



IBM Software Group

CICS VSAM Recovery for z/OS Technical Overview

WebSphere software

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Preface

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Agenda

- **CICSVR and forward recovery introduction**
- **CICS and CICSVR setup**
- **Recovery scenarios**
 - ▶ Basic primary site recovery
 - ▶ Selective recovery
 - ▶ Disaster recovery using log stream copies and exported RCDS
 - ▶ Disaster recovery using change accumulation data sets and shadow processing
 - ▶ Disaster recovery using a real time log data transfer product
- **CICS VR reference material**



What is CICS VR?

- **CICS VSAM Recovery**
- **Recovers VSAM data that was:**
 - ▶ Physically corrupted (fire, flood, deleted, overwritten, etc...)
 - ▶ Logically corrupted (incorrect transactions)

- Recovers updates made by:
 - ▶ CICS transactions
 - ▶ Batch applications

- CICSVR helps:
 - ▶ Reduce “downtime” when VSAM data is unavailable
 - ▶ Automate the recovery process



CICS VSAM Recovery – release history

- **Product Number – 5655-P30**

- **CICS VR 3.1 – GA December 2001**
 - ▶ Separate address space
 - ▶ Change accumulation feature
 - ▶ Migration utility

- **CICS VR 3.2 – GA February 2003**
 - ▶ Improved VSAM sphere grouping
 - ▶ Selective forward recovery
 - ▶ Automatic LSR buffer space calculation

- **CICS VR 3.3 – GA September 2004**
 - ▶ Batch backout
 - ▶ File copy notification service



CICS VSAM Recovery – release history

- **CICS VR 4.1 – GA December 2005**
 - ▶ Function to enhance Automated recovery
 - ▶ Improved operation to allow easier day-to-day use
 - ▶ Forward recovery and back out enhancements
 - ▶ Disaster recovery reporting

- **CICS VR 4.2 – GA April 2007**
 - ▶ Support for extended addressability ESDS datasets
 - ▶ Improved control of the VSAM environment through enhanced notification support
 - ▶ Enhanced logging support
 - ▶ CICS TS 3.2 support

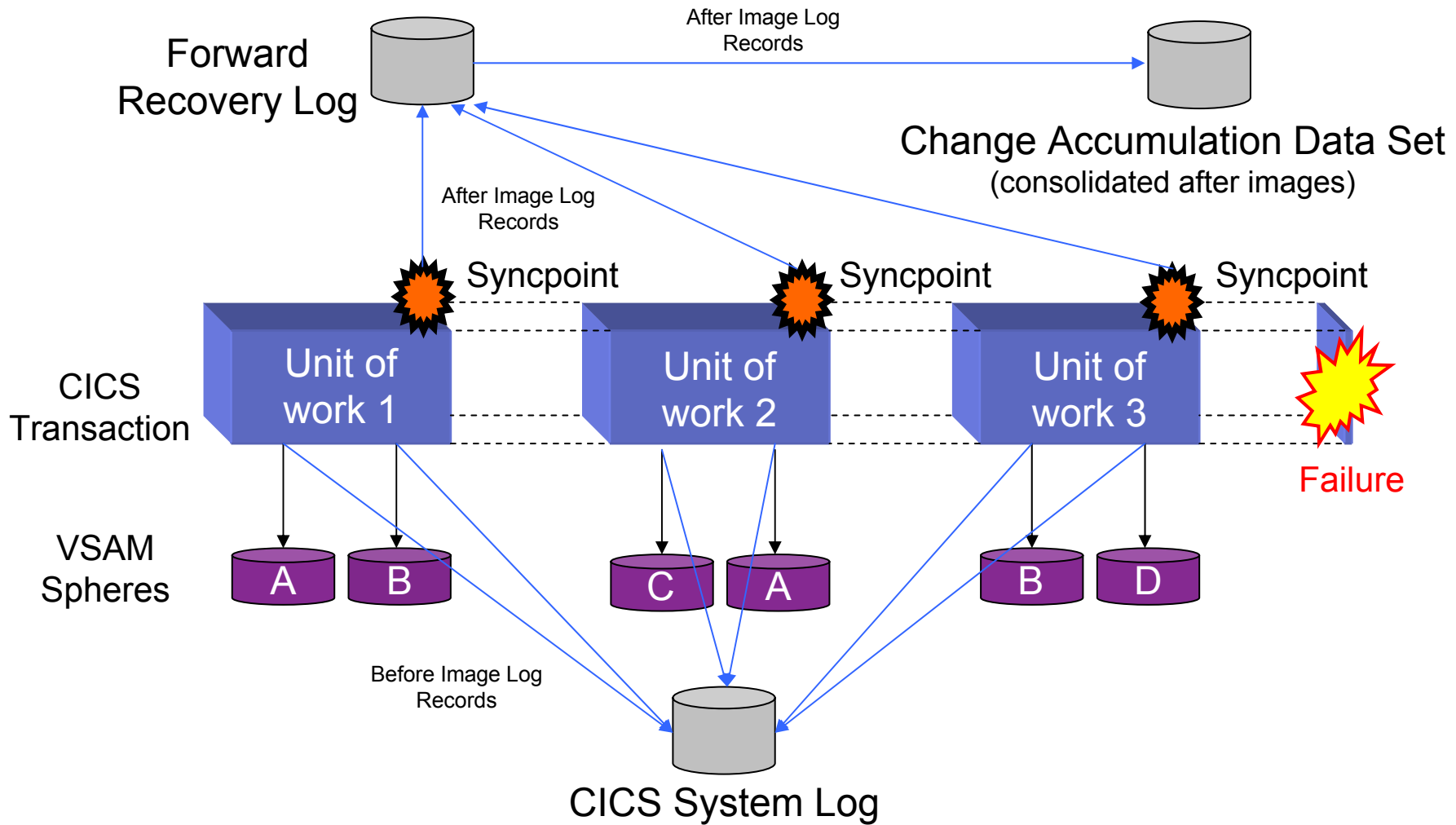
CICS VSAM Recovery – release history

- **CICS VR 4.3 – GA June 2008**

- ▶ Print and logstream copy enhancements
- ▶ Configurable Scavenger start times
- ▶ Partial Step-level backout
- ▶ Reduced Recovery Control Data Set (RCDS) contention at log copy
- ▶ Duplicate recovery avoidance
- ▶ New security authorization for batch logging and RCDS updates at notification
- ▶ Improved server configuration and installation
- ▶ Consistent timestamp display



What is forward recovery logging?



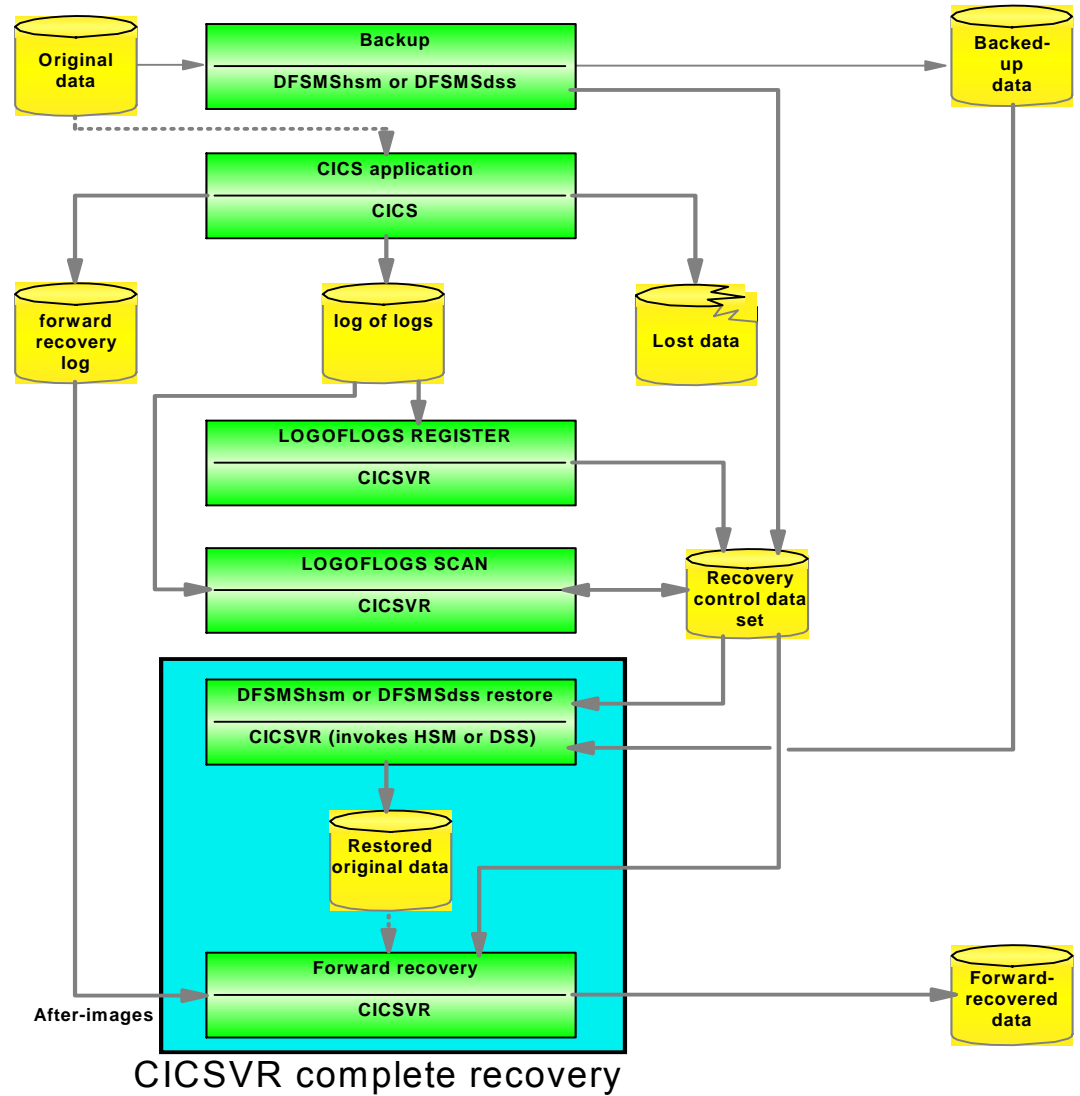
What are the features of CICSVR?

- **Utilities**

- ▶ Gather information about VSAM data sets
 - ▶ Perform actions against CICSVR entities (VSAM spheres, log streams, etc...)
-
- **Recovery Control Data Set (RCDS)**
 - ▶ Stores recovery information about VSAM data sets and update activity
 - **Panel interface**
 - ▶ Automates recovery job creation
 - **Address space**
 - ▶ Logs updates made to non-RLS VSAM spheres by batch applications
 - ▶ Communicates with other DFSMS components (DFSMSdss, DFSMShsm, etc...)



