



Bringing you Up-to-Date with VSAM in zVSE v4.2

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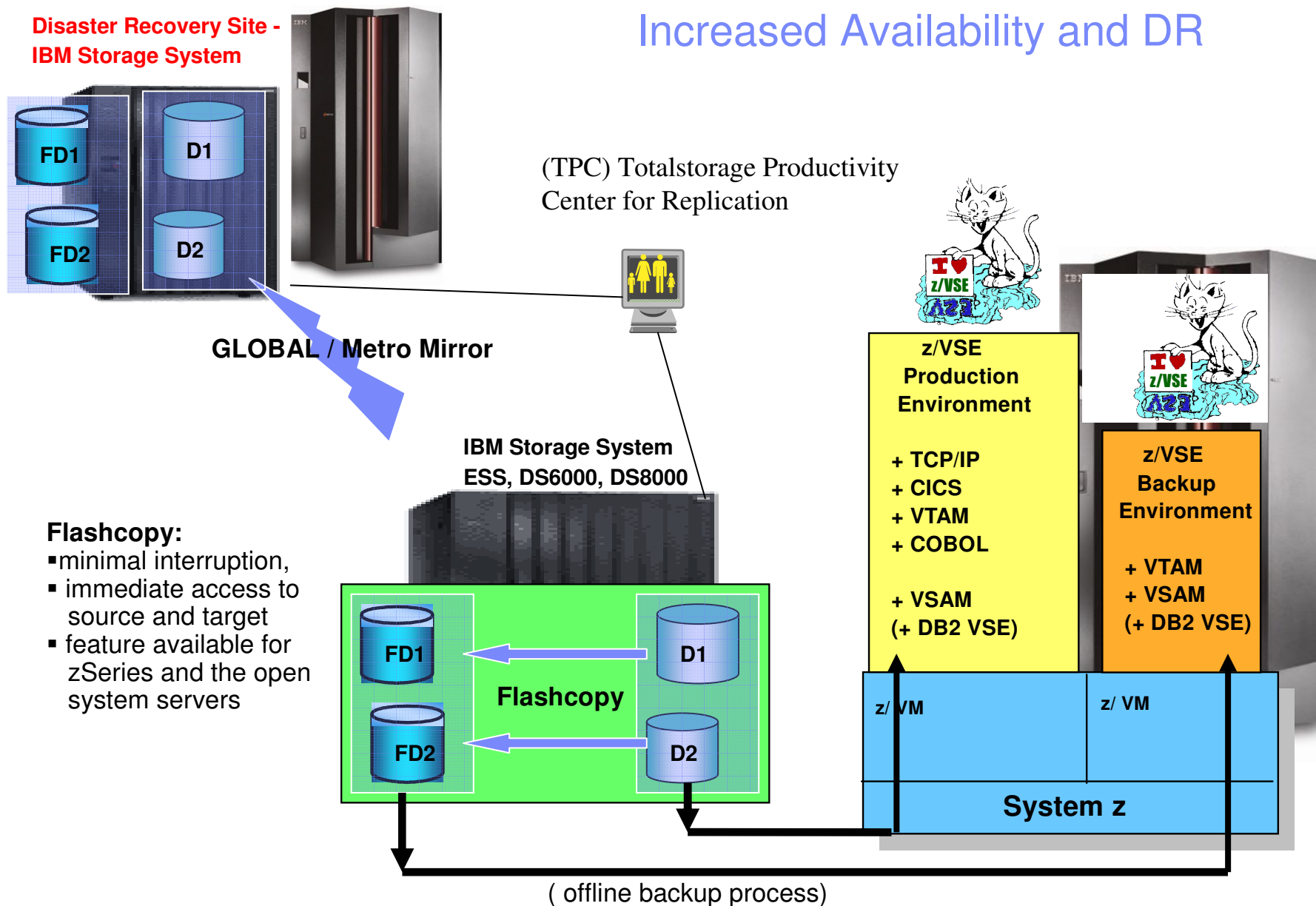
Agenda



- ➔
 - **Enhancements for Flashcopy**
 - **Backup/Restore Enhancements**
 - **Preventing Duplicate Candidate Volumes**
 - **New VSAM internals you should know**
 - **VSAM Meaningful Cluster Names**
 - **New VSAM Extent Prodexit**
 - **Task ID for VSAM Lock requests x'A8'**
 - **VSAM data Encryption / Protection**
 - **New VSAM Redirector enhancements**
 - **AIX Support**
 - **Tools for VSAM**

Disaster Recovery Site - IBM Storage System

Increased Availability and DR



Flashcopy:

- minimal interruption,
- immediate access to source and target
- feature available for zSeries and the open system servers

IDCAMS SNAP command Enhancements

The IDCAMS SNAP command provides an interface to the FlashCopy feature.

