function keys that you can apply directly.

> **Tip:** You can open the specific pull-down menu by entering the first letter of its name in the Command field and pressing F10. For example, typing V in the Command field and pressing F10 opens the Utilities menu CICSVR VSAM sphere list panel.

From the CICSVR VSAM sphere list, the available menu options under menu bar task items are as follows:

► **Administrate**

Allows management of VSAM spheres and logs. Actions and equivalent shortcut function keys are:

1. Deregister... F11
2. Exit   F3

► **Utilities**

Allows you to specify the utility that you want to run. The associated shortcut function keys are:

1. Reorganization... F4
2. Forward recovery... F5
3. Backup... F6

► **Tools**

Lets you run VSAM Record Level Sharing (RLS) functions and set the Scan option. The available actions are:

1. Turn on RLS recovery required
2. Turn off RLS recovery required
3. Unbind RLS lock
4. Bind RLS lock
5. Reset BWO bits to zero
6. Set scan option

► **List**

Allows the listing of relevant objects:

1. List backups...
2. List RLS details...
3. List backup names...

► **View**

Lets you restrict or sort the list of objects that display on the panel. The available actions are:

1. All
2. Include...
3. Sort...
4. Instance ID...

► **Help**

  Provides relevant help information in the following categories:

  1. Using help...
  2. General help... F1
  3. Index...
  4. Keys help...
  5. Command help...
  6. Product information

2.4.2 Using default recovery parameters

When you enter Y to the "Use default parameters for selected spheres" option, you can use one set of recovery parameters. The specified recovery parameters are applied to every selected VSAM sphere during construction of the recovery job. If you choose Y, all of the VSAM spheres have similar backup attributes, such as:

► Logical backup taken by any backup product

► Backup on the same DFSMShsm full volume dump

► Either no backup or a recovery job that does not include a step to restore from a backup

► All VSAM spheres have the same time format on the logs, either local time format or GMT format

Figure 2-8 shows the CICSVR VSAM sphere default parameters panel.

```
                    CICSVR VSAM sphere default parameters

 Enter the default values to be used for all selected VSAM spheres.

   1 - 8 character DSN extension . _____

   Forward-recovery start time . . _____  (YY.DDD HH:MM:SS)

   Forward-recovery stop time  . . _____  (YY.DDD HH:MM:SS)

   Backup date . . . . . . . . . . _____    (YY.DDD)

   Time format  . . . . . Local +    Backup type . None_____  +

   Volume for restore  . . _____     Unit for restore . . . . _____




 Command ===> _____
  F1=Help     F4=Prompt  F12=Cancel
```
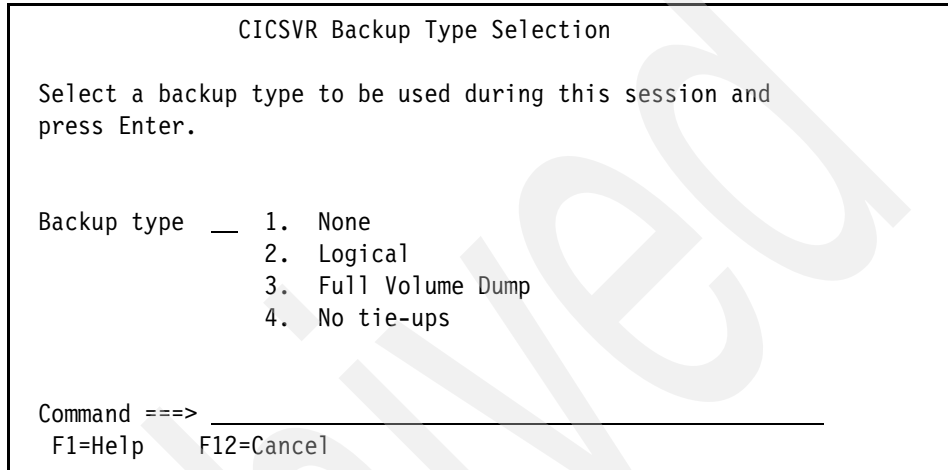
Figure 2-8   CICSVR VSAM sphere default parameters secondary window

You can input the input fields. We suggest that you enter the fields in the sequence that we show here:

► Backup type

Define the type of backup. Place the cursor to the Backup type field and press F4. The CICS VR Backup Type Selection panel displays, as shown in Figure 2-9.

```
                  CICSVR Backup Type Selection

 Select a backup type to be used during this session and
 press Enter.


 Backup type  __   1.  None
                   2.  Logical
                   3.  Full Volume Dump
                   4.  No tie-ups



 Command ===> _____
  F1=Help    F12=Cancel
```

Figure 2-9   CICSVR Backup Type Selection secondary window

Type the number that corresponds to your choice and press Enter. The types of backup are:

– None

Specifies that a backup does not exist or that you do not want CICS VR to create a step to restore the VSAM spheres from the backup.

– Logical

Specifies that you want CICS VR to restore the VSAM sphere from a logical backup that is known to CICS VR. CICS VR restores the logical backup that is selected from the CICS VR backup prompt list. If you use the backup-while-open (BWO) facility, CICS VR sets the forward recovery start time to the last recovery point of the VSAM sphere.

– Full volume dump

Specifies that each of the selected VSAM spheres are backed up on the same DFSMShsm full volume dump. Enter the date of the full volume dump in the Backup date field. CICS VR creates a recovery job that restores each VSAM sphere from the specified DFSMShsm full volume dump.
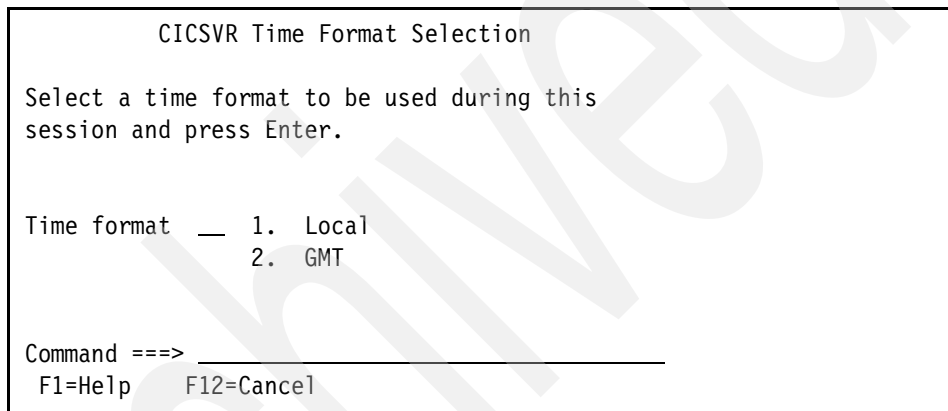
– No tie-ups

Specifies that you want CICS VR to restore the VSAM sphere from a backup taken by hardware, where there is no tie-up record on the log with a time stamp for the start of the backup. Selecting this backup type adds the NOTIEUPS keyword to the generated recovery job.

► Time format

This is a required field. It specifies the time format used on the logs of the selected VSAM spheres. All selected VSAM spheres must have the same format.

Place the cursor to the Time format field and press F4. The CICS VR time Format Selection panel displays, as shown in Figure 2-10.

```
            CICSVR Time Format Selection

Select a time format to be used during this
session and press Enter.



Time format  __  1.  Local
                 2.  GMT



Command ===> _____
 F1=Help    F12=Cancel
```

Figure 2-10   CICSVR Time Format Selection secondary window

Type the number that corresponds to your choice and press Enter. The values for the time format are:

– Local

Specify that local time format is used on the log blocks.

– GMT

Specify that Greenwich Mean Time (GMT) format is used on the log blocks.

After specifying the backup type and time format, the panels take you back to the CICSVR VSAM sphere default parameters window. Below are the descriptions of all the other fields available on this panel:

► 1-8 character DSN extension

An optional field. If you enter an extension, it is appended to the name of each selected VSAM sphere.

► Forward recovery start time

Identifies the date and time of the earliest after-image that CICS VR uses to recover the selected VSAM spheres.

► Forward recover stop time

An optional field. It identifies the date and time of the latest time stamp of the after-image that CICS VR uses to recover the selected VSAM spheres. If you leave the field blank, the default value is set to the date and time when the recovery job is created.

► Backup date

Identifies the date of the DFSMShsm full volume dump from which CICS VR restores. The backup date is based on your selection of backup parameters, such as Volume for restore and Unit for restore.

► Volume for restore

If you choose logical or full volume dump as the Backup type, you can only specify a name of the unit. Volume and Unit are to be entered together. If the sphere is SMS-managed, the volume and unit values are ignored.

► Unit for restore

Type of unit to which you want to restore the VSAM spheres.

2.4.3 Providing VSAM sphere forward recovery parameters

If you select a forward recovery for the VSAM spheres and type `N` in the "Use default parameters for selected spheres" option, the VSAM sphere parameters secondary window displays (Figure 2-11). This secondary window displays for each of the VSAM spheres that you select.

```
                         CICSVR VSAM sphere parameters

 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 . . . . . . : JTILLI1.CICSVR.FILE3

   New VSAM sphere name  . . _____

   Forward-recovery start time . . 07.325 00:05:50  (YY.DDD HH:MM:SS)

   Forward-recovery stop time  . . _____  (YY.DDD HH:MM:SS)

   Backup time . . . . . . . . . . 07.325 00:05:50  + (YY.DDD HH:MM:SS)

   Time format . . . . . Local  +    Backup type . Logical_____  +

   Volume for restore . . _____     Unit for restore . . . . . _____

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

Figure 2-11   VSAM sphere parameters secondary window

Here, you can specify the following sphere parameters for inclusion in the forward recovery run:

► New name for the recovered VSAM sphere
► Start time for forward recovery
► Stop time for forward recovery
► Backup time
► Backup type
► Time format used on the log (if you are using MVS log streams or QSAM copies of MVS log streams)
► The volume for the restored copy of the data set, if the backup is logical or a DFSMShsm full volume dump
► The unit for the restored copy of the data set, if the backup is logical or a DFSMShsm full volume dump

You can change the time format or backup type by placing the cursor to the corresponding field and pressing F4, which displays the selection windows, as shown on Figure 2-9 on page 36 and Figure 2-10 on page 37.

2.4.4 VSAM sphere Administrate menu

Figure 2-12 shows the Administrate menu for VSAM spheres.

```
 Administrate  Utilities  Tools  List  View  Help
 +------------------------------------+-----------------------------------
 |  _  1. Deregister...          F11 | re list            Row 1 to 11 of 16
 |     2. Exit                    F3 |
 +-------------------------------------+ t an action.

   N  Use default parameters for selected spheres
                                              Last time        RLS RR
   S  VSAM sphere                            referenced       flag on
   _  CICSVR.BL01.KSDS01                     00.001 00:00:00  N
   _  JTILLI1.CICSTS32.FILEA                 07.327 08:11:58  N
   _  JTILLI1.CICSVR.FILE1                   00.001 00:00:00  N
   _  JTILLI1.CICSVR.FILE2                   00.001 00:00:00  ?
   _  JTILLI1.CICSVR.FILE3                   00.001 00:00:00  N
   _  JTILLI1.CICSVR.FILE4                   00.001 00:00:00  N
   _  JTILLI1.CICSVR.HR.FILE1                00.001 00:00:00  N
   _  JTILLI1.CICSVR.HR.FILE2                00.001 00:00:00  N
   _  JTILLI1.CICSVR.HR.FILE3                00.001 00:00:00  N
   _  JTILLI1.CICSVR.HR.FILE4                00.001 00:00:00  N
   _  JTILLI1.CICSVR.PAYROLL.FILE1           00.001 00:00:00  N


 Command ===>
  F1=Help      F3=Exit       F4=Reorg     F5=FwdRec    F6=Backup    F7=Bkwd
  F8=Fwd     F10=Menu bar F11=Dereg     F12=Cancel
```

Figure 2-12   Example of VSAM sphere list Administrate menu

The first option allows you to deregister the selected VSAM spheres from the recovery control data set (RCDS). When you deregister a sphere, the name of the sphere is deleted from the RCDS. VSAM spheres are registered in the RCDS when the archive utility is invoked.

> **Note:** You can register VSAM Spheres using several other methods:
>
> ► During a log of logs scan (CICS TS)
> ► When DFSMSdss copies or dumps are created for use by CICS VR
> ► During CICS VR batch logging

The Administrate menu options are:

► Deregister

  Allows you to remove the sphere name from RCDS.

► Exit

  Allows you to end the function and remove it from the current screen.

To deregister the selected sphere, type 1 in the input field, or press Enter with the cursor on the Deregister option.

When you deregister one or more spheres, a deregister verification window opens for each selected VSAM sphere.

2.4.5 VSAM sphere Utilities menu

Figure 2-13 shows the Utilities menu for VSAM spheres.

```
 Administrate  Utilities  Tools  List  View  Help
-------------+-------------------------------+----------------------------
             | __ 1. Reorganization...    F4 | t            Row 1 to 11 of 16
             |    2. Forward recovery...  F5 |
Select one or |   3. Backup...            F6 | ction.
             +-------------------------------+
  N  Use default parameters for selected spheres
                                              Last time        RLS RR
  S  VSAM sphere                              referenced       flag on
  _  CICSVR.BL01.KSDS01                       00.001 00:00:00  N
  _  JTILLI1.CICSTS32.FILEA                   07.327 08:11:58  N
  _  JTILLI1.CICSVR.FILE1                     00.001 00:00:00  N
  _  JTILLI1.CICSVR.FILE2                     00.001 00:00:00  N
  _  JTILLI1.CICSVR.FILE3                     00.001 00:00:00  N
  _  JTILLI1.CICSVR.FILE4                     00.001 00:00:00  N
  _  JTILLI1.CICSVR.HR.FILE1                  00.001 00:00:00  N
  _  JTILLI1.CICSVR.HR.FILE2                  00.001 00:00:00  N
  _  JTILLI1.CICSVR.HR.FILE3                  00.001 00:00:00  N
  _  JTILLI1.CICSVR.HR.FILE4                  00.001 00:00:00  N
  _  JTILLI1.CICSVR.PAYROLL.FILE1             00.001 00:00:00  N

Command ===> _____
 F1=Help      F3=Exit      F4=Reorg     F5=FwdRec    F6=Backup    F7=Bkwd
 F8=Fwd     F10=Menu bar F11=Dereg    F12=Cancel
```

Figure 2-13   Example of VSAM sphere list Utilities menu

The Utilities menu options that are available are:

► Reorganization

Allows you to create and submit a reorganization job.

► Forward recovery

Allows you to redo updates on the restored sphere.

► Backup

Allows you to create and submit a backup job.

In a forward recovery job, CICS VR performs these operations on the selected VSAM spheres:

► Restore, to recreate the VSAM sphere, by copying the relevant backup.
► Forward recovery, to redo updates on the restored sphere.

CICS VR checks which operations are needed for each sphere that is selected.

VSAM sphere reorganization

From the VSAM Sphere Utilities menu, you can select option 1 to perform a Reorganization. Alternatively, you can press the equivalent shortcut function key F4. This option brings up the VSAM sphere parameters for reorganization secondary window, as shown in Figure 2-14.

```
             CICSVR VSAM sphere reorganization parameters     Row 1 to 2 of 2

Type the increase amount (percent) and specify new CI sizes for desired
entries. Switch reorganization type by pressing PF4(SwType), if needed.
Press Enter to continue.


VSAM sphere . . . . . . : JTILLI1.CICSVR.FILE4


Reorganization type . . : AIXFULL
Increase  . . . . . . . . 10  % (0-99)


Backup name for ESDS  . .
REORG mode  . . . . . . . 2  (1-CICS Offline, 2-non-CICS)
CICS APPLID . . . . . . .

VSAM sphere entry                                  Type     Cur. CI  New CI
JTILLI1.CICSVR.FILE4.DATA                          DATA     512
JTILLI1.CICSVR.FILE4.INDEX                         INDEX    6144
**************************** Bottom of data *****************************


Command ===>
 F1=Help     F4=SwType    F7=Bkwd     F8=Fwd      F12=Cancel
```

Figure 2-14   VSAM sphere parameters for reorganization secondary window

This panel provides detailed information about the components of the selected
VSAM data set. You can get a more detailed description of the fields by moving
the cursor to the desired field and selecting Help (pressing F1).

The panel in Figure 2-14 allows you to specify the parameters to be used for
reorganization of the VSAM sphere that you selected. These parameters are:

► Reorganization type

  This field defines the steps to be taken during reorganization. The possible
  values are:

  – AIXFULL: If AIUXFULL is specified for this field, then the data components
    of all alternate indexes of the VSAM sphere will be reorganized using the
    other parameters on this panel.

  – NOSPACE: If NOSPACE is set, then all of the components of the VSAM
    sphere will be reorganized.

  You can switch the value for this field by pressing F4.

► Increase

This value is used as a relative amount to increase the VSAM data set's allocated space by. The value is entered as a percentage, and it can vary from 0% to 99%.

► Backup name for ESDS

You need to specify the value for this field if the VSAM data set is an ESDS and if at least one of the VSAM sphere's entries has a value for New CI specified.

This backup name is needed to make a backup of the ESDS VSAM sphere immediately after the reorganization. It is required because the change of CI causes the change of RBAs, and the possible future recovery fails if it finds that actual RBAs in a data set differ from those recorded on the log stream.

> **Note:** The backup of an ESDS data set is made by means of IDCAMS REPRO.

► REORG mode

Can be either 1 for CICS-Offline or 2 for non-CICS.

CICS-Offline mode means that the VSAM data set must be taken offline from CICS before the reorganization. This mode generates the additional steps in the reorganization job, which take the VSAM data set offline from CICS prior to reorganization and bring the sphere back online to CICS after reorganization complete. CICS-Offline mode works in conjunction with CICS APPLID field.

Non-CICS mode means that the VSAM data set is not defined in CICS.

► CICS APPLID

This field is required if CICS-Offline was specified for REORG mode. The value of this field is the APPLID of the particular CICS region which receives the requests to take the sphere offline and back online.

> **Note:** CICS must be prepared to receive these requests.

► New CI

This is a set of fields, one per each VSAM sphere entry, such as data or index. The entries for VSAM sphere's alternate indexes, if any, are shown as well. Use these fields to specify the new CI sizes for the VSAM data set components.

The value for these fields is in bytes and is limited to 32768. Alternatively, you can specify a value in kilobytes. In this case, the value can have trailing K for kilobytes and is limited to 32 K.

Select F7=Bkwd or F8=Fwd to scroll through the list of VSAM sphere entries.

Select F12=Cancel to return to the VSAM Sphere list without proceeding to reorganization job construction.

VSAM sphere forward recovery

From the VSAM Sphere Utilities menu, you can select option 2 to perform a Forward Recovery. Alternatively, you can use the equivalent shortcut function key of F5. This option brings up the VSAM sphere parameters for forward recovery secondary window, as shown in Figure 2-15.

```
                        CICSVR VSAM sphere parameters

  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 . . . . . . : JTILLI1.CICSVR.FILE4

    New VSAM sphere name  . . _____

    Forward-recovery start time . . 07.325 00:05:26  (YY.DDD HH:MM:SS)

    Forward-recovery stop time  . . _____  (YY.DDD HH:MM:SS)

    Backup time . . . . . . . . . . 07.325 00:05:26  + (YY.DDD HH:MM:SS)

     Time format . . . . . Local  +   Backup type . Logical_____  +

     Volume for restore . . _____    Unit for restore . . . . . _____

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

Figure 2-15   Sample VSAM sphere parameters secondary window

This panel allows you to specify the parameters to be used for the forward recovery job, which include:

► New VSAM sphere name

  Optional field. Enter the name for the new VSAM sphere, if you want to run forward recovery to a new sphere, leaving the original name unaffected.

▶ Forward-recovery start time

Identifies the time of the earliest redo record that CICS VR uses to recover the selected VSAM sphere. If the backup is selected, this value is set automatically to the backup time.

▶ Forward-recovery stop time

Optional field. Identifies the time of the latest redo record that CICS VR uses to recover the selected VSAM sphere. If the field is left blank, the default value is the creation date and time of this forward recovery job.

▶ Backup time

Identifies backup creation date and time, if Logical is specified for the Backup type. Also, can be used to select the backup to restore from. To choose a backup, press F4 with the cursor on this field.

▶ Time format

The format of all the time stamps that are displayed on the panel. Can be either Local or GMT. To change time format, press F4 with the cursor on this field and choose the desired value.

▶ Backup type

Can be either None, Logical, Full Volume Dump, or No tie-ups. If the VSAM sphere must be restored prior to the recovery, the value needs to be Logical. If Hardware backup is being used, or if there is no a tie-up record on the log with the time stamp of the backup start, the value here needs to be No tie-ups.

▶ Volume for restore

Identifies the name of the volume to which the backup is restored. Applicable to Logical and Full Volume Dump backup types only.

▶ Unit for restore

Identifies the type of the volume to which the backup is restored. Applicable to Logical and Full Volume Dump backup types only.

Initially, the panel chooses the latest backup for the selected VSAM sphere and sets the start time and backup time values automatically. If you want to change the backup to restore the selected VSAM sphere from, press F4 with the cursor on the Backup time field. The CICSVR backup prompt list appears, as shown in Figure 2-16 on page 47.

```
                          CICSVR backup prompt list          Row 1 to 2 of 2

  Select one backup time, then press Enter.

  VSAM sphere  . . . : JTILLI1.CICSTS32.FILEA


  ---------------------- Data set backup information ----------------------
  S  Date    Time     Gen  Ver  Online  RP Date  RP Time  Type   Product
  _  07.334  13:53:32  00   0019  NO                        LOCAL  HSMLB
  _  07.334  13:18:01  01   0018  NO                        LOCAL  HSMLB
  **************************** Bottom of data ****************************










  Command ===> _____
   F1=Help     F7=Bkwd     F8=Fwd      F12=Cancel
```

Figure 2-16   CICSVR backup prompt list panel

To choose a backup, type s or S beside the backup time and press Enter. This
takes you back to the sphere parameters panel with start time and backup time
fields updated according to the chosen backup.

To use a non-DFSMShsm logical backup, you need to define a restore skeleton
to CICS VR that matches the product identifier of the backup that is known to
CICS VR for each of the selected spheres. See *CICSVR V4R2 Implementation
Guide and Reference,* SC34-6802, for more information about backup
notification, registration, and restore skeletons.

After you input the new VSAM sphere name on the VSAM sphere parameters panel and press Enter, the Log Stream Type input panel displays, as shown in Figure 2-17. This panel allows you to specify the log stream type.

```
 Administrate  Utilities  Tools  List  View  Help
 +-----------------------------------------------------------------------------+
 |                          CICSVR log stream type                             |
 |                                                                             |
 |  Specify log stream type. Press Enter to continue the job creation.         |
 |                                                                             |
 |    Log stream type  . . __  1.  MVS logger log stream                       |
 |                             2.  QSAM copy                                    |
 |                                                                             |
 |                                                                             |
 |  Command ===>                                                               |
 |   F1=Help     F5=GetDef   F6=SaveDef F12=Cancel                             |
 +-----------------------------------------------------------------------------+
     JTILLI1.CICSVR.FILE3                         00.001 00:00:00  N
     JTILLI1.CICSVR.FILE4                         00.001 00:00:00  N
     JTILLI1.CICSVR.HR.FILE1                      00.001 00:00:00  N
     JTILLI1.CICSVR.HR.FILE2                      00.001 00:00:00  N
     JTILLI1.CICSVR.HR.FILE3                      00.001 00:00:00  N
     JTILLI1.CICSVR.HR.FILE4                      00.001 00:00:00  N
     JTILLI1.CICSVR.PAYROLL.FILE1                 00.001 00:00:00  N

 Command ===> FWDREC
  F1=Help      F3=Exit      F4=Reorg     F5=FwdRec    F6=Backup    F7=Bkwd
  F8=Fwd      F10=Menu bar F11=Dereg    F12=Cancel
```

Figure 2-17   CICSVR Log Stream Type input panel

For the Log stream type, you specify:

► Whether the generated JCL should use an MVS logger log stream.

► Whether the generated JCL should use a QSAM copy of a log stream.

You can press F5=GetDef to display the stored default values, or you can press F6=SaveDef to save the current values as defaults.

After you have selected MVS logger log stream, the VSAM sphere forward
recovery options panel displays, as shown in Figure 2-18.

```
 Administrate  Utilities  Tools  List  View  Help
 +-----------------------------------------------------------------------------+
 | DWWPPFR3                   CICSVR forward recovery only                      |
 |                                                                             |
 | Press Enter to create a job with default values. Or, select one or more     |
 | choices below, and press Enter to override current values.                  |
 |                                                                             |
 |                                                                             |
 |                                                                             |
 |    S  Forward-recovery parameters related to:                               |
 |    _  Sequence checking                                                     |
 |    _  VSAM buffer pools                                                      |
 |    _  CICSVR exits                                                           |
 |    _  Selective forward recovery                                            |
 |                                                                             |
 |                                                                             |
 |                                                                             |
 | Command ===> _____                   |
 |  F1=Help    F12=Cancel                                                       |
 +-----------------------------------------------------------------------------+
      JTILLI1.CICSVR.HR.FILE4                          00.001 00:00:00  N
      JTILLI1.CICSVR.PAYROLL.FILE1                     00.001 00:00:00  N

 Command ===> FWDREC
  F1=Help      F3=Exit      F4=Reorg     F5=FwdRec    F6=Backup    F7=Bkwd
  F8=Fwd       F10=Menu bar F11=Dereg    F12=Cancel
```

Figure 2-18   VSAM sphere forward recovery options panel

This panel allows you to specify additional options of the generated forward
recovery job for the VSAM spheres that are selected. Press Enter to submit the
recovery job using the current parameter values. There might be defaults that are
stored in the recovery control data set (RCDS), so be sure to review them before
you submit the job.

Type S or s beside the parameters that you want to change, and then press Enter.
The parameters that you can change are:

► Sequence Checking

   To specify the actions that CICS VR takes if it encounters sequence errors
   during forward recovery

► VSAM Buffer Pools

   To specify LSR buffer space values to improve VSAM performance during
   forward recovery

► CICSVR Exits

   To specify exits to be used in forward recovery

► Selective Forward Recovery

   To specify which log records should or should not be applied during forward recovery.

Refer to *CICSVR V4R2 Implementation Guide and Reference,* SC34-6802 for forward recovery topics.

Select F12=Cancel to return to the VSAM Sphere parameters panel.

VSAM LSR Buffer Pools input panel

When you select the VSAM Buffer Pools option, the Automatic LSR VSAM Buffer Pools input panel displays, as shown in Figure 2-19. In this panel, you can enable the automatic LSR VSAM buffer pools or specify manual allocations.

```
+------------------------------------------------------------------------------+
|                       CICSVR VSAM buffer pools          Row 1 to 11 of 11    |
| Command ===> _____                  |
|                                                                              |
| For LSR, Enable or disable Automatic LSR buffers. If disable, specify the     |
| number of LSR buffers or leave all fields blank for NSR. Then press Enter.    |
|                                                                              |
|   Automatic LSR buffers ===> YES                                             |
|                                                                              |
|   Number of buffers  Pool size                                               |
|   _____            B512                                                    |
|   _____            B1K                                                     |
|   _____            B2K                                                     |
|   _____            B4K                                                     |
|   _____            B8K                                                     |
|   _____            B12K                                                    |
|   _____            B16K                                                    |
|   _____            B20K                                                    |
|   _____            B24K                                                    |
|   _____            B28K                                                    |
|   _____            B32K                                                    |
| **************************** Bottom of data ***************************** |
|  F1=Help     F5=GetDef   F6=SaveDef F10=AutoNO  F11=AutoYES F12=Cancel        |
+------------------------------------------------------------------------------+
```

Figure 2-19   Automatic LSR VSAM Buffer Pools input panel

The input fields in this panel are:

► Automatic LSR buffers

  – YES: To enable automatic LSR buffers calculation
  – NO: To provide manual input

► Number of buffers per pool size: To specify numeric allocation per pool size

You can define whether you want CICS VR to create and use VSAM local shared resource (LSR) buffer pools automatically, or not, during recovery or backout. In most cases, LSR processing is preferable to non-shared resource (NSR) processing. LSR processing can improve VSAM storage resource utilization.

Selective forward recovery

When you choose the Selective Forward Recovery option, the CICSVR Selective Forward Recovery secondary window display, as shown in Figure 2-20. In this panel, you can define selective groupings, either for inclusion or for exclusion, in the forward recovery job creation.

```
DWWPPSFR              CICSVR selective forward recovery


Select a command (INCLUDE or EXCLUDE) and specify one or more ID values.
Press Enter to save the command. The panel will clear allowing you to
enter values for another Include or Exclude command.  Press F12 to return
to the previously displayed panel.


Command (INCLUDE = 1, EXCLUDE = 2) _


              -------------------------- VALUE -------------------------
FILE  . . .  _____  _____  _____  _____  _____  _____
             _____  _____  _____  _____  _____  _____


TERMINAL  .  ____    ____    ____    ____    ____    ____
             ____    ____    ____    ____    ____    ____


TRANSACTION  ____    ____    ____    ____    ____    ____
             ____    ____    ____    ____    ____    ____


Command ===> _____
 F1=Help    F12=Cancel
```

Figure 2-20   CICSVR Selective Forward Recovery secondary window

Use this secondary window to generate one or more INCLUDE or EXCLUDE commands in the produced recovery job.

You can use the INCLUDE and EXCLUDE commands to specify which log records should or should not be applied to the VSAM spheres that are selected during the forward recovery.

Select a command (INCLUDE or EXCLUDE) and then enter one or more FILE IDs, TERMINAL IDs, or TRANSACTION IDs. Press Enter to save the command. You can enter another INCLUDE or EXCLUDE command or press F12 to return to the previously displayed panel.

CICS VR saves all entered INCLUDE and EXCLUDE commands until you return to the CICSVR VSAM Sphere List panel. Therefore, if you leave and return to this secondary window without going back to the VSAM Sphere List panel, all previously created INCLUDE and EXCLUDE commands still exist. Any newly created commands are also added to the resulting recovery job.

If you enter multiple EXCLUDE commands and INCLUDE commands, CICS VR processes all the EXCLUDE commands before the INCLUDE commands.

For more information about CICS VR selective forward recovery, refer to *CICSVR V4R2 Implementation Guide and Reference,* SC34-6802.

After you have selected a command, specify one or more ID values, then press Enter. CICS VR saves the command and adds it to the produced recovery job.

All entered EXCLUDE commands appear before all entered INCLUDE commands on the produced recovery job.

VSAM sphere backup

From the VSAM Sphere Utilities menu, you can select option 3 to take a backup of the selected VSAM spheres. Alternatively, you can use the equivalent shortcut function key of F6. This option opens the VSAM sphere backup parameters secondary window, as shown in Figure 2-21.

```
                   CICSVR VSAM sphere backup parameters

 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 . . . . . . : JTILLI1.CICSVR.FILE4

  VSAM sphere backup name

  Aggregate group name  . .

  Backup product name . . . HSMLB  (HSMLB, ABARS, DSSLC, DSSLD or other)

  Backup type . . . . . . . 3  (1-CICS Online, 2-CICS Offline, 3-non-CICS)

  CICS APPLID . . . . . . .



 Command ===>
  F1=Help        F7=PrevVSAM   F12=Cancel
```

Figure 2-21   CICSVR VSAM sphere backup parameters panel

This panel allows you to specify the parameters used to take a backup of the VSAM sphere that you selected. These parameters are:

► Backup name

   The name of the backup data set

► Aggregate group name

   The name of the ABARS aggregate group to take a backup of

   Note: To initiate an aggregate backup, type ABARS for the Backup product name.

- ▶ Backup product name

  The name of the backup product. This name is used by the panels to locate the appropriate JCL skeleton for backup.

- ▶ Backup type

  Can be either 1 for CICS-Online, 2 for CICS-Offline, or 3 for non-CICS.

  CICS-Online mode means that the VSAM data set remains open to CICS during the backup. This is possible, if the backup product supports the BWO (Backup-While-Open) interface only.

  CICS-Offline mode means that the VSAM data set should be taken offline from CICS before the backup processing. This mode generates the additional steps in the backup job, which take the VSAM data set offline from CICS prior to the backup, and bring the sphere back online to CICS after backup is done. CICS-Offline mode works in conjunction with CICS APPLID field.

  Non-CICS mode means that the VSAM data set is not defined in CICS.

- ▶ CICS APPLID

  This field is required if CICS-Offline was specified for Backup type. The value of this field is the APPLID of the particular CICS region which receives the requests to take sphere offline and back online.

  Note: CICS must be prepared to receive these requests.

Custom backup skeletons

CICS VR allows for any backup product to be used to take a backup of selected VSAM data sets. This support is provided by allowing custom backup skeletons. Figure 2-22 shows the backup skeleton using IDCAMS REPRO as a backup product. This skeleton is supplied in CICS VR V4 as an example of custom backup skeleton.

```
)CM*******************-START-OF-SPECIFICATIONS-***********************/
)CM**********************-PPS-STATEMENTS-****************************/
)CM                                                             */
)CM     @BANNER_START                             01            */
)CM     Licensed Materials - Property of IBM                    */
)CM                                                             */
)CM     5655-P30              DWWID1RP                          */
)CM                                                             */
)CM     (C) Copyright IBM Corp. 2005                           */
)CM                                                             */
)CM                                                             */
)CM                                                             */
)CM                                                             */
)CM     @BANNER_END                                            */
)CM                                                             */
)CM*******************-END-PPS-STATEMENTS-***********************/
//IDCREPRO EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//INFILE   DD DISP=SHR,DSN=&CSPH
//SYSIN    DD *
    REPRO    -
      INFILE(INFILE)  -
      OUTDATASET(&CBKDSN)
/*
//BKUPNTFY EXEC PGM=DWWNT,COND=(4,LT,IDCREPRO)
//DWWMSG   DD   SYSOUT=*
//DWWPRINT DD   SYSOUT=*
//DWWDMSG  DD   SYSOUT=*
//DWWIN    DD   *
  NOTIFY  DSN(&CSPH) -
          BN(&CBKDSN) -
          PROD(IDCRP) -
          ALLOC(Y)
/*
```

Figure 2-22   Example of a custom backup skeleton using IDCAMS REPRO

This skeleton is the framework for the future JCL job. To allow its customization, the skeleton contains the references to the variables that are used in CICSVR backup parameters panel. A variable is coded within a skeleton as a variable name preceded by an ampersand (&) character.

Several CICS VR variables are available for use within the custom backup skeleton:

► &CSPH

The original VSAM sphere name

► &CBKDSN

The backup name

► &CBKCSID

The CICS APPLID, if backup type of 2 is specified

► &CBKTYPE

The backup type value, can be 1, 2 or 3 as specified on the Backup parameters panel

To use the custom backup skeleton, follow these steps:

1. Create a skeleton.

2. Name a skeleton according to the form DWW*prdnm*, where *prdnm* is a five character product name abbreviation, with the character 1 in the third place. For example, a product name *IDCRP* produces a skeleton named *DWWID1RP*.

3. Copy the new skeleton to one of the libraries that are used in your DWWSLIB concatenation for the CICS VR panels.

4. Open the panels and navigate to the Backup parameters window.

5. Specify the required parameters. For the Backup product name, enter the original five character product name abbreviation. For example, if you want to use the *DWWID1RP* skeleton, specify *IDCRP* for the Backup product name.

2.4.6 VSAM sphere list sort

Figure 2-23 shows an example of how to use View menu to choose sort criteria.

```
 Administrate  Utilities  Tools  List  View  Help
 +----------------------------------------------------------------------------+
 | DWWPPVSR                 CICSVR VSAM sphere list sort                       |
 |                                                                            |
 | Select the column to sort by, then press Enter.                            |
 |                                                                            |
 |                          __  1.  VSAM sphere                                |
 |                              2.  Ascending last archive time                |
 |                              3.  Descending last archive time               |
 |                                                                            |
 | Command ===> _____               |
 |  F1=Help    F12=Cancel                                                      |
 +----------------------------------------------------------------------------+
      JTILLI1.CICSVR.FILE3                        00.001 00:00:00  N
      JTILLI1.CICSVR.FILE4                        00.001 00:00:00  N
      JTILLI1.CICSVR.HR.FILE1                     00.001 00:00:00  N
      JTILLI1.CICSVR.HR.FILE2                     00.001 00:00:00  N
      JTILLI1.CICSVR.HR.FILE3                     00.001 00:00:00  N
      JTILLI1.CICSVR.HR.FILE4                     00.001 00:00:00  N
      JTILLI1.CICSVR.PAYROLL.FILE1                00.001 00:00:00  N

 Command ===>
  F1=Help     F3=Exit     F4=Reorg    F5=FwdRec   F6=Backup   F7=Bkwd
  F8=Fwd      F10=Menu bar F11=Dereg   F12=Cancel
```

Figure 2-23   Example of VSAM sphere list sort criteria input

You can select the sorting criteria to display the VSAM spheres, as follows:

► Alphabetically, by VSAM sphere name

► By the time of last archive of the sphere, starting with the oldest archived
  sphere

► By the time of last archive of the sphere, starting with the most recently
  archived sphere

2.5 List CICS TS log streams

The list CICS TS log streams option allows you to work with a list of CICS TS log streams. When you select option 2 on the main menu and press Enter, the Log Stream List panel displays, as shown in Figure 2-24.

```
 Administrate  List  View  Help
 --------------------------------------------------------------------------------
                            CICSVR log stream list              Row 1 to 5 of 5

Select one or more log streams, then select an action. This list contains log
streams and CICSVR log stream copies. Log streams do not have a copied date
and time.


  S  Log stream                                Copied until (GMT)
  _  CICSMVS.BL01.FILELOG
  _  CICSMVS.CICSVRAR.FILELOG
  _  DWW.JTILLI1.UNDOLOG
  _  DWW.UNDOLOG
  _  JTILLI1.CICSVR.FILELOG
******************************* Bottom of data ********************************




Command ===> _____
 F1=Help      F3=Exit      F4=ListDet   F5=ListSAM   F7=Bkwd      F8=Fwd
F10=Menu bar F11=Dereg     F12=Cancel
```

Figure 2-24   CICSVR log stream list

To select one or more log streams or log stream copies that are registered to CICS VR, type s or S beside the log stream name. Then, select an action to perform on the selected log streams.

The time when the log stream copy ended is displayed. Log streams do not have a copied date and time.

Some options can be selected directly with function keys:

► F4=ListDet: To list detailed information for selected log streams.

► F5=ListSAM: To list SAM copies of selected log streams.

► F11=Dereg: To deregister selected log streams or SAM log stream copies from the recovery control data set (RCDS).

2.5.1 Menus for the Log Stream List panel

This section describes menu options on the Log Stream List panel:

► **Administrate**

Allows you to deregister selected log streams from RCDS or to exit the log stream panel. Options include:

1. Deregister... F11
2. Exit   F3

► **List**

Lets you list log stream details or data set name. Options include:

1. List details... F4
2. List SAM copies... F5

► **View**

Lets you restrict or sort the list of objects that appear on the panel. The available actions are:

1. All
2. Include...
3. Sort...

► **Help**

Provides relevant help information in the following categories:

1. Using help...
2. General help... F1
3. Index...
4. Keys help...
5. Command help...
6. Product information

2.5.2 Logs Stream Administrate menu options

Figure 2-25 shows the Administrate menu options.

```
Administrate  List  View  Help
  +----------------------------+---------------------------------------------
  | _ 1. Deregister ...    F11 |  log stream list              Row 1 to 5 of 5
  |   2. Exit              F3  |
  +----------------------------+ en select an action. This list contains log
  streams and CICSVR log stream copies. Log streams do not have a copied date
  and time.


   S  Log stream                               Copied until (GMT)
   _  CICSMVS.BLO1.FILELOG
   _  CICSMVS.CICSVRAR.FILELOG
   _  DWW.JTILLI1.UNDOLOG
   _  DWW.UNDOLOG
   _  JTILLI1.CICSVR.FILELOG
  ***************************** Bottom of data ********************************




  Command ===> _____
   F1=Help     F3=Exit     F4=ListDet   F5=ListSAM   F7=Bkwd      F8=Fwd
   F10=Menu bar F11=Dereg   F12=Cancel
```

Figure 2-25   Example of Log Stream Log List Administrate menu options

The first option allows you to deregister the selected log streams from the
recovery control data set (RCDS). When you deregister a log stream, all
information about the log stream is deleted from the RCDS.

Type 1 beside the first option and press Enter, or press Enter with the cursor on
the Deregister option.

When you deregister one or more log streams, a deregister verification window
displays for each deregistered log stream.

2.5.3 Log stream details list

You can select the log streams by typing S or s beside the item. When you press F4=ListDet, a log stream details list displays. Figure 2-26 shows an example of a Log Stream Details List.

```
                        CICSVR log stream details list

  Select one or more errors, then press Enter to get more information. Or,
  press Enter to show the log stream details list for the next selected log
  stream. Or, press F12 to cancel the list sequence.

    Log stream . . . . : DWW.JTILLI1.UNDOLOG
    First block number :        0
    Last block number  :        0
    First time copied  : 00.001 00:00:00  (local)
                         00.001 00:00:00  (GMT)
    Last time copied . : 00.001 00:00:00  (local)
                         00.001 00:00:00  (GMT)
    Last copy time . . : 00.001 00:00:00  (GMT)


    S  Information & error
  **************************** Bottom of data *****************************



  Command ===> _____
   F1=Help     F7=Bkwd      F8=Fwd      F12=Cancel
```

Figure 2-26   Log stream details list

This secondary window displays information about the log stream that is selected. This information includes:
► Log stream data set name
► First and last copied block numbers
► Time of the first copied record, both local time and GMT
► Time of last copied record, both local time and GMT
► Last time the log stream was copied, GMT only
► Any information or error messages relating to the log stream

To get more information about any of the messages, type S or s beside the selected messages and press Enter. A details window displays for each log stream that you selected.

Select F12=Cancel to return to the CICSVR Log Stream List without seeing the detail lists for any remaining selected log streams.

2.5.4 CICSVR SAM copy list

You can use the Log Stream Copy utility to copy an MVS log stream into a Sequential Access Method (SAM) copy, which is essential for remote recovery. When you make a Log Stream Copy run, the information about the copy (or copies) is stored in RCDS. Refer to *CICSVR V4R2 Implementation Guide and Reference,* SC34-6802 for more details on SAM. Figure 2-27 displays the result when you perform the F5=ListSAM action under the List Menu bar task item.

```
CICSVR SAM copy list              Row 1 to 1 of 1

Select one or more SAM copies, then select an action.

  Log stream . . . . : JTILLI1.CICSVR.FILELOG

  S  SAM log stream copy                        Copy time (GMT)
  _  JTILLI1.CICSVR.FILELOG.COPY                 07.330 13:28:13
**************************** Bottom of data *****************************












 Command ===> _____
  F1=Help     F4=ListDet  F7=Bkwd     F8=Fwd     F11=Dereg   F12=Cancel
```

Figure 2-27   SAM Copy List panel

QSAM copies of the log streams are registered in the recovery control data set (RCDS) when the CICS VR Log Stream Copy utility is invoked. You can select them by placing S or s beside the QSAM copy name and then selecting an action.

The last copy time for each QSAM copy is displayed in GMT.

In this panel, you can perform the following actions:

► F4=ListDet: To list detailed information for each QSAM copy
► F11=Dereg: To deregister the selected QSAM copies from the RCDS

When you deregister a QSAM copy, all information about the QSAM copy is deleted from the RCDS. You can also choose to delete and uncatalog the copy. If the copy is stored on tape, it is uncataloged but not deleted.

A QSAM copy list displays for each log stream that you selected in the CICSVR-copied log stream list.

Select F12=Cancel to return to the CICS VR-copied log stream list without seeing the QSAM copy lists for any remaining selected log streams.

2.5.5 Log Stream List Sort

There is a panel to choose sort options when displaying the selected log streams. Figure 2-28 shows the available sort options.

```
  Administrate  List  View  Help
 +-----------------------------------------------------------------------------+
 |                          CICSVR log stream list sort                        |
 |                                                                             |
 | Select the column to sort by, then press Enter.                             |
 |                                                                             |
 |            __  1.  Log stream                                               |
 |                2.  Ascending copied-until time                              |
 |                3.  Descending copied-until time                             |
 |                                                                             |
 | Command ===> _____               |
 |  F1=Help    F12=Cancel                                                      |
 +-----------------------------------------------------------------------------+
     DWW.UNDOLOG
     JTILLI1.CICSVR.FILELOG
******************************* Bottom of data ********************************




 Command ===>
  F1=Help      F3=Exit      F4=ListDet   F5=ListSAM   F7=Bkwd      F8=Fwd
 F10=Menu bar F11=Dereg     F12=Cancel
```

Figure 2-28   Log Stream List Sort options

The Log Stream List Sort options are:

► Log stream name
► Least-recently copied record

▶ Most-recently copied record

Select **All** to list all of the log streams with QSAM copies registered to CICS VR. Use this option to refresh the CICSVR log stream list after you have selected **Include** or **Sort**.

Type 1 beside the first option to use All, or press Enter while the cursor is on the All option.

2.6 List CICS TS Log of Logs

This option applies to CICS TS only. It allows you to work with a list of Log of Logs. When you select option 3 on the main menu and press Enter, the Log of Logs List panel displays, as shown in Figure 2-29.

```
 Administrate  Utilities  List  View  Help
 -----------------------------------------------------------------------------
                          CICSVR log of logs list            Row 1 to 1 of 1

Select one or more log of logs, then select an action.


                              Last scan
  S  Log of logs            time (GMT)    DD name
  _  CICSMVS.CICSVRAR.DFHLGLOG   07.330 10:20
****************************** Bottom of data ********************************












 Command ===> _____
  F1=Help      F3=Exit      F4=ListDet    F5=ScanAll   F6=Register  F7=Bkwd
  F8=Fwd     F10=Menu bar F11=Dereg     F12=Cancel
```

Figure 2-29   CICSVR Log of Logs List panel

2.6.1 Menus for the Log of Logs List panel

This section describes the available menu options from the Log of Logs List panel:

► **Administrate**

Allows you to register and deregister a log of logs in the recovery control data set (RCDS). Options include:

1. Register...   F6
2. Deregister... F11
3. Exit   F3

► **Utilities**

Lets you perform a scan of all logs of logs. Options include:

1. Scan all   F5
2. Scan selected
3. Scan listed

► **List**

Allows listing of detailed information for each log of logs. Options include:

1. List details... F4

► **View**

Lets you restrict or sort the list of objects that appear on the panel. The available options are:

1. All
2. Include...
3. Sort...

► **Help**

Provides relevant help information in the following categories:

1. Using help...
2. General help... F1
3. Index...
4. Keys help...
5. Command help...
6. Product information

2.6.2 Log of Logs Administrate menu

Figure 2-30 displays the Administrate actions that you can perform on selected log of logs.

```
 Administrate  Utilities  List  View  Help


 +------------------------+---------------------------------------------------
 |   1. Register...   F6  | ICSVR log of logs list             Row 1 to 1 of 1
 |   2. Deregister... F11 |
 |   3. Exit          F3  | gs, then select an action.
 +------------------------+

                                 Last scan
   S  Log of logs              time (GMT)    DD name
   _  CICSMVS.CICSVRAR.DFHLGLOG  07.330 10:20
 ****************************** Bottom of data ******************************










 Command ===> _____
  F1=Help     F3=Exit      F4=ListDet   F5=ScanAll   F6=Register  F7=Bkwd
  F8=Fwd      F10=Menu bar F11=Dereg    F12=Cancel
```

Figure 2-30   Log of Logs Administrate menu

The Administrate Register function allows you to register information about a log of logs. When you register a log of logs, its name is stored in the recovery control data set (RCDS). Detailed information is extracted by the scan utility.

You provide the name of the log of logs and specify the time at which you want the scan utility to start. Do this by typing 1 in the input field or pressing Enter while the cursor is placed on the Register option.

You can choose to deregister a log of logs. When you deregister a log of logs, the information about this log of logs is removed from the RCDS.

2.6.3 Log of Logs registration

Figure 2-31 shows the secondary window of the log of logs register panel.

```
 Administrate  Utilities  List  View  Help
 +------------------------------------------------------------------------------+
 |                         CICSVR log of logs register                          |
 | Command ===> _____                |
 |                                                                              |
 | 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)                    |
 |                                                                              |
 |  F1=Help    F12=Cancel                                                       |
 +------------------------------------------------------------------------------+
```

Figure 2-31 Log of logs register panel

You can specify the name of the log of logs that you want to register to the CICS VR RCDS. Other information is extracted from the log of logs by the scan utility.

A log of logs data set name has 1-26 characters and follows the MVS data set naming convention.

If you do not want to register a log of logs, press F12=Cancel. This action returns you immediately to the Log of Logs List panel.

2.6.4 Scan Log of Logs

Figure 2-32 displays the Utilities menu of the Log of Logs list panel.

```
  Administrate  Utilities  List  View  Help
 -------------+-------------------------+----------------------------------
              | _ 1. Scan all       F5 | gs list             Row 1 to 1 of 1
              |   2. Scan selected     |
 Select one or|   3. Scan listed       |  an action.
              +-------------------------+

                             Last scan
   S  Log of logs            time (GMT)    DD name
   _  CICSMVS.CICSVRAR.DFHLGLOG   07.330 10:20
 ***************************** Bottom of data ********************************




 Command ===>
  F1=Help      F3=Exit      F4=ListDet   F5=ScanAll   F6=Register  F7=Bkwd
  F8=Fwd       F10=Menu bar F11=Dereg    F12=Cancel
```
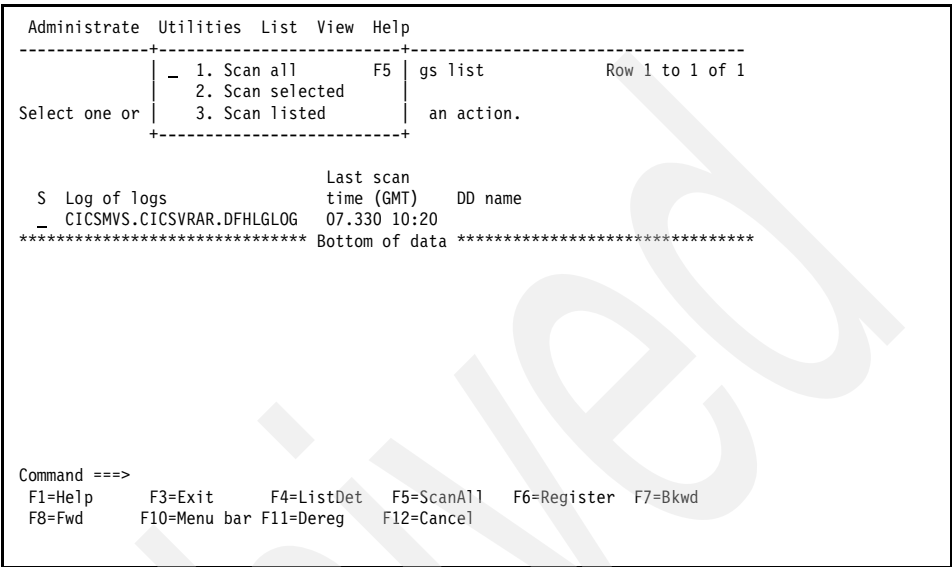
Figure 2-32   Log of Logs list Utilities menu

Select the first option, Scan all, to invoke a scan utility for all log of logs that are
registered in the recovery control data set (RCDS). The scan utility extracts
information from the log of logs and stores it in the recovery control data set
(RCDS).

Type 1 in the input field and press Enter to use Scan all, or press Enter with the
cursor on the Scan all option.

Select the second option, Scan selected, to invoke a scan of only the log of logs
that are selected on the log of logs list. The scan utility extracts information from
the log of logs and stores it in the recovery control data set (RCDS).

Type 2 in the input field and press Enter to use Scan selected, or press Enter with
the cursor on the Scan selected option.

Select the third option, Scan listed, to invoke a scan of only the log of logs that
are currently listed on the log of logs list. Any log of logs that does not appear on
the log of logs list (if it was previously filtered) will not be scanned. The scan utility
extracts information from the log of logs and stores it in the recovery control data
set (RCDS).

Type 3 in the input field and press Enter to use Scan listed, or press Enter with the cursor on the Scan Listed option.

2.6.5 Log of logs details list

Figure 2-33 is the log of logs details list panel. This window displays information about the log of logs that you selected.

```
                      CICSVR log of logs details list

  Select one or more errors, then press Enter to get more information. Or,
  press Enter to show the log of logs list for the next selected log of
  logs. Or, press F12 to cancel the list sequence.

    Log of logs  . . . : CICSMVS.CICSVRAR.DFHLGLOG
    First block number :                  1
    Last block number  :               2025
    First timestamp  . : 07.324 14:11:08  (local)
                         07.324 13:11:08  (GMT)
    Last timestamp . . : 07.327 14:20:57  (local)
                         07.327 13:20:57  (GMT)
    Last scan time . . : 07.330 10:20:30  (GMT)


    S   Information & error
  **************************** Bottom of data ****************************



  Command ===> _____
   F1=Help     F7=Bkwd     F8=Fwd     F12=Cancel
```

Figure 2-33   Log of logs details list

This window displays information about the log of logs that you selected, which includes:
► The log of logs data set name
► The first and last block numbers that are scanned
► The first and last time stamps that are scanned, both local time and GMT
► The last time the scan utility was run, GMT
► Any information or error messages relating to the log of logs

To see more information about any of the messages, type S or s beside the selected messages and press Enter. A window displays for each log of logs that you selected.

Select F12=Cancel to return to the CICSVR Log of Logs List without seeing the Detailed Lists for any remaining selected logs of logs.

2.6.6 Log of logs list include panel

Figure 2-34 shows the log of logs list include panel.

```
 Administrate  Utilities  List  View  Help
 +--------------------------------------------------------------------------+
 |                    CICSVR log of logs list include                       |
 | Command ===> _____            |
 |                                                                          |
 | Specify search criteria to include in the log of logs list, then press   |
 | Enter.                                                                   |
 |                                                                          |
 |   Log of logs  . . . . *_____                             |
 |                                                                          |
 |   Scanned after  . . .  _____ (YY.DDD HH:MM:SS)                    |
 |   Scanned before . . .  _____ (YY.DDD HH:MM:SS)                    |
 |                                                                          |
 |  F1=Help    F12=Cancel                                                   |
 +--------------------------------------------------------------------------+



 F1=Help     F3=Exit      F4=ListDet   F5=Scan     F6=Register  F7=Bkwd
 F8=Fwd      F10=Menu bar F11=Dereg    F12=Cancel
```

Figure 2-34   Log of logs list include panel

In this panel, you can provide search criteria to list the log of logs. The log of logs data set name has 1-26 characters and uses the MVS data set naming convention.

An asterisk (*) represents any number of characters, and the percent sign (%) represents a single-character wild card.

2.6.7 Log of logs list sort panel

Figure 2-35 shows the log of logs sort criteria input panel.

```
 Administrate  Utilities  List  View  Help
 +------------------------------------------------------------------------------+
 |                         CICSVR log of logs list sort                         |
 | Command ===> _____                   |
 |                                                                              |
 | Select the column to sort by, then press Enter.                              |
 |                                                                              |
 |                          __  1.  Log of logs                                 |
 |                              2.  Ascending last scan time                    |
 |                              3.  Descending last scan time                   |
 |                                                                              |
 |   F1=Help    F12=Cancel                                                      |
 +------------------------------------------------------------------------------+




     F1=Help      F3=Exit      F4=ListDet   F5=Scan      F6=Register  F7=Bkwd
     F8=Fwd      F10=Menu bar F11=Dereg    F12=Cancel
```

Figure 2-35   Log of logs list sort panel

You can sort the log of logs list as follows:

► Alphabetically, by log of logs data set name

► By the time and date when the scan utility was last invoked, starting with the least-recently scanned log of logs

► By the time and date when the scan utility was last invoked, starting with the most-recently scanned log of logs

Type a numerical choice beside the first option and press Enter, or you can press Enter while the cursor is on the chosen option.

The resulting Log of Logs List panel displays with the log of logs list sorted in the option that you specify.

2.7 Specify criteria for automatic deregistration

You can use this option to customize the criteria for deregistration of the various assets from recovery control data set (RCDS). The types of these assets are:

► Log streams
► Backups
► Change Accumulation data sets

When you select option 4 on the main menu and press Enter, the CICSVR automatic deregister criteria menu displays, as seen in Figure 2-36.

```
 Help
 -------------------------------------------------------------------------------
                   CICSVR automatic deregister criteria menu

Select one and press Enter.




                    _  1.  Automatic log stream deregister
                       2.  Automatic backup deregister
                       3.  Automatic change accumulation deregister




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Command ===> _____
 F1=Help      F3=Exit     F10=Menu bar F12=Cancel
```

Figure 2-36   CICSVR automatic deregister criteria menu

In the automatic deregister criteria menu, you specify the deregistration options for log stream blocks and log stream copies, backups, and change accumulation data sets.

2.7.1 Automatic log stream deregister

The CICS VR automatic log stream deregistration feature can deregister log stream blocks or copies from the RCDS automatically.

You can use the first option, automatic log stream deregister, to set various deregistration criteria for the log streams. When you type 1 in the input field and press Enter, the CICSVR automatic log stream deregister panel displays, as shown in Figure 2-37.

```
                    CICSVR automatic log stream deregister

 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


 Command ===>
  F1=Help      F11=IndDereg    F12=Cancel
```

Figure 2-37   CICSVR automatic log stream deregister panel

To turn automatic deregistration on, type a value for any of the retention period fields.

Log stream blocks that are older than the retention period are deleted when the CICS VR Log Of Logs Scan utility is invoked. Log stream copies that are older than the retention period are deregistered from the recovery control data set (RCDS) when the CICS VR Log Of Logs Scan utility is invoked. You can also choose to uncatalog and delete these log stream copies. If any of these log stream copies are stored on tape, they cannot be deleted.

To set the automatic deregistration of log stream blocks, type the number of days for the retention period for blocks, and press Enter.

To set the automatic deregistration of log stream copies:

1. Specify the number of days for the retention period for copies.

2. Type either 1 or 2 in the "Uncatalog and delete" field to choose whether the copies are uncataloged and deleted.

3. Press Enter to save changes in the recovery control data set (RCDS).

> **Note:** If you specify zero (0) for the retention period, the log streams are deregistered at the next run of CICS VR Log of Logs Scan utility.

2.7.2 Automatic individual log stream deregister

There is an option to set log stream-specific retention periods. To invoke this option, press F11=IndDereg in the automatic deregister criteria menu. The CICSVR individual log stream deregister panel displays, as shown in Figure 2-38.

```
                   CICSVR individual log stream deregister     Row 1 to 6 of 6

   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
      CICSMVS.BL01.FILELOG           LS    ___
      CICSMVS.CICSVRAR.DFHLGLOG      LOL   ___
      CICSMVS.CICSVRAR.FILELOG       LS    ___
      DWW.JTILLI1.UNDOLOG            LS    ___
      DWW.UNDOLOG                    LS    ___
      JTILLI1.CICSVR.FILELOG         LS    ___
   **************************** Bottom of data *****************************




   Command ===> _____
    F1=Help     F7=Bkwd     F8=Fwd     F12=Cancel
```

Figure 2-38   CICSVR individual log stream deregister panel

In this panel, you specify the retention period that is specific to each log stream that is registered in RCDS. To specify the retention period for a particular log

stream, type the number of days in the "Retention period" field next to the log stream name.

Log stream blocks that are older than the retention period are deleted when the CICS VR Log Of Logs Scan utility is invoked.

2.7.3 Automatic backup deregister

The CICS VR automatic backup deregistration feature can deregister backups from the RCDS automatically.

You can use the second option on Automatic deregistration criteria panel, Automatic backup deregister, to set various deregistration criteria for backups. When you type 2 in the input field and press Enter, the CICSVR automatic backup deregister panel displays, as shown in Figure 2-39.

```
                      CICSVR automatic backup deregister

 Turn automatic deregistration for backups ON by specifying a value for the
 Retention setting option, then press Enter. Turn automatic deregistration
 for backups OFF by leaving the Retention setting option blank, then press
 Enter.

   Automatic backup deregister  . . . . . : OFF

   Retention setting  . . . . . . . . . . _      (1=Retention period,
                                                  2=Log data, 3=Catalog)

   Retention period (if Retention period
   selected as Retention setting) . . . . . ___  (Number of days)

   Uncatalog and delete . . . . . . . . . . _    (1=Yes, 2=No)




 Command ===> _____
  F1=Help    F12=Cancel
```

Figure 2-39   CICSVR automatic backup deregister panel

To turn CICS VR automatic backup deregistration on, choose the retention type and specify retention criteria. The retention type, or retention setting, can be one of the following settings:

► **Retention period**

The backups are deregistered based on the period of time, meaning that CICS VR deregisters backups that are older than the number of days that are specified in the Retention period field. The backup creation date is used to determine the backup age.

► **Log data**

The backups are deregistered based on the retention period that is specified for log streams. With this option selected, all the backups that are older than the largest value of the specified log stream blocks and log stream copies retention period settings (if both are specified) are deregistered from the RCDS. If no retention period is specified for log stream blocks or log stream copies, there is no automatic backup deregistration with this option selected.

> **Note:** Automatic backup deregistration based on the Log data will occur if general retention settings for the log streams is specified only. Thus, no automatic deregistration is initiated if there are just individual log stream retention settings.

► **Catalog**

The backups are deregistered when an entry for the backup is not returned from the ICF catalog. This option does not apply to DFSMShsm backups.

Optionally, CICS VR also can uncatalog and delete backup data sets when they are deregistered from the RCDS if a value of 1 (Yes) is specified in the Uncatalog and delete input field.

> **Note:** CICS VR will not attempt to uncatalog and delete a DFSMShsm logical backup or ABARS backups. Also, there will be no any attempts to delete the backup that resides on tape.

CICS VR automatic backup deregistration applies to all VSAM spheres that were registered to the CICS VR RCDS through the CICS VR file copy notification service, including registered DFSMShsm and DFSMSdss logical backups, ABARS backups, or by NOTIFY utility.

To turn Automatic backup deregistration off, clear all the fields and press Enter.

2.7.4 Automatic change accumulation data sets deregister

The CICS VR automatic change accumulation (CA) data sets deregistration feature can deregister CA data sets from the RCDS automatically.

You can use the third option on automatic deregistration criteria panel, Automatic change accumulation deregister, to set various deregistration criteria for CA data sets. When you type 3 in the input field and press Enter, the CICSVR automatic change accumulation deregister panel displays, as shown in Figure 2-40.

```
              CICSVR automatic change accumulation deregister


 Specify the automatic deregister criteria for change accumulation data
 sets, 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)

 Command ===> _____
  F1=Help    F12=Cancel
```

Figure 2-40   CICSVR automatic change accumulation deregister panel

To turn CICS VR automatic CA data sets deregistration on, specify the number of days to keep the CA data sets in the Retention period field.

Optionally, CICS VR can uncatalog and delete CA data sets when they are deregistered from the RCDS. If a CA data set is stored on tape, it can only be deregistered and uncataloged.

2.8 List CICS Backout Failed spheres list

This option allows you to work with a list of the sphere that is registered to CICS VR by CICS notification at backout failure. When you select option 7 on the main menu and press Enter, the CICS Backout Failed sphere list panel displays, as shown in Figure 2-41.

```
 Administrate  Utilities  List  Help
 -------------------------------------------------------------------------------
                        CICS Backout Failed sphere list         Row 1 to 1 of 1

 Select one sphere, then select an action.


  S  VSAM sphere                                    Time registered  Error
  _   JTILLI1.CICSTS.FILE1                          07.330 18:03:54  IOERROR
 ****************************** Bottom of data ********************************













 Command ===> _____
  F1=Help      F3=Exit     F4=ListDet   F5=Recov     F6=Reorg     F7=Bkwd
  F8=Fwd     F10=Menu bar F11=Dereg    F12=Cancel
```

Figure 2-41   CICS Backout Failed sphere list

To select a CICS Backout Failed sphere that is registered to CICS VR, type s or S beside the sphere name. Then, select an action to perform on the selected sphere.

The time of CICS Backout Failure registration displays along with the backout failed error condition. The error value can be:

IOERROR   I/O error occurred
NOSPACE   Data set is out of storage
AIXFULL   No space in non-unique alternate index

Some options can be selected directly with function keys:

- ► F4=ListDet: To list the detailed information for selected sphere.
- ► F5=Recov: To create and submit a forward recovery job. Applicable to IOERROR only.
- ► F6=Reorg: To create and submit a reorganization job. Applicable to AIXFULL or NOSPACE only.
- ► F11=Dereg: To deregister the selected sphere from the recovery control data set (RCDS).

2.8.1 Menus for the CICS Backout Failed list

This section describes the menu options on the CICS Backout Failed sphere list panel:

- ► **Administrate**

  Allows you to deregister selected CICS Backout Failed spheres from RCDS, to set automation level, or to exit the panel. Options include:

  1. Deregister... F11
  2. Automation
  3. Exit F3

- ► **Utilities**

  Allows you to specify a utility you want to use on the selected sphere. The available actions are:

  1. Recovery... F5
  2. Recovery and Backup...
  3. Reorganization... F6

- ► **List**

  Lets you list the details of the selected sphere:

  1. List details... F4

- ► **Help**

  Provides relevant help information in the following categories:

  1. Using help...
  2. General help... F1
  3. Index...
  4. Keys help...
  5. Command help...
  6. Product information

2.8.2 CICS Backout Failed sphere list Administrate menu

Figure 2-42 shows the Administrate menu options.

```
 Administrate  Utilities  List  Help
+------------------------+--------------------------------------------------
| _  1. Deregister... F11 | Backout Failed sphere list        Row 1 to 1 of 1
|    2. Automation        |
|    3. Exit         F3   | ct an action.
+------------------------+

  S  VSAM sphere                                Time registered  Error
     JTILLI1.CICSTS.FILE1                        07.330 18:03:54  IOERROR
****************************** Bottom of data *******************************










Command ===>
 F1=Help      F3=Exit      F4=ListDet   F5=Recov    F6=Reorg     F7=Bkwd
 F8=Fwd      F10=Menu bar F11=Dereg    F12=Cancel
```

Figure 2-42   Example of CICS Backout Failed sphere list Administrate menu

With the first option, you can deregister the selected sphere from the recovery
control data set (RCDS). When you deregister a sphere, all information about the
CICS Backout Failure on that sphere is deleted from the RCDS.

Type 1 beside the first option and press Enter, or press Enter with the cursor on
the Deregister option.

When you deregister a sphere, a deregister verification window displays.

With the second option, you can set the automation level to be maintained by
CICS VR for the notifications on CICS Backout failure.

Type 2 beside the first option and press Enter, or press Enter with the cursor on the Automation option. The CICSVR Automation Level window displays, as shown in Figure 2-43.

```
                         CICSVR Automation Level

 Press F11(TurnON) or F10(TurnOFF) to change the CICSVR recovery automation
 level. Then Press Enter to save the default or F12 to cancel.


   CICSVR Recovery/Reorganization
   Automation (ON/OFF)  . . . . . . . . : ON




 Command ===> _____
  F1=Help    F10=TurnOFF F11=TurnON  F12=Cancel
```

Figure 2-43   CICSVR Automation Level panel

In the Automation Level panel, you can control the automatic forward recovery or reorganization for CICS Backout Failed sphere. The automation level can be either ON or OFF:

On   Forward recovery and reorganization jobs are constructed automatically, no user assistance is required. A recovery or reorganization job is tuned and submitted on the VSAM sphere when a CICS Backout failure is alerted and registered by CICS VR.

Off   No recovery or reorganization job is constructed. User assistance is required to construct and submit the recovery or reorganization job, using the CICS Backout Failed sphere list panel shown on Figure 2-42 on page 80.

To turn automation on, press F10=TurnON. To turn automation off, press F11=TurnOFF.

2.8.3 CICS Backout Failed sphere details list

You can select a sphere by typing s or S beside the sphere name. When you press F4=ListDet, a CICS Backout Failed sphere details list displays, as shown in Figure 2-44.

```
               CICS Backout Failed sphere details list

  VSAM sphere . . . . . . : JTILLI1.CICSTS.FILE1
  File name . . . . . . . : FILEA
  Registration time . . . : 07.330 18:03:54
  Modification time . . . : 07.330 18:03:54
  Application ID  . . . . : IYCZZ320
  Error type  . . . . . . : IOERROR
  Recovery status . . . . : ACCEPTED
  RLS . . . . . . . . . . : NO
  Logstream . . . . . . . : JTILLI1.CICSTS.DFHLOG




 Command ===> _____
  F1=Help    F12=Cancel
```

Figure 2-44   CICS Backout Failed sphere details list

This secondary window displays information about the sphere that is selected, which includes:

VSAM sphere	The name of the VSAM data set
File name	The CICS file name for the VSAM data set
Registration time	The time of notification of CICS Backout failure
Modification time	The time when the entry for the VSAM sphere was updated
Application ID	Application identifier of the CICS region that initiated the registration of Backout failure
Error type	CICS Backout failure error condition, can be IOERROR, AIXFULL, or NOSPACE
Recovery status	Current status of the recovery or reorganization process. This describes the particular phase during automatic recovery or reorganization. For example, ACCEPTED or ACCEPRLS is the initial status after CICS Backout failure registration. For a complete list of the values for this field, see the Online help for this panel by pressing F1=Help.