CICS TS and CICSVR



CICSVR complete recovery



What CICS and CICSVR setup is required?

- **Define required CICSVR data sets**
 - ▶ RCDS, DWWMSG, DWWDUMP, etc...
- **Enable CICS forward recovery logging**
 - ▶ Define logs (forward recovery logs and log of logs)
 - ▶ Update VSAM sphere CICS file definitions or ICF catalog entries
- **Update CICSVR with recovery information**
 - ▶ Register log of logs
 - ▶ Scan log of logs
- **Enable CICSVR batch logging**
 - ▶ Update VSAM sphere ICF catalog entries (to enable batch logging)
- **Establish a VSAM sphere backup process**

Define the RCDS

- **Central repository of recovery information**

```
//ALLOC      EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN      DD *
  DEFINE CLUSTER -
    (NAME ( 'DWW.DWWCON1 ' ) -
    VOLUMES (TSOL01) -
    CYLINDERS (60 20) -
    LINEAR -
    SHR (3 3))

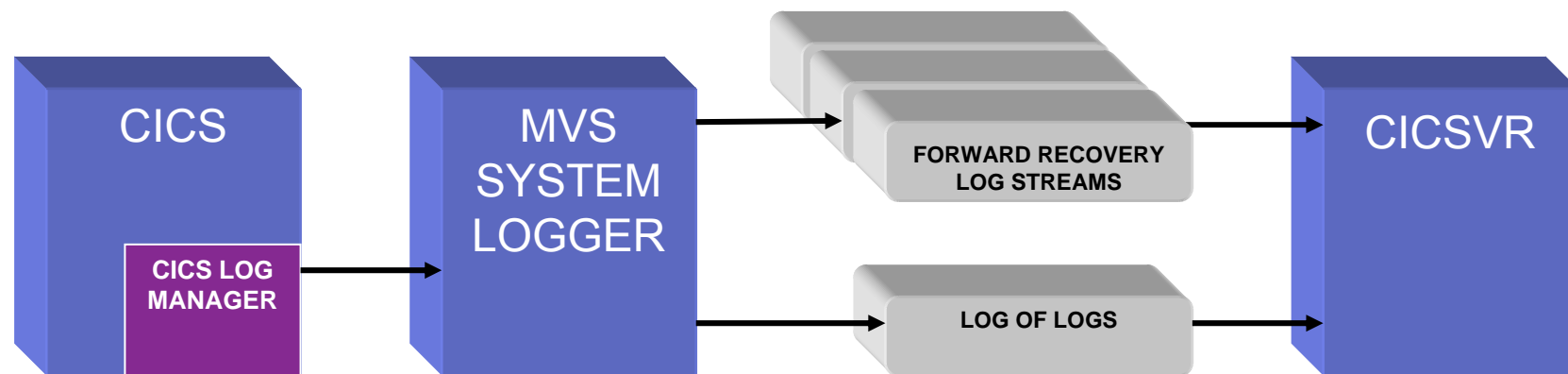
  DEFINE CLUSTER -
    (NAME ( 'DWW.DWWCON2 ' ) -
    VOLUMES (TSO007) -
    CYLINDERS (60 20) -
    LINEAR -
    SHR (3 3))

  DEFINE CLUSTER -
    (NAME ( 'DWW.DWWCON3 ' ) -
    VOLUMES (TSOL02) -
    CYLINDERS (30 20) -
    LINEAR -
    SHR (3 3))
/*
```



Define logs to the MVS System Logger and CICS

- **Forward recovery log stream**
 - ▶ Contains log records that reflect every add, update, and delete
 - ▶ Used during forward recovery processing
- **Log of logs**
 - ▶ Contains information about VSAM spheres being updated
 - ▶ Used to inform CICSVR of update activity



Define log streams to the MVS System Logger

- Use the IXCMIAPU utility

```
/*-----*/
/* Allocate FORWARD RECOVERY LOG STREAM DFHJ01 */
/*-----*/
//DEFLGSTR EXEC PGM=IXCMIAPU
//SYSPRINT DD SYSOUT=*,DCB=RECFM=FBA
//SYSIN DD *
DATA TYPE(LOGR) REPORT(NO)
DEFINE LOGSTREAM NAME(CICSVR.CICSPROD.DFHJ01)
STRUCTNAME(LOG_GENERAL_001) LS_SIZE(1180)
HIGHOFFLOAD(80) LOWOFFLOAD(40)
AUTODELETE(NO) RETPD(0)
DESCRIPTION(CICSVR_FWD_RECV1)

/*
```



Define log of logs to CICS

- **Example using CEDA DEFINE**

```
DEFINE GROUP(JRNL) DESC('log of logs')  
    JOURNALMODEL(DFHLGLOG) JOURNALNAME(DFHLGLOG) TYPE(MVS)  
    STREAMNAME(&USERID..CICSVR.DFHLGLOG)
```



Enable VSAM sphere forward recovery logging

- **Non-RLS data sets**

- ▶ Update VSAM sphere CICS file definitions with:

```
FWDRECOVLOG(1-99) - userid.applid.DFHJnn  
RLSACCESS(NO)  
RECOVERY(ALL)
```

- **RLS data sets**

- ▶ Update VSAM sphere ICF catalog entries with:

```
LOG(ALL)  
LOGSTREAMID(name of forward recovery log stream)
```



Register the log of logs to CICSVR

- **Submit batch job or use the CICSVR panel interface**
 - ▶ Subsequent scans will scan all registered log of logs

```
/*-----*/
/* REGISTER LOG OF LOGS                               */
/*-----*/
//REGISTER EXEC PGM=DWWAR
//STEPLIB DD DSN=DWW.SDWWLOAD,DISP=SHR
//DWWDUMP DD SYSOUT=*
//DWWMSG DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWCON1 DD DSN=DWW.DWWCON1,DISP=SHR
//DWWCON2 DD DSN=DWW.DWWCON2,DISP=SHR
//DWWCON3 DD DSN=DWW.DWWCON3,DISP=SHR
//DWWCOPY1 DD DUMMY
//DWWIN DD *
      LOGOFLOGS REGISTER(CICSVR.CICSVR.DFHLGLOG)
/*
```



Scan the log of logs

- **Submit log of logs scan batch job**
 - ▶ CICSVR retrieves necessary recovery information and stores it in the RCDS
 - ▶ Should run batch job during regular intervals

```
//*-----*/
//* Scan logoflogs                               */
//*-----*/
//SCANLOG EXEC PGM=DWWAR
//STEPLIB DD DSN=DWW.SDWWLOAD,DISP=SHR
//SYSUDUMP DD SYSOUT=*
//DWWDUMP DD SYSOUT=*
//DWWMSG DD SYSOUT=*
//DWWPRINT DD SYSOUT=*
//DWWCON1 DD DISP=SHR,DSN=DWW.DWWCON1
//DWWCON2 DD DISP=SHR,DSN=DWW.DWWCON2
//DWWCON3 DD DISP=SHR,DSN=DWW.DWWCON3
//DWWIN DD *
LOGOFLOGS SCAN RECOVERYREPORT(YES)
/*
```



Optionally enable CICSVR batch logging

- **Only non-RLS data sets supported by CICSVR batch logging**
 - ▶ Writes log records for every add, update, and delete made by batch jobs
 - ▶ Update VSAM sphere ICF catalog entries with:

```
FRLOG(RED0)  
LOGSTREAMID(name of forward recovery log stream)
```



Establish a VSAM sphere backup procedure

- CICSVR increases recovery automation when logical backups are created by DFSMSdss or DFSMShsm
 - ▶ DFSMShsm logical backups
 - No additional CICSVR setup required
 - ▶ BWO backups
 - Update CICS definitions with:
 - BACKUPTYPE(DYNAMIC)
 - Set the activity keypoint frequency (AKPFREQ) to non-zero
 - ▶ DFSMSdss logical copies and dumps
 - Add **CICSVRBACKUP** and **RENAMEU(**,CICSVR.**)** keywords to copy job
 - Add **CICSVRBACKUP** keyword to dump job

