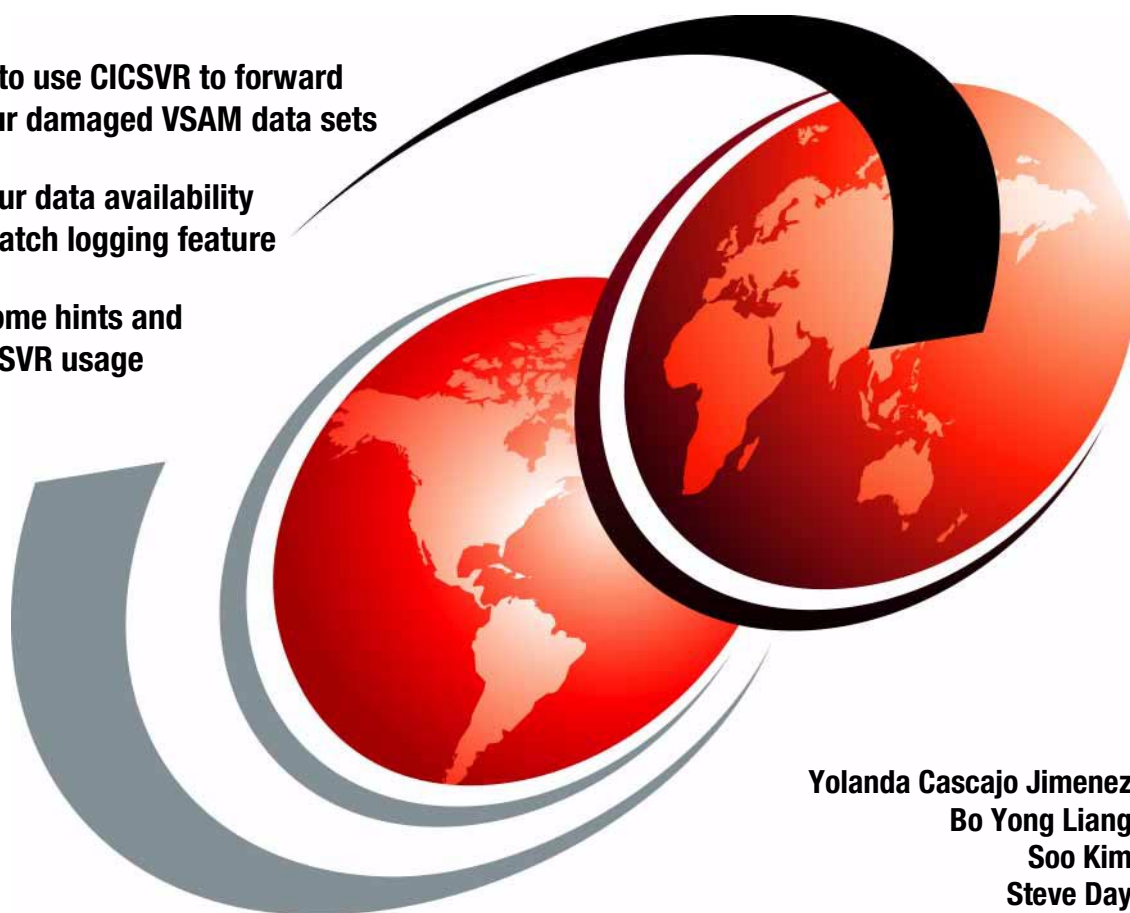


CICSVR Usage Guide

Learn how to use CICSVR to forward
recover your damaged VSAM data sets

Improve your data availability
using the batch logging feature

Discover some hints and
tips for CICSVR usage



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International Technical Support Organization

CICSVR Usage Guide

June 2002

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

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This edition applies to Version 3 Release 1 of CICS VSAM Recovery, Program Number 5655-H91, and to all subsequent releases and modifications until otherwise indicated in new editions.

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Preface

CICS VSAM Recovery (CICSVR) is an IBM product that allows you to automate the recovery of your damaged or lost VSAM data sets, whether you are using them in a CICS, batch, or combined environment.

CICSVR is for organizations where the availability and integrity of VSAM data is vital. CICSVR provides an ISPF panel interface and automates the construction of recovery jobs.

CICSVR V3R1 introduces new capabilities and improved performance to the VSAM recovery process. Traditionally, CICSVR was primarily used as a CICS data recovery tool. With this new version, CICSVR also provides recovery for your VSAM batch applications.

This IBM Redbook introduces you to the new features of CICSVR and provides useful information for helping you in the installation, setting up, and use of the product in your environment. Practical examples are included for easier understanding.

This redbook is written for storage administrators or CICS systems programmers responsible for VSAM data set recovery.

The team that wrote this redbook

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Introduction

In this chapter we provide a brief introduction to CICS VSAM Recovery (CICSVR) Version 3 Release 1 and its capabilities.

These topics are discussed:

- ▶ What CICSVR is and how you can use it
- ▶ The basic components and programs of CICSVR

CICSVR V3R1 can be ordered as a separate product, product number 5655-H91, or as a component of the IBM TotalStorage Management Toolkit. For more information about the Toolkit, refer to the Web site:

<http://www.storage.ibm.com/software/toolkit/>

1.1 What is CICSVR?

CICS VSAM Recovery V3R1 (CICSVR) is an automated recovery product that will enable you to recover VSAM data sets that have been lost or physically damaged.

CICSVR V3R1 can provide recovery for VSAM data sets updated by CICS applications. In addition CICSVR V3R1 can also provide recovery for VSAM data sets updated by batch applications using *batch logging*.

In both cases, updates to your VSAM data sets are recorded on a MVS system logger log stream. The writes to the log stream are done by CICS and CICSVR batch logger and are referred to as *after-images* or *redo records*. CICSVR can then use these after-images to perform *forward recovery* if your VSAM data sets are lost or corrupted.

CICSVR can be used in z/OS V1R1 and upwards, and in OS/390 V2R10 if the appropriate dependency PTFs have been applied (see Appendix A, “Additional information on APARS” on page 79).

The following releases of CICS are supported:

- ▶ CICS TS V2 or V1
- ▶ CICS/ESA V4

From this point on, all the information provided in the book refers to the CICS TS environment (unless specified otherwise). For specific details about the CICS V4 environment, refer to Appendix C, “CICSVR for CICS V4” on page 97.

1.1.1 Terminology used in this book

Following are some of the common terms we are using throughout this redbook:

- ▶ **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 your 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 can fail if there has been a CI split; in this case, the backup is marked as invalid.

- ▶ **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.
- ▶ **Forward recovery:** The CICSVR function that reapplies all changes to the VSAM data set since the last backup. The data set can be a VSAM KSDS, ESDS, RRDS, or VRRDS. CICSVR 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 CICSVR forward recovery, CICSVR restores a DFSMSHsm or DFSMSdss 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. CICSVR 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 is a repository of the necessary information to create the job to recover VSAM data sets. CICSVR uses three identical RCDSs to reduce the possibility of data loss.
- ▶ **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 CICSVR product, the term **VSAM sphere** is used referring to VSAM data sets, even when they do not have alternate indexes defined. Through this book we use the term “**VSAM data set**” with the same meaning as “VSAM sphere” is used in the CICSVR product, including VSAM data sets with or without alternate indexes defined.

1.1.2 Programs used by CICSVR

Table 1-1 shows the programs used by CICSVR.

Table 1-1 CICSVR programs

CICSVR 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

For further information on these programs, see *CICS VSAM Recovery V3R1 Implementation Guide*, SH26-4126.

1.1.3 DD names used by CICSVR

In this section we describe the common DD names that CICSVR uses. Each DD name identifies a data set used for a specific function. Table 1-2 shows the DD names list.

Table 1-2 CICSVR DD names

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

1.2 What can I do with CICSVR

In this section we provide a short introduction to the different CICSVR components and functions.

1.2.1 CICSVR ISPF dialogs

CICSVR is designed to enable you to recover the VSAM data sets by navigating ISPF dialogs.

From the ISPF panels you can select which VSAM data sets you wish to recover and which backup data sets to use. CICSVR will execute the LOGOFLOGS SCAN command in the background in order to get the latest information on your VSAM data sets from CICS. It will also invoke DFSMSHsm or DFSMSdss to restore from the latest backup.

The ISPF dialogs will generate the restore and forward recovery job.

1.2.2 VSAM forward recovery

Before forward recovery, you need to restore your damaged VSAM data set from its most recent backup copy. If you use DFSMSHsm or DFSMSdss for backing up your VSAM data sets, CICSVR will restore the latest backup copy. If you use another backup or restore product you must do the restore manually. CICSVR will then build the forward recovery job which you can submit when you are ready.

The next step is to use the CICSVR ISPF dialogs to generate the forward recovery job. This will invoke the DWWCO program to do the recovery. This program will read the after-images of your VSAM records from the log stream and apply them in the same sequence that they were originally written to your VSAM data set. When it has completed the VSAM data set will be in the exact state that it was at the point of failure.

1.2.3 CICSVR 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 required for batch logging must be closed to CICS.

In order for batch logging to work the CICSVR server *must* be active. In addition all VSAM data sets that require batch logging must be SMS-managed and must be defined with FRLOG(RED0) and LOGSTREAMID(*logstreamname*) parameters.

If a problem occurs with your VSAM data sets after the batch process, you can use CICSVR to forward recover the updates recorded on the MVS system logger log stream.

1.2.4 Remote recovery site commands

New RCDS commands can assist you to maintain a remote disaster recovery site. These commands are:

- ▶ **EXPORT:** Copies the RCDS information before sending it to a remote site
- ▶ **IMPORT:** Reloads the previously exported RCDS information.

1.2.5 Change accumulation processing

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



Setting up CICSVR

In this chapter we provide information on how to set up the different CICSVR components. We also describe these components in more detail. The following topics are covered:

- ▶ CICSVR system setup
- ▶ CICSVR address space
- ▶ RCDS definition
- ▶ JCL skeleton
- ▶ CICSVR utility programs
- ▶ ITSO sample environment

2.1 CICSVR system setup

The following sections contain details on the customization of the system parameters that are required for CICSVR.

We assume that the CICSVR product libraries are already installed in your system. For details about the installation process refer to *Program Directory for CICS VSAM Recovery*, GI11-1232.

Installation recommendation: CICSVR *must* be installed in SREL(C150).

Do not install CICSVR in the z/OS or OS/390 target and distribution zones, as this will produce unpredictable results.

2.1.1 LPA customization

It is essential that the LPALST is set up correctly. Make sure that the library DWW.SDWWLPA (supplied by CICSVR V3R1) is placed ahead of *hlq*.SDWWDLPA (supplied by DFSMS PTF UW79809).

UW79809 supplies dummy stubs for VSAM batch logging. For further information see information APAR II13131 in Appendix A, “Additional information on APARS” on page 79.

2.1.2 System parameters

The parameter which controls if the CICSVR 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 Indicates to start CICSVR at system initialization

NO CICSVR start is deferred

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

Every system in a SYSPLEX must have an IGDSMSxx setup for the CICSVR server address space.

You should also define a prefix for all CICSVR required data sets (or use the default value of DWW) by using the IGDSMSxx parameter **CICSVR_DSNAME_PREFIX**(*hlq.slq*). This prefix is used for the data sets that must be pre-allocated before you can start the CICSVR address space. These are those allocated to the DD names DWWCON1, DWWCON2 and DWWCON3,

and also DWWMSG (refer to 1.1.3, “DD names used by CICSVR” on page 4 for information about these DD names). The DWWMSG data set must also have a suffix of *systemname*. This *systemname* can be found in SYS1.PARMLIB(IEASYSxx) in the SYSNAME parameter.

Other data sets that can be pre-allocated are DWWPRINT, DWWDMMSG and DWWDUMP. They are not required for the CICSVR server but it is recommended that you do have them. They must have the same prefix (CICSVR_DSNAME_PREFIX) and the *systemname* suffix.

The CICSVR_DSNAME_PREFIX parameter is *mandatory* if you have CICSVR_INIT(YES) and specifies the prefix for dynamically allocated RCDS data set names.

Add DWW.SDWWLOAD to the LNKLIST concatenation. This is required for the CICSVR server.

An entry in IFAPRDxx is required to enable CICSVR V3R1.

In order to be able to issue DFSMSHsm authorized commands, your userid will require an entry in ARCCMDxx as follows:

```
AUTH userid DATABASEAUTHORITY(CONTROL)
```

This authority is required for change accumulation processing for data sets that have been backed up by DFSMSHsm.

2.2 CICSVR address space

The CICSVR address space is an integral part of CICSVR V3R1 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 CICSVR server address space is only required for batch logging or if you are using DFSMSdss for your backups.

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 may be required for problem determination. Example 2-1 shows a sample output.

Example 2-1 V SMS,CICSVR commands output

V SMS,CICSVR,TERMINATESERVER

```
DWW0172I REQUEST TO TERMINATE CICSVR ADDRESS 491
SPACE IS ACCEPTED:
CICSVR SERVER TERMINATION SCHEDULED.
DWW210I CICSVR HISTORY SCAVENGER STARTED 492
ON SYSTEM: SC62
DWW210I CICSVR HISTORY SCAVENGER FINISHED 493
ON SYSTEM: SC62
DWW008I CICSVR SERVER SUCCESSFULLY TERMINATED AT END OF MEMORY.
```

V SMS,CICSVR,ACTIVE

```
DWW015I CICSVR SERVER ADDRESS SPACE HAS FAILED AND IS RESTARTING.
IEF196I      1 //IEESYSAS JOB MSGLEVEL=1
IEF196I      2 //CICSVR EXEC IEESYSAS,PROG=DWWISJST
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 COMPONENTIEF196I
IEF196I      XX* STARTING FULL FUNCTION SYSTEM ADDRESS SPACES.
IEF196I      00250000
IEF196I      IEFC653I SUBSTITUTION JCL - PGM=DWWISJST
IEF403I IEESYSAS - STARTED - TIME=21.18.32 - ASID=01F7 - SC62
IEF196I IEF237I 3D02 ALLOCATED TO DWWMSG
IEF196I IEF237I 3C19 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 IEF237I 3D1A ALLOCATED TO DWWMSG
DWW204I CICSVR DATA SET NAMING CONVENTION SET DURING 521
CICSVR ADDRESS SPACE INITIALIZATION ON SYSTEM: SC62
CURRENT VALUE: DWWUSER.V3R1M0
DWW014I CICSVR SERVER ADDRESS SPACE IS NOW ACTIVE.
```

To find the status of your CICSVR server you can use the following command:

D SMS,CICSVR,ALL

An example of the output from this command is shown in Example 2-2.

Example 2-2 D SMS,CICSVR,ALL command output

```
D SMS,CICSVR,ALL
IEE932I 185
DWW020I DISPLAY SMS,CICSVR
DISPLAY SMS,CICSVR - SERVER STATUS
  SYSNAME: SC61      AVAILABLE ASID: 01F6 STEP: CICSVR_Init_Complete
  SYSNAME: SC62      AVAILABLE ASID: 01F8 STEP: CICSVR_Init_Complete

DISPLAY SMS,CICSVR - JOB STATUS
  NUMBER OF JOBS USING BATCH LOGGING:
  SYSNAME: SC61      0
  SYSNAME: SC62      0

DATA SET NAMING CONVENTION IN USE:
  SYSNAME: SC61      DWWUSER.V3R1M0
  SYSNAME: SC62      DWWUSER.V3R1M0
```

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

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

See Example 2-3 for a sample output.

Example 2-3 D SMS,CICSVR,LOGSTREAMS(ALL)

```
D SMS,CICSVR,LOGSTREAMS(ALL)
DWW020I DISPLAY SMS,CICSVR
DISPLAY SMS,CICSVR - LOG STREAM CONNECTION STATUS
  SYSNAME                0000000001111111112222222222333
  INDENTIFIER             12345678901234567890123456789012

  SCSCPAA9.DFHJ01        .C.....

01  SYSNAME: SC61
02  SYSNAME: SC62
```

In the display above 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 positions along this row would indicate on which sysplexes this log stream was active if it had been defined to use the coupling facility.

2.3 RCDS definition

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

The RCDS is made up of three linear VSAM data sets. They contain identical copies of the information that CICSVR requires for VSAM recovery. It is recommended that the RCDS data sets are allocated on different volumes and should use different disk controllers and channels. This will minimize the possibility of a hardware failure making all three RCDSs unusable. CICSVR 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.

A sample definition for the RCDS is shown in Example 2-4.

Example 2-4 Sample RCDS definition

DEF CL (NAME(DWWUSER.V3R1MO.DWWCON1)	-
VOLUME(TOTCI1)	-
CYLINDERS(200 30)	-
LINEAR	-
SHAREOPTIONS(3 3))	-
DEF CL (NAME(DWWUSER.V3R1MO.DWWCON2)	-
VOLUME(TOTCI2)	-
CYLINDERS(200 30)	-
LINEAR	-
SHAREOPTIONS(3 3))	-
DEF CL (NAME(DWWUSER.V3R1MO.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.

At present, to increase the RCDS size, you must shut down the CICSVR server. If the RCDS is shared between sysplexes, then the servers on all sysplexes must be shut down. In a future release, IBM intends to alter this so that it is not necessary.

2.4 JCL skeleton

The JCL skeleton can be accessed from the *CICSVR main menu* panel selecting **Option 5**.

The first time that you access the ISPF dialogs, you should alter the JCL according to your CICSVR setup. Change the data set name in the STEPLIB DD name and the RCDS data set names in DWWCON1, DWWCON2 and DWWCON3. You may also wish to add DD names for DWWDUMP, DWWDMSG, SYSMDUMP and SYSUDUMP for problem determination. Refer to 1.1.3, “DD names used by CICSVR” on page 4 for additional information.

When you save the new JCL skeleton, it will be stored in the library allocated to the ISPF DD name as member DWWUJOB.

An example of the modified JCL skeleton that we used is shown in Example 2-5.