RLS	Indicates if the sphere was opened in RLS mode
Logstream	Log stream name to be used by forward recovery

2.8.4 CICS Backout Failed sphere list Utilities menu

Figure 2-45 shows the Utilities menu options for CICS Backout Failed sphere details list.

```
 Administrate  Utilities  List  Help
--------------+-----------------------------+-----------------------------
              | _  1. Recovery...          F5 | e list          Row 1 to 1 of 1
              |    2. Recovery and Backup... |
Select one sp |    3. Reorganization       F6 |
              +-----------------------------+

  S  VSAM sphere                                   Time registered  Error
  S  JTILLI1.CICSTS.FILE1                          07.330 18:03:54  IOERROR
****************************** Bottom of data ********************************













Command ===>
 F1=Help        F3=Exit       F4=ListDet    F5=Recov     F6=Reorg      F7=Bkwd
 F8=Fwd       F10=Menu bar F11=Dereg      F12=Cancel
```

Figure 2-45   Example of CICS Backout Failed sphere list Utilities menu

The options available in this menu are:

► **Recovery**

To create and submit a recovery job

► **Recovery and backup**

To create and submit a recovery job with a backup step

► **Reorganization**

To create and submit a reorganization job

In a recovery and a recovery with a backup jobs, CICS VR performs the following operations on a selected VSAM sphere:

► Restore, which re-creates a VSAM sphere from a backup known to CICS VR

► Forward recovery, which redoes updates on the restored sphere

Additionally, for a recovery with a backup job, CICS VR performs a backup of the VSAM sphere following the successful restore and recovery.

In a reorganization job, CICS VR takes the following actions according to the error type for the selected VSAM sphere:
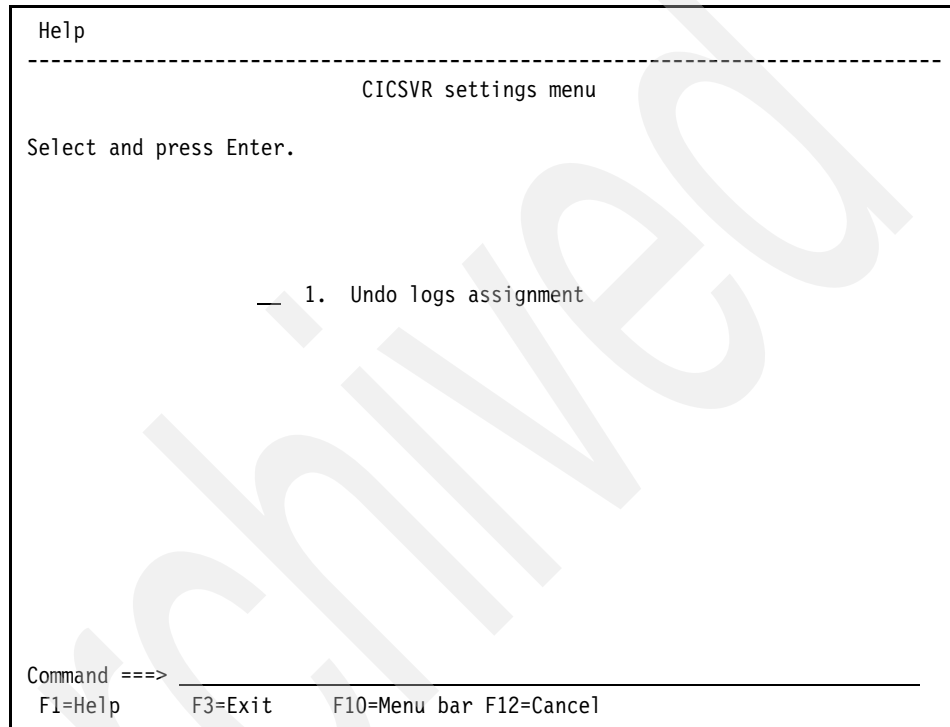
► For NOSPACE error type, CICS VR defines a new sphere with an extended space for the sphere components and replaces the original VSAM sphere.

► For AIXFULL error type, defines a new sphere with an extended MAXRECORDSIZE for NONUNIQUE alternate indexes and replaces the original VSAM sphere.

If you choose to construct a recovery job, the CICSVR VSAM sphere parameters panel appears, as seen in Figure 2-15 on page 45.

If you choose to construct a recovery with a backup job, the CICSVR VSAM sphere backup parameters panel follows the VSAM sphere parameters panel, as seen in Figure 2-21 on page 53.

2.9 CICS VR Settings

This option allows you to customize some of CICS VR functions. Currently, there is only one option, Undo logs assignment, to allow the use of multiple undo logs. When you select option 8 from the main menu, a panel with CICS VR settings appears, as shown in Figure 2-46.

```
 Help
 -------------------------------------------------------------------------------
                               CICSVR settings menu

 Select and press Enter.




                       __   1.  Undo logs assignment












 Command ===> _____
  F1=Help      F3=Exit     F10=Menu bar F12=Cancel
```

Figure 2-46   CICSVR settings panel

When you type 1 in the input field and press Enter, the CICSVR Undo logs assignment panel displays, as shown in Figure 2-47.

```
 Administrate  View  Help
 -----------------------------------------------------------------------------
                          CICSVR Undo logs assignment          Row 1 to 3 of 3

Select one or more associations, then select an action. Or, use Add action to
register new association.


 S  Value     Type      Undo log name              Time
 _  JTILLI1   HLQ       DWW.JTILLI1.UNDOLOG         07.333 10:18:22
 _  TSTJCL*   JOBNAME   DWW.TEST.UNDOLOG            07.333 10:17:58
 _  JTILLI1   USERID    DWW.JTILLI1.UNDOLOG         07.325 07:37:33
****************************** Bottom of data ******************************








 Command ===> _____
  F1=Help      F3=Exit      F4=SwSort    F5=Add       F6=Alter     F7=Bkwd
  F8=Fwd      F10=Menu bar F11=Delete   F12=Cancel
```

Figure 2-47   CICSVR Undo logs assignment panel

This panel contains the list of registered undo log associations. You can use undo log associations to choose an undo log for particular batch logging tasks. For example, you can specify that any job requesting CICS VR batch undo logging, being submitted under the specific TSO user ID, will place the undo records into specific undo log. Alternatively, you can set it up like all undo log records for all the VSAM data sets with name's high-level qualifier of TEST.* are placed to another undo log.

To define the rules for CICS VR Batch undo logging, the undo log associations are used. The CICSVR Undo logs assignment panel allows you to manage these associations.

To select one or more undo log associations, type s or S beside the association. Then select an action to perform on selected associations.

The columns show the following information for each association:

Value The string that CICS VR tries to match when searching for any association that applies to a submitted job.

Type The type of association. Determines whether the Value is user ID, job name prefix or VSAM data set name high-level qualifier.

Undo log name The undo log that is used if this association applies to a job.

Time The time when the association was created or updated.

2.9.1 Menus for the Undo logs assignment panel

This section describes menu options on the Undo logs assignment panel:

▶ **Administrate**

Allows you to change or delete existing associations, to add new ones, or to exit the panel. Options include:

1. Add... F5
2. Alter... F6
3. Delete... F11
4. Exit F3

▶ **View**

Allows you to sort the association list. The available sort options are:

1. Sort by value
2. Sort by type
3. Sort by undo log name

▶ **Help**

Provides relevant help information in the following categories:

1. Using help...
2. General help... F1
3. Index...
4. Keys help...
5. Command help...
6. Product information

2.9.2 Undo logs assignment Administrate menu

Figure 2-48 shows the Administrate menu options.

```
 Administrate  View  Help
+----------------------------------------+-----------------------------------
| _  1. Add...                      F5 | ssignment           Row 1 to 3 of 3
|    2. Alter...                    F6 |
|    3. Delete...                   F11 | t an action. Or, use Add action to
|    4. Exit                        F3 |
+----------------------------------------+

  S  Value     Type      Undo log name               Time
     JTILLI1   HLQ       DWW.JTILLI1.UNDOLOG         07.333 10:18:22
     TSTJCL*   JOBNAME   DWW.TEST.UNDOLOG            07.333 10:17:58
     JTILLI1   USERID    DWW.JTILLI1.UNDOLOG         07.333 10:42:57
****************************** Bottom of data ******************************








Command ===>
 F1=Help      F3=Exit      F4=SwSort    F5=Add      F6=Alter      F7=Bkwd
 F8=Fwd      F10=Menu bar F11=Delete   F12=Cancel
```

Figure 2-48   Example of Administrate menu on CICSVR Undo logs assignment panel

Creating an association

Use the first option, Add, to create an association. Type 1 beside the first option
and press Enter, or press Enter with the cursor on the Add option. Alternatively,
press F5=Add to create an association.

When you choose to add an association, the blank Undo logs management
panel displays, as shown in Figure 2-49.

```
                    CICSVR Undo logs management

 Choose association type by pressing PF4(SwType), type the value, specify
 undo log name prefix and press Enter. Or, press F12 to cancel request.

  Association type  . . : USERID

  Association value . . .  _____

  Undo log name prefix     _____        .UNDOLOG




 Command ===> _____
  F1=Help      F4=SwType      F7=PrevItem    F12=Cancel
```

Figure 2-49   CICSVR Undo logs management

I n this panel, you can specify the parameters for the new association, which
include:

► Association type

   To specify or change the association type, press F4=SwType to loop through
   the three possible types:

   – USERID

      With this type specified, the association value is an exact user ID under
      which matching jobs run.

   – JOBNAME

      With this type, the association value is the job name prefix of matching
      jobs.

   – HLQ

      When this type is on, the value is an exact high-level qualifier for the name
      of the VSAM sphere which matching jobs update.

► Association value

The value to be used to match the association to the running job.

The value for USERID and HLQ types are exact, while the value for JOBNAME type is the job name prefix, which can be a mask ending with an asterisk (*) as a wildcard.

► Undo log name prefix

The prefix for the name of the undo log that is used for logging if this association matches the submitted job parameters. The prefix is used to construct the undo log name, which follows the naming convention of *prefix*.UNDOLOG.

To add an association:

1. Choose Association type by pressing F4=SwType

2. Specify the association value and undo log name prefix.

3. Press Enter to save the association and return to the Undo logs assignment panel.

Modifying the parameters of an existing association

The second option on the Administrate menu (shown in Figure 2-48 on page 88), Alter, allows you to modify the parameters of one or more of existing associations.

Select one or more associations by typing s or S beside them and choosing Alter on Administrate either by entering 2 in the input field or by pressing Enter with the cursor on the second option.

Alternatively, press F6=Alter to modify the selected associations.

The CICSVR Undo logs management panel displays, allowing the modification of the parameters for the first of selected associations, as shown in Figure 2-50.

```
                       CICSVR Undo logs management

 Choose association type by pressing PF4(SwType), type the value, specify
 undo log name prefix and press Enter. Or, press F12 to cancel request.

  Association type  . . : JOBNAME

  Association value . . . TSTJCL*

  Undo log name prefix    DWW.TEST            .UNDOLOG




 Command ===>
  F1=Help        F4=SwType       F7=PrevItem    F12=Cancel
```

Figure 2-50   Example of CICSVR Undo logs management panel in Alter mode

If more than one association is selected, the Undo logs management panel is displayed several times, one time for each association selected. To proceed to the next selected association, press Enter. To return to the previous association, press F7=PrevItem.

Deleting an association

The third option on the Administrate menu (shown in Figure 2-48 on page 88), Delete, allows you to remove one or more of existing associations.

Select one or more associations by typing s or S beside them and choosing Delete on Administrate menu by entering 3 in the input field or by pressing Enter with the cursor on the third option.

Alternatively, press F11=Delete to remove the selected associations.

The CICSVR Undo logs association deregister panel displays for a confirmation of association deregister, as shown in Figure 2-51.

```
                    CICSVR Undo logs association deregister

 Press Enter to deregister the association. Or, press F12 to cancel the
 request.

   Association type  . . : HLQ

   Association value . . : JTILLI1

   Undo log name . . . . : DWW.JTILLI1.UNDOLOG



 Command ===> _____
  F1=Help    F12=Cancel
```

Figure 2-51   CICSVR Undo logs association deregister panel

If more than one association is selected, the deregister verification panel displays several times, one time for each association selected. To proceed with removing of an association, press Enter. Alternatively, press F12 to cancel the delete sequence and return to the CICSVR Undo logs assignment panel.

2.9.3 Undo logs assignment View menu

Figure 2-52 shows the View menu options.

```
 Administrate  View  Help
 -------------+----------------------------+-------------------------------
              |  _  1. Sort by value        | gnment          Row 1 to 3 of 3
              |     2. Sort by type         |
 Select one or |    3. Sort by undo log name | n action. Or, use Add action to
 register new  +----------------------------+


   S  Value    Type     Undo log name            Time
      JTILLI1   HLQ      DWW.JTILLI1.UNDOLOG      07.333 10:18:22
      TSTJCL*   JOBNAME  DWW.TEST.UNDOLOG         07.333 10:17:58
      JTILLI1   USERID   DWW.JTILLI1.UNDOLOG      07.333 10:42:57
 ***************************** Bottom of data ******************************




 Command ===>
  F1=Help      F3=Exit      F4=SwSort    F5=Add      F6=Alter    F7=Bkwd
  F8=Fwd       F10=Menu bar F11=Delete   F12=Cancel
```

Figure 2-52   Example of View menu on CICSVR Undo logs assignment panel

This menu allows you to sort the association list in various ways. You can choose
from sorting the associations by value, by type, or by undo log name. Type the
number of your choice in the input field and press Enter, or press Enter with the
cursor on the corresponding option.

Part 2

CICS VR installation and customization

In this part, we review the installation and customization of CICS VR and how to integrate CICS VR into your current system.

3

CICS VR installation

In this chapter, we provide information about how to set up the various CICS VR components. We provide a quick installation guide that describes all the necessary steps to set up CICS VR V4R2 successfully. We also describe the CICS VR components in more detail.

In this chapter, we discuss the following topics:

► Quick installation guide
► Executing the IVP jobs to verify CICS VR installation
► CICS VR setup considerations
► CICS VR address space
► RCDS definition
► JCL skeleton
► CICS VR utilities
► ITSO sample environment

3.1 Quick installation guide

In this section, we provide step-by-step instructions on how to install CICS VR V4R2M0. We use a library naming convention with the high-level qualifier DWW.V2R2M0. For the steps that we describe here, we assume that the SMP/E installation steps that are described in *Program Directory for CICS VSAM Recovery*, GI10-2599-02 have been completed. We also assume that the CICS VR Server installation is required.

> **Note:** The CICS VR server address space is required for batch logging, backup notification, and backout failure notification.

When you have completed these instructions, you are ready to run the IVP jobs. In this section, we describe the following installation steps:

► Updating LPALST
► Updating LNKLST
► Updating SYS1.PARMLIB
► Defining RCDS
► Activating the CICS VR server address space
► Setting up the ISPF interface

3.1.1 Updating LPALST

You need to add the library DWW.V4R2M0.SDWWLPA to the LPALST. To add the library dynamically to the LPALST, you can issue the command SETPROG.

In our test environment, an old level of CICS VR was installed previously on our image SC66. Therefore, we uses the SETPROG command shown in the Example 3-1 to override the previous library.

Example 3-1   SETPROG command output

```
SETPROG LPA,ADD,MASK=*,DSNAME=DWW.V4R2M0.SDWWLPA

IEF196I IEF237I C90A ALLOCATED TO SYS00339
IEF196I IEF285I   DWW.V4R2M0.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
```

3.1.2 Updating LNKLST

You need to add the following libraries, which are required for the CICS VR
server, to the LNKLST concatenation:

► DWW.V4R2M0.SDWWLOAD
► DWW.V4R2M0.SDWWLENU

Example 3-2 shows the command sequence to update the LNKLST dynamically
with the new library names.

Example 3-2   Update LNKLST

```
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.V4R2M0.SDWWLOAD
IEF196I IEF285I   VOL SER NOS= TOTCI3.
CSV501I DATA SET DWW.V4R2M0.SDWWLOAD 886
HAS BEEN ADDED TO LNKLST SET LNKLST68

S LLA,SUB=MSTR

SETPROG LNK,UPDATE,JOB=*
```

You can 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. Example 3-3 shows the output of the command.

Example 3-3   Display LLA 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.V4R2M0.SDWWLENU
     ...
     ...
45   L        DWW.V4R2M0.SDWWLOAD
```

3.1.3 Updating SYS1.PARMLIB

In this section, we describe the necessary updates to SYS1.PARMLIB.

IGDSMSxx SYS1.PARMLIB member

The IGDSMSxx SYS1.PARMLIB CICS VR parameter is required to activate the
server address space only. Example 3-4 shows setting up the parameter in
member IGDSMSxx.

Example 3-4   Parmlib member IGDSMSxx

```
CICSVR_INIT(YES)
CICSVR_GRPNAME_SUFFIX(PROD)
CICSVR_DSNAME_PREFIX(DWWUSER)
CICSVR_RCDS_PREFIX(DWWUSER.V4R2M0)
```

There are two additional CICS VR parameters available. We recommend that
you let them default. Therefore, we do not specify them in our IGDSMSxx
member.

► CICSVR_GENERAL_CONTROL()
► CICSVR_ZZVALUE_PARM()

Note: CICS VR parameters can be also updated dynamically.

We describe how to specify the CICS VR parameters dynamically in 3.3.4,
"Dynamically changing the IGDSMSxx member" on page 125.

You can use the following parameters:

► CICSVR_INIT(YES)

Specifies that the CICS VR server address space is activated during
initialization of the z/OS image. If NO is specified, the server address space
does not startup up automatically. Furthermore, 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 a XCF group. In our environment, we kept the default PROD 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 should use the same set of RCDS data sets. See 3.4, "CICS VR address space" on page 126 for more detailed installation information.

▶ CICSVR_DSNAME_PREFIX(DWWUSER.V4R2M0)

During initialization of the server address space, the DSNAME prefix is used to allocate data sets to the DWWMSG, DWWDMSG, and DWWDUMP DD names. These data sets can be preallocated or are allocated automatically during server initialization.

▶ CICSVR_RCDS_PREFIX(DWWUSER.V4R2M0)

The RCDS data sets contain the necessary recovery information. They must be preallocated prior to activating the server address space. There can be three RCDS DD data sets allocated to the following DD statements: DWWCON1, DWWCON2, and DWWCON3. The naming convention for the RCDS data sets is:

RCDS_PREFIX.DWWCON(x).GRPNAME_SUFFIX

Therefore, the RCDS data set names that we use in our environment for our server address space installation is:

DWWUSER.V4R2M0.DWWCON(x).GRPPROD

This description of the CICS VR parameters is intended to provide a brief overview. See 3.3.2, "System parameters" on page 123 for a more detailed description of the CICS VR system parameters.

IFAPROD SYS1.PARMLIB member

The CICS VR program ID must be enabled. To do so, we added the entry shown in Example 3-5 to the IFAPRDxx member.

Example 3-5   IFAPRDxx member

```
PRODUCT OWNER('IBM CORP')
        NAME(CICSVR)
        ID(5655-P30)
        VERSION(*) RELEASE(*) MOD(*)
        FEATURENAME(CICSVR)
        STATE(ENABLED)
```

If the IFAPRDxx member contains an older version of CICS VR, you get a
DWW190E message when the server address space initializes, as shown in
Example 3-6.

Example 3-6   Not licensed message

```
*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
```

3.1.4 Defining RCDS data sets

You can use the JCL shown in Example 3-7 to define a small temporary set of
RCDS data sets that can be used for the IVP process only. If you want to allocate
your final RCDS data sets that can be used by the ISPF interface and the server
address space, you have to follow the RCDS naming convention. As mentioned
in the previous section, the naming convention for RCDS data sets is as follows:

► DWWUSER.V4R2M0: RCDS prefix
► DWWCON1: DD name
► GRP: Constant
► PROD: Group prefix

All active server address spaces in the sysplex that belong to the same XCF
group can share one set of RCDS data sets.

Note: 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.

Example 3-7   JCL to define RCDS data sets

```
//CICSRS3  JOB (999,POK),'CICS VR 4.2',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.V4R2M0.DWWCON1.GRPPROD)-
                 STORCLAS(SCCOMP)           -
```

```
                    CYLINDERS(200 30)          -
                    LINEAR                     -
                    SHAREOPTIONS(3 3)          -
                 )
    DEFINE CLUSTER(                            -
          NAME(DWWUSER.V4R2M0.DWWCON2.GRPPROD)-
                    STORCLAS(SCCOMP)           -
                    CYLINDERS(200 30)          -
                    LINEAR                     -
                    SHAREOPTIONS(3 3)          -
)
    DEFINE CLUSTER(                            -
          NAME(DWWUSER.V4R2M0.DWWCON3.GRPPROD)-
                    STORCLAS(SCCOMP)           -
                    CYLINDERS(200 30)          -
                    LINEAR                     -
                    SHAREOPTIONS(3 3)          -
                 )
```

3.1.5 Activating the CICS VR server address space

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: These 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

When all the installation steps have been completed successfully, use the /V SMS,CICSVR command to activate the server. When the server address space starts up successfully, message DWW014I is issued (Example 3-8). If the server address space initialization fails, the log must be investigated to solve the problem. See 3.4, "CICS VR address space" on page 126 for more details about the server address space installation.

Example 3-8   Message DWW014I

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

3.1.6 Setting up the ISPF interface

To run the IVP jobs, you first need to set up the ISPF interface. In our environment, we preallocate data sets to the following DD statements:

▶ DWWMSG
▶ DWWDMSG
▶ DWWPRINT
▶ DWWDUMP

You can use the sample JCL shown in Example 3-9 to define the data sets. These data sets must have unique names for ISPF, CICS VR utilities, and the server. Therefore, we recommend that you use the TSO user ID as HLQ in ISPF for DWWMSG, DWWDMSG, DWWDUMP, and DWWPRINT.

Prior to running the CICS VR dialog interface, you must create the data sets that are allocated to the ISPFILE, DWWMSG, and DWWPRINT DD names in DWWCLIST.

Example 3-9   Message and dump data sets

```
//CICSRS3  JOB (999,POK),'CICS VR 4.2',CLASS=A,MSGLEVEL=(1,1),
// MSGCLASS=T,NOTIFY=&SYSUID,REGION=0M
/*JOBPARM L=9999,SYSAFF=SC66
//BR14 EXEC PGM=IEFBR14
//DWWDUMP1 DD  DISP=(,CATLG),UNIT=3390,SPACE=(CYL,(10,10)),
//             RECFM=VBA,LRECL=84,BLKSIZE=3120,
//             DSN=CICSRS3.V4R2M0.DWWDUMP
//DWWPRINT DD  DISP=(,CATLG),UNIT=3390,SPACE=(CYL,(1,1)),
//             RECFM=FBA,LRECL=133,BLKSIZE=27930,
//             DSN=CICSRS3.V4R2M0.DWWPRINT
//DWWDMSG1 DD  DISP=(,CATLG),UNIT=3390,SPACE=(CYL,(1,1)),
//             RECFM=VBA,LRECL=84,BLKSIZE=3120,
//             DSN=CICSRS3.V4R2M0.DWWDMSG
//DWWMSG2  DD  DISP=(,CATLG),UNIT=3390,SPACE=(CYL,(1,1)),
```

```
//                RECFM=VBA,LRECL=133,BLKSIZE=27930,
//                DSN=CICSRS3.V4R2M0.DWWMSG
```

To activate the ISPF interface, we modified the sample CLIST. The sample CLIST is provided in member DWWCLIST of the SDWWCNTL data set. Example 3-10 shows the CLIST that we used to start the ISPF dialog interface.

We added allocations for DWWMSG, DWWPRINT, and ISPFILE data sets to get diagnostic and tracing information while running the ISPF interface.

Example 3-10   Sample DWWCLIST

```
PROC 0
CONTROL   FLUSH NOPROMPT    MSG
/* ------------------------------------------------------------------ */
/*                                                                     */
/*   §BANNER_START                        01                           */
/*   Licensed Materials - Property of IBM                              */
/*                                                                     */
/*   5655-P30            DWWCLIST                                       */
/*                                                                     */
/*   (C) Copyright IBM Corp. 1991, 2006                                */
/*                                                                     */
/*                                                                     */
/*                                                                     */
/*                                                                     */
/*   §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        */
/* ------------------------------------------------------------------ */
/*                                                                     */
/*   FUNCTION:  SAMPLE CLIST TO INVOKE THE CICSVR ISPF DIALOG.         */
/*              (ENGLISH)                                              */
/* ------------------------------------------------------------------ */
 ISPEXEC CONTROL ERRORS RETURN        /* RETURN IPF ERRORS TO CLIST */


/* ------------------------------------------------------------------ */
/*  Replace the value of the HLQ variable with what you have          */
/*  specified for §hlq§ in the DWWALLOC job.                          */
/* ------------------------------------------------------------------ */

 SET HLQ  = DWW.V4R2M0              /* PREFIX FOR CICSVR LIBRARIES  */

/* ------------------------------------------------------------------ */
/*  Replace the value of the THLQ variable with what you have         */
/*  specified for THLQ symbolic parameter in the DWWRUNAR IVP job. */
/* ------------------------------------------------------------------ */

 SET THLQ = DWWUSER.V4R2M0             /* PREFIX FOR RCDS DATA SETS  */
                                       /* AND USER FILES             */
```

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

 ISPEXEC VGET ZUSER SHARED          /* GET USERID                  */

 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)
 FREE FI(DWWLOAD)


/* ------------------------------------------------------------------ */
/* Note: Recovery Control Data Set names &THLQ..DWWCON1, &THLQ..DWWCON2
/* and THLQ..DWWCON3 are for installation verification only.
/* ------------------------------------------------------------------ */
/* ------------------------------------------------------- DWWCON1  */
 ALLOC FI(DWWCON1) DA('&THLQ..DWWCON1') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE ^= 0 THEN DO
    SET DDNAME = DWWCON1
    GOTO SETMSG3
 END
/* ------------------------------------------------------- DWWCON2  */
 ALLOC FI(DWWCON2) DA('&THLQ..DWWCON2') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE ^= 0 THEN DO
    SET DDNAME = DWWCON2
    GOTO SETMSG3
 END
/* ------------------------------------------------------- DWWCON3  */
 ALLOC FI(DWWCON3) DA('&THLQ..DWWCON3') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE ^= 0 THEN DO
    SET DDNAME = DWWCON3
    GOTO SETMSG3
 END
/* ------------------------------------------------------- DWWMSG   */
 /** ALLOC FI(DWWMSG) SYSOUT(X) DEST(XXXX)  ***/
 ALLOC FI(DWWMSG) DA('&Zuser..V4R2M0.DWWMSG') SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE ^= 0 THEN DO
    SET DDNAME = DWWMSG
     GOTO SETMSG3
 END
/* ------------------------------------------------------- DWWPRINT */
 /** ALLOC FI(DWWPRINT) SYSOUT(X) DEST(XXXX)  ***/
 ALLOC FI(DWWPRINT) DA('&ZUSER..V4R2M0.DWWPRINT') SHR
```

```
   SET RCSAVE = &LASTCC
   IF &RCSAVE ^= 0 THEN DO
      SET DDNAME = DWWPRINT
       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 ^= 0 THEN DO
    SET DDNAME = DWWLOAD
    GOTO SETMSG3
 END

/* ------------------------------------------------------ DWWLLIB  */
 SET &LIBS = &STR('&HLQ..SDWWLOAD')
 SET &DSN1 = &STR('&HLQ..SDWWLENU')
 /*** SET &DSN2 = &STR('&HLQ..DWWEXLD')  /***
 /*** SET &LIBS = &STR(&LIBS , &DSN1 , &DSN2) /***
 SET &LIBS = &STR(&LIBS , &DSN1 )
 ALLOC FI(DWWLLIB) DA(&LIBS) SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE ^= 0 THEN DO
    SET DDNAME = DWWLLIB
    GOTO SETMSG3
 END

/* ------------------------------------------------------ ISPPLIB  */
 ISPEXEC LIBDEF ISPPLIB DATASET ID('&HLQ..SDWWPENU')
 SET RCSAVE = &LASTCC
 IF &RCSAVE ^= 0 THEN DO
   SET DDNAME = ISPPLIB
   GOTO SETMSG3
 END
/* ------------------------------------------------------ ISPMLIB  */
 ISPEXEC LIBDEF ISPMLIB DATASET ID('&HLQ..SDWWMENU')
 SET RCSAVE = &LASTCC
 IF &RCSAVE ^= 0 THEN DO
    SET DDNAME = ISPMLIB
```

```
         GOTO SETMSG3
       END
/* -------------------------------------------------- ISPTLIB */
 ISPEXEC LIBDEF ISPTLIB DATASET ID('&HLQ..SDWWTENU')
 SET RCSAVE = &LASTCC
 IF &RCSAVE ^= 0 THEN DO
    SET DDNAME = ISPTLIB
    GOTO SETMSG3
 END
/* -------------------------------------------------- DWWSLIB */
 SET &LIBS = &STR('&ZUSER..ISPF.ISPFILE')
 /*** SET &LIBS = &STR('&ZUSER..ISPF.ISPPROF')  /***
 SET &DSN  = &STR('&HLQ..SDWWSENU')
 SET &LIBS = &STR(&LIBS , &DSN)
 ALLOC FI(DWWSLIB) DA(&LIBS) SHR
 SET RCSAVE = &LASTCC
 IF &RCSAVE ^= 0 THEN DO
    SET DDNAME = DWWSLIB
    GOTO SETMSG3
 END
/* -------------------------------------------------- ISPFILE */
 ALLOC FI(MYFILE) DA('&ZUSER..ISPF.ISPFILE') SHR
 /*** ALLOC FI(MYFILE) DA('&ZUSER..ISPF.ISPPROF') SHR /***
 SET RCSAVE = &LASTCC
 IF &RCSAVE ^= 0 THEN DO
    SET DDNAME = MYFILE
    GOTO  SETMSG3
 END

 ALLOC FI(ISPFILE) DA('&ZUSER..ISPF.ISPFILE') SHR
 /*** ALLOC FI(ISPFILE) DA('&ZUSER..ISPF.ISPPROF') SHR /***
 SET RCSAVE = &LASTCC
 IF &RCSAVE ^= 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 ^= 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)
                  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)
```

3.2 Executing the IVP jobs to verify CICS VR installation

When you have completed the installation steps, you need to execute the IVP
jobs. In this section, we discuss most of the jobs listed in Table 3-1. You need to
execute the CLIST to activate the ISPF interface to complete the IVP process.
See 3.1.6, "Setting up the ISPF interface" on page 104 for information about
creating a CLIST that can be used to run the IVP.

Table 3-1   IVP jobs

Job Name	Job Type
DWWASMLI	Assemble and link the sample exit
DWWVRDEF	Create and define the sample VSAM cluster and journal
DWWRUNAR	Run the CICS VR RCDS import utility to load recovery information
DWWCLIST	Sample CLIST to allocate and invoke CICS VR dialog interface
DWWPRTVS	Print the sample VSAM base to verify CICS VR installation
DWWCLNUP	Clean up job to delete the test data that was created by IVP jobs

3.2.1 DWWASMLI job

The DWWASMLI IVP job 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.

In our environment, we copy member DWWASMLI from the SDWWCNTL data set. To run the job, we modify the SETPARM statement only. The HLQ variable that we use in our environment is DWW.V4R2M0. Example 3-11 shows the first part of the JCL that we use to submit the job.

Example 3-11   DWWASMLI

```
//CICSRS3  JOB (999,POK),'CICS VR 4.2',CLASS=A,MSGLEVEL=(1,1),
// MSGCLASS=T,NOTIFY=&SYSUID,REGION=0M
//SETPARM  SET HLQ=DWW.V4R2M0
//REXXCRE  EXEC PGM=IEBGENER
//SYSPRINT DD SYSOUT=*
//SYSUT1   DD *
//
```

When the job executes successfully, the exit load module DWWPREEX is link edited to library DWW.V4R2M0.DWWEXLD, as shown in Example 3-12.

Example 3-12   Binder operation summary

```
SAVE OPERATION SUMMARY:

  MEMBER NAME          DWWPREEX
  LOAD LIBRARY         DWW.V4R2M0.DWWEXLD
  PROGRAM TYPE         LOAD MODULE
  VOLUME SERIAL        TST021
  MAX BLOCK            32760
  DISPOSITION          REPLACED
  TIME OF SAVE          03.33.34  NOV 23, 2007
```

3.2.2 DWWVRDEF job

In our environment, we copy member DWWVRDEF from data set SDWWCNTL. To run the job, we updated the following variables:

▶ SET HLQ=DWW.V4R2M0
▶ SET THLQ=DWWUSER.V4R2M0
▶ SET TVOL=TOTCI3

We also insert IDCAMS delete statements to the beginning of the job, in case it has to run multiple times. When we run the job for the first time, we receive the following message:

```
EDG8197I VOLUME IS NOT DFSMSrmm MANAGED
```

We then modified the volume variable in the REXX™ part of the job as shown in Example 3-13 on page 111. We changed the statement:

```
blksize(6000) volume("Volume") new f(logfile)
```

To:

```
    blksize(6000) volume("P3") new f(logfile)
```

After that, we submit the job successfully. The following data set was produced:

► DWWUSER.V4R2M0.CICSVR.LOGSCPY
► DWWUSER.V4R2M0.CUSTOMER
► DWWUSER.V4R2M0.CUSTOMER.D
► DWWUSER.V4R2M0.CUSTOMER.I

Example 3-13   DWWVRDEF

```
//CICSRS3  JOB (999,POK),'CICS VR 4.2',CLASS=A,MSGLEVEL=(1,1),
// MSGCLASS=T,NOTIFY=&SYSUID,REGION=0M
/*JOBPARM L=9999,SYSAFF=SC66
//DELETE     EXEC PGM=IDCAMS
//SYSPRINT   DD   SYSOUT=*
//SYSIN      DD   *
  DEL DWWUSER.V4R2M0.CUSTOMER
  DEL DWWUSER.V4R2M0.CICSVR.LOGSCPY NONVSAM
  SET MAXCC=0
/*
//SETPARM  SET HLQ=DWW.V4R2M0
//         SET THLQ=DWWUSER.V4R2M0
//         SET TVOL=TOTCI3
//REXXCRE  EXEC PGM=IEBGENER
//SYSPRINT DD SYSOUT=*
//SYSUT1   DD *
 /* REXX application for DWWVRDEF automatization:
*/
 /*      1) Copy (PDS) logstream copy to a sequential dataset
*/
 /*      2) Define BASE Cluster and path
*/

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

```
 /* NOTE: this app is to be invoked from DWWVRDEF member only
*/


/*--------------------------------------------------------------------*/
 /* 18 Jan 2006 VNDR69N
*/


/*--------------------------------------------------------------------*/
Subcom TSO
If RCÖ=0 Then Do
  Say "ERROR: Couldn't initialize TSO environment"
  Exit 8
End
Address TSO
P1=Word(Arg(1),1)
P2=Word(Arg(1),2)
P3=Word(Arg(1),3)
If (P1='')!(P2='')!(P3='') Then Do
  Say "ERROR: Please check the parameters specified"
  Exit 8
End
Log="'"P2".CICSVR.LOGSCPY'"
 /* if DS not found then should be allocated */
If SysDSN(Log)Ö='OK' Then Do
  Say "* DS("Log") not found, attempting to allocate..."
  Call outtrap "Trap."
  "allocate da("log") dsorg(PS) space(1,1) tracks lrecl(5996) recfm(V)
  blksize(6000) volume("P3") new
f(logfile)"   <--------------------------
  Call outtrap "OFF"
  if RCÖ=0 Then Do
    Say "ERROR: DS("Log") could not be allocated"
    Exit 8
  End Else
    Say "* DS("Log") allocated successfully"
End; Else Do
  Say "* DS("Log") has been previously allocated, attempting to open"
  Call outtrap "Trap."
  "allocate da("log") f(logfile) old"
  Call outtrap "OFF"
  if RCÖ=0 Then Do
    Say "ERROR: DS("Log") could not be opened"
    Exit 8
  End Else
    Say "* DS("Log") opened successfully"
```

```
End
Scpy="'"P1".SDWWJRNL(DWWLSCPY)'"
Say "* Attempting to open DS("Scpy")"
Call outtrap "Trap."
"allocate da("Scpy") f(infile) shr"
Call outtrap "OFF"
if RCÖ=0 Then Do
  Say "ERROR: DS("Scpy") could not be opened"
  Exit 8
End Else
  Say "* DS("Scpy") opened successfully"
"Execio * diskr infile (FINIS"
"Execio * diskw logfile (FINIS"
"Free F(logfile)"
"Free F(infile)"
Say "* DS("Scpy") content has been copied to DS("Log")"
custd="'"P2".CUSTOMER"
Say "* Allocating DS("custd", IDCAMS returns:"
"DEFINE CLUSTER(NAME("custd"') RECORDS(25 0) SHR(2) INDEXED) DATA(
NAME("custd".D') VOL("P3") RECSZ(40 80) CISZ(512) FSPC(0 0) KEYS(1 0))
INDEX(NAME("custd".I') VOL("P3") CISZ(2048))"
if RCÖ=0 Then Do
  Say "ERROR: DS("custd"') could not be allocated"
  Exit 8
End
"DEFINE PATH(NAME('"P2".CUSTPATH') PATHENTRY('"P2".CUSTOMER') UPDATE)"
if RCÖ=0 Then Do
  Say "ERROR: Path('"P2".CUSTPATH') could not be defined"
  Exit 8
End
Exit 0
/&
//SYSUT2   DD DSN=&&REXXFN(REXXDEF),DISP=(NEW,PASS),
//            UNIT=SYSDA,SPACE=(TRK,(5,2,10)),
//            DCB=(RECFM=FB,LRECL=80,BLKSIZE=800)
//SYSIN    DD DUMMY
//REXXDEF  EXEC PGM=IKJEFT01,PARM='REXXDEF &HLQ &THLQ &TVOL',REGION=0M
//SYSEXEC  DD DSN=&&REXXFN,DISP=(OLD,PASS)
//SYSTSPRT DD SYSOUT=*
//SYSTSIN  DD DUMMY
```

3.2.3 DWWRUNAR job

In our environment, we copy member DWWRUNAR from SDWWCNTL. We modified the following variables to run the job:

- ► SET HLQ=DWW.V4R2M0
- ► SET THLQ=DWWUSER.V4R2M0
- ► SET TVOL=TOTCI3

The job allocates three data sets to DD statements DWWCON1, DWWCON2, and DWWCON3. After that, predefined recovery data is imported to the RCDS data set. DWWRUNAR allocates temporary RCDS data sets for IVP use only. We recommend that you use a copy of DWWCLIST that is configured to use the temporary RCDS data sets. You then need to use the real RCDS data sets in the CICS VR target environment.

In our environment, we use the JCL shown in Example 3-14.

Example 3-14   DWWRUNAR job

```
//CICSRS3X JOB (999,POK),'CICS VR 4.2',CLASS=A,MSGLEVEL=(1,1),
// MSGCLASS=T,NOTIFY=&SYSUID,REGION=0M
/*JOBPARM L=9999,SYSAFF=SC66
//DELETE     EXEC PGM=IDCAMS
//SYSPRINT   DD   SYSOUT=*
//SYSIN      DD   *
  DEL DWWUSER.V4R2M0.DWWCON1
  DEL DWWUSER.V4R2M0.DWWCON2
  DEL DWWUSER.V4R2M0.DWWCON3
  SET MAXCC=0
/*
//SETPARM  SET HLQ=DWW.V4R2M0
//         SET THLQ=DWWUSER.V4R2M0
//         SET TVOL=TOTCI3
//REXXCRE  EXEC PGM=IEBGENER
//SYSPRINT DD SYSOUT=*
//SYSUT1   DD *
 /* REXX application for DWWRUNAR automatization:             */
 /*-------------------------------------------------------------------*/
 /* NOTE: this app is to be invoked from DWWRUNAR member only    */
 /*-------------------------------------------------------------------*/
 /* 14 Sep 2006 VNDR69N                                         */
 /*-------------------------------------------------------------------*/
Subcom TSO
If RCÖ=0 Then Do
  Say "ERROR: Couldn't initialize TSO environment"
```

```
  Exit 8
End
Address TSO
P1=Word(Arg(1),1)
P2=Word(Arg(1),2)
P3=Word(Arg(1),3)
If (P1='')!(P2='')!(P3='') Then Do
  Say "ERROR: Please check the parameters specified"
  Exit 8
End
"DEFINE CLUSTER (NAME('"P2".DWWCON1') VOLUMES("P3") TRACKS(5 20) LINEAR
SHR(3 3))"
If RCÖ=0 Then Do
  Say "ERROR: RCDS('"P2".DWWCON1') could not be allocated"
  Exit 8
End
"DEFINE CLUSTER (NAME('"P2".DWWCON2') VOLUMES("P3") TRACKS(5 20) LINEAR
SHR(3 3))"
If RCÖ=0 Then Do
  Say "ERROR: RCDS('"P2".DWWCON2') could not be allocated"
  Exit 8
End
"DEFINE CLUSTER (NAME('"P2".DWWCON3') VOLUMES("P3") TRACKS(5 20) LINEAR
SHR(3 3))"
If RCÖ=0 Then Do
  Say "ERROR: RCDS('"P2".DWWCON3') could not be allocated"
  Exit 8
End
Exit 0
/&
//SYSUT2   DD DSN=&&REXXFN(REXXRUNA),DISP=(NEW,PASS),
//         UNIT=SYSDA,SPACE=(TRK,(5,2,10)),
//         DCB=(RECFM=FB,LRECL=80,BLKSIZE=800)
//SYSIN    DD DUMMY
//*---------------------------------------------------------------
//*        Define RCDS data sets
//*---------------------------------------------------------------
//* This step is expected to complete with return code 0
//REXXRUNA EXEC PGM=IKJEFT01,PARM='REXXRUNA &HLQ &THLQ &TVOL',
//         REGION=64M
//SYSEXEC  DD DSN=&&REXXFN,DISP=(OLD,PASS)
//SYSTSPRT DD SYSOUT=*
//SYSTSIN  DD DUMMY
//*---------------------------------------------------------------
//*        IMPORT RCDS
```

```
//*------------------------------------------------------------
//* This step is expected to complete with return code 0
//IMPORT    EXEC PGM=DWWGJCDS,REGION=0M
//STEPLIB   DD DSN=&HLQ..SDWWLOAD,DISP=SHR
//          DD DSN=&HLQ..SDWWLENU,DISP=SHR
//DWWMSG    DD SYSOUT=*
//DWWPRINT  DD SYSOUT=*
//DWWCON1   DD DSN=&THLQ..DWWCON1,DISP=SHR
//DWWCON2   DD DSN=&THLQ..DWWCON2,DISP=SHR
//DWWCON3   DD DSN=&THLQ..DWWCON3,DISP=SHR
//DWWCOPY1  DD DSN=&HLQ..SDWWJRNL(DWWRCDSE),DISP=SHR
//DWWIN     DD *
  RCDS IMPORT
/*
```

3.2.4 DWWCLIST job

This section describes how to activate the CICS VR ISPF interface. (We described how to set up the CICS VR interface in 3.1.6, "Setting up the ISPF interface" on page 104.) We assume that the CLIST that you created is available for this IVP step.

To activate the ISPF interface, follow these steps:

1. Start the ISPF dialog interface by issuing the following command:

   EXEC'DWWUSER.V4R2M0.SDWWCNTL(DWWCLIST)'

   The CICS VR main menu displays.

2. Next, edit the JCL skeleton by selecting 5 (JCL skeleton) from the CICS VR main menu.

   a. Edit the skeleton (job and DD statements). Add hlq.DWWEXLD, hlq.SDWWLOAD, and hlq.DWWLENU to STEPLIB.

   b. Also, be sure the correct RCDS names are allocated to the DWWCON1, DWWCON2, and DWWCON3 DD names.

      In our environment, we use a set of temporary RCDS data sets for the IVP process. We also use a copy of DWWCLIST to run the ISPF interface for the IVP. We specify the real RCDS data set names in the production DWWCLIST.

   Example 3-15 shows the JCL skeleton that we use in our CICS VR environment.

Example 3-15   JCL skeleton

```
//CICSRS3&CJOBCHAR JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=&&SYSUID,
//              MSGCLASS=X,CLASS=A,REGION=4M
/*JOBPARM L=9999,SYSAFF=SC66
)SEL &CUTIL NE REORG  && &CUTIL NE BACKUP
//DWW       PROC
//RECOVER  EXEC PGM=DWWCO
//STEPLIB  DD DSN=DWW.V4R2M0.SDWWLOAD,DISP=SHR
//         DD DSN=DWW.V4R2M0.SDWWLENU,DISP=SHR
//         DD DSN=DWW.V4R2M0.DWWEXLD,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWCON1  DD DSN=DWWUSER.V4R2M0.DWWCON1,DISP=SHR
//DWWCON2  DD DSN=DWWUSER.V4R2M0.DWWCON2,DISP=SHR
//DWWCON3  DD DSN=DWWUSER.V4R2M0.DWWCON3,DISP=SHR
//         PEND
//* END OF PROC
)ENDSEL
```

3. Select 1 (list of VSAM spheres) in the CICS VR main menu. At the CICS VR VSAM sphere list include panel, press Enter. The CICS VR VSAM sphere list panel displays (Figure 3-1).

```
 Administrate  Utilities  Tools  List  View  Help
 -------------------------------------------------------------------------------
                          CICS VR 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
                                                   Last time      RLS RR
   S  VSAM sphere                                  referenced     flag on
   s  DWW.CICSVR.CUSTOMER                          05.259 13:19:46 ?
 ****************************** Bottom of data ********************************
```

Figure 3-1   CICS VR VSAM sphere list panel

Note: The CICS VR VSAM sphere list panel displays the one and only sphere, DWW.CICSVR.CUSTOMER, with a warning message that explains that an error was found and refers to message 1410. This message displays because the sphere does not exist. It does not need to exist for this IVP, so you can ignore the message.

4. Select the sphere in the sphere list and press F5=FWDREC to perform forward recovery only. The CICS VR VSAM Sphere parameters panel displays (as shown in Figure 3-2). In this panel, complete the following fields:

New VSAM Sphere name   `&THLQ.CUSTOMER`

     Where `&THLQ` is the high-level qualifier used in job DWWVRDEF

Forward recovery start time   `91.001 00:00:00`

5. Press Enter.

> **Note:** The CICS VR IVP is designed to use a predefined log stream copy and recovers to a new VSAM sphere &THLQ.CUSTOMER, where &THLQ is the high-level qualifier that is used in job DWWVRDEF, which creates this new sphere. The original sphere DWW.CICSVR.CUSTOMER does not need to be created. The IVP forward recovery job that is generated by the ISPF dialog interface specifies SPHERE(DWW.CICSVR.CUSTOMER) and NEWSPHERE(&THLQ.CUSTOMER). Do not modify these parameters, or the forward recovery job will complete with RC 04 and the message `DWW0640W No records were applied.`

```
 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 . . . . . . : DWW.CICSVR.CUSTOMER

  New VSAM sphere name  . . DWWUSER.V4R2M0.CUSTOMER

  Forward-recovery start time . . 91.001 00:00:00  (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
```

Figure 3-2   CICS VR VSAM sphere parameters

6. At the CICS VR Log Stream Type panel, select 2 (QSAM copy), and then press Enter.

7. At the CICS VR forward recovery only panel, select CICSVR exits, and then press Enter.

8. Type DWWPREEX in the field for Preapply exit (as shown in Figure 3-3), and then 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
```

Figure 3-3   CICS VR exits panel

9. Press Enter again to create the JCL.

At this point, you have changed the default value for the THLQ symbolic parameter in the IVP jobs. Therefore, you must select three (edit the job) and replace the high-level qualifier of DWW.CICSVR.LOGSCPY value with the THLQ value that you defined in the IVP jobs.

We defined DWWUSER.V4R2M0 for the THLQ symbolic parameter.

10. Press F3 to save the JCL.

Figure 3-4 shows the generated recovery job.

```
//CICSRS31 JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=&SYSUID,
//             MSGCLASS=X,CLASS=A,REGION=4M
/*JOBPARM L=9999,SYSAFF=SC66
//DWW      PROC
//RECOVER  EXEC PGM=DWWCO
//STEPLIB  DD DSN=DWW.V4R2M0.SDWWLOAD,DISP=SHR
//         DD DSN=DWW.V4R2M0.SDWWLENU,DISP=SHR
//         DD DSN=DWW.V4R2M0.DWWEXLD,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWCON1  DD DSN=DWWUSER.V4R2M0.DWWCON1,DISP=SHR
//DWWCON2  DD DSN=DWWUSER.V4R2M0.DWWCON2,DISP=SHR
//DWWCON3  DD DSN=DWWUSER.V4R2M0.DWWCON3,DISP=SHR
//         PEND
//* END OF PROC
//DWW001 EXEC DWW,COND=(8,LT)
//DWWIN    DD   *
  RECOVER                      -
    ONLY                 -
    NEWSPHERE(DWWUSER.V4R2M0.CUSTOMER) -
    APPLYCA              -
    STARTTIME(05.258/06:05:05)      -
    STOPTIME(05.258/10:32:58)       -
    STARTAT(DSNAME)          -
    SPHERE(DWW.CICSVR.CUSTOMER)
  ALLOCATE                   -
    LOG(                     -
      DWWUSER.V4R2M0.CICSVR.LOGSCPY  -
      )
  MVSLOG                     -
    COPY
  BLDVRP
  DEFEXIT                    -
    PREAPPLY(DWWPREEX,NEW)
//*
```

Figure 3-4   Generated recovery job

11. Next, select 1 to submit the JCL.

When the job has completed, you can use any standard utility to view the job output (see Figure 3-5). The result of the forward recovery is that the journal contains six records:

– 2 DSNAME records
– 4 file control records after-images

These four file control after-image records consist of:

• 2 UPD-AFTER
• 2 ADD-AFTER
• 0 DEL-AFTER

```
KEY TO FIELD IDENTIFIERS
----------------------------------------------------
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 JOURNAL DATA SET                      PROCESSED      DSNAME   UPD-AFTER   ADD-AFTER   DEL-AFTER
----------------------------------------  -------------  ----------  ----------  ----------  ----------
DWWUSER.V4R2M0.CICSVR.LOGSCPY                          6           2           2           2           0
----------------------------------------  -------------  ----------  ----------  ----------  ----------
TOTAL                                                 6           2           2           2           0
----------------------------------------  -------------  ----------  ----------  ----------  ----------
```

Figure 3-5   Journal data set statistics

We verified the results of the IVP recovery job. Figure 3-6 shows the recovery progress report.

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


VSAM SPHERE NAME: DWW.CICSVR.CUSTOMER

THE PREVIOUS FORWARD RECOVERY REGISTERED FOR THIS VSAM SPHERE WHICH WAS
RUN AT 07.327 08:18:30 COMPLETED WITH ERROR.


THIS FORWARD RECOVERY WAS RUN AT: 07.327 08:22:47
TYPE OF RECOVERY : FORWARD RECOVERY IN ONE STEP ONLY.

NO AIXS WERE REMOVED FROM THE UPGRADE SET.
FORWARD RECOVERY RAN SUCCESSFULLY.
NO AIXS NEEDED TO BE REBUILT.
```

Figure 3-6   Recovery progress report

3.3 CICS VR setup considerations

This section includes details about the customization of the system parameters that are required for CICS VR.

We assume that the CICS VR product libraries are already installed in your system. For details about the installation process, refer to *Program Directory for CICS VSAM Recovery*, GI10-2599-02.

> **Installation recommendation:** CICS VR *must* be installed in SREL(C150).

3.3.1 LPA and LNKLST customization

It is essential that the LPALST is set up correctly. Make sure that the library DWW.SDWWLPA (supplied by CICS VR V4R2M0) is added to the LPALST. We recommend to add the library to the dynamic LPALST. See Example 3-16.

Example 3-16   Example to add SDWWLPA dynamically

```
SETPROG LPA,ADD,MASK=*,DSNAME=DWW.V4R2M0.SDWWLPA

IEF196I IEF237I C90A ALLOCATED TO SYS00339
IEF196I IEF285I DWW.V4R2M0.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
```

Add the following libraries to the LNKLST concatenation, which is required for the CICS VR server only.

- ► DWW.V4R2M0.SDWWLOAD
- ► DWW.V4R2M0.SDWWLENU

We recommend that you add the libraries dynamically. Example 3-2 on page 99 shows the command sequence that we used to update the LNKLST dynamically with the new library names.

> **Attention:** We had a previous version of CICS VR libraries active in the LPA and LNKLST. Because of that, we got the following ABEND during the IVP process:
>
> ```
> ABENDSOC2 in module DWWGJTOP CSECT DWWUTMNT at offset X'35E'
> ```
>
> We IPLed the system, which solved the problem.

3.3.2 System parameters

The parameter that controls whether the CICS VR server address space is started during an IPL is the CICSVR_INIT parameter in SYS1.PARMLIB(IGDSMSxx). The possible values of this parameter are:

YES Start CICS VR at system initialization

NO CICS VR start is deferred

If you specify CICSVR_INIT(NO), you have to issue a SETSMS CICSVR_INIT(YES) command before you can activate the CICS VR server.

3.3.3 CICS VR in a SYSPLEX

Every system in a sysplex must have an IGDSMSxx setup for the CICS VR server address space. Furthermore, all systems must be running as a sysplex, because local mode is not allowed.

CICSVR_GRPNAME_SUFFIX()

You must specify a XCF group to allow for sharing of recovery data. The RCDS data sets must be defined on DASD that is shared by all systems in a sysplex that belongs to the same CICS VR XCF group. You can define the XCF group name using the CICSVR_GRPNAME_SUFFIX() parameter. The suffix is used to logically group server address spaces as well as their belonging RCDS data sets.

The group name suffix must be appended to the name of the RCDS data sets that belong to the same XCF group. When the server address space initializes, it tries to locate the RCDS data sets using both the RCDS name prefix and group

name suffix. If the RCDS cannot be located, the server fails to initialize. In this case, the server issues message DWW180E with completion code NORCDS. See Example 3-17.

Example 3-17   NORCDS

```
*DWW180E UNEXPECTED ERROR DURING CICSVR SERVER PROCESSING. 423
  MODULE WHICH DETECTED THE ERROR: DWW1IRCM
  RETURN CODE (HEX): 00000008
  REASON CODE (HEX): 711152E0
  CALLED MODULE ERROR INFORMATION:
  RETURN CODE (HEX): 00000024
  REASON CODE (HEX): 71122412
  COMPLETION CODE: NORCDS
```

You should also define prefixes for all CICS VR required data sets (or use the default value of DWW) by using the IGDSMSxx parameter.

You can define the following prefixes for data sets that are required by CICS VR:

► CICSVR_DSNAME_PREFIX(hlq.slq)

When the CICS VR server address space activates, it attempts to allocate data sets to the DWWMSG, DWWDMSG, and DWWDUMP DD names using a predefined naming convention.

When the server activates, it also appends a suffix of the system name to the allocated data set names, If you want to pre-allocate the data sets, you also must append a suffix of the system name, which can be found in SYS1.PARMLIB(IEASYSxx) in the SYSNAME parameter.

► CICSVR_RCDS_PREFIX(hlq.slq)

You must create The RCDS data sets prior to activating the CICS VR server address space. When the server activates, it tries to allocate the RCDS data sets by using the naming convention that is specified by the RCDS prefix. The server also requires a constant GRP + group suffix that is appended to RCDS data set names, as follows:

– DWWUSER.V4R2M0: RCDS prefix
– DWWCON1: DD name
– GRP: Constant
– PROD: Group prefix

All active server address spaces in the sysplex that belong to the same XCF group can share one set of RCDS data sets.

3.3.4 Dynamically changing the IGDSMSxx member

You can change the value of any of the CICS VR PARMLIB parameters specified in the active IGDSMSxx member dynamically without updating the member itself. You can issue the SETSMS operator command, followed by the CICS VR parameter name and value, for each of the CICS VR parameters to change the current setting. The dynamically changed parameters are not used by CICS VR until the next time the CICS VR server address space is started. However, you change the CICSVR_DSNAME_PREFIX dynamically, 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.

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

You can change the following IGDSMSxx parameters dynamically:

► 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)

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

3.3.5 IFAPRDXX member

An entry in IFAPRDxx is required to enable CICSVR V4.R2.M0.

3.4 CICS VR address space

The CICS VR address space is an integral part of CICS VR V4 and is used for communicating with DFSMShsm and DFSMSdss. It can be started when z/OS is IPLed if the appropriate parameter has been set in SYS1.PARMLIB.

> **Note:** The CICS VR server address space is required for batch logging, backup notifications, and backout failure notifications.

The server can be terminated and reactivated by the following MVS system commands:

```
V SMS,CICSVR,TERMINATESERVER
V SMS,CICSVR,ACTIVE
```

The output of these commands is displayed in the syslog and can be used for problem determination. Example 3-18 shows a sample output of these commands.

Example 3-18   V SMS,CICSVR commands output

```
V SMS,CICSVR,ACTIVE
DWW015I CICSVR SERVER ADDRESS SPACE HAS TERMINATED AND IS RESTARTING.
IEF196I         1 //IEESYSAS JOB MSGLEVEL=1
IEF196I         2 //CICSVR   EXEC IEESYSAS,PROG=DWW1SJST
IEF196I  STMT NO. MESSAGE
IEF196I         2 IEFC001I PROCEDURE IEESYSAS WAS EXPANDED USING
SYSTEM
IEF196I LIBRARY SYS1.PROCLIB
IEF196I         3 XXIEESYSAS PROC PROG=IEFBR14
IEF196I                 00050000
IEF196I         4 XXIEFPROC  EXEC PGM=&PROG
IEF196I                 00100000
IEF196I           XX* THE IEESYSAS PROCEDURE IS SPECIFIED IN THE
IEF196I                 00150000
IEF196I           XX* PARAMETER LIST TO IEEMB881 BY MVS COMPONENTS
IEF196I                 00200000
IEF196I           XX* STARTING FULL FUNCTION SYSTEM ADDRESS SPACES.
IEF196I                 00250000
IEF196I           IEFC653I SUBSTITUTION JCL - PGM=DWW1SJST
IEF403I IEESYSAS - STARTED - ASID=00A9 - SC66
DWW204I CICSVR DATA SET NAMING CONVENTION SET DURING 756
CICSVR ADDRESS SPACE INITIALIZATION ON SYSTEM: SC66
CURRENT VALUE: DWWUSER.SRV
DWW206I CICSVR XCF GROUP NAMING CONVENTION SET DURING 757
CICSVR ADDRESS SPACE INITIALIZATION ON SYSTEM: SC66
CURRENT VALUE: PROD
```

```
DWW207I CICSVR UNDO LOG NAMING CONVENTION SET DURING 758
CICSVR ADDRESS SPACE INITIALIZATION ON SYSTEM: SC66
CURRENT VALUE: DWW
IEE932I 759
DWW590I CICSVR CONTROL SERVICE REQUEST IS ACCEPTED.
  CONTROL FUNCTION:  UNDOLOG
  CONTROL STRING:    ENABLE CONT
  STATE DESCRIPTION: CONTROL PARAMETER ACTIVATED
IEE932I 760
DWW590I CICSVR CONTROL SERVICE REQUEST IS ACCEPTED.
  CONTROL FUNCTION:  BACKOUT
  CONTROL STRING:    SUBMIT NONE
  STATE DESCRIPTION: CONTROL PARAMETER ACTIVATED
IEE932I 761
DWW590I CICSVR CONTROL SERVICE REQUEST IS COMPLETED.
  CONTROL FUNCTION:  GENERAL
  CONTROL STRING:
  STATE DESCRIPTION: DUMMY CONTROL STRING
DWW240I CICSVR ADDRESS SPACE HAS SUCCESSFULLY CONNECTED 762
TO XCF GROUP DWWMPROD ON SYSTEM: SC66
DWW205I CICSVR RCDS NAMING CONVENTION SET DURING 763
CICSVR ADDRESS SPACE INITIALIZATION ON SYSTEM: SC66
CURRENT VALUE: DWWUSER.V4R2M0
IEF196I IGD100I 6D22 ALLOCATED TO DDNAME DWWDMSG  DATACLAS (      )
IEF196I IEF285I   DWWUSER.SRV.DWWDMSG.SC66
CATALOGED
IEF196I IEF285I   VOL SER NOS= TSTO45.
IEF196I IEF237I 6D22 ALLOCATED TO DWWDMSG
IEF196I IGD100I 851B ALLOCATED TO DDNAME DWWDUMP  DATACLAS (      )
IEF196I IEF285I   DWWUSER.SRV.DWWDUMP.SC66
CATALOGED
IEF196I IEF285I   VOL SER NOS= TSTO25.
IEF196I IEF237I 851B ALLOCATED TO DWWDUMP
IEF196I IGD103I SMS ALLOCATED TO DDNAME DWWCON1
IEF196I IGD103I SMS ALLOCATED TO DDNAME DWWCON2
IEF196I IGD103I SMS ALLOCATED TO DDNAME DWWCON3
IEF196I IGD100I 841B ALLOCATED TO DDNAME DWWMSG   DATACLAS (      )
IEF196I IEF285I   DWWUSER.SRV.DWWMSG.SC66
CATALOGED
IEF196I IEF285I   VOL SER NOS= TSTO24.
IEF196I IEF237I 841B ALLOCATED TO DWWMSG
IEF196I IGD100I C516 ALLOCATED TO DDNAME DWWPRINT DATACLAS (      )
IEF196I IEF285I   DWWUSER.SRV.DWWPRINT.SC66
CATALOGED
IEF196I IEF285I   VOL SER NOS= TSTO19.
IEF196I IEF237I C516 ALLOCATED TO DWWPRINT
IEF196I IGD100I 871D ALLOCATED TO DDNAME DWWHIST  DATACLAS (      )
IEF196I IEF285I   DWWUSER.SRV.DWWHIST.SC66
CATALOGED
```

```
IEF196I IEF285I    VOL SER NOS= TSTO2F.
IEF196I IEF237I 871D ALLOCATED TO DWWHIST
IEE932I 787
DWW500I RCDS DWWCON1 ( DWWUSER.V4R2M0.DWWCON1.GRPPROD )
IS IN USE.
IEE932I 788
DWW500I RCDS DWWCON2 ( DWWUSER.V4R2M0.DWWCON2.GRPPROD )
IS IN USE.
IEE932I 789
DWW500I RCDS DWWCON3 ( DWWUSER.V4R2M0.DWWCON3.GRPPROD )
IS IN USE.
DWW540I 3 RCDS ARE IN USE, NO ACTION REQUIRED.
DWW245I APPLICATION IDENTIFIER .RPROD03 SET 791
FOR CICSVR ADDRESS SPACE ON SYSTEM: SC66
DWW014I CICSVR SERVER ADDRESS SPACE IS NOW ACTIVE.
```

To find the status of your CICS VR server, you can use the following command:

```
D SMS,CICSVR,ALL
```

An example of the output from this command is shown in Example 3-19.

Example 3-19   D SMS,CICSVR,ALL command output

```
D SMS,CICSVR,ALL
IEE932I 829
DWW020I DISPLAY SMS,CICSVR
DISPLAY SMS,CICSVR - SERVER STATUS
  SYSNAME:  SC66        AVAILABLE ASID: 00A9 STEP: CICSVR_Init_Complete

DISPLAY SMS,CICSVR - JOB STATUS
  APPLID AND NUMBER OF JOBS USING BATCH LOGGING:
  SYSNAME:  SC66       .RPROD03       0        0        0

DATA SET NAMING CONVENTION IN USE:
  SYSNAME:  SC66       DWWUSER.SRV

UNDO LOG NAMING CONVENTION IN USE:
  SYSNAME:  SC66       DWW

RCDS NAMING CONVENTION IN USE: DWWUSER.V4R2M0

XCF GROUP NAMING CONVENTION IN USE: PROD
```

For information regarding the log streams, there are two further display commands:

```
D SMS,CICSVR,LOGSTREAMS(logstreamname)
D SMS,CICSVR,LOGSTREAMS(ALL)
```

See Example 3-20 for a sample output.

Example 3-20   D SMS,CICSVR,LOGSTREAMS(ALL)

```
D SMS,CICSVR,LOGSTREAMS(ALL)
DWW020I DISPLAY SMS,CICSVR
DISPLAY SMS,CICSVR - LOG STREAM CONNECTION STATUS
  SYSNAME                    00000000011111111112222222222333
  INDENTIFIER                12345678901234567890123456789012

  SCSCPAA9.DFHJ01            .C..............................

  01  SYSNAME:  SC61
  02  SYSNAME:  SC62
```

The letter C opposite the log stream name (SCSCPAA9.DFHJ01) indicates that it is active on system 02, which is SC62. In this case the log stream had been defined as DASD-only.

A letter S in any position along this row indicates on which sysplexes this log stream was active if it had been defined to use the coupling facility.

3.5 RCDS definition

The RCDS is a repository that contains all the necessary information to perform a forward recovery for VSAM data sets.

The RCDS is made up of three linear VSAM data sets. These data sets contain identical copies of the information that CICS VR requires for VSAM recovery. It is recommended that the RCDS data sets are allocated on different volumes and that they use different disk controllers and channels. This setup minimizes the possibility of a hardware failure making all three RCDS data sets unusable. CICS VR can determine if any of the three RCDS data sets are empty or have been corrupted and can copy the current information into the newly created data set.

Example 3-21 shows a sample definition for the RCDS.

Example 3-21

```
DEF CL (NAME(DWWUSER.V4R2M0.DWWCON1)        -
                VOLUME(TOTCI1)              -
                CYLINDERS(200 30)            -
                LINEAR                      -
                SHAREOPTIONS(3 3))          -
DEF CL (NAME(DWWUSER.V4R2M0.DWWCON2)        -
                VOLUME(TOTCI2)              -
                CYLINDERS(200 30)            -
                LINEAR                      -
                SHAREOPTIONS(3 3))          -
DEF CL (NAME(DWWUSER.V4R2M0.DWWCON3)        -
                VOLUME(TOTCI3)              -
                CYLINDERS(150 30)            -
                LINEAR                      -
                SHAREOPTIONS(3 3)           -
```

The size of the RCDS is dependent on batch logging activity. A high number of data sets being logged and frequent open and close processing requires more RCDS space.

It is recommended that the third RCDS is sized smaller than the other two. If this smaller RCDS becomes full, CICS VR issues warning messages but can continue to operate with the two larger RCDSs. This allows time for remedial action to be taken before all three RCDS data sets become full. An RCDS can be deallocated from the CICS VR server using the following command:

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

In this command, *ddname* is DWWCON1, DWWCON2, or DWWCON3.

The RCDS can be deleted, redefined with more space, and then brought back online to the CICS VR server using the following command:

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

Then, CICS VR refills the empty RCDS automatically using data from the other two RCDSs.

3.6 JCL skeleton

You can access the JCL skeleton from the CICS VR main menu panel by selecting option 5.

The first time that you access the ISPF dialog interface, you need to alter the JCL according to your CICS VR setup:

► Change the data set name in the STEPLIB DD name and the RCDS data set names in DWWCON1, DWWCON2, and DWWCON3.

► You might also want to add DD names for DWWDUMP, DWWDMSG, SYSMDUMP and SYSUDUMP for problem determination.

When you save the new JCL skeleton, it is stored in the library that is allocated to the ISPFILE DD name as member DWWUJOB.

Example 3-22 shows an example of the modified sample JCL skeleton that we used in our environment.

Example 3-22   Sample JCL skeleton

```
//CICSRS3&CJOBCHAR JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=&&SYSUID,
//            MSGCLASS=X,CLASS=A,REGION=4M
/*JOBPARM L=9999,SYSAFF=SC66
)SEL &CUTIL NE REORG  && &CUTIL NE BACKUP
//DWW      PROC
//RECOVER  EXEC PGM=DWWCO
//STEPLIB  DD DSN=DWW.V4R2M0.SDWWLOAD,DISP=SHR
//         DD DSN=DWW.V4R2M0.SDWWLENU,DISP=SHR
//         DD DSN=DWW.V4R2M0.DWWEXLD,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWCON1  DD DSN=DWWUSER.V4R2M0.DWWCON1.GRPPROD,DISP=SHR
//DWWCON2  DD DSN=DWWUSER.V4R2M0.DWWCON2.GRPPROD,DISP=SHR
//DWWCON3  DD DSN=DWWUSER.V4R2M0.DWWCON3.GRPPROD,DISP=SHR
//         PEND
//* END OF PROC
)ENDSEL
```

A useful command to obtain which data sets are allocated to your ISPF session is ISRDDN. Figure 3-7 shows a sample output of this command. (Only the CICS VR data sets are shown in this sample.)