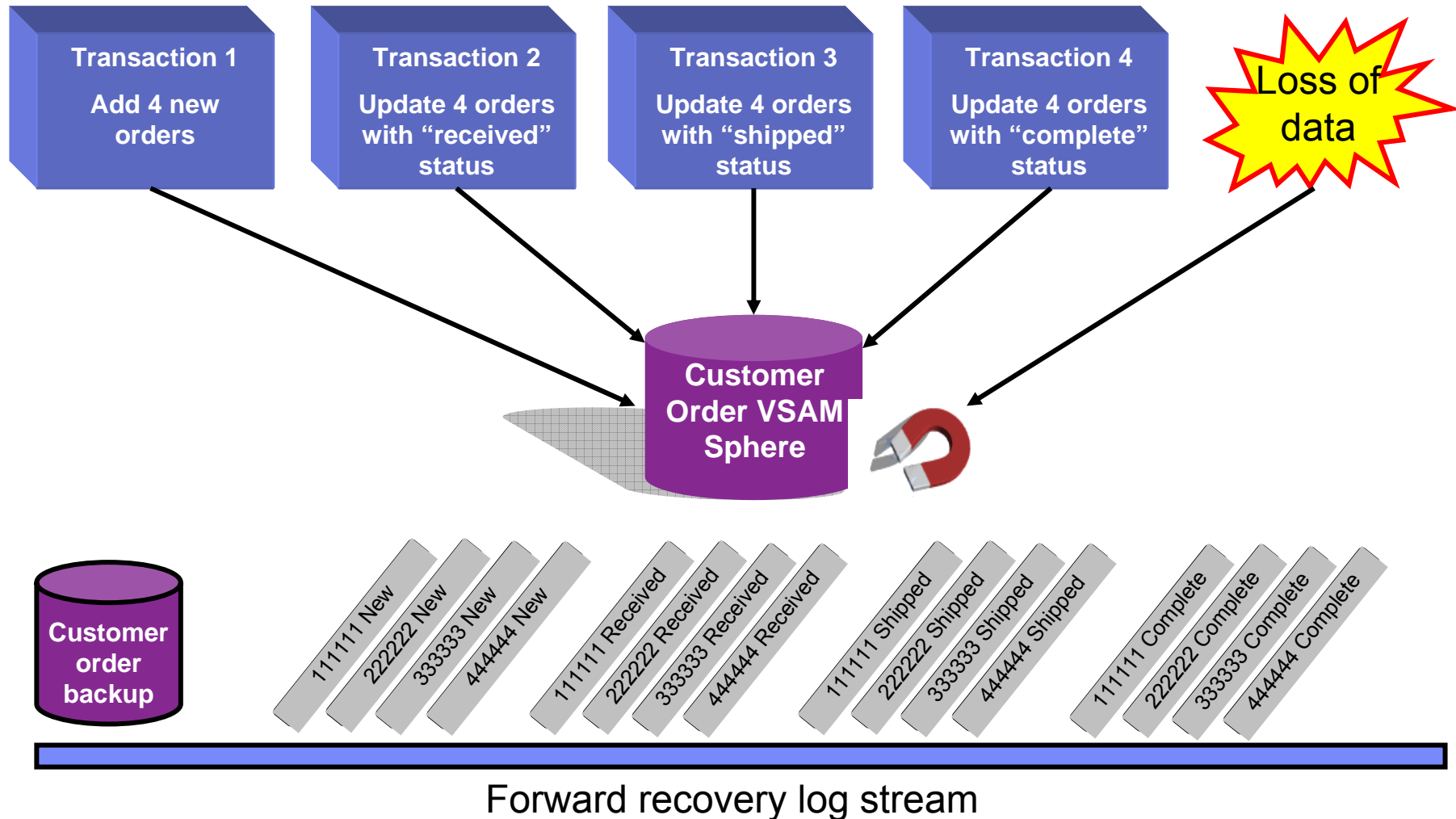
```

/*-----*/
/* CREATE A DSS COPY FOR CUSTOMER.ORDER          */
/*-----*/
//LOGICCP1 EXEC PGM=ADRDSSU
//SYSPRINT DD  SYSOUT=*
//SYSIN      DD  *
COPY
  DS(INCL(DEMOCICS.CICSVR.CICSV4.CUSTOMER.ORDER)) -
  OUTDYNAM( XMCICS ) -
  RENAMEU(**,CICSVR.**) -
  CICSVRBACKUP
/*

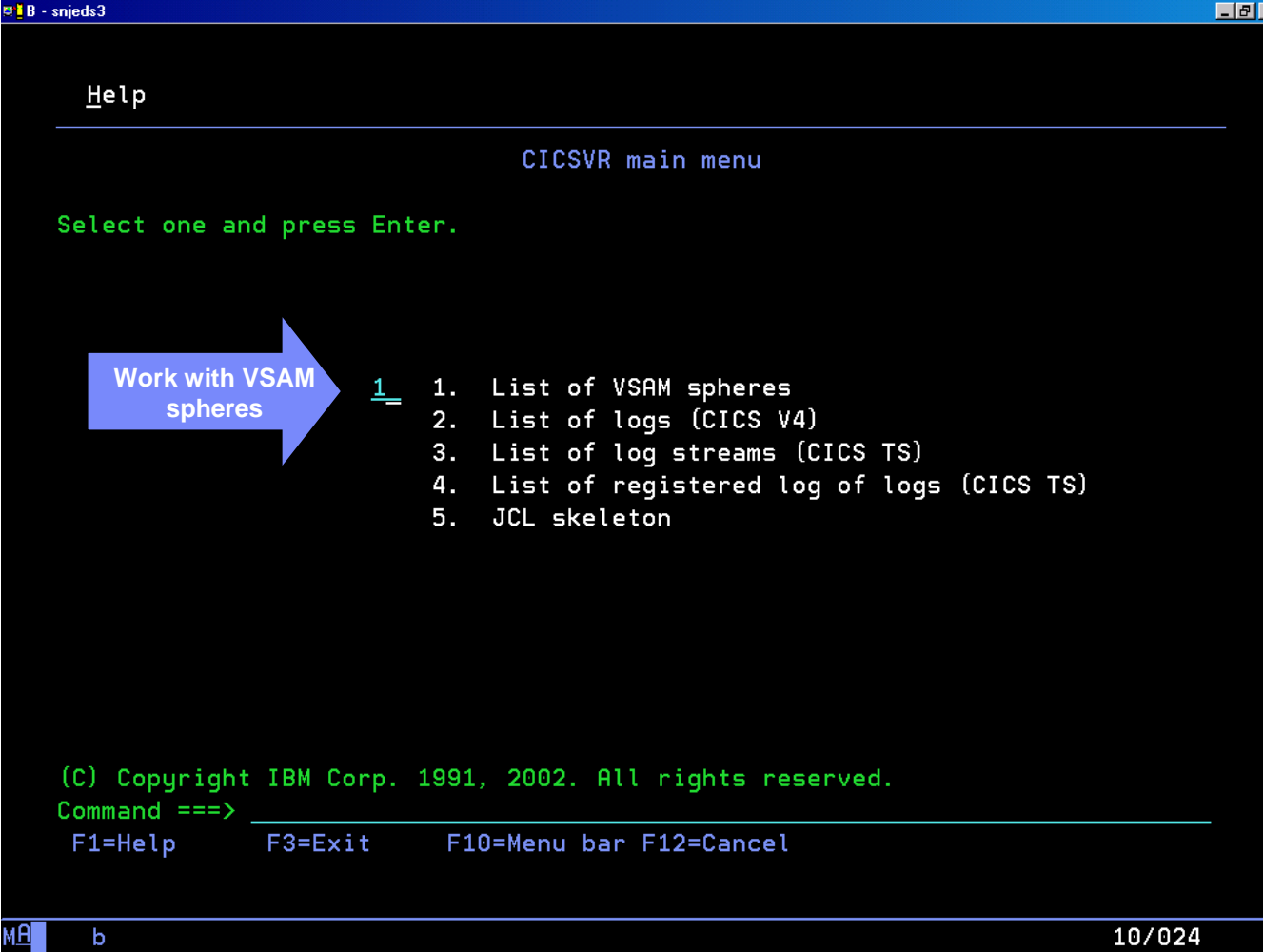
```



Basic primary site recovery scenario



CICSVR main menu



```
B - snjeds3
Help
-----
CICSVR main menu

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

(C) Copyright IBM Corp. 1991, 2002. All rights reserved.
Command ==>
F1=Help   F3=Exit   F10=Menu bar F12=Cancel

MA b 10/024
```



CICSVR VSAM sphere list filter

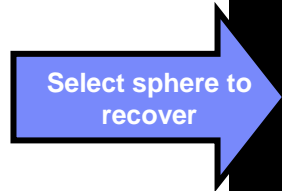
```

Help
      CICSVR VSAM sphere list include
Specify VSAM sphere list search criteria, then press Enter.
VSAM sphere . . . . . DEMOCICS.CICSVR.CUSTOMER.ORDER
OR
Specify the name of a data set that contains a list of VSAM spheres,
then press Enter.
Data Set Name . . . . . _____
Command ==> _____
F1=Help   F12=Cancel

(C) Copyright IBM Corp. 1991, 2002. All rights reserved.
Command ==>
F1=Help   F3=Exit   F10=Menu bar F12=Cancel
    
```



CICSVR VSAM sphere list – select sphere



```

IBM - snjeds3
-----
Administrate Utilities Tools List View Help
-----
CICSVR VSAM sphere list                               Row 1 to 1 of 1

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

N Use default parameters for selected spheres
S VSAM sphere                                         Last time      RLS RR
S DEMOCICS.CICSVR.CUSTOMER.ORDER                    referenced    flag on
00.001 00:00:00
***** Bottom of data *****

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

MA b                                                    22/015
    
```



CICSVR VSAM sphere list – select recovery action

```

eIB - snjeds3
-----
Administrate Utilities Tools List View Help
Select a recovery action
Select one of the following:
  1. Complete recovery... F4
  2. Forward recover only... F5
  3. Backout only... F6
ion.
N Use default parameters for selected spheres
S VSAM sphere
S DEMOCICS.CICSVR.CUSTOMER.ORDER
Last time referenced 00.001 00:00:00
RLS RR flag on
***** Bottom of data *****

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

MA b 03/020
    
```



Log of logs scan report

```

IBM - snjeds3
  Menu Utilities Compilers Help
  BROWSE CICSVR.PANELS.DWWPRINT Line 00000000 Col 001 080
  ***** Top of Data *****
  CICSVR - LOG OF LOGS SCAN UTILITY DATE : 200

  STATISTICS FOR A LOG OF LOGS SCAN
  =====

  LOG OF LOGS NAME      : CICSVR.CICSVR.DFHLGLOG
  FIRST TIME GMT       : 03.280 15:45:04
  LAST TIME GMT        : 03.280 15:45:18
  FIRST TIME LOCAL     : 03.280 11:45:04
  LAST TIME LOCAL      : 03.280 11:45:18
  FIRST BLOCK NUMBER   :
  LAST BLOCK NUMBER    : 1665

  VSAM DATA SET STATISTICS
  =====

  Command ==> _____ Scroll ==> PAGE
  F1=Help  F2=Split  F3=Exit  F5=Rfind  F7=Up    F8=Down  F9=Swap
  F10=Left F11=Right F12=Cancel

  MR b 22/015
  
```



CICSVR VSAM sphere recovery parameters

```

CICSVR VSAM sphere parameters

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

VSAM sphere . . . . . : DEMOCICS.CICSVR.CUSTOMER.ORDER

New VSAM sphere name . . _____

Forward-recovery start time . . 03.280 11:44:41 (YY.DDD HH:MM:SS)
Forward-recovery stop time . . _____ (YY.DDD HH:MM:SS)
Backup time . . . . . 03.280 11:44:41 + (YY.DDD HH:MM:SS)

Time format          Backup type
1 1. Local          2 1. None
   2. GMT              2. Logical
                       3. Full volume dump

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

Default values will restore sphere from latest logical backup and forward recover to current point in time



CICSVR backup prompt list

```

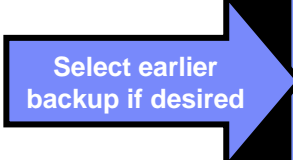
IBM - snjeds3
CICSVR backup prompt list                               Row 1 to 3 of 3

Select one backup time, then press Enter.