Example 2-5 Sample JCL skeleton

```
//TESTGFS&CJOBCHAR JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=&&SYSUID,
//                      MSGCLASS=T,CLASS=A,REGION=4M
//DWW      PROC
//RECOVER  EXEC PGM=DWWCO
//STEPLIB  DD DSN=DWW.SDWWLOAD,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWDUMP  DD SYSOUT=*
//DWWDMSG  DD SYSOUT=*
//SYSMDUMP DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//DWWCON1  DD DSN=DWWUSER.V3R1M0.DWWCON1,DISP=SHR
//DWWCON2  DD DSN=DWWUSER.V3R1M0.DWWCON2,DISP=SHR
//DWWCON3  DD DSN=DWWUSER.V3R1M0.DWWCON3,DISP=SHR
//          PEND
```

A useful command to find out which data sets are allocated to your ISPF session is **ISRDDN**.

Figure 2-1 shows a sample output of this command. Only the CICSVR data sets are shown.

Command ==>				Current Data Set Allocations		Row 1 of 133	
						Scroll ==> PAGE	
Volume	Disposition	Act	DDname	Data Set Name	Actions: B E V M F C I Q		
.....			
TOTTS0	SHR,KEEP	>	DWWCON1	DWWUSER.V3R1M0.DWWCON1			
TSMS59	SHR,KEEP	>	DWWCON2	DWWUSER.V3R1M0.DWWCON2			
TSM547	SHR,KEEP	>	DWWCON3	DWWUSER.V3R1M0.DWWCON3			
TOTCI2	SHR,KEEP	>	DWLLIB	DWW.SDWWLOAD			
TOTCI2	SHR,KEEP	>		DWW.DWEXLD			
TOTCI2	SHR,KEEP	>	DWWLOAD	DWW.SDWWLOAD			
TOTSTZ	SHR,KEEP	>	DWWMSG	YCJRES3.DWW.DWWMSG			
TOTTSE	SHR,KEEP	>	DWWPRINT	YCJRES3.DWW.DWWPRINT			
TOTTSJ	SHR,KEEP	>	DWWSLIB	YCJRES3.DWW.ISPFILE			
TOTCI2	SHR,KEEP	>		DWW.SDWWSENU			
.....			
TOTTSJ	SHR,KEEP	>	ISPFILE	YCJRES3.DWW.ISPFILE			
.....			
TOTCI2	SHR,KEEP	>	ISP17483	DWW.SDWWLOAD			
TOTCI2	SHR,KEEP	>	ISP17484	DWW.SDWWPENU			
TOTCI2	SHR,KEEP	>	ISP17485	DWW.SDWWMENU			
TOTCI2	SHR,KEEP	>	ISP17486	DWW.SDWWTENU			
.....			
TOTTSJ	SHR,KEEP	>	MYFILE	YCJRES3.DWW.ISPFILE			
.....			
-----				End of Allocation List		-----	
F1=Help	F2=Split	F3=Exit	F5=Rfind	F7=Up	F8=Down	F9=Swap	
F10=Left	F11=Right	F12=Cancel					

Figure 2-1 Sample TSO ISRDDN command output

2.5 CICSVR utilities

In this section we describe the main CICSVR utilities.

2.5.1 Log of logs registration

When you define a new log of logs, use the ISPF dialog to register it with CICSVR. From the *CICSVR main menu* panel, select **Option 4**. This gives you a list of all currently registered log of logs. From here, select the **Administratrate** 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 (selecting **2** or **PF11**).

The registration panel is shown in Figure 2-2.

```
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 2-2 CICS log of logs registration panel

The deregistration panel is shown in Figure 2-3.

```
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 2-3 CICS log of logs deregistration panel

2.5.2 Log of logs scan

The LOGOFLOGS SCAN command instructs CICSVR to scan all the CICS TS log of logs that are registered in the RCDS. This should be set up as a batch job and run several times a day. This is to keep the RCDS up to date with essential recovery information. Whenever you run a scan CICSVR 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 the RCDS and optionally deleted.

For an example of the job required for a LOGOFLOGS SCAN, see Example 2-6.

Example 2-6 Sample LOGOFLOGS SCAN job

```
//YCJRES3S JOB ,SCANLOG,CLASS=A,MSGCLASS=T,NOTIFY=&SYSUID
//*
//SCANLOG EXEC PGM=DWWAR,REGION=OM
//STEPLIB DD DSN=DWW.SDWWLOAD,DISP=SHR
//DWWMSG DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWCON1 DD DSN=DWWUSER.V3R1M0.DWWCON1,DISP=SHR
//DWWCON2 DD DSN=DWWUSER.V3R1M0.DWWCON2,DISP=SHR
//DWWCON3 DD DSN=DWWUSER.V3R1M0.DWWCON3,DISP=SHR
//DWWIN DD *
LOGOFLOGS SCAN AUTODEREG(YES) RECOVERYREPORT(YES)
//
```

You can also request a LOGOFLOGS SCAN from the CICSVR ISPF dialogs by selecting the log of logs list (**Option 4** in the *CICSVR main menu* panel) and then the **Utilities** pull-down menu. See Figure 2-4.

Administrate Utilities List View Help

-----+-----+-----

1 1. Scan all F5 | gs list Row 1 to 1 of 1

Command ==> +-----+

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

S Log of logs Last scan

S CICSSTS.CICSVR.DFHLGLOG 02.119 22:45 DD name

***** Bottom of data *****

Figure 2-4 LOGOFLOGS SCAN using ISPF dialog

If you have multiple log of logs and for performance reasons you only want to scan some of them, you can do this if you have CICSVR APAR PQ58471 installed. This gives you an extra option which allows you to scan specific log of logs.

2.5.3 Log stream copy

The log stream copy utility should also be run regularly and should be immediately followed by a backup of the RCDS. See Example 2-7 for an example of the job.

Example 2-7 Sample log stream copy job

```
//YCJRES3X JOB ,CICSVR,CLASS=A,MSGCLASS=T,NOTIFY=&SYSUID
//*
//COMMAND EXEC PGM=DWWLC
//STEPLIB DD DSN=DWW.SDWWLOAD,DISP=SHR
//DWWCOPY1 DD DSN=YCJRES1.LSCOPY.DFHJ01.C001,DISP=(,CATLG,DELETE),
//          UNIT=SYSDA,VOL=SER=TOTTSY,SPACE=(CYL,(10,2,),RLSE)
//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 *
//          LOGSTREAMCOPY          -
//          NAME(SCSCPA9.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.

2.5.4 RCDS export/import

The CICSVR 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. For an example of the export command, see Example 2-8.

Example 2-8 Sample RCDS export job

```
//YCJRES3X JOB ,CICSVR,CLASS=A,MSGCLASS=T,NOTIFY=&SYSUID
//*
//EXPORT EXEC PGM=DWWGJCDS
//STEPLIB DD DSN=DWW.SDWWLOAD,DISP=SHR
//DWWCOPY1 DD DSN=YCJRES1.RCDS.DWWCOPY1,DISP=(,CATLG,DELETE),
//          UNIT=SYSDA,VOL=SER=TOTTSY,SPACE=(CYL,(20,10),RLSE)
//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
//
```

You can use the **IMPORT** utility for restoring a previously exported data set. For an example of the import command see Example 2-9.

Example 2-9 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.RCDS.DWWCOPY1,DISP=SHR
//DWWCON1 DD DSN=YCJRES1.V3R1M0.DRP.DWWCON1,DISP=SHR
//DWWCON2 DD DSN=YCJRES1.V3R1M0.DRP.DWWCON2,DISP=SHR
//DWWCON3 DD DSN=YCJRES1.V3R1M0.DRP.DWWCON3,DISP=SHR
//DWWMSG DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWIN DD *
RCDS IMPORT
//
```

2.5.5 Migration utility

In order to migrate from CICSVR V2R3M0 to CICSVR V3R1M0 you should run the migration utility program **DWWMIW** to convert your RCDS data sets to V3R1M0 format. Example 2-10 shows a sample job for running the migration utility.

Example 2-10 Sample migration utility job

```
//YCJRES3M JOB ,MIGRATE,CLASS=A,MSGCLASS=T,NOTIFY=&SYSUID
//*
//MIGRATE EXEC PGM=DWWMIW,REGION=0M
//STEPLIB DD DSN=DWW.SDWWLOAD,DISP=SHR
//DWWMSG DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWCON1 DD DSN=DWWUSER.V3R1M0.DWWCON1,DISP=SHR
//DWWCON2 DD DSN=DWWUSER.V3R1M0.DWWCON2,DISP=SHR
//DWWCON3 DD DSN=DWWUSER.V3R1M0.DWWCON3,DISP=SHR
//*
//DWWOCON1 DD DSN=DWWUSER.V2R3M0.DWWCON1,DISP=SHR
//DWWOCON2 DD DSN=DWWUSER.V2R3M0.DWWCON2,DISP=SHR
//DWWOCON3 DD DSN=DWWUSER.V2R3M0.DWWCON3,DISP=SHR
//
```

If you attempt to start the CICSVR server with an RCDS from an earlier release of CICSVR, you will get an error message informing you that your RCDS is back-level.

2.6 ITSO sample environment

We used z/OS V1R1 with DFSMS V2R10.

You can run CICSVR on OS/390 V2R10 if you have applied the dependency PTFs (refer to *Program Directory for CICS VSAM Recovery*, GI11-1232 for further information).

We 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 1.3 and we defined our log of logs using the job in Example 2-11. In this example we used DASD-only logs but CICSVR does not differentiate between DASD-only or log streams that are defined in the coupling facility.

Example 2-11 Sample log of logs log stream definition

```
//YCJRES3L JOB ,CICSVR,CLASS=A,MSGCLASS=T,NOTIFY=&SYSUID
//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)
//
```



CICSVR VSAM batch logging

In this chapter we discuss the CICSVR batch logging implementation. The following topics are covered:

- ▶ CICSVR VSAM batch logging description
- ▶ Forward recovery implementation
- ▶ A specific recovery scenario

3.1 Batch logging description

CICSVR VSAM batch logging (hereafter referred to as batch logging) provides forward recovery capability for VSAM data sets that are updated by batch applications.

3.1.1 Batch logging protects VSAM data sets

The CICSVR 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, CICSVR creates a new RCDS record containing data set name, timestamp, 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 DFSMS writes the information to the RCDS directly.
 - **For DFSMSHsm:** CICSVR can get the information from the DFSMSHsm BCDS (backup control data set).
- ▶ Relative log stream IDs:
OS/390 or z/OS log stream(s) log the after-images of the VSAM data sets updates.

CICSVR is able to forward recover the after-images of these VSAM data sets to a specific point in time. These are the forward recovery steps:

- ▶ Restore the VSAM data sets from a backup:
If the data were backed up using DFSMSHsm or DFSMSdss, CICSVR can find the latest backup and restore them automatically before forward recovery.
- ▶ Apply the after-images from the logs to recover VSAM data sets.

3.1.2 CICSVR batch logging benefits

These are the main benefits:

- ▶ **Saves data:** Batch logging can forward recover damaged VSAM data sets.
- ▶ **Saves time:** Avoids the need to re-run batch jobs.

- ▶ **Ease of use:** The CICSVR ISPF dialog can guide you through the creation of a forward recovery job quickly and easily while maintaining data integrity.
- ▶ **Flexibility:** MVS log stream copy and RCDS export/import utilities make it feasible for disaster recovery.
- ▶ **Safety:** CICSVR maintains three copies of the RCDS.
- ▶ **Manageability:** You can deregister the information which is no longer needed from the RCDS, such as: VSAM data sets, log streams, copies of MVS log streams.

3.1.3 Batch logging prerequisites

CICSVR VSAM batch logging requires the following:

- ▶ CICSVR server address space must be active.
- ▶ All VSAM data sets must be:
 - SMS-managed
 - Defined with FRLOG(REDO) and LOGSTREAMID specified
- ▶ All VSAM data sets must not be:
 - Accessed in RLS mode
 - Currently in use by CICS

For the detailed pre-requisites of the system environment refer to 1.1, “What is CICSVR?” on page 2.

3.2 Batch logging and forward recovery implementation

In this section we discuss the steps to forward recover VSAM data sets with batch logging enabled. The following topics are included:

- ▶ ITSO testing environment
- ▶ CICSVR server address space checking
- ▶ MVS log stream definition
- ▶ Batch logging enablement
- ▶ VSAM data set backup
- ▶ VSAM data set batch update
- ▶ Batch logging checking
- ▶ Forward recovery job
- ▶ CICSVR forward recovery report

3.2.1 ITSO batch logging environment

Our batch logging implementation scenario includes the following components:

- ▶ DASD-only log stream — BATCH.LOGGING
- ▶ VSAM KSDS data set — YCJRES1.CICSVR.STATES
- ▶ DFSMSdss DUMP as backup utility
- ▶ Batch program to update the VSAM data set

For more details about the ITSO testing environment, see 2.6, “ITSO sample environment” on page 19.

3.2.2 CICSVR server address space checking

The CICSVR server address space *must* be active for batch logging. You can use the following system command to check the status of the CICSVR server.

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

If the server is inactive, you can issue the following command to activate it:

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

For more details, refer to 2.1, “CICSVR system setup” on page 8.

3.2.3 MVS log stream definition

The MVS system logger is a component of MVS/ESA, OS/390, and z/OS. CICSVR batch logger logs the after-images of the VSAM data sets updated by batch jobs to the MVS log stream.

Example 3-1 shows the sample job we used to define the log stream.

Example 3-1 Sample log stream definition job

```
//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(BATCH.LOGGING)
           DASDONLY(YES)
           HLQ(YCJRES1)
           STG_SIZE(500)
           LS_SIZE(7000)
           MODEL(NO)
           OFFLOADRECALL(YES)
           DIAG(NO)
           RETPD(4)
           AUTODELETE(YES)
//
```

The following command will list the log stream report (see Example 3-2).

DATA TYPE(LOGR) REPORT(YES)

Example 3-2 Sample MVS log stream report

ADMINISTRATIVE DATA UTILITY:	REPORT	DATA TYPE = LOGR
------------------------------	--------	------------------

```

LOGSTREAM NAME(BATCH.LOGGING) STRUCTNAME() LS_DATACLAS()
      LS_MGMTCLAS() LS_STORCLAS() HLQ(YCJRES1) 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(4) AUTODELETE(YES) OFFLOADRECALL(YES)
      DASDONLY(YES) DIAG(NO)
      MAXBUFSIZE(65532)

```

3.2.4 Batch logging enablement

The VSAM data sets for batch logging must be:

- ▶ SMS-managed
- ▶ Defined with FRLOG(REDO) 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 3-3 shows a sample job to define a VSAM KSDS data set.

Example 3-3 Sample VSAM data set definition

```

//S1      EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN   DD *
          DEF CL(NAME(YCJRES1.CICSVR.STATES)          -
              UNIQUE                                  -
              CYL(2 1)                                -
              RECSZ(80 80)                             -
              STORCLAS(STANDARD)                       -
              FRLOG(REDO)                               -
              LOGSTREAMID(BATCH.LOGGING)               -
              KEYS (15 0)                               -
              SHR(3 3)                                   -
              VOL(TOTTS4)                               -
              FSPC(50 50))                             -
          DATA(NAME(YCJRES1.CICSVR.STATES.DATA))      -
          INDEX(NAME(YCJRES1.CICSVR.STATES.INDEX))
//

```

It is important to pay attention to the highlighted parameters:

► **STORCLAS(STANDARD):**

For a data set to be SMS-managed, it has to be assigned a storage class.

► **FRLOG(RED0):**

Specifies that CICSVR VSAM batch logging will be performed for the VSAM data set. CICSVR will write forward recovery log records to the log specified by the LOGSTREAMID parameter.

If you specify FRLOG(RED0), you must also specify the LOGSTREAMID parameter, unless it is already defined.

► **LOGSTREAMID(BATCH.LOGGING):**

Specifies the MVS log stream name to be used for writing the forward recovery log records.

Alter an existing VSAM data set

An existing SMS-managed VSAM data set can be altered to enable VSAM batch logging. Example 3-4 shows an example job.

Example 3-4 Sample VSAM data set ALTER job

```
//S1      EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
  ALTER YCJRES1.CICSVR.STATES          -
      FRLOG(RED0)                      -
      LOGSTREAMID(BATCH.LOGGING)
//
```

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 YCJRES1.CICSVR.STATES 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(YCJRES1.CICSVR.STATES) ALL
```

Figure 3-1 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-----BATCH.LOGGING
RECOVERY  TIMESTAMP  LOCAL-----X'0000000000000000'
RECOVERY  TIMESTAMP  GMT-----X'0000000000000000'
```

Figure 3-1 VSAM data set attributes

3.2.5 VSAM data set backup

You can use any storage management product to backup your VSAM data sets. CICSVR provides complete data set forward recovery automation if you use DFSMSHsm or DFSMSdss utilities. There are some other considerations when using DFSMS:

► **DFSMSHsm**

The CICSVR server address space is not required in order to use DFSMSHsm. However, if the CICSVR server address space is active, all userids running CICSVR must be authorized for issuing DFSMSHsm authorized commands (see 2.1.2, “System parameters” on page 8).

CICSVR gets the backup information directly from the DFSMSHsm BCDS.

You can make a DFSMSHsm backup using any of the following ways:

- DFSMSHsm automatic backup.
You can do it by assigning a management class to your 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 3-5 shows a sample job.