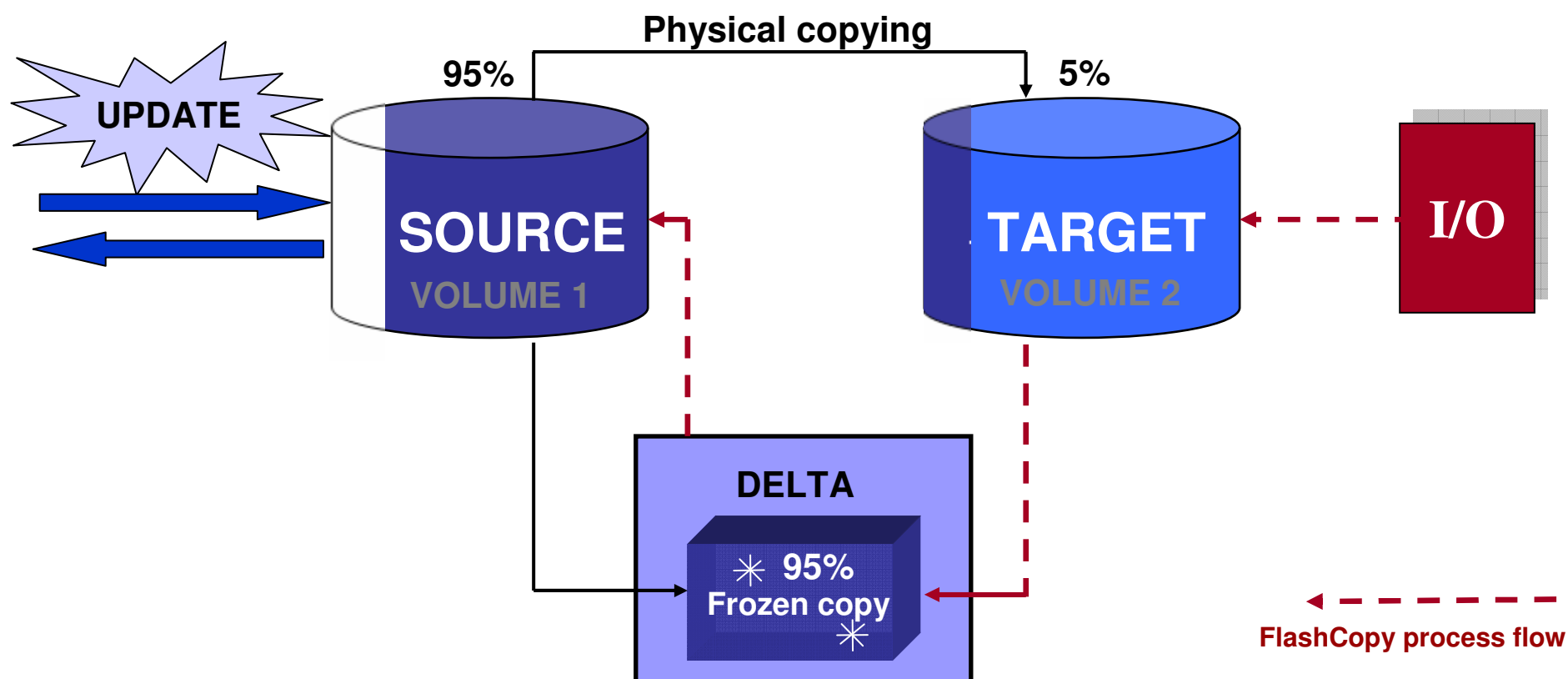
- New **NOCOPY** parameter of the IDCAMS SNAP command creates the FlashCopy. The physical copying of data to target volumes is not performed.
- New **DDSR** parameter of the IDCAMS SNAP command terminates the FlashCopy relation between the source and target volumes and frees the used resources.
- New parameter **COPY** of the IDCAMS SNAP command is now specified explicitly.
- Provided an opportunity to administrate user access rights to the IDCAMS SNAP command using the **Basic Security Manager (BSM)**.