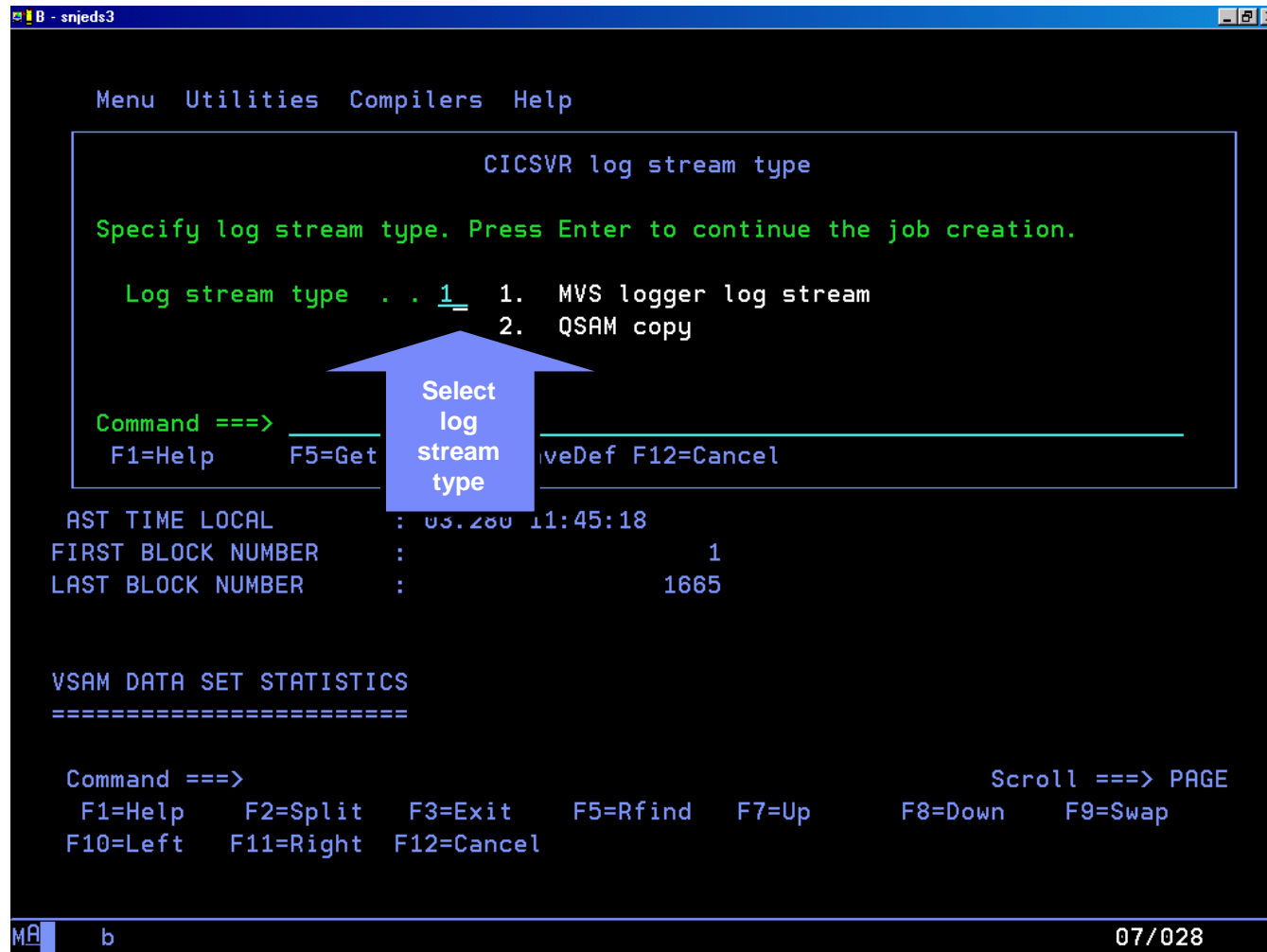
VSAM sphere . . . : DEMOCICS.CICSVR.CUSTOMER.ORDER

----- Data set backup information -----
      Backup      Gen Ver BWO RLS      Recovery point      Product
S   Date   Time   no. no.      Date   Time   Type
=   03.280 11:44:41 00 025 NO  NO      LOCAL  HSMLB
-   03.280 11:44:40      NO  NO      LOCAL  DSSLC
-   03.223 17:03:17 01 024 NO  NO      LOCAL  HSMLB
***** Bottom of data *****

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



CICSVR log stream selection



Additional CICSVR recovery parameters

```

IB - snjeds3
Menu Utilities Compilers Help

CICSVR complete recovery

Press Enter to create a job with default values. Or, select one or more
choices below, and press Enter to override current values.

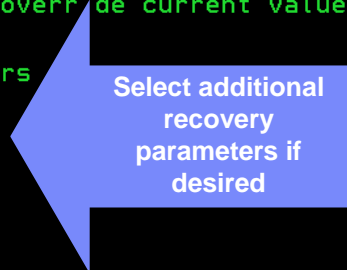
S Recovery and backout parameters
= Sequence checking
- VSAM buffer pools
- CICSVR exits
- Selective forward recovery

Command ==> _____
F1=Help F12=Cancel

VSAM DATA SET STATISTICS
=====

Command ==> _____ Scroll ==> PAGE
F1=Help F2=Split F3=Exit F5=Rfind F7=Up F8=Down F9=Swap
F10=Left F11=Right F12=Cancel

MA b 09/006
    
```



CICSVR job submission

Menu Utilities Compilers Help

CICSVR job submission

Select one and press Enter.

Submit, edit, or save the recovery job →

- 2 1. Submit the job
- 2. Browse the job
- 3. Edit the job
- 4. Save generated JCL
- 5. Return to VSAM sphere list

Command ==> _____

F1=Help F12=Cancel

The recovery job has been generated. 665

VSAM DATA SET STATISTICS
=====

Command ==> _____ Scroll ==> PAGE

F1=Help F2=Split F3=Exit F5=Rfind F7=Up F8=Down F9=Swap
F10=Left F11=Right F12=Cancel

MA b 07/031



CICSVR recovery job

```

IBM - snjeds3
Menu Utilities Compilers Help
BROWSE CICSVR.PANELS.ISPFILE(DWWBATCH) - 01.00 Line 00000014 Col 001 080
//DWWIN DD *
RECOVER -
  ONLY -
  APPLYCA -
  STARTTIME (03.280/11:45:04) -
  STOPTIME (03.280/11:45:10) -
  STARTAT (DSNAME) -
  VERSION (025) -
  SPHERE (DEMOCICS.CICSVR.CUSTOMER.ORDER)
MVSLOG -
  NAME (CICSVR.CICSPROD.DFHJ01)
BLDVRP
//*
***** Bottom of Data *****

Command ==> Scroll ==> PAGE
F1=Help F2=Split F3=Exit F5=Rfind F7=Up F8=Down F9=Swap
F10=Left F11=Right F12=Cancel
MA b A 22/015

```



CICSVR recovery report

```

B - snjeds3
-----
Display Filter View Print Options Help
-----
SDSF OUTPUT DISPLAY TESTGFS1 JOB27358  DSID   103 LINE 29      COLUMNS 01- 80
COMMAND INPUT ==> _                               SCROLL ==> PAGE
OFIRST AND LAST RECORDS APPLIED:
-----
RECORDS          DATE      TIME      TIME
                  YY/DDD   HH:MM:SS  TYPE
-----
FIRST RECORD APPLIED 03/280   11:45:06  LOCAL
LAST RECORD APPLIED 03/280   11:45:08  LOCAL
-----

-NAME OF RECOVERED DATA SET:  DEMOCICS.CICSVR.CUSTOMER.ORDER
0          :----- RECORDS FOUND ON THE LOG(S) -----: :-----
DATASET  FCT ENTRY
TYPE     NAME          DSNAME    UPD-AFTER  ADD-AFTER  DEL-AFTER
-----
BASE     CUSTORDR         1          12         4          0
-----
TOTAL          1          12         4          0
-----
0-----
OVERALL TOTAL          1          12         4          0
F1=HELP    F2=SPLIT    F3=END     F4=RETURN  F5=IFIND   F6=B00K
F7=UP      F8=DOWN     F9=SWAP    F10=LEFT   F11=RIGHT  F12=RETRIEVE
-----
MA  b          A          04/021
    
```



CICSVR change accumulation

```

IBM - snjeds3
-----
Menu Utilities Compilers Help
-----
BROWSE  CICSVR  ANELS.ISPFILE(DWWBATCH) - 01.00  Line 00000014 Col 001 080
//DWWIN  DD
RECOVER
ONLY
APPLYCA
STARTTIME (
STOPTIME (03
STARTAT (DSNA.
VERSION (025)
SPHERE (DEMOCIC .CICSVR.CUSTOMER.ORDER)
MVSLOG
NAME (CICSVR.CICSPROD.DFHJ01)
BLDVRP
//*
***** Bottom of Data *****

Command ==>
Scroll ==> PAGE
F1=Help  F2=Split  F3=Exit  F5=Rfind  F7=Up  F8=Down  F9=Swap
F10=Left F11=Right F12=Cancel

MA  b  A  22/015
    
```

Use any appropriate change accumulation data sets



CICSVR change accumulation contd.

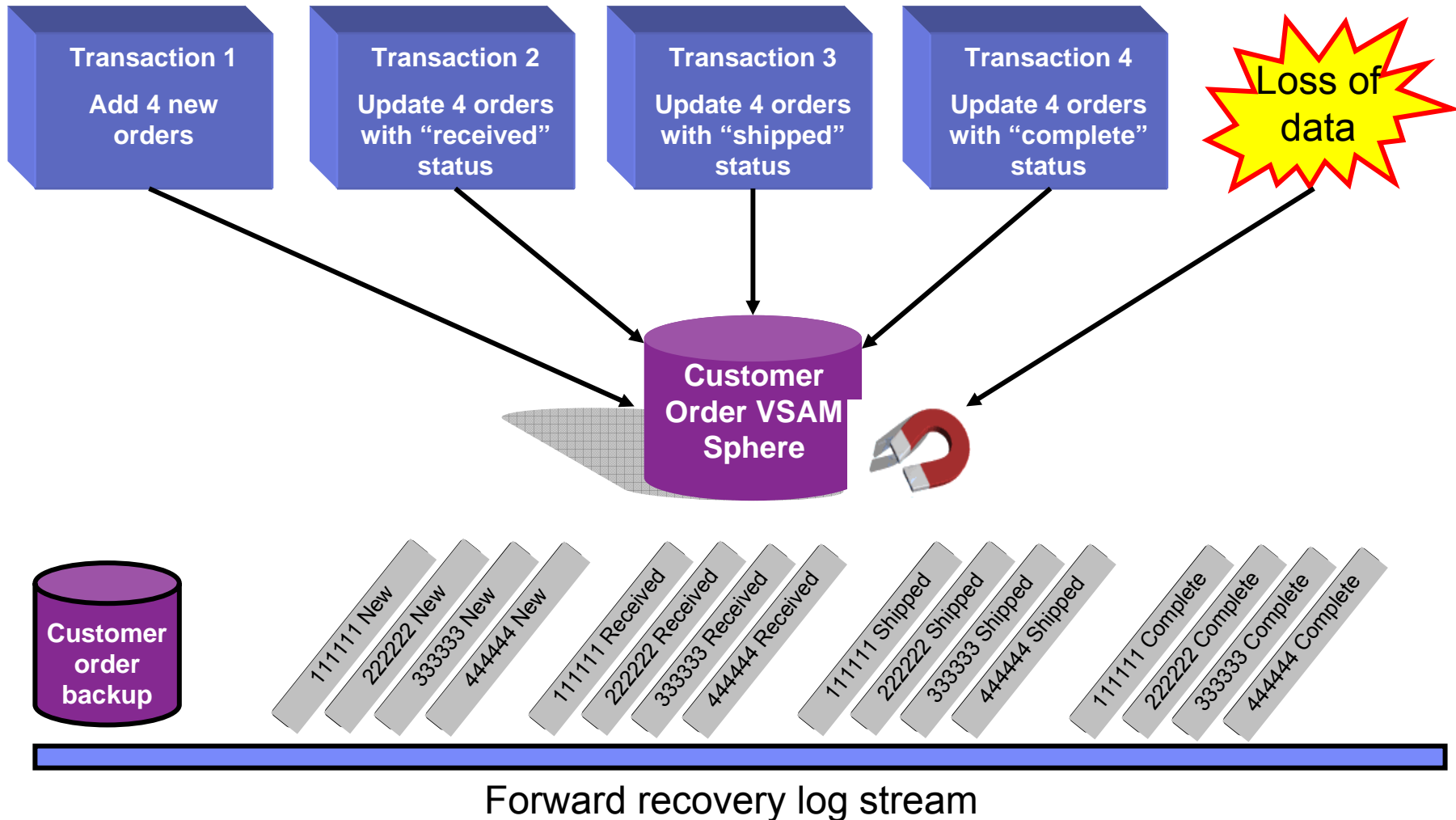
- Consolidates log records into Change Accumulation (CA) data sets used during forward recovery
- Significantly reduces time required to forward recover a VSAM sphere
- Change accumulation batch jobs created once and submitted during regular intervals
- CICSVR automatically creates and maintains CA data sets