Example 3-5 Sample DFSMSHsm inline backup

```
//HBACK EXEC PGM=ARCINBAK
//ARCPRI DD SYSOUT=*
//ARCSNA DD SYSOUT=*
//BACK01 DD DSN=YCJRES1.CICSVR.STATES,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 will be restored. The restored VSAM data set will then be forward recovered, and the AIX will be 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 CICSVR server address space received notification every time a backup is made, by specifying the special keyword CICSVRBACKUP.

CICSVR stores the DFSMSdss backup information in the RCDS. The CICSVR server address space must be active.

- DFSMSdss COPY

Example 3-6 shows a sample job using DFSMSdss COPY.

Example 3-6 Sample DFSMSdss COPY job

```
//STEP1 EXEC PGM=ADDRSSU
//SYSPRI DD SYSOUT=*
//SYSIN DD *
COPY DATASET( -
  INCLUDE(YCJRES1.CICSVR.STATES)) -
  RENAMEU(**,CICSVR.***) -
  OUTDYNAM((TOTTS4),(TSM05)) -
  CICSVRBACKUP
/*
```

By specifying CICSVRBACKUP and RENAMEU(**,CICSVR.**), CICSVR provides DFSMSdss with a new name for each copy using the naming convention *prefix.DSOUTPUT.Dyyyyddd.Thhmmsss*, where:

- | | |
|----------------|--|
| <i>prefix</i> | Is the value of the CICSVR_DSNAME_PREFIX parameter defined in the IGDSMSxx PARMLIB member. |
| <i>yyyyddd</i> | Represents the year and day in Julian date format. |
| <i>hhmmsss</i> | Represents the hour, minutes, and seconds. |

The VSAM data sets were copied into new VSAM data sets, as shown in Figure 3-2.

DSLIS - Data Sets Matching DWWUSER.V3R1M0.DSOUTPUT		Row 1 of 84
Command ==>		Scroll ==> PAGE
Command - Enter "/" to select action	Message	Volume

DWWUSER.V3R1M0.DSOUTPUT.D2002084.T1247028		*VSAM*
DWWUSER.V3R1M0.DSOUTPUT.D2002084.T1247028.D		TSMS06
DWWUSER.V3R1M0.DSOUTPUT.D2002084.T1247028.I		TSMS06
DWWUSER.V3R1M0.DSOUTPUT.D2002084.T1247043		*VSAM*
DWWUSER.V3R1M0.DSOUTPUT.D2002084.T1247043.D		TOTTS4
DWWUSER.V3R1M0.DSOUTPUT.D2002084.T1247043.I		TOTTS4
...		

Figure 3-2 Sample list of DFSMSdss COPY data sets

– DFSMSdss DUMP

Example 3-7 shows a sample backup job using DFSMSdss DUMP.

Example 3-7 Sample DFSMSdss DUMP job

```
//STEP2 EXEC PGM=ADDRSSU
//SYSPRINT DD SYSOUT=*
//BACKUP DD DSN=YCJRES1.BATCH.BACKUP.BLO1,VOL=SER=TOTTS4,
// DISP=(,CATLG,DELETE),UNIT=SYSDA,SPACE=(TRK,(20,20))
//SYSIN DD *
DUMP OUTDDNAME(BACKUP) -
DATASET(INCLUDE(YCJRES1.CICSVR.STATES -
)) -
CICSVRBACKUP
/*
```

Using the CICSVRBACKUP keyword DFSMSdss notifies the CICSVR 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.

For more details about rebuilding AIX during CICSVR forward recovery of VSAM data sets updated by CICS refer to 4.1.1, “VSAM data set definitions” on page 44.

You can use the ISPF dialog to check the information about the backups of your VSAM data sets. On the *CICSVR main menu* panel select **Option 1** and enter the search criteria. You will 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** pull down menu to display the list of backups for this data set.

The *CICSVR backup list* panel is shown (Figure 3-3), 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 . . . : YCJRES1.CICSVR.STATES

----- Data set backup information -----
Backup      Gen Ver BW0 RLS      Recovery point      Product
Date  Time  no. no.      Date  Time      Type
02.081 19:49:33      NO  NO      Date  Time      LOCAL  DSSLD
***** Bottom of data *****

F1=Help      F7=Bkwd      F8=Fwd      F12=Cancel
-----+-----

```

Figure 3-3 *CICSVR backup list*

In our case the **Product** field shows a value of **DSSLD**, which means that the backup was made using DFSMSdss logical DUMP. Other values for this field are:

- ▶ HSMLB: DFSMSHsm logical copy (data set level)
- ▶ DSSLC: DFSMSdss logical COPY

3.2.6 VSAM data set update

When a candidate VSAM data set is opened for updating by a batch job (not in *load mode*), CICSVR server address space records the information about that VSAM data set in the RCDS.

3.2.7 Batch logging checking

You can use the CICSVR ISPF dialog to verify if batch logging occurred. 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

VSAM data set information

In the *CICSVR main menu* panel select **Option 1** and enter a search criteria. In the *CICSVR VSAM sphere list* panel (Figure 3-4) you can see the new defined VSAM data set. When you use “*” as the search criteria all the VSAM data sets that are registered in the RCDS will appear in the list.

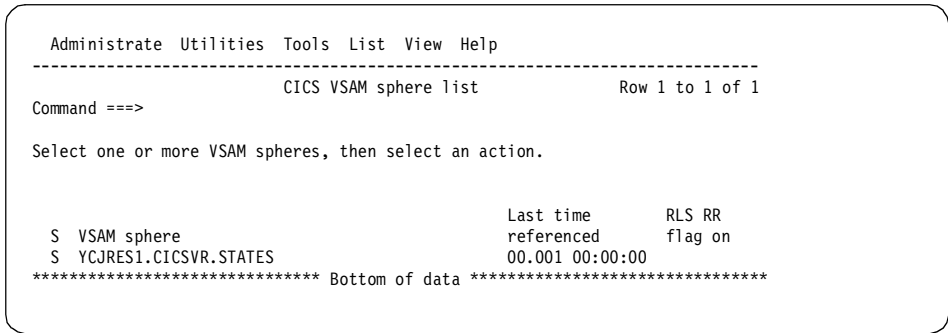


Figure 3-4 CICSVR VSAM sphere list

Log stream information

Select **Option 3** in *CICSVR main panel*, the log stream information is displayed in the *CICSVR log stream list*. See Figure 3-5.

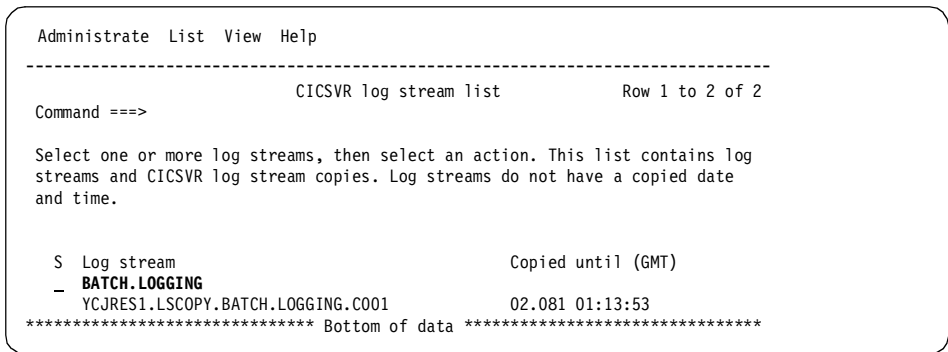


Figure 3-5 CICSVR log stream list

3.2.8 Forward recovery job creation

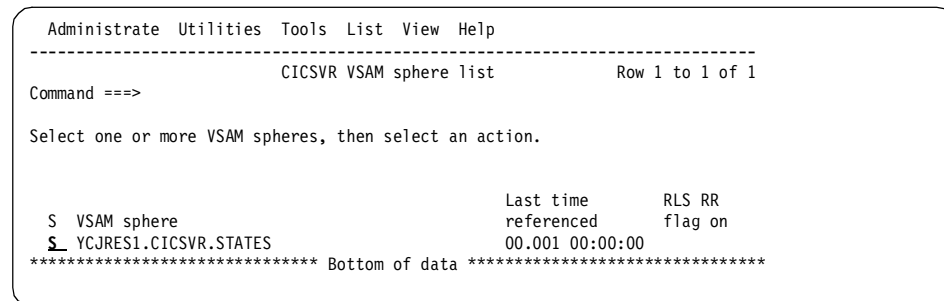
You can use the CICSVR ISPF dialog to help you create the forward recovery job interactively.

Customize the JCL skeleton

The first time that you create a forward recovery job you should alter the JCL skeleton according to your CICSVR setup. See 2.4, “JCL skeleton” on page 13 for more details.

Select the VSAM data sets

To select the VSAM data set(s) you want to forward recover go to the *CICSVR VSAM sphere list* menu and select the data set(s), as shown in Figure 3-6.



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.

S	VSAM sphere	Last time referenced	RLS RR flag on
<u>1</u>	YCJRES1.CICSVR.STATES	00.001 00:00:00	

***** Bottom of data *****

Figure 3-6 Select VSAM data set to recover

To select the type of recovery you want for the selected data set(s) do the following:

- ▶ Press **PF4** to perform a complete recovery
- ▶ Press **PF5** to perform forward recovery only

You get the same result if after selecting the data set(s) you choose one of the options in the **Utilities** pull down menu (see Figure 3-7).

Administrate Utilities Tools List View Help			
-----+-----		-----+-----	
Command ==>	1. Complete recovery... F4	Row 1 to 1 of 1	
	2. Forward recover only... F5		
	3. Backout only... F6		
Select one or +-----+ ion.			
S	VSAM sphere	Last time	RLS RR
S	YCJRES1.CICSVR.STATES	referenced	flag on
		00.001 00:00:00	
***** Bottom of data *****			

Figure 3-7 Select forward recovery type

At this time CICSVR always runs the log of logs scan. It is not necessary for batch logging and it may take long time. It can be bypassed by the user after applying APAR PQ58471. Refer to “New CICSVR APARs” on page 92 for more information.

VSAM forward recovery setup

If you have selected more than one VSAM data set from the *CICSVR VSAM sphere list* panel, the *CICSVR VSAM sphere parameters* panel (see Figure 3-8) will be displayed once for every selected VSAM data set.

If your data was backed up by DFSMSHsm or DFSMSdss, CICSVR will show the default parameters according to the latest backup. So you do not need to enter new information on this panel.

```

+-----+
|                                     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.STATES                             |
|                                                                              |
| New VSAM sphere name . .                                                  |
|                                                                              |
| Forward-recovery start time . . 02.081 19:49:33  (YY.DDD HH:MM:SS)         |
|                                                                              |
| Forward-recovery stop time . .                                           (YY.DDD HH:MM:SS)         |
|                                                                              |
| Backup time . . . . . 02.081 19:49:33  + (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                                       |
+-----+

```

Figure 3-8 Setup forward recovery parameters

It is important to check that the correct **Backup type** is selected. CICSVR 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 if you want CICSVR to use the MVS log stream or SAM copies of the log stream (if they exist) during the recovery:

```

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 3-9 Select CICSVR log stream type

If CICSVR detects errors while constructing the forward recovery job, the *CICSVR recovery job error list* panel will appear (see Figure 3-10).

```

CICSVR recovery job error list          Row 1 to 2 of 2
Command ==>

Select one or more errors, then press Enter to get more information about
the error.

S   Error          Data set
-   Overlapping recover  YCJRES2.CICSV4.FILE
-   Mixed CICS levels    YCJRES2.CICSV4.FILE
***** Bottom of data *****

```

Figure 3-10 *CICSVR recovery job error list panel*

You can select any error on the list to see more details.

In Figure 3-11 you have the option to change the CICSVR parameters that are to be used in the recovery job creation. See *CICS VSAM Recovery V3R1 Implementation Guide*, SH26-4126 for details.

```

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                                           |
|                                                         |
| F1=Help   F12=Cancel                                       |
+-----+
| The recovery control data set has no relevant default values. |
+-----+

```

Figure 3-11 *Forward recovery parameter panel*

After you select the parameters, CICSVR creates the forward recovery job automatically. You can choose to submit the job or save it in the *CICSVR job submission* panel shown in Figure 3-12.

```

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 3-12 Forward recovery job submission

You can save the produced recovery job as a member of the PDS allocated to the ISPF DD name. The member name is specified in the *CICSVR save JCL* panel, see Figure 3-13.

```

                                     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 3-13 Save the forward recovery job

Use the **TSO ISRDDN** command while the CICSVR panels are active to determine the name of the PDS.

The sample forward recovery job is shown in Example 3-8:

Example 3-8 Sample forward recovery job

```

01 //TESTGFS JOB (ACCOUNT),MSGLEVEL=(1,1),NOTIFY=&SYSUID,
02 //          MSGCLASS=X,CLASS=A,REGION=4M
03 //DWW      PROC
04 //RECOVER  EXEC PGM=DWWCO
05 //STEPLIB DD DSN=DWW.SDWWLOAD,DISP=SHR
06 //DWWMSG   DD SYSOUT=*
07 //DWWPRINT DD SYSOUT=*

```



```

08 //DWWCON1 DD DSN=DWWUSER.V3R1M0.DWWCON1,DISP=SH
09 //DWWCON2 DD DSN=DWWUSER.V3R1M0.DWWCON3,DISP=SH
10 //DWWCON3 DD DSN=DWWUSER.V3R1M0.DWWCON2,DISP=SH
11 //      PEND
12 /* END OF PROC
13 //AMS001 EXEC PGM=IDCAMS
14 //SYSPRINT DD SYSOUT=*
15 //SYSIN DD *
16 DELETE YCJRES1.CICSVR.STATES
17 SET MAXCC=0
18 /*
19 //DSS001 EXEC PGM=ADRDSU
20 //SYSPRINT DD SYSOUT=*
21 //TAPE DD DISP=SHR,
22 //      DSN=YCJRES1.BATCH.BACKUP.BL01
23 //SYSIN DD *
24 RESTORE INDD(TAPE) DS( -
25     INCL(YCJRES1.CICSVR.STATES)) -
26     CATALOG
27 /*
28 //DWW001 EXEC DWW
29 //DWWIN DD *
30 RECOVER -
31     ONLY -
32     APPLYCA -
33     STARTTIME(02.081/19:49:33) -
34     STOPTIME(02.081/20:32:59) -
35     STARTAT(DSNAME) -
36     SPHERE(YCJRES1.CICSVR.STATES)
37     MVSLOG -
38     NAME(BATCH.LOGGING)
39 /*

```

CICSVR 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 13 to line 27 in Example 3-8.
- ▶ For DFSMSdss COPY, the restore steps are shown in Example 3-9.

Example 3-9 Restore steps for DFSMSdss COPY

```

//ASM001 EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
DELETE YCJRES1.CICSVR.STATES
SET MAXCC=0
/*
//DSS001 EXEC PGM=ADRDSU
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
COPY DS( -

```

```

INCL(DWWUSER.V3R1M0.DSOUTPUT.D2002081.T194933)) -
OUTDYNAM(
  (TOTTS4) -
  ,(TSM505) -
) -
CATALOG -
RENAMEU((DWWUSER.V3R1M0.DSOUTPUT.D2002081.T194933, -
YCJRES1.CICSVR.STATES))
/*

```

- 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 3-8 on page 34 should be **None(1)**, and the VERSION parameter should not be included in the recovery command.

3.2.9 CICSVR forward recovery report

When the forward recovery job ends, the report is created in the data set specified in the DWWPRINT DD name. A sample report is shown in Example 3-10.

Example 3-10 CICSVR batch logging report