```
  Current Data Set Allocations            Row 12 of 126
 Command ===>                                           Scroll ===> CSR

 Volume   Disposition Act DDname   Data Set Name   Actions: B E V M F C I Q
 TOTCI3   SHR,KEEP    >   DWWCON1  DWWUSER.V4R2M0.DWWCON1
 TOTCI3   SHR,KEEP    >   DWWCON2  DWWUSER.V4R2M0.DWWCON2
 TOTCI3   SHR,KEEP    >   DWWCON3  DWWUSER.V4R2M0.DWWCON3
 TOTCI3   SHR,KEEP    >   DWWLLIB  DWW.V4R2M0.SDWWLOAD
 TOTCI3   SHR,KEEP    >            DWW.V4R2M0.SDWWLENU
 TOTCI3   SHR,KEEP    >   DWWLOAD  DWW.V4R2M0.SDWWLOAD
 TOTCI3   SHR,KEEP    >            DWW.V4R2M0.SDWWLENU
 TST03A   SHR,KEEP    >   DWWMSG   DWWUSER.V4R2M0.DWWMSG.SC66
 TST044   SHR,KEEP    >   DWWPRINT DWWUSER.V4R2M0.DWWPRINT.SC66
 TST01A   SHR,KEEP    >   DWWSLIB  CICSRS3.ISPF.ISPFILE
 TOTCI3   SHR,KEEP    >            DWW.V4R2M0.SDWWSENU
          NEW,DEL     >   FT05F001 ---------- Allocated to the terminal -------
          NEW,DEL     >   FT06F001 ---------- Allocated to the terminal -------
 TST01A   SHR,KEEP    >   ISPFILE  CICSRS3.ISPF.ISPFILE
 Z18RD1   SHR,KEEP    >   ISPLLIB  SYS1.DGTLLIB
 Z18RD1   SHR,KEEP    >            SYS1.DFQLLIB
 TOTPT1   SHR,KEEP    >            IXFP210.SIBLOAD
 TOTPT1   SHR,KEEP    >            IXFP210.STKLOAD
 Z18RD1   SHR,KEEP    >            GIM.SGIMLMD0
 Z18RD1   SHR,KEEP    >            HES.SHESLMOD
 F1=HELP      F2=split ne  F3=END      F4=RETURN    F5=RFIND     F6=RCHANGE
 F7=UP        F8=DOWN      F9=SWAP nex F10=LEFT     F11=RIGHT    F12=RETRIEVE
```

Figure 3-7   Sample TSO ISRDDN command output

3.7 CICS VR utilities

In this section, we describe the main CICS VR utilities.

3.7.1 Log of logs registration

When you define a new log of logs, use the ISPF dialog interface to register it with CICS VR. From the CICS VR main menu panel, select option 3 to view a list of all currently registered log of logs. From here, select the Administrate pull-down menu and then the option to register your log of logs (1 or PF6). You can also deregister your log of logs from the same pull-down menu (by selecting 2 or F11).

Figure 3-8 shows the registration panel.

```
Administrate  Utilities  List  View  Help
+------------------------------------------------------------------------------+
|                          CICSVR log of logs register                         |
| Command ===>                                                                 |
|                                                                              |
| 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)                   |
|                                                                              |
|  F1=Help    F12=Cancel                                                       |
+------------------------------------------------------------------------------+
```

Figure 3-8   CICS log of logs registration panel

Figure 3-9 shows the deregistration panel.

```
   Administrate  Utilities  List  View  Help
+------------------------------------------------------------------------------+
|                         CICSVR log of logs deregister                        |
| Command ===>                                                                 |
|                                                                              |
| Press Enter to deregister the log of logs. Or, press F12 to cancel the       |
| request.                                                                     |
|                                                                              |
|   Log of logs  . . . : CICSTS.CICSVR.DFHLGLOG                                |
|                                                                              |
|  F1=Help    F12=Cancel                                                       |
+------------------------------------------------------------------------------M
```

Figure 3-9   CICS log of logs deregistration panel

3.7.2 Log of logs scan

The LOGOFLOGS SCAN command instructs CICS VR to scan all the CICS TS log of logs that are registered in the RCDS. This scan needs to be set up as a batch job and run several times a day to keep the RCDS up to date with essential recovery information. Whenever a scan is run, CICS VR begins at the point where the last scan ended. If the retention period for any log stream blocks or copies are detected they are removed from he RCDS and optionally deleted.

Example 3-23 shows an example of the job that is required for a LOGOFLOGS SCAN.

Example 3-23   Example required for LOGOFLOGS SCAN

```
//CICSRS3  JOB (999,POK),'CICS VR 4.2',CLASS=A,MSGLEVEL=(1,1),
// MSGCLASS=T,NOTIFY=&SYSUID,REGION=0M
/*JOBPARM L=9999,SYSAFF=SC66
//SCANLOG  EXEC PGM=DWWAR,REGION=0M
//STEPLIB  DD DSN=DWW.V4R2M0.SDWWLOAD,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWCON1  DD DSN=DWWUSER.V4R2M0.DWWCON1.GRPPROD,DISP=SHR
//DWWCON2  DD DSN=DWWUSER.V4R2M0.DWWCON2.GRPPROD,DISP=SHR
//DWWCON3  DD DSN=DWWUSER.V4R2M0.DWWCON3.GRPPROD,DISP=SHR
//DWWIN    DD *
        LOGOFLOGS SCAN AUTODEREG(YES) RECOVERYREPORT(YES)
//
/*
```

You can also request a LOGOFLOGS SCAN from the CICS VR ISPF dialog interface by selecting the log of logs list (option 3 in the CICS VR main menu panel) and then the Utilities pull-down menu. See Figure 3-10.

```
 Administrate  Utilities  List  View  Help
 ------------ +-------------------------+ -----------------------------------
              | 2  1. Scan all      F5 | gs list             Row 1 to 1 of 1
 Command ===> | 2. Scan selected       |
              | 3. Scan listed         |
 Select one or +-----------------------+ an action.


                             Last scan
   S  Log of logs            time (GMT)    DD name
   S  CICSTS.CICSVR.DFHLGLOG    07.335 15:28
 ***************************** Bottom of data *******************************
```

Figure 3-10   LOGOFLOGS SCAN using ISPF panel

If you have multiple log of logs, and for performance reasons you only want to scan some of them, you can do this by selecting option 2 from the Utilities pull-down menu of the CICS VR log of logs list panel, which gives you an extra option that allows you to scan specific log of logs.

3.7.3 Log stream copy

You also need to run the log stream copy utility regularly, followed immediately by a backup of the RCDS. See Example 3-24 for an example of the job.

Example 3-24   Sample log stream copy job

```
/*JOBPARM L=9999,SYSAFF=SC66
//*-------------------------------------------------------------
//*         ARCHIVE
//*-------------------------------------------------------------
//IMPORT    EXEC PGM=DWWLC,REGION=0M
//STEPLIB   DD DSN=DWW.V4R2M0.SDWWLOAD,DISP=SHR
//          DD DSN=DWW.V4R2M0.SDWWLENU,DISP=SHR
//DWWMSG    DD SYSOUT=*
//DWWPRINT  DD SYSOUT=*
//DWWCON1   DD DSN=DWWUSER.V4R2M0.DWWCON1.GRPPROD,DISP=SHR
//DWWCON2   DD DSN=DWWUSER.V4R2M0.DWWCON2.GRPPROD,DISP=SHR
//DWWCON3   DD DSN=DWWUSER.V4R2M0.DWWCON3.GRPPROD,DISP=SHR
//DWWCOPY1  DD DSN=DWW.V4R2M0.SDWWJRNL(DWWLG001),DISP=SHR
//DWWIN     DD *
   LOGSTREAMCOPY -
    NAME(CICSTS.SCSCPAA4.DFHJ01)  -
    SELECT(CICSVR) -
    COPIES(1) -
    MOD
/*
```

You can take more than one copy, for example by adding a DWWCOPY2 DD name and changing the COPIES(1) operand to COPIES(2).

Only the MVS log stream copied to the data set specified in the DWWCOPY1 DD name is registered in the RCDS.

3.7.4 RCDS export/import

The CICS VR EXPORT utility is one way to take a backup of your RCDS. In this method, only certain essential tables are copied. Alternatively, you can use the IDCAMS REPRO command to back up your data sets. Example 3-25 shows an example of the EXPORT command.

Example 3-25   Sample RCDS export job

```
//CICSRS3  JOB (999,POK),'VIVS VR 4.2',CLASS=A,MSGLEVEL=(1,1),
// MSGCLASS=T,NOTIFY=&SYSUID,REGION=0M
```

```
/*JOBPARM L=9999,SYSAFF=SC66
//*-------------------------------------------------------------
//*          ARCHIVE
//*-------------------------------------------------------------
//EXPORT    EXEC PGM=DWWGJCDS,REGION=0M
//STEPLIB   DD DSN=DWW.V4R2M0.SDWWLOAD,DISP=SHR
//          DD DSN=DWW.V4R2M0.SDWWLENU,DISP=SHR
//DWWMSG    DD SYSOUT=*
//DWWPRINT  DD SYSOUT=*
//DWWCON1   DD DSN=DWWUSER.V4R2M0.DWWCON1,DISP=SHR
//DWWCON2   DD DSN=DWWUSER.V4R2M0.DWWCON2,DISP=SHR
//DWWCON3   DD DSN=DWWUSER.V4R2M0.DWWCON3,DISP=SHR
//DWWCOPY1  DD DSN=DWW.V4R2M0.SDWWJRNL(DWWEXPXX),DISP=SHR
//DWWIN     DD *
  RCDS EXPORT
/*
```

You can use the IMPORT utility for restoring a previously exported data set.
Example 3-26 shows an example of the IMPORT command.

Example 3-26   Sample RCDS import job

```
//CICSRS3  JOB (999,POK),'VIVS VR 4.2',CLASS=A,MSGLEVEL=(1,1),
// MSGCLASS=T,NOTIFY=&SYSUID,REGION=0M
/*JOBPARM L=9999,SYSAFF=SC66
//*-------------------------------------------------------------
//*          ARCHIVE
//*-------------------------------------------------------------
//IMPORT    EXEC PGM=DWWGJCDS,REGION=0M
//STEPLIB   DD DSN=DWW.V4R2M0.SDWWLOAD,DISP=SHR
//          DD DSN=DWW.V4R2M0.SDWWLENU,DISP=SHR
//DWWMSG    DD SYSOUT=*
//DWWPRINT  DD SYSOUT=*
//DWWCON1   DD DSN=DWWUSER.V4R2M0.DWWCON1,DISP=SHR
//DWWCON2   DD DSN=DWWUSER.V4R2M0.DWWCON2,DISP=SHR
//DWWCON3   DD DSN=DWWUSER.V4R2M0.DWWCON3,DISP=SHR
//DWWCOPY1  DD DSN=DWW.V4R2M0.SDWWJRNL(DWWRCDSE),DISP=SHR
//DWWIN     DD *
  RCDS IMPORT
/*
```

3.7.5 Migration utility

To migrate from CICS VR V2 or V3 to CICS VR V4, you need to run the migration utility program, DWWMIW, to convert your RCDS data sets to V4 format. Example 3-27 shows a sample job for running the migration utility.

> **Note:** CICS VR releases earlier than V2R2 do not store recovery information in recovery control data sets. Therefore, when migrating to CICS VR V4R2 from a CICS VR release earlier than V2R2, there is no need to run the CICS VR migration utility.

Example 3-27   Sample migration utility job

```
//CICSRS3  JOB (999,POK),'VIVS VR 4.2',CLASS=A,MSGLEVEL=(1,1),
// MSGCLASS=T,NOTIFY=&SYSUID,REGION=0M
/*JOBPARM L=9999,SYSAFF=SC66
//MIGRATE  EXEC PGM=DWWMIW,REGION=0M
//STEPLIB  DD DSN=DWW.V4R2M0.SDWWLOAD,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWCON1  DD DSN=DWWUSER.V4R2M0.DWWCON1,DISP=SHR
//DWWCON2  DD DSN=DWWUSER.V4R2M0.DWWCON2,DISP=SHR
//DWWCON3  DD DSN=DWWUSER.V4R2M0.DWWCON3,DISP=SHR
//*
//DWWOCON1 DD DSN=DWWUSER.V3R2M0.DWWCON1,DISP=SHR
//DWWOCON2 DD DSN=DWWUSER.V3R2M0.DWWCON2,DISP=SHR
//DWWOCON3 DD DSN=DWWUSER.V3R2M0.DWWCON3,DISP=SHR
//
```

If you attempt to start the CICS VR server with an RCDS from an earlier release of CICS VR, you will get an error message informing you that your RCDS is back-level.

3.8 ITSO sample environment

In our sample environment for this book, we used z/OS 1.8 with DFSMS for z/OS 1.8. We also used SMS-managed volumes for the allocation of our VSAM data sets. SMS is mandatory for batch logging.

The version of CICS that we used was CICS TS 3.2. We defined our log of logs using the job in Example 3-28. In this example we used DASD-only logs; however, CICS VR does not differentiate between DASD-only or log steams that are defined in the coupling facility.

Example 3-28   sample log of logs log stream definition

```
//S1       EXEC PGM=IXCMIAPU,REGION=4M
//STEPLIB  DD DSN=SYS1.MIGLIB,DISP=SHR
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
  DATA TYPE(LOGR) REPORT(YES)
  DEFINE LOGSTREAM NAME(CICSTS.CICSVR.DFHLGLOG)
                   DASDONLY(YES)
                   HLQ(CICS)
                   STG_SIZE(500)
                   LS_SIZE(7000)
                   MODEL(NO)
                   OFFLOADRECALL(YES)
                   DIAG(NO)
                   RETPD(4)
                   AUTODELETE(YES)
//
```

4

CICS VR integration

In this chapter, we discuss how to integrate CICS VR into your existing CICS TS environment. We assume that you have an existing CICS TS system up and running that has been in existence for a while and that you have just installed CICS VR. You now need to configure existing files to use CICS VR and you need to build the CICS VR process into any new files that you create.

In this chapter, we discuss the following topics:

- ► High-level overview of the recovery process
    - System setup overview
    - File setup overview
    - Backup processing
    - CICS VR initial processing
    - Recovery actions using CICS VR
- ► CICS VSAM RLS file sample
- ► MVS Logger setup
- ► VSAM RLS recovery sample

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4.1 High-level overview of the recovery process

In this section, we provide a quick high-level overview of the resources that you create or modify and the tools that are used to set up and recover files. We cover every step later in this chapter in more detail in the sample walkthrough or in one of our recovery samples.

4.1.1 System setup overview

After you set up the basic product, you need to ensure that the CICS regions have a log of logs and various journal models defined to process your files. For the log of logs setup:

► Use IXCMIAPU to define a log of logs log stream

► Use CEDA to define a log of logs model

Consider sharing one common log of logs for all regions, which can simplify the recovery process.

For forward recovery log setup:

► Use IXCMIAPU to define a forward recovery log log stream

► Use CEDA to define a CICS forward recovery journal model

Each file that is to be recovered must have a log stream associated with it. Again, you can share logs, or you can combine files. Which method you choose depends on many factors and requires some thought as to how you group files.

4.1.2 File setup overview

CICS VR can control several types of files:

► Standard VSAM non-shared files
► VSAM RLS shared files
► Batch files that are offline from CICS and RLS quiesced

For each file make one of the following CICS RDO entries, based on the file type:

► RLS files
  – Use CEDA to set RLsaccess: YES
  – Use IDCAMS to set LOG(ALL)
  – Use IDCAMS set LOGSTREAMID(xx)
► Non-RLS files
  – Use CEDA to set RECOVery: ALL
  – Use CEDA to set Fwdrecovlog: yy

► Offline batch files
  – Use IDCAMS to set FRLOG(ALL)
  – Use IDCAMS to set LOGSTREAMID(xx)

If you intend to process the file offline from CICS using batch, then you need the CICS VR address space running and you need to set the FRLOG parameter.

Because any parameter set in the VSAM catalog will override a CICS-defined setting and because most sites perform both normal CICS file processing and batch offline processing for the same files, you can combine all of these options and choose to use only the RLaccess option based on the type of file. So, most files can be set as follows:

► Use IDCAMS to set LOG(ALL)
► Use IDCAMS set LOGSTREAMID(xx)
► Use IDCAMS to set FRLOG(ALL)

The only real choice you should have to make is to set RLaccess to Yes or No; all the other options should apply.

4.1.3 Backup processing

After you have created your data sets, you are ready to create initial backups and set up an ongoing backup process that will be the basis of your recovery actions.

► Use DFSMShsm, DFSMSdss, ABARS, or any other product to create an initial backup of your files.

► Set up a regular scheduled backup process for your backup method.

► Consider using Backup While Open to allow more frequent backups, which can reduce the recovery time.

Note: You need to synchronize backups and the retention period of logs to ensure that you do not lose any forward recovery logs, creating a window of time with no recovery records. If you take weekly file backups, make sure logs are kept longer than seven days.

4.1.4 CICS VR initial processing

After you have created your data sets, logs and journals, and an initial backup, you are ready to prime the pump, so to speak, using CICS VR.

1. Use the CICS VR panels to register your log of logs.
2. Use the CICS VR panels to scan the logs and register all your data sets.
3. Use the CICS VR panels to deregister extraneous data sets.

4.1.5 Recovery actions using CICS VR

After you have all your files being managed by a controlled backup process run at periodic intervals and have the necessary logging taking place, you are covered and ready to restore your data if needed.

1. If you are recovering a CICS online file, close and disable the file from CICS.

2. Use the panels to select your file and recovery type.

3. Select your VSAM sphere parameters.

4. Select the log stream type.

5. Select any optional forward recovery parameters.

6. View, submit, or save your recovery job.

7. Verify your results.

8. If you are recovering a CICS online file, open and enable the file to CICS.

4.2 CICS VSAM RLS file sample

At this point, the assumption is that you have your existing CICS environment, and you have installed CICS VR. Now, you need to convert existing files to use CICS VR for recovery. Using the FILEA sample, we can demonstrate the complete process from start to finish.

We begin by assuming that you do not have FILEA defined. If you do, you can modify the steps to alter your existing file. Either way, the basic steps are the same.

4.2.1 File modifications and definitions

You can find the FILEA sample in group DFH$FILA. Copy it into a non-CICS owned group so that you can modify it.

For this example, we use FILEA as an RLS file. Because this is not an RLS book, we do not explain the setup of an RLS file in detail here, but the basic setup is as follows:

1. Have a DASD management team set up the SMSVSAM server.

2. Have a MVS team define the cache and lock structures.

3. Ensure that each file does not have IMBED or REPLICATE.

4. Have a DASD management team set the file to the appropriate SMS Storageclass for RLS.

5. Ensure that the CICS regions startup parms have RLS=YES.

6. Modify the CICS CEDA definition for each file to RLsaccess ==> YES.

Because RLS basically pushes the functionality for file processing outside of CICS into SMS, the forward logging attributes needed to control an RLS version of FILEA exist outside of CICS in the VSAM catalog and are controlled through IDCAMS.

> **Note:** You can specify logging parameters in two places:
>
> ▶ Inside CICS through CEDA
> ▶ Outside of CICS through IDCAMS
>
> One important point to note is that the IDCAMS LOG and LOGSTREAMID parameters will override the CEDA RECOVERY and FWDRECOVLOG parameters. Thus, it makes sense to ignore completely the CEDA parameters and use the IDCAMS-defined parameters for both CICS online and Batch only.

CICS CEDA setup for FILEA

The only change necessary inside of CICS is to ensure that the file definition has RLsaccess=YES coded. The other recovery parameters are all ignored, and you can leave them at their defaults, as shown in Figure 4-1.

```
OBJECT CHARACTERISTICS
 CEDA  View File( FILEA    )
  File          : FILEA

 VSAM PARAMETERS
  DSNAme        : CICSDSW.VSAMU.FILEA

  RLsaccess     : Yes                Yes | No

 RECOVERY PARAMETERS
  RECOVery      : Backoutonly        None | Backoutonly | All
  Fwdrecovlog   : No                 No | 1-99
```

Figure 4-1   CEDA display of FILEA attributes

TSO/ISPF IDCAMS setup for FILEA

Using IDCAMS, you can use an ALTER command to modify an existing file, or
you can add the logging parameters when you define the file using IDCAMS. The
key attributes that you need to set for forward logging are:

► LOG(ALL)
► LOGSTREAMID (CICSTS.CICS VR.LOGGING)

You can add the LOG and LOGSTREAMID parameters to an existing data set
online or in batch. Example 4-1 shows the IDCAMS JCL that modifies an existing
version of FILEA using a batch job.

Example 4-1   Sample JCL used to modify an existing VSAM file

```
//VSAMALT EXEC  PGM=IDCAMS
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  *
  ALTER CICSDSW.VSAMU.FILEA   -
    LOG(ALL)                  -
    LOGSTREAMID(CICSTS.CICSVR.LOGGING)
```

Alternatively, you can issue an ALTER command directly to the cluster from
TSO/ISPF, as shown in Figure 4-2.

```
Menu  Options  View  Utilities  Compilers  Help
-------------------------------------------------------------------------------
DSLIST - Data Sets Matching CICSDSW.VSAMU.FILEA                     Row 1 of 3
Command ===>                                                  Scroll ===> CSR

Command - Enter "/" to select action                Message          Volume
-------------------------------------------------------------------------------
alter / log(all) logstreamid(cicsts.cicsvr.logging)                  *VSAM*
        CICSDSW.VSAMU.FILEA.DATA                                      TOTCIE
        CICSDSW.VSAMU.FILEA.INDEX                                     TOTCIE
***************************** End of Data Set list ****************************
```

Figure 4-2   ALTER command using TSO to set logging parameters

Both batch or online methods produce the same results. Figure 4-3 shows the LISTC output after altering the data set to include the LOG and LOGSTREAMID parameters.

```
CLUSTER ------- CICSDSW.VSAMU.FILEA
      IN-CAT --- CATALOG.TOTICF1.VTOTCI5

      SMSDATA
        STORAGECLASS ----CICSRLS     MANAGEMENTCLASS-STANDARD

      RLSDATA
        LOG -----------------ALL   RECOVERY REQUIRED --(NO)       FRLOG
------REDO
        VSAM QUIESCED -------(NO)   RLS IN USE --------(YES)
        LOGSTREAMID--------------CICSTS.CICSVR.LOGGING
```

Figure 4-3   TSO LISTC display of the FILEA data set

With the log stream defined as part of the file attributes in the VSAM catalog, any CICS region that opens the file will use the same log stream, which means that this file can only be used on a single LPAR if DASD logging is used.

> **Note:** If you do not update the JCL that is used to create the data set, then when someone deletes and redefines it, the logging parameters will be lost. So, you need to ensure that the deleted or defined JCL is updated.

> **Note:** In our sample, show in Figure 4-3, we also set FRLOG(REDO). If you set this parameter, your data set will be ready for batch forward recovery logging. You can use a value of FRLOG(ALL), which allows for batch undo logging and batch forward recovery logging.

4.2.2 Journal setup

In regards to forward recovery logging, CICS Journals are similar to an alias in that they are a logical entity that points to the real log outside of CICS.

There is no CICS file that is associated with the system logs that can store the actual MVS Logger log stream information. To allow CICS TS to connect to the external MVS log stream, you need to hard-code a journal definition or create a journal model. (We explain this setup in the next section "Log of logs journal".)

For files that are performing forward recovery logging, a journal definition is optional and is dependent on how you define the file's log and recovery parameters. (We discuss this topic in "CICS file journals" on page 146.)

Log of logs journal

Because CICS initiates the creation of the log of logs log stream, it needs a log stream name to pass on to the MVS Logger. Thus, it uses either a hard-coded journal or a journal model to pull that information.

In our environment, we defined and installed a single journal model that could be used by any CICS region, as shown in Figure 4-4. We discuss setting up the actual MVS log stream in 4.3, "MVS Logger setup" on page 147.

```
OBJECT CHARACTERISTICS
 CEDA  View Journalmodel( DFHLGLOG )
  Journalmodel   : DFHLGLOG
  Group          : LOGTEST
  Description    : Log of logs for VSAM recovery products
  Journalname    : DFHLGLOG
  Type           : Mvs                    Mvs | Smf | Dummy
  Streamname     : &USERID..CICSVR.DFHLGLOG
```

Figure 4-4   CEDA definition of the log of logs journal model

CICS file journals

Any CICS file that performs journaling using the recovery parameters set inside the file definition, through CEDA, attempts to use a hard-coded journal or a journal model. In our environment, we defined a single model that could be used by all CICS regions on the LPAR, as shown in Figure 4-5.

```
OBJECT CHARACTERISTICS
 CEDA  View Journalmodel( LOGMODEL )
  Journalmodel   : LOGMODEL
  Group          : LOGTEST
  Description    : DEFAULT LOG MODEL
  Journalname    : DFHJ*
  Type           : Mvs                    Mvs | Smf | Dummy
  Streamname     : &USERID..CICSVR.&JNAME
```

Figure 4-5   CEDA definition of the general non-RLS file journal model

After both journal models are installed, they show up in the CEMT I JModel command shown in Figure 4-6.

We mentioned before how you can define forward recovery logging log streams inside or outside of CICS. If you define log streams outside of CICS through the IDCAMS LOGSTREAMID parameter, then you do not need a journal or journal model for those files. For our example using FILEA, we only need the log of logs journal model. Because it is not an actual file, we must define it to CICS.

```
I JM
STATUS:  RESULTS
 Jmo(LOGMODEL) Jou(DFHJ*   ) Mvs
    Str(&USERID..CICSVR.&JNAME    )
 Jmo(DFHLGLOG) Jou(DFHLGLOG) Mvs
    Str(&USERID..CICSVR.DFHLGLOG  )
 Jmo(DFHLOG  ) Jou(DFHLOG  ) Mvs
    Str(CICSTS.SCSCPAA4.DFHLOG    )
 Jmo(DFHSHUNT) Jou(DFHSHUNT) Mvs
    Str(CICSTS.SCSCPAA4.DFHSHUNT  )
```

Figure 4-6   CEMT display of journal models

> **Note:** Even if you do define a journal model for a file with the LOGSTREAMID parameter coded using IDCAMS, CICS ignores the journal model and does not create a journal. When this occurs, you see the model in the CEMT I JM display, and you see the log stream in the CEMT I STR display. However, you do not see a journal in the CEMT I JO display, because CICS is bypassing the journal using the log stream information directly out of the VSAM catalog.

4.3 MVS Logger setup

For the CICS environment, there are two parts to a log stream:

► The actual MVS Logger resource itself

► A log stream specification that is either associated with the file definition inside of CICS or in the VSAM catalog outside of CICS

Similar to the CICS journals, the log stream that is pointed to by CICS must either be hard-coded in the MVS Logger or a model must exist.

We addressed the log stream specification in 4.1.1, "System setup overview" on page 140, and we covered the journal in 4.2.2, "Journal setup" on page 145. In this section, we discuss the actual MVS Logger resource.

Both parts can by created dynamically or hard-coded. If you go the dynamic route, you need a model definition in both CICS and MVS.

4.3.1 Log of logs log stream

We describe the set up of the log of logs journal model in 4.2.2, "Journal setup" on page 145.

Now, we need to define a log stream to the MVS Logger through the IXCMIAPU utility. If you do not have the authority to run this utility, then you need to call the MVS team for assistance. Again, similar to the RLS file issue, all attributes that are associated with the log stream are outside of CICS in the MVS Logger.

Running the JCL shown in Example 4-2 creates the CICSTS.CICSVR.DFHLGLOG log stream in the MVS Logger and generates the report shown in Example 4-3.

Example 4-2   JCL Used to create the log of logs log stream

```
//LOGLST   EXEC  PGM=IXCMIAPU
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  *
  DATA TYPE(LOGR) REPORT(NO)
  LIST LOGSTREAM NAME(CICSTS.CICSVR.*) DETAIL(YES)
  DEFINE LOGSTREAM NAME(CICSTS.CICSVR.DFHLGLOG)  LS_SIZE(7000)
  HLQ(CICS) MODEL(NO) STG_SIZE(500) LOWOFFLOAD(45) HIGHOFFLOAD(80)
  RETPD(0) AUTODELETE(NO) DASDONLY(YES) DIAG(NO)
  MAXBUFSIZE(65532)
  LIST LOGSTREAM NAME(CICSTS.CICSVR.*) DETAIL(YES)
/*
```

Example 4-3   MVS log stream report of the log of logs

```
ADMINISTRATIVE DATA UTILITY:  REPORT                      DATA TYPE = LOGR

LOGSTREAM NAME(CICSTS.CICSVR.DFHLGLOG) STRUCTNAME() LS_DATACLAS()
         LS_MGMTCLAS() LS_STORCLAS() HLQ(CICS) MODEL(NO) LS_SIZE(7000)
         STG_MGMTCLAS() STG_STORCLAS() STG_DATACLAS() STG_SIZE(500)
         LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(YES) DUPLEXMODE(UNCOND)
         RMNAME() DESCRIPTION() RETPD(0) AUTODELETE(NO) OFFLOADRECALL(YES)
         DASDONLY(YES) DIAG(NO) LOGGERDUPLEX() EHLQ(NO_EHLQ)
         MAXBUFSIZE(65532)
```

4.3.2 RLS shared log stream for CICS logging of FILEA

When using RLS, many CICS regions can update the same file at the same time. So, you want to log activity to a shared log stream.

In 4.2.1, "File modifications and definitions" on page 142 and 4.2.2, "Journal setup" on page 145, we defined the file to CICS and the file itself to MVS. Now, we need to define the log stream that FILEA uses in the MVS Logger.

Running the JCL listed in Example 4-4 creates the CICSTS.CICSVR.LOGGING log stream in the MVS Logger, generating the report shown in Example 4-5.

Example 4-4   JCL used to create the CICS online shared log stream

```
//LOGLST   EXEC  PGM=IXCMIAPU
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  *
  DATA TYPE(LOGR) REPORT(NO)
  LIST LOGSTREAM NAME(CICSTS.CICSVR.*) DETAIL(YES)
  DEFINE LOGSTREAM NAME(CICSTS.CICSVR.LOGGING)  LS_SIZE(7000)
  HLQ(CICS) MODEL(NO) STG_SIZE(500) LOWOFFLOAD(45) HIGHOFFLOAD(80)
  RETPD(0) AUTODELETE(NO) DASDONLY(YES) DIAG(NO)
  MAXBUFSIZE(65532)
  LIST LOGSTREAM NAME(CICSTS.CICSVR.*) DETAIL(YES)
/*
```

Example 4-5   MVS log stream report of the FILEA log stream

```
ADMINISTRATIVE DATA UTILITY:  REPORT                         DATA TYPE = LOGR
_____
LOGSTREAM NAME(CICSTS.CICSVR.LOGGING) STRUCTNAME() LS_DATACLAS()
        LS_MGMTCLAS() LS_STORCLAS() HLQ(CICS) MODEL(NO) LS_SIZE(7000)
        STG_MGMTCLAS() STG_STORCLAS() STG_DATACLAS() STG_SIZE(500)
        LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(YES) DUPLEXMODE(UNCOND)
        RMNAME() DESCRIPTION() RETPD(0) AUTODELETE(NO) OFFLOADRECALL(YES)
        DASDONLY(YES) DIAG(NO) LOGGERDUPLEX() EHLQ(NO_EHLQ)
        MAXBUFSIZE(65532)
```

4.3.3 Logging for non-RLS CICS files

If you are performing forward recovery logging for a non-RLS file, you have the option of defining recovery information in CICS or in the VSAM catalog using IDCAMS. If you choose to define the log inside of CICS, you set the FWDRECOVLOG parameter in the CSD to a number between 1 and 99.

CICS then uses the journal model, that we defined in "CICS file journals" on page 146, to open a log stream called CICSTS.CICSVR.DFHJ*xx*, where *xx* is the value coded in FWDRECOVLOG. The MVS Logger uses the MVS Logger model listed in Example 4-6 to create the actual physical log stream.

Running the JCL shown in Example 4-6 creates the CICSTS.CICSVR.MODEL log stream model in the MVS Logger and generates the report shown in Example 4-7.

Example 4-6   JCL used to create a generic log stream model

```
//LOGLST   EXEC  PGM=IXCMIAPU
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  *
  DATA TYPE(LOGR) REPORT(NO)
  LIST LOGSTREAM NAME(CICSTS.CICSVR.*) DETAIL(YES)
  DEFINE LOGSTREAM NAME(CICSTS.CICSVR.MODEL)  LS_SIZE(7000)
  HLQ(CICS) MODEL(YES) STG_SIZE(500) LOWOFFLOAD(45) HIGHOFFLOAD(80)
  RETPD(0) AUTODELETE(NO) DASDONLY(YES) DIAG(NO)
  MAXBUFSIZE(65532)
  LIST LOGSTREAM NAME(CICSTS.CICSVR.*) DETAIL(YES)
/*
```

Example 4-7   MVS log stream report of the generic model

```
ADMINISTRATIVE DATA UTILITY:  REPORT                        DATA TYPE = LOGR


LOGSTREAM NAME(CICSTS.CICSVR.MODEL) STRUCTNAME() LS_DATACLAS()
         LS_MGMTCLAS() LS_STORCLAS() HLQ(CICS) MODEL(YES) LS_SIZE(0)
         STG_MGMTCLAS() STG_STORCLAS() STG_DATACLAS() STG_SIZE(500)
         LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(YES) DUPLEXMODE(UNCOND)
         RMNAME() DESCRIPTION() RETPD(0) AUTODELETE(NO) OFFLOADRECALL(YES)
         DASDONLY(YES) DIAG(NO) LOGGERDUPLEX() EHLQ(NO_EHLQ)
         MAXBUFSIZE(65532)
```

Again, you do not need the journal definitions and models for this sample, but you might need them for your system.

4.3.4 Opening your file: Actions and results

In this section, we go through commands and screens and show the output that gets created and the processing that takes place at each step along the way.

File status

Setting FILEA OPE (open) and ENA (enabled) the first time, as shown in Figure 4-7, will seem to hang for a little bit because CICS is automatically creating or opening all necessary journals and log streams that are required to manage forward recovery logging.

```
I FI(FILEA)
STATUS:  RESULTS - OVERTYPE TO MODIFY
 Fil(FILEA   ) Vsa Ope Ena Rea Upd Add Bro Del     Sha Rls
        Dsn( CICSDSW.VSAMU.FILEA                          )
```

Figure 4-7   CEMT SET FI(FILEA) OPE ENA command results

Journal model status

The first time any file is opened that requires recovery, the log of logs is updated. If the log of logs does not exist, as in our environment, it is created using the journal model shown in Figure 4-8.

```
I JM
STATUS:  RESULTS
 Jmo(LOGMODEL) Jou(DFHJ*  ) Mvs
    Str(&USERID..CICSVR.&JNAME   )
 Jmo(DFHLGLOG) Jou(DFHLGLOG) Mvs
    Str(&USERID..CICSVR.DFHLGLOG )
 Jmo(DFHLOG  ) Jou(DFHLOG  ) Mvs
    Str(CICSTS.SCSCPAA4.DFHLOG    )
 Jmo(DFHSHUNT) Jou(DFHSHUNT) Mvs
    Str(CICSTS.SCSCPAA4.DFHSHUNT  )
```

Figure 4-8   Display of available journal models

Journal status

After the log of logs is created and opened as shown in Figure 4-9, CICS can open the log stream that is associated with FILEA.

```
I JO
STATUS:  RESULTS - OVERTYPE TO MODIFY
 Jou(DFHLGLOG) Mvs Ena      Str(CICSTS.CICSVR.DFHLGLOG   )
 Jou(DFHLOG  ) Mvs Ena      Str(CICSTS.SCSCPAA4.DFHLOG   )
 Jou(DFHSHUNT) Mvs Ena      Str(CICSTS.SCSCPAA4.DFHSHUNT )
```

Figure 4-9   Display of the active journals showing log of logs

Log stream status

In our environment, we set FILEA to use log stream CICSTS.CICSVR.LOGGING using the JCL shown in Example 4-2 on page 148. Log stream CICSTS.CICSVR.LOGGING now shows up inside CICS, as shown in Figure 4-10.

```
I STR
STATUS:  RESULTS
 Str(CICSTS.CICSVR.DFHLGLOG   ) Use(0000001) Ok
 Str(CICSTS.CICSVR.LOGGING    ) Use(0000001) Ok
 Str(CICSTS.SCSCPAA4.DFHLOG   ) Use(0000001) Ok  Sys
 Str(CICSTS.SCSCPAA4.DFHSHUNT ) Use(0000001) Ok  Sys
```

Figure 4-10   Display of log streams active in MVS

All adds, changes, or deletes to FILEA from now on will cause CICS to log all after images of FILEA in the CICSTS.CICSVR.LOGGING log stream for use by CICS VR.

4.3.5 CICS VR log scan and file register

Let us move outside of CICS and the setup process and review the backup and recovery process. Similar to the initial usage of FILEA inside CICS, we had to do some setup before we could start using FILEA for the very first time. CICS VR also needs some setup to register logs and files.

In the CICS environment, the log of logs is used to keep track of all file open and close activity. So, in the absolutely simplest CICS system with only one file defined, you need at least two logs to perform forward recovery:

► The journal or log stream to log actual forward recovery after images
► The log of logs to keep track of all file activity

Perform a log of logs scan

The very first time that you use CICS VR or after creating a new log of logs data set, you need to register the log of logs to CICS VR and then scan it to register potential data sets that you might want to recover.

You use the CICS VR log of logs list panel to manage log of logs and to perform the initial scan. Follow these steps:

1. From the CICS VR main menu, select the list of registered log of logs selection (option 3) as shown in Figure 4-11.

```
 CICSVR main menu
Command ===>


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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 F1=Help      F3=Exit     F10=Menu bar F12=Cancel
```
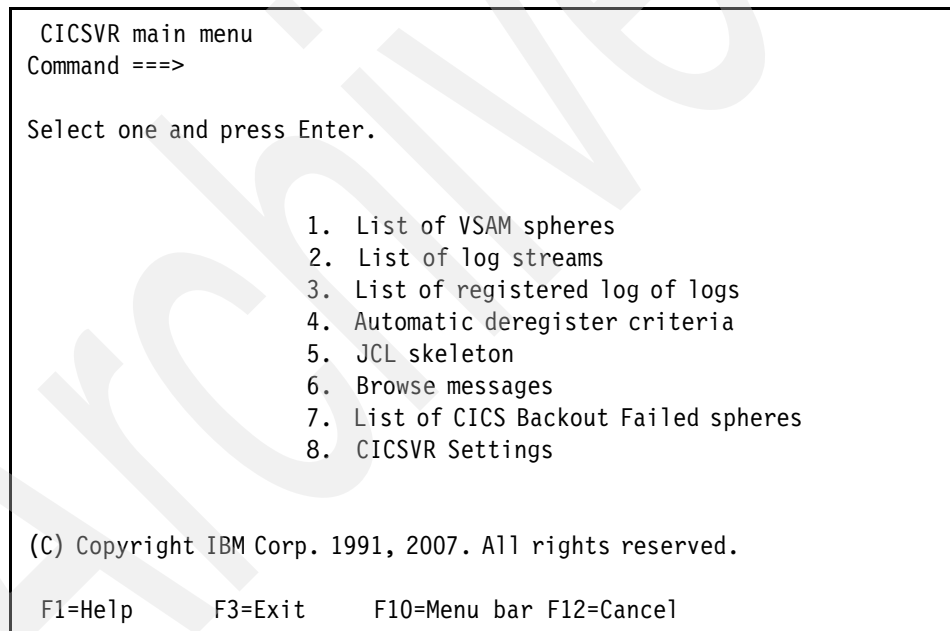
Figure 4-11   Log of logs processing options

2. From the Administrate menu, select **Register** as shown in Figure 4-12.

```
 Administrate  Utilities  List  View  Help
 +------------------------+ --------------------------------------------------
 | 1  1. Register...   F6 | ICSVR log of logs list              Row 1 to 1 of 1
 |    2. Deregister... F11 |
 |    3. Exit          F3 |
 +------------------------+ gs, then select an action.


                                Last scan
   S  Log of logs                time (GMT)    DD name
   S  CICSTS.CICSVR.DFHLGLOG      07.333 13:53
 ****************************** Bottom of data *******************************
```

Figure 4-12   Register a new log of logs

3. Enter the new or existing log of logs and press Enter to register it to CICS VR as shown in Figure 4-13.

```
 Administrate  Utilities  List  View  Help
 +-----------------------------------------------------------------------------+
 | CICSVR log of logs register                                                 |
 | Command ===>                                                                |
 |                                                                             |
 | 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  . . . . CICSTS.CICSVR.DFHLGLOG                               |
 |                                                                             |
 |   Start scan point . .                 (YY.DDD HH:MM:SS)                    |
 |                                                                             |
 | F1=Help    F12=Cancel                                                       |
 +-----------------------------------------------------------------------------+
```

Figure 4-13   Enter log of logs data set name

CICS VR responds with a successful registration message, shown in
Figure 4-14.

```
  Administrate  Utilities  List  View  Help
  ------------------------------------------------------------------------------
                             CICSVR log of logs list            Row 1 to 1 of 1
   Command ===>

   Select one or more log of logs, then select an action.



                                    Last scan
    S  Log of logs                  time (GMT)    DD name
       CICSTS.CICSVR.DFHLGLOG
  ****************************** Bottom of data ******************************




  +----------------------------------------------------------------------------+
  | The log of logs CICSTS.CICSVR.DFHLGLOG is registered to the recovery control |
  | data set.                                                                   |
  +----------------------------------------------------------------------------+
```

Figure 4-14   Resulting message from successfully registering your log of logs

4. Next, you need to tell CICS VR to scan the log of logs. It then registers all data
   sets that have been referenced by CICS. From the Utilities menu shown,
   select **Scan selected**, as shown in Figure 4-15.

```
  Administrate  Utilities  List  View  Help
  -------------- +--------------------------+ ----------------------------------
               | 2  1. Scan all       F5 | gs list              Row 1 to 1 of 1
   Command ===> |    2. Scan selected     |
               |    3. Scan listed       |
   Select one or +--------------------------+ an action.


                                    Last scan
    S  Log of logs                  time (GMT)    DD name
    S  CICSTS.CICSVR.DFHLGLOG
  ****************************** Bottom of data ******************************
```

Figure 4-15   Scan log of logs to register data sets

Any file that was opened or closed in CICS will have one or more records in the log of logs. CICS VR scans for these records and updates its RCDS with this information. For any file to show up in CICS VR, it must have been opened as a recoverable file in CICS. Thus, because this file was just created and opened (as shown in Figure 4-7 on page 151), CICS VR scans the log of logs, finds a reference to FILEA, and registers it to CICS VR.

Figure 4-16 shows CICS VR scanning the log of logs in our environment.

```
Administrate  Utilities  List  View  Help
+------------------------------------------------------------------------------+
|                                 CICSVR wait                                   |
|                                                                              |
| CICSVR is scanning the log of logs. This might take a few minutes.           |
|                                                                              |
|                                                                              |
|                                                                              |
+------------------------------------------------------------------------------+
```

Figure 4-16   CICS VR performing a log of logs scan

After the scan is done, you get a short report as seen in Figure 4-17.

```
1CICSVR - CICS VSAM RECOVERY                                              DATE
: 07/11/29     TIME : 08:53:42
0
 DWW1101I The archive utility is started at 07/11/29 10:27:27.

DWW1102I The archive utility is terminated. The maximum condition code is 0.
```

Figure 4-17   CICS VR log of logs scan report

5. Even though a successful scan report was generated, we can list the CICS VR status information that is contained in the CICS VR RCDS about the selected log of logs. From the List menu, select **List details**, as shown in Figure 4-18.

```
 Administrate  Utilities  List  View  Help
 --------------------------+--------------------------+ --------------------------
                           |  1. List details... F4 |         Row 1 to 1 of 1
 Command ===>              +--------------------------+

 Select one or more log of logs, then select an action.


                               Last scan
   S  Log of logs             time (GMT)     DD name
   S  CICSTS.CICSVR.DFHLGLOG   07.333 15:27
 ***************************** Bottom of data ******************************
```

Figure 4-18   Display information about the log of logs and when it was last scanned

Figure 4-19 shows the log of logs scan details. Each time CICS VR scans the log of logs, it makes a note of where it stop the scan using the "Last block number" field. Thus, each time CICS VR attempts to run another scan, it simply checks the current in-use block number against the stored value and either performs a new scan or skips it. Notice, when using the CICS VR panels, that sometimes it performs scans and sometimes it skips the scan.

```
 CICSVR log of logs details list
Command ===>

Select one or more errors, then press Enter to get more information. Or,
press Enter to show the log of logs list for the next selected log of
logs. Or, press F12 to cancel the list sequence.

  Log of logs  . . . : CICSTS.CICSVR.DFHLGLOG
  First block number :                      1
  Last block number  :                   5245
  First timestamp  . : 07.330 08:29:27  (local)
                       07.330 13:29:27  (GMT)
  Last timestamp . . : 07.332 09:02:12  (local)
                       07.332 14:02:12  (GMT)
  Last scan time . . : 07.333 15:27:27  (GMT)


  S  Information & error
**************************** Bottom of data *****************************



 F1=Help     F7=Bkwd     F8=Fwd     F12=Cancel
```

Figure 4-19   CICS VR log of logs scan status information

Verify the file is listed in CICS VR

Now that the initial log of logs scan is complete, you can view the file in CICS VR by selecting "List of VSAM spheres" (option 1), as shown in Figure 4-20.

```
 Help
 ------------------------------------------------------------------------------
                               CICSVR main menu
 Command ===>

 Select one and press Enter.


                     1   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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  F1=Help      F3=Exit      F10=Menu bar F12=Cancel
```

Figure 4-20   List all VSAM spheres

The listing shows the file to be similar to the FILEA shown in Figure 4-21. Thus, you know that everything is set up correctly, that CICS is performing forward recovery logging, and that CICS VR is tracking file activity.

```
 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
                                                    Last time       RLS RR
   S  VSAM sphere                                    referenced      flag on
   s  CICSDSW.VSAMU.FILEA                            07.333 15:27:27 N
 ****************************** Bottom of data *******************************
```

Figure 4-21   Displaying files in CICS VR

4.3.6 Backup of the file

Now, for one of the most important tasks. You need to create a backup copy of the file. You have several options:

▶ **DFSMShsm logical backups**

– You can create logical backups for an entire VSAM sphere (not just the base cluster).
– CICS VR can query DFSMShsm's inventory dynamically to retrieve and display a list of all DFSMShsm logical backups that exist for VSAM spheres.
– BWO support.
– 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.

▶ **DFSMShsm full volume dumps**

– CICS VR provides limited support for DFSMShsm full volume dumps.

▶ **DFSMSdss logical copies and dumps**

– DFSMSdss logical copies and dumps are fully supported by CICS VR.
– Notification of DFSMSdss logical copies and dumps is automatically performed by DFSMSdss.
– The CICS VR server address space must be active for CICS VR to keep an inventory of DFSMSdss logical copies and dumps created for VSAM data sets.

▶ **ABARS backups**

– ABARS backups are fully supported by CICS VR.
– CICS VR provides the ability to keep an inventory of ABARS backups in the RCDS.

▶ **Any other backup product**

– CICS VR contains general backup support that allows an inventory of the backups to be maintained in the CICS VR RCDS.
– The CICS VR server address space must be active for CICS VR to keep an inventory of backups created by other products.
– 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.

In our environment, we use DFSMShsm and DFSMSdss to create backups. For the RLS recovery sample, we use a DSSLC backup. For a detailed overview of backing up files, see 6.3.3, "VSAM data set backup" on page 224.

HSM backup

Using HSM to perform backups, you have two options: online or batch. Online HSM backup is the quickest and easiest for our testing purposes. However, for existing batch processing, you need to use batch backups. We show a quick backup using both processes.

To perform a backup online through TSO/ISPF, issue the HBACKDS command as shown in Figure 4-22.

```
 Menu  Options  View  Utilities  Compilers  Help
 -------------------------------------------------------------------------------
 DSLIST - Data Sets Matching CICSDSW.VSAMU.FILEA                      Row 1 of 3
 Command ===>                                                    Scroll ===> CSR

 Command - Enter "/" to select action                      Message         Volume
 -------------------------------------------------------------------------------
 hbackds / ICSDSW.VSAMU.FILEA                                            *VSAM*
         CICSDSW.VSAMU.FILEA.DATA                                        TOTCIE
         CICSDSW.VSAMU.FILEA.INDEX                                       TOTCIE
 **************************** End of Data Set list ****************************
```

Figure 4-22   Backing up FILEA through HSM online

To perform a backup using a batch job, run the job shown in Example 4-8.

Example 4-8   Backing up FILEA through HSM in batch

```
//CICSRS31 JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=&SYSUID,
//            MSGCLASS=X,CLASS=A,REGION=4M
/*JOBPARM L=9999,SYSAFF=SC66
//HSMBKUP  EXEC PGM=ARCINBAK
//ARCPRINT DD SYSOUT=*
//ARCSNAP  DD SYSOUT=*
//BACK01   DD  DSN=CICSDSW.VSAMU.FILEA,DISP=SHR
//*
//
```

If you want to back up more than one file, just replicate the BACK01 DD card making BACK02.

DSS backup

You can also use DFSMSdss to back up your files, except that you can only run DSS in batch. You can use the JCL shown in Example 4-9 to back up FILEA in batch.

> **Note:** The CICS VR address space must be active when the DSS backup job is executed.

Example 4-9   Backing up FILEA using DSS in batch

```
//CICSRS31 JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=&SYSUID,
//            MSGCLASS=X,CLASS=A,REGION=4M
/*JOBPARM L=9999,SYSAFF=SC66
//*------------------------------------------------------------------*
/
//* Please change OUTDYNAM keyword value XXXXXX to the actual volume
*/
//* name, which the backup should be placed to.
*/
//*------------------------------------------------------------------*
/
//LOGICCPY EXEC PGM=ADRDSSU
//SYSPRINT DD   SYSOUT=*
//SYSIN    DD   *
  COPY                    -
    DS(INCL(CICSDSW.VSAMU.FILEA))    -
    OUTDYNAM( TOTCI3 )  -
    RENAMEU(**,CICSDSW.VSAMU.FILEA.B1) -
    CICSVRBACKUP
/*
//
```

Using CICS VR to verify that the file is backed up

CICS VR is aware of the method that you used to back up the file; however, from your perspective, it does not matter. CICS VR can process both backups with no visible difference to you or to your selection process.

To list backups, from the CICS VR VSAM sphere list panel, from the List menu select **List backups**, as shown in Figure 4-23.

```
 Administrate  Utilities  Tools  List  View  Help
 ------------------------------ +-------------------------+ ----------------
                            CICS | 1 1. List backups...    |  Row 1 to 1 of 1
 Command ===>                    |   2. List RLS details... |
                                 |   3. List backup names   |
 Select one or more VSAM spheres +-------------------------+

   N  Use default parameters for selected spheres
                                                    Last time       RLS RR
   S  VSAM sphere                                   referenced      flag on
   S  CICSDSW.VSAMU.FILEA                           07.333 15:27:27  N
 ***************************** Bottom of data *****************************
```

Figure 4-23   List backups known to CICS VR

The backup listing shows that there are three backups of FILEA, two of which were taken with DFSMShsm and one with DFHSMSdss (Figure 4-24). In our sample, we made one DFSMShsm backup online and one using batch, but to CICS VR and to SMS, they are one and the same.

```
 CICSVR backup list              Row 1 to 3 of 3
 Command ===>

 Press Enter to show the backup list for the next selected VSAM sphere. Or,
 press F12 to cancel the list sequence.

   VSAM sphere  . . . : CICSDSW.VSAMU.FILEA


 --------------------- Data set backup information ---------------------
   Date    Time     Gen  Ver   Online  RP Date  RP Time   Type    Product
   07.334  03:09:14              NO                        LOCAL   DSSLC
   07.332  08:26:41              NO                        LOCAL   DSSLD
   07.330  09:12:01              NO                        LOCAL   DSSLC
 *************************** Bottom of data ****************************
```

Figure 4-24   List all our VSAM spheres

4.4 VSAM RLS recovery sample

In this section, we discuss a VSAM RLS recovery example. We provide a step-by-step walkthrough for two forward recovery scenarios:

► For the first scenario we use a batch program to add six additional records to FILEA. We use batch logging for FILEA. After that, we use a CICS program to update and delete records at a time. For the sample scenario, we assume that the delete request was processed by mistake. Therefore, we need to perform forward recovery up to a specific point in time, rather than running a full forward recovery.

► The second part of the recovery sample describes how to perform a full forward recovery of the first scenario. In this case, we assume that the volume became unusable. Therefore, we have to restore the backup followed by a forward recovery process.

4.4.1 Step 1: Take a backup

We start the VSAM RLS recovery sample by taking a backup of FILEA first. From the CICS VR main menu, select 1 to display the List of available VSAM spheres. Then, press enter on the CICS VR VSAM sphere list include window. After that, select the file from the list of sphere names and open the Utilities menu.

Figure 4-25 shows the Utilities menu. We selected **Backup** (option 3) to take a backup of FILEA. Then, press Enter.

```
  Administrate  Utilities  Tools  List  View  Help
 --------------+-------------------------------+------------------------------
             | 3  1. Reorganization...    F4 | t              Row 1 to 1 of 1
Command ===>  |     2. Forward recovery...  F5 |
             |     3. Backup...            F6 |
Select one or +-------------------------------+

  N  Use default parameters for selected spheres
                                              Last time        RLS RR
  S  VSAM sphere                              referenced       flag on
  S  CICSDSW.VSAMU.FILEA                       07.332 09:54:44  N
****************************** Bottom of data *******************************
```

Figure 4-25   Utilities menu

On the next panel, we enter the CICS VR backup parameters. Figure 4-26 shows the specified parameters.

We entered a backup name of DWWUSER.VSAMUB1.FILEA, and we selected DSSLD for the backup product. At this stage the file is quiesced in CICS; therefore, we let the backup type value default to non-CICS.

```
 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 . . . . . . : CICSDSW.VSAMU.FILEA

 VSAM sphere backup name    DWWUSER.VSAMUB1.FILEA

 Aggregate group name  . .

 Backup product name . . . DSSLD  (HSMLB, ABARS, DSSLC, DSSLD or other)

 Backup type . . . . . . . 3  (1-CICS Online, 2-CICS Offline, 3-non-CICS)

 CICS APPLID . . . . . . .
```

Figure 4-26   Backup parameters

When we press Enter, the job for the DSS backup is generated. We select Edit the JCL to update the name of the volume. Example 4-10 shows the DSS backup job.

Example 4-10   Backup job

```
//DSSDUMP EXEC PGM=ADRDSSU
//SYSPRINT DD SYSOUT=*
//DD1 DD UNIT=3390,VOL=SER=TOTCI3,SPACE=(CYL,(5,1)),
// DISP=(NEW,CATLG),
// DSN=DWWUSER.VSAMUB1.FILEA
//SYSIN DD *
   DUMP OUTDD(DD1) -
   DS(INCL(CICSDSW.VSAMU.FILEA)) -
   CICSVRBACKUP
/*
//
```

After submitting the job, we go back to VSAM sphere list panel. Here, we select the file again to open the List menu. From there, we select option 3 to get a list of available backups. Example 4-11 shows the backup name that we created.

Example 4-11   Backup information

```
VSAM sphere  . . . : CICSDSW.VSAMU.FILEA

-------------------- Data set backup information ----------------------

S  Date    Time     Type    Backup data set name
   07.332  08:26:41 LOCAL   DWWUSER.VSAMUB1.FILEA
   07.330  09:12:01 LOCAL   DWWUSER.SRV.DS003001.D2007330.T0912015
***************************** Bottom of data *****************************
```

4.4.2 Step 2: Update FILEA from batch

> **Note:** You can use the IBM supplied FILEA sample file for this recovery sample. We use a RLS version of FILEA but any non RLS defined FILEA can be used also to complete the following steps. The contents of any existing FILEA in your environment is not important.

We use a batch program that provides new records to be used by the recovery sample. Example 4-12 shows a subset of FILEA before making any changes.

Example 4-12   Subset of FILEA before changes

```
000100 S. D. BORMAN       SURREY, ENGLAND
000102 J. T. CZAYKOWSKI   WARWICK, ENGLAND
000104 M. B. DOMBEY       LONDON,ENGLAND
000106 A. I. HICKSON      CROYDON, ENGLAND
000111 ALAN TULIP         SARATOGA,CALIFORNIA
000762 SUSAN MALAIKA      SAN JOSE,CALIFORNIA
000983 J. S. TILLING      WASHINGTON, DC
001222 D.J.VOWLES         BOBLINGEN, GERMANY
001781 TINA J YOUNG       SINDELFINGEN,GERMANY
003210 B.A. WALKER        NICE, FRANCE
003214 PHIL CONWAY        SUNNYVALE, CAL.
003890 JOHN CUMMINGS      NICE, FRANCE
004004 JANET FOUCHE       DUBLIN, IRELAND
004445 DR. P. JOHNSON     SOUTH BEND, S.DAK.
004878 ADRIAN JONES       SUNNYVALE, CALIF.
005005 A. E. DALTON       SAN FRANCISCO, CA.
005444 ROS READER         SARATOGA, CALIF.
```

```
005581 PETE ROBBINS      BOSTON, MASS.
006016 SIR MICHAEL ROBERTS NEW DELHI, INDIA
```

To add six additional records to the existing FILEA, we use the JCL shown in
Example 4-13. (You can find the example program, VSAMBUPD, in Appendix C,
"Sample program, VSAMBUPD" on page 377.) We use a RLS version of FILEA;
therefore, we issue the following command in CICS to quiesce the file:

```
CEMT SET DSN(CICSDSW.VSAMU.FILEA) QUIESCE
```

If you use a non-RLS version, it is sufficient to close the file in CICS.

Example 4-13   FILEA update job

```
//CICSRS3  JOB (999,POK),'CICS VR 4.2',CLASS=A,MSGLEVEL=(1,1),
// MSGCLASS=T,NOTIFY=&SYSUID,REGION=0M
/*JOBPARM L=9999,SYSAFF=SC66
//S1       EXEC PGM=VSAMBUPD
//STEPLIB  DD DISP=SHR,DSN=CICSSYSF.APPL53.LOADLIB
//FILEPK   DD DISP=SHR,DSN=CICSDSW.VSAMU.FILEA
//SYSOUT   DD SYSOUT=A
//SYSPRINT DD SYSOUT=A
//SYSUDUMP DD SYSOUT=A
//SYSABEND DD SYSOUT=A
//SYSINT   DD *
 110030 CHRIS RAYNS        USA      POUGHKEEPSIE X
 110031 TATIANA ZHBANNIKOVA RUSSIA  MOSCOW       X
 110032 VALERY KOULAJENKOV RUSSIA   MOSCOW       X
 110033 MAXIM STOGNEV      RUSSIA   MOSCOW       X
 110034 JOHN TILLING       UK       HURSLEY      X
 110035 PETER KLEIN        GERMANY MAINZ         X
END
/*
```

We run the job and print the data set again. It now contains the new records that
we can use for next steps in the sample.

Example 4-14 shows the data after processing our input.

Example 4-14   FILEA contents after running update job

```
 000100 S. D. BORMAN       SURREY, ENGLAND
 000102 J. T. CZAYKOWSKI   WARWICK, ENGLAND
 000104 M. B. DOMBEY       LONDON,ENGLAND
 000106 A. I. HICKSON      CROYDON, ENGLAND
 000111 ALAN TULIP         SARATOGA,CALIFORNIA
```

```
000762 SUSAN MALAIKA       SAN JOSE,CALIFORNIA
000983 J. S. TILLING       WASHINGTON, DC
001222 D.J.VOWLES          BOBLINGEN, GERMANY
001781 TINA J YOUNG        SINDELFINGEN,GERMANY
003210 B.A. WALKER         NICE, FRANCE
003214 PHIL CONWAY         SUNNYVALE, CAL.
003890 JOHN CUMMINGS       NICE, FRANCE
004004 JANET FOUCHE        DUBLIN, IRELAND
004445 DR. P. JOHNSON      SOUTH BEND, S.DAK.
004878 ADRIAN JONES        SUNNYVALE, CALIF.
005005 A. E. DALTON        SAN FRANCISCO, CA.
005444 ROS READER          SARATOGA, CALIF.
005581 PETE ROBBINS        BOSTON, MASS.
006016 SIR MICHAEL ROBERTS NEW DELHI, INDIA
110030 CHRIS RAYNS         USA     POUGHKEEPSIE
110031 TATIANA ZHBANNIKOVA RUSSIA  MOSCOW
110032 VALERY KOULAJENKOV  RUSSIA  MOSCOW
110033 MAXIM STOGNEV       RUSSIA  MOSCOW
110034 JOHN TILLING        UK      HURSLEY
110035 PETER KLEIN         GERMANY MAINZ
```

4.4.3 Step 3: Update FILEA using CICS

We use the CICS program shown in Example 4-15 to update and delete two records that we added using the batch program. We defined transaction VUPD to run the program. To update FILEA using CICS requires the following steps:

1. The program issues a read for update for key 110030, which is first of the new records. After that, we move an X character to the first byte of the INTO() area.

2. Next, the program does a rewrite command of the modified record. Record with key 110030 is updated.

3. The program issues a write operator command to indicate that it has updated the record.

4. It delays the process for a minute before it deletes one of the records.

5. When the program gets control again after one minute, it issues a delete command for key 110031.

6. The program issues a write to operator command again to log the time stamp of the delete command.

Example 4-15   CICS application program

```
DFHEISTG DSECT
HERE     DS    CL80
TSTVSAM  CSECT
BEGIN    DS    0H
READ     DS    0H
1        EXEC CICS READ FILE('FILEA') INTO(HERE) RIDFLD(RID1) UPDATE
         MVC   HERE(1),=CL1'X'
2        EXEC CICS REWRITE FILE('FILEA') FROM(HERE)
3        EXEC CICS WRITE OPERATOR TEST(MSG1) TEXTLENGTH(80)
4        EXEC CICS DELAY FOR MINUTES(1)
5        EXEC CICS DELETE FILE('FILEA') RIDFLD(RID2)
6        EXEC CICS WRITE OPERATOR TEST(MSG2) TEXTLENGTH(80)
RETURN   DS    0H
         EXEC CICS RETURN
MSG1     DC    CL80' CICSVR RECOVERY SAMPLE - KEY 110030 UPDATED'
MSG2     DC    CL80' CICSVR RECOVERY SAMPLE - KEY 110031 DELETED'
RID1     DC    CL6'110030'
RID2     DC    CL6'110031'
         END
```

We start transaction VUPD and verify the result. The joblog shows the output of
the write operator commands that we issued (Example 4-16). We can use the
time stamps of the messages to specify the stop time for the forward recovery
process. We do not want to recover the after image for the delete request.
Therefore, we specify a stop time later than 08.56.26 and before 08.57.27. For a
full forward recovery, we would not specify a stop time at all in order to recover
every request that is on the log data set.

Example 4-16   Write operator command output

```
08.56.26 STC22647  + CICS VR RECOVERY SAMPLE - KEY 110030 UPDATED
08.57.27 STC22647  + CICS VR RECOVERY SAMPLE - KEY 110031 DELETED
```

4.4.4 Step 4: Forward recovery, Scenario 1

At this point, we decide to perform a recovery to restore the damaged file to the
state before we deleted record 110031. Our plan of action is to take FILEA offline
from CICS, use CICS VR to create a recovery job that will restore FILEA from the
last backup taken at step 1, and then apply all records from the forward recovery
log streams to recover up to the point in time we think the file is consistent.

We start the recovery process by getting into the CICS VR panels and selecting
our file from the listing of available VSAM spheres (Figure 4-27).

```
 --------------------------------------------------------------------------------
                                CICSVR main menu
 Command ===>


 Select one and press Enter.



                    1   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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  F1=Help     F3=Exit     F10=Menu bar F12=Cancel
```

Figure 4-27   CICS VR main menu

A log scan to bring in the latest VSAM Spheres has already been run. We select
Forward recovery (option 2) from the Utilities menu (Figure 4-28).

```
 Administrate  Utilities  Tools  List  View  Help
 -------------- +-------------------------------+ ----------------------------
               | 2  1. Reorganization...    F4 | t                Row 1 to 1 of 1
 Command ===>  |    2. Forward recovery...  F5 |
               |    3. Backup...            F6 |
 Select one or +-------------------------------+ ction.


   N  Use default parameters for selected spheres
                                               Last time         RLS RR
   S  VSAM sphere                              referenced        flag on
   S  CICSDSW.VSAMU.FILEA                      07.332 09:54:44   N
 ****************************** Bottom of data *******************************
```

Figure 4-28   Selection of the file

Pressing Enter starts the log of logs scan utility and then displays the DWWMSG log shown in Figure 4-29. DWWMSG shows any failures during the recovery scan process.

```
VIEW      DWWUSER.V4R2M0.DWWMSG.SC66
Co
Command ===>
.TITLE 1CICSVR - CICS VSAM RECOVERY                                    DATE :
07/11/28    TIME : 09:02:34
000002 O
000003 DWW1101I The archive utility is started at 07/11/28 09:06:17.
000004
000005  DWW1102I The archive utility is terminated. The maximum condition code is 0.
```

Figure 4-29   DWWMSG log

We skip through the DWWMSG messages by pressing PF3. If a log of logs scan is needed, CICS VR performs a scan and displays the DWWPRINT data set with the scan report shown in Example 4-17.

Example 4-17   Scan report

```
CICSVR -  LOG OF LOGS SCAN UTILITY                              DATE : 20071128    TIME : 09061752    PAGE : 1

STATISTICS FOR A LOG OF LOGS SCAN
=================================

LOG OF LOGS NAME       : CICSTS.CICSVR.DFHLGLOG
FIRST TIME GMT         : 07.332 11:27:50
LAST TIME GMT          : 07.332 14:02:12
FIRST TIME LOCAL       : 07.332 06:27:50
LAST TIME LOCAL        : 07.332 09:02:12
FIRST BLOCK NUMBER     :            4501
LAST BLOCK NUMBER      :            5245


VSAM DATA SET STATISTICS
========================

VSAM DATA SET NAME                            CICSID   FCT NAME  OPEN DATE/TIME   CLOSE DATE/TIME  MVS LOG STREAM NAME
--------------------------------------------  -------- --------  --------------   --------------   --------------------
CICSDSW.VSAMU.FILEA                            SCSCPAA4 FILEA     07.332 06:27:50  07.332 06:32:00  CICSTS.CICSVR.LOGGING
CICSDSW.VSAMU.FILEA                            SCSCPAA4 FILEA     07.332 08:56:14  07.332 09:02:12  CICSTS.CICSVR.LOGGING
```

If no log of logs activity has occurred, the log scan report is skipped automatically. We use F3 to get out of the log scan report, and we select the backup and recovery data set information. For this sample, we recover to a new

data set so that we can open both the damaged copy of FILEA and the new restored copy for comparison purposes. The recovery file is CICSDSW.VSAMUR1.FILEA, as shown in Figure 4-30.

```
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 . . . . . . : CICSDSW.VSAMU.FILEA

  New VSAM sphere name  . . CICSDSW.VSAMUR1.FILEA

  Forward-recovery start time . . 07.332 08:26:41  (YY.DDD HH:MM:SS)

  Forward-recovery stop time  . . 07.332 08:57:00  (YY.DDD HH:MM:SS)

  Backup time . . . . . . . . . 07.332 08:26:41  + (YY.DDD HH:MM:SS)

  Time format . . . . . Local  +   Backup type . Logical           +

  Volume for restore . .            Unit for restore . . . . .

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

Figure 4-30   CICS VR forward recovery parameters

The latest backup was selected for us automatically, but you need to always check the backup time and make sure that you are using the correct backup. To stop the recovery before we reach the end of the forward recovery log stream, we use stop time 08:57:00, which is in the middle of the time stamps that we got from the joblog earlier. The stop time that we use prevents us from forward recovering the delete request.

Next, press Enter and select MVS Logger log stream. We want to use the current in-use log stream data, not a QSAM copy of a log stream as shown in Figure 4-31. See the LOGSTREAMCOPY command in CICS VR 4.2 Implementation Guide, for more information about QSAM copies.

```
 CICSVR log stream type
 Command ===>

 Specify log stream type. Press Enter to continue the job creation.

   Log stream type  . . 1   1.  MVS logger log stream
                            2.  QSAM copy




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

Figure 4-31   CICS VR log stream type

Press Enter to continue. The CICS VR sphere active panel displays. It says that
the sphere was active at the defined stop time and there are further log records
on the forward recovery log. Our plan is to recover the file using our stop time and
to take another backup if the recovery was successful.

Press F12 to proceed.