Sample change accumulation statistics (1 million records processed)

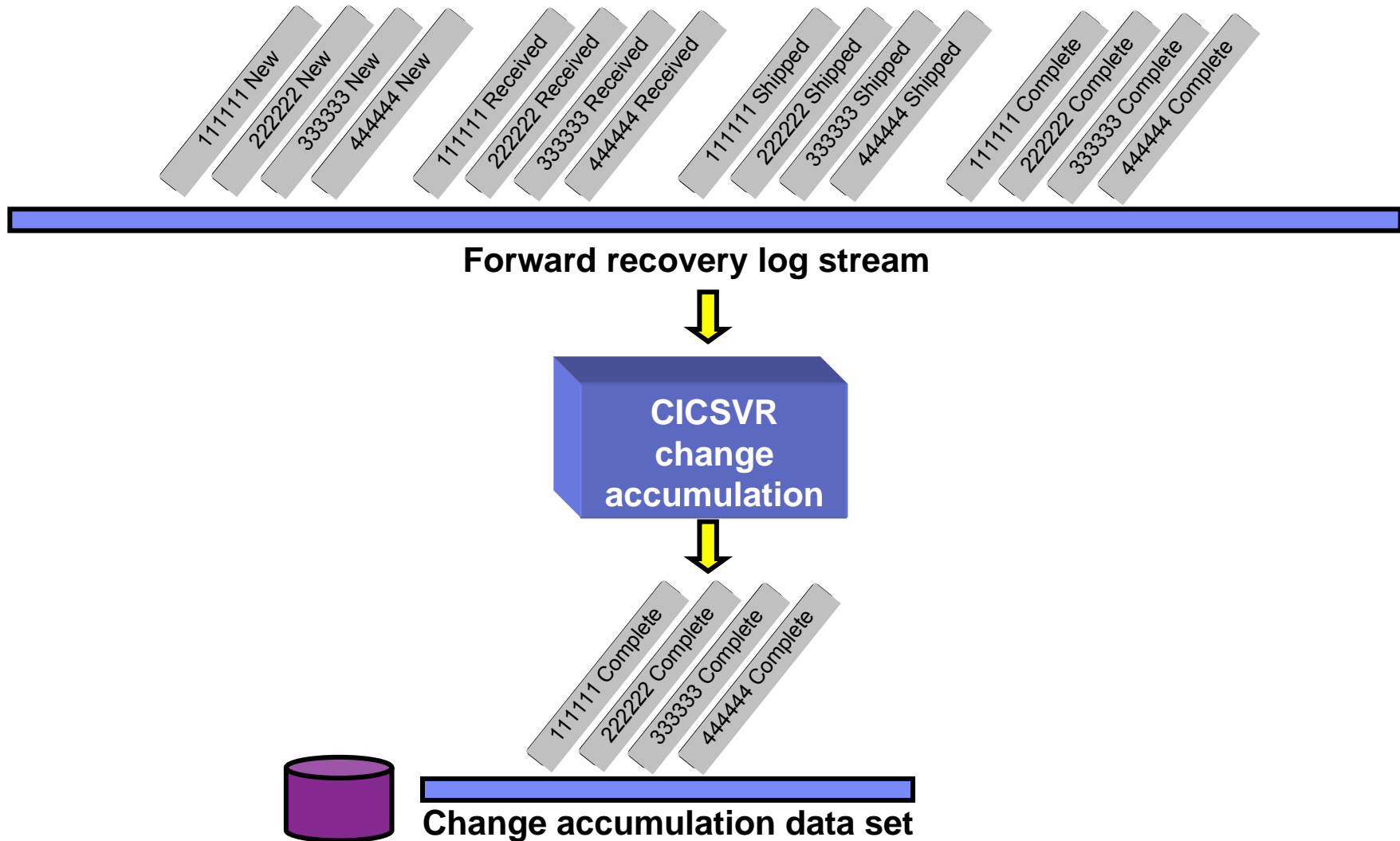
<u>VSAM sphere type</u>	<u>Reduced elapsed recovery time</u>	<u>Reduced CPU time</u>
KSDS	87%	57%
ESDS	93%	68%
RRDS	93%	62%
VRRDS	85%	59%



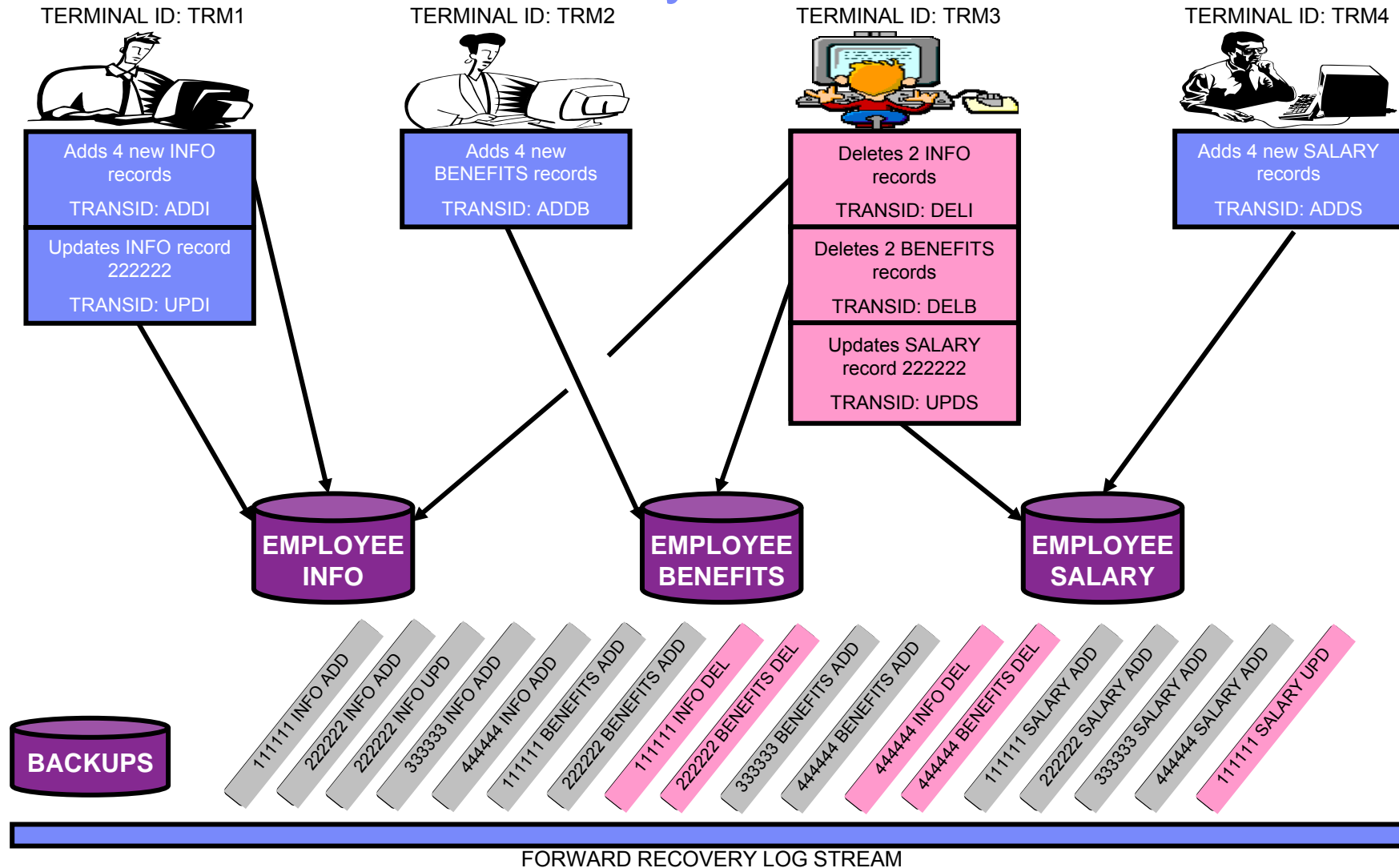
Basic primary site recovery scenario



CICSVR change accumulation contd.



Selective forward recovery scenario



ISMF main menu

```

IB - snjeds3
Panel Help
-----
ISMF PRIMARY OPTION MENU - z/OS DFSMS V1 R3

Select one of the following options and press Enter:

0 ISMF Profile          - Specify ISMF User Profile
1 Data Set              - Perform Functions Against Data Sets
2 Volume                - Perform Functions Against Volumes
3 Management Class     - Specify Data Set Backup and Migration Criteria
4 Data Class            - Specify Data Set Allocation Parameters
5 Storage Class        - Specify Data Set Performance and Availability
6 Storage Group        - Specify Volume Names and Free Space Thresholds
7 Automatic Class Selection - Specify ACS Routines and Test Criteria
8 Control Data Set     - Specify System Names and Default Criteria
9 Aggregate Group      - Specify Data Set Recovery Parameters
10 Library Management  - Specify Library and Drive Configurations
11 Enhanced ACS Management - Perform Enhanced Test/Configuration Management
C Data Collection      - Process Data Collection Function
L List                 - Perform Functions Against Saved ISMF Lists
R Removable Media Manager - Perform Functions Against Removable Media

Enter Selection or Command ==> 1
F1=Help  F2=Split  F3=End  F4=
F10=Left F11=Right F12=Cursor  B=Down  F9=Swap

MA b 22/035