```

CICSVR - CICS VSAM RECOVERY      DATE: 02/03/22      TIME: 20:33:04      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
BATCH.LOGGING	2	1	0	1	0
TOTAL	2	1	0	1	0

```

CICSVR - CICS VSAM RECOVERY      DATE: 02/03/22      TIME: 20:33:04      PAGE: 2

STATISTICS OF RECOVERED DATA SETS
-----
BASE NAME OF RECOVERED DATA SET: YCJRES1.CICSVR.STATES
BASE NAME OF ORIGINAL DATA SET: YCJRES1.CICSVR.STATES
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	02/081	19:49:33	LOCAL
LAST RECORD APPLIED	02/081	19:49:33	LOCAL

NAME OF RECOVERED DATA SET: YCJRES1.CICSVR.STATES									
:-- 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	D0000002	1	0	1	0	1	0	0	0

TOTAL		1	0	1	0	1	0	0	0

OVERALL TOTAL		1	0	1	0	1	0	0	0

GRAND TOTAL		1	0	1	0	1	0	0	0

CICSVR - CICS VSAM RECOVERY DATE: 02/03/22 TIME: 20:33:04 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: 02/03/22 TIME: 20:33:04 PAGE: 4

RECOVERY PROGRESS REPORT

VSAM SPHERE NAME: YCJRES1.CICSVR.STATES

NO PREVIOUS FORWARD RECOVERY REGISTERED FOR THIS VSAM SPHERE.

THIS FORWARD RECOVERY WAS RUN AT: 02.081 20:32:59
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.
RELATING A SUCCESSFUL FORWARD RECOVERY TO VSAM WAS SKIPPED
BECAUSE THERE IS NO VSAM RLS SUPPORT FOR THIS VSAM SPHERE.
***** BOTTOM OF DATA *****

3.3 A specific recovery scenario

Batch logging provides forward recovery capability for VSAM data sets that are updated by batch applications. It can be used not only to recover the lost data after a physical error, but also to save time when a problem in a batch process occurs.

In this section we document a sample scenario in which you can get benefit from having CICSVR installed in your system. Figure 3-14 shows the sample scenario.

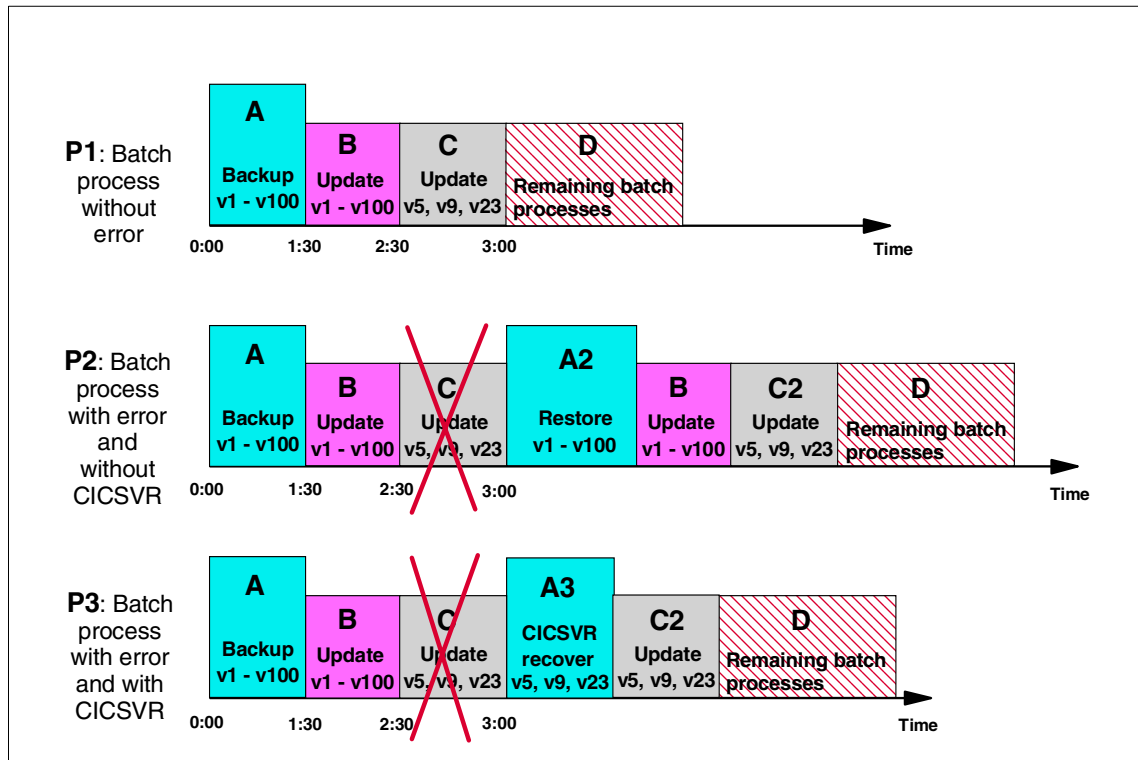


Figure 3-14 Sample batch logging scenario

The processes documented are:

► **P1: Ordinary batch process without error.**

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 ran successfully.
- **C:** Batch process 9 that updates VSAM data sets V5, V9, and V23 ran successfully.
- **D:** All other remaining batch processes ran successfully.

► **P2: Batch process with error and without CICSVR.**

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 ran successfully.
- **C:** Batch process 9 that updates VSAM data sets V5, V9, and V23 encountered an error.
- **A2:** The problem that caused the error in step C was corrected and VSAM data sets V1 - V100 were restored from their backups made in step A.
- **B:** Batch processes 1 - 8 that update VSAM data sets V1 - V100 were re-executed successfully.
- **C2:** Batch process 9 that updates VSAM data sets V5, V9, and V23 was re-executed successfully.
- **D:** All other remaining batch processes ran successfully.

► **P3: Batch process with error and with CICSVR.**

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 ran successfully.
- **C:** Batch process 9 that updates VSAM data sets V5, V9, and V23 encountered an error.
- **A3:** The problem that caused the error in step C was corrected and CICSVR recovered VSAM data sets V5, V9, and V23 to the point they were at after step B ran successfully.
- **C2:** Batch process 9 that updates VSAM data sets V5, V9, and V23 was re-executed successfully.
- **D:** All other remaining batch processes ran successfully.

Scenario P3 shows how CICSVR can save you time during batch processing when an error is encountered during one of the batch processes. By using CICSVR, only the VSAM data sets that were corrupted due to an error in a batch process need to be restored and recovered. CICSVR can restore and recover these corrupted VSAM data sets to the state they were in before the process that encountered the error was executed. Once 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 may use CICSVR batch logging in your test system, especially when you are going to update or add a new programs to your batch stream. There are some considerations when using batch logging:

- ▶ **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 step B finished.
- ▶ **AIXs:** If you use DFSMSHsm for backing up and restore your VSAM data sets, the AIXs will be recovered automatically. But if you use DFSMSdss instead, then you have to redefine and rebuild the AIXs of these VSAM data sets manually after forward recovery. See “VSAM data set backup” on page 27.



CICSVR 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 1.3 and also by a batch program (when CICSVR does the logging). The batch update took place after our VSAM KSDS had been closed to CICS. 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 including VSAM data set definitions and backup using DFSMSdss COPY and the new CICSVRBACKUP parameter
- ▶ Automated restore and recovery after VSAM data set corruption

4.1 Forward recovery environment

In this scenario we had a VSAM KSDS with one AIX. These data sets were updated by both CICS TS and a batch job. The after-images were written to the same log stream.

The version of CICS that we used was CICS TS 1.3 with APAR PQ50900 installed (available 10/2001).

4.1.1 VSAM data set definitions

The definition of the VSAM KSDS and alternate index (AIX) that we used for our forward recovery scenario are shown in Example 4-1.

Example 4-1 Sample VSAM KSDS, AIX, and PATH definition

```
//YCJRES3A JOB ,CICSVR,CLASS=A,MSGCLASS=T,NOTIFY=&SYSUID
//S1      EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN   DD *
          DEF CL(NAME(YCJRES1.CICSVR.CARFILE)
              UNIQUE
              CYL(2 1)
              RECSZ(80 80)
              KEYS (10 0)
              FRLOG(REDO)
              LOGSTREAMID(SCSCPAA9.DFHJ01)
              STORCLAS(STANDARD)
              SHR(2 3)
              VOL(TOTCI2)
              FSPC(50 50))
          DATA(NAME(YCJRES1.CICSVR.CARFILE.DATA))
          INDEX(NAME(YCJRES1.CICSVR.CARFILE.INDEX))
/*
//S2      EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN   DD *
          DEFINE ALTERNATEINDEX(
              NAME(YCJRES1.CICSVR.CARFILE.AIX)
              RELATE(YCJRES1.CICSVR.CARFILE)
              VOL(TOTCI2)
              TRACKS(2 2)
              REUSE
              SHR(2)
              KEYS(10 25)
              NONUNIQUEKEY
              UPGRADE
              )
          DATA(
              NAME(YCJRES1.CICSVR.CARFILE.AIX.DATA)
              RECSZ(24 250)
```



```

        CISZ(512) -
        FSPC(0 0) -
    ) -
INDEX( -
    NAME(YCJRES1.CICSVR.CARFILE.AIX.INDEX) -
    CISZ(512) -
) -
DEFINE PATH( -
    NAME(YCJRES1.CICSVR.CARFILE.AIX.PATH) -
    PATHENTRY(YCJRES1.CICSVR.CARFILE.AIX) -
    UPDATE -
) -
//

```

For the base cluster, the FRLOG and LOGSTREAMID parameters are used by CICSVR to handle the batch logging.

Attention: The only time CICSVR will remove the AIXs from the upgrade set before forward recovery and rebuild them after forward recovery is when the VSAM data set is restored from a backup made by DFSMSHsm using the *backup-while-open* (BWO) facility. The AIXs must have been defined as reusable (using the definition keyword REUSE) and be part of the upgrade set.

CICSVR will remove and rebuild the AIXs when a *fuzzy* status of the BWO is detected. *Fuzzy* status indicates that the AIX was in the upgrade set and the base cluster was changed before the BWO but the AIX was changed after the BWO.

If the BWO facility is not being used, CICSVR will not remove and rebuild the AIXs in the upgrade set. If a DFSMSHsm logical backup was made for a VSAM data set, the entire sphere (base cluster, and paths) will be backed up. During the restore, DFSMSHsm will restore the entire sphere. If the AIXs were part of the upgrade set, they will be rebuilt during the forward recovery.

4.1.2 CICS TS 1.3 file definition

The recovery parameters for the CICS sample file definition were as follows (Figure 4-1).

RECOVERY PARAMETERS		
RECOVery	: A11	None Backoutonly A11
Fwdrecovlog	: 01	No 1-99
BAckuptype	: Static	Static Dynamic

Figure 4-1 CICS recovery parameters

The forward recovery log we used was **01**. This corresponds to a log stream name of SCSCPAA9.DFHJ01 (*Applid.DFHJ + 01*). The journal model definition is shown in Figure 4-2.

```

OBJECT CHARACTERISTICS
CEDA View Journalmodel( DFHJ      )
  Journalmodel   : DFHJ
  Group          : $CICSVR
  Description    :
  Journalname    : DFHJ*
  Type           : Mvs                Mvs | Smf | Dummy
  Streamname     : &APPLID..&JNAME

```

Figure 4-2 CICS journal definition

4.1.3 VSAM data set backup

For VSAM data set backups you can either use DFSMSHsm or DFSMSdss, however it is recommended that you use DFSMSHsm. If you use DFSMSHsm you can write ACS routines and specify management classes for your data sets to enable the automatic backup.

If you want to take a DFSMSHsm backup manually you can either run DFSMSHsm in batch mode (inline backup) as the sample in Example 4-2 or issue a DFSMSHsm command from TSO, for example:

HBACKDS datasetname TARGET(DASD)

Example 4-2 Sample DFSMSHsm inline backup job

```

//YCJRES3H JOB ,CICSVR,CLASS=A,MSGCLASS=T,NOTIFY=&SYSUID
//*
//S1          EXEC PGM=ARCINBAK
//BACK01      DD DSN=YCJRES1.CICSVR.CARFILE,DISP=SHR
//ARCPRIINT   DD SYSOUT=*
//ARCSNAP     DD SYSOUT=*
//

```

For further information on DFSMSHsm commands refer to *DFSMSHsm Storage Administration Reference*, SC35-0422.

If you use DFSMSdss as your backup utility the CICSVR server must be active. For an example of DFSMSdss COPY see Example 4-3:

Example 4-3 Sample DFSMSdss COPY job

```
//YJRES1X JOB ,CICSVR,CLASS=A,MSGCLASS=T,NOTIFY=&SYSUID
//*
//STEP1 EXEC PGM=ADDRSSU
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
COPY DATASET(
    INCLUDE(YJRES1.CICSVR.CARFILE) -
    RENAMEU(**,CICSVR.***) -
    TOL(ENQF) -
    CICSVRBACKUP
//
```

When you use the CICSVRBACKUP parameter, DFSMSdss informs CICSVR that a copy has been taken and CICSVR stores the name of the copy in the RCDS. In the example above the RENAMEU parameter requests that CICSVR provides DFSMSdss with a new name for each copy using the format *cicsvrprefix.DSOUTPUT.Dyyyddd.Thhmmss*.

If your backups are taken by DFSMSHsm this information is re-acquired each time it is needed via an ARCXTRCT macro call to DFSMSHsm.

You can determine which backups are available by using the **List** pull down menu from the *CICSVR VSAM sphere list* panel, see Figure 4-3.

Administrate Utilities Tools List View Help

-----+-----+-----

Command ==> CICS 1 1. List backups... ow 1 to 3 of 3
2. List RLS details...

-----+-----+-----

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

S	VSAM sphere	Last time referenced	RLS RR flag on
S	YJRES1.CICSVR.CARFILE	02.085 23:46:44	
	YJRES1.CICSVR.PARKS	02.088 01:48:53	N
	YJRES1.CICSVR.STATES	00.001 00:00:00	N

Figure 4-3 CICSVR VSAM sphere list menu

The output from the previous panel is shown in Figure 4-4.

```

CICSVR backup list                               Row 1 to 9 of 10
Command ==>

Press Enter to show the backup list for the next selected VSAM sphere. Or,
press F12 to cancel the list sequence.

VSAM sphere . . . : YCJRES1.CICSVR.CARFILE

----- Data set backup information -----
Backup      Gen Ver BWO RLS      Recovery point      Product
Date  Time  no. no.      Date  Time      Type
02.087 17:26:42      NO NO      LOCAL DSSLC
02.087 17:17:49      NO NO      LOCAL DSSLC
02.087 17:08:21      NO NO      LOCAL DSSLC
02.087 17:06:21      NO NO      LOCAL DSSLC
02.085 20:11:45 00 001 NO NO      LOCAL HMLB
02.085 16:23:24      NO NO      LOCAL DSSLC
02.085 16:22:54      NO NO      LOCAL DSSLC
02.085 16:19:25      NO NO      LOCAL DSSLC
02.085 14:16:30      NO NO      LOCAL DSSLC
F1=Help      F7=Bkwd      F8=Fwd      F12=Cancel

```

Figure 4-4 CICSVR backup list

4.2 Automated restore and recovery

In this section we describe the step-by-step instructions on how to restore your VSAM data sets and forward recover the CICS updates as well as the batch updates. CICSVR does this by using the after-images that were previously written to the log stream.

In the example described the VSAM KSDS had been updated twice since the most recent backup. First it was updated by a CICS program, then closed to CICS and updated by a batch program.

The steps to follow are:

- ▶ Step 1: List registered VSAM data sets
- ▶ Step 2: Select criteria to filter the VSAM data sets
- ▶ Step 3: Select the VSAM data sets to recover
- ▶ Step 4: Select recovery option
- ▶ Step 5: Specify forward recovery parameters
- ▶ Step 6: Select log stream type
- ▶ Step 7: Specify other options
- ▶ Step 8: Forward recovery job submission

4.2.1 Step 1: List registered VSAM data sets

From the *CICSVR main menu* panel select **Option 1** (Figure 4-5) to create a list of all the VSAM data sets that are registered in the RCDS.

```
Help
-----
CICSVR main menu
Command ==>
Select one and press Enter.

1 1. List of VSAM spheres
   2. List of logs (CICS V4)
   3. List of log streams (CICS TS)
   4. List of registered log of logs (CICS TS)
   5. JCL skeleton

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

Figure 4-5 Select list of VSAM data sets

4.2.2 Step 2: Select criteria to filter the VSAM data sets

After selecting the option to list the VSAM data sets, you are requested to provide the name of the VSAM data set you wish to recover (Figure 4-6). The name may be fully or partially qualified (using *). Alternatively, enter * to list all the registered data sets.

```
Help
+-----+
| CICSVR VSAM sphere list include |
| Command ==>                     |
| Specify search criteria to include in the VSAM sphere list, then press |
| Enter.                           |
| VSAM sphere . . . . . *         |
| F1=Help    F12=Cancel           |
+-----+

(C) Copyright IBM Corp. 1991, 2001. All rights reserved.
```

Figure 4-6 Enter VSAM data set name

4.2.3 Step 3: Select the VSAM data sets to recover

The next step is to select the data sets you want to recover from the list generated in the previous step. You select the desired data sets by placing an **S** to the left of the data set name (Figure 4-7).

Administrat Utilities Tools List View Help

CICSVR VSAM sphere list Row 1 to 3 of 3

Command ==>

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

S	VSAM sphere	Last time referenced	RLS RR flag on
S	YCJRES1.CICSVR.CARFILE	02.091 23:46:00	N
	YCJRES1.CICSVR.PARKS	02.088 01:48:53	N
	YCJRES1.CICSVR.STATES	00.001 00:00:00	N

***** 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 4-7 Select VSAM data set(s) for forward recovery

The field **RLS RR flag on** in the previous panel indicates the status of the *recovery required* flag in the RLS cell of the catalog entry for the VSAM data set. When the RR flag is ON, the VSAM data set cannot be accessed by any application other than CICSVR.

During the execution of a recovery job CICSVR changes the RR flag to ON and then back to OFF if the recovery was successful. If the recovery job fails or if the VSAM data set was restored and recovered to a new name, the RR flag of the original VSAM data set will remain ON.

If you wish to allow access to a VSAM data set that was not successfully recovered or was recovered to a new name, you should select the **Tools** pull down menu. Then, select **Options 4** and **2** to bind the RLS locks and turn off the RLS RR flag.

4.2.4 Step 4: Select recovery option

Once you have the data set(s) selected you have to select the recovery option you want. Select the **Utilities** option and then choose one of the recovery options from the pull down menu (Figure 4-8).

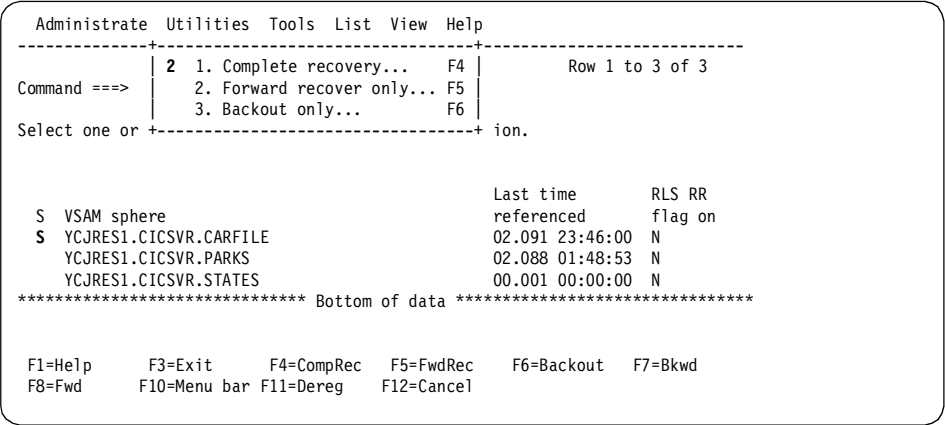


Figure 4-8 Select forward recovery option

You get the same result without using the **Utilities** pull down menu just by selecting the VSAM data set(s) from the *CICSVR VSAM sphere list* menu and pressing **PF4** (Complete recovery) or **PF5** (Forward recovery only).

For CICS TS, complete recovery is the same as forward recovery only.

After forward recovery has been selected CICSVR will automatically run a log of logs scan. An example of the output produced is shown in Example 4-4.