```
 CICSVR VSAM sphere active at stop time

 Warning: The VSAM sphere shown here was active at the stop time defined
 for the recovery. This may lead to problems if this sphere is recovered
 again using this stop time as the start time for the new job. A recover
 job is built, unless there are other errors preventing the job build.

   VSAM sphere  . . . : CICSDSW.VSAMU.FILEA
   JCL step generated : Yes




 F12=Cancel
```

Figure 4-32   CICS VR sphere active panel

Next, we come to the forward recovery parameters selection panel. Because we are not using any optional parameters for this recovery, we just press Enter to skip this panel and go to the job submission panel.

```
 CICSVR forward recovery only
Command ===>

Press Enter to create a job with default values. Or, select one or more
choices below, and press Enter to override current values.


  S  Forward-recovery parameters related to:
     Sequence checking
     VSAM buffer pools
     CICSVR exits
     Selective forward recovery


 F1=Help     F12=Cancel
```

Figure 4-33   Select forward recovery

We select **Browse the job** (option 2) from the CICS VR job submission panel shown in Figure 4-34 to review the recovery job, followed by option 1 to submit the job for processing.

```
 CICSVR job submission
 Command ===>

 Select one and press Enter.

                           1.  Submit the job
                           2.  Browse the job
                           3.  Edit the job
                           4.  Save generated JCL
                           5.  Return to VSAM sphere list


  F1=Help     F12=Cancel
```

Figure 4-34   CICS VR job submission panel

Example 4-18 shows the JCL that was built.

Example 4-18   JCL created by CICS VR

```
/*JOBPARM L=9999,SYSAFF=SC66
//DWW      PROC
//RECOVER  EXEC PGM=DWWC0
//STEPLIB  DD DSN=DWW.V4R2M0.SDWWLOAD,DISP=SHR
//         DD DSN=DWW.V4R2M0.SDWWLENU,DISP=SHR
//         DD DSN=DWW.V4R2M0.DWWEXLD,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWCON1  DD DSN=DWWUSER.V4R2M0.DWWCON1.GRPPROD,DISP=SHR
//DWWCON2  DD DSN=DWWUSER.V4R2M0.DWWCON2.GRPPROD,DISP=SHR
//DWWCON3  DD DSN=DWWUSER.V4R2M0.DWWCON3.GRPPROD,DISP=SHR
//         PEND
//* END OF PROC
//AMS001   EXEC PGM=IDCAMS,COND=(8,LE)
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
    DELETE CICSDSW.VSAMUR1.FILEA
    SET MAXCC = 0
/*
/*
//DSSLD1   EXEC PGM=ADRDSSU,COND=(8,LE)
//SYSPRINT DD SYSOUT=*
//TAPE  DD DISP=SHR,
//     DSN=DWWUSER.VSAMUB1.FILEA
//SYSIN    DD *
  RESTORE INDD(TAPE)  DS(   -
    INCL(CICSDSW.VSAMU.FILEA))    -
    RENAMEU((CICSDSW.VSAMU.FILEA,      -
      CICSDSW.VSAMUR1.FILEA))   -
    CATALOG
/*
//DWW001 EXEC DWW,COND=(8,LT)
//DWWIN    DD   *
  RECOVER             -
    ONLY             -
    NEWSPHERE(CICSDSW.VSAMUR1.FILEA)      -
    APPLYCA          -
    STARTTIME(07.332/08:55:21)        -
STOPTIME(07.332/08:57:00)          -
    STARTAT(DSNAME)          -
    SPHERE(CICSDSW.VSAMU.FILEA)
```

```
    MVSLOG                           -
      NAME(CICSTS.CICSVR.LOGGING)
    BLDVRP
//*
```

Finally, we submit the recovery job and check the progress and output in SDSF.
When the job completes, we get the recovery report shown in Example 4-19.

Example 4-19   Recovery job output report

```
ORIGINAL NAME OF RECOVERED  DATA SET:  CICSDSW.VSAMU.FILEA
                  :--------- RECORDS FOUND ON THE LOG(S) ----------:
DATASET  FCT ENTRY
TYPE     NAME              DSNAME   UPD-AFTER   ADD-AFTER   DEL-AFTER
-------  ---------  -----------  -----------  -----------  -----------
BASE     D0000006             1            0            6            0
BASE     FILEA                1            1            0            1
-------  ---------  -----------  -----------  -----------  -----------
TOTAL                         2            1            6            1
-------  ---------  -----------  -----------  -----------  -----------
-----------------  -----------  -----------  -----------  -----------
OVERALL TOTAL                 2            1            6            1
-----------------  -----------  -----------  -----------  -----------
-----------------  -----------  -----------  -----------  -----------
GRAND TOTAL                   2            1            6            1
-----------------  -----------  -----------  -----------  -----------


:----- CHANGE RECORDS APPLIED  -----:  :-- CHANGES
                                             IGNORED
        ADDS      UPDATES     DELETES     BY EXIT
  -----------  -----------  -----------  -----------
          6            0            0            0
          0            1            0            0
  -----------  -----------  -----------  -----------
          6            1            0            0
  -----------  -----------  -----------  -----------
  -----------  -----------  -----------  -----------
          6            1            0            0
  -----------  -----------  -----------  -----------
  -----------  -----------  -----------  -----------
          6            1            0            0
  -----------  -----------  -----------  -----------
```

Example 4-20 shows the final data after recovery. As shown in the example, record 110030 is updated, it shows the X in the very first byte, while record 10031 still exists. We have recovered the file to the state before we deleted record 110031.

Example 4-20   Subset of FILEA after recovery

```
 000100 S. D. BORMAN       SURREY, ENGLAND
 000102 J. T. CZAYKOWSKI   WARWICK, ENGLAND
 000104 M. B. DOMBEY       LONDON,ENGLAND
 000106 A. I. HICKSON      CROYDON, ENGLAND
 000111 ALAN TULIP         SARATOGA,CALIFORNIA
 000762 SUSAN MALAIKA      SAN JOSE,CALIFORNIA
 000983 J. S. TILLING      WASHINGTON, DC
 001222 D.J.VOWLES         BOBLINGEN, GERMANY
 001781 TINA J YOUNG       SINDELFINGEN,GERMANY
 003210 B.A. WALKER        NICE, FRANCE
 003214 PHIL CONWAY        SUNNYVALE, CAL.
 003890 JOHN CUMMINGS      NICE, FRANCE
 004004 JANET FOUCHE       DUBLIN, IRELAND
 004445 DR. P. JOHNSON     SOUTH BEND, S.DAK.
 004878 ADRIAN JONES       SUNNYVALE, CALIF.
 005005 A. E. DALTON       SAN FRANCISCO, CA.
 005444 ROS READER         SARATOGA, CALIF.
 005581 PETE ROBBINS       BOSTON, MASS.
 006016 SIR MICHAEL ROBERTS NEW DELHI, INDIA
X110030 CHRIS RAYNS        USA     POUGHKEEPSIE
 110031 TATIANA ZHBANNIKOVA RUSSIA  MOSCOW
 110032 VALERY KOULAJENKOV RUSSIA  MOSCOW
 110033 MAXIM STOGNEV      RUSSIA  MOSCOW
 110034 JOHN TILLING       UK      HURSLEY
 110035 PETER KLEIN        GERMANY MAINZ
```

4.4.5 Step 5: Forward recovery, Scenario 2

In scenario 2, we want to perform a full forward recovery for FILEA.

> **Note:** We use the same backup, and we can carry on without transition. If you want to run scenario 2 without going through the all the previous steps, you must run step 2 and step 3 to perform the necessary updates to FILEA.

We go back to the VSAM sphere list panel. In scenario 1, we processed a partial recovery. Therefore, CICS VR set the RLS recovery required flag to yes (Figure 4-35).

```
 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
                                                    Last time        RLS RR
   S  VSAM sphere                                    referenced       flag on
      CICSDSW.VSAMU.FILEA                            07.332 14:06:18  Y
 ****************************** Bottom of data *******************************
```

Figure 4-35   RLS recovery flag set to yes

Before we can continue, we must turn off the RLS recovery required flag. We select **Turn off RLS recovery required** (option 2) from the tools menu to turn off the flag (Figure 4-36).

```
 Administrate  Utilities  Tools  List  View  Help
 ----------------------- +------------------------------------+ ------------
                         | 2  1. Turn on RLS recovery required |  1 to 1 of 1
 Command ===>            |    2. Turn off RLS recovery required |
                         |    3. Unbind RLS lock              |
 Select one or more VSAM |    4. Bind RLS lock                |
                         |    5. Reset BWO bits to zero       |
   N  Use default paramet|    6. Set scan option             |
                         +------------------------------------+    RLS RR
   S  VSAM sphere                                    referenced    flag on
   S  CICSDSW.VSAMU.FILEA                            07.332 14:06:18  Y
 ****************************** Bottom of data *******************************
```

Figure 4-36   RLS recovery turned off

We start the full forward recovery process by selecting the file from the list of available VSAM spheres. A log scan to bring in the latest VSAM Spheres has already been run. We choose the Forward recovery option by selecting 2 and pressing Enter. There was no log of logs activity for our file; therefore, the log scan report is skipped.

We use a new VSAM Sphere name CICSDSW.VSAMUR2.FILEA as shown in Figure 4-37. We do not use a specific stop time for the full forward recovery. We want to recover all FILEA activities that exist on the forward recovery log stream starting from the backup time stamp until the DASD became unusable.

```
 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 . . . . . . : CICSDSW.VSAMU.FILEA

  New VSAM sphere name  . . CICSDSW.VSAMUR2.FILEA

  Forward-recovery start time . . 07.332 08:26:41  (YY.DDD HH:MM:SS)

  Forward-recovery stop time  . .                  (YY.DDD HH:MM:SS)

  Backup time . . . . . . . . . 07.332 08:26:41  + (YY.DDD HH:MM:SS)

  Time format . . . . . Local  +    Backup type . Logical           +

  Volume for restore . .          Unit for restore . . . . .

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

Figure 4-37   New sphere name used

We press Enter and select MVS logger log stream on the log type panel.

Next, we come to the forward recovery parameters selection panel. Because we are not using any optional parameters for this recovery, we just press Enter to skip this panel and go to the job submission panel.

We select option 2 from the CICS VR job submission panel followed by option 1 to finally submit the generated job.

When the job completes successfully, we verify the result of the forward recovery process. The job output shows that we found the following information about the log:

▶ 6 add after images
▶ 1 upd after image
▶ 1 del after image

The second part of the job output shows that we have applied all the changes (as shown in Example 4-21).

Example 4-21   Job output

```
ORIGINAL NAME OF RECOVERED  DATA SET: CICSDSW.VSAMU.FILEA
                 :--------- RECORDS FOUND ON THE LOG(S) ----------:
DATASET  FCT ENTRY
TYPE     NAME         DSNAME    UPD-AFTER   ADD-AFTER   DEL-AFTER
-------  ---------  -----------  -----------  -----------  -----------
BASE     D0000006           1          0           6           0
BASE     FILEA              1          1           0           1
-------  ---------  -----------  -----------  -----------  -----------
TOTAL                       2          1           6           1
-------  ---------  -----------  -----------  -----------  -----------
------------------  -----------  -----------  -----------  -----------
OVERALL TOTAL               2          1           6           1
------------------  -----------  -----------  -----------  -----------
------------------  -----------  -----------  -----------  -----------
GRAND TOTAL                 2          1           6           1
------------------  -----------  -----------  -----------  -----------


:----- CHANGE RECORDS APPLIED  -----:  :-- CHANGES
                                            IGNORED
      ADDS       UPDATES      DELETES      BY EXIT
-----------  -----------  -----------  -----------
        6            0            0            0
        0            1            1            0
-----------  -----------  -----------  -----------
        6            1            1            0
-----------  -----------  -----------  -----------
-----------  -----------  -----------  -----------
        6            1            1            0
-----------  -----------  -----------  -----------
-----------  -----------  -----------  -----------
        6            1            1            0
-----------  -----------  -----------  -----------
   DATE:  07/11/28    TIME:  09:35:16    PAGE:  3
```

Example 4-22 shows the list of FILEA after processing the recovery. Because all the changes have been forward recovered, record 110030 is updated and record 110031 does not exist because it has been deleted by the CICS application.

Example 4-22   FILE A output

```
 000100 S. D. BORMAN        SURREY, ENGLAND
 000102 J. T. CZAYKOWSKI    WARWICK, ENGLAND
 000104 M. B. DOMBEY        LONDON,ENGLAND
 000106 A. I. HICKSON       CROYDON, ENGLAND
 000111 ALAN TULIP          SARATOGA,CALIFORNIA
 000762 SUSAN MALAIKA       SAN JOSE,CALIFORNIA
 000983 J. S. TILLING       WASHINGTON, DC
 001222 D.J.VOWLES          BOBLINGEN, GERMANY
 001781 TINA J YOUNG        SINDELFINGEN,GERMANY
 003210 B.A. WALKER         NICE, FRANCE
 003214 PHIL CONWAY         SUNNYVALE, CAL.
 003890 JOHN CUMMINGS       NICE, FRANCE
 004004 JANET FOUCHE        DUBLIN, IRELAND
 004445 DR. P. JOHNSON      SOUTH BEND, S.DAK.
 004878 ADRIAN JONES        SUNNYVALE, CALIF.
 005005 A. E. DALTON        SAN FRANCISCO, CA.
 005444 ROS READER          SARATOGA, CALIF.
 005581 PETE ROBBINS        BOSTON, MASS.
 006016 SIR MICHAEL ROBERTS NEW DELHI, INDIA
X110030 CHRIS RAYNS         USA      POUGHKEEPSIE
 110032 VALERY KOULAJENKOV  RUSSIA  MOSCOW
 110033 MAXIM STOGNEV       RUSSIA  MOSCOW
 110034 JOHN TILLING        UK       HURSLEY
 110035 PETER KLEIN         GERMANY MAINZ
```

In review, CICS VR makes the recovering process extremely easy. It walks through all the steps that are needed to recover data and presents panels and fields that give choices that show all available options along the way, such as what backup to use and what time frames to use.

When all your backup processes and logging are taking place, the hardest part about a recovery is deciding what time to recover to. CICS VR cannot help you prevent lost or damaged files, but after a failure occurs, it can help you get back into action extremely quickly.

Part 3

CICS VR usage scenarios

In this part, we discuss some usage scenarios for CICS VR and include both batch and CICS examples.

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CICS VR in a CICS TS environment

In this chapter, we describe a forward recovery scenario in which one VSAM data set is updated both by CICS TS 3.2 and by a batch program (when CICS VR does the logging). The batch update takes place after the VSAM KSDS has been closed to CICS. Thus, the data set cannot be updated simultaneously by both CICS and batch programs.

This chapter contains a step-by-step explanation of the following topics:

► Forward recovery environment
► Restore and recovery

5.1 Forward recovery environment

This scenario includes a VSAM KSDS. In our environment, these data sets were updated by both CICS TS and a batch job. The after-images were written to the same log stream, in this example CICSMVS.CICSVRAR.FILELOG.

5.1.1 VSAM data set definitions

For this example, we used the CICS sample VSAM KSDS FILEA. Example 5-1 shows the job of defining the cluster and loading it with data. In our environment, we amended the cluster definition to add the FRLOG and LSID parameters that are used by CICS VR batch logging.

Example 5-1   Sample VSAM KSDS definition

```
//DEFFILEA JOB TIME=1440,CLASS=A,MSGLEVEL=(1,1),MSGCLASS=H,
//         NOTIFY=&SYSUID
//* JOB TO DEFINE FILEA DATA SET
//STEP1    EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=A
//SYSIN  DD  *
    DELETE ('JTILLI1.CICSTS32.FILEA') PURGE CLUSTER
    SET MAXCC=0
    DEFINE CLUSTER (RECORDS(8000) -
     NAME (JTILLI1.CICSTS32.FILEA) -
     VOLUMES (SYSDAV) -
     FRLOG(ALL) -
     LSID(CICSMVS.CICSVRAR.FILELOG) -
     IXD)             -
    DATA -
     (RECSZ(80,80) -
     CONTROLINTERVALSIZE(2048) -
     NAME (JTILLI1.CICSTS32.FILEA.DATA) -
     KEYS(6 1) -
     FREESPACE(10 10) -
     BUFFERSPACE (8192)) -
   INDEX -
     (NAME(JTILLI1.CICSTS32.FILEA.INDX) -
     REPL)
/*
//STEP2   EXEC PGM=IDCAMS,REGION=512K
//SYSPRINT DD SYSOUT=A
//*DDNAME1  DD DISP=OLD,UNIT=3380,VOL=SER=SYSDAV
//SYSIN    DD *
    REPRO INFILE ( SYS01 ) -
         OUTDATASET(JTILLI1.CICSTS32.FILEA)
```

```
/*
//SYS01    DD *
 000100S. D. BORMAN        SURREY, ENGLAND     3215677826 11 81$0100.11Y02000000
 000102J. T. CZAYKOWSKI    WARWICK, ENGLAND    9835618326 11 81$1111.11Y04000000
 000104M. B. DOMBEY        LONDON,ENGLAND      1284629326 11 81$0999.99Y06000000
 000106A. I. HICKSON       CROYDON, ENGLAND    1948567326 11 81$0087.71Y08000000
 000111ALAN TULIP          SARATOGA,CALIFORNIA 4612075301 02 74$0111.11Y10000000
 000762SUSAN MALAIKA       SAN JOSE,CALIFORNIA 2231212101 06 74$0000.00Y12000000
 000983J. S. TILLING       WASHINGTON, DC      3451212021 04 75$9999.99Y14000000
 001222D.J.VOWLES          BOBLINGEN, GERMANY  7031555110 04 73$3349.99Y16000000
 001781TINA J YOUNG        SINDELFINGEN,GERMANY7031999021 06 77$0009.99Y18000000
 003210B.A. WALKER         NICE, FRANCE        1234567026 11 81$3349.99Y20000000
 003214PHIL CONWAY         SUNNYVALE, CAL.     3411212000 06 73$0009.99N22000000
 003890BRIAN HARDER        NICE, FRANCE        0000000028 05 74$0009.99N24000000
 004004JANET FOUCHE        DUBLIN, IRELAND     7111212102 11 73$1259.99N26000000
 004445DR. P. JOHNSON      SOUTH BEND, S.DAK.  6121212026 11 81$0009.99N28000000
 004878ADRIAN JONES        SUNNYVALE, CALIF.   3221212010 06 73$5399.99N30000000
 005005A. E. DALTON        SAN FRANCISCO, CA.  0000000101 08 73$0009.99N32000000
 005444ROS READER          SARATOGA, CALIF.    6771212020 10 74$0809.99N34000000
 005581PETE ROBBINS        BOSTON, MASS.       4131212011 04 74$0259.99N36000000
 006016SIR MICHAEL ROBERTS NEW DELHI, INDIA    7033121121 05 74$0009.88Y38000000
 006670IAN HALL            NEW YORK, N.Y.      2121212031 01 75$3509.88N40000000
 006968J.A.L. STAINFORTH   WARWICK, ENGLAND    5671382126 11 81$0009.88Y42000000
 007007ANDREW WHARMBY      STUTTGART, GERMANY  7031100010 10 75$5009.88N44000000
 007248M. J. AYRES         REDWOOD CITY, CALF. 3331212111 10 75$0009.88N46000000
 007779MRS. A. STEWART     SAN JOSE, CALIF.    4151212003 01 75$0009.88Y48000000
 009000P. E. HAVERCAN      WATERLOO, ONTARIO   0987654321 01 75$9000.00Y50000000
 100000M. ADAMS            TORONTO, ONTARIO    0341512126 11 81$0010.00Y52000000
 111111C. BAKER            OTTAWA, ONTARIO     5121200326 11 81$0011.00Y54000000
 200000S. P. RUSSELL       GLASGOW,  SCOTLAND  6373829026 11 81$0020.00Y56000000
 222222DR E. GRIFFITHS     FRANKFURT, GERMANY  2003415126 11 81$0022.00Y58000000
 300000V. J. HARRIS        NEW YORK, U.S.      6473980126 11 81$0030.00Y60000000
 333333J.D. HENRY          CARDIFF, WALES      7849302026 11 81$0033.00Y62000000
 400000C. HUNT             MILAN, ITALY        2536373826 11 81$0040.00Y64000000
 444444D. JACOBS           CALGARY, ALBERTA    7788982026 11 81$0044.00Y67000000
 500000P. KINGSLEY         MADRID, SPAIN       4445464026 11 81$0000.00Y70000000
 555555S.J. LAZENBY        KINGSTON, N.Y.      3994442026 11 81$0005.00Y73000000
 600000M.F. MASON          DUBLIN, IRELAND     1239878026 11 81$0010.00Y76000000
 666666R. F. WALLER        LA HULPE, BRUSSELS  4298384026 11 81$0016.00Y79000000
 700000M. BRANDON          DALLAS, TEXAS       5798432026 11 81$0002.00Y82000000
 777777L.A. FARMER         WILLIAMSBURG, VIRG. 9187613126 11 81$0027.00Y85000000
 800000P. LUPTON           WESTEND, LONDON     2423338926 11 81$0030.00Y88000000
 888888P. MUNDY            NORTHAMPTON, ENG.   2369163926 11 81$0038.00Y91000000
 900000D.S. RENSHAW        TAMPA, FLA.         3566812026 11 81$0040.00Y94000000
 999999ANJI STEVENS        RALEIGH, N.Y.       8459163926 11 81$0049.00Y97000000
/*
```

5.1.2 CICS TS 3.2 file definition

Figure 5-1 shows the recovery parameters for the CICS sample file definition.

```
RECOVERY PARAMETERS
 RECOVery       : All             None │ Backoutonly │ All
 Fwdrecovlog    : 01              No │ 1-99
 BAckuptype     : Static          Static │ Dynamic
```

Figure 5-1   CICS recovery parameters

The forward recovery log that we used was 01. This log corresponds to a log
stream name of CICSMVS.CICSVRAR.FILELOG. Figure 5-2 shows the
Journalmodel definition.

```
OBJECT CHARACTERISTICS
 CEDA  View Journalmodel( FILELOG  )
  Journalmodel   : FILELOG
  Group          : TT3TEST
  Description    :
  Journalname    : DFHJ01
  Type           : Mvs                Mvs │ Smf │ Dummy
  Streamname     : CICSMVS.CICSVRAR.FILELOG
```

Figure 5-2   CICS journal definition

5.1.3 VSAM data set backup

For VSAM data set backups, you can use DFSMShsm, DFSMSdss, ABARs, or
non-IBM backup. If you use DFSMShsm, you can write ACS routines and specify
management classes for your data sets to enable the automatic backup.

If you use DFSMSdss as your backup utility the CICS VR server must be active.
Example 5-2 shows an example of DFSMSdss COPY.

Example 5-2   Sample DFSMSdss COPY job

```
//DSSCOPY JOB MSGCLASS=H,CLASS=A,MSGLEVEL=(1,1),REGION=4096K,
//          NOTIFY=&SYSUID
//*---------------------------------------------------------
//* SAMPLE DFSMSDSS COPY JOB
//*---------------------------------------------------------
//*
//STEP1 EXEC PGM=ADRDSSU
```

```
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
  COPY DATASET(                         -
       INCLUDE(JTILLI1.CICSTS32.FILEA) -
       RENAMEU(**,CICSVR.**)            -
       TOL(ENQF)                        -
       CICSVRBACKUP
//
```

When you use the CICSVRBACKUP parameter, DFSMSdss informs CICS VR
that a copy has been taken, and CICS VR stores the name of the copy in the
RCDS. In Example 5-2, the RENAMEU parameter requests that CICS VR
provides DFSMSdss with a new name for each copy using the format
prefix.DSOiinnn.D*yyyddd*.T*hhmmsst.*

If you want to take a DFSMShsm backup manually, you can either run
DFSMShsm in batch mode (inline backup) as shown in Example 5-3 or issue a
DFSMShsm command from TSO, for example:

    HBACKDS datasetname TARGET(DASD)

Example 5-3   Sample DFSMShsm inline backup job

```
//HSMBACKP JOB MSGCLASS=H,CLASS=A,MSGLEVEL=(1,1),REGION=4096K,
//              NOTIFY=&SYSUID
//*------------------------------------------------------------
//* SAMPLE DFSMSHSM INLINE BACKUP JOB
//*------------------------------------------------------------
//S1       EXEC PGM=ARCINBAK
//BACKO1   DD DSN=JTILLI1.CICSTS32.FILEA,DISP=SHR
//ARCPRINT DD SYSOUT=*
//ARCSNAP  DD SYSOUT=*
//
```

For further information about DFSMShsm commands, refer to *DFSMShsm
Storage Administration Reference*, SC26-7402.

You can take a backup through the CICS VR panels. To back up VSAM data sets,
the high-level steps include:

1. List registered VSAM data sets.
2. Select criteria to filter the VSAM data sets.
3. Select the VSAM data sets to backup and backup utility.
4. Specify VSAM sphere backup parameters.
5. Forward backup job submission.
6. CICS VR backup list.

Here are the details. To back up VSAM data sets, follow these steps:

1. From the CICS VR main menu panel select **List of VSAM spheres** (option 1) as shown in Figure 5-3.

```
 Help
 -----------------------------------------------------------------------
                            CICSVR main menu
Command ===>

Select one and press Enter.

                     1   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

(C) Copyright IBM Corp. 1991, 2007. All rights reserved.
 F1=Help     F3=Exit     F4=swap lis F1O=Menu bar F12=Cancel
```

Figure 5-3   Select list of VSAM data sets

2. Select the criteria to filter the VSAM data sets, as shown in Figure 5-4.

```
 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 . . . _____

  F1=Help     F12=Cancel
```

Figure 5-4   Enter VSAM data set name

3. Select the VSAM data sets to backup and the backup utility by selecting
   Backup (option 3) from the Utilities menu, as shown in Figure 5-5.

```
 Administrate  Utilities  Tools  List  View  Help
 --------------+-------------------------------+ ----------------------------
              | 3  1. Reorganization...     F4 | t            Row 1 to 12 of 23
 Command ===>  |    2. Forward recovery...   F5 |
              |    3. Backup...             F6 |
 Select one or +-------------------------------+ ction.

   N  Use default parameters for selected spheres
                                                 Last time         RLS RR
   S  VSAM sphere                                referenced        flag on
      CICSVR.BL01.KSDS01                         00.001 00:00:00   N
      CICSVR.R40BL010.BL.ESDS01                  00.001 00:00:00   N
      CICSVR.R40BL010.BL.ESDS02                  00.001 00:00:00   N
   S  JTILLI1.CICSTS32.FILEA                     07.334 13:08:06   N
      JTILLI1.CICSVR.ESDS01                      00.001 00:00:00   N
      JTILLI1.CICSVR.ESDS02                      00.001 00:00:00   N
      JTILLI1.CICSVR.FILE1                       00.001 00:00:00   N
      JTILLI1.CICSVR.FILE2                       00.001 00:00:00   N
      JTILLI1.CICSVR.FILE3                       00.001 00:00:00   N
      JTILLI1.CICSVR.FILE4                       00.001 00:00:00   N
      JTILLI1.CICSVR.HR.FILE1                    00.001 00:00:00   N
      JTILLI1.CICSVR.HR.FILE2                    00.001 00:00:00   N
  F1=Help      F3=Exit      F4=Reorg     F5=FwdRec    F6=Backup    F7=Bkwd
  F8=Fwd       F10=Menu bar F11=Dereg    F12=Cancel
```

Figure 5-5   Select VSAM data sets and backup utility

4. Specify the VSAM sphere backup parameters, as shown in Figure 5-6.

```
 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 . . . . . . : JTILLI1.CICSTS32.FILEA

 VSAM sphere backup name

 Aggregate group name  . .

 Backup product name . . . HSMLB  (HSMLB, ABARS, DSSLC, DSSLD or other)

 Backup type . . . . . . . 3  (1-CICS Online, 2-CICS Offline, 3-non-CICS)

 CICS APPLID . . . . . . . _____
```

Figure 5-6   VSAM backup parameters

To get the same result without using Utilities menu, select the VSAM data sets
from the CICS VR VSAM sphere list menu and press F6.

5. Forward the backup job submission, as shown in Figure 5-8.

```
 CICSVR job submission
Command ===>
Select one and press Enter.


                         1    1.  Submit the job
                              2.  Browse the job
                              3.  Edit the job
                              4.  Save generated JCL
                              5.  Return to VSAM sphere list


 F1=Help    F12=Cancel
The backup job has been generated.
```

Figure 5-7   CICS VR job submission panel

6. If your backups are taken by DFSMShsm, the CICS VR backup list
   information is re-acquired each time it is needed through an ARCXTRCT
   macro call to DFSMShsm. You can determine which backups are available
   using the List menu from the CICS VR VSAM sphere list panel, as shown in
   Figure 5-8.

```
 Administrate  Utilities  Tools  List  View  Help
 ------------------------------ +--------------------------+
 ----------------
                           CICS │ 1  1. List backups...     │ ow 1 to 12 of
 23
  Command ===>                  │     2. List RLS details... │
                                │     3. List backup names   │
  Select one or more VSAM spheres +--------------------------+

    N  Use default parameters for selected spheres
                                                  Last time       RLS RR
    S  VSAM sphere                                referenced      flag on
       CICSVR.BL01.KSDS01                         00.001 00:00:00  N
       CICSVR.R40BL010.BL.ESDS01                  00.001 00:00:00  N
       CICSVR.R40BL010.BL.ESDS02                  00.001 00:00:00  N
    S  JTILLI1.CICSTS32.FILEA                      07.334 13:08:06  N
       JTILLI1.CICSVR.ESDS01                      00.001 00:00:00  N
       JTILLI1.CICSVR.ESDS02                      00.001 00:00:00  N
       JTILLI1.CICSVR.FILE1                       00.001 00:00:00  N
       JTILLI1.CICSVR.FILE2                       00.001 00:00:00  N
       JTILLI1.CICSVR.FILE3                       00.001 00:00:00  N
       JTILLI1.CICSVR.FILE4                       00.001 00:00:00  N
       JTILLI1.CICSVR.HR.FILE1                    00.001 00:00:00  N
       JTILLI1.CICSVR.HR.FILE2                    00.001 00:00:00  N
   F1=Help    F3=Exit    F4=Reorg   F5=FwdRec   F6=Backup    F7=Bkwd
   F8=Fwd        F10=Menu bar F11=Dereg    F12=Cancel
```

Figure 5-8   CICS VR VSAM sphere list menu

Figure 5-9 shows the output from this panel.

```
 CICSVR backup list              Row 1 to 2 of 2
Command ===>

Press Enter to show the backup list for the next selected VSAM sphere. Or,
press F12 to cancel the list sequence.

  VSAM sphere  . . . : JTILLI1.CICSTS32.FILEA


  ------------- Data set backup information --------------------------
Date    Time    Gen  Ver  Online  RP Date  RP Time  Type   Product
07.334  13:53:32  00   0019  NO                       LOCAL  HSMLB
07.334  13:18:01  01   0018  NO                       LOCAL  HSMLB
```

Figure 5-9   CICS VR backup list

5.2 Restore and recovery

In this section, we describe how to restore VSAM data sets and forward recover
the CICS updates, as well as the batch updates. CICS VR does this using the
after-images that were previously written to the log stream.

> **Note:** In the example, the VSAM KSDS has been updated twice since the
> most recent backup.

First, use the CICS sample AMNU CICS transaction to add one record to FILEA
(Figure 5-10).

```
  OPERATOR INSTRUCTIONS
OPERATOR INSTR - ENTER AMNU
FILE INQUIRY   - ENTER AINQ AND NUMBE
FILE BROWSE    - ENTER ABRW AND NUMBE
FILE ADD       - ENTER AADD AND NUMBE
FILE UPDATE    - ENTER AUPD AND NUMBE
PRESS CLEAR TO EXIT
ENTER TRANSACTION: AADD NUMBER 1
```

Figure 5-10   Add one record to VSAM file

Then, close the file to CICS and run a batch job that adds a further 300 records
to FILEA. For this example, we assume the FILEA has become corrupted, so we

want to forward recover FILEA from the backup taken as well as to recover the one record that was added by the AMNU CICS transaction and the 300 records that were added by the batch job.
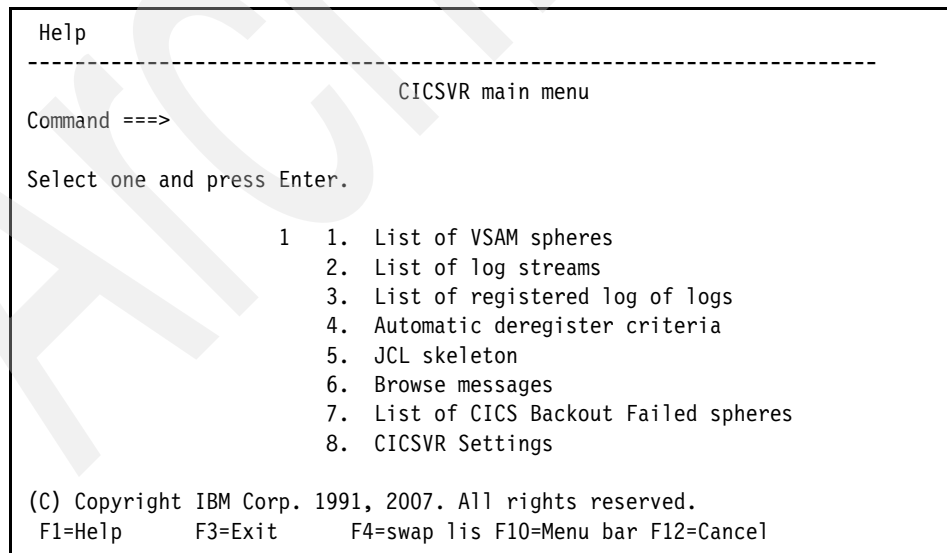
A high-level overview of the steps to follow are:

1. List registered VSAM data sets.
2. Select criteria to filter the VSAM data sets.
3. Select the VSAM data sets to recover.
4. Select recovery utility.
5. Specify forward recovery parameters.
6. Select log stream type.
7. Specify other options.
8. Forward recovery job submission.

We discuss the steps in detail in the sections that follow.

5.2.1 Step 1: List registered VSAM data sets

to create a list of all the VSAM data sets that are registered in the RCDS, from the CICS VR main menu panel select List of VSAM spheres (option 1), as shown in Figure 5-11.

```
  Help
 ----------------------------------------------------------------------
                              CICSVR main menu
 Command ===>

 Select one and press Enter.

                   1    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

 (C) Copyright IBM Corp. 1991, 2007. All rights reserved.
  F1=Help      F3=Exit      F4=swap lis F10=Menu bar F12=Cancel
```

Figure 5-11   Select list of VSAM data sets

5.2.2 Step 2: Select criteria to filter the VSAM data sets

After selecting the option to list the VSAM data sets, you need to provide the name of the VSAM data set that you want to recover (Figure 5-12). The name can be fully or partially qualified, using an asterisk (*). Alternatively, you can enter an asterisk (*) to list all the registered data sets.

```
 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 . . .

 F1=Help     F12=Cancel
```

Figure 5-12   Enter VSAM data set name

5.2.3 Step 3: Select the VSAM data sets to recover

Next, you need to select the data sets that you want to recover from the list that you generated in the previous step. You select the desired data sets by placing an *S* to the left of the data set name (Figure 5-13).

```
 Administrate  Utilities  Tools  List  View  Help
 --------------------------------------------------------------------------
CICSVR VSAM sphere list          Row 1 to 12 of 23
 Command ===>


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

   N  Use default parameters for selected spheres
                                              Last time        RLS RR
   S  VSAM sphere                             referenced       flag on
      CICSVR.BL01.KSDS01                      00.001 00:00:00  N
      CICSVR.R40BL010.BL.ESDS01               00.001 00:00:00  N
      CICSVR.R40BL010.BL.ESDS02               00.001 00:00:00  N
   S  JTILLI1.CICSTS32.FILEA                  07.334 13:08:06  N
      JTILLI1.CICSVR.ESDS01                   00.001 00:00:00  N
      JTILLI1.CICSVR.ESDS02                   00.001 00:00:00  N
      JTILLI1.CICSVR.FILE1                    00.001 00:00:00  N
      JTILLI1.CICSVR.FILE2                    00.001 00:00:00  N
      JTILLI1.CICSVR.FILE3                    00.001 00:00:00  N
      JTILLI1.CICSVR.FILE4                    00.001 00:00:00  N
 F1=Help     F3=Exit     F4=Reorg     F5=FwdRec   F6=Backup    F7=Bkwd
   F8=Fwd      F10=Menu bar F11=Dereg    F12=Cancel
```

Figure 5-13   Select VSAM data sets for forward recovery

5.2.4 Step 4: Select recovery utility

After you have selected the data sets, you need to select the recovery utility. From the **Utilities** menu, select **Forward recovery**, as shown in Figure 5-14.

```
  Administrate  Utilities  Tools  List  View  Help
 ------------- +-------------------------------+ ----------------------------
              | 2  1. Reorganization...    F4 | t           Row 1 to 12 of 23
  Command ===> |    2. Forward recovery...  F5 |
              |    3. Backup...            F6 |
  Select one or +-----------------------------+ ction.

    N  Use default parameters for selected spheres
                                                  Last time        RLS RR
    S  VSAM sphere                                referenced       flag on
       CICSVR.BL01.KSDS01                         00.001 00:00:00  N
       CICSVR.R40BL010.BL.ESDS01                  00.001 00:00:00  N
       CICSVR.R40BL010.BL.ESDS02                  00.001 00:00:00  N
    S  JTILLI1.CICSTS32.FILEA                     07.334 13:08:06  N
       JTILLI1.CICSVR.ESDS01                      00.001 00:00:00  N
       JTILLI1.CICSVR.ESDS02                      00.001 00:00:00  N
       JTILLI1.CICSVR.FILE1                       00.001 00:00:00  N
       JTILLI1.CICSVR.FILE2                       00.001 00:00:00  N
       JTILLI1.CICSVR.FILE3                       00.001 00:00:00  N
       JTILLI1.CICSVR.FILE4                       00.001 00:00:00  N
       JTILLI1.CICSVR.HR.FILE1                    00.001 00:00:00  N
       JTILLI1.CICSVR.HR.FILE2                    00.001 00:00:00  N
   F1=Help     F3=Exit     F4=Reorg     F5=FwdRec    F6=Backup    F7=Bkwd
   F8=Fwd      F10=Menu bar F11=Dereg    F12=Cancel
```

Figure 5-14   Select forward recovery utility

You can get the same result without using the Utilities menu by selecting the VSAM data sets from the CICS VR VSAM sphere list panel and pressing F5=FwdRec.

After forward recovery has been selected CICS VR will automatically run a log of logs scan. An example of the output produced is shown in Example 5-4.

Example 5-4   Output from log of logs scan

```
CCICSVR -  LOG OF LOGS SCAN UTILITY              DATE : 20071130    TIME : 09045032    PAGE :
1


STATISTICS FOR A LOG OF LOGS SCAN
=================================


LOG OF LOGS NAME        : CICSMVS.CICSVRAR.DFHLGLOG
```

```
FIRST TIME GMT          : 07.334 07:31:00
LAST TIME GMT           : 07.334 07:52:26
FIRST TIME LOCAL        : 07.334 08:31:00
LAST TIME LOCAL         : 07.334 08:52:26
FIRST BLOCK NUMBER      :                 5505
LAST BLOCK NUMBER       :                 6141


 VSAM DATA SET STATISTICS
 ========================


 VSAM DATA SET NAME        CICSID   FCT NAME  OPEN DATE/TIME   CLOSE DATE/TIME  MVS LOG
STREAM NAME
 ------------------------- -------- -------- --------------- ---------------
-------------------------
 JTILLI1.CICSTS32.FILEA    IYZIZC01 FILEA     07.334 08:38:42 07.334 08:52:26
CICSMVS.CICSVRAR.FILELOG


 CLOSE STATISTICS FOR FILE ID WITHOUT OPEN RECORD
 ================================================

 FILE ID  CICSID   CLOSE DATE/TIME MVS LOG STREAM NAME
 -------- -------- --------------- -------------------------
 DFHCSD   IYZIZC01 07.334 08:31:00 CICSMVS.CICSVRAR.FILELOG
 FILEA    IYZIZC01 07.334 08:36:57 CICSMVS.CICSVRAR.FILELOG
```

5.2.5 Step 5: Specify forward recovery parameters

After selecting the data sets and the recovery utility that we want, there are some recovery parameters that we might want to select. In the CICS VR VSAM sphere parameters panel (Figure 5-15), the necessary parameters are provided as default.

```
 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 . . . . . . : JTILLI1.CICSTS32.FILEA

  New VSAM sphere name  . .

  Forward-recovery start time . . 07.334 13:53:32  (YY.DDD HH:MM:SS)

  Forward-recovery stop time  . .                  (YY.DDD HH:MM:SS)

  Backup time . . . . . . . . . . 07.334 13:53:32  + (YY.DDD HH:MM:SS)

  Time format . . . . . Local  +    Backup type  . Logical            +

  Volume for restore . .            Unit for restore . . . . .

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

Figure 5-15   VSAM forward recovery parameters

Note: The default parameters are enough for creating the forward recovery job. You do not need to change them or specify others unless you want to recover up to a specific point in time or from a specific point in time.

In our environment, we left the Forward-recovery stop time parameter blank. In this case, the time taken is the current time. For further information about the forward recovery parameters, refer to *CICS VSAM Recovery V4.2 Users Guide and Reference*, SC34-6804.

5.2.6 Step 6: Select the log stream type

You need to specify the type of log stream CICS VR uses during the forward recovery. Select the type of log stream in the CICS VR log stream type panel (Figure 5-16).

```
 CICSVR log stream type
Command ===>

Specify log stream type. Press Enter to continue the job creation.

  Log stream type  . . 1   1.  MVS logger log stream
                           2.  QSAM copy


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

Figure 5-16   Select log stream type

If the log stream is not available, you need to use QSAM copy (option 2), assuming that you have taken log stream copies.

5.2.7 Step 7: Specify other options

Next, you are presented with the CICS VR forward recovery only panel to specify additional parameters (Figure 5-17).

```
 CICSVR forward recovery only
Command ===>

Press Enter to create a job with default values. Or, select one or more
choices below, and press Enter to override current values.

  S   Forward-recovery parameters related to:
      Sequence checking
      VSAM buffer pools
      CICSVR exits
      Selective forward recovery

 F1=Help     F12=Cancel
 +-------------------------------------------------------------+
 |The recovery control data set has no relevant default values.|
 +-------------------------------------------------------------+
```

Figure 5-17   CICS VR recovery utility

For this example forward recovery, none of the further options were required.

5.2.8 Step 8: Forward recovery job submission

After you have selected all the necessary options and parameters, you are presented with the CICS VR job submission panel (Figure 5-18). You can select to submit the job immediately or to save it as a member of the PDS library allocated to the ISPFILE DD name.

```
 CICSVR job submission
Command ===>


Select one and press Enter.


                              3   1.  Submit the job
                                  2.  Browse the job
                                  3.  Edit the job
                                  4.  Save generated JCL
                                  5.  Return to VSAM sphere list


 F1=Help    F12=Cancel
 +-----------------------------------+
 |The recovery job has been generated.|
 +-----------------------------------+
```

Figure 5-18   CICS VR job submission panel

The forward recovery job generated by CICS VR is shown in Example 5-5.

Example 5-5   Sample forward recovery job

```
//JTILLI1 JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=,
//             MSGCLASS=X,CLASS=A,REGION=4M
//DWW      PROC
//RECOVER  EXEC PGM=DWWCO
//STEPLIB  DD DISP=SHR,DSN=DWW.CICSVR42.SDWWLOAD
//         DD DISP=SHR,DSN=DWW.CICSVR42.SDWWLENU
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWCON1  DD DISP=SHR,DSN=DWW.DWWCON1.GRPITSO
//DWWCON2  DD DISP=SHR,DSN=DWW.DWWCON2.GRPITSO
//DWWCON3  DD DISP=SHR,DSN=DWW.DWWCON3.GRPITSO
//         PEND
//* END OF PROC
//DWW001 EXEC DWW,COND=(8,LT)
//DWWIN    DD   *
```

```
             RECOVER                    -
               ONLY                     -
               APPLYCA                  -
               STARTTIME(07.334/13:54:30)        -
               STOPTIME(07.334/13:58:08)          -
               STARTAT(DSNAME)          -
               VERSION(014)             -
               SPHERE(JTILLI1.CICSTS32.FILEA)
             MVSLOG                     -
               NAME(CICSMVS.CICSVRAR.FILELOG)
             BLDVRP
          //
```

> **Important:** Backups and restores by DFSMShsm include the alternate
> indexes if they are present. If the backup that was used in the forward recovery
> was taken using DFSMSdss, then any associated alternate indexes have to be
> rebuilt manually.

Example 5-6 shows the output from the sample forward recovery.

Example 5-6   Forward recovery output

```
CICSVR - CICS VSAM RECOVERY DATE : 07/11/30     TIME : 14:10:16      PAGE : 1


DWW0010I CICSVR is started at 07/11/30 14:10:17.

             RECOVER                    -
               ONLY                     -
               APPLYCA                  -
               STARTTIME(07.334/13:54:30)        -
               STOPTIME(07.334/13:58:08)          -
               STARTAT(DSNAME)          -
               VERSION(019)             -
               SPHERE(JTILLI1.CICSTS32.FILEA)


             MVSLOG                     -
               NAME(CICSMVS.CICSVRAR.FILELOG)


             BLDVRP

 DWW1287I No attempt was made to unbind any VSAM RLS locks for VSAM sphere JTILLI1.CICSTS32.FILEA
because there is no VSAM RLS support for it.
DWW0617I THE FOLLOWING DATA  LSR BUFFER SIZES WILL BE USED: B2K = 4
DWW0617I THE FOLLOWING INDEX LSR BUFFER SIZES WILL BE USED: B4K = 3
DWW1288I No attempt was made to bind any VSAM RLS locks for VSAM sphere JTILLI1.CICSTS32.FILEA
because there is no VSAM RLS support for it.
```

DWW1289I No attempt was made to report to VSAM RLS successful completion of the forward recovery
for VSAM sphere JTILLI1.CICSTS32.FILEA because there is no VSAM RLS support for it.

DWW0011I CICSVR processing complete. Maximum condition code is 0.

CICSVR - CICS VSAM RECOVERY   DATE: 07/11/30   TIME: 14:10:26   PAGE: 1

 MVS LOG STREAM STATISTICS:

 KEY TO FIELD IDENTIFIERS

 UPD-AFTER UPDATE AFTER IMAGE
 ADD-AFTER ADD AFTER IMAGE
 DEL-AFTER DELETE AFTER IMAGE
 DSNAME   DDNAME TO SPHERE AND PATH NAME

- NAME OF MVS LOG STREAM	NO OF RECORDS PROCESSED	NO OF DSNAME	NO OF UPD-AFTER	NO OF ADD-AFTER	NO OF DEL-AFTER
CICSMVS.CICSVRAR.FILELOG	303	2	0	301	0
TOTAL	303	2	0	301	0

CICSVR - CICS VSAM RECOVERY   DATE: 07/11/30   TIME: 14:10:26   PAGE: 2

 STATISTICS OF RECOVERED DATA SETS

 BASE NAME OF RECOVERED DATA SET: JTILLI1.CICSTS32.FILEA
 BASE NAME OF ORIGINAL DATA SET: JTILLI1.CICSTS32.FILEA
 THE FOLLOWING ASSOCIATED PATHS ARE DEFINED IN THE VSAM CATALOG:
     NO PATHS DEFINED.
 FIRST AND LAST RECORDS APPLIED:

RECORDS	DATE YY/DDD	TIME HH:MM:SS	TIME TYPE
FIRST RECORD APPLIED	07/334	13:54:57	LOCAL
LAST RECORD APPLIED	07/334	13:58:06	LOCAL

-NAME OF RECOVERED DATA SET: JTILLI1.CICSTS32.FILEA

DATASET TYPE	FCT ENTRY NAME	DSNAME	RECORDS FOUND ON THE LOG(S) UPD-AFTER	ADD-AFTER	DEL-AFTER	CHANGE RECORDS APPLIED ADDS	UPDATES	DELETES	CHANGES IGNORED BY EXIT
BASE	D0000115	1	0	300	0	300	0	0	0
BASE	FILEA	1	0	1	0	1	0	0	0

```
------- --------- ------ -------- -------- -------- ------- -------- -------- ----------
TOTAL                   2        0      301        0      301        0        0        0
------- --------- ------ -------- -------- -------- ------- -------- -------- ----------

----------------- ------ -------- -------- -------- ------- -------- -------- ----------
OVERALL TOTAL           2        0      301        0      301        0        0        0
----------------- ------ -------- -------- -------- ------- -------- -------- ----------

----------------- ------ -------- -------- -------- ------- -------- -------- ----------
GRAND TOTAL             2        0      301        0      301        0        0        0
----------------- ------ -------- -------- -------- ------- -------- -------- ----------
```

CICSVR - CICS VSAM RECOVERY   DATE: 07/11/30   TIME: 14:10:26   PAGE: 3

  EXIT ACTION STATISTICS

```
-                 :----------NUMBER OF ACTIONS TAKEN--------:
 EXIT NAME         RECORD CHANGE  CONTINUE     IGNORE
 ----------------- ------------- ------------- -------------
 PREAPPLY          EXIT NOT TAKEN
 ESDS DELETE       EXIT NOT TAKEN
 ----------------- ------------- ------------- -------------
-                 :--NUMBER OF ACTIONS TAKEN-:
 EXIT NAME         CONTINUE      IGNORE
 ----------------- ------------- -------------
 ERROR             EXIT NOT TAKEN
 ----------------- ------------- -------------
-                 :--NUMBER OF ACTIONS TAKEN-:
 EXIT NAME          CODE CHANGED  CONTINUE
 ----------------- ------------- -------------
 TERMINATION       EXIT NOT TAKEN
 ----------------- ------------- -------------
```

CICSVR - CICS VSAM RECOVERY   DATE: 07/11/30   TIME: 14:10:26   PAGE:
4

 RECOVERY PROGRESS REPORT

 VSAM SPHERE NAME: JTILLI1.CICSTS32.FILEA

 THE PREVIOUS FORWARD RECOVERY REGISTERED FOR THIS VSAM SPHERE WHICH WAS
 RUN AT 07.334 13:32:37 COMPLETED SUCCESSFULLY.

 THIS FORWARD RECOVERY WAS RUN AT: 07.334 14:10:18
 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.
DFSMSHSM RECOVER WAS SUCCESSFUL.
NO AIXS WERE REMOVED FROM THE UPGRADE SET.
FORWARD RECOVERY RAN SUCCESSFULLY.
NO AIXS NEEDED TO BE REBUILT.
BINDING THE VSAM RLS LOCKS WAS SKIPPED
     BECAUSE THERE IS NO VSAM RLS SUPPORT FOR THIS VSAM SPHERE.
REPORTING OF SUCCESSFUL FORWARD RECOVERY TO VSAM RLS WAS SKIPPED
     BECAUSE THERE IS NO VSAM RLS SUPPORT FOR THIS VSAM SPHERE.
```

Examining the forward recovery report, in the MVS log stream statistics panel, shows that CICS VR read 303 records from the forward recovery log, two DSNAME records, and 301 add-after records. A DSNAME record maps the file name to the VSAM DSNAME, and add-after records are the after images of records added to the data set.

The section Statistics of Recovered Data sets (in Example 5-6) provides further detail. In a batch environment, CICS VR generates a unique DDNAME (equivalent to a CICS file name in the FCT) to place in the log record and shows that the updates made by the batch job are recorded under FCT entry name D0000115. One DSNAME record and 300 add-after records exist, and CICS VR added the 300 records. For FILEA, one DSNAME record and one add-after record exist, and CICS VR added the one record from the CICS transaction.

6

CICS VR VSAM batch logging

In this chapter we discuss the CICS VR VSAM batch logging implementation.

In this chapter, we discuss the following topics:

► Batch logging description
► Batch undo logging and batch backout
► Batch forward recovery logging and forward recovery
► Which batch recovery technique to use

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6.1 Batch logging description

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

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, should the batch job encounter an abend, CICS VR batch backout can be used to remove the updates made by the failed batch job or batch job step. CICS VR batch backout provides the same facilities as CICS transaction backout provides for online transactions.

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, should the data set become corrupt, CICS VR forward recovery can be used to recreate the updates made by the batch job. Moreover, the after-images log records written by CICS VR are the same format log records as those written by CICS when the data set is online to CICS. Thus, if updates are made by to a data set by CICS transactions and then offline from CICS updates are made by batch jobs, then CICS VR forward recovery can be used to recover both the CICS updates and the batch updates.

Undo logging and forward recovery logging, or both can be enabled for a VSAM data set.

This section explains the tasks that are required to enable batch logging for VSAM data sets.

6.1.1 Batch logging protects VSAM data sets

The CICS VR server address space collects the following information about the candidate VSAM data sets and stores it in the RCDS:

► Open/close activity

Each time the batch logging enabled VSAM data set is opened for update, CICS VR creates a new RCDS record containing data set name, time stamp, and log stream ID information.

- ► Backup activity

  The process of recording is different, depending on the backup utility that you use:

  - **For DFSMSdss**: Using the CICSVRBACKUP option DFSMSdss informs (or notifies) the CICS VR server that then updates the RCDS.
  - **For DFSMShsm**: CICS VR can get the information from the DFSMShsm BCDS (backup control data set).
  - **For DFSMShsm ABARS**: The data mover used is DFSMSdss and so using the CICSVRBACKUP option DFSMSdss informs (or notifies) the CICS VR server which then updates the RCDS.
  - **For other backup types**: Use of the CICS VR notify interface informs the CICS VR server which then updates the RCDS.

- ► Log stream IDs

  The MVS system logger is a component of z/OS. Log streams are written to by CICS VR and hold the before-images and after-images of the updates made to the VSAM data sets.

CICS VR provides a batch backout utility, which can be invoked manually or automatically, to back out updates made by a failed batch job step. You can also remove updates made by multiple job steps or an entire batch job.

CICS VR can also forward recover the after-images of these VSAM data sets to a specific point in time. The forward recovery steps include:

1. Restore the VSAM data sets from a backup:

   CICS VR can find the latest backup and restore them automatically before forward recovery.

2. Apply the after-images from the logs to recover VSAM data sets.

Using CICS VR batch backout or CICS VR forward recovery can reduce the amount of time that 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.

6.1.2 Batch logging prerequisites

CICS VR VSAM batch logging requires the following:

► CICS VR server address space must be active.

► All VSAM data sets must be:

   – SMS-managed

   – Defined with FRLOG(UNDO) if batch undo logging is required

   – Defined with FRLOG(REDO) and LOGSTREAMID if batch forward recovery logging is required

   – Defined with FRLOG(ALL) and LOGSTREAMID if both batch undo logging and batch forward recovery logging is required

► All VSAM data sets must *not* be:

   – Empty: CICS VR batch logging does not operate when the data set is accessed in VSAM load mode

   – Accessed in RLS mode by batch jobs

   – Currently in use by CICS

6.1.3 ITSO batch logging environment

Our batch logging implementation scenario includes the following components:

► z/OS coupling facility log stream DWW.JTILLI1.UNDOLOG used for undo logging

► z/OS coupling facility log stream CICSMVS.CICSVRAR.FILELOG used for forward recovery logging

► VSAM KSDS data set JTILLI1.CICSTS32.FILEA

► DFSMSdss DUMP as the backup utility

► A batch program to that adds 300 records to the VSAM data set

6.1.4 CICS VR server address space checking

The CICS VR server address space *must* be active for batch logging. You can use the following system command to check the status of the CICS VR server:

```
D SMS,CICSVR,ALL
```

If the server is inactive, you can issue the following command to activate it:

```
V SMS,CICSVR,ACTIVE
```

6.2 Batch undo logging and batch backout

In this section, we discuss the steps to use CICS VR batch backout to recover VSAM data sets with batch undo logging enabled. We discuss the following topics in this section:

- ► MVS log stream definition
- ► Batch undo logging enablement
- ► VSAM data set batch update
- ► CICS VR batch backout
- ► CICS VR Batch backout report

6.2.1 MVS log stream definition

CICS VR batch logger logs the before-images of the VSAM records updated by batch jobs to an MVS log stream called the undo log which is owned by the CICS VR server. Prior to CICS VR V4R2, there could be only one undo log per CICS VR server, and because there can only be one CICS VR server active on a system, that meant that all batch jobs running on the same system use the same undo log. CICS VR V4R2 allows use of multiple undo logs per CICS VR server. However, each individual batch job is restricted to using one undo log.

For undo logs recovery logs, you can use coupling facility log streams or DASD-only log streams. Use DASD-only log streams when you do not have access to or do not want to use a coupling facility for logging.

> **Note:** DASD-only log streams can only be single-system in scope, so only one system can connect to a DASD-only log stream. Use coupling facility logging if you wish to share undo logs between CICS VR servers across multiple systems in the sysplex. A coupling facility is required to merge the data from multiple systems into a single log stream.

In this example, we use coupling facility log streams, and Example 6-1 shows the job used to define the log stream for undo logging.

Example 6-1   Undo log stream definition job

```
//DEFUNDOL JOB CLASS=A,MSGCLASS=H,REGION=4096K,NOTIFY=JTILLI1,
//         MSGLEVEL=(1,1)
//*---------------------------------------------------------------*
/
//*  Delete logstream
*/
```

```
//*------------------------------------------------------------------*
/
//DELLS     EXEC PGM=IXCMIAPU
//SYSPRINT DD SYSOUT=*,DCB=RECFM=FBA
//SYSIN    DD *
  DATA TYPE(LOGR) REPORT(NO)
  DELETE LOGSTREAM NAME(DWW.JTILLI1.UNDOLOG)
/*
//*------------------------------------------------------------------*
/
//*  Allocate logstream
*/
//*------------------------------------------------------------------*
/
//ALLOCLS  EXEC PGM=IXCMIAPU
//SYSPRINT DD SYSOUT=*,DCB=RECFM=FBA
//SYSIN    DD *
  DATA TYPE(LOGR) REPORT(YES)
  DEFINE LOGSTREAM NAME(DWW.JTILLI1.UNDOLOG)
        STRUCTNAME(LOG_CICSVR) LS_SIZE(1180)
        LS_DATACLAS(STANDARD)
        LS_STORCLAS(STANDARD)
/*
//
```

The following command lists the log stream report (as shown in Example 6-2).

```
  DATA TYPE(LOGR) REPORT(YES)
```

Example 6-2   Undo log stream report

```
ADMINISTRATIVE DATA UTILITY:  REPORT                        DATA TYPE = LOGR
_____
LOGSTREAM NAME(DWW.JTILLI1.UNDOLOG) STRUCTNAME(LOG_CICSVR)
        LS_DATACLAS(STANDARD)
        LS_MGMTCLAS() LS_STORCLAS(STANDARD) HLQ(IXGLOGR) MODEL(NO)
        LS_SIZE(1180)
        STG_MGMTCLAS() STG_STORCLAS() STG_DATACLAS() STG_SIZE(0)
        LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO) DUPLEXMODE()
        RMNAME() DESCRIPTION() RETPD(0) AUTODELETE(NO) OFFLOADRECALL(YES)
        DASDONLY(NO) DIAG(NO) LOGGERDUPLEX() EHLQ(NO_EHLQ) GROUP()
```

Defining a default undo log to CICS VR

Unlike CICS VR forward recovery logs, the undo log to be used is not an attribute of the VSAM sphere definition. Prior to CICS VR V4R2, only one undo log could be used. The name of this default undo log is specified using the CICSVR_UNDOLOG_PREFIX(prefix) parameter in the active IGDSMSxx member of SYS1.PARMLIB. The CICS VR server will, therefore, use a log stream of name: *prefix*.UNDOLOG. The prefix can be up to eight characters long and must follow the syntax rules for data set names. The prefix must contain exactly one qualifier. DWW is the default value.

If your environment has multiple instances of CICS VR implemented in a sysplex and if the CICS VR instances perform undo logging, consider the following 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 that have an instance of CICS VR belonging to a different XCF group should have a different value defined for the undo log prefix

Using an association to define an undo log to CICS VR

CICS VR V4R2 provides an Undo logs assignment feature 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 batch job that involves undo logging, CICS VR searches for any matching assignments that you have set up between these elements of the job and a particular undo log. When CICS VR finds an assignment that applies for a submitted job, it writes undo records to the named undo log.

To set up an undo log assignment:

1. From the CICS VR main menu, select CICSVR settings (option 8).

2. On the next panel, select Undo logs assignment (option 1). The CICSVR Undo logs assignment panel displays.

3. Use F5=Add to create a new assignment.

Figure 6-1 shows three assignments have already been created:

▶ The first assignment is a VSAM high-level qualifier assignment that states that jobs updating VSAM spheres with a high level qualifier JTILLI1 will use an undo log named DWW.JTILLI1.UNDOLOG.

▶ The second assignment says all jobs with the name beginning with TSTJCL will use DWW.TEST.UNDOLOG.

▶ The third assignment says that all jobs running under user ID JTILLI1 will use DWW.JTILLI1.UNDOLOG.

```
 Administrate  View  Help
 --------------------------------------------------------------------------------
                          CICSVR Undo logs assignment          Row 1 to 3 of 3

 Select one or more associations, then select an action. Or, use Add action to
 register new association.