```

Work with ISMF
data set lists



Enter data set selection criteria

```

IB - snjeds3
Panel Defaults Utilities Scroll Help
DATA SET SELECTION ENTRY PANEL OTHER VALUES PRESENT
For a Data Set List, Select Source of Generated List . . . 2 (1 or 2)

1 Generate from a Saved List          Query Name To
  List Name . . . _____          Save or Retrieve _____

2 Generate a new list from criteria below
  Data Set Name . . . 'DEMOCICS.CICSVR.EMPLOYEE.*'
  Enter "/" to select option _ Generate Exclusive l.
  Specify Source of the new list . . . 2 (1 - VTOC, 2 Catalog)
  1 Generate list from VTOC
    Volume Serial Number . . . _____ (fully or partially specified)
  2 Generate list from Catalog
    Catalog Name . . . _____
    Catalog Password . . . _____ (if password protected)
    Volume Serial Number . . . _____ (fully or partially specified)
    Acquire Data from Volume . . . . . N (Y or N)
    Acquire Data if DFSMSHsm Migrated . . . N (Y or N)

Command ==> _____
F1=Help  F2=Split  F3=End  F4=Return  F7=Up  F8=Down  F9=Swap
F10=Left F11=Right F12=Cursor
    
```

Data set name mask

4 more screens of selection criteria



ISMF data set list

```

Panel  List  Dataset  Utilities  Scroll  Help
-----
                                DATA SET LIST
                                Entries 1-3 of 3
                                Data Columns 3-4 of 39
Enter Line Operators below:

LINE          OPERATOR          DATA SET NAME          ALLOC  ALLOC
                   SPACE      USED
--- (1) ---  ----- (2) -----  -- (3) --  -- (4) --
                                DEMOCICS.CICSVR.EMPLOYEE.BENEFITS
                                DEMOCICS.CICSVR.EMPLOYEE.INFO
                                DEMOCICS.CICSVR.EMPLOYEE.SALARY
-----  -----  -----  BOTTOM OF DATA  -----  -----

```

Command ==> VSAMREC
 F1=Help F2=Split F3=...
 F10=Left F11=Right F12=...sor

Scroll ==> HALF
 F8=Down F9=Swap

MA b A 22/022

Invoke CICSVR to create a recovery job for all listed spheres



CICSVR VSAM sphere list

The screenshot shows a CICS terminal window titled 'B - snjeds3'. The main menu includes 'Administrate', 'Utilities', 'Tools', 'List', 'View', and 'Help'. The current screen is 'CICSVR VSAM sphere list' showing 'Row 1 to 3 of 3'. A green instruction reads: 'Select one or more VSAM spheres, then select an action.' Below this, a green prompt asks to 'Use default parameters for selected spheres'. A table lists three VSAM spheres, all of which are selected with an 'S' in the first column. The table columns are 'VSAM sphere', 'Last time referenced', and 'RLS RR flag on'. A blue arrow points to the 'S' in the first column with the text 'Enter one set of recovery parameters'. Another blue arrow points to the table with the text 'All spheres automatically selected'. At the bottom, a 'Command ==>' line is followed by function key definitions: F1=Help, F3=Exit, F4=CompRec, F5=FwdRec, F6=Backout, F7=Bkwd, F8=Fwd, F10=Menu bar, F11=Dereg, F12=Cancel. The status bar at the bottom shows 'MA b' and '10/004'.

VSAM sphere	Last time referenced	RLS RR flag on
DEMOCICS.CICSVR.EMPLOYEE.BENEFITS	03.280 16:08:27	
DEMOCICS.CICSVR.EMPLOYEE.INFO	03.280 16:08:27	
DEMOCICS.CICSVR.EMPLOYEE.SALARY	03.280 16:08:27	



Select a recovery action

```

IBM - snjeds3
Administrative Utilities Tools List View Help
Select a recovery action 1 1. Complete recovery... F4
Select one c 2. Forward recover only... F5
3. Backout only... F6
ion.
Y Use default parameters for selected spheres
S VSAM sphere Last time RLS RR
referenced flag on
S DEMOCICS.CICSVR.EMPLOYEE.BENEFITS 03.280 16:08:27
S DEMOCICS.CICSVR.EMPLOYEE.INFO 03.280 16:08:27
S DEMOCICS.CICSVR.EMPLOYEE.SALARY 03.280 16:08:27
***** Bottom of data *****

Command ==>
F1=Help F3=Exit F4=CompRec F5=FwdRec F6=Backout F7=Bkwd
F8=Fwd F10=Menu bar F11=Dereq F12=Cancel

MA b 03/020
    
```



Enter default recovery parameters

The screenshot shows a terminal window titled "B - snjeds3" with the following text:

```

CICSVR VSAM sphere default parameters

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

 1 - 8 character DSN extension . _____

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

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

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

Time forma 1 1. Lo
           2. GM

Backup type 2 1. None
           2. Logical
           3. Full volume dump

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

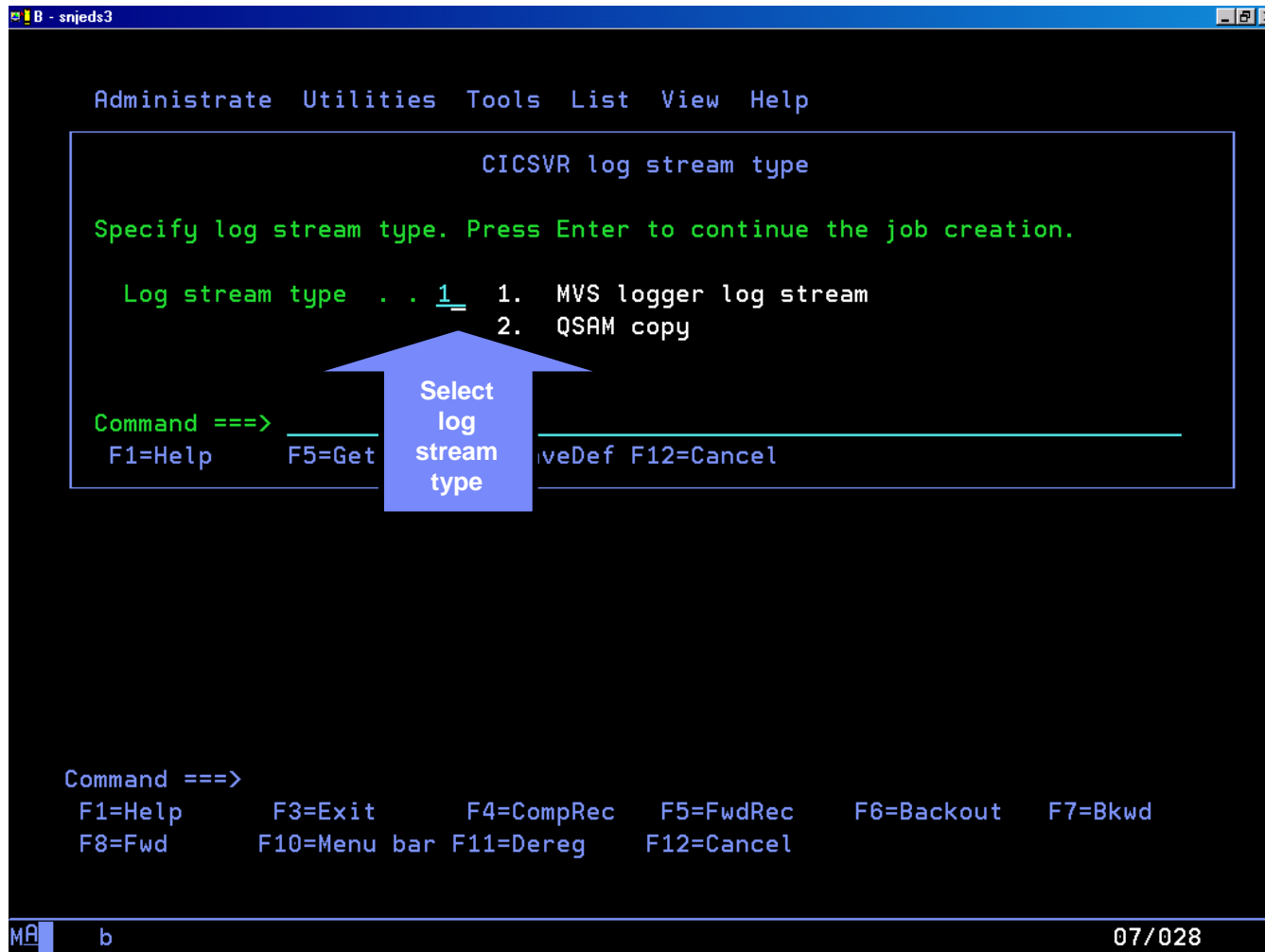
Command ==> _____
F1=Help   F12=Cancel
    
```

A blue callout box with a white arrow points to the "Backup date" field. The text inside the callout box reads: "Recover every sphere from its latest logical backup and forward recover to the current point in time".

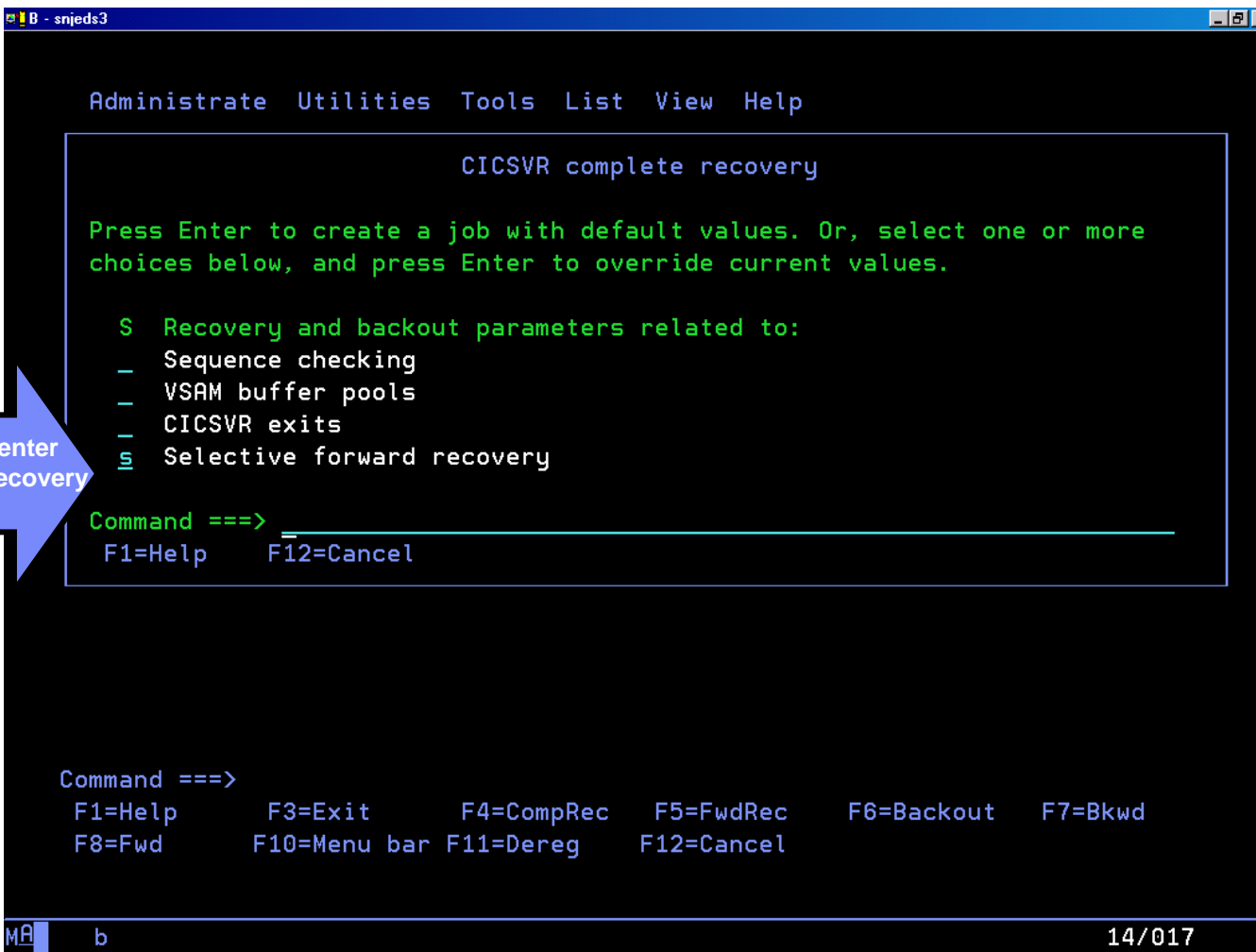
At the bottom of the terminal window, there is a status bar with "b" on the left and "15/039" on the right.