Example 4-4 Output from log of logs scan

CICSVR - LOG OF LOGS SCAN UTILITY			DATE : 02/04/01	TIME : 14:20:00	PAGE : 1
STATISTICS FOR A LOG OF LOGS SCAN					
=====					
LOG OF LOGS NAME	:	CICSTS.CICSVR.DFHLGLOG			
FIRST TIME GMT	:	02.091 19:19:16			
LAST TIME GMT	:	02.091 19:19:21			
FIRST TIME LOCAL	:	02.091 14:19:16			
LAST TIME LOCAL	:	02.091 14:19:21			
FIRST BLOCK NUMBER	:	9437			
LAST BLOCK NUMBER	:	10181			
VSAM DATA SET STATISTICS					
=====					
VSAM DATA SET NAME	CICSID	FCT NAME	OPEN DATE/TIME	CLOSE DATE/TIME	MVS LOG STREAM NAME
YCJRES1.CICSVR.CARFILE	SCSCPA9	CARFILE	02.091 14:19:16	02.091 14:19:21	SCSCPA9.DFHJ01
YCJRES1.CICSVR.CARFILE	SCSCPA9	CARFILE	02.091 14:19:17	02.091 14:19:21	SCSCPA9.DFHJ01

4.2.5 Step 5: Specify forward recovery parameters

After selecting the data set(s) and the type of recovery we want there are some recovery parameters that we may want to select. In the *CICSVR VSAM sphere parameters* menu (Figure 4-9) the necessary parameters are provided as default.

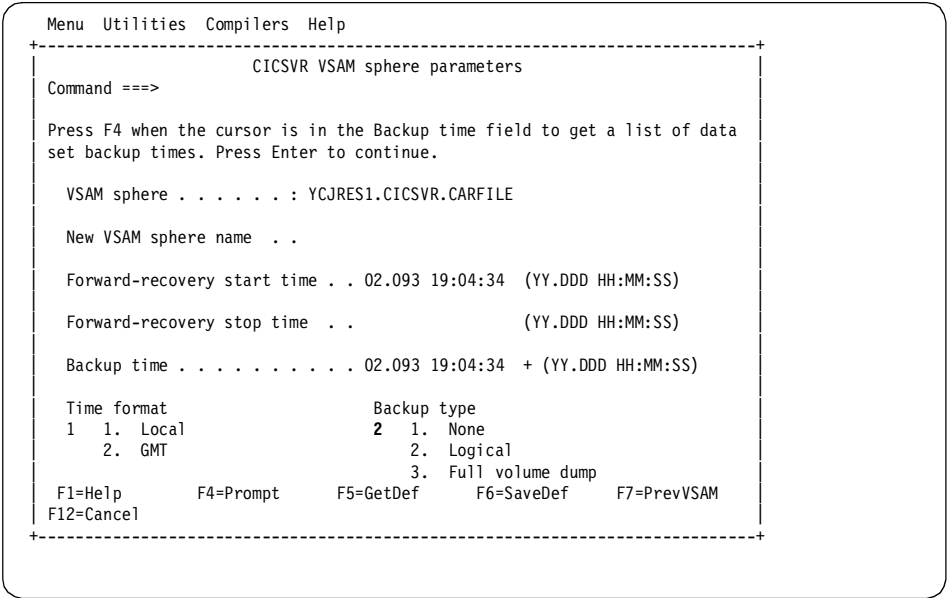


Figure 4-9 VSAM forward recovery parameters

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. The **Forward-recovery stop time** parameter was left blank. In this case the time taken is the current time. For further information on the forward recovery parameters refer to *CICS VSAM Recovery V3R1 User's Guide and Reference*, SH26-4127.

4.2.6 Step 6: Select the log stream type

You have to specify the type of log stream CICSVR should use during the forward recovery. You select the type of log stream in the *CICSVR log stream type* panel (Figure 4-10).

```
Menu Utilities Compilers Help
+-----+
|                                     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 4-10 Select log stream type

If the log stream is not available, you would have to use option **2. QSAM copy** assuming that you had taken log stream copies.

4.2.7 Step 7: Specify other options

You are presented the *CICSVR complete recovery* panel or *CICSVR forward recovery only* panel to specify additional parameters (Figure 4-11).

```
Menu Utilities Compilers Help
+-----+
|                                     CICSVR complete recovery                                     |
| 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 Recovery and backout parameters related to:                             |
|   Sequence checking                                                         |
|   VSAM buffer pools                                                         |
|   CICSVR exits                                                             |
|                                                                              |
| F1=Help   F12=Cancel                                                       |
+-----+
+-----+
| The recovery control data set has no relevant default values. |
+-----+
```

Figure 4-11 CICSVR recovery options

For this forward recovery, none of these further options were required.

4.2.8 Step 8: Forward recovery job submission

Once you have selected all the necessary options and parameters you are presented *CICSVR job submission* panel (Figure 4-12). You can select to submit the job immediately or to save it as a member of the PDS library allocated to the ISPF DD name.

Figure 4-12 *CICSVR job submission panel*

The forward recovery job generated by CICSVR is shown in Example 4-5.

Example 4-5 *Sample forward recovery job*

```
//YCJRES3F JOB CICSVR,MSGLEVEL=(1,1),NOTIFY=&SYSUID,
//          MSGCLASS=T,CLASS=A,REGION=4M
/*JOBPARM S=SC62
//DWW      PROC
//RECOVER  EXEC PGM=DWWCO
//STEPLIB  DD DSN=DWW.SDWWLOAD,DISP=SHR
//DWWMSG   DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWDUMP  DD SYSOUT=*
//DWWCON1  DD DSN=DWWUSER.V3R1M0.DWWCON1,DISP=SHR
//DWWCON2  DD DSN=DWWUSER.V3R1M0.DWWCON2,DISP=SHR
//DWWCON3  DD DSN=DWWUSER.V3R1M0.DWWCON3,DISP=SHR
//          PEND
/** END OF PROC
//AMS001   EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
DELETE YCJRES1.CICSVR.CARFILE
SET MAXCC=0
```

```

/*
//DSS001 EXEC PGM=ADDRSSU
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
COPY DS( -
    INCL(DWWUSER.V3R1M0.DSOUTPUT.D2002093.T1904342)) -
    OUTDYNAM( -
        (TOTTS4) -
        ,(TSM505) -
        ) -
    CATALOG -
    RENAMEU((DWWUSER.V3R1M0.DSOUTPUT.D2002093.T1904342, -
        YCJRES1.CICSVR.CARFILE))
/*
//DWW001 EXEC DWW
//DWWIN DD *
RECOVER -
    ONLY -
    APPLYCA -
    STARTTIME(02.093/19:04:53) -
    STOPTIME(02.093/19:05:05) -
    STARTAT(DSNAME) -
    SPHERE(YCJRES1.CICSVR.CARFILE)
MVSLOG -
    NAME(SCSCPAA9.DFHJ01)
//

```

In the example, the latest backup had been taken by DFSMSdss, so there is a COPY step to restore from this backup. If the latest backup had been taken by DFSMSHsm, the VERSION keyword is added to the RECOVER command.

Important: Backups and restores by DFSMSHsm include the alternate indexes if they are present. If the backup used in your forward recovery was taken using DFSMSdss, then any associated alternate indexes will have to be rebuilt manually.

Example 4-6 shows the output from the sample forward recovery.

Example 4-6 Forward recovery output

CICSVR - CICS VSAM RECOVERY

DATE : 02/04/03

TIME : 19:12:24

PAGE : 1

DWW0010I CICSVR is started at 02/04/03 19:12:25.

```

RECOVER -
  ONLY -
  APPLYCA -
  STARTTIME(02.093/19:04:53) -
  STOPTIME(02.093/19:05:05) -
  STARTAT(DSNAME) -
  SPHERE(YCJRES1.CICSVR.CARFILE)

MVSLOG -
  NAME(SCSCPAA9.DFHJ01)

```

DWW1287I No attempt was made to unbind any VSAM RLS locks for VSAM sphere YCJRES1.CICSVR.CARFILE because there is no VSAM RLS support for it.

DWW1288I No attempt was made to bind any VSAM RLS locks for VSAM sphere YCJRES1.CICSVR.CARFILE 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 YCJRES1.CICSVR.CARFILE because there is no VSAM RLS support for it.

DWW0011I CICSVR processing complete. Maximum condition code is 0.

CICSVR - CICS VSAM RECOVERY DATE: 02/04/03 TIME: 19:12:29 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
SCSCPAA9.DFHJ01	8	2	2	2	2
TOTAL	8	2	2	2	2

CICSVR - CICS VSAM RECOVERY DATE: 02/04/03 TIME: 19:12:29 PAGE: 2

STATISTICS OF RECOVERED DATA SETS

BASE NAME OF RECOVERED DATA SET: YCJRES1.CICSVR.CARFILE
BASE NAME OF ORIGINAL DATA SET: YCJRES1.CICSVR.CARFILE
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	02/093	19:04:57	LOCAL
LAST RECORD APPLIED	02/093	19:04:57	LOCAL

NAME OF RECOVERED		DATA SET: YCJRES1.CICSVR.CARFILE		:----- RECORDS FOUND ON THE LOG(S) -----:		:----- CHANGE RECORDS APPLIED -----:		:-- CHANGES IGNORED BY EXIT	
DATASET TYPE	FCT ENTRY NAME	DSNAME	UPD-AFTER	ADD-AFTER	DEL-AFTER	ADDS	UPDATES	DELETES	
BASE	CARFILE	1	1	1	1	1	1	1	0
TOTAL		1	1	1	1	1	1	1	0
NAME OF RECOVERED		DATA SET: YCJRES1.CICSVR.CARFILEP		:----- RECORDS FOUND ON THE LOG(S) -----:		:----- CHANGE RECORDS APPLIED -----:		:-- CHANGES IGNORED BY EXIT	
DATASET TYPE	FCT ENTRY NAME	DSNAME	UPD-AFTER	ADD-AFTER	DEL-AFTER	ADDS	UPDATES	DELETES	
PATH	CARFILEP	1	1	1	1	1	1	1	0
TOTAL		1	1	1	1	1	1	1	0
OVERALL TOTAL		2	2	2	2	2	2	2	0
GRAND TOTAL		2	2	2	2	2	2	2	0

CICSVR - CICS VSAM RECOVERY DATE: 02/04/03 TIME: 19:12:29 PAGE: 3

EXIT ACTION STATISTICS

EXIT NAME	RECORD CHANGE	CONTINUE	IGNORE
PREAPPLY	EXIT NOT TAKEN		
ESDS DELETE	EXIT NOT TAKEN		
EXIT NAME	CONTINUE	IGNORE	
ERROR	EXIT NOT TAKEN		
EXIT NAME	CODE CHANGED	CONTINUE	
TERMINATION	EXIT NOT TAKEN		

CICSVR - CICS VSAM RECOVERY

DATE: 02/04/03 TIME: 19:12:29 PAGE: 4

RECOVERY PROGRESS REPORT

VSAM SPHERE NAME: YCJRES1.CICSVR.CARFILE

THE PREVIOUS FORWARD RECOVERY REGISTERED FOR THIS VSAM SPHERE WHICH WAS RUN AT 02.091 20:09:55 COMPLETED WITH ERROR.

THIS FORWARD RECOVERY WAS RUN AT: 02.093 19:12:25
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.
RELATING A SUCCESSFUL FORWARD RECOVERY TO VSAM WAS SKIPPED
BECAUSE THERE IS NO VSAM RLS SUPPORT FOR THIS VSAM SPHERE.



Disaster recovery

In this chapter we discuss some important considerations when planning for a disaster recovery solution. CICSVR can be used to recover your data sets in case of a disaster in your computer center.

The following topics are covered:

- ▶ What disaster recovery is
- ▶ Disaster recovery strategy
- ▶ How to create the recovery job
- ▶ What you need to do before a disaster
- ▶ What you need to do after a disaster
- ▶ Overview of disaster recovery for CICS TS
- ▶ Sample disaster recovery scenario for CICS TS

5.1 What disaster recovery is

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 your data can be updated simultaneously at both sites. However if you cannot set up this environment because of resource constraints you will have to recover the lost data using another method. CICSVR can recover the 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 required to perform the recovery. Unlike at the primary site you may not have all the log stream copies available at the remote site. Recent updates may 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 would have to rerun all the transactions manually from the time of the last backup up to the time of the crash. This may take a long time or may not be possible. CICSVR minimizes the manual effort by reapplying all changes recorded in the log stream copies.

VSAM forward recovery for disaster recovery requires transport of your data from the primary site to the remote site in order to rebuild the environment there. It should be done regularly. The more often you transport data the less data you will lose.

The data you need to transport to the remote site includes:

- ▶ DFSMSHsm CDSs
- ▶ VSAM data sets backup copies
- ▶ Log stream copies
- ▶ RCDS exported sequential data set

5.2 Disaster recovery strategy

Before you encounter a disaster, you should define the objectives of the disaster recovery plan.

If your business requires the system to be recovered without delay you will have to invest more money in hardware. In this case CICSVR may not be the right choice for your business.

Once you have decided to use CICSVR to recover your VSAM data sets at the remote site you should decide the following:

- ▶ 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 to use to back up the VSAM data sets
- ▶ How often you should make a backup of your VSAM data sets
- ▶ How often you should run the log of logs scan
- ▶ How often you should run the log stream copy
- ▶ Whether or not you should export/back up the RCDS
- ▶ What backup method to use to copy the RCDS
- ▶ How often you should run the RCDS export/backup

If the primary site has been lost you should 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 should occur you will have to generate the job to forward recover the lost VSAM data sets. There are two ways to generate the job. One way is to use the ISPF dialog interface, the other is to generate the job manually.

Before deciding which backup method to use you should 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

5.2.1 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 should be able to find when the backup and the log stream copy were made. The RCDS at the remote site may not contain the latest information. This will depend on the time and frequency of the RCDS export/backup job.

5.2.2 Cataloging the data sets at the remote site

You should catalog the backup of your 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 will also help you to find the correct backup and log stream copies if you need to create the recovery job manually.

5.2.3 Frequency of the log stream copy

This will determine how many updates you are not able to recover. For example, if you run the log stream copy job every 30 minutes you will 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 should rerun the batch job.

You should 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 will recover up to the time when the log stream copy was taken, which is in the middle of the batch job. In order to rerun the incomplete batch job you have to remove the updates performed by the job but you may not be able to do so.

5.2.4 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 should 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/close time
- ▶ Forward recovery log stream name
- ▶ CICS region name

5.2.5 Frequency and time of the RCDS export/backup

The RCDS is updated by several components of CICSVR such as the log of logs scan job, the CICSVR server address space, the log stream copy job, the VSAM data set backup job, and the change accumulation job. You should export the RCDS every time it is updated. You should ensure that the export data set is sent to the remote site as soon as it is created.

Whether or not to export/back up the RCDS

If you decide to create the recovery job manually you do not need to export/back up the RCDS.

Refer to “How to create the recovery job” on page 68 for more details.

5.2.6 Selecting the backup method to use

You can use DFSMSHsm, DFSMSdss or another backup method. There are some differences between them.

Using DFSMSHsm

The DFSMSHsm BCDS contains the information about data set backups. CICSVR issues a command to acquire the information in the BCDS when it generates the recovery job. In order for CICSVR to be able to successfully recover the lost VSAM data sets you must have done the following:

- ▶ Have made a backup of all the DFSMSHsm CDSs and send it to the remote site after a backup of your VSAM data set was made.
- ▶ Have a copy of your DFSMSHsm backup tapes at the remote site. This can be done manually or automatically.

DFSMSHsm has a function called **DUPLEX TAPE**. This function allows to create automatically two identical copies of the backup tapes. You may choose to create a local copy (ORIGINAL) in your primary site and another copy (ALTERNATE) in the remote site.

You may 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 will 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 will allow you to use the alternate tapes as if they were the originals.

- ▶ Run the ISPF dialog interface to create the recovery job (refer to 4.2, “Automated restore and recovery” on page 48 for the steps to follow). You must select option **2. Logical backup** on the *CICSVR VSAM sphere parameters* panel for the backup type. See Figure 5-1.

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
F8=Fwd	F10=Menu bar	F11=Dereg	F12=Cancel	F7=Bkwd

Figure 5-1 Backup type

Note: CICSVR 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 which provides you with the capability to back up and recover a user-defined group of data sets (*aggregate group*). The aggregate group may contain data sets belonging 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 may then be physically transported or transmitted, 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/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 may select to use ABARS for backing up the VSAM data sets belonging to your critical applications. In this case you will 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 your 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 should select option **1. None** for the backup type in the *CICSVR VSAM sphere parameters* panel. See Figure 5-1.

5.2.7 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 the following sections we discuss the differences between the two methods.

Export RCDS

CICSVR provides the EXPORT utility to copy the RCDS to a sequential data set. You should 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 in order 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 the following:

- ▶ Forward recovery information only needed at the primary site
- ▶ Backup information
- ▶ Shadow images information
- ▶ Change accumulation information
- ▶ Retention period information

Example 5-1 shows an example of a job for exporting the RCDS.

Example 5-1 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 5-2 shows the output from a normal termination of the export job.

Example 5-2 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 CICSVR EXPORT utility, you could back up the RCDS using another method such as IDCAMS REPRO, DFSMSShsm, or DFSMSdss. In this case the copy will contain 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 created using another method will be larger than the one created by the EXPORT utility.

You may 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 5-3 shows an example of a RCDS backup using IDCAMS REPRO.

Example 5-3 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 the RCDS was backed up using IDCAMS REPRO, REPRO must also be used to restore the RCDS. Example 5-4 shows an example job.

Example 5-4 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)
//
```

5.3 How to create the recovery job

There are two ways to create the recovery job.

- ▶ Using the ISPF dialog interface
- ▶ Using a manual method

5.3.1 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:

- ▶ Use DFSMSHsm to back up your VSAM data sets because it acquires the backup information from the BCDS. Backup information is not exported.
- ▶ 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 63.
- ▶ Run the log of logs scan job before the RCDS export job.
- ▶ Take a *single* copy of the log stream and send the copy to the remote site. The RCDS will only record information about the first copy.
- ▶ 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 the above steps has failed the RCDS export job may not contain the latest information. Consequently the recovery job created by the ISPF dialog may not be accurate. You may 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 available at the remote site. When you create the recovery job you must select option 2. **QSAM copy** on the *CICSVR log stream type* panel. See Figure 5-2.