  S   Value     Type      Undo log name               Time
      JTILLI1   HLQ       DWW.JTILLI1.UNDOLOG          07.333 10:18:22
      TSTJCL*   JOBNAME   DWW.TEST.UNDOLOG            07.333 10:17:58
      JTILLI1   USERID    DWW.JTILLI1.UNDOLOG          07.333 10:42:57
 ****************************** Bottom of data *******************************




 Command ===>
  F1=Help      F3=Exit      F4=SwSort    F5=Add       F6=Alter     F7=Bkwd
  F8=Fwd      F10=Menu bar F11=Delete    F12=Cancel
```

Figure 6-1   Example of undo logs assignment

It is possible for a batch job to match more than one assignment. If this is the case, the batch jobs must resolve to the same undo log, as a job can only use one undo log. If there is a conflicting assignment, CICS VR undo log produces an error. So, for example, a job called TSTJCL4 cannot update VSAM sphere JTILLI1.CICSTS32.FILEA because there are conflicting assignments that tell CICS VR to use DWW.TEST.UNDOLOG and DWW.JTILLI1.UNDOLOG.

In our batch logging scenario, the batch job FILLREC2 runs under user ID JTILLI1 and updates VSAM sphere JTILLI1.CICSTS32.FILEA. This VSAM sphere matches two of the assignments which map to the same undo log, and so DWW.JTILLI1.UNDOLOG is used.

6.2.2 Batch undo logging enablement

The VSAM data sets that require batch undo logging must be:

► SMS-managed

► Defined with FRLOG(UNDO) or defined with FRLOG(ALL), which means both undo logging and forward recovery logging

You can either define a new VSAM data set or alter an existing SMS-managed VSAM data set for batch undo logging.

VSAM data set definition

Figure 6-3 shows a sample job to define a VSAM KSDS data set with undo logging. FRLOG(UNDO) specifies that CICS VR VSAM batch undo logging is performed for the VSAM data set. CICS VR use either the default undo log, or if an assignment is found, the undo log specified in that assignment, which is the case in our scenario.

Example 6-3   Sample VSAM data set definition

```
//S1        EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN  DD  *
   DEFINE CLUSTER (RECORDS(8000) -
    NAME (JTILLI1.CICSTS32.FILEA) -
    VOLUMES (SYSDAV) -
    FRLOG(UNDO) -
    IXD)
   DATA -
    (RECSZ(80,80) -
    CONTROLINTERVALSIZE(2048) -
    NAME (JTILLI1.CICSTS32.FILEA.DATA) -
    KEYS(6 1) -
    FREESPACE(10 10) -
    BUFFERSPACE (8192)) -
   INDEX -
    (NAME(JTILLI1.CICSTS32.FILEA.INDX) -
    REPL)
/*
```

CICS VR Undo logging settings

To control CICS VR undo logging, you need to specify two parameters in the active IGDSMSxx member of SYS1.PARMLIB before you use CICS VR undo logging. You can also alter these parameters using the SETSMS commands. The two parameters are:

► CICSVR_UNDOLOG_CONTROL(*string*)

   This parameter is used to enable or disable undo logging on the system, to specify the action to be taken if an undo logging failure occurs, and to specify if CICS VR should perform synchronous undo logging. For our scenario, we used the default value of ENABLE CONT, which means that undo logging is enabled, that the job will continue if an undo logging error occurs, and that synchronous logging is not used.

► CICSVR_BACKOUT_CONTROL(*string*)

   This parameter is used to control whether CICS VR submits a batch backout job automatically if a batch job encounters a failure (system or user abend). For our scenario, we used the default value of SUBMIT NONE, which means that CICS VR does not submit a batch backout job automatically if a failure occurs.

For more information about these parameters, see the *CICS VR V4R2 Implementation Guide and Reference*, SC34-6802.

6.2.3 VSAM data set batch update

When a candidate VSAM data set is opened for updating by a batch job (not in load mode), CICS VR server address space records the information about that VSAM data set in the RCDS.

In our example, we run a batch job that adds 300 records to VSAM KSDS data set JTILLI1.CICSTS32.FILEA. CICS VR batch logging produced message DWW264I, which indicates that UNDO logging was successful (Example 6-4).

Example 6-4   Batch job output showing successful UNDO logging

```
16.57.34 JOB03786 ---- TUESDAY,   04 DEC 2007 ----
16.57.34 JOB03786 IRR010I  USERID JTILLI1  IS ASSIGNED TO THIS JOB.
16.57.34 JOB03786 ICH70001I JTILLI1  LAST ACCESS AT 16:33:47 ON TUESDAY, DECEMBER 4,2007
16.57.34 JOB03786 £HASP373 FILLREC2 STARTED - INIT 5    - CLASS A - SYS MVV3
16.57.34 JOB03786 IEF403I FILLREC2 - STARTED - TIME=16.57.34
16.57.41 JOB03786 DWW264I VSAM BATCH UNDO LOGGING COMPLETED SUCCESSFULLY.  503
   503              ASID (IN HEX):       002E
   503              RETURN CODE (IN HEX): 00000000
   503              REASON CODE (IN HEX): 73050092
16.57.41 JOB03786 -                                   --TIMINGS (MINS.)--
16.57.41 JOB03786 -JOBNAME  STEPNAME PROCSTEP    RC   EXCP    CPU    SRB  CLOCK
```

```
16.57.41 JOB03786  -FILLREC2            PTKUPD1   00    64    .00    .00    .12
16.57.41 JOB03786  IEF404I FILLREC2 - ENDED - TIME=16.57.41
16.57.41 JOB03786  -FILLREC2 ENDED.  NAME-                    TOTAL CPU TIME=
```

6.2.4 CICS VR batch backout

CICS VR provides a batch backout utility program, DWWBACK, that processes the CICS VR BATCHBACK command. You can use the BATCHBACK command to remove updates that were made to VSAM spheres by one or more steps in a batch job, provided undo logging has been performed. Batch backout can be run automatically by CICS VR if a batch job failed or manually by running a job that invokes DWWBACK.

Example 6-5 shows the job that we ran to back out the changes that were made by batch job FILLREC2. Batch job FILLREC2 added 300 records to JTILLI1.CICSTS32.FILEA.

Example 6-5   Example batch backout job to backout the whole FILLREC2 batch job

```
//BBACKOUT JOB CLASS=A,MSGCLASS=H,REGION=4096K,NOTIFY=&SYSUID,
//         MSGLEVEL=(1,1)
//********************************************************************/
//*  BATCH BACKOUT                                                   */
//********************************************************************/
//BA01     EXEC PGM=DWWBACK
//DWWDUMP  DD SYSOUT=*
//DWWMSG   DD SYSOUT=*
//DWWDMSG  DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWCON1  DD DSN=DWW.DWWCON1.GRPITSO,DISP=SHR
//DWWCON2  DD DSN=DWW.DWWCON2.GRPITSO,DISP=SHR
//DWWCON3  DD DSN=DWW.DWWCON3.GRPITSO,DISP=SHR
//DWWIN    DD *
  BATCHBACK JOB(FILLREC2) RCDS(YES)
/*
```

6.2.5 CICS VR Batch backout report

When the batch backout job ends, the report is created in the data set specified in the DWWPRINT DD name. Example 6-6 shows the output from running the BBACKOUT job.

Example 6-6   Report from batch backout utility

```
CICSVR - BATCH BACKOUT UTILITY                          DATE : 07/12/04    TIME : 16:58:07 PAGE : 1

BATCH BACKOUT JOB STEP STATISTICS:
----------------------------------

KEY TO FIELD IDENTIFIERS
-----------------------------------------
UPD-BEFORE  DELETE OR UPDATE BEFORE IMAGE
ADD-BEFORE  ADD BEFORE IMAGE
DATA SETS   DIFFERENT DATA SETS UPDATED
-----------------------------------------

JOB NAME: FILLREC2
JOB ID:   JOB03786

NAME OF LOGSTREAM:
DWW.JTILLI1.UNDOLOG

                NO OF RECORDS       NO OF       NO OF         NO OF
STEP NAME  PROCESSED FOR STEP   DATA SETS   UPD-BEFORE    ADD-BEFORE
---------- ------------------- ----------- ----------- -----------

PTKUPD1                  600           1           0           300
---------- ------------------- ----------- ----------- -----------
TOTAL                    600           1           0           300
---------- ------------------- ----------- ----------- -----------
CICSVR - BATCH BACKOUT UTILITY                              DATE : 07/12/04    TIME : 16:58:07
PAGE : 2

BATCH BACKOUT DATA SET STATISTICS
---------------------------------

JOB NAME: FILLREC2
JOB ID:   JOB03786

BASE NAME OF BACKED OUT DATA SET: JTILLI1.CICSTS32.FILEA

BASE NAME OF ORIGINAL DATA SET: JTILLI1.CICSTS32.FILEA

FIRST AND LAST LOG RECORDS APPLIED:
                                       DATE       TIME      TIME
    RECORDS                            YYYY.MM.DD HH:MM:SS TYPE
    -------------------------------------- ---------- -------- -----
    LOG BLOCK TIME STAMP AT BACKOUT START  2007.12.04 16:57:38 LOCAL
    LOG BLOCK TIME STAMP AT BACKOUT END    2007.12.04 16:57:37 LOCAL
```

```
           --------------------------------------   ----------  --------  -----

JOB STEP   ----- NUMBER OF BEFORE ---   ------- NUMBER OF CHANGED ------    CHANGES
  NAME            IMAGE LOG RECORDS                VSAM RECORDS             IGNORED

           UPD-BEFORE    ADD-BEFORE     ADDS     UPDATES    DELETES    BY EXIT
--------   -----------   -----------   ---------  ----------  ---------  -----------
PTKUPD1              0           300           0          0        300             0
--------   -----------   -----------   ---------  ----------  ---------  -----------
TOTAL               0           300           0          0        300             0
--------   -----------   -----------   ---------  ----------  ---------  -----------


--------   -----------   -----------   ---------  ----------  ---------  -----------
OVERALL
TOTAL               0           300           0          0        300             0
--------   -----------   -----------   ---------  ----------  ---------  -----------

CICSVR - BATCH BACKOUT UTILITY                          DATE : 07/12/04    TIME : 16:58:07
PAGE : 3

BATCH BACKOUT EXIT ACTION STATISTICS
------------------------------------

JOB NAME: FILLREC2
JOB ID:   JOB03786

                    :---------NUMBER OF -----------:
EXIT NAME             RECORDS PASSED TO THE EXIT
-----------------  ----------------------------
ESDS DELETE                        0
-----------------  ----------------------------
```

The report shows that the CICS VR batch backout utility processed 300
ADD-BEFORE log records, which resulted in it backing out the 300 adds by
deleting 300 records.

6.3 Batch forward recovery logging and forward recovery

In this section, we discuss the steps to forward recover VSAM data sets with
batch logging enabled. We discuss the following topics:

► MVS log stream definition
► Batch forward recovery logging enablement
► VSAM data set backup
► VSAM data set batch update
► Forward recovery job creation
► CICS VR forward recovery report

6.3.1 MVS log stream definition

CICS VR batch logger logs the after-images of the VSAM data sets that are updated by batch jobs to an MVS log stream. For forward recovery logs, you can use coupling facility log streams or DASD-only log streams. Use DASD-only log streams when you do not have access to or do not want to use a coupling facility for logging.

> **Note:** DASD-only log streams can only be single-system in scope, so only one system can connect to a DASD-only log stream. 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.

In this example, we use coupling facility log streams, and Example 6-7 shows the job that we used to define the log stream for forward recovery logging.

Example 6-7   Fr log stream definition job

```
//DEFFRLOG JOB CLASS=A,MSGCLASS=H,REGION=4096K,NOTIFY=JTILLI1,
//         MSGLEVEL=(1,1)
//*----------------------------------------------------------------*
/
//*  Delete logstream
*/
//*----------------------------------------------------------------*
/
//DELLS    EXEC PGM=IXCMIAPU
//SYSPRINT DD SYSOUT=*,DCB=RECFM=FBA
//SYSIN    DD *
  DATA TYPE(LOGR) REPORT(NO)
  DELETE LOGSTREAM NAME(CICSMVS.CICSVRAR.FILELOG)
/*
//*----------------------------------------------------------------*
/
//*  Allocate logstream
*/
//*----------------------------------------------------------------*
/
//ALLOCLS  EXEC PGM=IXCMIAPU
//SYSPRINT DD SYSOUT=*,DCB=RECFM=FBA
//SYSIN    DD *
  DATA TYPE(LOGR) REPORT(YES)
  DEFINE LOGSTREAM NAME(CICSMVS.CICSVRAR.FILELOG)
         STRUCTNAME(LOG_CICSVR) LS_SIZE(1180)
```

```
                        LS_DATACLAS(STANDARD)
                        LS_STORCLAS(STANDARD)
        /*
        //
```

The following command lists the log stream report (as shown in Example 6-8):

```
    DATA TYPE(LOGR) REPORT(YES)
```

Example 6-8 Fr log stream report

```
ADMINISTRATIVE DATA UTILITY:  REPORT                           DATA TYPE = LOGR

_____
LOGSTREAM NAME(CICSMVS.CICSVRAR.FILELOG) STRUCTNAME(LOG_CICSVR)
          LS_DATACLAS(STANDARD)
          LS_MGMTCLAS() LS_STORCLAS(STANDARD) HLQ(IXGLOGR) MODEL(NO)
          LS_SIZE(1180)
          STG_MGMTCLAS() STG_STORCLAS() STG_DATACLAS() STG_SIZE(0)
          LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO) DUPLEXMODE()
          RMNAME() DESCRIPTION() RETPD(0) AUTODELETE(NO) OFFLOADRECALL(YES)
          DASDONLY(NO) DIAG(NO) LOGGERDUPLEX() EHLQ(NO_EHLQ) GROUP()
```

6.3.2 Batch forward recovery logging enablement

The VSAM data sets that require batch forward recovery logging must be:

► SMS-managed
► Defined with FRLOG(REDO) or FRLOG(ALL) specified
► Defined with LOGSTREAMID specified

You can either define a new VSAM data set or alter an existing SMS-managed VSAM data set for batch logging.

VSAM data set definition

Example 6-9 shows a sample job to define a VSAM KSDS data set with forward recovery logging.

Example 6-9 Sample VSAM data set definition

```
//S1        EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN  DD  *
    DEFINE CLUSTER (RECORDS(8000) -
     NAME (JTILLI1.CICSTS32.FILEA) -
     VOLUMES (SYSDAV) -
```

```
        FRLOG(REDO) -
        LSID(CICSMVS.CICSVRAR.FILELOG) -
        IXD)
      DATA -
        (RECSZ(80,80) -
        CONTROLINTERVALSIZE(2048) -
        NAME (JTILLI1.CICSTS32.FILEA.DATA) -
        KEYS(6 1) -
        FREESPACE(10 10) -
        BUFFERSPACE (8192)) -
      INDEX -
        (NAME(JTILLI1.CICSTS32.FILEA.INDX) -
        REPL)
/*
```

It is important to pay attention to the highlighted parameters:

► FRLOG(REDO)

Specifies that CICS VR VSAM batch logging is performed for the VSAM data set. CICS VR writes forward recovery log records to the log that is specified by the LOGSTREAMID parameter.

If you specify FRLOG(REDO) or FRLOG(ALL), you must also specify the LOGSTREAMID parameter, unless it is already defined.

► LOGSTREAMID(CICSMVS.CICSVRAR.FILELOG)

Specifies the MVS log stream name that is used for writing the forward recovery log records.

In our environment, we did not specify the STORCLAS parameter explicitly. A local standard of using VOLUMES(SYSDAV) signifies that the data set is SMS managed.

Alter an existing VSAM data set

You can alter an existing SMS-managed VSAM data set to enable VSAM batch logging. Example 6-10 shows an example job.

Example 6-10   Sample VSAM data set ALTER job

```
//ALTFILEA JOB TIME=1440,CLASS=A,MSGLEVEL=(1,1),MSGCLASS=H,
//         NOTIFY=&SYSUID
//* JOB TO DEFINE FILEA DATA SET
//STEP1    EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=A
//SYSIN  DD  *
```

```
       ALTER JTILLI1.CICSTS32.FILEA    -
       FRLOG(REDO)                      -
       LSID(CICSMVS.CICSVRAR.FILELOG)
/*
//
```

Make sure that the VSAM data set is SMS-managed before using the IDCAMS
ALTER command; otherwise, you will get the following error messages:

```
IDC3019I INVALID ENTRY TYPE FOR REQUESTED ACTION
IDC3009I ** VSAM CATALOG RETURN CODE IS 60 - REASON CODE IS IGG0CLKV-106
IDC0532I **ENTRY JTILLI1.CICSTS32.FILEA NOT ALTERED
IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 8
```

VSAM data sets attributes

You can use the following command to list the VSAM data set attributes:

```
LISTC ENTRY(JTILLI1.CICSTS32.FILEA) ALL
```

Figure 6-2 shows the output of this command.

```
SMSDATA
  STORAGECLASS ---STANDARD      MANAGEMENTCLASS-STANDARD
  DATACLASS --------(NULL)      LBACKUP ---0000.000.0000
  BWO STATUS------00000000      BWO TIMESTAMP---00000 00:00:00.0
  BWO--------------(NULL)
RLSDATA
  LOG ---------------(NULL)     RECOVERY REQUIRED --(NO)     FRLOG
--------------REDO
  VSAM QUIESCED -------(NO)     RLS IN USE ---------(NO)
  LOGSTREAMID-----------CICSMVS.CICSVRAR.FILELOG
  RECOVERY TIMESTAMP LOCAL-----X'0000000000000000'
  RECOVERY TIMESTAMP GMT-------X'0000000000000000'
```

Figure 6-2   VSAM data set attributes

6.3.3 VSAM data set backup

You can use any storage management product to backup VSAM data sets. For non-IBM products, you can provide JCL skeletons to CICS VR so that backup and restore using these products can be part of the forward recovery process.

Other considerations when using DFSMS include:

▶ DFSMShsm

The CICS VR server address space need not be active when taking a backup with DFSMShsm. However, if the CICS VR server address space is active, all user IDs that are running CICS VR must be authorized for issuing DFSMShsm authorized commands (see 3.3.2, "System parameters" on page 123).

CICS VR gets the backup information directly from the DFSMShsm BCDS.

You can make a DFSMShsm backup using any of the following methods:

– DFSMShsm automatic backup

You can do the backup by assigning a management class to data sets. The management class specify the frequency of the backups, number of backup versions to keep, retention information, and so on.

– DFSMShsm command backup

You can issue the DFSMShsm HBACKDS command from TSO. For example:

`TSO HBACKDS datasetname TARGET(DASD)`

– DFSMShsm inline backup

You can make an inline backup invoking the ARCINBAK program from a batch job.

Example 6-11 shows a sample job.

Example 6-11 Sample DFSMShsm inline backup

```
//HBACK    JOB TIME=1440,CLASS=A,MSGLEVEL=(1,1),MSGCLASS=H,
//         NOTIFY=&SYSUID
//*
//HBACK    EXEC PGM=ARCINBAK
//ARCPRINT DD SYSOUT=*
//ARCSNAP  DD SYSOUT=*
//BACK01   DD DSN=JTILLI1.CICSTS32.FILEA,DISP=SHR
//
```

For more detailed information about DFSMShsm backup, refer to *DFSMShsm Storage Administration Reference,* SC35-0422.

If your VSAM data sets are backed up using DFSMShsm, the entire VSAM sphere (base cluster, AIX®, paths) will be backed up. Therefore, during the restore process the entire sphere is restored. Then, the restored VSAM data set is forward recovered, and the AIX is rebuilt (if the AIX is part of the upgrade set).

► **DFSMSdss**

When you use DFSMSdss COPY or DUMP to back up your VSAM data sets, the CICS VR server address space receives notification every time a backup is made, by specifying the special keyword CICSVRBACKUP.

CICS VR stores the DFSMSdss backup information in the RCDS. The CICS VR server address space must be active.

– DFSMSdss COPY

Example 6-12 shows a sample job using DFSMSdss COPY.

Example 6-12   Sample DFSMSdss COPY job

```
//DSSCOPY  JOB TIME=1440,CLASS=A,MSGLEVEL=(1,1),MSGCLASS=H,
//         NOTIFY=&SYSUID
//*
//STEP1    EXEC PGM=ADRDSSU,REGION=0M
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
  COPY DATASET( -
       INCLUDE(JTILLI1.CICSTS32.FILEA)) -
       RENAMEU(**,CICSVR.**)           -
       CICSVRBACKUP
/*
//
```

By specifying CICSVRBACKUP and RENAMEU(**,CICSVR.**), CICS VR provides DFSMSdss with a new name for each copy using the naming convention *prefix*.DSOiinnn.D*yyyyddd.*T*hhmmsst*, where:

prefix   Is the value of the CICSVR_DSNAME_PREFIX parameter defined in the IGDSMSxx PARMLIB member

yyyyddd   Represents the year and day in Julian date format

hhmmsst   Represents the hour, minutes, and seconds, and *t* is the tenths of a second

The VSAM data sets are copied into new VSAM data sets, as shown in Figure 6-3.

```
DSLIST - Data Sets Matching DWW.DSO*.D2007337.*                    Row 1 of 6

Command - Enter "/" to select action                 Message         Volume
-------------------------------------------------------------------------------
        DWW.DS002001.D2007337.T1427155                                *VSAM*
        DWW.DS002001.D2007337.T1427155.DATA                           PVP001
        DWW.DS002001.D2007337.T1427155.INDX                           PVP001
        DWW.DS002001.D2007337.T1434490                                *VSAM*
        DWW.DS002001.D2007337.T1434490.DATA                           PVP003
        DWW.DS002001.D2007337.T1434490.INDX                           PVP003
```

Figure 6-3   Sample list of DFSMSdss COPY data sets

– DFSMSdss DUMP

Example 6-13 shows a sample backup job using DFSMSdss DUMP.

Example 6-13   Sample DFSMSdss DUMP job

```
//DSSDUMP  JOB TIME=1440,CLASS=A,MSGLEVEL=(1,1),MSGCLASS=H,
//         NOTIFY=&SYSUID
//*
//STEP2    EXEC PGM=ADRDSSU,REGION=0M
//SYSPRINT DD SYSOUT=*
//BACKUP   DD DSN=JTILLI1.CICSTS32.FILEA.BACKUP,VOL=SER=PVP001,
//            DISP=(,CATLG,DELETE),UNIT=SYSDA,SPACE=(TRK,(20,20))
//SYSIN    DD *
  DUMP    OUTDDNAME(BACKUP)                            -
          DATASET(INCLUDE(JTILLI1.CICSTS32.FILEA       -
                )))                                    -
          CICSVRBACKUP
/*
//
```

Using the CICSVRBACKUP keyword DFSMSdss notifies the CICS VR server address space every time a backup is made.

The SPHERE keyword is mutually exclusive with the CICSVRBACKUP keyword, therefore only the base cluster will be backed up. Thus, during the restore of this VSAM data set from its DFSMSdss backup, only the base cluster will be restored. The user is responsible for manually recreating and rebuilding any AIXs for this VSAM data set.

Also note that if a new name is specified to restore the VSAM data set (regardless of the type of backup that exists for it), the user is responsible for recreating and rebuilding the AIXs.

You can use the ISPF dialog to check the information about the backups of VSAM data sets. On the CICS VR main menu panel, select **Option 1** and enter the search criteria. You see the list of VSAM data sets that meet the selected criteria. Select the data set for which you want to check the information (with an **s**) and select **Option 1** from the **List** menu to display the list of backups for this data set.

The CICS VR backup list panel displays (Figure 6-4) with a list of all the existing backups for the selected data set.

```
   Administrate  Utilities  Tools  List  View  Help
  +------------------------------------------------------------------------------+
  |                          CICSVR backup list              Row 1 to 1 of 1 |
  | Command ===>                                                                  |
  |                                                                              |
  | Press Enter to show the backup list for the next selected VSAM sphere. Or,  |
  | press F12 to cancel the list sequence.                                       |
  |                                                                              |
  |   VSAM sphere  . . . : JTILLI1.CICSTS32.FILEA                                 |
  |                                                                              |
  |   ------------------- Data set backup information --------------------       |
  |       Backup      Gen Ver BWO RLS     Recovery point        Product         |
  |   Date   Time     no. no.          Date    Time     Type                    |
  |   07.337  14:46:17          NO                       LOCAL  DSSLD           |
  |   07.337  14:34:49          NO                       LOCAL  DSSLC           |
  |   07.337  14:27:16          NO                       LOCAL  DSSLC           |
  |   07.337  14:04:32  00  0021 NO                      LOCAL  HSMLB           |
  |   07.337  00:08:33  01  0020 NO                      LOCAL  HSMLB           |
  |**************************** Bottom of data ********************************* |
  |                                                                              |
  |                                                                              |
  |                                                                              |
  |                                                                              |
  |                                                                              |
  |                                                                              |
  |   F1=Help     F7=Bkwd     F8=Fwd     F12=Cancel                              |
  +------------------------------------------------------------------------------+
```

Figure 6-4   CICSVR backup list

The top line shows the latest backup, and in the Product field it shows a value of DSSLD, which means that the backup was made using DFSMSdss logical DUMP. Other backups with product types are displayed:

► DSSLC: DFSMSdss logical copy
► HSMLB: DFSMShsm logical copy (data set level)

6.3.4 VSAM data set batch update

When a candidate VSAM data set is opened for updating by a batch job (not in load mode), CICS VR server address space records the information about that VSAM data set in the RCDS.

In our example, we run a batch job that adds 300 records to VSAM KSDS data set JTILLI1.CICSTS32.FILEA. CICS VR batch logging produced message DWW264I, which indicates that REDO logging was successful.

Example 6-14   Batch job output showing successful REDO logging

```
15.07.54 JOB03495 ---- MONDAY,    03 DEC 2007 ----
 15.07.54 JOB03495  IRR010I  USERID JTILLI1  IS ASSIGNED TO THIS JOB.
 15.07.54 JOB03495  ICH70001I JTILLI1  LAST ACCESS AT 14:46:17 ON MONDAY, DECEMBER 3,
2007
 15.07.54 JOB03495  £HASP373 FILLREC2 STARTED - INIT 5    - CLASS A - SYS MVV3
 15.07.54 JOB03495  IEF403I FILLREC2 - STARTED - TIME=15.07.54
 15.08.02 JOB03495  DWW264I VSAM BATCH REDO LOGGING COMPLETED SUCCESSFULLY.  981
    981              ASID (IN HEX):        002E
    981              RETURN CODE (IN HEX): 00000000
    981              REASON CODE (IN HEX): 73050092
 15.08.02 JOB03495  -                                       --TIMINGS (MINS.)-
 15.08.02 JOB03495  -JOBNAME  STEPNAME PROCSTEP   RC   EXCP    CPU    SRB  CLOCK
 15.08.02 JOB03495  -FILLREC2          PTKUPD1    00   67    .00    .00    .13
 15.08.02 JOB03495  IEF404I FILLREC2 - ENDED - TIME=15.08.02
```

You can also use the CICS VR ISPF dialog interface to verify whether batch logging occurred. You can verify the following information can be verified:

► The VSAM data set name is registered in the RCDS
► The log stream name is registered in the RCDS

6.3.5 Forward recovery job creation

You can use the CICS VR ISPF dialog interface to help you create the forward recovery job interactively.

Customize the JCL skeleton

The first time that you create a forward recovery job, you need to alter the JCL skeleton according to your CICS VR setup. See 3.6, "JCL skeleton" on page 131 for more details.

Select the VSAM data sets

To select the VSAM data sets that you want to forward recover, go to the CICS
VR VSAM sphere list menu and select the data sets, as shown in Figure 6-5.

```
 Administrate  Utilities  Tools  List  View  Help
 sssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssss
                           CICSVR VSAM sphere list         Row 1 to 11 of 23

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

   N  Use default parameters for selected spheres
                                                 Last time        RLS RR
   S  VSAM sphere                                referenced       flag on
      CICSVR.BL01.KSDS01                         00.001 00:00:00  N
      CICSVR.R40BL010.BL.ESDS01                  00.001 00:00:00  N
      CICSVR.R40BL010.BL.ESDS02                  00.001 00:00:00  N
   s  JTILLI1.CICSTS32.FILEA                     07.334 13:08:06  N
      JTILLI1.CICSVR.ESDS01                      00.001 00:00:00  N
      JTILLI1.CICSVR.ESDS02                      00.001 00:00:00  N
      JTILLI1.CICSVR.FILE1                       00.001 00:00:00  N
      JTILLI1.CICSVR.FILE2                       00.001 00:00:00  N
      JTILLI1.CICSVR.FILE3                       00.001 00:00:00  N
      JTILLI1.CICSVR.FILE4                       00.001 00:00:00  N
       JTILLI1.CICSVR.HR.FILE1                    00.001 00:00:00  N
```

Figure 6-5   CICS VR VSAM Sphere list panel

At this point press F5=FwdRec to perform forward recovery, or you choose option
2 from the Utilities menu. CICS VR then runs a log of logs scan.

VSAM forward recovery setup

CICS VR now shows the default parameters according to the latest backup. So, you do not need to enter new information in the next panel (Figure 6-6).

```
+------------------------------------------------------------------------------+
|                         CICSVR VSAM sphere parameters                        |
|                                                                              |
| 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 . . . . . . : JTILLI1.CICSTS32.FILEA                           |
|                                                                              |
|   New VSAM sphere name  . .                                                  |
|                                                                              |
|   Forward-recovery start time . . 07.337 14:46:17  (YY.DDD HH:MM:SS)         |
|                                                                              |
|   Forward-recovery stop time  . .                  (YY.DDD HH:MM:SS)         |
|                                                                              |
|   Backup time . . . . . . . . . . 07.337 14:46:17  + (YY.DDD HH:MM:SS)       |
|                                                                              |
|   Time format . . . . . Local  +    Backup type . Logical         +         |
|                                                                              |
|   Volume for restore . .            Unit for restore . . . . .              |
|                                                                              |
|   Command ===>                                                               |
|  F1=Help        F4=Prompt      F5=GetDef      F6=SaveDef      F7=PrevVSAM     |
|  F12=Cancel                                                                  |
*------------------------------------------------------------------------------+
```

Figure 6-6   Setup forward recovery parameters

It is important to check that the correct Backup type is selected. CICS VR defaults to the latest logical backup that exists for the VSAM data set.

Press Enter when you finish the setup, and press Enter again to confirm.

Specify whether you want CICS VR to use the MVS log stream or QSAM copies
of the log stream (if they exist) during the recovery (see Figure 6-7).

```
  Menu  Utilities  Compilers  Help
+------------------------------------------------------------------------------+
|                           CICSVR log stream type                             |
| Command ===>                                                                 |
|                                                                              |
| Specify log stream type. Press Enter to continue the job creation.           |
|                                                                              |
|   Log stream type  . .    1.  MVS logger log stream                          |
|                           2.  QSAM copy                                      |
|                                                                              |
|                                                                              |
|                                                                              |
|  F1=Help     F5=GetDef   F6=SaveDef F12=Cancel                               |
+------------------------------------------------------------------------------+
```

Figure 6-7   Select CICSVR log stream type

If CICS VR detects errors while constructing the forward recovery job, the CICS
VR recovery job error list panel displays. You can select any error in the list to see
more details.

In Figure 6-8, you have the option to change the CICS VR parameters that are
used in the recovery job creation. For details, see *CICS VSAM Recovery V4R2
Implementation Guide and Reference*, SC34-6802.

```
  Menu  Utilities  Compilers  Help
 +----------------------------------------------------------------------------+
 |                         CICSVR forward recovery only                       |
 | Command ===>                                                               |
 |                                                                            |
 | Press Enter to create a job with default values. Or, select one or more    |
 | choices below, and press Enter to override current values.                 |
 |                                                                            |
 |                                                                            |
 |   S  Forward-recovery parameters related to:                               |
 |   _  Sequence checking                                                     |
 |   _  VSAM buffer pools                                                      |
 |   _  CICSVR exits                                                           |
 |   -  Selective forward recovery |                                          |
 |                                                                            |
 |                                                                            |
 |  F1=Help    F12=Cancel                                                     |
 +----------------------------------------------------------------------------+
 | The recovery control data set has no relevant default values. |
 +---------------------------------------------------------------+
```

Figure 6-8   Forward recovery parameter panel

After you select the parameters, CICS VR creates the forward recovery job automatically. You can choose to submit the job or save it in the CICS VR job submission panel shown in Figure 6-9.

```
 Menu  Utilities  Compilers  Help
+------------------------------------------------------------------------------+
|                             CICSVR job submission                            |
| Command ===>                                                                 |
|                                                                              |
| Select one and press Enter.                                                  |
|                                                                              |
|                              4   1.  Submit the job                          |
|                                  2.  Browse the job                          |
|                                  3.  Edit the job                            |
|                                  4.  Save generated JCL                      |
|                                  5.  Return to VSAM sphere list              |
|                                                                              |
|  F1=Help    F12=Cancel                                                       |
+------------------------------------------------------------------------------+
+------------------------------------+
| The recovery job has been generated. |
+------------------------------------+
```

Figure 6-9   Forward recovery job submission

You can save the produced recovery job as a member of the PDS allocated to the ISPFILE DD name. The member name is specified in the CICS VR save JCL panel (see Figure 6-10).

```
                          CICSVR save JCL
  Command ===>

  Type a member name for the CICSVR generated JCL. Press Enter to save the
  generated JCL as this member name.


    Member name . . $FWDRCVY


  F1=Help    F12=Cancel
```

Figure 6-10   Save the forward recovery job

Use the TSO ISRDDN command while the CICS VR panels are active to determine the name of the PDS.

Example 6-15 shows the sample forward recovery job.

Example 6-15   Sample forward recovery job

```
01 //TSTGFS1 JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=JTILLI1,
02 //           MSGCLASS=H,CLASS=A,REGION=4M
03 //DWW       PROC
04 //RECOVER   EXEC PGM=DWWCO
05 //*STEPLIB  DD DSN=DWW.SDWWLOAD,DISP=SHR
06 //*         DD DSN=DWW.SDWWLENU,DISP=SHR
07 //DWWMSG    DD SYSOUT=*
08 //DWWPRINT  DD SYSOUT=*
09 //DWWCON1   DD DSN=DWW.DWWCON1.GRPITSO,DISP=SHR
10 //DWWCON2   DD DSN=DWW.DWWCON2.GRPITSO,DISP=SHR
11 //DWWCON3   DD DSN=DWW.DWWCON3.GRPITSO,DISP=SHR
12 //          PEND
13 //* END OF PROC
14 //AMS001   EXEC PGM=IDCAMS,COND=(8,LE)
15 //SYSPRINT DD SYSOUT=*
16 //SYSIN    DD *
17    DELETE JTILLI1.CICSTS32.FILEA
18    SET MAXCC = 0
19 /*
20 /*
21 //DSSLD1   EXEC PGM=ADRDSSU,COND=(8,LE)
22 //SYSPRINT DD SYSOUT=*
23 //TAPE  DD DISP=SHR,
24 //    DSN=JTILLI1.CICSTS32.FILEA.BACKUP
25 //SYSIN    DD *
26   RESTORE INDD(TAPE)  DS(   -
27     INCL(JTILLI1.CICSTS32.FILEA))   -
28     SPHERE           -
29     CATALOG
30 /*
31 //DWW001 EXEC DWW,COND=(8,LT)
32 //DWWIN    DD   *
33   RECOVER              -
34    ONLY              -
35    APPLYCA           -
36    STARTTIME(07.337/15:07:58)      -
37    STOPTIME(07.337/15:08:00)        -
38    STARTAT(DSNAME)          -
39    SPHERE(JTILLI1.CICSTS32.FILEA)
40   MVSLOG                -
41    NAME(CICSMVS.CICSVRAR.FILELOG)
42   BLDVRP
43 //*
```

CICS VR generates the appropriate job to restore the VSAM data set based on the selected backup information:

► For DFSMSdss DUMP, the restore steps go from line 14 to line 30 in Example 6-15.

► For DFSMSdss COPY, the restore steps are shown in Example 6-16.

Example 6-16   Restore steps for DFSMSdss COPY

```
//AMS001  EXEC PGM=IDCAMS,COND=(8,LE)
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
    DELETE JTILLI1.CICSTS32.FILEA
    SET MAXCC = 0
/*
//DSSLC1  EXEC PGM=ADRDSSU,COND=(8,LE)
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
  COPY DS(    -
    INCL(DWW.DS002001.D2007337.T1434490))   -
    OUTDYNAM(              -
     (PVP005)           -
        )   -
    CATALOG   -
    RENAMEU((DWW.DS002001.D2007337.T1434490,  -
     JTILLI1.CICSTS32.FILEA))
/*
```

► For DFSMShsm backup, the forward recovery job requests DFSMShsm to restore the VSAM data sets according to the values of the VERSION and SPHERE parameters included in the recover command.

If you are going to restore the DFSMShsm backup manually, the Backup type option in Figure 6-6 on page 230 should be None(1), and the VERSION parameter should not be included in the recovery command.

6.3.6 CICS VR forward recovery report

When the forward recovery job ends, the report is created in the data set specified in the DWWPRINT DD name. Example 6-17 shows a sample report.

Example 6-17   CICSVR batch logging report

```
CICSVR - CICS VSAM RECOVERY                    DATE : 07/12/03    TIME : 16:15:31    PAGE : 1

 MVS LOG STREAM STATISTICS:
 ---------------------------
 KEY TO FIELD IDENTIFIERS
 -------------------------------------------------------
 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
 -----------------------------  -------------  ----------  -----------  -----------  -----------
 CICSMVS.CICSVRAR.FILELOG                 301           1            0          300            0
 -----------------------------  -------------  ----------  -----------  -----------  -----------
 TOTAL                                    301           1            0          300            0
 -----------------------------  -------------  ----------  -----------  -----------  -----------


CICSVR - CICS VSAM RECOVERY                    DATE: 07/12/03    TIME: 16:15:31    PAGE:  2


 STATISTICS OF RECOVERED DATA SETS
 ---------------------------------
 BASE NAME OF RECOVERED  DATA SET: JTILLI1.CICSTS32.FILEA
 BASE NAME OF  ORIGINAL  DATA SET: JTILLI1.CICSTS32.FILEA
 THE FOLLOWING ASSOCIATED PATHS ARE DEFINED IN THE VSAM CATALOG:
     NO PATHS DEFINED.
 FIRST AND LAST RECORDS APPLIED:
                          DATE    TIME      TIME
      RECORDS            YY/DDD  HH:MM:SS   TYPE
      --------------------  ------  --------  -----
      FIRST RECORD APPLIED 07/337  15:07:58  LOCAL
      LAST RECORD APPLIED  07/337  15:07:58  LOCAL
      --------------------  ------  -------
-NAME OF RECOVERED  DATA SET: JTILLI1.CICSTS32.FILEA
                 :-- RECORDS FOUND ON THE LOG(S) ---: :- CHANGE RECORDS APPLIED -: :- CHANGES
 DATASET  FCT ENTRY                                                                   IGNORED
 TYPE     NAME    DSNAME UPD-AFTER ADD-AFTER DEL-AFTER    ADDS   UPDATES   DELETES    BY EXIT
 -------  --------- ------ --------- --------- --------- ------- -------- -------- ----------
 BASE     D0000116      1         0       300         0     300        0        0          0
 -------  --------- ------ --------- --------- ---------  ------- -------- -------- ----------
 TOTAL                   1         0       300         0     300        0        0          0
 -------  --------- ------ --------- --------- --------- ------- -------- -------- ----------
 ------------------ ------ --------- --------- --------- ------- -------- -------- ----------
 OVERALL TOTAL           1         0       300         0     300        0        0          0
 ------------------ ------ --------- --------- --------- ------- -------- -------- ----------
 ------------------ ------ --------- --------- --------- ------- -------- -------- ----------
 GRAND TOTAL             1         0       300         0     300        0        0          0
 ------------------ ------ --------- --------- --------- ------- -------- -------- ----------
```

```
 EXIT ACTION STATISTICS
 ---------------------
-                    :----------NUMBER OF ACTIONS TAKEN--------:
 EXIT NAME           RECORD CHANGE  CONTINUE      IGNORE
 -----------------  -------------  -------------  -------------
 PREAPPLY            EXIT NOT TAKEN
 ESDS DELETE         EXIT NOT TAKEN
 -----------------  -------------  -------------  -------------
-                    :--NUMBER OF ACTIONS TAKEN-:
 EXIT NAME           CONTINUE      IGNORE
 -----------------  -------------  -------------
 ERROR               EXIT NOT TAKEN
 -----------------  -------------  -------------
-                    :--NUMBER OF ACTIONS TAKEN-:
 EXIT NAME            CODE CHANGED  CONTINUE
 -----------------  -------------  -------------
 TERMINATION         EXIT NOT TAKEN
 -----------------  -------------  -------------
```

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


 VSAM SPHERE NAME: JTILLI1.CICSTS32.FILEA

 THE PREVIOUS FORWARD RECOVERY REGISTERED FOR THIS VSAM SPHERE WHICH WAS
 RUN AT 07.334 14:10:38 COMPLETED SUCCESSFULLY.


 THIS FORWARD RECOVERY WAS RUN AT: 07.337 16:15:24
 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.
 BINDING THE VSAM RLS LOCKS WAS SKIPPED
     BECAUSE THERE IS NO VSAM RLS SUPPORT FOR THIS VSAM SPHERE.
 REPORTING OF SUCCESSFUL FORWARD RECOVERY TO VSAM RLS WAS SKIPPED
     BECAUSE THERE IS NO VSAM RLS SUPPORT FOR THIS VSAM SPHERE.
```

If we examine the forward recovery report, the section `MVS log stream statistics` shows that CICS VR reads 301 records from the forward recovery log, one DSNAME record, and 300 add-after records. A DSNAME record maps the file name to the VSAM DSNAME, and add-after records are the after images of records that are added to the data set. The section `Statistics of Recovered Data sets` shows further detail. In a batch environment, CICS VR generates a unique DDNAME (equivalent to a CICS filename in the FCT) to place in the log record and that the updates made by the batch job are recorded under FCT entry name D0000116. We see one DSNAME record and 300 add-after records, and CICS VR has added 300 records to the data set.

6.4 Which batch recovery technique to use

Following on from the discussion on the implementation of both batch backout and batch forward recovery, in this section we discuss when to use each recovery technique.

Batch backout provides similar capabilities for batch applications that CICS transaction backout provides for CICS online transactions, if you equate a batch job step to a CICS unit of work. Before CICS VR supported batch backout, then certainly using CICS VR forward recovery if a long running batch process failed was very often more efficient than rerunning the whole batch process. Since the introduction of batch backout support, we can improve the efficiency further by using batch backout to backout the failed step, correcting the problem, and then restarting the batch process at the start of the failed step.

However, that does not mean that batch forward recovery is redundant. Being able to use batch backout relies on the fact that the data set itself is still available, which is no different from CICS. CICS transaction backout relies on being able to back out the changes to a data set. If the disk is damaged, CICS suffers a backout failure. Forward recovery from a previously taken backup is the best method to recover the data.

In summary, batch backout is the most efficient way to recover from batch failures, but batch forward recovery is the insurance policy against media failure. For the remainder of this section we describe how forward recovery can help recovery. Figure 6-11 shows the sample scenario.
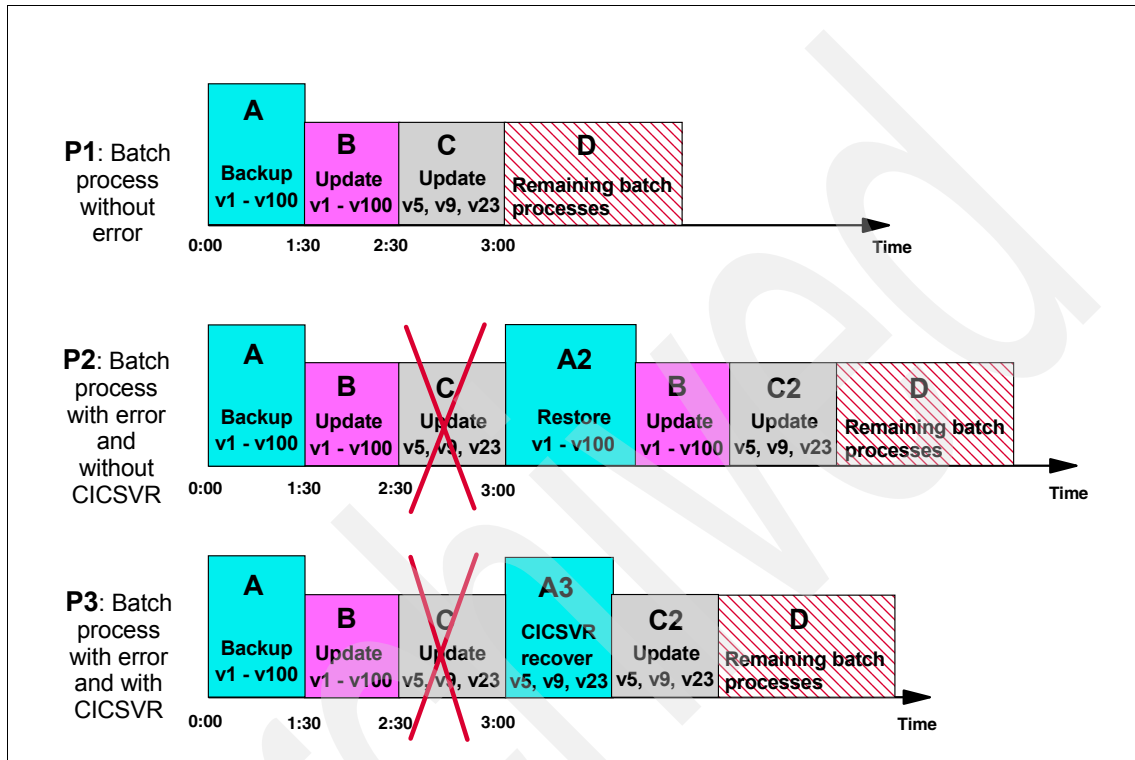
Figure 6-11   Sample batch logging scenario

The processes illustrated in this figure are:

▶ **P1**: Ordinary batch process without error

The following sequence of events occur in this scenario:

– **A**: VSAM data sets V1-V100 are backed up.

– **B**: Batch processes 1-8 that update VSAM data sets V1-V100 run successfully.

– **C**: Batch process 9 that updates VSAM data sets V5, V9, and V23 run successfully.

– **D**: All other remaining batch processes run successfully

► **P2**: Batch process with error and without CICS VR

The following sequence of events occur in this scenario:

– **A**: VSAM data sets V1- V100 are backed up.

– **B**: Batch processes 1-8 that update VSAM data sets V1-V100 run successfully.

– **C**: Batch process 9 that updates VSAM data sets V5, V9, and V23 encounter an error.

– **A2**: The problem that caused the error in step C is corrected and VSAM data sets V1-V100 are restored from their backups made in step A.

– **B**: Batch processes 1-8 that update VSAM data sets V1-V100 re-execute successfully.

– **C2**: Batch process 9 that updates VSAM data sets V5, V9, and V23 is re-executed successfully.

– **D**: All other remaining batch processes run successfully.

► **P3**: Batch process with error and with CICS VR

The following sequence of events occurred in this scenario:

– **A**: VSAM data sets V1-V100 are backed up.

– **B**: Batch processes 1-8 that update VSAM data sets V1-V100 run successfully.

– **C**: Batch process 9 that updates VSAM data sets V5, V9, and V23 encounter an error.

– **A3**: The problem that caused the error in step C is corrected and CICS VR recovers VSAM data sets V5, V9, and V23 to the point that they were at after step B ran successfully.

– **C2**: Batch process 9 that updates VSAM data sets V5, V9, and V23 is re-executed successfully.

– **D**: All other remaining batch processes run successfully.

Scenario P3 shows how CICS VR can save time during batch processing when an error is encountered during one of the batch processes. By using CICS VR, you need to restore and recover only the VSAM data sets that are corrupted due to an error in a batch process. CICS VR can restore and recover these corrupted VSAM data sets to the state that they were in before the process that encountered the error was executed. Then, after the problem is fixed that caused the error in the batch process, that process can be re-run. There is no need to restore all of the VSAM data sets or re-run all of the batch processes.

You can use CICS VR batch logging in a test system, especially when you are going to update or add a new programs to a batch stream. Some considerations when using batch logging include:

▶ **Stop time**

You must specify the stop time for forward recovery correctly. The stop time must be exactly between the time step B finished and the time step C started. It is recommended to use the time that step B finished.

▶ **AIXs**

If you use DFSMShsm for backing up and restore your VSAM data sets, the AIXs are recovered automatically. However, if you use DFSMSdss instead, then you have to redefine and rebuild the AIXs of these VSAM data sets manually after forward recovery. See 6.3.3, "VSAM data set backup" on page 224.

7

Disaster recovery

In this chapter, we discuss important considerations when planning for a disaster recovery solution. You can use CICS VR to recover data sets in case of a disaster in your computer center.

In this chapter, we discuss the following topics:

- ► Understanding disaster recovery
- ► Disaster recovery strategy
- ► Creating the recovery job
- ► Preparing for disaster recovery
- ► What to do after a disaster occurs
- ► Overview of disaster recovery for CICS TS
- ► Sample scenario for CICS TS

7.1 Understanding disaster recovery

Disaster in this book refers to a situation where you have lost your primary computer site. If you want uninterrupted service, you should use a disk mirroring system at your remote site so that data can be updated simultaneously at both sites. However, if you cannot set up this type of environment because of resource constraints, you will have to recover lost data using another method. CICS VR can recover lost VSAM data sets at the remote site.

Disaster recovery in this book is concerned with only *forward recovery of VSAM data sets at a remote site*.

The main difference between disaster recovery at the remote site and forward recovery at the primary site is the availability of the data that is required to perform the recovery. Unlike at the primary site, you might not have all the log stream copies available at the remote site. Recent updates might not be written to the log stream copy. In most instances, it is not possible to recover the VSAM data sets to their latest state. The success of the disaster recovery depends on how much of the required data is available at the remote site and how recent it is.

Without forward recovery, you have to rerun all the transactions manually from the time of the last backup up to the time of the crash, which can take a long time or which might not be possible. CICS VR minimizes the manual effort by reapplying all changes that are recorded in the log stream copies.

VSAM forward recovery for disaster recovery requires transport of data from the primary site to the remote site in order to rebuild the environment there. Transport of date should be done regularly. The more often you transport data, the less data that you will lose.

The data that you need to transport to the remote site includes:

► DFSMShsm CDSs
► VSAM data sets backup copies
► Log stream copies
► RCDS exported sequential data set

7.2 Disaster recovery strategy

Before you encounter a disaster, you need to define the objectives of your *disaster recovery plan*.

If your business requires the system to be recovered without delay, you have to invest more money in hardware. In this case, CICS VR might not be the right choice for your business.

After you have decided to use CICS VR to recover your VSAM data sets at the remote site, you then need to decide:

- ▶ What data sets you have to forward recover?
- ▶ How you will transport the required data from the primary to the remote site?
- ▶ What backup method will you use to back up the VSAM data sets?
- ▶ How often do you need to make a backup of your VSAM data sets?
- ▶ How often do you need to run the log of logs scan?
- ▶ How often do you need to run the log stream copy?
- ▶ Do you need to export or back up the RCDS?
- ▶ What backup method do you need to use to copy the RCDS?
- ▶ How often do you need to run the RCDS export or backup?

If the primary site was lost, you need to ask the following additional questions:

- ▶ What are the latest VSAM backup data sets available at the remote site?
- ▶ What are the names of the log stream copies since the last VSAM backup was taken?
- ▶ Did you send the latest RCDS export/backup to the remote site?

If a disaster occurs, you need to generate the job to forward recover the lost VSAM data sets. There are two methods to generate the job:

- ▶ Use the ISPF dialog interface
- ▶ Generate the job manually

Before deciding which backup method to use, consider the following:

- ▶ Naming the VSAM data set backup and the log stream copy
- ▶ Cataloging VSAM data set backup and the log stream copy at the remote site
- ▶ Frequency of the log stream copy
- ▶ Frequency and time of the log of logs scan
- ▶ Frequency and time of the RCDS export

7.2.1 Naming standard

It is important to include the date and time stamp in the name of the VSAM data set backup and log stream copy. Without referring to the RCDS, you need to be able to determine when the backup and the log stream copy were made. The RCDS at the remote site might not contain the latest information. The latest information depends on the time and frequency of the RCDS export and backup job.

7.2.2 Cataloging the data sets at the remote site

You need to catalog the backup of the VSAM data sets and the log stream copy as soon as they arrive at the remote site; otherwise, the recovery job will fail with a JCL error. This catalog can also help you to find the correct backup and log stream copies if you need to create the recovery job manually.

7.2.3 Frequency of the log stream copy

The frequency of the log stream copy determines how many updates you cannot recover. For example, if you run the log stream copy job every 30 minutes you lose up to 30 minutes of CICS batch updates. If the copy was performed while the batch logging was active for a batch job, the forward recovery job should exclude the batch update portion by specifying the batch start time in the STOPTIME parameter of the recovery job. Then, you need to rerun the batch job.

You need to avoid running the log stream copy job while batch logging is in progress. If the last log stream copy was made in the middle of batch logging for a batch job, the forward recovery at the remote site using the log stream copy recovers up to the time when the log stream copy was taken, which is in the middle of the batch job. To rerun the incomplete batch job, you have to remove the updates performed by the job; however, you might not be able to do so.

7.2.4 Frequency and time of the log of logs scan

CICS does not update the RCDS directly. Instead, the log of logs scan job reads the information from the log of logs (DFHLGLOG) and updates the RCDS. The scan runs when you use the ISPF dialog interface to generate the recovery job. You need to schedule the scan job regularly to update the RCDS.

CICS updates the log of logs with the following information:

- ► Data set name
- ► Data set open and close time
- ► Forward recovery log stream name
- ► CICS region name

7.2.5 Frequency and time of the RCDS export and backup

The RCDS is updated by several components of CICS VR, such as the log of logs scan job, the CICS VR server address space, the log stream copy job, the VSAM data set backup job, and the change accumulation job. You need to export the RCDS every time it is updated, and you need to ensure that the export data set is sent to the remote site as soon as it is created.

Whether to export or back up the RCDS

If you decide to create the recovery job manually, you do not need to export or back up the RCDS.

7.2.6 Selecting the backup method to use

You can use DFSMShsm, DFSMSdss, or another backup method. There are some differences between these backup methods.

Using DFSMShsm

The DFSMShsm BCDS contains the information about data set backups. CICS VR issues a command to acquire the information in the BCDS when it generates the recovery job. For CICS VR to recover the lost VSAM data sets successfully, you must have done the following tasks:

- ► Made a backup of all the DFSMShsm CDSs and sent the backup to the remote site after a backup of the VSAM data set was made.

- ► Have a copy of the DFSMShsm backup tapes at the remote site, which can be done manually or automatically.

  DFSMShsm has a function called DUPLEX TAPE. This function allows you to create two identical copies of the backup tapes automatically. You can choose to create a local copy (ORIGINAL) in the primary site and another copy (ALTERNATE) in the remote site.

  You can copy the tapes manually using the TAPECOPY function or another method of duplication.

  In either case, if you create the duplicates in the primary site, you need to send them to the remote site.

- ► In case of a disaster, you need to restore the DFSMShsm CDSs at the remote site and start DFSMShsm with the option SETSYS DISASTERMODE. Then, you have to replace all the original tapes with the alternates by issuing the command:

    ```
    TAPEREPL ALL DAVOLUMES
    ```

    This command allows you to use the alternate tapes as though they were the originals.

- ► Run the ISPF dialog interface to create the recovery job. Select **Logical backup** (option 2) on the CICSVR VSAM sphere parameters panel for the backup type. See Figure 7-1.

```
 Administrate  Utilities  Tools  List  View  Help
 +-----------------------------------------------------------------------------+
 |                      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 . . . . . . : YCJRES1.CICSVR.CARFILE                          |
 |                                                                             |
 |   New VSAM sphere name  . .                                                 |
 |                                                                             |
 |   Forward-recovery start time . . 02.095 16:34:19  (YY.DDD HH:MM:SS)        |
 |                                                                             |
 |   Forward-recovery stop time  . . 02.099 20:00:00  (YY.DDD HH:MM:SS)        |
 |                                                                             |
 |   Backup time . . . . . . . . . . 02.095 16:34:19  + (YY.DDD HH:MM:SS)      |
 |                                                                             |
 |   Time format                      Backup type                             |
 |   1  1.  Local                   2  1.  None                               |
 |      2.  GMT                         2.  Logical                           |
 |                                      3.  Full volume dump                  |
 |  F1=Help       F4=Prompt     F5=GetDef    F6=SaveDef    F7=PrevVSAM         |
 | F12=Cancel                                                                  |
 +-----------------------------------------------------------------------------+
 ****************************** Bottom of data *********************************




 F1=Help      F3=Exit      F4=CompRec   F5=FwdRec   F6=Backout   F7=Bkwd
 F8=Fwd       F10=Menu bar F11=Dereg    F12=Cancel
```

Figure 7-1   Backup type

> **Note:** CICS VR obtains the backup information from the DFSMShsm BCDS when it generates the recovery job.

It is recommended that you use DFSMShsm backup for the remote site if you want to create the recovery job using the ISPF dialog interface.

Using DFSMShsm ABARS

Aggregate backup and recovery support (ABARS) is a component of DFSMShsm that provides the capability to back up and recover a user-defined group of data sets (aggregate group). The aggregate group can contain data sets that belong to an application or any combination of data sets that you want treated as a separate entity.

To use aggregate backup, you must first specify the data sets to be backed up. Then, you use the ABACKUP command or ISMF panels to back up the data sets to tape files. These tape files can then be transported or transmitted physically, using a transmission program to a recovery site where the data sets can be recovered.

To perform aggregate recovery, you must have the control file, data files, and instruction or activity log file created by a previous aggregate backup. To use the simplified ARECOVER command, you must also have an ABARS activity (ABR) record at the recovery site. You can then use the ARECOVER command to recover the data sets from the tape files.

You can select to use ABARS for backing up the VSAM data sets belonging to your critical applications. In this case, you need to transmit to the remote site all the files created by the ABACKUP command.

For more information about ABARS refer to *DFSMShsm Storage Administration Guide,* SC35-0421.

Using another backup method

You can use other backup utilities such as IDCAMS REPRO, DFSMSdss, or any vendor's product to back up VSAM data sets.

If you copy the RCDS using the EXPORT command, it will not contain the backup information. Therefore, you have to restore your VSAM data sets manually before you run the recovery job. In this case, when creating the recovery job, you need to select **None** (option 1) for the backup type in the CICS VR VSAM sphere parameters panel. See Figure 7-1 on page 246.

7.2.7 What backup method to use to copy the RCDS

You can use either the CICSVR EXPORT utility to copy the RCDS or another method. In this section, we discuss backup methods to copy the RCDS.

Export RCDS

CICS VR provides the EXPORT utility to copy the RCDS to a sequential data set. You need to run this utility and transport the exported data set regularly to the remote site. It is mandatory that you have the RCDS at the remote site to run the ISPF dialog interface.

The EXPORT utility only copies the information in the RCDS that is necessary at the remote site. It does not copy:

► Forward recovery information that is needed only at the primary site
► Backup information
► Shadow images information
► Change accumulation information
► Retention period information

Example 7-1 shows an example of a job for exporting the RCDS.

Example 7-1   Sample RCDS export job

```
//YCJRES1X JOB ,CICSVR,CLASS=A,MSGCLASS=T,NOTIFY=&SYSUID
//*
//EXPORT   EXEC PGM=DWWGJCDS
//STEPLIB  DD DSN=DWW.SDWWLOAD,DISP=SHR
//DWWCOPY1 DD DSN=YCJRES1.DWWCOPY,
//           UNIT=SYSDA,
//           SPACE=(CYL,(1,3),RLSE),
//           DISP=(NEW,CATLG)
//DWWCON1  DD DSN=DWWUSER.V3R1M0.DWWCON1,DISP=SHR
//DWWCON2  DD DSN=DWWUSER.V3R1M0.DWWCON2,DISP=SHR
//DWWCON3  DD DSN=DWWUSER.V3R1M0.DWWCON3,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWIN    DD *
           RCDS EXPORT
/*
```

Example 7-2 shows the output from a normal termination of the export job.

Example 7-2   Sample export job output

```
CICSVR - CICS VSAM RECOVERY DATE: 02/03/07

DWW1551I The RCDS utility is started at 02/03/27 13:49:45.
          RCDS EXPORT

DWW1553I Command processing is complete. The maximum condition code is 0.

DWW1552I The RCDS utility has terminated. The maximum condition code is 0.
```

Backing up RCDS using another method

Instead of using the CICS VR EXPORT utility, you can back up the RCDS using another method, such as IDCAMS REPRO, DFSMShsm, or DFSMSdss. In this case, the copy contains all the records in the RCDS, including DFSMSdss backup history, the change accumulation, and the shadow copy information, while the EXPORT utility copies the information selectively. Therefore, the size of the data set that is created using another method is larger than the one created by the EXPORT utility.

You might also consider sending the change accumulation data sets and the shadow copy data sets to the remote site if you use them at the primary site. Both change accumulation and shadow copies can help speed up the forward recovery process.

Example 7-3 shows an example of a RCDS backup using IDCAMS REPRO.

Example 7-3   Sample RCDS backup using IDCAMS REPRO

```
//YCJRES1J JOB ,BACKUP,CLASS=A,MSGCLASS=T,NOTIFY=&SYSUID
//*
//S1       EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//RCDS1    DD DSN=DWWUSER.V3R1M0.DWWCON1,DISP=SHR
//RCDS2    DD DSN=DWWUSER.V3R1M0.DWWCON2,DISP=SHR
//RCDS3    DD DSN=DWWUSER.V3R1M0.DWWCON3,DISP=SHR
//BKUP1    DD DSN=YCJRES1.RCDS1.BKUP,DISP=(,CATLG,DELETE),
//            UNIT=SYSDA,VOL=SER=TOTTSY,SPACE=(CYL,(20,10),RLSE),
//            DCB=BLKSIZE=4096
//BKUP2    DD DSN=YCJRES1.RCDS2.BKUP,DISP=(,CATLG,DELETE),
//            UNIT=SYSDA,VOL=SER=TOTTSY,SPACE=(CYL,(20,10),RLSE),
//            DCB=BLKSIZE=4096
//BKUP3    DD DSN=YCJRES1.RCDS3.BKUP,DISP=(,CATLG,DELETE),
//            UNIT=SYSDA,VOL=SER=TOTTSY,SPACE=(CYL,(20,10),RLSE),
```

```
//            DCB=BLKSIZE=4096
//SYSIN    DD *
      REPRO IFILE(RCDS1) OFILE(BKUP1)
      REPRO IFILE(RCDS2) OFILE(BKUP2)
      REPRO IFILE(RCDS3) OFILE(BKUP3)
//
```

If you back up the RCDS using IDCAMS REPRO, then you must also use
REPRO to restore the RCDS. Example 7-4 shows an example job.

Example 7-4   Sample RCDS restore using IDCAMS REPRO

```
//YCJRES1I JOB ,RESTORE,CLASS=A,MSGCLASS=T,NOTIFY=&SYSUID
//*
//S1       EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//RCDS1    DD DISP=SHR,DSN=YCJRES1.TEST.DWWCON1
//RCDS2    DD DISP=SHR,DSN=YCJRES1.TEST.DWWCON2
//RCDS3    DD DISP=SHR,DSN=YCJRES1.TEST.DWWCON3
//BKUP1    DD DISP=SHR,DSN=YCJRES1.RCDS1.BKUP
//BKUP2    DD DISP=SHR,DSN=YCJRES1.RCDS2.BKUP
//BKUP3    DD DISP=SHR,DSN=YCJRES1.RCDS3.BKUP
//SYSIN    DD *
      REPRO  IFILE(BKUP1) OFILE(RCDS1)
      REPRO  IFILE(BKUP2) OFILE(RCDS2)
      REPRO  IFILE(BKUP3) OFILE(RCDS3)
//
```

7.3 Creating the recovery job

There are two ways to create the recovery job:

► Using the ISPF dialog interface
► Using a manual method

7.3.1 Using the ISPF dialog interface

If you plan to use the ISPF dialog interface to create the recovery job, you need access to the RCDS. You must keep the RCDS up-to-date by performing the following steps:

1. Use DFSMShsm to back up your VSAM data sets, because it acquires the backup information from the BCDS. Backup information is not exported.

2. Back up your DFSMShsm CDSs immediately after the VSAM backup is made, and send it to the remote site. Refer to "Using DFSMShsm" on page 245.

3. Run the log of logs scan job before the RCDS export job.

4. Take a *single* copy of the log stream and send the copy to the remote site. The RCDS records information only about the first copy.

5. Run the RCDS export job immediately after the log stream copy job, and send the exported data set to the remote site.

If one of these steps fails, the RCDS export job might not contain the latest information. Consequently, the recovery job that is created by the ISPF dialog interface might not be accurate. You might need to amend the job manually to use the latest copy or backup data set.

It is recommended that you check the RCDS for the latest log stream copy that is available at the remote site. When you create the recovery job, you must select **QSAM copy** (option 2) on the CICS VR log stream type panel. See Figure 7-2.

```
  Menu  Utilities  Compilers  Help
 +---------------------------------------------------------------------------+
 |                              CICSVR log stream type                       |
 | Command ===>                                                              |
 |                                                                           |
 | Specify log stream type. Press Enter to continue the job creation.        |
 |                                                                           |
 |    Log stream type  . . 2   1.  MVS logger log stream                     |
 |                             2.  QSAM copy                                  |
 |                                                                           |
 |                                                                           |
 |   F1=Help     F5=GetDef   F6=SaveDef F12=Cancel                           |
 +---------------------------------------------------------------------------+



   F1=Help    F2=Split   F3=Exit    F5=Rfind   F7=Up      F8=Down    F9=Swap
   F10=Left   F11=Right  F12=Cancel
```

Figure 7-2   Select 2. QSAM copy

7.3.2 Using a manual method

Alternatively, you can create the recovery job manually. In this case, you do not need the RCDS. However, you do have to find the latest backup of your VSAM data sets and the required log stream copies, which can be achieved by cataloging the data sets with a proper naming convention. (For more information, see 7.2.1, "Naming standard" on page 244 and 7.2.2, "Cataloging the data sets at the remote site" on page 244.)

Generate the recovery job in advance using arbitrary values for the necessary parameters: STARTTIME, STOPTIME, SPHERE, and LOG. Keep it at the remote site. If a disaster occurs, change the values and run the job.

Example 7-5 shows the skeleton of a recovery job.

Example 7-5   Sample recovery job skeleton

```
//YCJRES11 JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=&SYSUID,
//           MSGCLASS=X,CLASS=A,REGION=4M
//DWW      PROC
//RECOVER  EXEC PGM=DWWCO
//STEPLIB  DD DSN=DWW.SDWWLOAD,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//         PEND
```

```
//DWW001 EXEC DWW
//DWWIN    DD   *
  RECOVER                               -
    ONLY                                -
    STARTTIME(02.099/06:00:00)          -
    STOPTIME(02.099/14:00:00)           -
    STARTAT(DSNAME)                     -
    SPHERE(YCJRES1.CICSVR.CARFILE)
  ALLOCATE                              -
    LOG(                                -
      YCJRES1.DFHJ01.REM.D02099.T120432 -
        )
  MVSLOG                                -
    COPY
//*
```

You do not need to code the DWWCON1, DWWCON2, and DWWCON3 DD names, because you are not using the RCDS. The job returns an informational message:

```
DWW1269I No report can be written for VSAM sphere
YCJRES1.CICSVR.CARFILE because the RCDS is not allocated.
```

However, the recovery is performed normally.

Before you submit the recovery job, you must restore your VSAM data sets from the latest backup.

7.4 Preparing for disaster recovery

The remote site needs to maintain the same level of software as the primary site to ensure that you can recover your data accurately and that you can run the system at the remote site in the same way that the primary site ran after the recovery.

The steps that you need to perform at the primary site to prepare for disaster recovery include:

► Back up the VSAM data set
► Back up the DFSMShsm CDSs
► Copy the log stream
► Run the log of logs scan
► Export and back up RCDS
► Tapes to transports to the remote site

7.4.1 Back up the VSAM data set

CICS application data sets are usually backed up daily after the CICS system is shut down. After they are backed up, create an extra copy and transport it to the remote site. You can use DFSMShsm, DFSMSdss, or a third-party product.

7.4.2 Back up the DFSMShsm CDSs

The BCDS contains the DFSMShsm backup information. If you used DFSMShsm to back up your VSAM data sets, you need to back up the BCDS (and the other CDSs) as well and send the backup to the remote site. This detail is required by the ISPF dialog interface.

7.4.3 Copy the log stream

You need to copy the forward recovery log stream regularly and send it to the remote site. If you are taking two copies of the log stream using the COPIES(2) parameter in the IBM-supplied utility, CICS VR does not record the information for the second copy in the RCDS. Therefore, if you send the second copy to the remote site, you must amend the recovery job that is created by the ISPF dialog interface.

7.4.4 Run the log of logs scan

You need to run the log of logs scan regularly. Refer to 7.2.4, "Frequency and time of the log of logs scan" on page 244.

7.4.5 Export and back up RCDS

You should copy the RCDS regularly. Refer to "Whether to export or back up the RCDS" on page 245 and 7.2.7, "What backup method to use to copy the RCDS" on page 248.

7.4.6 Tapes to transports to the remote site

You need to transport the following taps from the primary site to the remote site. You need to catalog these tapes as soon as they arrive at the remote site.

- ► The VSAM data sets backup
- ► The DFSMShsm CDSs backup
- ► The log stream copy
- ► The RCDS export and backup

7.5 What to do after a disaster occurs

In this section, we describe the steps that you need to follow after a disaster occurs in the primary site. These steps might include:

► Restore the DFSMShsm CDSs
► Restore the RCDS
► Restore the VSAM data sets
► Generate and run the recovery job

7.5.1 Restore the DFSMShsm CDSs

If your VSAM data sets backups were made using DFSMShsm, you need to restore the DFSMShsm CDSs and have available the DFSMShsm backup tapes. Refer to "Using DFSMShsm" on page 245.

7.5.2 Restore the RCDS

If you plan to use the ISPF dialog interface, you must import the RCDS. If you have used another method to copy the RCDS, you need to use the equivalent utility to restore it. Refer to "Backing up RCDS using another method" on page 249.

Import the RCDS

The sequential data set that is created by the EXPORT utility job needs to be available at the remote site. The IMPORT utility can recover the RCDS at the remote site. If the backup of the RCDS was taken by the IDCAMS REPRO utility, you must use REPRO to restore the RCDS.

Example 7-6 shows a sample job for RCDS IMPORT. You can use this job at your remote site to recover the RCDS.

Example 7-6   Sample RCDS import job

```
//YCJRES1X JOB ,CICSVR,CLASS=A,MSGCLASS=T,NOTIFY=&SYSUID
//*
//IMPORT   EXEC PGM=DWWGJCDS
//STEPLIB  DD DSN=DWW.SDWWLOAD,DISP=SHR
//DWWCOPY1 DD DSN=YCJRES1.DWWCOPY,DISP=SHR
//DWWCON1  DD DSN=DWWUSER.V3R1M0.DWWCON1,DISP=SHR
//DWWCON2  DD DSN=DWWUSER.V3R1M0.DWWCON2,DISP=SHR
//DWWCON3  DD DSN=DWWUSER.V3R1M0.DWWCON3,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
```

```
//DWWIN    DD *
           RCDS IMPORT
/*
```

Example 7-7 shows the output from a normal termination of the import job.

Example 7-7   Sample import job output

```
CICSVR - CICS VSAM RECOVERY DATE : 02/03/07

DWW1551I The RCDS utility is started at 02/03/27 14:19:14.
           RCDS IMPORT

DWW1553I Command processing is complete. The maximum condition code is 0.

DWW1552I The RCDS utility has terminated. The maximum condition code is 0.
```

7.5.3 Restore the VSAM data sets

The lost VSAM data sets must be restored from their backup before the forward recovery process. If you used DFSMShsm to back up your VSAM data sets, the ISPF dialog interface creates the recovery job that restores the data sets automatically.

7.5.4 Generate and run the recovery job

If the RCDS contains the latest information about the VSAM data set backup and the log stream copy information, then you can use the ISPF dialog interface to create the recovery job.

7.6 Overview of disaster recovery for CICS TS

Figure 7-3 shows an example of the CICS VR disaster recovery environment for CICS TS.
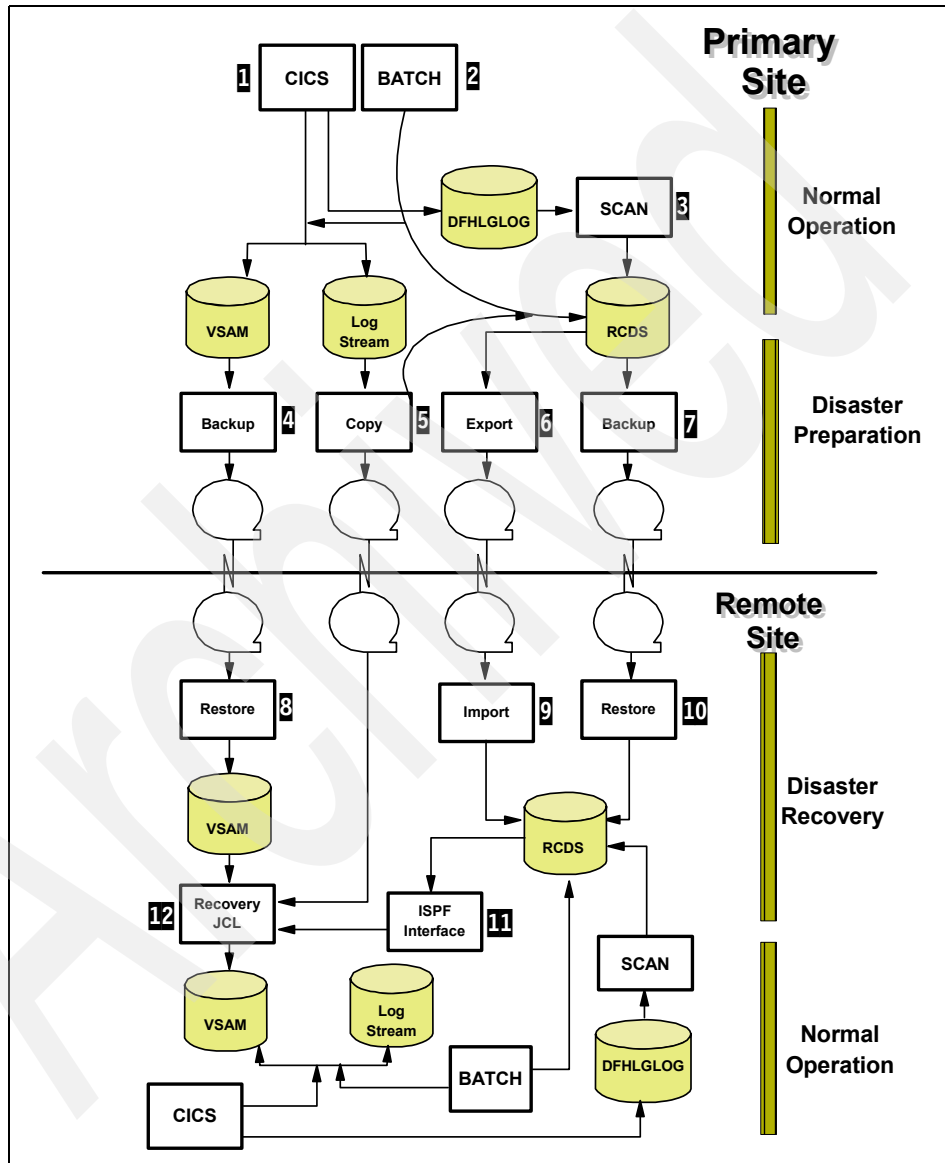
Figure 7-3   Overview of disaster recovery

The activities at the primary site, as illustrated in Figure 7-3, are as follows:

1. CICS updates the VSAM data sets and logs the after-images in the log stream. It also updates the log of logs. Refer to 7.2.4, "Frequency and time of the log of logs scan" on page 244.