CICSVR log stream selection



Select the “Selective forward recovery” option



The screenshot shows a terminal window titled "B - snjeds3" with a menu bar: "Administrate Utilities Tools List View Help". The main content is "CICSVR complete recovery" with instructions: "Press Enter to create a job with default values. Or, select one or more choices below, and press Enter to override current values." A list of options is shown, with "Selective forward recovery" underlined. A blue arrow points to this option with the text "Select option to enter selective forward recovery criteria". Below the list is a "Command ==>" prompt with "F1=Help" and "F12=Cancel". At the bottom, a second "Command ==>" prompt is shown with a grid of function key options: F1=Help, F3=Exit, F4=CompRec, F5=FwdRec, F6=Backout, F7=Bkwd, F8=Fwd, F10=Menu bar, F11=Dereg, and F12=Cancel. The bottom status bar shows "MA b" and "14/017".

```
Administrate Utilities Tools List View Help

CICSVR complete recovery

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
S Selective forward recovery

Command ==> _____
F1=Help   F12=Cancel

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

MA b 14/017
```



CICSVR job submission

IBM - snjeds3

Administrate Utilities Tools List View Help

CICSVR job submission

Select one and press Enter.

Submit, edit, or save the recovery job

2 1. Submit the job
 2. Browse the job
 3. Edit the job
 4. Save generated JCL
 5. Return to VSAM sphere list
 6. Return to ISMF

Command ==> _____

F1=Help F12=Cancel

The recovery job has been generated.

Command ==>

F1=Help F3=Exit F4=CompRec F5=FwdRec F6=Backout F7=Bkwd
 F8=Fwd F10=Menu bar F11=Dereg F12=Cancel

MA b A 07/031



CICSVR selective forward recovery job

```

IB - snjeds3
Menu Utilities Compilers Help
BROWSE  CICSVR.PANELS.ISPFILE(DWWBATCH) - 01.00  Line 00000027 Col 001 080
STOPTIME (03.280/11:45:18) -
STARTAT (DSNAME) -
VERSION (024) -
SPHERE (DEMOCICS.CICSVR.EMPLOYEE.INFO)
RECOVER -
ONLY -
APPLYCA -
STARTTIME (03.280/11:45:12) -
STOPTIME (03.280/11:45:18) -
STARTAT (DSNAME) -
VERSION (026) -
SPHERE (DEMOCICS.CICSVR.EMPLOYEE.BENEFITS)
MVSLOG -
NAME (CICSVR.CICSPROD.DFHJ02)
BLDVRP
EXCLUDE TERMID (TRM3)
/*
***** Bottom of Data *****
Command ==> Scroll ==> PAGE
F1=Help F2=Split F3=Exit F5=Rfind F7=Up F8=Down F9=Swap
F10=Left F11=Right F12=Cancel
MA b 22/015
    
```

All spheres that have updates logged on the same forward recovery log are recovered in same job step for efficiency



CICSVR and disaster recovery

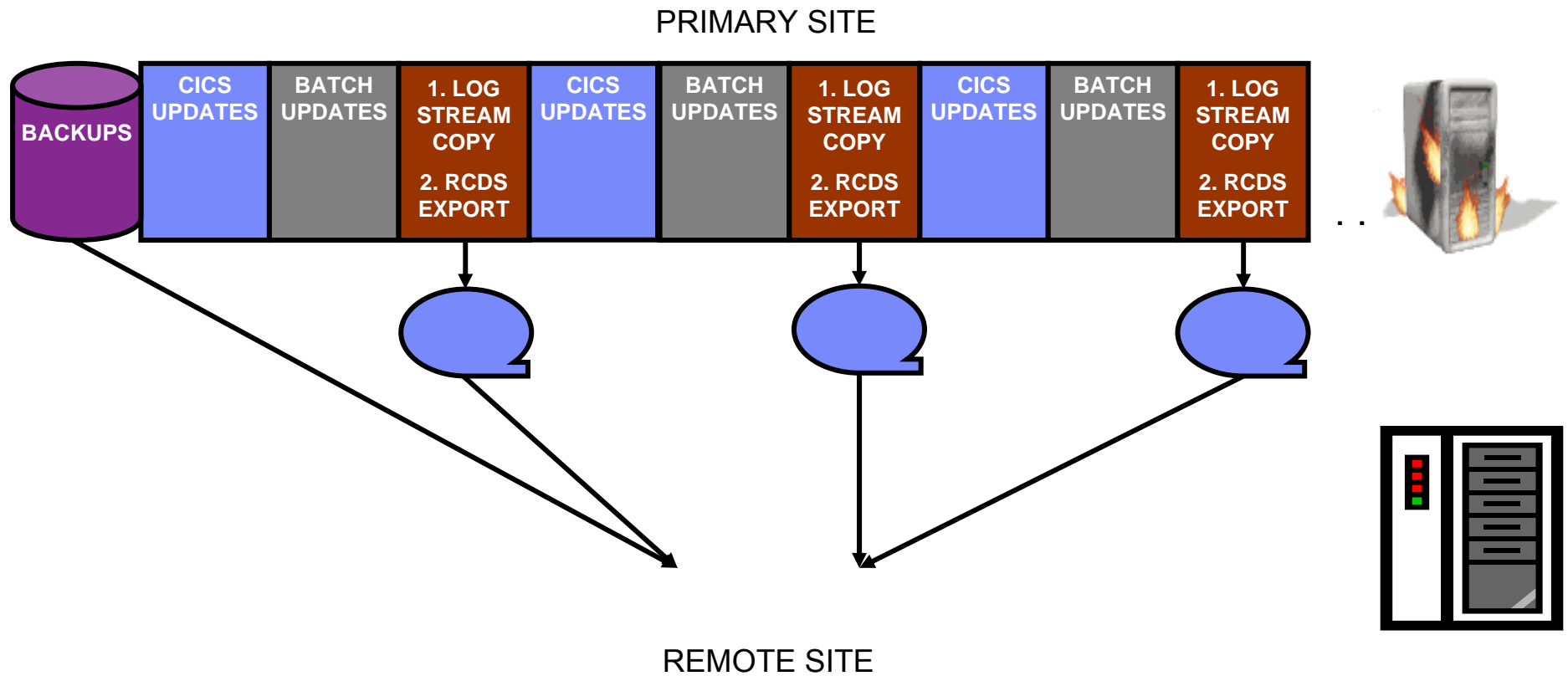
▪ **CICSVR disaster recovery utilities**

- ▶ Log stream copy
 - Create sequential data set copy of a forward recovery log stream
- ▶ RCDS import/export
 - Create sequential data set of essential recovery information
- ▶ Remote site change accumulation (enhancement APAR PQ77805)
 - Create change accumulation data sets for use at a remote recovery site
 - Will accumulate latest unread portion of forward recovery log stream
- ▶ Shadow recovery
 - Maintain updated copies of VSAM spheres at a remote recovery site
 - Batch job set up once and submitted during regular intervals



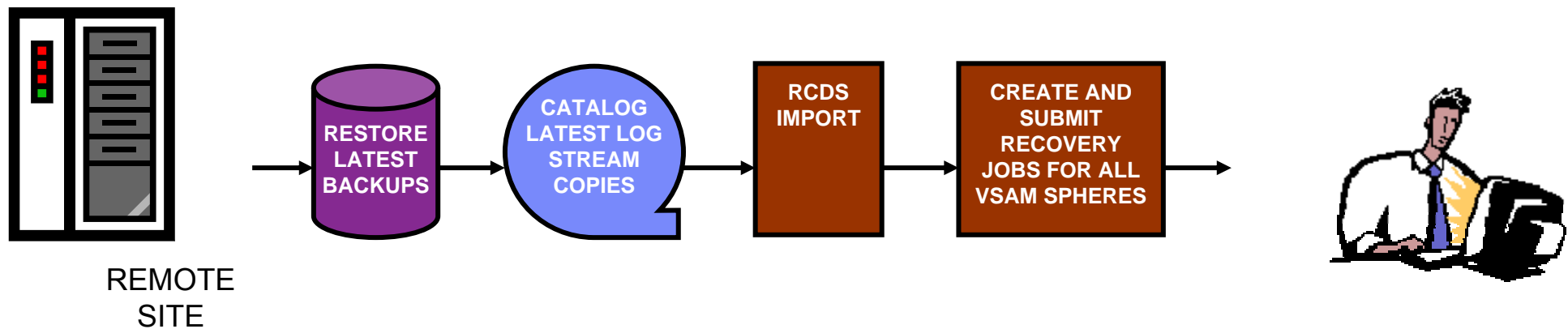
Disaster recovery method 1 - Log stream copies and RCDS import/export