Menu	Utilities	Compilers	Help
------	-----------	-----------	------

Command ==> CICSVR log stream type

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 5-2 Select 2. QSAM copy

5.3.2 Using manual method

Alternatively you can create the recovery job manually. In this case you do not need the RCDS. However you have to find the latest backup of your VSAM data sets and the required log stream copies. This can be achieved by cataloging the data sets with a proper naming convention. Refer to “Naming standard” on page 61.

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 5-5 shows the skeleton of a recovery job.

Example 5-5 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 will return an informational message:

DWW1269I No report can be written for VSAM sphere YCJRES1.CICSVR.CARFILE because the RCDS is not allocated.

However the recovery will be performed normally.

Before you submit the recovery job you must restore your VSAM data sets from the latest backup.

5.4 What you need to do before a disaster

The remote site should maintain the same level of software as the primary site. This will ensure that you cannot only recover your data accurately but run the system at the remote site in the same way that the primary site ran after the recovery.

The following lists the steps you may need to perform.

- ▶ Back up the VSAM data sets
- ▶ Back up the DFSMSHsm CDSs
- ▶ Copy the log stream
- ▶ Run the log of logs scan
- ▶ Export the RCDS
- ▶ Catalog the VSAM backups and log stream copies at the remote site

5.4.1 What you need to do at the primary site

The following sections document the activities you should perform at the primary site to be prepared for a disaster.

Back up the VSAM data set

CICS application data sets are usually backed up daily after the CICS system is shutdown. When 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.

Back up the DFSMSHsm CDSs

The BCDS contains the DFSMSHsm backup information. If DFSMSHsm was used to back up your VSAM data sets you should back up the BCDS (and the other CDSs) as well and send the backup to the remote site. It will be required by the ISPF dialog interface.

Copy the log stream

You should 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 **COPIES(2)** parameter in the IBM supplied utility CICSVR 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 created by the ISPF dialog interface.

Run the log of logs scan

You should run the log of logs scan regularly. Refer to “Frequency and time of the log of logs scan” on page 62.

Export/back up RCDS

You should copy the RCDS regularly. Refer to “Whether or not to export/back up the RCDS” on page 63 and “What backup method to use to copy the RCDS” on page 65.

5.4.2 What you need to do at the remote site

The following is a list of tapes that should be transported from the primary site. You should catalog them 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/backup

5.5 What you need to do after a disaster

The following describes the steps you may need to do after a disaster occurs in the primary site.

- ▶ Restore the DFSMSHsm CDSs
- ▶ Restore the RCDS
- ▶ Restore the VSAM data sets
- ▶ Generate and run the recovery job

5.5.1 Restore the DFSMSHsm CDSs

If your VSAM data sets backups were made using DFSMSHsm you should restore the DFSMSHsm CDSs and have available the DFSMSHsm backup tapes. Refer to “Using DFSMSHsm” on page 63.

5.5.2 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 should use the equivalent utility to restore it. Refer to “Backing up RCDS using another method” on page 66.

Import the RCDS

The sequential data set created by the EXPORT utility job should 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 5-6 shows a sample job for RCDS IMPORT. You can use this job at your remote site to recover the RCDS.

Example 5-6 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 5-7 shows the output from a normal termination of the import job.

Example 5-7 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.

5.5.3 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.

5.5.4 Generate and run the recovery job

If the RCDS contains the latest information on the VSAM data set backup and the log stream copy information then you can use the ISPF dialog interface to create the recovery job. Refer to 4.2, “Automated restore and recovery” on page 48.

5.6 Overview of disaster recovery for CICS TS

Figure 5-3 shows an example of the CICSVR disaster recovery environment for CICS TS.

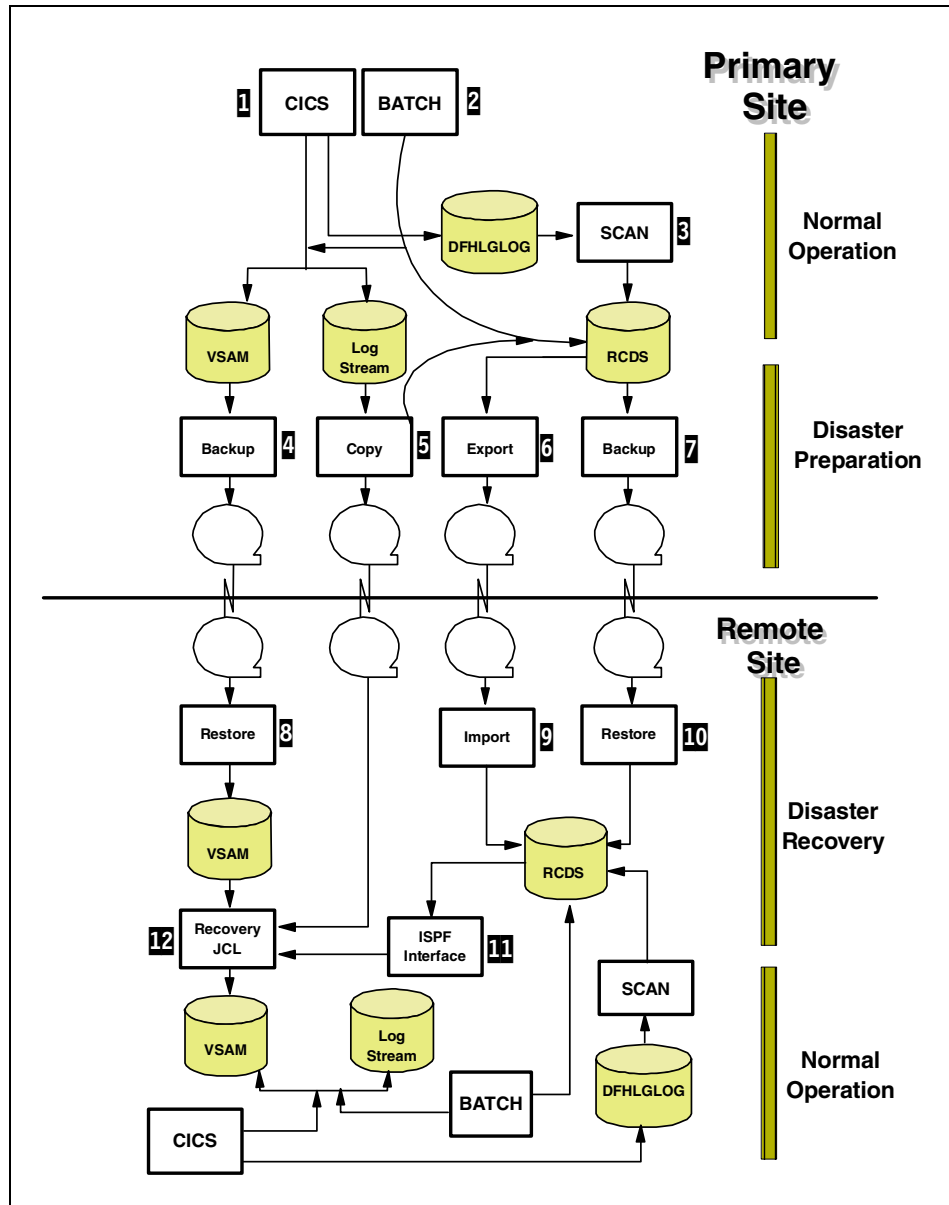


Figure 5-3 Overview of disaster recovery

The activities at the primary site 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 “Frequency and time of the log of logs scan” on page 62.
- ▶ **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 “Frequency and time of the log of logs scan” on page 62.
- ▶ **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 “Selecting the backup method to use” on page 63.
- ▶ **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 “Frequency of the log stream copy” on page 62.
- ▶ **6** The supplied utility can export the RCDS for use at the remote site. Refer to “Export RCDS” on page 65.
- ▶ **7** Alternatively you can use another method to copy the RCDS. Refer to “Backing up RCDS using another method” on page 66.

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 will be 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 72.
- ▶ **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.

5.7 Sample scenario for CICS TS

In this section we describe a sample disaster recovery scenario using CICSVR.

5.7.1 Disaster at primary site

Figure 5-4 shows the activities that take place at the primary site before the disaster occurs.

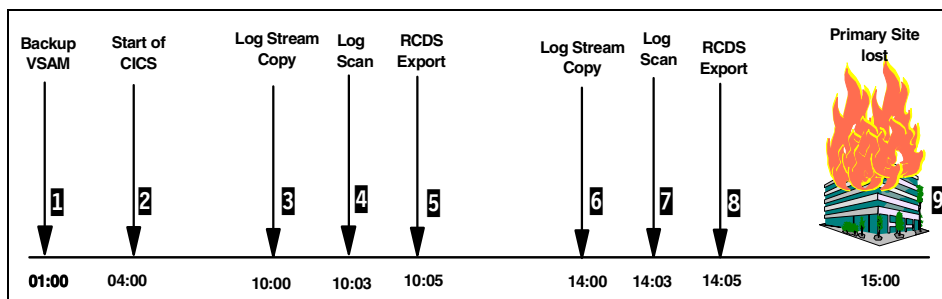


Figure 5-4 Disaster scenario for CICS TS

- ▶ **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.

5.7.2 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 will recover the VSAM data sets up to the time of the last log stream copy. In this scenario it will recover up to 14:00. The updates made by CICS between 14:00 and 15:00 have to be recovered manually. Therefore you need to decide carefully the frequency of the log stream copy job.



A

Appendix A.

Additional information on APARS

In this appendix we include information about APARs that provide additional functionality or correct some errors encountered during the use of CICSVR. Some of these APARs may not be available at the time this redbook is published, so you need to check them from time to time to know when they become available.

The following APARs are described:

- ▶ Info APAR II13131
- ▶ Documentary APAR OW53432
- ▶ Documentary APAR OW53881
- ▶ Dependency APARs required for OS/390 V2R10
- ▶ New CICSVR V3R1 APARs

A.1 APAR II13131

APAR Identifier **II13131** Last Changed 02/02/13
UW79809 SDWDLPA CONSIDERATIONS, INSTALL ISSUES, PROBLEMS FROM
NOT FOLLOWING HOLD ACTION

Symptom IN INFO	Status INTRAN
Severity 4	Date Closed
Component INFOV2LIB	Duplicate of
Reported Release 001	Fixed Release
Component Name V2 LIB INFO ITE	Special Notice
Current Target Date ..	Flags
SCP	
Platform	
Status Detail: Not Available	

PE PTF List:

PTF List:

Parent APAR:

Child APAR list:

ERROR DESCRIPTION:

5695DF101 UW79809 SDWDLPA HDZ11F0 OS/390 2.10 thru z/OS 1.2

The PTF UW79809 supplies the dummy stubs for the VSAM batch logging function. This ptf does have a hold type of action which must be followed to avoid installation or IPL failures. Failure to take the actions specified will result in installation issues or failure of subsequent IPL's.

The hold action states that you must allocate a new data set, update your SMP/e DDDEFS to avoid installation errors. You MUST also add the dataset to your LPALSTxx concatenation to avoid a wait state during IPL after installing this PTF.

Failure to allocate the data set and update your SMP/e DDDEFS will result in message GIM54502E during apply. Failure to add the data set to your LPALSTxx concatenation will result in a wait state with message IEA303W abend 052 reason 0000312 in IEAVNP26.

You may receive this PTF either through the normal service channels (ESO, service only CBPDO, etc) or as part of an order for OS/390 2.10 thru z/OS 1.2. If your order is a CBPDO, then the PTF should show up with a hold type of action during the apply steps. If you receive this as part of serverpac or custompac, then you may not see the hold data. You do need to verify that the data set is part of your LPALSTxx concatenation

before IPL'ing your system.

Common questions we have seen about this PTF:

1. Does it matter what the high level qualifier is for this data set ? No. If you do not have a preference we would suggest SYS1. Note that data sets in LPALSTxx must be either cataloged in the master catalog, or have the volume serial specified.

2. We don't have CICSVR or CICS. Why do we need to add this data set ?

As the ptf states it is adding a batch logging function capability for SMS managed VSAM data sets. It is also providing the ability for a product such as CICSVR 3.1 to interface directly with DFSMS to provide management functions such as forward recovery, log management and so on.

We are aware that not every customer has CICSVR (or that they will acquire it) so we provide dummy modules or stubs for those customers who do not have it. But because of where in the processing of DFSMS a product (such as CICSVR 3.1) needs to be invoked (and initialized) these modules must be LPA because the initialization is done during NIP processing when OS/390,z/OS is being IPLed.

From a serviceability and maintenance point of view having the modules in separate dataset makes problem determination and maintenance easier. A product such as CICSVR will usually not be installed into the same SMP/e zones as OS/390 or z/OS. It has also been our direction for several years now that products that reside in LPA or linklist provide their own data sets that are added to either LPALSTxx for LPA or PROGxx for linklist. A recent example of this is RMF which used to install into LPALIB and LINKLIB but now provides data sets to be added to the concatenations. We also try if possible to avoid having one products replace another products modules in the same data set, as it makes problem determination more complex.

From an install perspective it's easier for a product such as CICSVR that will provide it's version of those modules to provide them in a dataset that is added to LPALSTxx ahead of a dataset with dummy modules. If the dummy modules were added in SYS1.LPALIB, the install instructions become more complex to force a data set in front of SYS1.LPALIB.

We also do try if possible to avoid adding new data sets to a release of a product such as DFSMS in the middle of a release but that is not always possible.

ADDITIONAL KEYWORDS:

ABEND053 RSN312 WAIT040 MSGIEA303W MSGGIM54502E DWW1VS00

LOCAL FIX:

A.2 APAR OW53432

```
*****
* PROBLEM DESCRIPTION: This DOC APAR describes the first part *
* of the publication updates for OW50538 *
* which implemented "backup change *
* notification" to support CICSVR 3.1. *
* The new "backup change notification" *
* option is activated when the *
* CICSVRBACKUP keyword is specified on *
* the data set COPY or logical data set *
* DUMP command. New MSGADR927E and *
* MSGADR928I are added for this *
* enhancement. *
*****
* RECOMMENDATION: See OW53881 for additional publication *
* changes. *
```

```
*****
* PROBLEM DESCRIPTION: This DOC APAR describes the first part *
* of the publication updates for OW50538 *
* which implemented "backup change *
* notification" to support CICSVR 3.1. *
* The new "backup change notification" *
* option is activated when the *
* CICSVRBACKUP keyword is specified on *
* the data set COPY or logical data set *
* DUMP command. New MSGADR927E and *
* MSGADR928I are added for this *
* enhancement. *
*****
* RECOMMENDATION: See OW53881 for additional publication *
* changes. *
```

APAR Identifier **OW53432** Last Changed 02/03/15
NEW FUNCTION DOC APAR TO SUPPORT CICSVR 3.1

Symptom NF NEWFUNCTION	Status CLOSED DOC
Severity 4	Date Closed 02/03/15
Component 5695DF175	Duplicate of
Reported Release 1F0	Fixed Release
Component Name DFSMS/MVS DSS	Special Notice
Current Target Date ..02/03/15	Flags
SCP	
Platform	
Status Detail: APARCLOSURE - APAR is being closed.	

PE PTF List:

PTF List:

Parent APAR: OW50538
Child APAR list: OW53881

ERROR DESCRIPTION:

This new function DOC APAR describes the DFSMSdss publication updates for OW50538 which implemented "backup change notification" to support CICSVR 3.1. The new backup change notification is activated when CICSVRBACKUP keyword is specified on the logical data set COPY or DUMP command. New MSGADR927 and MSGADR928I are added for this enhancement.

LOCAL FIX:

PROBLEM SUMMARY:

```
*****
* USERS AFFECTED: CICSVR 3.1 users who use DFSMSdss 1F0 or *
*                  1G0 as their backup utility.              *
*****
* PROBLEM DESCRIPTION: This DOC APAR describes the first part *
*                      of the publication updates for OW50538 *
*                      which implemented "backup change      *
*                      notification" to support CICSVR 3.1.  *
*                      The new "backup change notification"  *
*                      option is activated when the          *
*                      CICSVRBACKUP keyword is specified on  *
*                      the data set COPY or logical data set *
*                      DUMP command. New MSGADR927E and      *
*                      MSGADR928I are added for this         *
*                      enhancement.                           *
*****
* RECOMMENDATION: See OW53881 for additional publication    *
*                  changes.                                  *
*****
```

PROBLEM CONCLUSION:

The following changes will be made to "OS/390 V2R10 MVS System Messages Volume 1" GC28-1784 and "z/OS MVS System Messages Volume 1", SA22-7631.

Under "ADR Messages", add the following text in MSGADR468E:

Application Programmer Response:

o If CICSVRBACKUP is specified and the entry name is an alternate index, the alternate index is not processed. You may want to exclude the alternate index on your COPY command so this error message is not issued the next time you submit the job. See "DFSMSdss Storage Administration Reference" for more information on the CICSVRBACKUP keyword on the COPY command.

.
Under "ADR Messages", add ADR927E and ADR928I:

.
ADR927E (ttt)-mmmm(yy), CICSVRBACKUP FAILED FOR DATA SET
dsname, REASON = reason_code

.
Explanation: CICSVRBACKUP keyword was specified on the data set COPY or logical data set DUMP command. Therefore, DFSMSdss attempted to notify the CICSVR server address space that a CICSVR backup of the VSAM base cluster was requested or completed. The notification failed with listed decimal reason code (reason_code):

70000 DFSMSdss was not able to acquire storage for
CICSVR Backup Notification parameter list.
CICSVR was not notified of the backup.

.
other CICSVR reason code describing the CICSVR Backup
Notification failure.

.
System Action: Processing of this data set ends.
DFSMSdss processing continues. The return code is 8.

.
Operator Response: None.

. Application Programmer Response: If you did not intend to create data set backups for use by CICSVR, remove CICSVRBACKUP keyword and resubmit the job. Otherwise, correct the problem as indicated by the reason code (reason_code) and reprocess the data set:

70000 Refer to previously issued ADR0376E message.

.
other Ensure that the CICSVR server address space is active. The minimum required CICSVR release is Version 3 Release 1. Refer to the "CICSVR return codes and reason codes in non-CICSVR messages" section of the "CICS VSAM Recovery Messages and Problem Determination" manual for an explanation of the reason code.