2. Batch logging updates the VSAM data sets and logs the after-images in the log stream. It also updates the RCDS.

3. The log of logs scan job should run regularly to keep the RCDS as up-to-date as possible. The job also runs automatically when you generate the recovery job using the ISPF dialog interface. Refer to 7.2.4, "Frequency and time of the log of logs scan" on page 244.

4. The VSAM data sets backups should be made on a regular basis and sent to the remote site. If you use DFSMSdss or DFSMShsm to back up your VSAM data sets, they update the RCDS. Refer to 7.2.6, "Selecting the backup method to use" on page 245.

5. Run the log stream copy job. You must run the CICSVR supplied utility to copy log stream data to a sequential data set. This job updates the RCDS with the log stream copy information. Refer to 7.2.3, "Frequency of the log stream copy" on page 244.

6. The supplied utility can export the RCDS for use at the remote site. Refer to "Export RCDS" on page 248.

7. Alternatively you can use another method to copy the RCDS. Refer to "Backing up RCDS using another method" on page 249.

The activities at the remote site are:

8. Restore the VSAM data sets from the backups. This step is not required if you use DFSMShsm to back up your VSAM data sets. The recovery job includes the restore step.

9. Import the RCDS. This import is required if you have decided to use the ISPF dialog interface to generate the recovery job. The recovered RCDS is also required after the recovery when the remote system replaces primary site. Refer to "Import the RCDS" on page 255.

10. Restore the RCDS if you used another method to copy the RCDS.

11. Use the ISPF dialog interface to generate the recovery job.

12. Run the recovery job to reapply all the changes made to the VSAM data set since the backup.

7.7 Sample scenario for CICS TS

In this section, we describe a sample disaster recovery scenario using CICS VR.

7.7.1 Disaster at primary site

Figure 7-4 shows the activities that take place at the primary site before the disaster occurs.
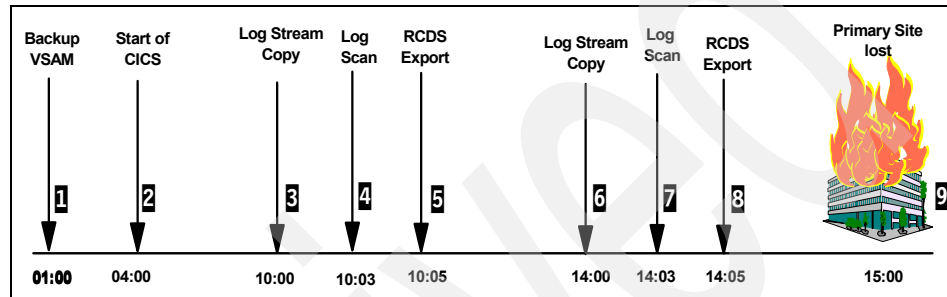
Figure 7-4   Disaster scenario for CICS TS

1. The backup copies of the VSAM data sets were made at 01:00 after the batch process had completed. The backups were sent to the remote site; therefore, you do not need to recover the updates made by the batch process.

2. The VSAM data sets were allocated to CICS. CICS started updating the VSAM data sets.

3. The log stream was copied to a data set and sent to the remote site.

4. The log of logs scan ran to include the latest information in the RCDS

5. The RCDS was exported to a sequential data set and sent to the remote site. This job should run as soon as the log stream copy has been made so that it can contain the latest copy information.

6. The log stream was copied.

7. The log of logs scan job was ran.

8. The RCDS export job was ran.

9. The primary site is lost.

7.7.2 Disaster recovery at the remote site

The following steps are performed at the remote site after the disaster:

1. Import the RCDS from the exported data set from the primary site. Alternatively restore the RCDS from the backup.

2. Run the ISPF dialog interface to create the recovery job.

3. Run the recovery job. If you used DFSMShsm to back up your VSAM data sets you do not need to restore them from the backup. The recovery job restores them before the forward recovery.

The recovery job recovers the VSAM data sets up to the time of the last log stream copy. In this scenario, it recover up to 14:00. The updates made by CICS between 14:00 and 15:00 must be recovered manually, indicating the need to decide carefully the frequency of the log stream copy job.

New functions in CICS VR V4

In this part of the book, we look at the new functions in CICSVR V4, such as Log Stream copy utility enhancements and Backup control enhancements.

8

CICS VR automated recovery

In this chapter, we give an overview of the features in CICS VR Version 4 that provide autonomic capability between CICS TS and CICS VR. We also describe how to configure CICS TS and CICS VR for automation and provide an example of recovering from a backout failure.

This chapter includes the following sections:

► Overview of CICS VR automated recovery
► Configuring CICS TS
► Configuring CICS VR
► Backout failure example

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8.1 Overview of CICS VR automated recovery

CICS VR automated recovery involves some autonomic functionality in CICS and CICS VR. If a data set suffers a backout failure and CICS is forced to shunt a unit of work, it informs CICS VR that the event has happened. You can configure CICS VR to respond to such an event and recover the data set automatically without any intervention from you, or CICS VR can register the backout failure so that you can take action later by initiating recovery using the CICS VR panel interface. After the data set is forward recovered from a previously taken backup, CICS VR instructs CICS to retry its backout. CICS unshunts the unit of work and retries the backout, which now completes successfully because the data set is in a consistent state.

Backout failures can occur in CICS for a number of reasons, the more obvious one being a media failure causing the data to become inaccessible, in which case the recovery procedures just described is applied. Another form of backout failure can be due to a data set becoming full or an alternate index becoming full. In this case, the data is still accessible, so forward recovery is not required. Instead a reorganization of the data is required to provide more space. CICS VR automated recovery provides procedures to reorganize the sphere by redefining it with more space, or with a larger alternate index record size and then instructs CICS to retry its backout.

In summary 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 are included to 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 before instructing CICS to retry its backout.

8.2 Configuring CICS TS

You need to set a number of definitions and parameters in CICS to enable the CICS and CICS VR autonomic function.

8.2.1 Adding CICS VR libraries

You need to add the CICS VR SDWWLOAD library to the DFHRPL concatenation list. You can add the library through a DD card to the CICS JCL, or if you are using CICS TS 3.2, you can use the new LIBRARY RDO resource to add the CICS VR library to the DFHRPL concatenation.

8.2.2 Installing CICS VR definitions

To add the CICS resource definitions that are required by CICS VR, you can run the DWWCSD41 job that is provided in the SDWWCNTL library as shown in Example 8-1. This job creates two resource groups, DWWCICVR and DWWEXCI. Before running the job you need to edit it to change the default library values to match those of your installation:

► Group DWWCICVR contains the definitions for CICS VR automatic recovery. You need to add this group to the group list that is used at CICS startup.

► DWWEXCI contains definitions for a External CICS Interface (EXCI) generic connection because CICS VR uses the EXCI. You need to install DWWEXCI if you do not already have a EXCI generic connection defined. If you already have a EXCI generic connection installed, do not install group DWWEXCI.

Example 8-1   CSD definitions in DWWCSD41 job

```
/
  DELETE  GROUP(DWWCICVR)
*
  DEFINE TRANSACTION(DWWX) GROUP(DWWCICVR) PROGRAM(DFHMIRS)
  DESCRIPTION(CICS Server Transaction required by CICSVR)
     PROFILE(DFHCICSA)
*
* Programs
*
  DEFINE PROGRAM(DWWAUXCS) GROUP(DWWCICVR) LANGUAGE(ASSEMBLER)
  DESCRIPTION(CICS Server Program required by CICSVR)
       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(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)
*
```

8.2.3 Configuring the External CICS Interface

As mentioned previously, CICS VR uses the External CICS Interface (EXCI). So, you need to ensure that EXCI is configured correctly as follows:

► Set IRCSTRT=YES in the SIT or as a SIT override to ensure that CICS inter-region communication is open.

► Ensure DWWEXCI or your own group containing an EXCI generic connection is installed.

► Customize the EXCI default DFHXCOPT table as required. A default linkedited DFHXCOPT is supplied in the CICS SDFHEXCI library and the source is supplied in SDFHSAMP.

  In particular the default DFHXCOPT table contains a setting of =0, which means that EXCI obtains the CICS SVC number by inquiring from z/OS as to which CICS SVC is in use. z/OS reports the first CICS SVC to be used since the IPL. To ensure the correct SVC is used, change the DFHXCOPT table to

specify `CICSSVC=nn` where *nn* is the same SVC number that you use for your CICS systems. The CICS type 3 SVC number is specified using the CICSSVC=nn parameter in the DFHSIT table or as a SIT override. The default is 216 which is used by sample DFHSIT6$.

If you change the default DFHXCOPT table, you need to linkedit the table and replace the member in SDFHEXCI or ensure that it is in a library in the link list or any STEPLIBs in front of the SDFHEXCI library to ensure your version of the table is picked up.

8.2.4 Enabling the CICS VR Backout Failure Exit

CICS TS and CICS VR communicate in a backout failure scenario using a Global User Exit (GLUE) program called DWWXFCBF that is provided by CICS VR, which is enabled at the XFCBFAIL exit point in CICS. This exit is driven when an error occurs during file backout of a unit of work.

You activate notification of CICS VR by including a CICS VR program called DWWEFCBF in first phase PLT, which is executed during CICS startup. This program ensures that the exit is enabled. CICS VR provides a sample PLT table in member DWWPLTI1 in the SDWWCNTL library showing the program entry required in a PLT table (see Example 8-2).

Example 8-2   Sample PLT showing entry for DWWEFCBF

```
************************************************************************
*
*
    DFHPLT TYPE=INITIAL,SUFFIX=I1
*
    DFHPLT TYPE=ENTRY,PROGRAM=DWWEFCBF
*
*  Programs specified before the DFHDELIM program will be executed
*  during second initialization stage
*
*
    DFHPLT TYPE=ENTRY,PROGRAM=DFHDELIM
*  Programs specified before the DFHDELIM program will be executed
*  during second initialization stage
*
*
    DFHPLT TYPE=FINAL
*
    END
```

The job of the DWWXFCBF exit is to notify CICS VR when a backout failure event occurs. The exit is driven in CICS for a number of reasons. The exit

determines if the error is due to an IOERROR, a NOSPACE condition, or a AIXFULL condition. If so, it issues a CICS VR notify service that communicates with the CICS VR server. The CICS VR server then updates the RCDS asynchronously with information concerning the failure. Thus, the CICS VR server needs to be active to capture backout failure events.

8.3 Configuring CICS VR

In CICS VR, you need to set some parameters, customize jobs, and ensure the correct utilization of the EXCI.

8.3.1 Setting CBAUTO

For CICS VR, you need to decide on the setting for the CICS backout automated recovery parameter CBAUTO. This parameter controls whether CICS VR fully automates the building and submitting of the recovery job (CBAUTO YES) or whether it just registers the backout failure in the RCDS and allows you to initiate recovery later through the CICS VR panel interface (CBAUTO NO).

You can set the CBAUTO parameter in a number of ways.

Setting CBAUTO in the active IGDSMSxx parmlib member

You can set the CBAUTO parameter using the CICSVR_GENERAL_CONTROL setting in the active IGDSMSxx member of SYS1.PARMLIB, as shown in Example 8-3. The parameter is actioned when the CICS VR server is initialized.

Example 8-3   Setting CBAUTO in IGDSMSxx parmlib member

```
CICSVR_GENERAL_CONTROL(CBAUTO YES)
```

The parmlib member only allows the setting of one general control parameter. As an alternative, CICS VR provides a way of activating several settings after the server is active. CICS VR provides a sample DWWRMDFS job in library SDWWCNTL showing how to set this parameter.

Setting CBAUTO using a SETSMS command

You can set the CBAUTO parameter using a SETSMS command as shown in Example 8-4.

Example 8-4   SETSMS command to set the CBAUTO parameter

```
SETSMS CICSVR_GENERAL_CONTROL(CBAUTO YES)
```

Setting CBAUTO from the CICS VR panels

You can set the CBAUTO parameter using the CICS VR panels. Follow these steps:

1. From the main menu, select **List of CICS Backout Failed spheres** (option 7), as shown in Figure 8-1.

```
 Help
 -------------------------------------------------------------------------------
                                CICSVR main menu

 Select one and press Enter.



                    7    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 8-1   CICS VR Main menu

2. On the CICS backout failed sphere list panel, from the Administrate menu, select **Automation** (option 2), as shown in Figure 8-2.

```
 Administrate  Utilities  List  Help
 +------------------------+-------------------------------------------------
 ¦ 2 1. Deregister... F11 ¦ Backout Failed sphere list
 ¦    2. Automation       ¦
 ¦    3. Exit         F3  ¦ ct an action.
 +------------------------+

   S  VSAM sphere                                  Time registered  Error
 ****************************** Bottom of data ******************************
```

Figure 8-2   CICS backout failed sphere list panel

3. On the CICS VR Automation Level panel, you can use F10=TurnOFF or F11=TrunON to toggle the setting. In this example, shown in Figure 8-3, we use F11 to turn automation on.

```
                        CICSVR Automation Level

Press F11(TurnON) or F10(TurnOFF) to change the CICSVR recovery automation
level. Then Press Enter to save the default or F12 to cancel.



  CICSVR Recovery/Reorganization
  Automation (ON/OFF)  . . . . . . . . : ON




Command ===>
 F1=Help    F10=TurnOFF F11=TurnON  F12=Cancel
```

Figure 8-3   CICS VR Automation level panel

4. After you set the automation level, press Enter to save the setting in the RCDS.

8.3.2 Customize CICS VR skeletons

It is recommended that the SDFHEXCI library is in the linklist and any library containing a modified DFHXCOPT table is ahead of SDFHEXCI in the linklist. If this is the case, then no customization of skeletons is required.

Alternatively, you can specify your CICS SDFHEXCI library (and any library that contains a modified DFHXCOPT) in the STEPLIB concatenations of CICS VR shipped skeletons.

The skeletons are DWWFIMNG, DWWPUJ, and DWWRPUJ. You need to first create your own private skeleton library. Then, copy the DWWFIMNG, DWWPUJ, and DWWRPUJ members from the CICS VR SDWWSENU library. Modify them as required and include your library in the CICS VR CLIST as the first in the DWWSLIB concatenation (before SDWWSENU).

8.3.3 Customize CICS VR started tasks

CICS VR uses the following started tasks for automated recovery:

► DWWCBINF
► DWWCBRRY
► DWWCBRRG

You can customize these jobs, in particular, to use a STEPLIB for libraries containing DFHXCOPT and the SDFHEXCI library if required.

> **Important:** If your CICS installation is using the EXCI for other purposes and has amended the sample user replaceable module DFHXCURM to route EXCI requests to other regions, ensure that the STEPLIB concatenation for the CICS VR started tasks does not include the library that contains this amended DFHXCURM. If the amended DFHXCURM is in the linklist, then ensure the CICS VR started tasks use a STEPLIB to specify the SDFHEXCI and DFHXCOPT libraries, to ensure the default DFHXCURM is used. We need to ensure the EXCI request is routed to the CICS region that CICS VR specifies.

The JCL for these CICS VR jobs must be in a library in the IEFPDSI concatenation or the IEFJOBS concatenation of the Master JCL MSTJCLxx. You should create a new library to use in MSTJCLxx and copy members DWWCBINF, DWWCBRRY and DWWCBRRG from the SDWWCNTL library.

> **Note:** You can find further details about setting up started tasks in the section "Understanding the master scheduler job control language" of the *z/OS MVS Initialization and Tuning Reference*.

If RACF® or a similar security product is in place, you need to ensure that the started tasks DWWCBINF, DWWCBRRY, and DWWCBRRG are defined to the the security product. In addition, assign a user ID to the jobs with the appropriate authorization to access the data sets referenced in DWWCBINF, DWWCBRRY and DWWCBRRG. The user ID should also be permitted to browse the output from these jobs.

8.4 Backout failure example

To demonstrate the automated recovery capabilities, we show an example whereby a CICS transaction updates a VSAM data set and suffers an IOERROR. The transaction abends, and the subsequent CICS transaction backout also suffers an IOERROR. Thus, CICS detects the backout failure condition.

We first show a scenario with CBAUTO set to NO, meaning that CICS VR is informed of the backout failure but does not initiate recovery. Then, we show what happens when CBAUTO is set to YES.

> **Note:** Generating a backout failure involved changing some CICS code to facilitate an IOERROR rather than trying to force a volume offline or by some other means. How we generated the IOERROR is not important. How CICS VR responds is the important point that we are demonstrating.

This scenario involves:

- ► CICS TS 3.2 configured as previously described with the CICS VR 4.2 SDWWLOAD library in DFHRPL, CICS VR CSD definitions installed, EXCI configured, and the CICS VR DWWXFCBF exit enabled during first phase PLT.
- ► CICS VR 4.2 configured with CBAUTO(NO), configured to use EXCI and the started tasks configured.
- ► A CICS VR 4.2 server active on the MVS image.

The transaction used for this sample was the CICS supplied sample transaction AMNU, which operates against the sample FILEA VSAM data set. To install the definitions for the AMNU sample, we installed group DFH$AFLA.

The definition for file FILEA was supplied in group DFH$FILA. We copied this definition to our own group and amended the DSNAME on the file definition to match that used when the FILEA VSAM cluster was defined as part of CICS TS 3.2 installation and also changed the recovery attributes as shown in Example 8-5.

Example 8-5   FILEA recovery parameters

```
RECOVERY PARAMETERS
 RECOVery      : All           None | Backoutonly | All
 Fwdrecovlog   : 01            No | 1-99
 BAckuptype    : Static        Static | Dynamic
```

The forward recovery log that we used was 01, which means use a journal name of DFHJ01. The journal name was mapped to an MVS log stream name of CICSMVS.CICSVRAR.FILELOG using the CICS journal model definition shown in Figure 8-4.

```
OBJECT CHARACTERISTICS
  CEDA  View Journalmodel( FILELOG  )
   Journalmodel   : FILELOG
   Group          : TT3TEST
   Description    :
   Journalname    : DFHJ01
   Type           : Mvs                      Mvs | Smf | Dummy
   Streamname     : CICSMVS.CICSVRAR.FILELOG
```

Figure 8-4   CICS journal model definition

For this test, we EDFed through the sample program. Typing CEDF at the CICS terminal and then typing AMNU to invoke the sample. Pressing Enter several times, we stopped when the map appeared on the screen and entered:

```
AADD            1
```

This command instructs the sample to add a record to FILEA using a key of 1.

We continued to press Enter, EDFing through the transaction, until the point where the map is displayed to enter data for the record. We typed John in the name field and continued pressing Enter until we came to the EXEC CICS WRITE FILE command. Pressing Enter to write to the file produced the panel shown in Figure 8-5.

```
 TRANSACTION: AADD PROGRAM: DFH£AALL TASK: 0000061 APPLID: IYZIZC01 DISPLAY:
00
  STATUS:  COMMAND EXECUTION COMPLETE
  EXEC CICS WRITE FILE
   FILE ('FILEA   ')
   FROM ('A000001JOHN                      ................................£'...)
   LENGTH (80)
   RIDFLD ('000001')
   NOHANDLE




  OFFSET:X'000616'    LINE:                 EIBFN=X'0604'
  RESPONSE: IOERR                           EIBRESP=17

 ENTER:  CONTINUE
 PF1 : UNDEFINED          PF2 : SWITCH HEX/CHAR     PF3 : END EDF SESSION
 PF4 : SUPPRESS DISPLAYS  PF5 : WORKING STORAGE     PF6 : USER DISPLAY
 PF7 : SCROLL BACK        PF8 : SCROLL FORWARD      PF9 : STOP CONDITIONS
 PF10: PREVIOUS DISPLAY   PF11: EIB DISPLAY          PF12: ABEND USER TASK
```

Figure 8-5   IOERR response for AADD transaction

The IOERROR response produced was due to our amended CICS code forcing an IOERROR. At this point, we pressed F12 to abend the task, entered an abend code of JST1, and press F12 again. The panel shown in Figure 8-6 displays.

```
 TRANSACTION: AADD PROGRAM: DFHEDFX  TASK: 0000061 APPLID: IYZIZC01 DISPLAY:  00
  STATUS:  AN ABEND HAS OCCURRED
     COMMAREA     = '.000001'
     EIBTIME      = 145605
     EIBDATE      = 0107326
     EIBTRNID     = 'AADD'
     EIBTASKN     = 61
     EIBTRMID     = 'TC54'

     EIBCPOSN     = 254
     EIBCALEN     = 7
     EIBAID       = X'7D'                                    AT X'001000EA'
     EIBFN        = X'0604'  WRITE                           AT X'001000EB'
     EIBRCODE     = X'800000000000'                          AT X'001000ED'
     EIBDS        = 'FILEA  '
+    EIBREQID     = '........'

  ABEND :   JST1

 ENTER:  CONTINUE
 PF1 : UNDEFINED        PF2 : SWITCH HEX/CHAR    PF3 : END EDF SESSION
 PF4 : SUPPRESS DISPLAYS  PF5 : WORKING STORAGE    PF6 : USER DISPLAY
 PF7 : SCROLL BACK      PF8 : SCROLL FORWARD     PF9 : STOP CONDITIONS
 PF10: PREVIOUS DISPLAY   PF11: EIB DISPLAY        PF12: UNDEFINED
```

Figure 8-6   AADD transaction abends JST1

At this point the transaction was still being held by EDF, so we pressed F3, and
the output shown in Figure 8-7 was received.

```
 FILE ADD

 NUMBER:  000001
 NAME:    john
 ADDRESS:
 PHONE:
 DATE:
 AMOUNT:  £0000.00
 COMMENT:


 ENTER DATA AND PRESS ENTER KEY













 DFHAC2205 14:59:50 IYZIZCO1 A backout failure has occurred during syncpoint
   processing for transaction AADD.
```

Figure 8-7   AADD transaction suffers a backout failure

Having released the transaction from EDF, CICS transaction backout was
activated, and CICS attempted to backout the write to FILEA. However, because
our CICS change was in place, this delete of the record during backout produced
an IOERROR. So, CICS detected a backout failure, as shown in the message
produced on the panel (see Figure 8-8).

```
13.59.50 JOB01585  +DFHFC4701 IYZIZCO1  122
     122            22/11/2007 14:59:50 IYZIZCO1 Backout failed for transaction  AADD
     122            VSAM file FILEA, unit of work X'C189524B581B6622', task 00061, base
     122            JTILLI1.CICSTS32.FILEA, path JTILLI1.CICSTS32.FILEA, failure code
     122            X'24'.
13.59.51 JOB01585  +DWW611I  CICS REQUEST FOR FORWARD RECOVERY OF VSAM DATA SET
     129            BACKOUT FAILURE HAS BEEN REGISTERED IN THE CICSVR RCDS. USE CICSVR
     129            ISPF DIALOG TO BUILD FORWARD RECOVERY JOB. THE DATA SET NAME IS:
     129            JTILLI1.CICSTS32.FILEA
```

Figure 8-8   CICS detects backout failure and CICS VR registers backout failure

The DFHFC4701 message was CICS detecting the backout failure. CICS notified
CICS VR of the backout failure, and CICS VR produced message DWW611I to

state that it had registered the failure in its RCDS. CBAUTO was set to NO, so no further action was taken by CICS VR at this time.

From a CICS panel, typing `CEMT INQUIRE UOW SHUNTED` produced the output shown in Figure 8-9.

```
 I UOW SHUNTED
  STATUS:  RESULTS - OVERTYPE TO MODIFY
   Uow(C189524B581B6622) Bac Shu Tra(AADD) Tas(0000061)
      Age(00000326) Ter(TC54) Netn(IYCOTC54) Use(CICSUSER) Dat




                                               SYSID=ISC1 APPLID=IYZIZCO1
  RESPONSE: NORMAL                             TIME: 14.05.16  DATE: 22.11.07
 PF 1 HELP      3 END       5 VAR       7 SBH 8 SFH 9 MSG 10 SB 11 SF
```

Figure 8-9   CEMT shunted unit of work panel

We saw that CICS had indeed shunted the UOW due to a backout failure.

Turning to CICS VR, we invoked the main menu and selected List of backout failed sphere (option 7), which produced the output shown in Figure 8-10.

```
 Administrate  Utilities  List  Help
 ----------------------------------------------------------------------------------------
                       CICS Backout Failed sphere list        Row 1 to 1 of 1

 Select one sphere, then select an action.


  S  VSAM sphere                              Time registered  Error
     JTILLI1.CICSTS32.FILEA                   07.326 13:59:50  IOERROR
```

Figure 8-10   CICS VR Backout Failed sphere list panel

We saw that CICS VR had registered DSNAME JTILLI1.CICSTS32.FILEA as
having suffered a backout failure. The reason was due to IOERROR, and the
time registered was displayed.

At this point, we disabled our IOERROR change to CICS and decided to recover
the data set. We typed S against the data set and pressed F5 to initiate building
of a recovery job. CICS VR performed a log of logs scan to update its RCDS.
Following the scan, we proceeded through the panels and submitted the
resulting recovery job. The recovery job completed with RC=0, and the
messages shown in Figure 8-11 displayed on the log.

```
14.14.34 JOB01585  +DWW605I  VSAM DATA SET IN NON-RLS MODE HAS BEEN MADE UNAVAILABLE
    177              WITH ALL CICS FILES CLOSED BY CICSVR REQUEST ATTEMPTING FORWARD
    177              RECOVERY OR REORGANIZATION. THE DATA SET NAME IS:
JTILLI1.CICSTS32.FILEA
14.14.55 JOB01585  +DWW606I  VSAM DATA SET IN NON-RLS MODE HAS BEEN MADE AVAILABLE WITH
    246              ALL CICS FILES ENABLED BY CICSVR REQUEST AFTER SUCCESSFUL FORWARD
    246              RECOVERY OR REORGANIZATION. THE DATA SET NAME IS:
    246              JTILLI1.CICSTS32.FILEA
```

Figure 8-11   Recovery messages

The messages show that VSAM data set JTILLI1.CICSTS32.FILEA was taken
offline by CICS VR, and following successful forward recovery, was brought back
online again. CICS VR instructed CICS to retry its backout. A CEMT INQUIRE
UOW SHUNTED request confirmed no shunted units of work. CICS has
successfully completed its backout and the data set is back to a consistent state.

As a final test, we ran the scenario again, this time with CBAUTO(YES) set.

The messages on the log show that as soon as CICS detected the backout failure and notified CICS VR, CICS VR built a recovery job and submitted it automatically (Figure 8-12). The data set was taken offline, forward recovered, and brought online to CICS again, at which point CICS retried its backout. The backout was successful because there were no further backout failure messages and no shunted units of work in CICS.

```
15.19.48 JOB01585  +DFHFC4701 IYZIZC01  750
     750               22/11/2007 16:19:48 IYZIZC01 Backout failed for transaction AADD
     750               VSAM file FILEA, unit of work X'C18964EB3076FE48', task 00265, base
     750               JTILLI1.CICSTS32.FILEA, path JTILLI1.CICSTS32.FILEA, failure code
     750               X'24'.
15.19.59 JOB01585  +DWW605I  VSAM DATA SET IN NON-RLS MODE HAS BEEN MADE UNAVAILABLE
     769               WITH ALL CICS FILES CLOSED BY CICSVR REQUEST ATTEMPTING FORWARD
     769               RECOVERY OR REORGANIZATION. THE DATA SET NAME IS: JTILLI1.CICSTS32.FILEA
15.20.13 JOB01585  +DWW606I  VSAM DATA SET IN NON-RLS MODE HAS BEEN MADE AVAILAILABLE
     839               ALL CICS FILES ENABLED BY CICSVR REQUEST AFTER SUCCESSFUL FORWARD
     839               RECOVERY OR REORGANIZATION. THE DATA SET NAME IS:
     839               JTILLI1.CICSTS32.FILEA
```

Figure 8-12   Log messages

9

Automatic and manual log of logs scan

In this chapter, we discuss how to run the CICS VR log of logs scan utility using the CICS VR server address space.

The CICS VR log of logs scan utility scans all the log of logs that are registered in the RCDS, gathers information needed for recovery, and updates the RCDS with this information. When you perform a forward recovery CICS VR initiates a log of logs scan automatically. If a scan has not run recently, it can take a significant amount of time to finish the forward recovery.

To improve the performance of the forward recovery significantly, we recommend that you set up a batch job to run a log of logs scan at regular intervals to keep the RCDS as up-to-date as possible.

The CICS VR server address space can help you to run the log of logs scan automatically at regularly scheduled times and manually at more convenient times.

In this chapter, we discuss the following topics:

► Automatic log of logs scan
► Manual log of logs scan
► Log of logs scan JCL skeleton

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9.1 Automatic log of logs scan

You can use the LOLSCAN function to control when the automatic log of logs scan runs (for example, at regularly scheduled times or once a day). The scan is scheduled to run every 24 hours after the CICS VR server address space has initialized. An example of the LOLSCAN command is:

```
LOLSCAN NO|YES|DEREG|REPORT|DEREPORT
```

Activate the *log of logs scan control default*. The specified value is registered in the RCDS as a value for the local default (unique for the system). Thus, you can activate the default on specific system or systems to automatically run the log of logs scan on the most suitable system or systems.

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

YES
: Register a YES value as the default in the RCDS, which 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, which 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, which 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, which 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.

> **Note:** The log of logs scan control default value is registered in the RCDS, so activating the default is normally performed only once when you initially set the default value to meet your system requirements or later when it is required to change the default value.

Figure 9-1 shows activating the log of logs scan control default. A DEREG value for the log of logs scan control default is registered in the RCDS, which enables the automatic log of logs scan to run at regularly scheduled times. During the log of logs scan, the automatic deregistration function is invoked, but the recovery report is not produced.

```
SETSMS CICSVR_GENERAL_CONTROL(LOLSCAN DEREG)
DWW590I CICSVR CONTROL SERVICE REQUEST IS ACCEPTED.
  CONTROL FUNCTION:  GENERAL
  CONTROL STRING:    LOLSCAN DEREG
  STATE DESCRIPTION: CONTROL DEFAULT(S) ACTIVATED
DWW599I DISPLAY CONTROL DEFAULTS.
  CONTROL DEFAULTS
    NAME      VALUE      SCOPE      OWNER
    LOLSCAN   DEREG      LOCAL      MVV3
```

Figure 9-1   Activating the log of logs scan control default

You can use the DISPLAY LOLSCAN function to display the log of logs scan control default as shown in Figure 9-2.

```
SETSMS CICSVR_GENERAL_CONTROL(DISPLAY LOLSCAN)
DWW599I DISPLAY CONTROL DEFAULTS.
  CONTROL DEFAULTS
    NAME      VALUE      SCOPE      OWNER
    LOLSCAN   DEREG      LOCAL      MVV3
DWW590I CICSVR CONTROL SERVICE REQUEST IS ACCEPTED.
  CONTROL FUNCTION:  GENERAL
  CONTROL STRING:    DISPLAY LOLSCAN
  STATE DESCRIPTION: CONTROL DEFAULT(S) DISPLAYED
```

Figure 9-2   Displaying the log of logs scan control default

Figure 9-3 shows the automatic log of logs scan. The CICS VR server address space constructs and issues the appropriate START operator command to submit the log of logs scan batch job. During the log of logs scan, invoke the automatic deregistration function but do not produce the recovery report.

```
S DWWARSCA,JOBNAME=DWWO2013,PREF=DWW,SUFF=ITSO,DEREG=YES,REP=NO
DWW246I APPLICATION LOLSCAN ( DWWO2013 ) SUCCESSFULLY RAN.
$HASP373 DWWO2013 STARTED
IEF403I DWWO2013 - STARTED - TIME=21.10.23
IEF404I DWWO2013 - ENDED - TIME=21.10.28
```

Figure 9-3   Automatic log of logs scan

Note: You can specify both the LOLSCAN function and the DISPLAY LOLSCAN function in the CICSVR_GENERAL_CONTROL parameter in the active IGDSMSxx member of SYS1.PARMLIB (it takes effect when the CICS VR server address space is next initialized) or in the SETSMS CICSVR_GENERAL_CONTROL operator command (it takes immediate effect if the CICS VR server address space is active, otherwise it takes effect when the CICS VR server address space is next initialized).

9.2 Manual log of logs scan

You can use the SCAN function to run the log of logs scan manually at more convenient times. For example, when system load is at its lowest. An example of the SCAN command is:

```
SCAN LOL|LOLDEREG|LOLREP|LOLDEREP
```

Run the log of log scan 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.

Figure 9-4 shows the manual log of logs scan. The CICS VR server address space constructs and issues the appropriate START operator command to submit the log of logs scan batch job. During the log of logs scan, invoke the automatic deregistration function but do not produce the recovery report.

```
SETSMS CICSVR_GENERAL_CONTROL(SCAN LOLDEREG)
DWW590I CICSVR CONTROL SERVICE REQUEST IS ACCEPTED.
  CONTROL FUNCTION:  GENERAL
  CONTROL STRING:   SCAN LOLDEREG
  STATE DESCRIPTION: LOG OF LOGS SCAN RAN
S DWWARSCA,JOBNAME=DWW02029,PREF=DWW,SUFF=ITSO,DEREG=YES,REP=NO
DWW246I APPLICATION LOLSCAN ( DWW02029 ) SUCCESSFULLY RAN.
$HASP373 DWW02029 STARTED
IEF403I DWW02029 - STARTED - TIME=12.12.07
IEF404I DWW02029 - ENDED - TIME=12.12.12
```

Figure 9-4   Manual log of logs scan

Note: You can specify the SCAN function in the CICSVR_GENERAL_CONTROL parameter in the active IGDSMSxx member of SYS1.PARMLIB (it takes effect when the CICS VR server address space is next initialized) or in the SETSMS CICSVR_GENERAL_CONTROL operator command (it takes immediate effect if the CICS VR server address space is active, otherwise it takes effect when the CICS VR server address space is next initialized).

9.3 Log of logs scan JCL skeleton

The CICS VR server address space uses a customized version of the log of logs scan JCL skeleton to run the log of logs scan automatically at regularly scheduled times and manually at more convenient times.

Figure 9-5 shows the log of logs scan JCL skeleton. The skeleton is located in the DWWARSCA member of SDWWCNTL. Edit the JOB statement in the skeleton to meet your system requirements. Then, copy the updated DWWARSCA member into your procedure 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 batch job.

```
RDEFINE STARTED DWWARSCA.* STDATA(USER(userid))
SETR RACLIST(STARTED) REFRESH
```

```
//DWWARSCA JOB (ACCOUNT),MSGLEVEL=(1,1),MSGCLASS=H,REGION=4M
//*******************************************************************/
//*                                                                 */
//* @BANNER_START                             01                    */
//* Licensed Materials - Property of IBM                            */
//*                                                                 */
//* 5655-P30              DWWARSCA                                   */
//*                                                                 */
//* (C) Copyright IBM Corp. 2006                                    */
//*                                                                 */
//* @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 9-5   Log of logs scan JCL skeleton

10

Log Stream Copy utility enhancements

In this chapter, we describe the CICS VR Log Stream Copy utility and its enhancements in CICS VR V4. We provide a detailed description of enhancements made to the CICS VR Log Stream Copy utility to add cursor support and describe the usage of Log Stream copy cursors and provide some examples.

In this chapter, we discuss the following topics:

► Overview of the Log Stream Copy utility
► Using Log Stream Copy cursors
► Example of using cursors

10.1 Overview of the Log Stream Copy utility

When VSAM data sets are updated by CICS applications or batch applications, the log records are written into an MVS log stream. These records can be used to provide a forward recovery for the VSAM spheres which were corrupted. To build a subset of all the records logged for the particular VSAM sphere, the CICS VR Log Stream Copy utility is used.

It is often useful to have a partial, or entire copy of the log stream, to implement specific forward recovery scenarios in the real environment. For example, one of the most applicable scenarios here is a remote site recovery. Because it is difficult to send an MVS log stream to the remote site, a log stream copy can be used for forward recovery there.

The CICS VR Log Stream Copy utility creates copies of the log records from MVS log streams to sequential access method (SAM) data sets. You can create up to nine SAM copies of the log stream within one Log Stream Copy job step. If you take more than one log stream copy in a job, only the first one is registered in RCDS, because just one copy is needed for successful forward recovery.

Example 10-1 shows a sample job of CICS VR Log Stream Copy.

Example 10-1   Log Stream Copy job

```
//JOB1 JOB ACCOUNTING INFORMATION,REGION=0M
//LSCOPY   EXEC PGM=DWWLC
//STEPLIB  DD DSN=DWW.SDWWLOAD,DISP=SHR
//         DD DSN=DWW.SDWWLENU,DISP=SHR
//DWWCOPY1 DD DSN=JTILLI1.FILELOG.COPY1,UNIT=SYSDA,
//           DISP=(NEW,CATLG),SPACE=(CYL,(5,2)),
//           DCB=(RECFM=VB,LRECL=16376,BLKSIZE=16380)
//DWWCON1  DD DSN=DWW.DWWCON1.GRPITSO,DISP=SHR
//DWWCON2  DD DSN=DWW.DWWCON2.GRPITSO,DISP=SHR
//DWWCON3  DD DSN=DWW.DWWCON3.GRPITSO,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWIN    DD *
     LOGSTREAMCOPY -
       NAME(JTILLI1.CICSVR.FILELOG) -
       SELECT(CICSVR) -
       COPIES(1) -
       MOD
/*
//
```

Various job parameters include:

- ▶ STEPLIB

  Supplies the name of CICS VR load library.

- ▶ DWWCOPY1

  Specifies the SAM data set to copy MVS log stream records to.

- ▶ DWWCON1-3

  Identifies the names of CICS VR recovery control data set (RCDS).

- ▶ DWWMSG

  Defines the output data set for CICS VR messages.

- ▶ DWWPRINT

  Defines the output data set for CICS VR reports.

- ▶ DWWIN

  Defines the input commands stream:

  - – LOGSTREAMCOPY

    The main keyword for the Log Stream Copy utility.

  - – NAME(JTILLI1.CICSVR.FILELOG)

    The name of the MVS log stream to be copied.

  - – SELECT (CICSVR)

    The type of records to be copied. Can be either CICSVR for CICS records and CICS VR batch logging records, or ALL, for all log records.

  - – COPIES(1)

    The number of copies to be made.

  - – MOD

    Specifies that the records are to be added to the end of the SAM data set for copy.

Example 10-2 shows the Log Stream Copy report for the job in Example 10-1.

Example 10-2   Log Stream Copy report

```
CICSVR -  MVS LOG STREAM COPY UTILITY  DATE : 07/12/05     TIME :
13:28:11     PAGE : 1

STATISTICS FROM THE MVS LOG STREAM COPY UTILITY
===============================================
```

```
MVS LOG STREAM NAME    : JTILLI1.CICSVR.FILELOG
FIRST TIME GMT         : 07.339 12:27:17
LAST TIME GMT          : 07.339 12:27:37
FIRST TIME LOCAL       : 07.339 13:27:17
LAST TIME LOCAL        : 07.339 13:27:37
FIRST BLOCK NUMBER     :                    1
LAST BLOCK NUMBER      :                56833
NUMBER OF BLOCKS READ  :                    6
NUMBER OF CICSVR BLOCKS:                    6
NUMBER OF BLOCKS COPIED:                    6
TYPE OF COPY           : CICS AND CICSVR
OUTPUT LOG NAME(S)     : JTILLI1.FILELOG.COPY1

PERFORMED ACTIONS      : COPY
```

10.2 Using Log Stream Copy cursors

CICS VR V4 introduced the cursors to facilitate automatic continuous log stream copying. With cursors, you do not have to specify the date and time parameters in your log stream copy job, even if you want to make a copy of the most recently added log records. Also, the cursors eliminate the need to copy the whole log stream, if there are some old copies present.

The new keywords for the cursors, SETBRCUR, REPBRCUR, and MOVBRCUR, ensure that the beginning and end of the copy is precisely defined and that the copy is repeatable.

> **Note:** Log streams processed in this way need to be defined as AUTODELETE(NO) RETPD(0) to avoid unexpected loss of data. This loss of data can occur because with AUTODELETE(YES) and defined MVS System Logger retention period allow the system to delete the log stream blocks periodically, which might not have been copied by CICS VR yet. So, the usage of cursors can lead to unexpected results in this case.

The new keywords for cursors include:

▶ SETBRCUR

Copies the log records starting from the start of copy cursor position, or from the beginning of the log stream, if there is no start of copy cursor position set yet. When the Log Stream Copy job with SETBRCUR keyword is submitted, a set of records are copied, the copy is registered in RCDS, and

the browse cursor is set to the last record copied. Example 10-3 shows the sample Log Stream Copy command with SETBRCUR.

Example 10-3 LOGSTREAMCOPY command with SETBRCUR keyword

```
LOGSTREAMCOPY NAME(CICSVR1.MVSLOG) -
SELECT(ALL) -
SETBRCUR
```

► REPBRCUR

Repeats the last copy. With this command specified, the browse cursor position is not changed. This keyword can be used to make another copy of the records written during the last copy. Example 10-4 shows the sample Log Stream Copy command with REPBRCUR.

Example 10-4 LOGSTREAMCOPY command with REPBRCUR keyword

```
LOGSTREAMCOPY NAME(CICSVR1.MVSLOG) -
SELECT(ALL) -
REPBRCUR
```

► MOVBRCUR

Moves the browse cursor. With this keyword specified, no actual copy occurs. You can use this keyword to move the `start of copy` position at the end of the records just copied. This makes any subsequent SETBRCUR runs to provide a copy of all the new records on the log stream.

Note: You can use the MOVBRCUR parameter in conjunction with SETBRCUR. In this case, the copy is taken, and if it completes successfully, the cursor is moved.

Example 10-5 shows the sample Log Stream Copy command with MOVBRCUR.

Example 10-5 LOGSTREAMCOPY command with MOVBRCUR keyword

```
LOGSTREAMCOPY NAME(CICSVR1.MVSLOG) -
SELECT(ALL) -
MOVBRCUR
```

If you do not need the log stream records that were just copied, run a job with MOVBRCUR and DELETE keywords to delete the records from the log stream that are already copied and to move the cursor.

You can use the DELETE keyword as an alternative way of log stream deregistration. In this case, the deregistration criteria can be assumed as the successful Log Stream Copy runs.

> **Note:** CICS VR protects the log stream records from casual deletion. To permit deletion ensure that the CICS VR global default LCDEL is set to YES. Otherwise, the DELETE keyword is ignored.

10.3 Example of using cursors

Figure 10-1 shows the sample scenario for the log stream copying using the cursors support.

We show a log stream with the first block written at 02:00am Local time. The description of the Log Stream Copy activities against this log stream is as follows:

1. At 04:00am local time, we submit a Log Stream Copy job against the log stream. For the parameters of the LOGSTREAMCOPY command we specify SETBRCUR, which copies the log stream records from the beginning up to the Log Stream Copy runtime, 04:00am and sets the browse cursor to the last record copied time, 04:00am also.

2. After that, we submit another Log Stream Copy job, with REPBRCUR specified, at 06:00am local time. Regardless of the time it is submitted, the records are repeatedly copied from the beginning of the log stream, 02:00am up to the current browse cursor setting 04:00am. This step makes an identical copy to that of step 1.

3. At 08:00am Local time, we submit yet another Log Stream Copy job with SETBRCUR keyword, just like we specified in step 1. Now, the Log Stream Copy takes all the records from the beginning of the log stream, 02:00am, up to the time it is submitted, 08:00am. Also, the new browse cursor position is set to 08:00am.

4. After that, at 09:00am Local time, we submit a MOVBRCUR Log Stream Copy job. This does not copy any records at all, but moves the `start of copy` position from the beginning of the log stream, 02:00am, to the last copied time, which is now defined by the SETBRCUR from step 3, 08:00am.

5. Finally, we run a job with SETBRCUR again, at 10:00am Local time. This copies the records starting from the new `start of copy` position, set in the previous step by MOVBRCUR, from 08:00am to be exact, up to the time the job submitted, 10:00am.
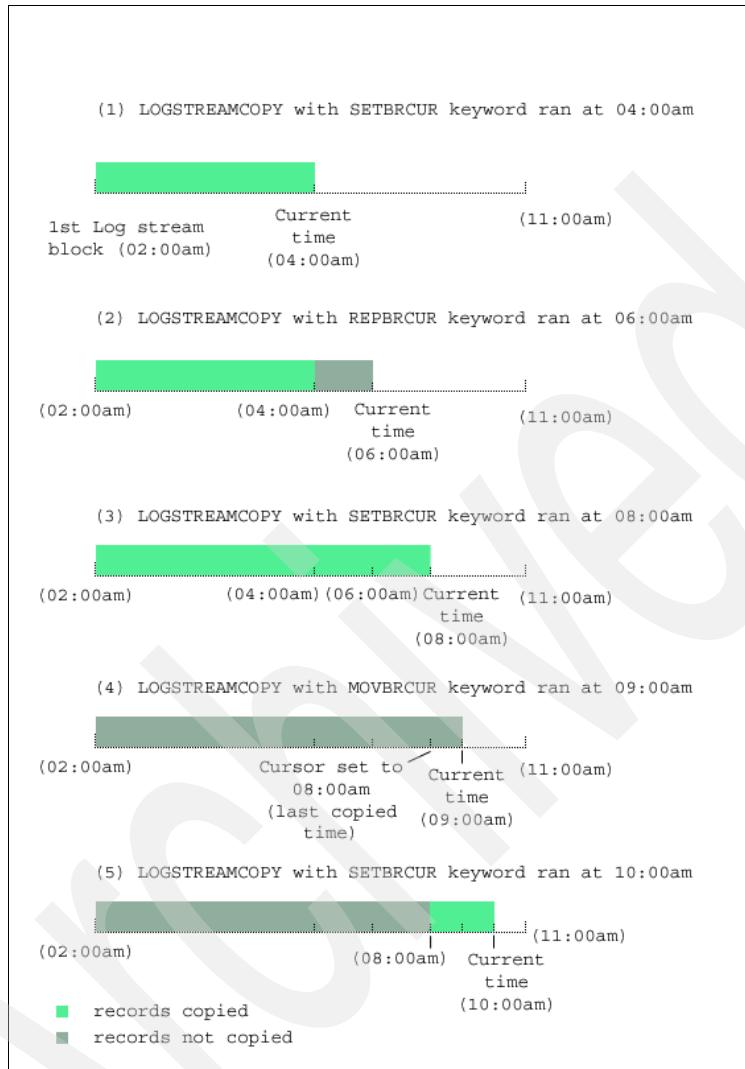
Figure 10-1   Example scenario with the Log Stream Copy cursors

So, as shown in this scenario, you can set the Log Stream Copy utility to continuously make the copies of a log stream by setting the browse cursor using SETBRCUR, and moving the `start of copy` point using MOVBRCUR. To have another copy of the previously copied set of records, you can use the REPBRCUR keyword. Having another copy of the previously copied set of records allows you to a set of Log Stream Copy jobs which do not need to be modified prior to submission.

11

Backup control enhancements

In this chapter, we discuss the backup control enhancements.

CICS VR can restore VSAM data sets 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 VSAM data sets through the CICS VR panel interface.

CICS VR can maintain an inventory of and restore DFSMSdss logical copies and dumps created for VSAM data sets. Additionally, CICS VR can list all DFSMSdss logical copies and dumps that exist for selected VSAM data sets through the CICS VR panel interface.

Using the CICS VR file copy notification service, CICS VR can maintain an inventory of and list through the panel interface logical backups created by using other IBM and non-IBM backup products. Additionally, by specifying a restore skeleton that is associated with each registered backup type, CICS VR can restore VSAM data sets from the selected logical backups.

CICS VR enhances the backup control for backups that are created using both IBM backup products and non-IBM backup products.

In this chapter, we discuss the following topics:

► ABARS backup
► Hardware backup
► File copy notification service
► IDCAMS REPRO backup

11.1 ABARS backup

You can use *DFSMShsm Aggregate Backup and Recovery Support* backups (referred to as simply *ABARS backups*) as your backup product.

CICS VR controls ABARS backups in the same way as backups that are created using DFSMShsm, DFSMSdss, and other currently supported backup products. It allows you to:

► Register ABARS backups in the RCDS
► List ABARS backups registered in the RCDS
► Restore ABARS backups registered in the RCDS
► Deregister ABARS backups from the RCDS
► Create ABARS backups for VSAM data sets registered in the RCDS

11.1.1 ABARS backup registration

ABARS uses DFSMSdss logical dump function to create backups for all of active (not migrated) data sets of aggregate groups. DFSMSdss notifies CICS VR when a logical dump is created and when the CICSVRBACKUP keyword is specified for a VSAM data set. CICS VR uses this function to implement the capability to register ABARS backups in the RCDS automatically.

You *must* perform the following actions to use ABARS as your backup product:

► Replace the *DFSMSdss Options Installation Exit Routine*
► Activate the *DFSMSdss logical dump registration control default*

DFSMSdss Options Installation Exit Routine

CICS VR supplies a version of the DFSMSdss Options Installation Exit Routine (DWWUIXIT), which specifies the CICSVRBACKUP option when a logical dump function is scheduled and when a valid value of the DFSMSdss logical dump registration control default is in effect. The supplied version (a load module) needs to be used to replace a dummy version of the DFSMSdss Options Installation Exit Routine (ADRUIXIT) as it is described in *z/OS DFSMS Installation Exits*, SG26-7396.

Figure 11-1 shows the supplied sample job that you can use to change the load module name from DWWUIXIT to ADRUIXIT as it is required for DFSMSdss. The sample job is located in the DWWUIXIT member of SDWWCNTL.

```
//DWWUIXIT JOB (ACCINFO)
//****************************************************************/
//*                                                             */
//* @BANNER_START                                               */
//* Licensed Materials - Property of IBM                        */
//*                                                             */
//* 5655-P30              DWWUIXIT                               */
//*                                                             */
//* (C) Copyright IBM Corp. 2006                                */
//*                                                             */
//* @BANNER_END                                                 */
//*                                                             */
//****************************************************************/
//*                                                             */
//*   CHANGE ACTIVITY:                                          */
//*                                                             */
//* $AJ= CVR420   420 060914 KVV                         @AJA*/
//*       ABARS Backups Control                          @AJA*/
//*                                                             */
//****************************************************************/
//*                                                             */
//* Name:  DWWUIXIT                                             */
//*                                                             */
//* Function:  Link edit job to link edit DFSMSdss             */
//*            Options Installation Exit Routine               */
//*                                                             */
//* Set "CAPS ON" to prevent JCL errors                        */
//*                                                             */
//* 1. Add the JOB statement to meet your system requirements  */
//*                                                             */
//* 2. Change load library names to meet your system requirements */
//*                                                             */
//****************************************************************/
//IEWL     EXEC PGM=IEWL,PARM='LIST,RENT,LET'
//SYSLMOD  DD DSN=USER.LOADLIB,DISP=SHR
//SYSLIB   DD DSN=DWW.CICSVR42.SDWWLOAD,DISP=SHR
//SYSPRINT DD SYSOUT=*
//SYSLIN   DD *
 CHANGE  DWWUIXIT(ADRUIXIT)
 INCLUDE SYSLIB(DWWUIXIT)
 ENTRY   ADRUIXIT
 NAME    ADRUIXIT(R)
```

Figure 11-1   Sample job DWWUIXIT

DFSMSdss logical dump registration control default

You can use the DSSLDREG function to control the DFSMSdss logical dumps registration. An example of the DSSLDREG function is:

```
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, which means that DFSMSdss logical dumps are not registered for any applications.

YES
: Register a YES value as the default in the RCDS, which 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, which 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, which 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, which 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:** No changes are required to applications because DFSMSdss logical dumps for VSAM data sets are automatically registered.
>
> If the DFSMSdss DUMP command includes the CICSVRBACKUP keyword it takes precedence over any current value for the DFSMSdss logical dump registration control default.
>
> The DFSMSdss logical dump registration control default value is registered in the RCDS, so activating the default is normally performed only once when you initially set the default value to meet your system requirements or later when it is required to change the default value.

Figure 11-2 shows activating the DFSMSdss logical dump registration control default. 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.

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

Figure 11-2   Activating the DFSMSdss logical dump registration control default

You can use the DISPLAY DSSLDREG function to display the DFSMSdss logical dump registration control default as shown in Figure 11-3.

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

Figure 11-3   Displaying the DFSMSdss logical dump registration control default

> **Note:** You can specify both the DSSLDREG function and the DISPLAY
> DSSLDREG function in the CICSVR_GENERAL_CONTROL parameter in the
> active IGDSMSxx member of SYS1.PARMLIB (it takes effect when the CICS
> VR server address space is next initialized) or in the SETSMS
> CICSVR_GENERAL_CONTROL operator command (it takes immediate effect
> if the CICS VR server address space is active, otherwise it takes effect when
> the CICS VR server address space is next initialized).

Example 11-1 shows the sample ABARS activity log when DSSLDREG NO is in
effect. ABARS backs up selected VSAM data sets by using DFSMSdss.
DFSMSdss does not notify the CICS VR server address space because the
DFSMSdss Options Installation Exit Routine does not specify the
CICSVRBACKUP option. So, ABARS creates a backup and it does not depend
the CICS VR server address space is active or is not active.

Example 11-1   Sample ABARS activity log when DSSLDREG NO is in effect

```
1PAGE 0001 Z/OS DFSMSHSM 1.7.0 DATA FACILITY HIERARCHICAL STORAGE MANAGER 07.337 11:53
0ARC6000I ABACKUP CVRTESTX EXECUTE UNIT(3490)
0ARC6054I AGGREGATE BACKUP STARTING FOR AGGREGATE GROUP CVRTESTX, AT 11:53:52, STARTED TASK =
DFHSMABR.ABAR0151
0ARC6030I ACTIVITY LOG FOR AGGREGATE GROUP CVRTESTX WILL BE ROUTED TO
HSMACT.H3.ABACKUP.CVRTESTX.D07337.T115352
0ARC6379I THE MANAGEMENT CLASS CONSTRUCTS USED IN THE AGGREGATE GROUP, CVRTESTX, ARE:
 CLASS NAME : STANDARD
 DESCRIPTION:
 STANDARD MANAGEMENT CLASS
 EXPIRATION ATTRIBUTES
  EXPIRE AFTER DAYS NON-USAGE: 1095
  EXPIRE AFTER DATE/DAYS     : NOLIMIT
 RETENTION LIMIT: 0
 PARTIAL RELEASE: N
 MIGRATION ATTRIBUTES
  PRIMARY DAYS NON-USAGE: 100
  LEVEL 1 DAYS NON-USAGE: 1
  COMMAND/AUTO MIGRATE  : BOTH
 GDG MANAGEMENT ATTRIBUTES
  # GDG ELEMENTS OF PRIMARY: 1
  ROLLED OFF GDS ACTION    : EXPIRE
 BACKUP ATTRIBUTES
  BACKUP FREQUENCY          : 3
  # OF BACKUP VERSIONS (DS EXISTS) : 2
  # OF BACKUP VERSIONS (DS DELETED): 1
  RETAIN DAYS ONLY BACKUP VERSION  : 180
      (DS DELETED)
  RETAIN DAYS EXTRA BACKUP VERSIONS: NOLIMIT
  ADMIN OR USER COMMAND BACKUP     : BOTH
```

```
    AUTO BACKUP                 : Y
    BACKUP COPY TECHNIQUE       : P


OARC6379I THE STORAGE CLASS CONSTRUCTS USED IN THE AGGREGATE GROUP, CVRTESTX, ARE:
 CLASS NAME : STANDARD
 DESCRIPTION:
 DEFAULT STORAGE CLASS
 AVAILABILITY: STANDARD
 ACCESSIBILITY:
 GUARANTEED SPACE: N
 GUARANTEED SYNCHRONOUS WRITE: N


 ARC6004I 0047 ABACKUP PAGE 0001      5695-DF175  DFSMSDSS V1R07.0 DATA SET SERVICES
2007.337 11:53
 ARC6004I 0047 ABACKUP ADR035I (SCH)-PRIME(06), INSTALLATION EXIT ALTERED BYPASS FAC CLASS CHK
DEFAULT TO YES
ARC6004I 0047 ABACKUP ADR035I (SCH)-PRIME(03), INSTALLATION EXIT ALTERED WORKUNIT DEFAULT TO ¦
 ARC6004I 0047 ABACKUP  DUMP DATASET(FILTERDD(SYS00006)) -
 ARC6004I 0047 ABACKUP  OUTDDNAME(SYS00004, -
 ARC6004I 0047 ABACKUP          SYS00005 -
 ARC6004I 0047 ABACKUP             ) OPTIMIZE(3) SPHERE                       -
 ARC6004I 0047 ABACKUP  ALLDATA(*) FORCECP(0) -
 ARC6004I 0047 ABACKUP  CONCURRENT -
 ARC6004I 0047 ABACKUP  SHARE TOLERATE(ENQFAILURE)
 ARC6004I 0047 ABACKUP ADR101I (R/I)-RIO1 (01), TASKID 001 HAS BEEN ASSIGNED TO COMMAND 'DUMP '
 ARC6004I 0047 ABACKUP ADR109I (R/I)-RIO1 (01), 2007.337 11:53:56 INITIAL SCAN OF USER CONTROL
STATEMENTS COMPLETED.
 ARC6004I 0047 ABACKUP ADR050I (001)-PRIME(01), DFSMSDSS INVOKED VIA APPLICATION INTERFACE
 ARC6004I 0047 ABACKUP ADR016I (001)-PRIME(01), RACF LOGGING OPTION IN EFFECT FOR THIS TASK
1PAGE 0002 Z/OS DFSMSHSM 1.7.0 DATA FACILITY HIERARCHICAL STORAGE MANAGER 07.337 11:53
 ARC6004I 0047 ABACKUP ADR006I (001)-STEND(01), 2007.337 11:53:56 EXECUTION BEGINS
OARC6075I TAPE VOLUME LD1274 SUCCESSFULLY ADDED TO ABARS RACF TAPE VOLUME SET
OARC6075I TAPE VOLUME LD1249 SUCCESSFULLY ADDED TO ABARS RACF TAPE VOLUME SET
OARC6004I 0047 ABACKUP ADR801I (001)-DTDSC(01),
 ARC6004I 0047 ABACKUP DATA SET FILTERING IS COMPLETE. 4 OF 4 DATA SETS WERE SELECTED: 0 FAILED
SERIALIZATION AND 0
 ARC6004I 0047 ABACKUP FAILED FOR
 ARC6004I 0047 ABACKUP                   OTHER REASONS.
OARC6004I 0047 ABACKUP ADR734I (001)-DTDSC(01),
 ARC6004I 0047 ABACKUP 2007.337 11:53:58 CONCURRENT COPY INITIALIZATION SUCCESSFUL FOR 4 OF 4
SELECTED DATA SETS.
 ARC6004I 0047 ABACKUP SERIALIZATION
OARC6004I 0047 ABACKUP                        FOR THIS DATA IS RELEASED IF DFSMSDSS HELD IT.
THE INTERMEDIATE RETURN
 ARC6004I 0047 ABACKUP CODE IS 0000.
OARC6402I CONCURRENT COPY INITIALIZATION IS COMPLETE FOR AGGREGATE CVRTESTX. ANY SERIALIZATION
HAS BEEN RELEASED. JOB =
 ABACKUP
```

```
0ARC6004I 0047 ABACKUP ADR788I (001)-DIVSM(03), PROCESSING COMPLETED FOR CLUSTER
JTILLI1.CICSVR.KSDS01,
 ARC6004I 0047 ABACKUP 1 RECORD(S) PROCESSED, REASON 0
0ARC6004I 0047 ABACKUP ADR788I (001)-DIVSM(03), PROCESSING COMPLETED FOR CLUSTER
JTILLI1.CICSVR.KSDS02,
 ARC6004I 0047 ABACKUP 1 RECORD(S) PROCESSED, REASON 0
 ARC6004I 0047 ABACKUP ADR454I (001)-DTDSC(01), THE FOLLOWING DATA SETS WERE SUCCESSFULLY
PROCESSED
 ARC6004I 0047 ABACKUP                      CLUSTER NAME   JTILLI1.CICSVR.ESDS01
 ARC6004I 0047 ABACKUP                      CATALOG NAME   ICFCAT.PLEXV.CATALOGA
 ARC6004I 0047 ABACKUP                    COMPONENT NAME JTILLI1.CICSVR.ESDS01.DATA
 ARC6004I 0047 ABACKUP                      CLUSTER NAME   JTILLI1.CICSVR.KSDS01
 ARC6004I 0047 ABACKUP                      CATALOG NAME   ICFCAT.PLEXV.CATALOGA
 ARC6004I 0047 ABACKUP                    COMPONENT NAME JTILLI1.CICSVR.KSDS01.DATA
 ARC6004I 0047 ABACKUP                    COMPONENT NAME JTILLI1.CICSVR.KSDS01.INDEX
 ARC6004I 0047 ABACKUP                      CLUSTER NAME   JTILLI1.CICSVR.KSDS02
 ARC6004I 0047 ABACKUP                      CATALOG NAME   ICFCAT.PLEXV.CATALOGA
 ARC6004I 0047 ABACKUP                    COMPONENT NAME JTILLI1.CICSVR.KSDS02.DATA
 ARC6004I 0047 ABACKUP                    COMPONENT NAME JTILLI1.CICSVR.KSDS02.INDEX
 ARC6004I 0047 ABACKUP                      CLUSTER NAME   JTILLI1.CICSVR.ESDS02
 ARC6004I 0047 ABACKUP                      CATALOG NAME   ICFCAT.PLEXV.CATALOGA
 ARC6004I 0047 ABACKUP                    COMPONENT NAME JTILLI1.CICSVR.ESDS02.DATA
 ARC6004I 0047 ABACKUP ADR006I (001)-STEND(02), 2007.337 11:54:04 EXECUTION ENDS
 ARC6004I 0047 ABACKUP PAGE 0002     5695-DF175   DFSMSDSS V1R07.0 DATA SET SERVICES
2007.337 11:53
 ARC6004I 0047 ABACKUP ADR013I (001)-CLTSK(01), 2007.337 11:54:09 TASK COMPLETED WITH RETURN
CODE 0000
0ARC6004I 0047 ABACKUP ADR012I (SCH)-DSSU (01),
 ARC6004I 0047 ABACKUP 2007.337 11:54:09 DFSMSDSS PROCESSING COMPLETE. HIGHEST RETURN CODE IS
0000
0ARC6004I 0047 ABACKUP PAGE 0001     5695-DF175   DFSMSDSS V1R07.0 DATA SET SERVICES
2007.337 11:54
0ARC6004I 0047 ABACKUP ADR035I (SCH)-PRIME(06), INSTALLATION EXIT ALTERED BYPASS FAC CLASS CHK
DEFAULT TO YES
0ARC6004I 0047 ABACKUP ADR035I (SCH)-PRIME(03), INSTALLATION EXIT ALTERED WORKUNIT DEFAULT TO ¦
0ARC6004I 0047 ABACKUP DUMP DATASET(INCLUDE( -
0ARC6004I 0047 ABACKUP  CICSVR.ABARS.INSTRUCT                   ,  -
0ARC6004I 0047 ABACKUP  HSMACT.H3.ABACKUP.CVRTESTX.D07337.T115352   )) -
1PAGE 0003 Z/OS DFSMSHSM 1.7.0 DATA FACILITY HIERARCHICAL STORAGE MANAGER 07.337 11:53
0ARC6004I 0047 ABACKUP OUTDDNAME(SYS00004, -
0ARC6004I 0047 ABACKUP        SYS00005 -
0ARC6004I 0047 ABACKUP                ) OPTIMIZE(3) SPHERE                -
0ARC6004I 0047 ABACKUP ALLDATA(*) FORCECP(0) -
0ARC6004I 0047 ABACKUP CONCURRENT -
0ARC6004I 0047 ABACKUP  SHARE TOLERATE(ENQFAILURE)
0ARC6004I 0047 ABACKUP ADR101I (R/I)-RI01 (01), TASKID 001 HAS BEEN ASSIGNED TO COMMAND 'DUMP '
0ARC6004I 0047 ABACKUP ADR109I (R/I)-RI01 (01), 2007.337 11:54:15 INITIAL SCAN OF USER CONTROL
STATEMENTS COMPLETED.
0ARC6004I 0047 ABACKUP ADR050I (001)-PRIME(01), DFSMSDSS INVOKED VIA APPLICATION INTERFACE
```

```
OARC6004I 0047 ABACKUP ADR016I (001)-PRIME(01),RACF LOGGING OPTION IN EFFECT FOR THIS TASK
OARC6004I 0047 ABACKUP ADR006I (001)-STEND(01),2007.337 11:54:15 EXECUTION BEGINS
OARC6004I 0047 ABACKUP ADR801I (001)-DTDSC(01),
  DATA SET FILTERING IS COMPLETE. 2 OF 2 DATA SETS WERE SELECTED: 0 FAILED SERIALIZATION AND 0
FAILED FOR
OARC6004I 0047 ABACKUP                    OTHER REASONS.
OARC6004I 0047 ABACKUP ADR734I (001)-DTDSC(01),
  2007.337 11:54:15 CONCURRENT COPY INITIALIZATION SUCCESSFUL FOR 2 OF 2 SELECTED DATA SETS.
SERIALIZATION
OARC6004I 0047 ABACKUP                              FOR THIS DATA IS RELEASED IF DFSMSDSS HELD IT.
THE INTERMEDIATE RETURN
 CODE IS 0000.
OARC6004I 0047 ABACKUP ADR454I (001)-DTDSC(01), THE FOLLOWING DATA SETS WERE SUCCESSFULLY
PROCESSED
OARC6004I 0047 ABACKUP                    CICSVR.ABARS.INSTRUCT
OARC6004I 0047 ABACKUP                 HSMACT.H3.ABACKUP.CVRTESTX.D07337.T115352
OARC6004I 0047 ABACKUP ADR006I (001)-STEND(02),2007.337 11:54:17 EXECUTION ENDS
OARC6004I 0047 ABACKUP ADR013I (001)-CLTSK(01), 2007.337 11:54:22 TASK COMPLETED WITH RETURN
CODE 0000
OARC6004I 0047 ABACKUP ADR012I (SCH)-DSSU (01),
 2007.337 11:54:22 DFSMSDSS PROCESSING COMPLETE. HIGHEST RETURN CODE IS 0000
OARC6382I ACTIVITY LOG HSMACT.H3.ABACKUP.CVRTESTX.D07337.T115352 HAS BEEN SUCCESSFULLY BACKED
UP
OARC6382I INSTRUCTION DATA SET CICSVR.ABARS.INSTRUCT HAS BEEN SUCCESSFULLY BACKED UP
OARC6369I STORAGE REQUIREMENTS FOR AGGREGATE GROUP CVRTESTX ARE: L0=9542K, ML1=0, ML2=0,
TOTAL=9542K
OARC6061I VOLUMES USED FOR CONTROL FILE CICSVR.ABARS.CVRTESTX.C.C01V0046 DURING AGGREGATE
BACKUP FOR AGGREGATE GROUP
 CVRTESTX ARE:
  LD1274
OARC6060I VOLUMES USED FOR DATA FILE CICSVR.ABARS.CVRTESTX.D.C01V0046 DURING AGGREGATE BACKUP
FOR AGGREGATE GROUP
 CVRTESTX ARE:
1PAGE 0004 Z/OS DFSMSHSM 1.7.0 DATA FACILITY HIERARCHICAL STORAGE MANAGER 07.337 11:53
  LD1274
OARC6071I VOLUMES USED FOR INSTRUCTION/ACTIVITY LOG FILE CICSVR.ABARS.CVRTESTX.I.C01V0046
DURING AGGREGATE BACKUP FOR
 AGGREGATE GROUP CVRTESTX ARE:
  LD1274
OARC6061I VOLUMES USED FOR CONTROL FILE CICSVR.ABARS.CVRTESTX.C.C02V0046 DURING AGGREGATE
BACKUP FOR AGGREGATE GROUP
 CVRTESTX ARE:
  LD1249
OARC6060I VOLUMES USED FOR DATA FILE CICSVR.ABARS.CVRTESTX.D.C02V0046 DURING AGGREGATE BACKUP
FOR AGGREGATE GROUP
 CVRTESTX ARE:
  LD1249
OARC6071I VOLUMES USED FOR INSTRUCTION/ACTIVITY LOG FILE CICSVR.ABARS.CVRTESTX.I.C02V0046
DURING AGGREGATE BACKUP FOR
```

```
 AGGREGATE GROUP CVRTESTX ARE:
  LD1249
OARC6055I AGGREGATE BACKUP HAS COMPLETED FOR AGGREGATE GROUP CVRTESTX, AT 11:54:31, RETCODE =
000
```

Example 11-2 shows the sample ABARS activity log when DSSLDREG ABARS is in effect and the CICS VR server address space is active. ABARS backs up selected VSAM data sets by using DFSMSdss. DFSMSdss notifies the CICS VR server address space for each successfully processed VSAM data set because the DFSMSdss Options Installation Exit Routine specifies the CICSVRBACKUP option. So, ABARS creates a backup and the CICS VR server address space registers the ABARS backup in the RCDS for the VSAM data sets.

Example 11-2   Sample ABARS activity log when DSSLDREG ABARS in effect and the CICS VR server address space active