- Primary site actions to prepare remote site for disaster recovery



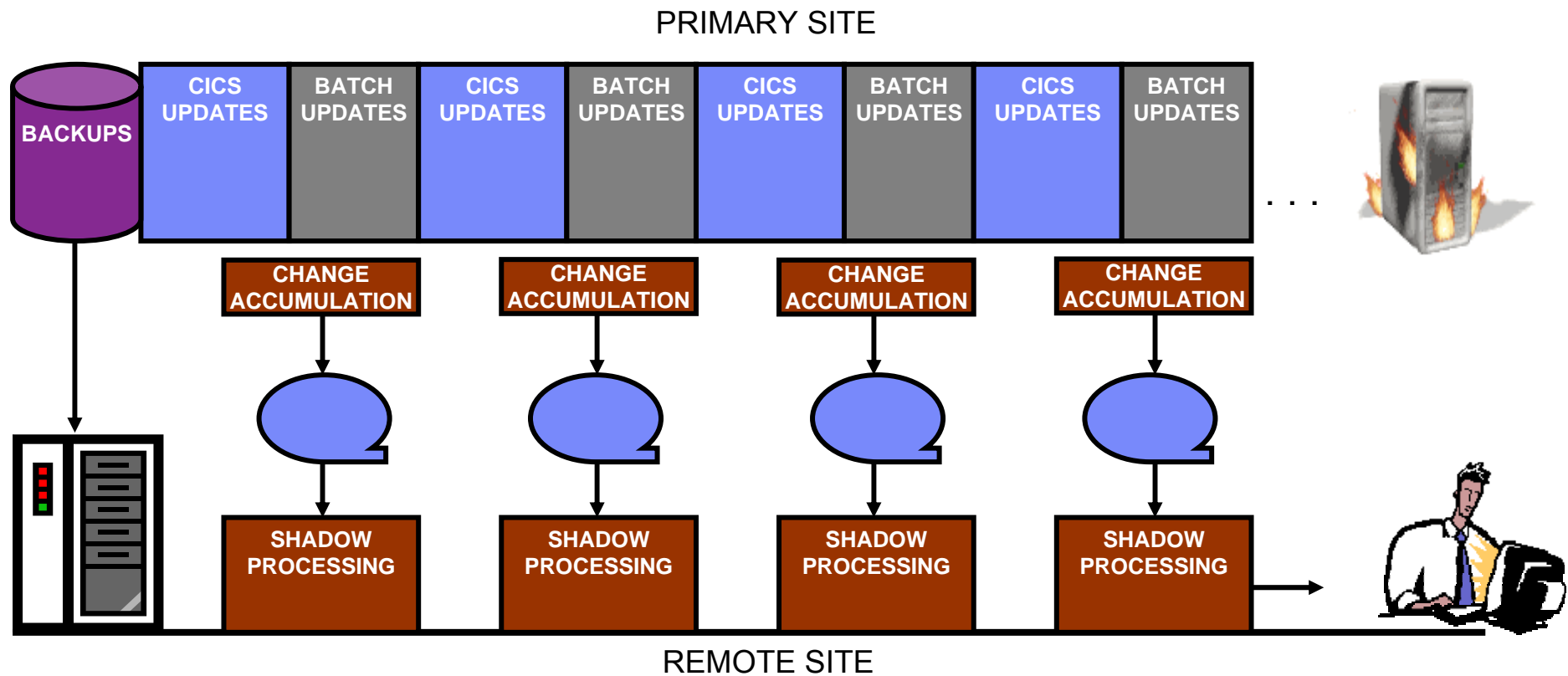
Disaster recovery method 1 - Log stream copies and RCDS import/export contd.

- Actions required at remote site to recover from primary site outage
 - ▶ Recovered VSAM spheres will be as current as the latest log stream copies that were received



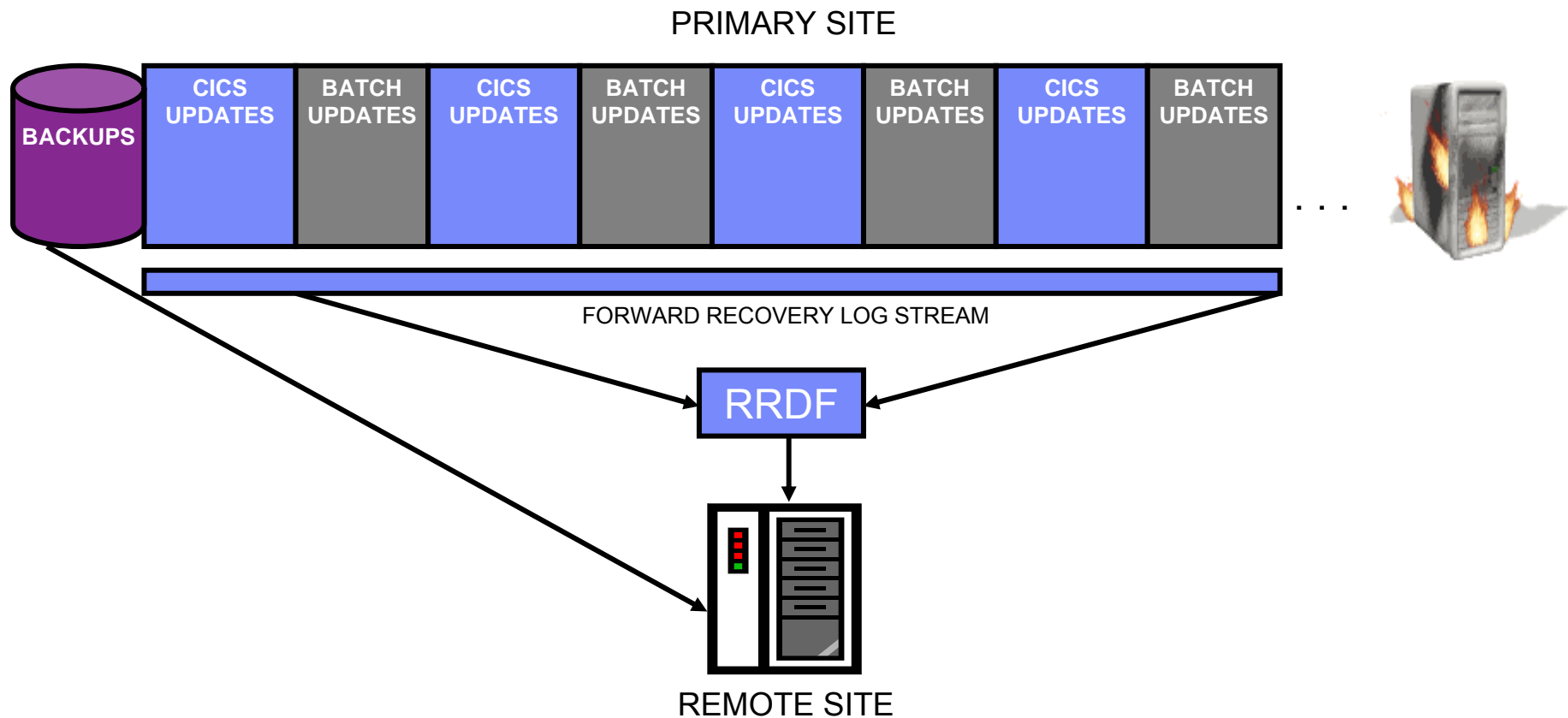
Disaster recovery method 2 – Change accumulation and shadow processing

- Primary and remote site actions to prepare remote site for disaster recovery



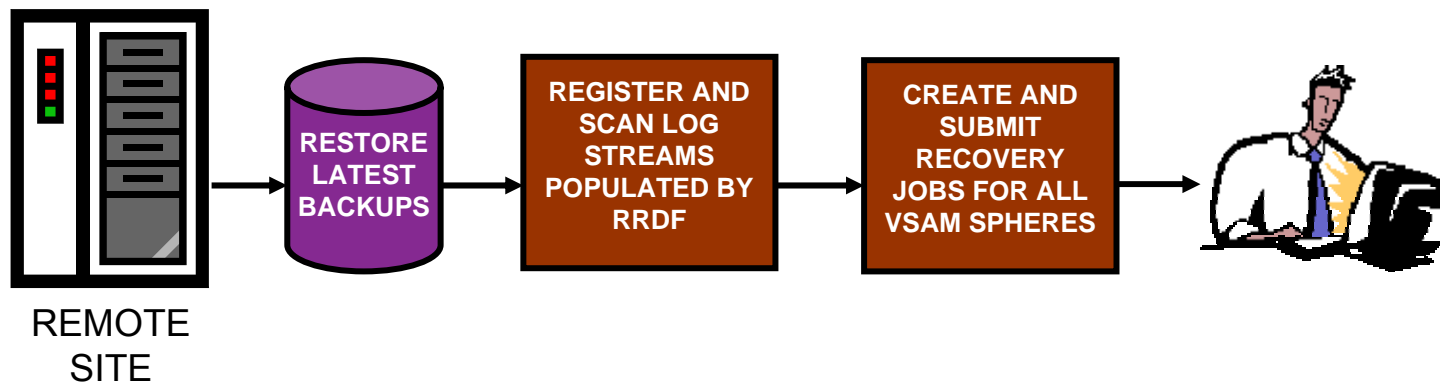
Disaster recovery method 3 – Real time log data transfer

- Primary site actions to prepare remote site for disaster recovery



Disaster recovery method 3 – Real time log data transfer contd.

- Actions required at remote site to recover from primary site outage
 - ▶ Recovered VSAM spheres will be as current as primary site
 - ▶ In this example, remote site log streams are populated by RRDF (Remote Recovery Data Facility)



CICSVR recap

- **Helps automate recovery in the following scenarios**
 - ▶ Recover damaged VSAM files at the primary site
 - ▶ Recover VSAM files in a disaster recovery scenario (at a remote site)
 - ▶ “Logically” recover VSAM files from particular updates
- **Eliminates possible user errors with the ISPF panel interface**
 - ▶ No need to manually track backups, update activity, etc...
- **Reduces recovery time**
 - ▶ Change accumulation consolidates log records
 - ▶ Shadow recovery keeps an updated VSAM sphere copy
 - ▶ Quickly and automatically builds proper recovery job
- **Recovers from updates made by CICS, batch, or both**
 - ▶ CICSVR logs updates made to non-RLS VSAM spheres by batch jobs
- **Fully supports log records written by Transactional VSAM (TVS)**



CICSVR requirements

- **z/OS V1.8 or higher**
- **Coupling facility required for RLS support**
- **Tape or cartridge unit for installation**
- **Supports any CICS TS release**
- **DFSORT V1R14 with APAR PQ42845 to use change accumulation with log records greater than 42,500 bytes**



Collateral

- **Web page**
 - ▶ <http://www.ibm.com/cics/vr>
- **Library page**
 - ▶ http://www-01.ibm.com/software/sw-library/en_US/products/A679298Y02696V31/
- **Documentation**
 - ▶ [CICS VR V4.3: Messages and Problem Determination](#) SC34-6916
 - ▶ [CICS VR V4.3: User's Guide](#) SC34-6917
 - ▶ [CICS VR V4.3: Implementation Guide and Reference](#) SC34-6915
 - ▶ [CICS VR V4.3: Program Directory](#) GI10-2599
- **Redbooks:**
 - ▶ [CICSVR Update for Release 4](#) SG24-7022
 - ▶ [CICSVR Usage Guide](#) SG24-6563
- **CICS VR V4.3 Announcement:**
 - ▶ <http://www-306.ibm.com/common/ssi/fcgi-bin/ssialias?infotype=an&subtype=ca&supplier=897&appname=IBMLinkRedirect&letternum=ENUS208-138>