.
Source: DFSMSdss

ADR928I (ttt)-mmmm(yy), CICSVRBACKUP WAS SUCCESSFUL FOR
DATA SET dsname

.
Explanation: The CICSVRBACKUP keyword was specified on the
data set COPY or logical data set DUMP command.
Therefore, DFSMSdss notified the CICSVR server address space
that a CICSVR backup of the VSAM base cluster has completed
successfully. The notification was successful.
System Action: Processing continues.

.
Operator Response: None.

.
Application Programmer Response: None.

.
Source: DFSMSdss

.

The following changes will be made to "OS/390 V2R10 DFSMSdss
Storage Administration Guide", SC35-0393 and "z/OS
DFSMSdss Storage Administration Guide", SC35-0423.

.
Add the following section to Chapter 6, Managing Availability
with DFSMSdss, following the section with the heading
"Backup with Concurrent Copy":

.
Using DFSMSdss as CICSVR's Backup Utility

.
CICSVR users may choose DFSMSdss as their backup utility.
When the CICSVRBACKUP keyword is specified, DFSMSdss notifies
the CICSVR server address space every time a CICSVR backup
is made for a VSAM base cluster. CICSVR stores the backup
information in its Recovery Control Data Set (RCDS). This
enables CICSVR to manage backups made by DFSMSdss. Beginning
with CICSVR Version 3 Release 1, CICSVR provides complete
data set forward recovery automation through the CICSVR
Dialog panels using backups made by DFSMSdss.

.
To use DFSMSdss DUMP to make CICSVR backups, the user needs to
create DFSMSdss DUMP jobs that can be regularly submitted with
a production planning system. The CICSVRBACKUP keyword must
be specified on the logical data set DUMP command. (See
"DFSMSdss Storage Administration Reference" for more
information on the CICSVRBACKUP keyword on the DUMP command.)
The output data set name must be unique each time the job is
run so that multiple backup copies can be maintained. See
"CICS VSAM Recovery Implementation Guide" for information about

different methods to generate a unique output data set name.

The DFSMSdss COPY command can also be used to make CICSVR backups. The advantage of using the COPY command over the DUMP command is that during a copy operation, DFSMSdss can use SnapShot to create the backup instantaneously when the data set resides on a RAMAC Virtual Array (RVA). This also enables CICSVR to use the COPY command for the recovery

process, which allows DFSMSdss to use SnapShot to recover the data set instantaneously when the data set is recovered back to an RVA device.

To use DFSMSdss COPY to make CICSVR backups, the user needs to create DFSMSdss COPY jobs that can be regularly submitted with a production planning system. The CICSVRBACKUP and RENAMEUNCONDITIONAL keywords must be specified on the data set COPY command. (See "DFSMSdss Administration Reference" for more information on the CICSVRBACKUP keyword.) When CICSVRBACKUP is specified, CICSVR will provide DFSMSdss with a new name for each VSAM base cluster to be copied. DFSMSdss will use the CICSVR generated new name instead of the one specified by the user. See "CICS VSAM Recovery Implementation Guide" for more information about CICSVR generated new name, its naming convention, and required RENAMEU specification.

The following changes will be made to "OS/390 V2R10 DFSMSdss Storage Administration Reference", SC35-0394 and "z/OS DFSMSdss Storage Administration Reference", SC35-0424.

Add the following command syntax for the CICSVRBACKUP keyword to the syntax diagrams for the COPY command in Chapter 3 Syntax --- Function Commands, under heading "B: Optional Keywords with COPY DATASET":

```
>----->
|               |
|-----CICSVRBACKUP-----|
|               |
>----->
```

Add the following text for the CICSVRBACKUP keyword to the COPY command in Chapter 3:

```
CICSVRBACKUP
>----->
```

|-----CICSVRBACKUP-----|

.
CICSVRBACKUP specifies that on a data set copy operation, DFSMSdss is to create backups for use by CICSVR. DFSMSdss notifies the CICSVR server address space when a CICSVR backup is made for a VSAM base cluster. This enables CICSVR to manage backups made by DFSMSdss.

.
When CICSVRBACKUP is specified, CICSVR will provide DFSMSdss with a new name for each VSAM base cluster to be copied. DFSMSdss will use the CICSVR generated new name instead of the one specified in the RENAMEUNCONDITIONAL keyword. (See "CICS VSAM Recovery Implementation Guide" for more information about CICSVR generated new name, its naming convention, and required RENAMEU specification.)

.
Notes:

1. CICSVRBACKUP is intended to be used in conjunction with CICSVR. The minimum required CICSVR release is Version 3 Release 1. To use CICSVRBACKUP, the CICSVR server address space must be active.
2. CICSVRBACKUP applies to DATASET copy only.
3. CICSVR manages VSAM base clusters backed up using the DFSMSdss COPY command. When CICSVRBACKUP is specified, DFSMSdss COPY will fail the processing of alternate indexes. CICSVR rebuilds reusable alternate indexes so you do not need to copy the alternate indexes. The CICSVRBACKUP keyword is ignored for non-VSAM data sets.
4. CICSVRBACKUP cannot be specified with SPHERE or DELETE.
5. When CICSVRBACKUP is specified, RENAMEUNCONDITIONAL must also be specified. The RENAMEU specification must follow the DFSMSdss syntax rules although DFSMSdss will use the CICSVR generated new name instead of the new name specified by the user. IBM recommends that the RENAMEU keyword be specified as "RENAMEU(**,CICSVR.**)" when used in conjunction with CICSVRBACKUP.

.
Add the following to the RENAMEU description under the COPY command:

.
Note: If CICSVRBACKUP is also specified, DFSMSdss will use the CICSVR generated new name instead of the new name you specified. See CICSVRBACKUP keyword on page xx under the COPY command for more information.

.
Add the following command syntax for the CICSVRBACKUP keyword to the syntax diagrams for the DUMP command in Chapter 3

Syntax --- Function Commands, under heading "D: Optional Keywords with DUMP DATASET for logical Data Set":

```

.
>----->
|               |
|-----CICSVRBACKUP-----|
.
Add the following text for the CICSVRBACKUP keyword to the
DUMP command in Chapter 3:
.
CICSVRBACKUP
.
>>-----><
|               |
|-----CICSVRBACKUP-----|
.

```

CICSVRBACKUP specifies that on a logical data set dump operation, DFSMSdss is to create backups for use by CICSVR. DFSMSdss notifies the CICSVR server address space when a CICSVR backup is made for a VSAM base cluster. This enables CICSVR to manage backups made by DFSMSdss. See "CICS VSAM Recovery 1 Implementation Guide" for more information about using DFSMSdss DUMP to create CICSVR backups.

Notes:

1. CICSVRBACKUP is intended to be used in conjunction with CICSVR. The minimum required CICSVR release is Version 3 Release 1. To use CICSVRBACKUP, the CICSVR server address space must be active.
2. CICSVRBACKUP applies to logical DATASET dump only.
3. CICSVR manages VSAM base clusters backed up using the DFSMSdss DUMP command. The CICSVRBACKUP keyword is ignored for non-VSAM data sets and VSAM alternate indexes. When CICSVRBACKUP is specified, DFSMSdss DUMP will process AIXes as usual but will not notify CICSVR of backups made for AIXes.

A.3 APAR OW53881

APAR Identifier **OW53881** Last Changed 02/03/15
 NEW FUNCTION DOC APAR TO SUPPORT CICSVR 3.1

Symptom NF NEWFUNCTION Status **CLOSED** DOC
 Severity 4 Date Closed 02/03/15

Component 5695DF175 Duplicate of
Reported Release 1F0 Fixed Release
Component Name DFSMS/MVS DSS Special Notice
Current Target Date ..02/03/15 Flags
SCP
Platform
Status Detail: APARCLOSURE - APAR is being closed.

PE PTF List:

PTF List:

Parent APAR: OW53432
Child APAR list:

ERROR DESCRIPTION:

This new function DOC APAR describes the DFSMSdss publication updates for OW50538 which implemented "backup change updates for OW50538 which implemented "backup change notification" to support CICSVR 3.1. The new backup change notification is activated when CICSVRBACKUP keyword is specified on the logical data set COPY or DUMP command. New MSGADR927E and MSGADR928I are added for this enhancement.

LOCAL FIX:

PROBLEM SUMMARY:

```
*****
* USERS AFFECTED: CICSVR 3.1 users who use DFSMSdss 1F0 or      *
*                  1G0 as their backup utility.                  *
*****
* PROBLEM DESCRIPTION: This DOC APAR describes the second      *
*                  part of the publication updates for          *
*                  OW50538 which implemented "backup            *
*                  change notification" to support              *
*                  CICSVR 3.1. The new "backup change          *
*                  notification" option is activated when       *
*                  the CICSVRBACKUP keyword is specified        *
*                  on the data set COPY or logical data        *
*                  set DUMP command. New MSGADR927E and        *
*                  MSGADR928I are added for this                *
*                  enhancement.                                  *
*****
* RECOMMENDATION: See OW53432 for additional publication        *
```

* changes. *

PROBLEM CONCLUSION:

--- DOC APAR continued from OW53432 ---

See OW53432 for additional publication changes.

.

Add the following text to the Glossary of "OS/390 V2R10 DFSMSdss Storage Administration Guide" SC35-0393, "z/OS DFSMSdss Storage Administration Guide" SC35-0423, "OS/390 V2R10 DFSMSdss Storage Administration Reference" SC35-0394, and "z/OS DFSMSdss Storage Administration SC35-0394, and "z/OS DFSMSdss Storage Administration Reference" SC35-0424.

.

backout. The CICSVR function that you can use if CICS fails in the attempt to back out uncommitted changes on a VSAM sphere. Using information from the RCDS, CICSVR constructs a job to back out uncommitted changes on a VSAM data set as indicated on the log.

.

CICS. Customer Information Control System.

.

CICSVR. CICS VSAM Recovery.

.

CICS VSAM Recovery (CICSVR). CICS VSAM Recovery is an IBM product that recovers your lost or damaged VSAM data.

CICSVR V3.1 recovers VSAM data in the following environments:

- o CICSVR VSAM batch logging (when the VSAM data sets are not accessed in record level sharing mode)
- o CICS TS
- o CICS V4

.

complete recovery. The CICSVR function that consists of forward recovery followed by backout, if needed. In CICSVR complete recovery, CICSVR restores a DFSMSshm or DFSMSdss backup for you.

.

forward recovery. The CICSVR function that reapplies all changes to the VSAM sphere since the last backup. CICSVR gets the information it needs to construct the recovery job from the RCDS. The contents of the logs are applied to the VSAM sphere to return it to its exact state before the data was lost. With CICSVR forward recovery, CICSVR restores a DFSMSshm or DFSMSdss backup for you.

.

RCDS. Recovery Control Data Set.

.

The following changes will be made to "OS/390 V2R10 DFSMS
Installation Exits", SC26-7392 and "z/OS DFSMS Installation
Exits", SC26-7396.

.

Add the following command keywords to the "Options
Installation-Wide Exit Routine (ADRUIXIT)" section in
Chapter 8, under heading "Simple keywords with no
subparameters":
CICSVRBACKUP, DUMPCONDITIONING, FCNOCOPY, and FCWITHDRAW

.

The "Options Installation-Wide Exit Routine (ADRUIXIT)"
section will also have the following updates to the ADRUFO
parameter list. The changes are flagged with change
bars (|):

25(X'19')	1	UFOTOIND	Concurrent copy indicators
	1... ..	UFOTOREQ	Concurrent Copy Requested
	.1.. ..	UFODCOND	DUMPCONDITIONING
	..1.	UFOCVRBK	CICSVRBACKUP
	...1	UFOFCNC	FLASHCOPY NOCOPY
 1...	UFOFCWD	FLASHCOPY WITHDRAW
xxx		Reserved

A.4 Dependency APARs

If you are running OS/390 V2R10, z/OS V1R1 or later release and you want to use the new components of CICSVR V3R1 (batch logging, CICSVR server address space, change accumulation, DFSMSdss and DFSMSHsm notification support) you need to install the following APARs.

OW44714	OW45559	OW45560	OW46161	OW47025	OW47574
OW47781	OW48258	OW48701	OW49369	OW49478	OW49529
OW49530	OW49800	OW50340	OW50341	OW50433	OW50538
OW50683	OW51100	OW51135	OW51544	OW51555	OW52194
PQ42845					

For more information about required APARs, refer to *Program Directory for CICS VSAM Recovery*, GI11-1232.

A.5 New CICSVR APARs

This section document new APARs that correct some errors encountered during our tests, as well as some enhancements to the product. Some of them are already available, but some others are still under development at the time this redbook is being written. We hope all of them will be available at the time the redbook is published.

APAR	Description
PQ56545	CICSVR V3R1 enhancement (CICSVR address space).
PQ56661	CICSVR V3R1 enhancement (logger processing).
PQ58578	CICSVR V3R1 miscellaneous fixes.
OW52960	CICSVR V3R1 enhancement (VSAM batch logging performance).
PQ58471	CICSVR V3R1 enhancement (selective log of logs scan, or bypass log of logs scan if batch logging only).

PQ56545 and PQ56661 require DFSMS dependency APARs OW52962 and OW53003 to be installed.



B

Problem diagnosis

In this appendix we provide some examples of problems that you may encounter when using CICSVR. They provide a description of each problem and the solution.

B.1 CICSVR server problems

There are some problems you may experience when using the CICSVR server address space.

B.1.1 CICSVR server initialization failure

Problem: The CICSVR server address space fails at initialization.

Solution: Check that the LPALST has been set up correctly. Make sure that library DWW.SDWWLPA (supplied by CICSVR 3.1) is ahead of hlq.SDWWDLPA (supplied by DFSMS PTF UW79809) in the LPALST concatenation.

UW79809 supplies dummy stubs for VSAM batch logging, for further information see “APAR II13131” on page 80.

B.1.2 CICSVR server start failure (message DWW180E)

Problem: The CICSVR 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 Problems backing up your VSAM data sets

Another situation in which you may encounter problems is when you are backing up your VSAM data sets.

B.2.1 DFSMSdss COPY fails (message ADR927E)

Problem: DFSMSdss COPY fails with the following error:

ADR927E Reason Code 4301058

DFSMSdss is unable to notify the CICSVR server that a copy had been taken and the panels hang because of an RCDS enqueue.

Solution: Install APAR PQ56545 and DFSMS dependency APARs OW52962 and OW53003.

Problem: DFSMSdss COPY fails with the following error:

ADR927E Reason Code 60929 (X'EE01')

The reason code indicates that the CICSVR server is not active.

Solution: Start the CICSVR server.

For further information regarding the diagnosis of ADR927E messages refer to “APAR OW53432” on page 82.

B.3 Batch logging problems

You may encounter also some problems while running batch logging.

B.3.1 After-images not logged in the log stream

Problem: The after-images are not logged when FRLOG=REDO and LOGSTREAMID parameters are specified.

Solution: Logging can not 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:

- Open the empty data set for load mode processing.
- Sequentially write one or more records, which could be dummy records.
- Close the data set to terminate load mode processing.
- Reopen the data set for normal processing. CICSVR batch logging can now occur for this VSAM data set.

B.4 Hints and tips

This section document some useful information that may help you in using CICSVR in a more effective way.

B.4.1 Displaying SMS options

You may need to know the value of the SMS parameters that are in effect. To do so you may use the following command:

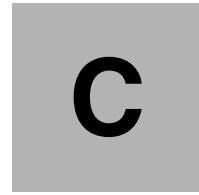
D SMS,OPTIONS

The output from this command can also be used to verify that any **SETMVS** commands that you have issued previously have taken effect.

An example of the output from this command is shown in Example B-1.

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
LRUCYCLES = 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 = DMWUSER.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
```



CICSVR for CICS V4

In this appendix we provide a brief description of the CICSVR functions that are specific to CICS V4.

C.1 Journal definition

CICS V4 uses journals as forward recovery logs. CICS can automatically switch the journals when one becomes full and submits the job to archive it. You can also switch journals manually.

Figure C-1 shows a sample definition for a CICS journal. JFILEID=02 indicates the journal file id for the forward recovery log. The journal file id must match the **Fwdrecovlog** parameter in file definition (see Figure C-2).