```
1PAGE 0001 Z/OS DFSMSHSM 1.7.0 DATA FACILITY HIERARCHICAL STORAGE MANAGER 07.337 11:57
OARC6000I ABACKUP CVRTESTX EXECUTE UNIT(3490)
OARC6054I AGGREGATE BACKUP STARTING FOR AGGREGATE GROUP CVRTESTX, AT 11:57:39, STARTED TASK =
DFHSMABR.ABAR0138
OARC6030I ACTIVITY LOG FOR AGGREGATE GROUP CVRTESTX WILL BE ROUTED TO
HSMACT.H3.ABACKUP.CVRTESTX.D07337.T115739
OARC6379I THE MANAGEMENT CLASS CONSTRUCTS USED IN THE AGGREGATE GROUP, CVRTESTX, ARE:
 CLASS NAME : STANDARD
 DESCRIPTION:
 STANDARD MANAGEMENT CLASS
 EXPIRATION ATTRIBUTES
  EXPIRE AFTER DAYS NON-USAGE: 1095
  EXPIRE AFTER DATE/DAYS    : NOLIMIT
 RETENTION LIMIT: 0
 PARTIAL RELEASE: N
 MIGRATION ATTRIBUTES
  PRIMARY DAYS NON-USAGE: 100
  LEVEL 1 DAYS NON-USAGE: 1
  COMMAND/AUTO MIGRATE  : BOTH
 GDG MANAGEMENT ATTRIBUTES
  # GDG ELEMENTS OF PRIMARY: 1
  ROLLED OFF GDS ACTION   : EXPIRE
 BACKUP ATTRIBUTES
  BACKUP FREQUENCY            : 3
  # OF BACKUP VERSIONS (DS EXISTS) : 2
  # OF BACKUP VERSIONS (DS DELETED): 1
  RETAIN DAYS ONLY BACKUP VERSION  : 180
     (DS DELETED)
  RETAIN DAYS EXTRA BACKUP VERSIONS: NOLIMIT
  ADMIN OR USER COMMAND BACKUP    : BOTH
  AUTO BACKUP               : Y
  BACKUP COPY TECHNIQUE       : P
```

OARC6379I THE STORAGE CLASS CONSTRUCTS USED IN THE AGGREGATE GROUP, CVRTESTX, ARE:
 CLASS NAME : STANDARD
 DESCRIPTION:
 DEFAULT STORAGE CLASS
 AVAILABILITY: STANDARD
 ACCESSIBILITY:
 GUARANTEED SPACE: N
 GUARANTEED SYNCHRONOUS WRITE: N

 ARC6004I 0047 ABACKUP PAGE 0001   5695-DF175 DFSMSDSS V1R07.0 DATA SET SERVICES
2007.337 11:57
 ARC6004I 0047 ABACKUP ADR035I (SCH)-PRIME(06), INSTALLATION EXIT ALTERED BYPASS FAC CLASS CHK
DEFAULT TO YES
ARC6004I 0047 ABACKUP ADR035I (SCH)-PRIME(03), INSTALLATION EXIT ALTERED WORKUNIT DEFAULT TO ¦
 ARC6004I 0047 ABACKUP DUMP DATASET(FILTERDD(SYS00006)) -
 ARC6004I 0047 ABACKUP OUTDDNAME(SYS00004, -
 ARC6004I 0047 ABACKUP   SYS00005 -
 ARC6004I 0047 ABACKUP   ) OPTIMIZE(3) SPHERE   -
 ARC6004I 0047 ABACKUP ALLDATA(*) FORCECP(0) -
 ARC6004I 0047 ABACKUP CONCURRENT -
 ARC6004I 0047 ABACKUP SHARE TOLERATE(ENQFAILURE)
 ARC6004I 0047 ABACKUP ADR101I (R/I)-RI01 (01), TASKID 001 HAS BEEN ASSIGNED TO COMMAND 'DUMP '
 ARC6004I 0047 ABACKUP ADR109I (R/I)-RI01 (01), 2007.337 11:57:46 INITIAL SCAN OF USER CONTROL
STATEMENTS COMPLETED.
 ARC6004I 0047 ABACKUP ADR050I (001)-PRIME(01), DFSMSDSS INVOKED VIA APPLICATION INTERFACE
 ARC6004I 0047 ABACKUP ADR035I (001)-PRIME(68), INSTALLATION EXIT ALTERED CICSVRBACKUP OPTION
1PAGE 0002 Z/OS DFSMSHSM 1.7.0 DATA FACILITY HIERARCHICAL STORAGE MANAGER 07.337 11:57
 ARC6004I 0047 ABACKUP ADR016I (001)-PRIME(01), RACF LOGGING OPTION IN EFFECT FOR THIS TASK
 ARC6004I 0047 ABACKUP ADR006I (001)-STEND(01), 2007.337 11:57:46 EXECUTION BEGINS
0ARC6075I TAPE VOLUME LD1617 SUCCESSFULLY ADDED TO ABARS RACF TAPE VOLUME SET
0ARC6075I TAPE VOLUME LD0126 SUCCESSFULLY ADDED TO ABARS RACF TAPE VOLUME SET
 ARC6004I 0047 ABACKUP ADR928I (001)-CVRI (06), CICSVRBACKUP WAS SUCCESSFUL FOR DATA SET
JTILLI1.CICSVR.ESDS01
 ARC6004I 0047 ABACKUP ADR928I (001)-CVRI (06), CICSVRBACKUP WAS SUCCESSFUL FOR DATA SET
JTILLI1.CICSVR.KSDS01
 ARC6004I 0047 ABACKUP ADR928I (001)-CVRI (06), CICSVRBACKUP WAS SUCCESSFUL FOR DATA SET
JTILLI1.CICSVR.KSDS02
 ARC6004I 0047 ABACKUP ADR928I (001)-CVRI (06), CICSVRBACKUP WAS SUCCESSFUL FOR DATA SET
JTILLI1.CICSVR.ESDS02
0ARC6004I 0047 ABACKUP ADR801I (001)-DTDSC(01),
 ARC6004I 0047 ABACKUP DATA SET FILTERING IS COMPLETE. 4 OF 4 DATA SETS WERE SELECTED: 0 FAILED
SERIALIZATION AND 0
 ARC6004I 0047 ABACKUP FAILED FOR
 ARC6004I 0047 ABACKUP   OTHER REASONS.
0ARC6004I 0047 ABACKUP ADR734I (001)-DTDSC(01),
 ARC6004I 0047 ABACKUP 2007.337 11:57:49 CONCURRENT COPY INITIALIZATION SUCCESSFUL FOR 4 OF 4
SELECTED DATA SETS.
 ARC6004I 0047 ABACKUP SERIALIZATION

OARC6004I 0047 ABACKUP   FOR THIS DATA IS RELEASED IF DFSMSDSS HELD IT.
THE INTERMEDIATE RETURN
 ARC6004I 0047 ABACKUP CODE IS 0000.
OARC6402I CONCURRENT COPY INITIALIZATION IS COMPLETE FOR AGGREGATE CVRTESTX. ANY SERIALIZATION
HAS BEEN RELEASED. JOB =
 ABACKUP
OARC6004I 0047 ABACKUP ADR788I (001)-DIVSM(03), PROCESSING COMPLETED FOR CLUSTER
JTILLI1.CICSVR.KSDS01,
 ARC6004I 0047 ABACKUP 1 RECORD(S) PROCESSED, REASON 0
OARC6004I 0047 ABACKUP ADR788I (001)-DIVSM(03), PROCESSING COMPLETED FOR CLUSTER
JTILLI1.CICSVR.KSDS02,
 ARC6004I 0047 ABACKUP 1 RECORD(S) PROCESSED, REASON 0
 ARC6004I 0047 ABACKUP ADR454I (001)-DTDSC(01), THE FOLLOWING DATA SETS WERE SUCCESSFULLY
PROCESSED
 ARC6004I 0047 ABACKUP   CLUSTER NAME   JTILLI1.CICSVR.ESDS01
 ARC6004I 0047 ABACKUP   CATALOG NAME   ICFCAT.PLEXV.CATALOGA
 ARC6004I 0047 ABACKUP   COMPONENT NAME JTILLI1.CICSVR.ESDS01.DATA
 ARC6004I 0047 ABACKUP   CLUSTER NAME   JTILLI1.CICSVR.KSDS01
 ARC6004I 0047 ABACKUP   CATALOG NAME   ICFCAT.PLEXV.CATALOGA
 ARC6004I 0047 ABACKUP   COMPONENT NAME JTILLI1.CICSVR.KSDS01.DATA
 ARC6004I 0047 ABACKUP   COMPONENT NAME JTILLI1.CICSVR.KSDS01.INDEX
 ARC6004I 0047 ABACKUP   CLUSTER NAME   JTILLI1.CICSVR.KSDS02
 ARC6004I 0047 ABACKUP   CATALOG NAME   ICFCAT.PLEXV.CATALOGA
 ARC6004I 0047 ABACKUP   COMPONENT NAME JTILLI1.CICSVR.KSDS02.DATA
 ARC6004I 0047 ABACKUP PAGE 0002   5695-DF175   DFSMSDSS V1R07.0 DATA SET SERVICES
2007.337 11:57
 ARC6004I 0047 ABACKUP   COMPONENT NAME JTILLI1.CICSVR.KSDS02.INDEX
 ARC6004I 0047 ABACKUP   CLUSTER NAME   JTILLI1.CICSVR.ESDS02
 ARC6004I 0047 ABACKUP   CATALOG NAME   ICFCAT.PLEXV.CATALOGA
 ARC6004I 0047 ABACKUP   COMPONENT NAME JTILLI1.CICSVR.ESDS02.DATA
 ARC6004I 0047 ABACKUP ADR006I (001)-STEND(02), 2007.337 11:57:52 EXECUTION ENDS
 ARC6004I 0047 ABACKUP ADR013I (001)-CLTSK(01), 2007.337 11:57:57 TASK COMPLETED WITH RETURN
CODE 0000
OARC6004I 0047 ABACKUP ADR012I (SCH)-DSSU (01),
 ARC6004I 0047 ABACKUP 2007.337 11:57:57 DFSMSDSS PROCESSING COMPLETE. HIGHEST RETURN CODE IS
0000
OARC6004I 0047 ABACKUP PAGE 0001   5695-DF175   DFSMSDSS V1R07.0 DATA SET SERVICES
2007.337 11:58
OARC6004I 0047 ABACKUP ADR035I (SCH)-PRIME(06), INSTALLATION EXIT ALTERED BYPASS FAC CLASS CHK
DEFAULT TO YES
OARC6004I 0047 ABACKUP ADR035I (SCH)-PRIME(03), INSTALLATION EXIT ALTERED WORKUNIT DEFAULT TO ¦
1PAGE 0003 Z/OS DFSMSHSM 1.7.0 DATA FACILITY HIERARCHICAL STORAGE MANAGER 07.337 11:57
OARC6004I 0047 ABACKUP DUMP DATASET(INCLUDE(-
OARC6004I 0047 ABACKUP CICSVR.ABARS.INSTRUCT   , -
OARC6004I 0047 ABACKUP HSMACT.H3.ABACKUP.CVRTESTX.D07337.T115739   )) -
OARC6004I 0047 ABACKUP OUTDDNAME(SYS00004, -
OARC6004I 0047 ABACKUP   SYS00005 -
OARC6004I 0047 ABACKUP   ) OPTIMIZE(3) SPHERE   -
OARC6004I 0047 ABACKUP ALLDATA(*) FORCECP(0) -

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OARC6004I 0047 ABACKUP  CONCURRENT -
OARC6004I 0047 ABACKUP  SHARE TOLERATE(ENQFAILURE)
OARC6004I 0047 ABACKUP ADR101I (R/I)-RIO1 (01), TASKID 001 HAS BEEN ASSIGNED TO COMMAND 'DUMP '
OARC6004I 0047 ABACKUP ADR109I (R/I)-RIO1 (01), 2007.337 11:58:01 INITIAL SCAN OF USER CONTROL
STATEMENTS COMPLETED.
OARC6004I 0047 ABACKUP ADR050I (001)-PRIME(01), DFSMSDSS INVOKED VIA APPLICATION INTERFACE
OARC6004I 0047 ABACKUP ADR035I (001)-PRIME(68), INSTALLATION EXIT ALTERED CICSVRBACKUP OPTION
OARC6004I 0047 ABACKUP ADR016I (001)-PRIME(01), RACF LOGGING OPTION IN EFFECT FOR THIS TASK
OARC6004I 0047 ABACKUP ADR006I (001)-STEND(01), 2007.337 11:58:01 EXECUTION BEGINS
OARC6004I 0047 ABACKUP ADR801I (001)-DTDSC(01),
   DATA SET FILTERING IS COMPLETE. 2 OF 2 DATA SETS WERE SELECTED: 0 FAILED SERIALIZATION AND 0
FAILED FOR
OARC6004I 0047 ABACKUP                       OTHER REASONS.
OARC6004I 0047 ABACKUP ADR734I (001)-DTDSC(01),
   2007.337 11:58:01 CONCURRENT COPY INITIALIZATION SUCCESSFUL FOR 2 OF 2 SELECTED DATA SETS.
SERIALIZATION
OARC6004I 0047 ABACKUP                            FOR THIS DATA IS RELEASED IF DFSMSDSS HELD IT.
THE INTERMEDIATE RETURN
 CODE IS 0000.
OARC6004I 0047 ABACKUP ADR454I (001)-DTDSC(01), THE FOLLOWING DATA SETS WERE SUCCESSFULLY
PROCESSED
OARC6004I 0047 ABACKUP                 CICSVR.ABARS.INSTRUCT
OARC6004I 0047 ABACKUP               HSMACT.H3.ABACKUP.CVRTESTX.D07337.T115739
OARC6004I 0047 ABACKUP ADR006I (001)-STEND(02), 2007.337 11:58:03 EXECUTION ENDS
OARC6004I 0047 ABACKUP ADR013I (001)-CLTSK(01), 2007.337 11:58:08 TASK COMPLETED WITH RETURN
CODE 0000
OARC6004I 0047 ABACKUP ADR012I (SCH)-DSSU (01),
 2007.337 11:58:08 DFSMSDSS PROCESSING COMPLETE. HIGHEST RETURN CODE IS 0000
OARC6382I ACTIVITY LOG HSMACT.H3.ABACKUP.CVRTESTX.D07337.T115739 HAS BEEN SUCCESSFULLY BACKED
UP
OARC6382I INSTRUCTION DATA SET CICSVR.ABARS.INSTRUCT HAS BEEN SUCCESSFULLY BACKED UP
1PAGE 0004 Z/OS DFSMSHSM 1.7.0 DATA FACILITY HIERARCHICAL STORAGE MANAGER 07.337 11:57
OARC6369I STORAGE REQUIREMENTS FOR AGGREGATE GROUP CVRTESTX ARE: L0=9542K, ML1=0, ML2=0,
TOTAL=9542K
OARC6061I VOLUMES USED FOR CONTROL FILE CICSVR.ABARS.CVRTESTX.C.C01V0047 DURING AGGREGATE
BACKUP FOR AGGREGATE GROUP
 CVRTESTX ARE:
   LD1617
OARC6060I VOLUMES USED FOR DATA FILE CICSVR.ABARS.CVRTESTX.D.C01V0047 DURING AGGREGATE BACKUP
FOR AGGREGATE GROUP
 CVRTESTX ARE:
   LD1617
OARC6071I VOLUMES USED FOR INSTRUCTION/ACTIVITY LOG FILE CICSVR.ABARS.CVRTESTX.I.C01V0047
DURING AGGREGATE BACKUP FOR
 AGGREGATE GROUP CVRTESTX ARE:
   LD1617
OARC6061I VOLUMES USED FOR CONTROL FILE CICSVR.ABARS.CVRTESTX.C.C02V0047 DURING AGGREGATE
BACKUP FOR AGGREGATE GROUP
 CVRTESTX ARE:
```

```
   LD0126
OARC6060I VOLUMES USED FOR DATA FILE CICSVR.ABARS.CVRTESTX.D.C02V0047 DURING AGGREGATE BACKUP
FOR AGGREGATE GROUP
 CVRTESTX ARE:
   LD0126
OARC6071I VOLUMES USED FOR INSTRUCTION/ACTIVITY LOG FILE CICSVR.ABARS.CVRTESTX.I.C02V0047
DURING AGGREGATE BACKUP FOR
 AGGREGATE GROUP CVRTESTX ARE:
   LD0126
OARC6055I AGGREGATE BACKUP HAS COMPLETED FOR AGGREGATE GROUP CVRTESTX, AT 11:58:15, RETCODE =
000
```

Example 11-3 shows the sample ABARS activity log when DSSLDREG ABARS is in effect and the CICS VR server address space is not active. ABARS backs up selected VSAM data sets by using DFSMSdss. DFSMSdss produces appropriate error messages and does not dump filtered VSAM data sets because the DFSMSdss Options Installation Exit Routine specifies the CICSVRBACKUP option but the CICS VR server address space is not active. So, ABARS does not create a backup.

Example 11-3   Sample ABARS activity log when DSSLDREG ABARS is in effect and the CICS VR server address space is not active

```
1PAGE 0001 Z/OS DFSMSHSM 1.7.0 DATA FACILITY HIERARCHICAL STORAGE MANAGER 07.337 11:59
OARC6000I ABACKUP CVRTESTX EXECUTE UNIT(3490)
OARC6054I AGGREGATE BACKUP STARTING FOR AGGREGATE GROUP CVRTESTX, AT 11:59:07, STARTED TASK =
DFHSMABR.ABAR0105
OARC6030I ACTIVITY LOG FOR AGGREGATE GROUP CVRTESTX WILL BE ROUTED TO
HSMACT.H3.ABACKUP.CVRTESTX.D07337.T115907
OARC6379I THE MANAGEMENT CLASS CONSTRUCTS USED IN THE AGGREGATE GROUP, CVRTESTX, ARE:
 CLASS NAME : STANDARD
 DESCRIPTION:
 STANDARD MANAGEMENT CLASS
 EXPIRATION ATTRIBUTES
   EXPIRE AFTER DAYS NON-USAGE: 1095
   EXPIRE AFTER DATE/DAYS    : NOLIMIT
 RETENTION LIMIT: 0
 PARTIAL RELEASE: N
 MIGRATION ATTRIBUTES
   PRIMARY DAYS NON-USAGE: 100
   LEVEL 1 DAYS NON-USAGE: 1
   COMMAND/AUTO MIGRATE  : BOTH
 GDG MANAGEMENT ATTRIBUTES
   # GDG ELEMENTS OF PRIMARY: 1
   ROLLED OFF GDS ACTION   : EXPIRE
 BACKUP ATTRIBUTES
   BACKUP FREQUENCY           : 3
   # OF BACKUP VERSIONS (DS EXISTS) : 2
```

```
   # OF BACKUP VERSIONS (DS DELETED): 1
   RETAIN DAYS ONLY BACKUP VERSION  : 180
       (DS DELETED)
   RETAIN DAYS EXTRA BACKUP VERSIONS: NOLIMIT
   ADMIN OR USER COMMAND BACKUP     : BOTH
   AUTO BACKUP                 : Y
   BACKUP COPY TECHNIQUE         : P


OARC6379I THE STORAGE CLASS CONSTRUCTS USED IN THE AGGREGATE GROUP, CVRTESTX, ARE:
 CLASS NAME : STANDARD
 DESCRIPTION:
 DEFAULT STORAGE CLASS
 AVAILABILITY: STANDARD
 ACCESSIBILITY:
 GUARANTEED SPACE: N
 GUARANTEED SYNCHRONOUS WRITE: N


 ARC6004I 0047 ABACKUP PAGE 0001     5695-DF175  DFSMSDSS V1R07.0 DATA SET SERVICES
2007.337 11:59
 ARC6004I 0047 ABACKUP ADR035I (SCH)-PRIME(06), INSTALLATION EXIT ALTERED BYPASS FAC CLASS CHK
DEFAULT TO YES
 ARC6004I 0047 ABACKUP ADR035I (SCH)-PRIME(03), INSTALLATION EXIT ALTERED WORKUNIT DEFAULT TO ¦
 ARC6004I 0047 ABACKUP  DUMP DATASET(FILTERDD(SYS00006)) -
 ARC6004I 0047 ABACKUP  OUTDDNAME(SYS00004, -
 ARC6004I 0047 ABACKUP            SYS00005 -
 ARC6004I 0047 ABACKUP               ) OPTIMIZE(3) SPHERE              -
 ARC6004I 0047 ABACKUP  ALLDATA(*) FORCECP(0) -
 ARC6004I 0047 ABACKUP  CONCURRENT -
 ARC6004I 0047 ABACKUP  SHARE TOLERATE(ENQFAILURE)
 ARC6004I 0047 ABACKUP ADR101I (R/I)-RI01 (01), TASKID 001 HAS BEEN ASSIGNED TO COMMAND 'DUMP '
 ARC6004I 0047 ABACKUP ADR109I (R/I)-RI01 (01), 2007.337 11:59:11 INITIAL SCAN OF USER CONTROL
STATEMENTS COMPLETED.
 ARC6004I 0047 ABACKUP ADR050I (001)-PRIME(01), DFSMSDSS INVOKED VIA APPLICATION INTERFACE
 ARC6004I 0047 ABACKUP ADR035I (001)-PRIME(68), INSTALLATION EXIT ALTERED CICSVRBACKUP OPTION
1PAGE 0002 Z/OS DFSMSHSM 1.7.0 DATA FACILITY HIERARCHICAL STORAGE MANAGER 07.337 11:59
 ARC6004I 0047 ABACKUP ADR016I (001)-PRIME(01), RACF LOGGING OPTION IN EFFECT FOR THIS TASK
 ARC6004I 0047 ABACKUP ADR006I (001)-STEND(01), 2007.337 11:59:11 EXECUTION BEGINS
OARC6075I TAPE VOLUME LD1033 SUCCESSFULLY ADDED TO ABARS RACF TAPE VOLUME SET
OARC6075I TAPE VOLUME LD0142 SUCCESSFULLY ADDED TO ABARS RACF TAPE VOLUME SET
OARC6004I 0047 ABACKUP ADR927E (001)-CVRI (03), CICSVRBACKUP FAILED FOR DATA SET
JTILLI1.CICSVR.ESDS01,
 ARC6004I 0047 ABACKUP REASON CODE = EE01
OARC6004I 0047 ABACKUP ADR927E (001)-CVRI (03), CICSVRBACKUP FAILED FOR DATA SET
JTILLI1.CICSVR.KSDS01,
 ARC6004I 0047 ABACKUP REASON CODE = EE01
OARC6004I 0047 ABACKUP ADR927E (001)-CVRI (03), CICSVRBACKUP FAILED FOR DATA SET
JTILLI1.CICSVR.KSDS02,
 ARC6004I 0047 ABACKUP REASON CODE = EE01
```

```
OARC6004I 0047 ABACKUP ADR927E (001)-CVRI (03), CICSVRBACKUP FAILED FOR DATA SET
JTILLI1.CICSVR.ESDS02,
 ARC6004I 0047 ABACKUP REASON CODE = EE01
OARC6004I 0047 ABACKUP ADR801I (001)-DTDSC(01),
 ARC6004I 0047 ABACKUP DATA SET FILTERING IS COMPLETE. 0 OF 0 DATA SETS WERE SELECTED: 0 FAILED
SERIALIZATION AND 0
 ARC6004I 0047 ABACKUP FAILED FOR
 ARC6004I 0047 ABACKUP                    OTHER REASONS.
OARC6004I 0047 ABACKUP ADR734I (001)-DTDSC(01),
 ARC6004I 0047 ABACKUP 2007.337 11:59:15 CONCURRENT COPY INITIALIZATION SUCCESSFUL FOR 0 OF 0
SELECTED DATA SETS. THE
 ARC6004I 0047 ABACKUP                    INTERMEDIATE RETURN CODE IS 0008.
OARC6402I CONCURRENT COPY INITIALIZATION IS COMPLETE FOR AGGREGATE CVRTESTX. ANY SERIALIZATION
HAS BEEN RELEASED. JOB =
 ABACKUP
 ARC6004I 0047 ABACKUP ADR415W (001)-DTDSC(04), NO DATA SETS WERE COPIED, DUMPED, OR RESTORED
FROM ANY VOLUME
 ARC6004I 0047 ABACKUP ADR006I (001)-STEND(02), 2007.337 11:59:16 EXECUTION ENDS
 ARC6004I 0047 ABACKUP ADR013I (001)-CLTSK(01), 2007.337 11:59:21 TASK COMPLETED WITH RETURN
CODE 0008
OARC6004I 0047 ABACKUP ADR012I (SCH)-DSSU (01),
 ARC6004I 0047 ABACKUP 2007.337 11:59:21 DFSMSDSS PROCESSING COMPLETE. HIGHEST RETURN CODE IS
0008 FROM:
 ARC6004I 0047 ABACKUP                    TASK   001
OARC6404E NOTHING WAS BACKED UP DURING THE BACKUP OF AGGREGATE GROUP CVRTESTX - AGGREGATE
BACKUP FAILED
OARC6401I TAPE VOLUME LD1033 SUCCESSFULLY DELETED FROM THE ABARS RACF TAPE VOLUME SET
OARC6401I TAPE VOLUME LD0142 SUCCESSFULLY DELETED FROM THE ABARS RACF TAPE VOLUME SET
OARC6055I AGGREGATE BACKUP HAS COMPLETED FOR AGGREGATE GROUP CVRTESTX, AT 11:59:31, RETCODE =
404
```

Note: The reason code EE01 means that the CICS VR server address space is not active.

Example 11-4 shows the sample ABARS activity log when DSSLDREG ABARSTOP is in effect and the CICS VR server address space is active. ABARS backs up selected VSAM data sets by using DFSMSdss. DFSMSdss notifies the CICS VR server address space for each successfully processed VSAM data set because the DFSMSdss Options Installation Exit Routine specifies the CICSVRBACKUP option. So, ABARS creates a backup and the CICS VR server address space registers the ABARS backup in the RCDS for the VSAM data sets.

Example 11-4   Sample ABARS activity log when DSSLDREG ABARSTOP in effect and the CICS VR server address space active

```
1PAGE 0001 Z/OS DFSMSHSM 1.7.0 DATA FACILITY HIERARCHICAL STORAGE MANAGER 07.337 12:00
0ARC6000I ABACKUP CVRTESTX EXECUTE UNIT(3490)
0ARC6054I AGGREGATE BACKUP STARTING FOR AGGREGATE GROUP CVRTESTX, AT 12:00:40, STARTED TASK =
DFHSMABR.ABAR0138
0ARC6030I ACTIVITY LOG FOR AGGREGATE GROUP CVRTESTX WILL BE ROUTED TO
HSMACT.H3.ABACKUP.CVRTESTX.D07337.T120040
0ARC6379I THE MANAGEMENT CLASS CONSTRUCTS USED IN THE AGGREGATE GROUP, CVRTESTX, ARE:
 CLASS NAME : STANDARD
 DESCRIPTION:
 STANDARD MANAGEMENT CLASS
 EXPIRATION ATTRIBUTES
  EXPIRE AFTER DAYS NON-USAGE: 1095
  EXPIRE AFTER DATE/DAYS    : NOLIMIT
 RETENTION LIMIT: 0
 PARTIAL RELEASE: N
 MIGRATION ATTRIBUTES
  PRIMARY DAYS NON-USAGE: 100
  LEVEL 1 DAYS NON-USAGE: 1
  COMMAND/AUTO MIGRATE  : BOTH
 GDG MANAGEMENT ATTRIBUTES
  # GDG ELEMENTS OF PRIMARY: 1
  ROLLED OFF GDS ACTION   : EXPIRE
 BACKUP ATTRIBUTES
  BACKUP FREQUENCY            : 3
  # OF BACKUP VERSIONS (DS EXISTS) : 2
  # OF BACKUP VERSIONS (DS DELETED): 1
  RETAIN DAYS ONLY BACKUP VERSION : 180
     (DS DELETED)
  RETAIN DAYS EXTRA BACKUP VERSIONS: NOLIMIT
  ADMIN OR USER COMMAND BACKUP    : BOTH
  AUTO BACKUP              : Y
  BACKUP COPY TECHNIQUE       : P

0ARC6379I THE STORAGE CLASS CONSTRUCTS USED IN THE AGGREGATE GROUP, CVRTESTX, ARE:
 CLASS NAME : STANDARD
 DESCRIPTION:
 DEFAULT STORAGE CLASS
```

```
 AVAILABILITY: STANDARD
 ACCESSIBILITY:
 GUARANTEED SPACE: N
 GUARANTEED SYNCHRONOUS WRITE: N


 ARC6004I 004A ABACKUP PAGE 0001    5695-DF175  DFSMSDSS V1R07.0 DATA SET SERVICES
2007.337 12:00
 ARC6004I 004A ABACKUP ADR035I (SCH)-PRIME(06), INSTALLATION EXIT ALTERED BYPASS FAC CLASS CHK
DEFAULT TO YES
ARC6004I 004A ABACKUP ADR035I (SCH)-PRIME(03), INSTALLATION EXIT ALTERED WORKUNIT DEFAULT TO ¦
 ARC6004I 004A ABACKUP  DUMP DATASET(FILTERDD(SYS00006)) -
 ARC6004I 004A ABACKUP  OUTDDNAME(SYS00004, -
 ARC6004I 004A ABACKUP          SYS00005  -
 ARC6004I 004A ABACKUP              ) OPTIMIZE(3) SPHERE                -
 ARC6004I 004A ABACKUP  ALLDATA(*) FORCECP(0) -
 ARC6004I 004A ABACKUP  CONCURRENT -
 ARC6004I 004A ABACKUP  SHARE TOLERATE(ENQFAILURE)
ARC6004I 004A ABACKUP ADR101I (R/I)-RI01 (01), TASKID 001 HAS BEEN ASSIGNED TO COMMAND 'DUMP '
 ARC6004I 004A ABACKUP ADR109I (R/I)-RI01 (01), 2007.337 12:00:44 INITIAL SCAN OF USER CONTROL
STATEMENTS COMPLETED.
 ARC6004I 004A ABACKUP ADR050I (001)-PRIME(01), DFSMSDSS INVOKED VIA APPLICATION INTERFACE
ARC6004I 004A ABACKUP ADR035I (001)-PRIME(68), INSTALLATION EXIT ALTERED CICSVRBACKUP OPTION
1PAGE 0002 Z/OS DFSMSHSM 1.7.0 DATA FACILITY HIERARCHICAL STORAGE MANAGER 07.337 12:00
 ARC6004I 004A ABACKUP ADR016I (001)-PRIME(01), RACF LOGGING OPTION IN EFFECT FOR THIS TASK
 ARC6004I 004A ABACKUP ADR006I (001)-STEND(01), 2007.337 12:00:44 EXECUTION BEGINS
0ARC6075I TAPE VOLUME LD1039 SUCCESSFULLY ADDED TO ABARS RACF TAPE VOLUME SET
0ARC6075I TAPE VOLUME LD1058 SUCCESSFULLY ADDED TO ABARS RACF TAPE VOLUME SET
 ARC6004I 004A ABACKUP ADR928I (001)-CVRI (06), CICSVRBACKUP WAS SUCCESSFUL FOR DATA SET
JTILLI1.CICSVR.ESDS01
 ARC6004I 004A ABACKUP ADR928I (001)-CVRI (06), CICSVRBACKUP WAS SUCCESSFUL FOR DATA SET
JTILLI1.CICSVR.KSDS01
 ARC6004I 004A ABACKUP ADR928I (001)-CVRI (06), CICSVRBACKUP WAS SUCCESSFUL FOR DATA SET
JTILLI1.CICSVR.KSDS02
 ARC6004I 004A ABACKUP ADR928I (001)-CVRI (06), CICSVRBACKUP WAS SUCCESSFUL FOR DATA SET
JTILLI1.CICSVR.ESDS02
0ARC6004I 004A ABACKUP ADR801I (001)-DTDSC(01),
 ARC6004I 004A ABACKUP DATA SET FILTERING IS COMPLETE. 4 OF 4 DATA SETS WERE SELECTED: 0 FAILED
SERIALIZATION AND 0
 ARC6004I 004A ABACKUP FAILED FOR
 ARC6004I 004A ABACKUP                    OTHER REASONS.
0ARC6004I 004A ABACKUP ADR734I (001)-DTDSC(01),
 ARC6004I 004A ABACKUP 2007.337 12:00:47 CONCURRENT COPY INITIALIZATION SUCCESSFUL FOR 4 OF 4
SELECTED DATA SETS.
 ARC6004I 004A ABACKUP SERIALIZATION
0ARC6004I 004A ABACKUP                         FOR THIS DATA IS RELEASED IF DFSMSDSS HELD IT.
THE INTERMEDIATE RETURN
 ARC6004I 004A ABACKUP CODE IS 0000.
0ARC6402I CONCURRENT COPY INITIALIZATION IS COMPLETE FOR AGGREGATE CVRTESTX. ANY SERIALIZATION
HAS BEEN RELEASED. JOB =
```

```
 ABACKUP
0ARC6004I 004A ABACKUP ADR788I (001)-DIVSM(03), PROCESSING COMPLETED FOR CLUSTER
JTILLI1.CICSVR.KSDS01,
 ARC6004I 004A ABACKUP 1 RECORD(S) PROCESSED, REASON 0
0ARC6004I 004A ABACKUP ADR788I (001)-DIVSM(03), PROCESSING COMPLETED FOR CLUSTER
JTILLI1.CICSVR.KSDS02,
 ARC6004I 004A ABACKUP 1 RECORD(S) PROCESSED, REASON 0
 ARC6004I 004A ABACKUP ADR454I (001)-DTDSC(01), THE FOLLOWING DATA SETS WERE SUCCESSFULLY
PROCESSED
 ARC6004I 004A ABACKUP                     CLUSTER NAME   JTILLI1.CICSVR.ESDS01
 ARC6004I 004A ABACKUP                     CATALOG NAME   ICFCAT.PLEXV.CATALOGA
 ARC6004I 004A ABACKUP                   COMPONENT NAME JTILLI1.CICSVR.ESDS01.DATA
 ARC6004I 004A ABACKUP                     CLUSTER NAME   JTILLI1.CICSVR.KSDS01
 ARC6004I 004A ABACKUP                     CATALOG NAME   ICFCAT.PLEXV.CATALOGA
 ARC6004I 004A ABACKUP                   COMPONENT NAME JTILLI1.CICSVR.KSDS01.DATA
 ARC6004I 004A ABACKUP                   COMPONENT NAME JTILLI1.CICSVR.KSDS01.INDEX
 ARC6004I 004A ABACKUP                     CLUSTER NAME   JTILLI1.CICSVR.KSDS02
 ARC6004I 004A ABACKUP                     CATALOG NAME   ICFCAT.PLEXV.CATALOGA
 ARC6004I 004A ABACKUP                   COMPONENT NAME JTILLI1.CICSVR.KSDS02.DATA
 ARC6004I 004A ABACKUP PAGE 0002      5695-DF175   DFSMSDSS V1R07.0 DATA SET SERVICES
2007.337 12:00
 ARC6004I 004A ABACKUP                   COMPONENT NAME JTILLI1.CICSVR.KSDS02.INDEX
 ARC6004I 004A ABACKUP                     CLUSTER NAME   JTILLI1.CICSVR.ESDS02
 ARC6004I 004A ABACKUP                     CATALOG NAME   ICFCAT.PLEXV.CATALOGA
 ARC6004I 004A ABACKUP                   COMPONENT NAME JTILLI1.CICSVR.ESDS02.DATA
 ARC6004I 004A ABACKUP ADR006I (001)-STEND(02), 2007.337 12:00:51 EXECUTION ENDS
 ARC6004I 004A ABACKUP ADR013I (001)-CLTSK(01), 2007.337 12:00:56 TASK COMPLETED WITH RETURN
CODE 0000
0ARC6004I 004A ABACKUP ADR012I (SCH)-DSSU (01),
 ARC6004I 004A ABACKUP 2007.337 12:00:56 DFSMSDSS PROCESSING COMPLETE. HIGHEST RETURN CODE IS
0000
0ARC6004I 004A ABACKUP PAGE 0001      5695-DF175   DFSMSDSS V1R07.0 DATA SET SERVICES
2007.337 12:01
0ARC6004I 004A ABACKUP ADR035I (SCH)-PRIME(06), INSTALLATION EXIT ALTERED BYPASS FAC CLASS CHK
DEFAULT TO YES
0ARC6004I 004A ABACKUP ADR035I (SCH)-PRIME(03), INSTALLATION EXIT ALTERED WORKUNIT DEFAULT TO ¦
1PAGE 0003 Z/OS DFSMSHSM 1.7.0 DATA FACILITY HIERARCHICAL STORAGE MANAGER 07.337 12:00
0ARC6004I 004A ABACKUP  DUMP DATASET(INCLUDE( -
0ARC6004I 004A ABACKUP  CICSVR.ABARS.INSTRUCT                   ,  -
0ARC6004I 004A ABACKUP  HSMACT.H3.ABACKUP.CVRTESTX.D07337.T120040   )) -
0ARC6004I 004A ABACKUP  OUTDDNAME(SYS00004, -
0ARC6004I 004A ABACKUP          SYS00005 -
0ARC6004I 004A ABACKUP               ) OPTIMIZE(3) SPHERE                -
0ARC6004I 004A ABACKUP  ALLDATA(*) FORCECP(0) -
0ARC6004I 004A ABACKUP  CONCURRENT -
0ARC6004I 004A ABACKUP  SHARE TOLERATE(ENQFAILURE)
0ARC6004I 004A ABACKUP ADR101I (R/I)-RI01 (01), TASKID 001 HAS BEEN ASSIGNED TO COMMAND 'DUMP '
0ARC6004I 004A ABACKUP ADR109I (R/I)-RI01 (01), 2007.337 12:01:00 INITIAL SCAN OF USER CONTROL
STATEMENTS COMPLETED.
```

OARC6004I 004A ABACKUP ADR050I (001)-PRIME(01),DFSMSDSS INVOKED VIA APPLICATION INTERFACE
OARC6004I 004A ABACKUP ADR035I (001)-PRIME(68),INSTALLATION EXIT ALTERED CICSVRBACKUP OPTION
OARC6004I 004A ABACKUP ADR016I (001)-PRIME(01),RACF LOGGING OPTION IN EFFECT FOR THIS TASK
OARC6004I 004A ABACKUP ADR006I (001)-STEND(01),2007.337 12:01:00 EXECUTION BEGINS
OARC6004I 004A ABACKUP ADR801I (001)-DTDSC(01),
   DATA SET FILTERING IS COMPLETE. 2 OF 2 DATA SETS WERE SELECTED: 0 FAILED SERIALIZATION AND 0
FAILED FOR
OARC6004I 004A ABACKUP   OTHER REASONS.
OARC6004I 004A ABACKUP ADR734I (001)-DTDSC(01),
   2007.337 12:01:00 CONCURRENT COPY INITIALIZATION SUCCESSFUL FOR 2 OF 2 SELECTED DATA SETS.
SERIALIZATION
OARC6004I 004A ABACKUP   FOR THIS DATA IS RELEASED IF DFSMSDSS HELD IT.
THE INTERMEDIATE RETURN
 CODE IS 0000.
OARC6004I 004A ABACKUP ADR454I (001)-DTDSC(01), THE FOLLOWING DATA SETS WERE SUCCESSFULLY
PROCESSED
OARC6004I 004A ABACKUP   CICSVR.ABARS.INSTRUCT
OARC6004I 004A ABACKUP   HSMACT.H3.ABACKUP.CVRTESTX.D07337.T120040
OARC6004I 004A ABACKUP ADR006I (001)-STEND(02),2007.337 12:01:02 EXECUTION ENDS
OARC6004I 004A ABACKUP ADR013I (001)-CLTSK(01), 2007.337 12:01:07 TASK COMPLETED WITH RETURN
CODE 0000
OARC6004I 004A ABACKUP ADR012I (SCH)-DSSU (01),
 2007.337 12:01:07 DFSMSDSS PROCESSING COMPLETE. HIGHEST RETURN CODE IS 0000
OARC6382I ACTIVITY LOG HSMACT.H3.ABACKUP.CVRTESTX.D07337.T120040 HAS BEEN SUCCESSFULLY BACKED
UP
OARC6382I INSTRUCTION DATA SET CICSVR.ABARS.INSTRUCT HAS BEEN SUCCESSFULLY BACKED UP
1PAGE 0004 Z/OS DFSMSHSM 1.7.0 DATA FACILITY HIERARCHICAL STORAGE MANAGER 07.337 12:00
OARC6369I STORAGE REQUIREMENTS FOR AGGREGATE GROUP CVRTESTX ARE: L0=9542K, ML1=0, ML2=0,
TOTAL=9542K
OARC6061I VOLUMES USED FOR CONTROL FILE CICSVR.ABARS.CVRTESTX.C.C01V0048 DURING AGGREGATE
BACKUP FOR AGGREGATE GROUP
 CVRTESTX ARE:
   LD1039
OARC6060I VOLUMES USED FOR DATA FILE CICSVR.ABARS.CVRTESTX.D.C01V0048 DURING AGGREGATE BACKUP
FOR AGGREGATE GROUP
 CVRTESTX ARE:
   LD1039
OARC6071I VOLUMES USED FOR INSTRUCTION/ACTIVITY LOG FILE CICSVR.ABARS.CVRTESTX.I.C01V0048
DURING AGGREGATE BACKUP FOR
 AGGREGATE GROUP CVRTESTX ARE:
   LD1039
OARC6061I VOLUMES USED FOR CONTROL FILE CICSVR.ABARS.CVRTESTX.C.C02V0048 DURING AGGREGATE
BACKUP FOR AGGREGATE GROUP
 CVRTESTX ARE:
   LD1058
OARC6060I VOLUMES USED FOR DATA FILE CICSVR.ABARS.CVRTESTX.D.C02V0048 DURING AGGREGATE BACKUP
FOR AGGREGATE GROUP
 CVRTESTX ARE:
   LD1058

```
OARC6071I VOLUMES USED FOR INSTRUCTION/ACTIVITY LOG FILE CICSVR.ABARS.CVRTESTX.I.C02V0048
DURING AGGREGATE BACKUP FOR
 AGGREGATE GROUP CVRTESTX ARE:
   LD1058
OARC6055I AGGREGATE BACKUP HAS COMPLETED FOR AGGREGATE GROUP CVRTESTX, AT 12:01:17, RETCODE =
000
```

Example 11-5 shows the sample ABARS activity log when DSSLDREG ABARSTOP is in effect and the CICS VR server address space is not active. ABARS backs up selected VSAM data sets by using DFSMSdss. DFSMSdss does not notify the CICS VR server address space because the DFSMSdss Options Installation Exit Routine does not specify the CICSVRBACKUP option since the CICS VR server address space is not active. So, ABARS creates a backup even when the CICS VR server address space is not active.

Example 11-5   Sample ABARS activity log when DSSLDREG ABARSTOP in effect and the CICS VR server address space not active

```
1PAGE 0001 Z/OS DFSMSHSM 1.7.0 DATA FACILITY HIERARCHICAL STORAGE MANAGER 07.337 12:02
OARC6000I ABACKUP CVRTESTX EXECUTE UNIT(3490)
OARC6054I AGGREGATE BACKUP STARTING FOR AGGREGATE GROUP CVRTESTX, AT 12:02:27, STARTED TASK =
DFHSMABR.ABAR0123
OARC6030I ACTIVITY LOG FOR AGGREGATE GROUP CVRTESTX WILL BE ROUTED TO
HSMACT.H3.ABACKUP.CVRTESTX.D07337.T120227
OARC6379I THE MANAGEMENT CLASS CONSTRUCTS USED IN THE AGGREGATE GROUP, CVRTESTX, ARE:
 CLASS NAME : STANDARD
 DESCRIPTION:
 STANDARD MANAGEMENT CLASS
 EXPIRATION ATTRIBUTES
   EXPIRE AFTER DAYS NON-USAGE: 1095
   EXPIRE AFTER DATE/DAYS     : NOLIMIT
 RETENTION LIMIT: 0
 PARTIAL RELEASE: N
 MIGRATION ATTRIBUTES
   PRIMARY DAYS NON-USAGE: 100
   LEVEL 1 DAYS NON-USAGE: 1
   COMMAND/AUTO MIGRATE  : BOTH
 GDG MANAGEMENT ATTRIBUTES
   # GDG ELEMENTS OF PRIMARY: 1
   ROLLED OFF GDS ACTION   : EXPIRE
 BACKUP ATTRIBUTES
   BACKUP FREQUENCY           : 3
   # OF BACKUP VERSIONS (DS EXISTS) : 2
   # OF BACKUP VERSIONS (DS DELETED): 1
   RETAIN DAYS ONLY BACKUP VERSION  : 180
       (DS DELETED)
   RETAIN DAYS EXTRA BACKUP VERSIONS: NOLIMIT
   ADMIN OR USER COMMAND BACKUP    : BOTH
```

```
   AUTO BACKUP                  : Y
   BACKUP COPY TECHNIQUE        : P


OARC6379I THE STORAGE CLASS CONSTRUCTS USED IN THE AGGREGATE GROUP, CVRTESTX, ARE:
 CLASS NAME : STANDARD
 DESCRIPTION:
 DEFAULT STORAGE CLASS
 AVAILABILITY: STANDARD
 ACCESSIBILITY:
 GUARANTEED SPACE: N
 GUARANTEED SYNCHRONOUS WRITE: N


 ARC6004I 004A ABACKUP PAGE 0001     5695-DF175  DFSMSDSS V1R07.0 DATA SET SERVICES
2007.337 12:02
 ARC6004I 004A ABACKUP ADR035I (SCH)-PRIME(06), INSTALLATION EXIT ALTERED BYPASS FAC CLASS CHK
DEFAULT TO YES
ARC6004I 004A ABACKUP ADR035I (SCH)-PRIME(03), INSTALLATION EXIT ALTERED WORKUNIT DEFAULT TO ¦
 ARC6004I 004A ABACKUP  DUMP DATASET(FILTERDD(SYS00006)) -
 ARC6004I 004A ABACKUP  OUTDDNAME(SYS00004, -
 ARC6004I 004A ABACKUP          SYS00005 -
 ARC6004I 004A ABACKUP               ) OPTIMIZE(3) SPHERE                     -
 ARC6004I 004A ABACKUP  ALLDATA(*) FORCECP(0) -
 ARC6004I 004A ABACKUP  CONCURRENT -
 ARC6004I 004A ABACKUP  SHARE TOLERATE(ENQFAILURE)
ARC6004I 004A ABACKUP ADR101I (R/I)-RI01 (01), TASKID 001 HAS BEEN ASSIGNED TO COMMAND 'DUMP '
 ARC6004I 004A ABACKUP ADR109I (R/I)-RI01 (01), 2007.337 12:02:33 INITIAL SCAN OF USER CONTROL
STATEMENTS COMPLETED.
 ARC6004I 004A ABACKUP ADR050I (001)-PRIME(01), DFSMSDSS INVOKED VIA APPLICATION INTERFACE
 ARC6004I 004A ABACKUP ADR016I (001)-PRIME(01), RACF LOGGING OPTION IN EFFECT FOR THIS TASK
1PAGE 0002 Z/OS DFSMSHSM 1.7.0 DATA FACILITY HIERARCHICAL STORAGE MANAGER 07.337 12:02
 ARC6004I 004A ABACKUP ADR006I (001)-STEND(01), 2007.337 12:02:33 EXECUTION BEGINS
OARC6075I TAPE VOLUME LD1072 SUCCESSFULLY ADDED TO ABARS RACF TAPE VOLUME SET
OARC6075I TAPE VOLUME LD1205 SUCCESSFULLY ADDED TO ABARS RACF TAPE VOLUME SET
OARC6004I 004A ABACKUP ADR801I (001)-DTDSC(01),
 ARC6004I 004A ABACKUP DATA SET FILTERING IS COMPLETE. 4 OF 4 DATA SETS WERE SELECTED: 0 FAILED
SERIALIZATION AND 0
 ARC6004I 004A ABACKUP FAILED FOR
 ARC6004I 004A ABACKUP                    OTHER REASONS.
OARC6004I 004A ABACKUP ADR734I (001)-DTDSC(01),
 ARC6004I 004A ABACKUP 2007.337 12:02:36 CONCURRENT COPY INITIALIZATION SUCCESSFUL FOR 4 OF 4
SELECTED DATA SETS.
 ARC6004I 004A ABACKUP SERIALIZATION
OARC6004I 004A ABACKUP                         FOR THIS DATA IS RELEASED IF DFSMSDSS HELD IT.
THE INTERMEDIATE RETURN
 ARC6004I 004A ABACKUP CODE IS 0000.
OARC6402I CONCURRENT COPY INITIALIZATION IS COMPLETE FOR AGGREGATE CVRTESTX. ANY SERIALIZATION
HAS BEEN RELEASED. JOB =
 ABACKUP
```

```
0ARC6004I 004A ABACKUP ADR788I (001)-DIVSM(03), PROCESSING COMPLETED FOR CLUSTER
JTILLI1.CICSVR.KSDS01,
 ARC6004I 004A ABACKUP 1 RECORD(S) PROCESSED, REASON 0
0ARC6004I 004A ABACKUP ADR788I (001)-DIVSM(03), PROCESSING COMPLETED FOR CLUSTER
JTILLI1.CICSVR.KSDS02,
 ARC6004I 004A ABACKUP 1 RECORD(S) PROCESSED, REASON 0
 ARC6004I 004A ABACKUP ADR454I (001)-DTDSC(01), THE FOLLOWING DATA SETS WERE SUCCESSFULLY
PROCESSED
 ARC6004I 004A ABACKUP                    CLUSTER NAME   JTILLI1.CICSVR.ESDS01
 ARC6004I 004A ABACKUP                    CATALOG NAME   ICFCAT.PLEXV.CATALOGA
 ARC6004I 004A ABACKUP                   COMPONENT NAME JTILLI1.CICSVR.ESDS01.DATA
 ARC6004I 004A ABACKUP                    CLUSTER NAME   JTILLI1.CICSVR.KSDS01
 ARC6004I 004A ABACKUP                    CATALOG NAME   ICFCAT.PLEXV.CATALOGA
 ARC6004I 004A ABACKUP                   COMPONENT NAME JTILLI1.CICSVR.KSDS01.DATA
 ARC6004I 004A ABACKUP                   COMPONENT NAME JTILLI1.CICSVR.KSDS01.INDEX
 ARC6004I 004A ABACKUP                    CLUSTER NAME   JTILLI1.CICSVR.KSDS02
 ARC6004I 004A ABACKUP                    CATALOG NAME   ICFCAT.PLEXV.CATALOGA
 ARC6004I 004A ABACKUP                   COMPONENT NAME JTILLI1.CICSVR.KSDS02.DATA
 ARC6004I 004A ABACKUP                   COMPONENT NAME JTILLI1.CICSVR.KSDS02.INDEX
 ARC6004I 004A ABACKUP                    CLUSTER NAME   JTILLI1.CICSVR.ESDS02
 ARC6004I 004A ABACKUP                    CATALOG NAME   ICFCAT.PLEXV.CATALOGA
 ARC6004I 004A ABACKUP                   COMPONENT NAME JTILLI1.CICSVR.ESDS02.DATA
 ARC6004I 004A ABACKUP ADR006I (001)-STEND(02), 2007.337 12:02:44 EXECUTION ENDS
 ARC6004I 004A ABACKUP PAGE 0002    5695-DF175  DFSMSDSS V1R07.0 DATA SET SERVICES
2007.337 12:02
 ARC6004I 004A ABACKUP ADR013I (001)-CLTSK(01), 2007.337 12:02:49 TASK COMPLETED WITH RETURN
CODE 0000
0ARC6004I 004A ABACKUP ADR012I (SCH)-DSSU (01),
 ARC6004I 004A ABACKUP 2007.337 12:02:49 DFSMSDSS PROCESSING COMPLETE. HIGHEST RETURN CODE IS
0000
0ARC6004I 004A ABACKUP PAGE 0001    5695-DF175  DFSMSDSS V1R07.0 DATA SET SERVICES
2007.337 12:02
0ARC6004I 004A ABACKUP ADR035I (SCH)-PRIME(06), INSTALLATION EXIT ALTERED BYPASS FAC CLASS CHK
DEFAULT TO YES
0ARC6004I 004A ABACKUP ADR035I (SCH)-PRIME(03), INSTALLATION EXIT ALTERED WORKUNIT DEFAULT TO ¦
0ARC6004I 004A ABACKUP DUMP DATASET(INCLUDE( -
0ARC6004I 004A ABACKUP  CICSVR.ABARS.INSTRUCT                , -
0ARC6004I 004A ABACKUP  HSMACT.H3.ABACKUP.CVRTESTX.D07337.T120227   )) -
1PAGE 0003 Z/OS DFSMSHSM 1.7.0 DATA FACILITY HIERARCHICAL STORAGE MANAGER 07.337 12:02
0ARC6004I 004A ABACKUP  OUTDDNAME(SYS00004, -
0ARC6004I 004A ABACKUP          SYS00005 -
0ARC6004I 004A ABACKUP              ) OPTIMIZE(3) SPHERE              -
0ARC6004I 004A ABACKUP  ALLDATA(*) FORCECP(0) -
0ARC6004I 004A ABACKUP  CONCURRENT -
0ARC6004I 004A ABACKUP  SHARE TOLERATE(ENQFAILURE)
0ARC6004I 004A ABACKUP ADR101I (R/I)-RI01 (01), TASKID 001 HAS BEEN ASSIGNED TO COMMAND 'DUMP '
0ARC6004I 004A ABACKUP ADR109I (R/I)-RI01 (01), 2007.337 12:02:59 INITIAL SCAN OF USER CONTROL
STATEMENTS COMPLETED.
0ARC6004I 004A ABACKUP ADR050I (001)-PRIME(01), DFSMSDSS INVOKED VIA APPLICATION INTERFACE
```

OARC6004I 004A ABACKUP ADR016I (001)-PRIME(01), RACF LOGGING OPTION IN EFFECT FOR THIS TASK
OARC6004I 004A ABACKUP ADR006I (001)-STEND(01), 2007.337 12:02:59 EXECUTION BEGINS
OARC6004I 004A ABACKUP ADR801I (001)-DTDSC(01),
  DATA SET FILTERING IS COMPLETE. 2 OF 2 DATA SETS WERE SELECTED: 0 FAILED SERIALIZATION AND 0
FAILED FOR
OARC6004I 004A ABACKUP   OTHER REASONS.
OARC6004I 004A ABACKUP ADR734I (001)-DTDSC(01),
  2007.337 12:03:02 CONCURRENT COPY INITIALIZATION SUCCESSFUL FOR 2 OF 2 SELECTED DATA SETS.
SERIALIZATION
OARC6004I 004A ABACKUP   FOR THIS DATA IS RELEASED IF DFSMSDSS HELD IT.
THE INTERMEDIATE RETURN
 CODE IS 0000.
OARC6004I 004A ABACKUP ADR454I (001)-DTDSC(01), THE FOLLOWING DATA SETS WERE SUCCESSFULLY
PROCESSED
OARC6004I 004A ABACKUP   CICSVR.ABARS.INSTRUCT
OARC6004I 004A ABACKUP   HSMACT.H3.ABACKUP.CVRTESTX.D07337.T120227
OARC6004I 004A ABACKUP ADR006I (001)-STEND(02), 2007.337 12:03:04 EXECUTION ENDS
OARC6004I 004A ABACKUP ADR013I (001)-CLTSK(01), 2007.337 12:03:09 TASK COMPLETED WITH RETURN
CODE 0000
OARC6004I 004A ABACKUP ADR012I (SCH)-DSSU (01),
 2007.337 12:03:09 DFSMSDSS PROCESSING COMPLETE. HIGHEST RETURN CODE IS 0000
OARC6382I ACTIVITY LOG HSMACT.H3.ABACKUP.CVRTESTX.D07337.T120227 HAS BEEN SUCCESSFULLY BACKED
UP
OARC6382I INSTRUCTION DATA SET CICSVR.ABARS.INSTRUCT HAS BEEN SUCCESSFULLY BACKED UP
OARC6369I STORAGE REQUIREMENTS FOR AGGREGATE GROUP CVRTESTX ARE: L0=9542K, ML1=0, ML2=0,
TOTAL=9542K
OARC6061I VOLUMES USED FOR CONTROL FILE CICSVR.ABARS.CVRTESTX.C.C01V0049 DURING AGGREGATE
BACKUP FOR AGGREGATE GROUP
 CVRTESTX ARE:
  LD1072
OARC6060I VOLUMES USED FOR DATA FILE CICSVR.ABARS.CVRTESTX.D.C01V0049 DURING AGGREGATE BACKUP
FOR AGGREGATE GROUP
 CVRTESTX ARE:
1PAGE 0004 Z/OS DFSMSHSM 1.7.0 DATA FACILITY HIERARCHICAL STORAGE MANAGER 07.337 12:02
  LD1072
OARC6071I VOLUMES USED FOR INSTRUCTION/ACTIVITY LOG FILE CICSVR.ABARS.CVRTESTX.I.C01V0049
DURING AGGREGATE BACKUP FOR
 AGGREGATE GROUP CVRTESTX ARE:
  LD1072
OARC6061I VOLUMES USED FOR CONTROL FILE CICSVR.ABARS.CVRTESTX.C.C02V0049 DURING AGGREGATE
BACKUP FOR AGGREGATE GROUP
 CVRTESTX ARE:
  LD1205
OARC6060I VOLUMES USED FOR DATA FILE CICSVR.ABARS.CVRTESTX.D.C02V0049 DURING AGGREGATE BACKUP
FOR AGGREGATE GROUP
 CVRTESTX ARE:
  LD1205
OARC6071I VOLUMES USED FOR INSTRUCTION/ACTIVITY LOG FILE CICSVR.ABARS.CVRTESTX.I.C02V0049
DURING AGGREGATE BACKUP FOR

```
 AGGREGATE GROUP CVRTESTX ARE:
   LD1205
OARC6055I AGGREGATE BACKUP HAS COMPLETED FOR AGGREGATE GROUP CVRTESTX, AT 12:03:18, RETCODE =
000
```

> **Note:** DSSLDREG YES and DSSLDREG YESTOP work in the same way as DSSLDREG ABARS and DSSLDREG ABARSTOP correspondingly but for any application, including ABARS application, that uses DFSMSdss to create DFSMSdss logical dumps.
>
> ► Use DSSLDREG NO when DFSMSdss logical dumps *must* be created but *not* registered by using the CICS VR server address space.
>
> ► Use DSSLDREG YES or DSSLDREG ABARS when DFSMSdss logical dumps *must* be created only if they have been successfully registered by using the CICS VR server address space.
>
> ► Use DSSLDREG YESTOP and DSSLDREG ABARSTOP when DFSMSdss logical dumps *must* be created even if they have not been successfully registered by using the CICS VR server address space.
>
> Thus, to both create DFSMSdss logical dumps successfully and register them successfully, the CICS VR server address space *must* be active when backup applications are running.

11.1.2 ABARS backup listing

You can use the CICS VR panel interface to list ABARS backups registered in the RCDS for selected VSAM data sets in the same way as backups that are created using DFSMShsm, DFSMSdss, and other currently supported backup products as shown in Figure 11-4, Figure 11-5 on page 323, and Figure 11-6 on page 323.

> **Note:** 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 8 of 8
 Command ===> _____

 Press Enter to show the backup list for the next selected VSAM sphere. Or,
 press F12 to cancel the list sequence.

   VSAM sphere  . . . : JTILLI1.CICSVR.ESDSO1


   -------------------- Data set backup information --------------------
   Date     Time    Gen  Ver   Online  RP Date  RP Time   Type   Product
   07.337   18:42:24            NO                         LOCAL  DSSLC
   07.337   12:00:46  01  0048  NO                         LOCAL  ABARS
   07.337   11:57:48  01  0047  NO                         LOCAL  ABARS
   07.334   20:33:05  01  0045  NO                         LOCAL  ABARS
   07.334   20:05:40  01  0044  NO                         LOCAL  ABARS
   07.332   14:35:52  01  0042  NO                         LOCAL  ABARS
   07.332   14:35:35  00  0002  NO                         LOCAL  HSMLB
   07.332   14:35:34  01  0001  NO                         LOCAL  HSMLB
 **************************** Bottom of data ****************************


  F1=Help     F5=Local    F6=GMT      F7=Bkwd     F8=Fwd     F12=Cancel
```

Figure 11-4   Backup list including ABARS backups

```
                    CICSVR registered backup names list       Row 1 to 5 of 6
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 get optional backup information, or F11 (Dereg) to
deregister the backup from the RCDS and optionally uncatalog and delete
the backup.

VSAM sphere  . . . : JTILLI1.CICSVR.ESDS01

-------------------- Data set backup information ----------------------

S  Date    Time     Type    Backup data set name
_  07.337  18:42:24  LOCAL   DWW.DS002001.D2007337.T1842243
S  07.337  12:00:46  LOCAL   CICSVR.ABARS.CVRTESTX.D.C01V0048
_  07.337  11:57:48  LOCAL   CICSVR.ABARS.CVRTESTX.D.C01V0047
_  07.334  20:33:05  LOCAL   CICSVR.ABARS.CVRTESTX.D.C01V0045
_  07.334  20:05:40  LOCAL   CICSVR.ABARS.CVRTESTX.D.C01V0044
 F1=Help     F5=Local    F6=GMT      F7=Bkwd     F8=Fwd     F10=Info
F11=Dereg   F12=Cancel
```

Figure 11-5   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  . . . . : JTILLI1.CICSVR.ESDS01

  Backup data set name : CICSVR.ABARS.CVRTESTX.D.C01V0048

  Product identifier . : ABARS


  -------------------- Optional information --------------------

***************************** Bottom of data *****************************




 F1=Help     F7=Bkwd     F8=Fwd      F12=Cancel
```

Figure 11-6   Backup optional information for the selected ABARS backup

11.1.3 ABARS backup restoring

You can use the CICS VR panel interface to restore selected VSAM data sets from ABARS backups registered in the RCDS in the same way as from backups that are created using DFSMShsm, DFSMSdss, and other currently supported backup products as shown in Figure 11-7.

> **Note:** 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.

When you select an ABARS backup, the supplied restore JCL skeleton is added to the generated recovery job. The skeleton deletes the target data sets (if they exist), then restores and renames (if requested) the selected VSAM data sets from the selected ABARS backup.

The skeleton is located in the DWWDSSLD member of SDWWSENU. In most cases, you do not need to make any changes to this skeleton. The substituted skeleton displays as a few separate job steps 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.

```
                        CICSVR backup prompt list           Row 1 to 8 of 8
 Command ===> _____

 Select one backup time, then press Enter.


 VSAM sphere  . . . : JTILLI1.CICSVR.ESDS01


 --------------------- Data set backup information ---------------------
 S  Date     Time     Gen  Ver  Online  RP Date  RP Time  Type   Product
 _  07.337   18:42:24            NO                        LOCAL  DSSLC
 S  07.337   12:00:46  01   0048  NO                        LOCAL  ABARS
 _  07.337   11:57:48  01   0047  NO                        LOCAL  ABARS
 _  07.334   20:33:05  01   0045  NO                        LOCAL  ABARS
 _  07.334   20:05:40  01   0044  NO                        LOCAL  ABARS
 _  07.332   14:35:52  01   0042  NO                        LOCAL  ABARS
 _  07.332   14:35:35  00   0002  NO                        LOCAL  HSMLB
 _  07.332   14:35:34  01   0001  NO                        LOCAL  HSMLB
 **************************** Bottom of data ****************************




  F1=Help     F7=Bkwd     F8=Fwd      F12=Cancel
```

Figure 11-7   Backup prompt list including ABARS backups

When it is possible, CICS VR uses the *selective restore* technique and the *group restore* technique for backup products which can create backups containing data not for one data set but for a number of data sets. For example, ABARS can create a backup for an aggregate group containing data for perhaps hundreds data sets.

CICS VR can apply the selective and group restore techniques to restore data sets from backups created by using DFSMSdss. CICS VR can apply the selective and group restore techniques as well to restore data sets from backups created by using ABARS since ABARS backups are DFSMSdss logical dumps.

Example 11-6 shows the sample forward recovery job using selective restore. CICS VR applies the selective restore technique to restore only selected data sets instead of restoring all data sets from the backup.

Example 11-6   Sample forward recovery job using selective restore

```
//TSTGFS1 JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=USERID,
//            MSGCLASS=X,CLASS=A,REGION=4M
//DWW      PROC
//RECOVER  EXEC PGM=DWWCO
//STEPLIB DD DSN=DWW.CICSVR42.SDWWLOAD,DISP=SHR
```

```
//         DD DSN=DWW.CICSVR42.SDWWLENU,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWCON1  DD DSN=DWW.DWWCON1.GRPITSO,DISP=SHR
//DWWCON2  DD DSN=DWW.DWWCON2.GRPITSO,DISP=SHR
//DWWCON3  DD DSN=DWW.DWWCON3.GRPITSO,DISP=SHR
//         PEND
//* END OF PROC
//AMS001   EXEC PGM=IDCAMS,COND=(8,LE)
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
   DELETE JTILLI1.CICSVR.ESDS01.NEW
   DELETE JTILLI1.CICSVR.KSDS01.NEW
   SET MAXCC = 0
/*
//DSSLD1   EXEC PGM=ADRDSSU,COND=(8,LE)
//SYSPRINT DD SYSOUT=*
//TAPE  DD DISP=SHR,
//    DSN=CICSVR.ABARS.CVRTESTX.D.C01V0048
//SYSIN    DD *
  RESTORE INDD(TAPE)  DS(INCL(   -
    JTILLI1.CICSVR.ESDS01  -
    JTILLI1.CICSVR.KSDS01 -
     ))          -
    RENAMEU(             -
    (JTILLI1.CICSVR.ESDS01,      -
     JTILLI1.CICSVR.ESDS01.NEW)   -
    (JTILLI1.CICSVR.KSDS01,      -
     JTILLI1.CICSVR.KSDS01.NEW)   -
    )              -
    CATALOG
/*
//DWW001 EXEC DWW,COND=(8,LT)
//DWWIN    DD    *
  RECOVER            -
   ONLY             -
   NEWSPHERE(JTILLI1.CICSVR.ESDS01.NEW)     -
   APPLYCA          -
   STARTTIME(07.338/10:39:47)      -
   STOPTIME(07.338/10:39:59)        -
   STARTAT(DSNAME)         -
   SPHERE(JTILLI1.CICSVR.ESDS01)
  RECOVER            -
   ONLY             -
   NEWSPHERE(JTILLI1.CICSVR.KSDS01.NEW)     -
```

```
   APPLYCA          -
   STARTTIME(07.338/10:39:53)      -
   STOPTIME(07.338/10:39:59)       -
   STARTAT(DSNAME)        -
   SPHERE(JTILLI1.CICSVR.KSDS01)
 MVSLOG                 -
   NAME(CICSVR.ITSO.FILELOG)
 BLDVRP
//*
```

Example 11-7 shows the sample forward recovery job using group restore. CICS
VR applies the group restore technique to restore all selected data sets in a
single invocation of the backup product instead of the individual invocation for
each data set.