```
DFHJCT TYPE=ENTRY
JFILEID=2,
JOUROPT=AUTOARCH,
ARCHJCL=DWWARCH,
JTYPE=DISK2
```

Figure C-1 Sample journal definition

The ARCHJCL parameter defines the member name that contains the archive JCL skeleton. The member must exist in the CICS data set specified in the DFHJPDS DD name (see Example C-1).

C.2 Recovery parameters

In the CICS file definition there are some recovery parameters you have to specify in order to enable forward recovery. Figure C-2 shows a sample of the recovery parameters included in a file definition. Specify **All** for **RECOVery** and the journal id of the journal for **Fwdrecovlog**.

RECOVERY PARAMETERS		
RECOVery	==> A11	None Backoutonly All
Fwdrecovlog	==> 02	No 1-99
Backuptype	==> Static	Static Dynamic
SECURITY		
RESsecnum	: 00	0-24 Public

Figure C-2 Recovery parameters for a file

C.3 JCL skeleton for archiving

Example C-1 shows a sample JCL skeleton for creating a journal archiving job.

Example: C-1 Sample archive JCL skeleton

```
//$%SYST%JJ%D JOB , 'ARCHIVE', MSGLEVEL=(1,1),
//          CLASS=A, MSGCLASS=T, REGION=6M, TIME=1440
//CHECK    EXEC PGM=DFHJACDU,
//          PARM='CHECK JOURNAL=%JJ, DATASET=%D, DATE=%ODATE, TIME=%OTIME'
//STEPLIB DD DSN=CICS.V4R1M0.SDFHLOAD, DISP=SHR
//DFHJACD DD DSN=%JACDDSN, DISP=SHR
//SYSPRINT DD SYSOUT=*
//DFHJAPRT DD SYSOUT=*
//AR1      EXEC PGM=DWWAR,
//          PARM='CICSID(%APPLID)'
//STEPLIB DD DSN=DWW.DWWLOAD, DISP=SHR
//DWWMSG DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWCON1 DD DSN=DWW.DWWCON1, DISP=SHR
//DWWCON2 DD DSN=DWW.DWWCON2, DISP=SHR
//DWWCON3 DD DSN=DWW.DWWCON3, DISP=SHR
//DWWARC1 DD DISP=SHR, DSN=%JOURDSN
//DWWCOPY1 DD DSN=USER1.TTCICS1.A%SYSTJ%JJ.D%CDATE.T%CTIME,
//          DISP=(NEW,CATLG,DELETE), SPACE=(CYL,(5,5)),
//          DCB=%JOURDSN
//DWWIN DD *
//          ARCHIVE -
//          COPIES(1) -
//          RECOVERYREPORT(YES)
/*
//*
//UPDATE   EXEC PGM=DFHJACDU, COND=(0,NE),
//          PARM='UPDATE JOURNAL=%JJ, DATASET=%D, DATE=%ODATE, TIME=%OTIME'
//STEPLIB DD DSN=CICS.V4R1M0.SDFHLOAD, DISP=SHR
//DFHJACD DD DSN=%JACDDSN, DISP=SHR
//SYSPRINT DD SYSOUT=*
//DFHJAPRT DD SYSOUT=*
//*
//
```

C.4 Batch logging

If you use batch logging with CICS V4, you must archive the journal before you start batch logging so CICSVR is aware of the time interval of the VSAM data sets on that journal. The correct process to follow is:

1. Write CICS V4 redo records to the forward recovery journal
2. Archive the forward recovery journal from step 1 and make a copy of the log stream (copy 1)
3. Use batch logging. Redo records are written to the log stream
4. Write CICS V4 redo records to the forward recovery journal

5. Archive the forward recovery journal from step 4 and make a copy of the log stream (copy 2)
6. Use the CICSVR ISPF dialog to create a forward recovery job. It will use copy 1, the log stream, and copy 2 for forward recovery (3 steps).

Glossary

A

access method services (AMS). A utility program for the definition and management of VSAM data sets.

after-image. Records that CICS writes to a forward-recovery log to show what the VSAM record will look like after it has been updated by the application. (Throughout the CICSVR library, the forward-recovery log is referred to as the log.)

alternate index (AIX). A collection of index entries related to a given base cluster and organized by an alternate key; that is, a key other than the prime key of the associated base cluster data records. The AIX gives an alternative directory for finding records in the data component of a base cluster.

archive utility. The CICSVR utility that registers details of a log on the RCDS and optionally copies it to a backup.

authorized program analysis report (APAR). A report of a problem that is suspected to be caused by a defect in a current, unaltered release of a program.

automatic journal archiving. A function provided by CICS V4. When a disk log, defined to use this function is ready for archiving, CICS automatically creates and submits an archive job. The log data set is not reused until archiving is complete, and CICS ensures that the archive jobs are submitted promptly.

B

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

backout failing log record (BOFLGREC). The record that CICS stores in the system log. This allows CICSVR to start and stop its scan of the log in the correct places and to locate the relevant before-images. CICS issues a BOFLGREVC the first time a backout failure is detected. CICS issues following BOFLGRECs if the same task suffers a backout failure through a different file, or if a different task suffers a backout failure. So, there is a BOFLGREC for each combination of file and task that fails backout.

backout. The CICSVR function that you can use if CICS fails in the attempt to back out uncommitted changes on a VSAM data set. Using the information from the RCDS, CICSVR constructs a job to back out the uncommitted changes on a VSAM KSDS, ESDS, or RRDS, as indicated on the log.

backup. The copy of the VSAM data set, either on disk or tape, that you make at regular intervals as a minimum precaution to protect a VSAM data set.

backup-while-open (BWO) facility. A facility that allows a backup copy of a VSAM data set to be made while the data set remains open for update. When you take a backup-while-open copy of a data set, only the updates that are made after the BWO need to be recovered in the event of a disk failure. This considerably reduces the amount of forward recovery that is needed.

base cluster. A key-sequenced or entry-sequenced data set that one or more alternate indexes can be built over, or a relative-record data set.

basic catalog structure (BCS). The name of the catalog structure in the integrated catalog facility environment.

before-image. The copy of a VSAM record that CICS saves in the system log before CICS updates the record. Before-images are used to back out incomplete or incorrect changes if a failure occurs.

buffer. An area of processing storage that is used to hold a block of data while it is waiting to be processed or written to an I/O device.

C

change accumulation (CA). A CICSVR utility that reduces the time it takes to perform a forward recovery. CICSVR change accumulation consolidates forward recovery log records into a CA data set. CICSVR uses the CA data set in conjunction with the forward recovery log to reduce the number of log records that CICSVR needs to apply to get the data set back to the exact state before the data was lost.

CICS session. The time period during which a user has access to a CICS system.

CICS system definition (CSD) data set. A VSAM KSDS cluster with alternate paths. The CSD data set contains a resource definition record for every record defined to CICS using resource definition online (RDO).

CICS. Customer information control system.

CICSplex. (1) A CICS complex, a set of interconnected CICS regions acting as resource managers, and combining to provide a set of coherent services for a customer's business needs. In its simplest form, a CICSplex operates within a single MVS image. Within a parallel sysplex environment, a CICSplex can be configured across all the MVS images in the sysplex. The CICS regions in the CICSplex are generally linked through the CICS interregion communication (IRC) facility, using either the XM or IRC access method (between regions in the same MVS image), or the XCF/MRO access method (between regions in different MVS images). (2) The largest set of CICS regions or systems to be manipulated by a single CICSplex SM entity.

cluster. In VSAM, a named structure consisting of a group of related components. For example, when the data is key sequenced, the cluster contains the data and index components; for a data that is entry sequenced, the cluster contains only a data component.

cold start. The standard CICS initialization sequence performed without regard for prior system activity.

Common User Access (CUA). Guidelines for the interface between a user and a workstation or terminal.

complete recovery. The CICSVR function that consists of forward recovery followed by backout, if needed. In CICSVR complete recovery, CICSVR restores a DFSMSHsm backup for you.

concurrent copy. The facility supported by DFSMS, CICS V4, and CICSVR that increases the availability of data by letting you make a consistent backup or copy of data, concurrent with normal application program processing.

control area (CA). A group of VSAM control intervals used as a unit for formatting a data set before adding records to it.

control area split. The movement of the contents of some VSAM control intervals in a control area to a newly created control area., to aid the insertion, or lengthening of a record when no free control intervals remain in the original control area.

control interval (CI). A fixed-length area of auxiliary-storage space where VSAM stores records and distributes free space. It is the unit of information that is transmitted to or from auxiliary storage, by VSAM.

control interval split. The movement of some stored records in a VSAM control interval to a free control interval, to aid the insertion, or lengthening of a record that will not fit in the original control interval.

Coupling Facility (CF). The hardware that provides high-speed caching, list processing, and locking functions in a sysplex.

D

Data Facility Storage Management Subsystem (DFSMS). An IBM licensed program that together with MVS compose the base operating system. DFSMS consists of DFSMSdfp, DFSMSdss, DFSMShsm, and DFSMSrmm.

data integrity. The quality of data that exists as long as accidental destruction, change, or loss.

deregister. The CICSVR function that removes a VSAM data set name from the RCDS, or removes all references to a log from the RCDS.

DFSMSdfp. A DFSMS functional component that provides functions for storage management, data management, program management, device management, and distributed data access.

DFSMSdss. A DFSMS functional components used to copy, move, dump, and restore data sets and volumes.

DFSMShsm. A DFSMS functional component used for backing up and recovering data, and managing space on volumes in the storage hierarchy.

DFSMSrmm. A DFSMS functional component that manages removable media, such as tapes, and optical disks.

E

emergency restart. Initialization of the CICS system following an abnormal end, where the information recorded on the system log is used to recover the data files of all interrupted transactions, to the condition they were in when the transactions started.

entry-sequenced data set (ESDS). A VSAM data set whose records are physically in the same order in which they were added to the data set. An ESDS is processed by addressed direct access, or addressed sequential access and has no index. Records are added at the end of the data set.

F

file control table (FCT). CICS table containing the characteristics of the files accessed by CICS file control.

file. A CICS entity that relates to a data set. File names are 1-8 characters long.

forward recovery. The CICSVR function that reapplies all changes to the VSAM data set since the last backup. The data set can be a KSDS, ESDS, RRDS, or VRRDS. CICSVR 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 set was lost. With CICSVR forward recovery, CICSVR restores a DFSMShsm backup for you.

forward-recovery log. A log that is being used for implementing forward recovery.

function modification identifier (FMID). A seven-character ID used to identify the release of a product.

G

generation data group (GDG). A collection of data sets kept in chronological order; each data set is a generation data set (GDS).

global user exit. A point in a CICS module at which CICS can pass control to a program that you have written and the resume control when your program has finished. When an exit program is enabled for a particular entry point, the program is called every time the exit point is reached.

I

I/O. Input/Output.

ICF catalog. A catalog that consists of a basic catalog structure (BCS) and its related volume table of contents (VTOCs), and VSAM volume data sets (VVDSSs). The ICF catalog is the only catalog that is supported by DFSMS.

in-flight transaction. A transaction that has uncommitted updated at the time of an abnormal CICS end.

Interactive System Productivity Facility (ISPF). The MVS interactive facility that serves as a full-screen editor and dialog manager. ISPF can be used for writing application programs. It is used by CICSVR to provide an interactive dialog between the CICSVR user and the CICSVR functions.

J

journal archive control data set (JACD). CICS V4 system data set for use by the CICS automatic journal archive facility to store information about the logs.

journal control table (JCT). The way by which the characteristics of the logs are described to CICS for access through journal control. The JCT contains journal information and operating system control blocks describing each log.

journal. See log.

journaling. The recording of information onto a journal (including the system log) for processing by CICSVR. Also known as *logging*.

K

keypoint. The periodic recording of system information and control blocks on the system log.

key-sequenced data set (KSDS). A VSAM data set whose records are loaded in key sequence and controlled by an index.

L

linear data set (LDS). A VSAM data set that contains data but no control information. A linear data set can be accessed as a byte-addressable string in virtual storage.

link pack area (LPA). In MVS, an area of virtual storage that contains re-enterable routines that are loaded at IPL time and that can be used concurrently by all tasks in the system.

local shared resources (LSR). Files that share a common pool of buffers and a common pool of strings; that is, control blocks supporting I/O operations.

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

log tail. In CICSVR, the oldest log record of interest. Log tail deletion is the process of deleting unneeded records that are older than the oldest record of interest to CICSVR.

log. A set of one or more sequential data sets to which records are written during a CICS session in these circumstances:

- ▶ By CICS, to implement user-defined resource protection (logging to the system log)
- ▶ By CICS, to implement user-defined automatic journaling (to a journal, including the system log)
- ▶ Explicitly, by the JOURNAL command (or macro), from an application program (to a journal, including the system log)

logical unit of work (LUW). A sequence of processing actions (for example, changes to a base cluster) that must be completed before the individual actions can be regarded as committed. Every CICS task that affects a recoverable resource consists of one or more LUWs. When changes are committed (by successful completion of the LUW and recording of the sync point on the system log), they need not to be backed out after a later failure of the transaction or system. The end of an LUW is marked in a transaction by a sync point, issued either by the user program or by CICS when the transaction ends. In the absence of user sync points, the entire task is an LUW.

M

master terminal operator (MTO). A CICS operator who is authorized to use the master-terminal-functions transaction.

menu bar. The area at the top of a window that contains choices that let the CICSVR user access the actions available in that window.

migration utility. The utility provided by CICSVR that helps you upgrade your RCDS.

O

object action. A process sequence in which the user selects an object and then selects an action to apply to that object.

P

path. A data set name for the relationship between an alternate index and its base cluster, or an alias for a VSAM data set.

problem management record (PMR). A record on the RETAIN database where all activity about your CICSVR problem is recorded.

program temporary fix (PTF). A temporary solution, or by-pass of a problem, diagnosed by IBM as resulting from a defect in a current, unaltered release of a program.

program update tape (PUT). A tape or cartridge on which IBM places PTFs so that you can install them on your system.

pull-down. A list of choices associated with a choice on the menu bar. The CICSVR user selects a choice from the menu bar, and a pull-down appears in the secondary window, under the choice.

R

record level sharing (RLS). An extension to VSAM which provides direct record level sharing of VSAM data sets from multiple address spaces across multiple systems. Record level sharing utilizes the S/390 Coupling Facility to provide cross system locking, local buffer invalidation, and cross system data caching. With RLS, CICS regions that share VSAM data sets can reside in one or more MVS images within a parallel sysplex. Known also as *VSAM RLS*.

recovery control data set (RCDS). One of the three identical linear VSAM data sets that contains information about the contents of archived logs and the ISPF dialog interface default values. CICSVR uses this stored information to construct recovery jobs. CICSVR uses three identical RCDSs to reduce the possibility of data loss.

recovery control. In CICSVR, the collective name for the functions that keep track of all the information needed to forward recover and back out protected VSAM spheres.

recovery point time. The point in time that forward recovery starts from for VSAM data sets that were restored from a backup made using the backup-while-open facility. With the backup-while-open facility, recovery point time is maximum of 30 minutes before the *actual* backup time.

recovery. (1) The general process of recovering VSAM by CICS or CICSVR. (2) In DFSMSHsm, the process of copying a backup version of a data set from a backup volume to a specified volume, possibly to the volume from which the backup version was made.

register. See *archive function*.

relative byte address (RBA). The displacement of a stored record or control interval from the beginnings of the storage space allocated to the VSAM data set to which it belongs.

relative-record data set (RRDS). A VSAM data set whose records are loaded into fixed-length slots. The records are accessed by relative record number (RRN).

restore. (1) The process of copying a backup version of a VSAM data set from backup media, to the same media from which the backup version was created, or to another media. This restored copy can then be used in CICSVR forward recovery or backout. (2) In DFSMSHsm, the process of invoking DFSMSdss to perform the recover function before running CICSVR complete recovery.

S

secondary window. The window you get when you select an option from a pull-down. A secondary window does not have a menu bar.

SMSVSAM. The name of the VSAM server that provides VSAM record level sharing (RLS).

storage management subsystem (SMS). A DFSMS facility used to automate and centralize the management of storage. Using SMS, a storage administrator describes data allocation characteristics, performance and availability goals, backup and retention requirements, and storage requirements to the system through data class, storage class, management class, and ACS routine definitions.

synchronization point (sync point). A point in the processing of a task at which changes to recoverable resources are regarded as committed.

sysplex. A set of MVS systems communicating and cooperating with each other through certain multi-system hardware components and software services to process customer workloads.

system initialization table (SIT). A CICS control table required for the system to be operational. The SIT controls the capability of the system through a set of system initialization parameters.

system log. A CICS log (ID=01) that is used by CICS to log changes to resources for backout.

T

task. In CICS, a single instance of the execution of a transaction.

tie-up record (TUR). The association between the file and data set, as recorded on the log.

transaction backout. The cancellation, because of a transaction failure, of all updates performed by a task.

transaction. Can be regarded as a unit of processing (consisting of one or more application programs) initiated by a single request, often from a terminal. A transaction might require the initiation of one or more tasks for its execution.

U

uncommitted updates. The updates from an incomplete LUW that are left on the VSAM sphere when a task or CICS abends.

unit of work (UOW). A sequence of processing actions (database changes, for example) that must be completed before any of the individual actions performed by a transaction can be regarded as committed. After changes are committed (by successful completion of the UOW and recording of the sync point on the system log), they become durable, and are not backed out in the event of a subsequent failure of the task or system. In CICS V4, this was referred to as a *logical unit of work* (LUW).

upgrade set. All the alternate indexes that VSAM has been instructed to update whenever there is a change to the data part of the base cluster.

V

variable relative-record data set (VRRDS). A VSAM data set whose records are loaded into variable-length slots. The records are accessed by relative record number (RRN).

volume table of contents (VTOC). A table on a direct access volume that describes each data set on the volume.

VSAM record level sharing. See *record level sharing*.

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

VSAM volume data set (VVDS). A data set that describes the characteristics of VSAM data sets and system-managed data sets residing on a given disk; part of an ICF catalog.

Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this redbook.

IBM Redbooks

For information on ordering these publications, see “How to get IBM Redbooks” on page 110.

- ▶ *CICS and VSAM Record Level Sharing: Recovery Considerations*, SG24-4768
- ▶ *DFSMSHsm Primer*, SG24-5272

Other resources

These publications are also relevant as further information sources:

- ▶ *CICS VSAM Recovery V3R1 Implementation Guide*, SH26-4126
- ▶ *CICS VSAM Recovery V3R1 User's Guide and Reference*, SH26-4127
- ▶ *CICS VSAM Recovery V3R1 Messages and Problem Determination*, SH26-4128
- ▶ *Program Directory for CICS VSAM Recovery V3R1M0*, GI11-1232
- ▶ *z/OS V1R1 DFSMSdss Storage Administration Reference*, SC35-0424
- ▶ *z/OS V1R1 DFSMSdss Storage Administration Guide*, SC35-0423
- ▶ *z/OS V1R1 DFSMSHsm Storage Administration Reference*, SC35-0422
- ▶ *z/OS V1R1 DFSMSHsm Storage Administration Guide*, SC35-0421
- ▶ *CICS Recovery and Restart Guide*, SC34-6008
- ▶ *CICS Resource Definition Guide*, SC34-5990

Referenced Web sites

These Web sites are also relevant as further information sources:

- ▶ CICS VSAM Recovery
<http://www.storage.ibm.com/software/cics/index.html>
- ▶ IBM TotalStorage Management Toolkit
<http://www.storage.ibm.com/software/toolkit/>

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CICSVR Usage Guide

**Learn how to use
CICSVR to forward
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damaged VSAM data
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**Discover some hints
and tips for CICSVR
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