Example 11-7   Sample forward recovery job using group restore

```
//TSTGFS1 JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=USERID,
//          MSGCLASS=X,CLASS=A,REGION=4M
//DWW     PROC
//RECOVER  EXEC PGM=DWWCO
//STEPLIB  DD DSN=DWW.CICSVR42.SDWWLOAD,DISP=SHR
//         DD DSN=DWW.CICSVR42.SDWWLENU,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWCON1  DD DSN=DWW.DWWCON1.GRPITSO,DISP=SHR
//DWWCON2  DD DSN=DWW.DWWCON2.GRPITSO,DISP=SHR
//DWWCON3  DD DSN=DWW.DWWCON3.GRPITSO,DISP=SHR
//         PEND
//* END OF PROC
//AMS001  EXEC PGM=IDCAMS,COND=(8,LE)
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
   DELETE JTILLI1.CICSVR.ESDS01.NEW
   DELETE JTILLI1.CICSVR.ESDS02.NEW
   DELETE JTILLI1.CICSVR.KSDS01.NEW
   DELETE JTILLI1.CICSVR.KSDS02.NEW
   SET MAXCC = 0
/*
//DSSLD1  EXEC PGM=ADRDSSU,COND=(8,LE)
//SYSPRINT DD SYSOUT=*
//TAPE  DD DISP=SHR,
//     DSN=CICSVR.ABARS.CVRTESTX.D.C01V0048
//SYSIN    DD *
  RESTORE INDD(TAPE)  DS(INCL(   -
```

```
               JTILLI1.CICSVR.ESDS01  -
               JTILLI1.CICSVR.ESDS02  -
               JTILLI1.CICSVR.KSDS01  -
               JTILLI1.CICSVR.KSDS02  -
                ))           -
               RENAMEU(            -
               (JTILLI1.CICSVR.ESDS01,     -
                JTILLI1.CICSVR.ESDS01.NEW)    -
               (JTILLI1.CICSVR.ESDS02,     -
                JTILLI1.CICSVR.ESDS02.NEW)    -
               (JTILLI1.CICSVR.KSDS01,     -
                JTILLI1.CICSVR.KSDS01.NEW)    -
               (JTILLI1.CICSVR.KSDS02,     -
                JTILLI1.CICSVR.KSDS02.NEW)    -
                )              -
               CATALOG
          /*
          //DWW001 EXEC DWW,COND=(8,LT)
          //DWWIN    DD   *
            RECOVER                  -
              ONLY                   -
              NEWSPHERE(JTILLI1.CICSVR.ESDS01.NEW)      -
              APPLYCA        -
              STARTTIME(07.338/10:39:47)      -
              STOPTIME(07.338/10:39:59)         -
              STARTAT(DSNAME)          -
              SPHERE(JTILLI1.CICSVR.ESDS01)
            RECOVER                  -
              ONLY                   -
              NEWSPHERE(JTILLI1.CICSVR.ESDS02.NEW)      -
              APPLYCA        -
              STARTTIME(07.338/10:39:50)      -
              STOPTIME(07.338/10:39:59)         -
              STARTAT(DSNAME)          -
              SPHERE(JTILLI1.CICSVR.ESDS02)
            RECOVER                  -
              ONLY                   -
              NEWSPHERE(JTILLI1.CICSVR.KSDS01.NEW)      -
              APPLYCA          -
              STARTTIME(07.338/10:39:53)      -
              STOPTIME(07.338/10:39:59)         -
              STARTAT(DSNAME)          -
              SPHERE(JTILLI1.CICSVR.KSDS01)
            RECOVER                  -
              ONLY                   -
```

```
    NEWSPHERE(JTILLI1.CICSVR.KSDS02.NEW)      -
     APPLYCA         -
     STARTTIME(07.338/10:39:55)        -
     STOPTIME(07.338/10:39:59)          -
     STARTAT(DSNAME)          -
     SPHERE(JTILLI1.CICSVR.KSDS02)
  MVSLOG                       -
     NAME(CICSVR.ITSO.FILELOG)
   BLDVRP
//*
```

Using the selective and group restore techniques reduces overall overheads and costs of the data set recovery.

11.1.4 ABARS backup deregistration

You can use the CICS VR panel interface to deregister ABARS backups from the RCDS in the same way as backups that are created using DFSMShsm, DFSMSdss, and other currently supported backup products as shown in Figure 11-8.

```
                   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.C01V0044

 Backup date and time
 (Local format)  . . . : 07.334 20:05:40

              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 11-8   ABARS backup deregistration

> **Note:** ABARS backups can be deregistered only from the RCDS. ABARS backups cannot be uncataloged and deleted.

You can use the CICS VR panel interface to set retention criteria for all logical backups that are registered in the RCDS as shown in Figure 11-9. The CICS VR automatic backup deregistration function deregisters any backups, including ABARS backups, from the RCDS when the retention criteria have been satisfied.

```
                     CICSVR automatic backup deregister
Command ===> _____

Turn automatic deregistration for backups ON by specifying a value for the
Retention setting option, then press Enter. Turn automatic deregistration
for backups OFF by leaving the Retention setting option blank, then press
Enter.

  Automatic backup deregister . . . . . : OFF

  Retention setting . . . . . . . . . . _     (1=Retention period,
                                              2=Log data, 3=Catalog)

  Retention period (if Retention period
  selected as Retention setting) . . . . ___  (Number of days)

  Uncatalog and delete . . . . . . . . . _     (1=Yes, 2=No)




 F1=Help     F12=Cancel
```

Figure 11-9   Automatic backup deregistration including ABARS backups

> **Note:** The CICS VR automatic backup deregistration function does not uncatalog and delete ABARS backups, even when the uncatalog and delete options are in effect.

11.1.5 ABARS backup creation

You can use the CICS VR panel interface to initiate creating backups using
ABARS for VSAM data sets that are registered in the RCDS in the same way as
using DFSMShsm, DFSMSdss, and other currently supported backup products
as shown in Figure 11-10.

To initiate creating a backup by ABARS, you must specify:

► The aggregate group name, not the backup name

► The backup product name, in this case ABARS, that is used to locate the
  appropriate backup JCL skeleton supplied with CICS VR

► Other parameters if required

```
                    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 . . . . . . : JTILLI1.CICSVR.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 11-10   ABARS backup creation

Example 11-8 shows the sample ABARS backup creation job.

Example 11-8   Sample ABARS backup creation job

```
//TSTGFS1 JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=USERID,
//            MSGCLASS=X,CLASS=A,REGION=4M
//ABACKUP EXEC PGM=IKJEFT01,REGION=512K
//SYSPRINT DD SYSOUT=*
```

```
//SYSTSPRT DD SYSOUT=*
//SYSTSIN  DD *
    HSEND NOWAIT ABACKUP CVRTESTX EXECUTE
/*
//
```

> **Note:** ABARS uses DFSMSdss logical dump function to create backups for all
> of active (not migrated) data sets of aggregate groups, which means that all
> the capabilities supported for DFSMSdss logical dumps, for example BWO,
> are supported for ABARS backups as well.

You can use the CICS VR panel interface to check that the created backup was
registered successfully in the RCDS as shown in Figure 11-11, Figure 11-12 on
page 333, and Figure 11-13 on page 333.

```
                            CICSVR backup list              Row 1 to 9 of 9
 Command ===> _____

 Press Enter to show the backup list for the next selected VSAM sphere. Or,
 press F12 to cancel the list sequence.

   VSAM sphere  . . . : JTILLI1.CICSVR.ESDSO1


   -------------------- Data set backup information ---------------------
   Date    Time     Gen  Ver   Online  RP Date  RP Time    Type   Product
   07.340  09:21:32  01  0058  NO                          LOCAL  ABARS
   07.339  00:08:31  00  0003  NO                          LOCAL  HSMLB
   07.337  18:42:24            NO                          LOCAL  DSSLC
   07.337  12:00:46  01  0048  NO                          LOCAL  ABARS
   07.337  11:57:48  01  0047  NO                          LOCAL  ABARS
   07.334  20:33:05  01  0045  NO                          LOCAL  ABARS
   07.334  20:05:40  01  0044  NO                          LOCAL  ABARS
   07.332  14:35:52  01  0042  NO                          LOCAL  ABARS
   07.332  14:35:35  01  0002  NO                          LOCAL  HSMLB
 **************************** Bottom of data ******************************
  F1=Help    F5=Local    F6=GMT       F7=Bkwd     F8=Fwd     F12=Cancel
```

Figure 11-11   Backup list including the created ABARS backup

```
                    CICSVR registered backup names list        Row 1 to 5 of 7
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 get optional backup information, or F11 (Dereg) to
deregister the backup from the RCDS and optionally uncatalog and delete
the backup.


VSAM sphere  . . . : JTILLI1.CICSVR.ESDS01


-------------------- Data set backup information ----------------------

S  Date    Time      Type    Backup data set name
S  07.340  09:21:32  LOCAL   CICSVR.ABARS.CVRTESTX.D.C01V0058
_  07.337  18:42:24  LOCAL   DWW.DS002001.D2007337.T1842243
_  07.337  12:00:46  LOCAL   CICSVR.ABARS.CVRTESTX.D.C01V0048
_  07.337  11:57:48  LOCAL   CICSVR.ABARS.CVRTESTX.D.C01V0047
_  07.334  20:33:05  LOCAL   CICSVR.ABARS.CVRTESTX.D.C01V0045
 F1=Help     F5=Local   F6=GMT      F7=Bkwd     F8=Fwd      F10=Info
F11=Dereg   F12=Cancel
```

Figure 11-12   Registered backup names list including the created ABARS backup

```
                    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  . . . . : JTILLI1.CICSVR.ESDS01

  Backup data set name : CICSVR.ABARS.CVRTESTX.D.C01V0058

  Product identifier . : ABARS



  -------------------- Optional information --------------------

***************************** Bottom of data *******************************



 F1=Help     F7=Bkwd    F8=Fwd     F12=Cancel
```

Figure 11-13   Backup optional information for the created ABARS backup

11.2 Hardware backup

CICS VR can restore VSAM data sets from backups created using hardware.

You can use the CICS VR panel interface to restore the selected VSAM data set from a backup that was created using hardware, where there is no tie-up record on the log with a time stamp for the start of the backup, as shown in Figure 11-14, Figure 11-15 on page 335, and Figure 11-16 on page 336.

Move the cursor to the Backup type field and select F4=Prompt as shown in Figure 11-14.

```
                      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 . . . . . . : JTILLI1.CICSVR.ESDS01

   New VSAM sphere name  . . _____

   Forward-recovery start time . . 07.344 00:07:49  (YY.DDD HH:MM:SS)

   Forward-recovery stop time  . . _____  (YY.DDD HH:MM:SS)

   Backup time . . . . . . . . . . 07.344 00:07:49  + (YY.DDD HH:MM:SS)

   Time format . . . . . Local  +    Backup type  . Logical_____  +

   Volume for restore . . _____    Unit for restore . . . . . _____

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

Figure 11-14   VSAM sphere parameters for a default backup

Specify the Backup type No tie-ups (option 4) and press Enter as shown in Figure 11-15.

```
                   CICSVR VSAM sphere parameters
C +----------------------------------------------------------------+
  |                 CICSVR Backup Type Selection                   |
P | Command ===> _____    | of data
s |                                                                |
  | Select a backup type to be used during this session and        |
  | press Enter.                                                    |
  |                                                                |
  |                                                                |
  | Backup type  4_  1.  None                                      |
  |                  2.  Logical                                   | )
  |                  3.  Full Volume Dump                          |
  |                  4.  No tie-ups                                 | )
  |                                                                |
  |                                                                | SS)
  |   F1=Help    F12=Cancel                                        |
  +----------------------------------------------------------------+   +

   Volume for restore . .            Unit for restore . . . . .

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

Figure 11-15   Backup type selection for a hardware backup

CICS VR uses a hardware backup as shown in Figure 11-16.

```
                       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 . . . . . . : JTILLI1.CICSVR.ESDSO1

   New VSAM sphere name  . .

   Forward-recovery start time . . 07.344 00:07:49  (YY.DDD HH:MM:SS)

   Forward-recovery stop time  . .                  (YY.DDD HH:MM:SS)

   Backup time . . . . . . . . . . 07.344 00:07:49 + (YY.DDD HH:MM:SS)

   Time format . . . . . Local  +   Backup type . No tie-ups      +

   Volume for restore . .            Unit for restore . . . . .

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

Figure 11-16   VSAM sphere parameters for a hardware backup

Finally, CICS VR adds the NOTIEUPS keyword to the generated recovery job as
shown in Example 11-9.

Example 11-9   Sample forward recovery job using a hardware backup

```
//TSTGFS1 JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=USERID,
//          MSGCLASS=X,CLASS=A,REGION=4M
//DWW     PROC
//RECOVER  EXEC PGM=DWWCO
//STEPLIB DD DSN=DWW.CICSVR42.SDWWLOAD,DISP=SHR
//        DD DSN=DWW.CICSVR42.SDWWLENU,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWCON1  DD DSN=DWW.DWWCON1.GRPITSO,DISP=SHR
//DWWCON2  DD DSN=DWW.DWWCON2.GRPITSO,DISP=SHR
//DWWCON3  DD DSN=DWW.DWWCON3.GRPITSO,DISP=SHR
//        PEND
//* END OF PROC
//DWW001 EXEC DWW,COND=(8,LT)
//DWWIN    DD   *
```

```
  RECOVER               -
    ONLY              -
    APPLYCA         -
    NOTIEUPS       -
    STARTTIME(07.344/15:25:48)      -
    STOPTIME(07.344/15:25:50)        -
    STARTAT(DSNAME)        -
    SPHERE(JTILLI1.CICSVR.ESDS01)
  MVSLOG               -
    NAME(CICSVR.ITSO.FILELOG)
  BLDVRP
//*
```

> **Note:** When you specify the NOTIEUPS keyword, CICS VR uses information
> gathered during a log of logs scan to determine which logged records to apply
> during forward recovery.

11.3 File copy notification service

By using the CICS VR file copy notification service, CICS VR can maintain an
inventory of and list through the panel interface logical backups that are created
using any IBM and non-IBM backup products. Additionally, by specifying a
restore skeleton that is associated with each registered backup type, CICS VR
can restore VSAM data sets from the selected logical backups.

CICS VR provides the following enhancements that are related to the file copy
notification service:

► Sample notify program
► Data set preallocation
► Notify utility

11.3.1 Sample notify program

CICS VR supplies a sample notify program that shows the file copy notification service usage to notify CICS VR about a backup created for a VSAM data set by using a REPRO product.

Example 11-10 shows the supplied sample program. The sample program is located in the DWWIFCNS member of SDWWSORC.

Example 11-10   Sample notify program

```
************************************************************************
* @BANNER_START                                01                     *
* Licensed Materials - Property of IBM                                *
*                                                                     *
* 5655-P30            DWWIFCNS                                         *
*                                                                     *
* (C) Copyright IBM Corp. 2006                                        *
*                                                                     *
*                                                                     *
*                                                                     *
*                                                                     *
* @BANNER_END                                                         *
*        PN= REASON  REL YYMMDD ID:      REMARKS                      *
*       $NM= ....... 420 060730 ......... Creation                    *
*                                                                     *
************************************************************************
************************************************************************
* Invoke file copy notification service  - This is a sample program
*                                          that can be used to call
*                                          file copy notification
*                                          service (DWWCVRN) to
*                                          register a backup with
*                                          CICSVR. It is assumed that
*                                          two parameters dataset_name
*                                          and backup_name are input
*                                          parameters passed from JCL.
*
* Input parameters   - dataset_name (name of VSAM data set)
*                    - backup_name (name of VSAM data set backup)
*
* You can add the parameters and/or change the value of parameters
* to call DWWCVRN.
*
************************************************************************
```

```
*
*   INIT AND SAVE REGS
*
DWWIFCNS CSECT
DWWIFCNS AMODE 31
DWWIFCNS RMODE 24
         PRINT GEN
R0       EQU   0
R1       EQU   1
R2       EQU   2
R3       EQU   3
R4       EQU   4
R6       EQU   6
R7       EQU   7
R10      EQU   10
R12      EQU   12
RBASE    EQU   R12              BASE REGISTER
R13      EQU   13
R14      EQU   14
R15      EQU   15
*
RC00     EQU   0                GOOD RETURN CODE
*
         STM   14,12,12(13)     SAVE REGISTERS
         BASR  RBASE,0          SET BASE REGISTER
         USING *,RBASE          ESTABLISH ADDRESSABILITY
         LR    R10,R13          CHAIN SAVE AREAS
         LA    R13,SAVEAREA
         ST    R10,4(,R13)
         ST    R13,8(,R10)
*
*   PROCESS PARAMETERS FROM INPUT
*
         L     R2,0(R1)         ADDRESS OF PARAMETERS LIST
         LA    R4,0 COUNT FOR CYCLE
         LH    R6,0(R2)         LENGTH OF PARAMETERS LIST
         LA    R7,0(R6,R2)      ADDRESS OF LAST BYTE + 1
         LA    R3,3
         SR    R6,R3            LENGTH OF PARAMETERS WITHOUT COMMA
CYCLE    BCTR  R7,0
         BCTR  R6,0
         LA    R4,1(R4)
         CLI   0(R7),C','       IS IT COMMA?
         BNE   CYCLE
         EX    R6,MOVE1         MOVE FIRST PARAMETER TO DATASET
```

```
        EX    R4,MOVE2              MOVE SECOND PARAMETER TO BACKUP
*
*  CALL FILE COPY NOTIFICATION SERVICE
*
        LOAD EP=DWWCVRN            LOAD FILE COPY NOTIFICATION SERVICE
        LR R15,R0
        CALL (15),(RETCODE,                                           X
             RSNCODE,                                                 X
             PROBDET,                                                 X
             PRODUCT,                                                 X
             TYPE,                                                    X
             DATASET,                                                 X
             BACKUP,                                                  X
             DATELOC,                                                 X
             TIMELOC,                                                 X
             DATEGMT,                                                 X
             TIMEGMT,                                                 X
             OPER,                                                    X
             ,                                                        X
             ,                                                        X
             ,                                                        X
             ,                                                        X
             ,                                                        X
             ,                                                        X
             ,                                                        X
             ,                                                        X
             ,                                                        X
             ,                                                        X
             ,                                                        X
             ,                                                        X
             ,                                                        X
             ,                                                        X
             ,                                                        X
             ,                                                        X
             ,)
        LTR  R15,R15               TEST RETURN CODE
        BE   EXIT00                IF SUCCESSFUL
        LR   R15,R0                LOAD REASON CODE TO PRINT
        N    R15,VAL
        B    EXIT
*
EXIT00  EQU  *
        LA   R15,RC00              SET GOOD RETURN CODE
EXIT    EQU  *
```

```
        L     R13,SAVEAREA+4      GET SAVE AREA ADDRESS
        RETURN (14,12),RC=(15)    RESTORE REGISTERS AND RETURN
*
SAVEAREA DC   18F'0'              SAVE AREA
*
MOVE1   MVC   DATASET(0),2(R2)
MOVE2   MVC   BACKUP(0),1(R7)
*
* PARAMETERS TO CALL DWWCVRN
*
RETCODE DS    F'0'                RETURN CODE
RSNCODE DS    F'0'                REASON CODE
PROBDET DS    2F'0'               PROBLEM DETERMINATION AREA
PRODUCT DC    C'REP'              BACKUP PRODUCT
TYPE    DC    C'RO'               BACKUP TYPE
DATASET DC    CL44' '             DATA SET NAME
BACKUP  DC    CL44' '             BACKUP NAME
DATELOC DC    X'00000000'         BACKUP DATE LOCAL
TIMELOC DC    X'00000000'         BACKUP TIME LOCAL
DATEGMT DC    X'00000000'         BACKUP DATE GMT
TIMEGMT DC    X'00000000'         BACKUP TIME GMT
*
OPER    DC    X'0080'             OPERATION FLAGS
*
        DS    F'0'
VAL     DC    X'00000FFF'
************************************************************************
        END
```

11.3.2 Data set preallocation

CICS VR enhances the file copy notification service, allowing automated support of any IBM and non-IBM backup product that does not preallocate the data sets at the time of the restore. For example, IDCAMS REPRO:

► At the time of the notification, CICS VR extracts information from the ICF catalog about the allocation attributes of the VSAM data set and registers this information in the RCDS.

► 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 VSAM data set.

You can use the following new flag in the `operation_flags` parameter:

10   PREALLOCATION REQUIRED. Specifies if the product
            that created the backup preallocates 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. So, at the time of the notification, CICS VR
            extracts information from the ICF catalog about the
            allocation attributes of the data set and registers
            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 preallocates
            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.

Table 11-1 shows the new return code and reason code combination that the file copy notification service can return when an issue that is related to the data set preallocation occurs.

Table 11-1   File copy notification service: New return and reason codes

Return code Hex	Reason code Hex	Equate symbol, meaning, and action
4	7184547D	**Equate Symbol:** *DWWCVRN_AllocRegisterFailure* **Meaning:** The PREALLOCATION REQUIRED flag 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 about the 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. So, the target data set should be preallocated manually before restoring the data set. **Action:** Set the PREALLOCATION REQUIRED flag 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).

Example 11-16 on page 356 and Example 11-17 on page 357 show the sample forward recovery job that includes a step to preallocate the target VSAM data set.

11.3.3 Notify utility

CICS VR simplifies the file copy notification service usage that provides a new notify utility. You can use the notify utility in place of the file copy notification service to notify CICS VR about a backup created for a VSAM data set by using an IBM or non-IBM backup product. An example of the NOTIFY command is:

```
NOTIFY DSNAME(dsname) BACKUPNAME(backupname) PRODUCT(product)
   [PREALLOC(NO|YES)]
   [BACKUPTIME(date and time,GMT|LOCAL)]
```

In this command line:

► DSNAME(*dsname*)

Specifies the fully qualified base cluster name of the VSAM data set for which the backup was created.

► BACKUPNAME(*backupname*)

Specifies the fully qualified name of the VSAM data set backup.

► PRODUCT(*product*)

Specifies the product that created the VSAM data set backup.

► BACKUPTIME(*date and time*,LOCAL|GMT)

Specifies the date and time when the VSAM data set backup was created.

► PREALLOC(YES|NO)

Specifies whether the product that created the backup preallocates 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. So, at the time of the notification, CICS VR extracts information from the ICF catalog about the allocation attributes of the data set and registers 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 preallocates 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.

You can add the notify utility invocation to the backup job as a job step that is executed when the backup successfully created. You need to set the data set disposition to OLD to avoid any data set updates.

> **Note:** DFSMShsm and DFSMSdss can notify CICS VR automatically when a
> logical backup is created. There is no need to use the notify utility for logical
> backups that are created by either DFSMShsm or DFSMSdss.

You can specify all required parameters using the NOTIFY command as shown in
Example 11-11.

Example 11-11   Sample notify utility with parameters specified on the NOTIFY command

```
//BACKUP   JOB MSGCLASS=H,CLASS=A,REGION=24M,
//            MSGLEVEL=(1,1),NOTIFY=JTILLI1
//*------------------------------------------------------------------*/
//* CREATE BACKUP                                                    */
//*------------------------------------------------------------------*/
//CREATE   EXEC PGM=IDCAMS
//IN       DD DSN=JTILLI1.CICSVR.KSDS01,DISP=OLD
//OUT      DD DSN=JTILLI1.CICSVR.KSDS01.BACKUP01,DISP=OLD
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
  REPRO INFILE(IN) -
        OUTFILE(OUT)
/*
//*------------------------------------------------------------------*/
//* NOTIFY CICSVR                                                    */
//*------------------------------------------------------------------*/
//NOTIFY   EXEC PGM=DWWNT
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWIN    DD *
  NOTIFY DSNAME(JTILLI1.CICSVR.KSDS01) -
        BACKUPNAME(JTILLI1.CICSVR.KSDS01.BACKUP01) -
        PRODUCT(REPRO) -
        PREALLOC(YES)
/*
//
```

You can specify some parameters using the NOTIFY command and others using the PARM parameter of the EXEC statement, as shown in Example 11-12.

Example 11-12   Sample notify utility with parameters specified on the EXEC statement

```
//BACKUP    JOB MSGCLASS=H,CLASS=A,REGION=24M,
//             MSGLEVEL=(1,1),NOTIFY=JTILLI1
//*------------------------------------------------------------------*/
//* CREATE BACKUP                                                    */
//*------------------------------------------------------------------*/
//CREATE   EXEC PGM=IDCAMS
//IN       DD DSN=JTILLI1.CICSVR.KSDS01,DISP=OLD
//OUT      DD DSN=JTILLI1.CICSVR.KSDS01.BACKUP02,DISP=OLD
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
  REPRO INFILE(IN) -
        OUTFILE(OUT)
/*
//*------------------------------------------------------------------*/
//* NOTIFY CICSVR                                                    */
//*------------------------------------------------------------------*/
//NOTIFY   EXEC PGM=DWWNT,
//  PARM=('DSNAME(JTILLI1.CICSVR.KSDS01)',
//        'BACKUPNAME(JTILLI1.CICSVR.KSDS01.BACKUP02)')
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWIN    DD *
  NOTIFY PRODUCT(REPRO) -
        PREALLOC(YES)
/*
//
```

You can also specify some parameters using the NOTIFY command and other in the PARM parameter of the EXEC statement to parametrize the notify utility invocation dynamically as shown in Example 11-13.

Example 11-13   Sample notify utility with the parametrization

```
//BACKUP    JOB MSGCLASS=H,CLASS=A,REGION=24M,
//             MSGLEVEL=(1,1),NOTIFY=JTILLI1
//*------------------------------------------------------------------*/
//* SET SYMBOLIC PARAMETERS                                          */
//*------------------------------------------------------------------*/
//SETSPH   SET SPHERE=JTILLI1.CICSVR.KSDS01
//SETBKP   SET BACKUP=JTILLI1.CICSVR.KSDS01.BACKUP03
//*------------------------------------------------------------------*/
```

```
//* CREATE BACKUP                                                       */
//*-------------------------------------------------------------------*/
//CREATE   EXEC PGM=IDCAMS
//IN       DD DSN=&SPHERE,DISP=OLD
//OUT      DD DSN=&BACKUP,DISP=OLD
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
  REPRO INFILE(IN) -
        OUTFILE(OUT)
/*
//*-------------------------------------------------------------------*/
//* NOTIFY CICSVR                                                      */
//*-------------------------------------------------------------------*/
//NOTIFY   EXEC PGM=DWWNT,PARM='DSNAME(&SPHERE),BACKUPNAME(&BACKUP)'
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWIN    DD *
  NOTIFY PRODUCT(REPRO) -
        PREALLOC(YES)
/*
//
```

> **Note:** You can prepare the sample as a job (residing in your procedure library)
> that can be invoked dynamically with the required values of the symbolic
> parameters.

You can use the CICS VR panel interface to check that all created backups were registered successfully in the RCDS as shown in Figure 11-17, Figure 11-18 on page 349, and Figure 11-19 on page 349.

```
                              CICSVR backup list           Row 1 to 10 of 11
 Command ===> _____

 Press Enter to show the backup list for the next selected VSAM sphere. Or,
 press F12 to cancel the list sequence.

   VSAM sphere  . . . : JTILLI1.CICSVR.KSDS01

   -------------------- Data set backup information --------------------
   Date    Time     Gen  Ver   Online  RP Date  RP Time   Type   Product
   07.339  16:23:40            NO                          LOCAL  REPRO
   07.339  15:17:03            NO                          LOCAL  REPRO
   07.339  15:16:30            NO                          LOCAL  REPRO
   07.339  00:08:32  00   0002  NO                         LOCAL  HSMLB
   07.337  12:00:46  01   0048  NO                         LOCAL  ABARS
   07.337  11:57:48  01   0047  NO                         LOCAL  ABARS
   07.334  20:33:05  01   0045  NO                         LOCAL  ABARS
   07.334  20:05:41  01   0044  NO                         LOCAL  ABARS
   07.333  00:03:26  01   0001  NO                         LOCAL  HSMLB
   07.332  14:35:53  01   0042  NO                         LOCAL  ABARS
  F1=Help    F5=Local   F6=GMT     F7=Bkwd    F8=Fwd    F12=Cancel
```

Figure 11-17   Backup list including backups created by the notify utility

```
                      CICSVR registered backup names list      Row 1 to 5 of 9
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 get optional backup information, or F11 (Dereg) to
deregister the backup from the RCDS and optionally uncatalog and delete
the backup.


VSAM sphere  . . . : JTILLI1.CICSVR.KSDS01


-------------------- Data set backup information ----------------------

S  Date     Time      Type    Backup data set name
S  07.339   16:23:40  LOCAL   JTILLI1.CICSVR.KSDS01.BACKUP03
_  07.339   15:17:03  LOCAL   JTILLI1.CICSVR.KSDS01.BACKUP02
_  07.339   15:16:30  LOCAL   JTILLI1.CICSVR.KSDS01.BACKUP01
_  07.337   12:00:46  LOCAL   CICSVR.ABARS.CVRTESTX.D.C01V0048
_  07.337   11:57:48  LOCAL   CICSVR.ABARS.CVRTESTX.D.C01V0047
 F1=Help     F5=Local   F6=GMT      F7=Bkwd     F8=Fwd      F10=Info
```

Figure 11-18   Registered backup names list including backups created by the notify utility

```
                      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  . . . . : JTILLI1.CICSVR.KSDS01

  Backup data set name : JTILLI1.CICSVR.KSDS01.BACKUP03

  Product identifier . : REPRO


  -------------------- Optional information ---------------------
```

Figure 11-19   Backup optional information for a backup created by the notify utility

DFSMSdss notifies the CICS VR server address space for each successfully
processed VSAM data sets when a logical dump is created for any application,
including ABARS application, and the CICSVRBACKUP option is in effect. The
CICS VR server address space then registers the DFSMSdss logical dump
automatically in the RCDS for the VSAM data sets. The DFSMSdss logical dump

can contain data not for one data set but for a number of data sets, but you can want to register only a few specific data sets of them.

In such cases, the notify utility can help you. You can manually apply the *selective registration* technique to notify the CICS VR server address space about a DFSMSdss logical dump that was created for needed VSAM data sets only as shown in Example 11-14.

Example 11-14   Sample notify utility using selective registration

```
//NOTIFY    JOB MSGCLASS=H,CLASS=A,REGION=24M,
//             MSGLEVEL=(1,1),NOTIFY=JTILLI1
//*-------------------------------------------------------------------*/
//* SET SYMBOLIC PARAMETERS                                           */
//*-------------------------------------------------------------------*/
//SETSPH    SET SPHERE=JTILLI1.CICSVR.KSDS01
//SETBKP    SET BACKUP=CICSVR.ITSO.DSSLDALL
//*-------------------------------------------------------------------*/
//*-------------------------------------------------------------------*/
//* NOTIFY CICSVR                                                     */
//*-------------------------------------------------------------------*/
//NOTIFY    EXEC PGM=DWWNT,PARM='DSNAME(&SPHERE),BACKUPNAME(&BACKUP)'
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWIN    DD *
  NOTIFY PRODUCT(ADRLD)
/*
//
```

> **Note:** Set a DSSLDREG NO value as the DFSMSdss logical dump registration control default to prevent the automatic DFSMSdss logical dumps registration.
>
> Do not specify the CICSVRBACKUP keyword in the DFSMSdss DUMP command when the DFSMSdss logical dump created.
>
> Specify a name of the ABARS data file as the name of the DFSMSdss logical dump created for an ABARS application. You can get the name of the ABARS data file from the ABARS activity log.
>
> Invoke the notify utility for each needed VSAM data set.

We use ADRLD as a product identifier because DSSLD is reserved for CICS VR. Further, simply ADRLD backups, for backups registered under the ADRLD product identifier.

You can create the appropriate restore JCL skeleton. For example, you can create the skeleton from the supplied restore JCL skeleton changing the name of the skeleton from DWWDSSLD to DWWADRLD. No other changes are required. The supplied skeleton is located in the DWWDSSLD member of SDWWSENU. Copy the newly created skeleton as a member DWWADRLD into SDWWSENU.

Now, you can use the CICS VR panel interface to restore selected VSAM data sets from ADRLD backups that are registered in the RCDS in the same way as from backups that are created using DFSMShsm, DFSMSdss, and other currently supported backup products as shown in Figure 11-20.

> **Note:** In the samples that we show here, only one VSAM data set was selected to recover. You can select a few VSAM data sets as well.

```
                         CICSVR backup prompt list          Row 1 to 11 of 15
 Command ===> _____

 Select one backup time, then press Enter.

 VSAM sphere  . . . : JTILLI1.CICSVR.KSDS01

 --------------------- Data set backup information ----------------------
 S  Date    Time     Gen  Ver   Online  RP Date  RP Time    Type    Product
 S  07.345  12:53:38             NO                          LOCAL   ADRLD
 _  07.345  12:23:12             NO                          LOCAL   DSSLD
 _  07.342  00:04:04  00   0003  NO                          LOCAL   HSMLB
 _  07.340  09:21:33  01   0058  NO                          LOCAL   ABARS
 _  07.339  19:31:21             NO                          LOCAL   IDCRP
 _  07.339  16:23:40             NO                          LOCAL   REPRO
 _  07.339  15:17:03             NO                          LOCAL   REPRO
 _  07.339  15:16:30             NO                          LOCAL   REPRO
 _  07.339  00:08:32  01   0002  NO                          LOCAL   HSMLB
 _  07.337  12:00:46  01   0048  NO                          LOCAL   ABARS
 _  07.337  11:57:48  01   0047  NO                          LOCAL   ABARS
  F1=Help     F7=Bkwd     F8=Fwd      F12=Cancel
```

Figure 11-20   Backup prompt list including an ADRLD backup

When you select an ADRLD backup, the created restore JCL skeleton is added to the generated recovery job. The skeleton deletes the target data sets (if they exist), then restores and renames (if requested) the selected VSAM data sets from the selected ADRLD backup.

The substituted skeleton displays as a few separate job steps 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 ADRLD backup, which is a DFSMSdss logical dump, as shown in Example 11-15.

Example 11-15   Sample forward recovery job using an ADRLD backup

```
//TSTGFS1 JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=USERID,
//           MSGCLASS=X,CLASS=A,REGION=4M
//DWW     PROC
//RECOVER  EXEC PGM=DWWCO
//STEPLIB DD DSN=DWW.CICSVR42.SDWWLOAD,DISP=SHR
//        DD DSN=DWW.CICSVR42.SDWWLENU,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWCON1  DD DSN=DWW.DWWCON1.GRPITSO,DISP=SHR
//DWWCON2  DD DSN=DWW.DWWCON2.GRPITSO,DISP=SHR
//DWWCON3  DD DSN=DWW.DWWCON3.GRPITSO,DISP=SHR
//         PEND
//* END OF PROC
//AMS001  EXEC PGM=IDCAMS,COND=(8,LE)
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
   DELETE JTILLI1.CICSVR.KSDS01.NEW
   SET MAXCC = 0
/*
/*
//DSSLD1  EXEC PGM=ADRDSSU,COND=(8,LE)
//SYSPRINT DD SYSOUT=*
//TAPE  DD DISP=SHR,
//    DSN=CICSVR.ITSO.DSSLDALL
//SYSIN    DD *
 RESTORE INDD(TAPE) DS(   -
   INCL(JTILLI1.CICSVR.KSDS01))   -
   RENAMEU((JTILLI1.CICSVR.KSDS01,      -
    JTILLI1.CICSVR.KSDS01.NEW))   -
   CATALOG
/*
//DWW001 EXEC DWW,COND=(8,LT)
//DWWIN    DD   *
 RECOVER                -
   ONLY                -
   NEWSPHERE(JTILLI1.CICSVR.KSDS01.NEW)      -
   APPLYCA       -
   STARTTIME(07.345/15:21:30)        -
   STOPTIME(07.345/15:21:34)         -
```

```
      STARTAT(DSNAME)         -
      SPHERE(JTILLI1.CICSVR.KSDS01)
   MVSLOG                     -
      NAME(CICSVR.ITSO.FILELOG)
   BLDVRP
//*
```

> **Note:** IBM plans to automatic selective registration in future versions of CICS VR.

11.4 IDCAMS REPRO backup

You can use IDCAMS REPRO as your backup product.

CICS VR controls backups that are created using IDCAMS REPRO (referred to as simply *REPRO backups*) in the same way as backups that are created using DFSMShsm, DFSMSdss, and other currently supported backup products, which allow you to:

► Register REPRO backups in the RCDS
► List REPRO backups registered in the RCDS
► Restore REPRO backups registered in the RCDS
► Deregister REPRO backups from the RCDS
► Create REPRO backups for VSAM data sets registered in the RCDS

11.4.1 Registering REPRO backups

You can use the CICS VR notify utility or the CICS VR panel interface to register REPRO backups in the RCDS as described in 11.3.3, "Notify utility" on page 344 and 11.4.5, "Creating REPRO backups" on page 362.

11.4.2 Listing REPRO backups

You can use the CICS VR panel interface to list REPRO backups that are registered in the RCDS for selected VSAM data sets in the same way as backups that are created using DFSMShsm, DFSMSdss, and other currently supported backup products as described in 11.3.3, "Notify utility" on page 344 and 11.4.5, "Creating REPRO backups" on page 362.

11.4.3 Restoring REPRO backups

You can use the CICS VR panel interface to restore selected VSAM data sets from REPRO backups that are registered in the RCDS in the same way as from backups that are created using DFSMShsm, DFSMSdss, and other currently supported backup products as shown in Figure 11-21 and Figure 11-22 on page 355.

```
                          CICSVR backup prompt list        Row 1 to 11 of 12
 Command ===> _____


 Select one backup time, then press Enter.


 VSAM sphere  . . . : JTILLI1.CICSVR.KSDS01


 ---------------------- Data set backup information ----------------------
 S  Date    Time     Gen  Ver   Online  RP Date  RP Time   Type   Product
 _  07.339  19:31:21             NO                         LOCAL  IDCRP
 S  07.339  16:23:40             NO                         LOCAL  REPRO
 _  07.339  15:17:03             NO                         LOCAL  REPRO
 _  07.339  15:16:30             NO                         LOCAL  REPRO
 _  07.339  00:08:32  00   0002  NO                         LOCAL  HSMLB
 _  07.337  12:00:46  01   0048  NO                         LOCAL  ABARS
 _  07.337  11:57:48  01   0047  NO                         LOCAL  ABARS
 _  07.334  20:33:05  01   0045  NO                         LOCAL  ABARS
 _  07.334  20:05:41  01   0044  NO                         LOCAL  ABARS
 _  07.333  00:03:26  01   0001  NO                         LOCAL  HSMLB
 _  07.332  14:35:53  01   0042  NO                         LOCAL  ABARS
```

Figure 11-21   Backup prompt list including REPRO backups for REPRO

```
                            CICSVR backup prompt list         Row 1 to 11 of 12
Command ===> _____

Select one backup time, then press Enter.

VSAM sphere  . . . : JTILLI1.CICSVR.KSDSO1


---------------------- Data set backup information ----------------------
S  Date      Time      Gen  Ver   Online  RP Date  RP Time   Type   Product
S  07.339   19:31:21              NO                          LOCAL  IDCRP
_  07.339   16:23:40              NO                          LOCAL  REPRO
_  07.339   15:17:03              NO                          LOCAL  REPRO
_  07.339   15:16:30              NO                          LOCAL  REPRO
_  07.339   00:08:32   00   0002  NO                          LOCAL  HSMLB
_  07.337   12:00:46   01   0048  NO                          LOCAL  ABARS
_  07.337   11:57:48   01   0047  NO                          LOCAL  ABARS
_  07.334   20:33:05   01   0045  NO                          LOCAL  ABARS
_  07.334   20:05:41   01   0044  NO                          LOCAL  ABARS
_  07.333   00:03:26   01   0001  NO                          LOCAL  HSMLB
_  07.332   14:35:53   01   0042  NO                          LOCAL  ABARS
 F1=Help    F7=Bkwd    F8=Fwd     F12=Cancel
```

Figure 11-22   Backup prompt list including an REPRO backup for IDCRP

Tip: CICS VR can restore REPRO backups registered under both the REPRO product identifier and the IDCRP product identifier.

Note: For REPRO backups, you can select to display the backup and recovery point times in local format or in Greenwich Mean Time (GMT) format.

When you select a REPRO backup, the appropriate restore JCL skeleton supplied with CICS VR is added to the generated recovery job. The skeleton deletes the target data set (if it exists), then preallocates and restores the selected VSAM data set from the selected REPRO backup.

For the REPRO product identifier, the skeleton is located in the DWWREPRO member of SDWWSENU. For IDCRP product identifier, the skeleton is located in the DWWIDCRP member of SDWWSENU. In most cases, you do not need to make any changes to these skeletons. The substituted skeleton displays as a few separate job steps in the generated recovery job prior to the forward recovery job step. The preallocation job step contains the IDCAMS DEFINE command to perform a preallocation the target VSAM data set. The restore job step contains

the IDCAMS REPRO command to perform a restore of the selected VSAM data set from the selected REPRO backup.

Example 11-16 shows the sample forward recovery job that is generated for the REPRO product identifier.

Example 11-16   Sample forward recovery job for REPRO

```
//TSTGFS1 JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=USERID,
//             MSGCLASS=X,CLASS=A,REGION=4M
//DWW      PROC
//RECOVER  EXEC PGM=DWWCO
//STEPLIB  DD DSN=DWW.CICSVR42.SDWWLOAD,DISP=SHR
//         DD DSN=DWW.CICSVR42.SDWWLENU,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWCON1  DD DSN=DWW.DWWCON1.GRPITSO,DISP=SHR
//DWWCON2  DD DSN=DWW.DWWCON2.GRPITSO,DISP=SHR
//DWWCON3  DD DSN=DWW.DWWCON3.GRPITSO,DISP=SHR
//         PEND
//* END OF PROC
//AMS001   EXEC PGM=IDCAMS,COND=(8,LT)
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
    DELETE JTILLI1.CICSVR.KSDS01.NEW  PURGE
    SET MAXCC = 0
 DEFINE                                                               -
  CLUSTER                                                             -
  (                                                                   -
   NAME ( JTILLI1.CICSVR.KSDS01.NEW )                                 -
   INDEXED                                                            -
   MANAGEMENTCLASS ( STANDARD )                                       -
   STORAGECLASS ( STANDARD )                                          -
   FRLOG ( REDO )                                                     -
   LOG ( ALL )                                                        -
   LOGSTREAMID ( CICSVR.ITSO.FILELOG )                               -
  )                                                                   -
  DATA                                                                -
  (                                                                   -
   NAME ( JTILLI1.CICSVR.KSDS01.NEW.DATA )                            -
   SHAREOPTIONS ( 3 3 )                                               -
   CONTROLINTERVALSIZE ( 18432 )                                      -
   RECORDSIZE ( 100 100 )                                             -
   KEYS ( 4 3 )                                                       -
   BUFFERSPACE ( 37376 )                                              -
   CYLINDERS ( 6 1 )                                                  -
```

```
  )                                                               -
  INDEX                                                           -
  (                                                               -
   NAME ( JTILLI1.CICSVR.KSDS01.NEW.INDEX )                       -
   SHAREOPTIONS ( 3 3 )                                           -
   CONTROLINTERVALSIZE ( 512 )                                    -
   TRACKS ( 1 1 )                                                 -
  )
//*
//REPRO2  EXEC PGM=IDCAMS,COND=(8,LE)
//SYSPRINT DD SYSOUT=*
//INFILE   DD DISP=SHR,
//     DSN=JTILLI1.CICSVR.KSDS01.BACKUP03
//SYSIN    DD *
     REPRO     -
       INFILE(INFILE)  -
       OUTDATASET(JTILLI1.CICSVR.KSDS01.NEW)
/*
//DWW001 EXEC DWW,COND=(8,LT)
//DWWIN    DD    *
  RECOVER               -
    ONLY                -
    NEWSPHERE(JTILLI1.CICSVR.KSDS01.NEW)       -
    APPLYCA         -
    STARTTIME(07.339/21:23:29)        -
    STOPTIME(07.339/21:23:31)         -
    STARTAT(DSNAME)          -
    SPHERE(JTILLI1.CICSVR.KSDS01)
  MVSLOG                -
    NAME(CICSVR.ITSO.FILELOG)
  BLDVRP
//*
```

Example 11-17 shows the sample forward recovery job that is generated for the IDCRP product identifier.

Example 11-17   Sample forward recovery job for IDCRP

```
//TSTGFS1 JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=USERID,
//             MSGCLASS=X,CLASS=A,REGION=4M
//DWW      PROC
//RECOVER  EXEC PGM=DWWCO
//STEPLIB  DD DSN=DWW.CICSVR42.SDWWLOAD,DISP=SHR
//         DD DSN=DWW.CICSVR42.SDWWLENU,DISP=SHR
//DWWMSG   DD SYSOUT=*
```

```
//DWWPRINT DD SYSOUT=*
//DWWCON1  DD DSN=DWW.DWWCON1.GRPITSO,DISP=SHR
//DWWCON2  DD DSN=DWW.DWWCON2.GRPITSO,DISP=SHR
//DWWCON3  DD DSN=DWW.DWWCON3.GRPITSO,DISP=SHR
//        PEND
//* END OF PROC
//AMS001   EXEC PGM=IDCAMS,COND=(8,LT)
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
    DELETE JTILLI1.CICSVR.KSDS01.NEW  PURGE
    SET MAXCC = 0
 DEFINE                                                         -
  CLUSTER                                                       -
  (                                                             -
   NAME ( JTILLI1.CICSVR.KSDS01.NEW )                           -
    INDEXED                                                     -
   MANAGEMENTCLASS ( STANDARD )                                 -
   STORAGECLASS ( STANDARD )                                    -
   FRLOG ( REDO )                                               -
   LOG ( ALL )                                                  -
   LOGSTREAMID ( CICSVR.ITSO.FILELOG )                          -
  )                                                             -
  DATA                                                          -
  (                                                             -
   NAME ( JTILLI1.CICSVR.KSDS01.NEW.DATA )                      -
   SHAREOPTIONS ( 3 3 )                                         -
   CONTROLINTERVALSIZE ( 18432 )                                -
   RECORDSIZE ( 100 100 )                                       -
   KEYS ( 4 3 )                                                 -
   BUFFERSPACE ( 37376 )                                        -
   CYLINDERS ( 6 1 )                                            -
  )                                                             -
  INDEX                                                         -
  (                                                             -
   NAME ( JTILLI1.CICSVR.KSDS01.NEW.INDEX )                     -
   SHAREOPTIONS ( 3 3 )                                         -
   CONTROLINTERVALSIZE ( 512 )                                  -
   TRACKS ( 1 1 )                                               -
  )
//*
//IDCRP2   EXEC PGM=IDCAMS,COND=(8,LE)
//SYSPRINT DD SYSOUT=*
//INFILE   DD DISP=SHR,
//     DSN=JTILLI1.CICSVR.KSDS01.BACKUP04
//SYSIN    DD *
```

```
     REPRO       -
       INFILE(INFILE)  -
       OUTDATASET(JTILLI1.CICSVR.KSDS01.NEW)
/*
//DWW001 EXEC DWW,COND=(8,LT)
//DWWIN    DD   *
  RECOVER                 -
    ONLY                  -
    NEWSPHERE(JTILLI1.CICSVR.KSDS01.NEW)      -
    APPLYCA          -
    STARTTIME(07.339/21:23:29)       -
    STOPTIME(07.339/21:23:31)         -
    STARTAT(DSNAME)          -
    SPHERE(JTILLI1.CICSVR.KSDS01)
  MVSLOG                  -
    NAME(CICSVR.ITSO.FILELOG)
  BLDVRP
//*
```

> **Note:** As shown in these examples, CICS VR generates identical recovery jobs for REPRO and IDCRP product identifiers.

11.4.4 Deregistering REPRO backups

You can use the CICS VR panel interface to deregister REPRO backups from the RCDS in the same way as backups that are created using DFSMShsm, DFSMSdss, and other currently supported backup products as shown in Figure 11-23.

```
                    CICSVR backup deregister verification
Command ===> _____

Select an action and press Enter to deregister the backup. Or, press F12
to cancel the request.

Backup name . . . . . : JTILLI1.CICSVR.KSDS01.BACKUP04

Backup date and time
(Local format)  . . . : 07.339 19:31:21

            2_  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 11-23   REPRO backup deregistration

Note: You can deregister REPRO backups from the RCDS as well as uncatalog and delete them.

You can use the CICS VR panel interface to set retention criteria for all logical backups that are registered in the RCDS as shown in Figure 11-24. The CICS VR automatic backup deregistration function deregisters any backups, including REPRO backups, from the RCDS when the retention criteria have been satisfied.

```
                       CICSVR automatic backup deregister
Command ===> _____

Turn automatic deregistration for backups ON by specifying a value for the
Retention setting option, then press Enter. Turn automatic deregistration
for backups OFF by leaving the Retention setting option blank, then press
Enter.

  Automatic backup deregister  . . . . . : OFF

  Retention setting  . . . . . . . . . . _     (1=Retention period,
                                               2=Log data, 3=Catalog)


  Retention period (if Retention period
  selected as Retention setting) . . . . . ___  (Number of days)

  Uncatalog and delete . . . . . . . . . . _    (1=Yes, 2=No)




 F1=Help    F12=Cancel
```

Figure 11-24   Automatic backup deregistration including REPRO backups

Note: The CICS VR automatic backup deregistration function uncatalogs and deletes REPRO backups when the uncatalog and delete options are in effect.

11.4.5 Creating REPRO backups

You can use the CICS VR panel interface to initiate creating backups using IDCAMS REPRO for VSAM data sets that are registered in the RCDS in the same way as using DFSMShsm, DFSMSdss, and other currently supported backup products as shown in Figure 11-25.

To initiate creating a backup by IDCAMS REPRO, you must specify:

► The backup name

► The backup product name, in this case IDCRP, that is used to locate the appropriate backup JCL skeleton supplied with CICS VR

► Other parameters if required

```
                    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 . . . . . . : JTILLI1.CICSVR.KSDS01

  VSAM sphere backup name   JTILLI1.CICSVR.KSDS01.BACKUP4

  Aggregate group name  . . _____

  Backup product name . . . IDCRP   (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 11-25   REPRO backup creation

Example 11-18 shows the sample REPRO backup creation job.

Example 11-18   Sample REPRO backup creation job

```
//TSTGFS1 JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=USERID,
//             MSGCLASS=X,CLASS=A,REGION=4M
//IDCREPRO EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
```

```
//INFILE   DD DISP=SHR,DSN=JTILLI1.CICSVR.KSDS01
//SYSIN    DD *
     REPRO     -
       INFILE(INFILE)  -
       OUTDATASET(JTILLI1.CICSVR.KSDS01.BACKUP04)
/*
//BKUPNTFY EXEC PGM=DWWNT,COND=(4,LT,IDCREPRO)
//DWWMSG   DD   SYSOUT=*
//DWWPRINT DD   SYSOUT=*
//DWWDMSG  DD   SYSOUT=*
//DWWIN    DD   *
  NOTIFY  DSN(JTILLI1.CICSVR.KSDS01) -
          BN(JTILLI1.CICSVR.KSDS01.BACKUP04) -
          PROD(IDCRP) -
          ALLOC(Y)
/*
//
```

The generated job includes the following job steps:

1. The IDCREPRO job step creates a backup of the VSAM data set

   Note: The backup data set *must* be allocated and cataloged before the
   generated job is submitted.

2. The BKUPNTFY job step invokes the CICS VR notify utility to register the
   created backup of the VSAM data set in the RCDS

You can use the CICS VR panel interface to check that the created backup was registered successfully in the RCDS as shown in Figure 11-26, Figure 11-27, and Figure 11-28 on page 365.

```
                              CICSVR backup list            Row 1 to 10 of 12
 Command ===> _____

 Press Enter to show the backup list for the next selected VSAM sphere. Or,
 press F12 to cancel the list sequence.

   VSAM sphere  . . . : JTILLI1.CICSVR.KSDS01

   -------------------- Data set backup information ---------------------
   Date     Time     Gen  Ver   Online  RP Date  RP Time    Type    Product
   07.339   19:31:21              NO                         LOCAL   IDCRP
   07.339   16:23:40              NO                         LOCAL   REPRO
   07.339   15:17:03              NO                         LOCAL   REPRO
   07.339   15:16:30              NO                         LOCAL   REPRO
   07.339   00:08:32  00   0002   NO                         LOCAL   HSMLB
   07.337   12:00:46  01   0048   NO                         LOCAL   ABARS
   07.337   11:57:48  01   0047   NO                         LOCAL   ABARS
   07.334   20:33:05  01   0045   NO                         LOCAL   ABARS
   07.334   20:05:41  01   0044   NO                         LOCAL   ABARS
   07.333   00:03:26  01   0001   NO                         LOCAL   HSMLB
  F1=Help     F5=Local    F6=GMT      F7=Bkwd     F8=Fwd     F12=Cancel
```

Figure 11-26   Backup list including the created REPRO backup

```
                    CICSVR registered backup names list      Row 1 to 5 of 10
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 get optional backup information, or F11 (Dereg) to
deregister the backup from the RCDS and optionally uncatalog and delete
the backup.


VSAM sphere  . . . : JTILLI1.CICSVR.KSDS01


-------------------- Data set backup information ----------------------

S  Date    Time     Type   Backup data set name
S  07.339  19:31:21 LOCAL  JTILLI1.CICSVR.KSDS01.BACKUP04
_  07.339  16:23:40 LOCAL  JTILLI1.CICSVR.KSDS01.BACKUP03
_  07.339  15:17:03 LOCAL  JTILLI1.CICSVR.KSDS01.BACKUP02
_  07.339  15:16:30 LOCAL  JTILLI1.CICSVR.KSDS01.BACKUP01
_  07.337  12:00:46 LOCAL  CICSVR.ABARS.CVRTESTX.D.C01V0048
 F1=Help     F5=Local    F6=GMT      F7=Bkwd     F8=Fwd      F10=Info
```

Figure 11-27   Registered backup names list including the created REPRO backup

```
                      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  . . . . : JTILLI1.CICSVR.KSDS01

  Backup data set name : JTILLI1.CICSVR.KSDS01.BACKUP04

  Product identifier . : IDCRP


  --------------------- Optional information ---------------------
```

Figure 11-28   Backup optional information for the create REPRO backup

Part 5

Appendixes

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A

Additional information about APARS

In this appendix, we include information about APARs. APARs provide additional functionality or correct issues that are encountered during the use of CICS VR.

We describe the following APARs:

► Dependency APARs
► CICS VR APARs

A.1 Dependency APARs

Use the following information to ensure that the correct maintenance is applied to z/OS and CICS TS.

A.1.1 z/OS 1.7 APARs

For CICS VR 4.1, the following z/OS 1.7 APARs are required:

- ► OA11708
- ► OA12168
- ► OA13706
- ► OA13841
- ► OA14083
- ► OA14114
- ► OA14338
- ► OA14371
- ► OA14727
- ► OA14989

For CICS VR 4.2, apply all of the z/OS 1.7 APARs from the previous list, plus the following APARs:

- ► OA16228
- ► OA18136

A.1.2 z/OS 1.8 APARs

For CICS VR 4.1, no z/OS 1.8 APARs are required.

For CICS VR 4.2, apply the following z/OS 1.8 APARs:

- ► OA16228
- ► OA18136

A.1.3 z/OS 1.9 APARs

For CICS VR 4.1 and CICS VR 4.2, no z/OS 1.9 APARs are required.

A.1.4 CICS TS 2.2 APARs

For CICS VR 4.1 and CICS VR 4.2, apply CICS APAR PQ91809.

A.1.5 CICS TS 2.3 APARs

For CICS VR 4.1 and CICS VR 4.2, apply the following CICS APARs:

► PQ91809
► PK23573

A.1.6 CICS TS 3.1 APARs

For CICS VR 4.1 and CICS VR 4.2, apply CICS APAR PK23984.

A.1.7 CICS TS 3.2 APARs

For CICS VR 4.1 and CICS VR 4.2, no CICS APARs are required.

A.2 CICS VR APARs

This section documents CICS VR Version 4 APARs that correct some issues, as well as some enhancements to the product. All APARs that we list are closed and PTFs are available.

APAR	Description
PK15503	CICS VR 4.1, new function to provide Kanji support.
PK15737	CICS VR 4.1, Batch backout performance fix to use LSRPOOL.
PK15739	CICS VR 4.1, fix to ship the required DFHCSD definitions.
PK17471	CICS VR 4.1, DBCS fix for Kanji users.
PK18133	CICS VR 4.1, fix to change accumulation and use of local time.
PK18141	CICS VR 4.1, fix to notify interface when used with z/OS 1.7 and above.
PK26778	CICS VR 4.1, fix for migrated log stream copies migrated to ML2 tape.
PK28852	CICS VR 4.1, new function to provide cursor support for logstreamcopy utility.
PK36374	CICS VR 4.1, fix when using batch backout with three or more AIXs on a sphere.
PK44606	CICS VR 4.2, enhancement to allow a return code of 4 to be treated as normal for CICS VR batch logging.

PK44784   CICS VR 4.1 and 4.2, batch logging performance improvement to reduce RCDS contention between batch logging and RCDS scavenger.

PK48927   CICS VR 4.2, RCDS migration utility fix.

Problem diagnosis

In this appendix, we provide some examples of issues that you might encounter when using CICS VR and how to solve them.

B.1 CICS VR server problems

In this section, we describe how to address issues that you might experience when using the CICS VR server address space.

B.1.1 CICS VR server initialization failure

Problem: The CICS VR server address space fails at initialization.

Solution: Check that the LPALST has been set up correctly.

Make sure that the CICS VR SDWWLPA library is ahead of the SDWWDLPA that is supplied by DFSMS in the LPALST concatenation. DFSMS supplies dummy stubs for VSAM batch logging that need to be replaced by the real CICS VR stubs.

B.1.2 CICS VR server start failure (message DWW180E)

Problem: The CICS VR server does not start and you get the message:

```
DWW180E Unexpected error during CICSVR server processing
```

Solution: Make sure that the required data sets DWWCON1, DWWCON2, DWWCON3, and DWWMSG have been pre-allocated.

Also verify that the DWWPRINT, DWWDUMP, and DWWMSG data sets all have the same hlq and slq as the DWWCON1, DWWCON2, DWWCON3 and DWWMSG data sets.

B.2 Batch logging issues: After-images not logged in the log stream

In this section, we describe how to address issues that you might experience with after-images not being logged in the log stream.

Problem: The after-images are not logged when FRLOG=REDO and LOGSTREAMID parameters are specified.

Solution: Logging cannot be performed when the VSAM data set is empty (load mode). If you have an empty VSAM data set, use the following steps to load it:

i. Open the empty data set for load mode processing.

ii. Sequentially write one or more records, which could be dummy records.

iii. Close the data set to terminate load mode processing.

iv. Reopen the data set for normal processing. CICS VR batch logging can now occur for this VSAM data set.

B.3 Hints and tips: Displaying SMS options

You might need to know the value of the SMS parameters that are in effect. To do so use the following command:

```
D SMS,OPTIONS
```

The output from this command can also be used to verify that any SETMVS commands that you have issued previously have taken effect.

Example B-1 shows an example of the output from this command.

Example: B-1   D SMS,OPTIONS output

```
D SMS,OPTIONS
IGD002I 16:20:00 DISPLAY SMS 504
ACDS     = SYS1.SMS.ACDS
COMMDS   = SYS1.SMS.COMMDS
INTERVAL = 10
DINTERVAL = 150
BMFTIME = 3600
CACHETIME = 3600
LRUTIME = 15
LRUCYCES = 240
SMF_TIME = YES
```

```
CF_TIME = 1800
LOCAL_DEADLOCK = 15
GLOBAL_DEADLOCK = 4
REVERIFY = NO
ACSDEFAULTS = NO
DSNTYPE = PDS
PDSESHARING = EXTENDED
OVRD_EXPDT = NO
SYSTEMS    = 32
HSP_SIZE   = 256MB
USE_RESOWNER = YES
RLS_MAX_POOL_SIZE = 100MB
RLSINIT = YES
RLSTMOUT = 0
COMPRESS = GENERIC
CICSVR_INIT = YES
CICSVR_DSNAME_PREFIX = DWWUSER.V3R1M0
PDSE_MONITOR = (YES,0,0)
TRACE   = OFF    SIZE = 128K     TYPE = ALL
JOBNAME = *     ASID = *
  TRACING EVENTS:
    MODULE = ON    SMSSJF = ON    SMSSSI = ON    ACSINT = ON
    OPCMD  = OFF   CONFC  = ON    CDSC   = ON    CONFS  = ON
    MSG    = OFF   ERR    = ON    CONFR  = ON    CONFA  = ON
    ACSPRO = ON    IDAX   = ON    DISP   = OFF   CATG   = ON
    VOLREF = ON    SCHEDP = ON    SCHEDS = ON    VTOCL  = ON
    VTOCD  = ON    VTOCR  = ON    VTOCC  = ON    VTOCA  = ON
    RCD    = ON    DCF    = ON    DPN    = ON    TVR    = ON
    DSTACK = ON    UAFF   = ON
```

Sample program, VSAMBUPD

This appendix includes the sample program, VSAMBUPD, that you can use when adding records with Example 4-13 on page 167.

Example: C-1   Batch program VSAMBUPD

```
//CICSRS3  JOB (999,POK),'CICS VR 4.2',CLASS=A,MSGLEVEL=(1,1),        00002100
// MSGCLASS=T,NOTIFY=&SYSUID,REGION=0M                                00002200
//*----------------------------------------------------------------*  00003000
//STEP1    EXEC PROC=C32ASMVS,OUTC=K,                                 00004000
//         INDEX='CICSTS32.CICS'                                      00005000
//SYSPUNCH DD   DSN=&&TEMP,DCB=(RECFM=F,BLKSIZE=80),                  00006000
//         SPACE=(80,(100,100)),UNIT=SYSDA,DISP=(NEW,PASS)            00007000
//SYSPRINT DD SYSOUT=*                                                00008000
//SYSIN    DD    *                                                    00009000
VSAMBUPD CSECT                                                        00010000
VSAMBUPD AMODE 31                                                     00020000
*                                                                     03020000
         SAVE (14,12)                                                 03030000
         BALR  12,0                                                   03040000
         USING *,12                                                   03050000
*                                                                     03060000
         ST    1,SAVER1             SAVE R1,R13,R14...                03070005
```

```
            ST    13,SAVER13                                              03071005
            ST    14,SAVER14                                              03072005
*                                                                         03073000
**************************************************************            03073100
            OPEN  (SYSINT,INPUT)                                          03073200
            TM    SYSINT+48,X'10'     CAN WE OPEN...                      03073305
            BO    NEXT            ... FILEA RECORD CARDS?                 03073405
            ABEND 110             NO.. ABEND                             03073505
NEXT        DS    0H                                                      03073600
**************************************************************            03073700
*                                                                        03074000
            BAL   5,OPENRTN                                              03081000
NEXTGET     DS    0H                                                     03081100
            GET   SYSINT,JOBCARD      READ FILEA RECORDS FROM...          03081205
            CLC   JOBCARD(3),=CL3'END'   ...JCL UNTIL END CARD            03081305
            BE    CLS                                                    03081400
            BAL   5,PUTRTN           ...AND PUT THEM TO FILEA             03084005
            B     NEXTGET                                                03084100
CLS         DS    0H                                                     03084200
            BAL   5,CLOSERTN         CLOSE FILEA                          03085105
            B     RETURN                                                 03086000
*                                                                        03090000
*                                                                        03210000
OPENRTN     EQU   *                                                      03220001
            OPEN  (VSAMFILE,(OUTPUT))                                    03230000
            LTR   15,15                        OPEN SUCCESSFUL ???        03231005
            BNZ   BADOPEN                       OOPS...  QUIT             03232005
            TESTCB ACB=VSAMFILE,OFLAGS=OPEN                              03233000
            BNZ   BADOPEN                                                03234000
            BR    5                                                      03235100
*                                                                        03235200
PUTRTN      EQU   *                                                      03235300
            MVI   RECORD,C' '        CLEAR RECORD AREA...                 03235505
            MVC   RECORD+1(79),RECORD   ... WITH BLANKS                   03235605
            MVC   RECORD(50),JOBCARD                                     03235700
            PUT   RPL=SEQRET                                             03235800
            ST    15,SAVE15          SAVE RETURN CODE                    03235905
            LTR   15,15              .. RETURN CODE = 0 ?                03236005
            BNZ   BADPUT             DO BADPUT PROCESS                   03236105
            BR    5                                                      03236400
*                                                                        03236500
CLOSERTN EQU      *                                                      03236600
            CLOSE VSAMFILE                                               03236700
            LTR   15,15                                                  03236800
            BNZ   BADCLOSE                                               03236900
```

```
        BR    5                                            03237100
*                                                          03237200
RETURN  EQU   *                                            03237300
        SR    15,15       SET USER RETURN CODE TO ZERO     03237400
        L     14,SAVER14                                   03237700
        LM    0,12,20(13)                                  03237800
        BR    14                                           03237900
*                                                          03238000
EODRTN  EQU   *                                            03238100
        WTO   '*** END OF FILE ROUTINE ENTERED          '  03238200
        LA    15,16                                        03238300
        L     14,SAVER14                                   03238700
        LM    0,12,20(13)                                  03238800
        BR    14                                           03238900
*                                                          03239000
*                                                          03239100
EODRTN1 EQU   *                                            03239200
        WTO   '***    PROCESSING EOF FOR SYSINT         '  03239300
        LA    15,16                                        03239400
        L     14,SAVER14                                   03239700
        LM    0,12,20(13)                                  03239800
        BR    14                                           03239900
BADTEST EQU   *                                            03240000
        WTO   '***        THE TESTCB FOR VSAM FEEDBACK CODE FAILED'  03240200
        L     14,SAVER14                                   03240500
        LM    0,12,20(13)                                  03240600
        BR    14                                           03240700
*                                                          03240800
ERROR1  EQU   *                                            03240900
        WTO   '***        SYNAD ERROR PROCESSING'          03241100
        L     14,SAVER14                                   03241400
        LM    0,12,20(13)                                  03241500
        BR    14                                           03241600
*                                                          03241700
BADOPEN EQU   *                                            03241800
        WTO   '***  OPEN FAILED             ...'           03242000
        L     14,SAVER14                                   03242300
        LM    0,12,20(13)                                  03242400
        BR    14                                           03242500
*                                                          03242600
BADPUT  EQU   *                                            03242700
        WTO   '****           FILE PUT FAILED...'          03242900
        L     14,SAVER14                                   03243200
        LM    0,12,20(13)                                  03243300
        BR    14                                           03243400
```

```
*                                                              03243500
BADCLOSE EQU    *                                              03243600
         WTO    '***              FILE CLOSE FAILED...'        03243800
         L      14,SAVER14                                     03244100
         LM     0,12,20(13)                                    03244200
         BR     14                                             03244300
*                                                              03244400
*************************************************************  03244500
*                 I/O FILE DECLARATIONS                        03244600
*************************************************************  03244700
SYSINT   DCB    DSORG=PS,MACRF=GM,EODAD=EODRTN1,LRECL=80,RECFM=FB,  X03244800
                DDNAME=SYSINT,DCBE=INT                         03244900
INT      DCBE   RMODE31=BUFF                                   03245000
*************************************************************  03245100
*                                                              03245200
VSAMFILE ACB    AM=VSAM,EXLST=MSTEXL,DDNAME=FILEPK,MACRF=(KEY,SEQ,OUT)  03245300
MSTEXL   EXLST  EODAD=EODRTN,SYNAD=ERROR1                      03245400
SEQRET   RPL    AM=VSAM,ACB=VSAMFILE,AREA=RECORD,AREALEN=80,   X03245500
                RECLEN=80,OPTCD=(KEY,SEQ,NUP,MVE,SYN)          03245600
*                                                              03245700
SEQRETA  DC     A(SEQRET)                                      03245800
USERKEY  DC     F'0'                                           03245900
SAVE15   DS     F'0'                                           03246000
RECORD   DS     CL256                                          03246100
*                                                              03246200
SAVER1   DC     F'0'                                           03246300
SAVER14  DC     F'0'                                           03246400
SAVER13  DC     F'0'                                           03246500
JOBCARD  DS     CL80                                           03247400
         END                                                   03247500
//STEP2    EXEC  PROC=C32LNKVS,PARM='LIST,LET,XREF'            03247600
//SYSLIN DD   DSN=&&TEMP,DISP=(OLD,DELETE)                     03247800
//       DD   *                                                03247900
         MODE AMODE(31),RMODE(24)                              03248000
         NAME   VSAMBUPD(R)                                    03248100
/*                                                             03249000
//                                                             03250000
```

Related publications

We consider the publications that we list in this section particularly suitable for a more detailed discussion of the topics that we cover in this book.

Other publications

These publications are relevant as further information sources:

► *CICS VSAM Recovery V4R2 Implementation Guide and Reference,* SC34-6802

► *Program Directory for CICS VSAM Recovery,* GI10-2599

► *DFSMShsm Storage Administration Reference*, SC26-7402

► *z/OS DFSMS Installation Exits*, SC26-7396

Online resources

The following Web site is also relevant as a further information source:

► Order CICS VR Web site

http://www-3.ibm.com/software/ts/cics/library

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CICS VR Version 4

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250 <-> 459 pages

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CICS VR Version 4

Provides details about autonomic interaction with CICS

Discusses enhanced backup support in CICS VR V4

Covers improved log stream copy function

CICS VSAM Recovery Version 4.2 (CICS VR) can help you to recover CICS and batch VSAM data from physical or logical corruption. CICS VR allows you to recover from errors quickly, reduces the risk that off-line processing might exceed its batch window, and improves the availability of your online CICS systems.

With CICS VR, you can:

► Perform automated recovery.
► Invoke the backup process from the CICS VR panel interface to allow both sharp and fuzzy backups (when enabled).
► Pre-allocate the target data set prior to restoring from a backup.
► Manage authorization for the panel interface to limit access to specific tasks by user ID.
► Test forward recovery and backout procedures to enable testing of recovery processes without affecting production data.
► Create disaster recovery reports to allow customers to review and validate what is needed at a remote site.
► Manage log streams.

This IBM Redbooks publication reviews how to install, customize, and implement CICS VR in your environment. It also looks at usage scenarios and new functions that are available with CICS VR 4.2.