See New Chapter 10, “Performing an IDCAMS SNAP (FlashCopy)”
“VSE/VSAM User’s Guide and Application Programming”.

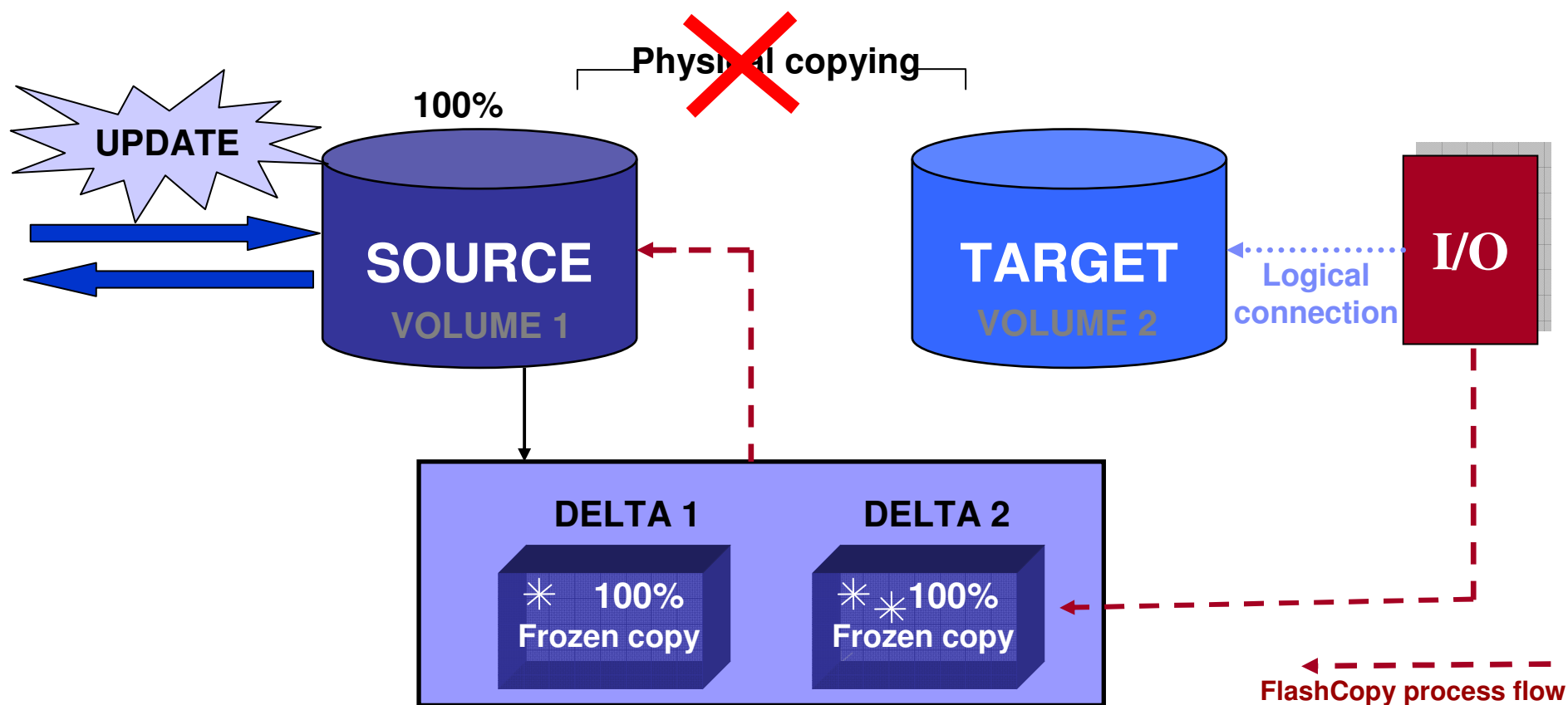
IDCAMS SNAP COPY parameter

Explicit specification of the default COPY parameter of the IDCAMS SNAP command, facilitates referencing to it by other z/VSE components.



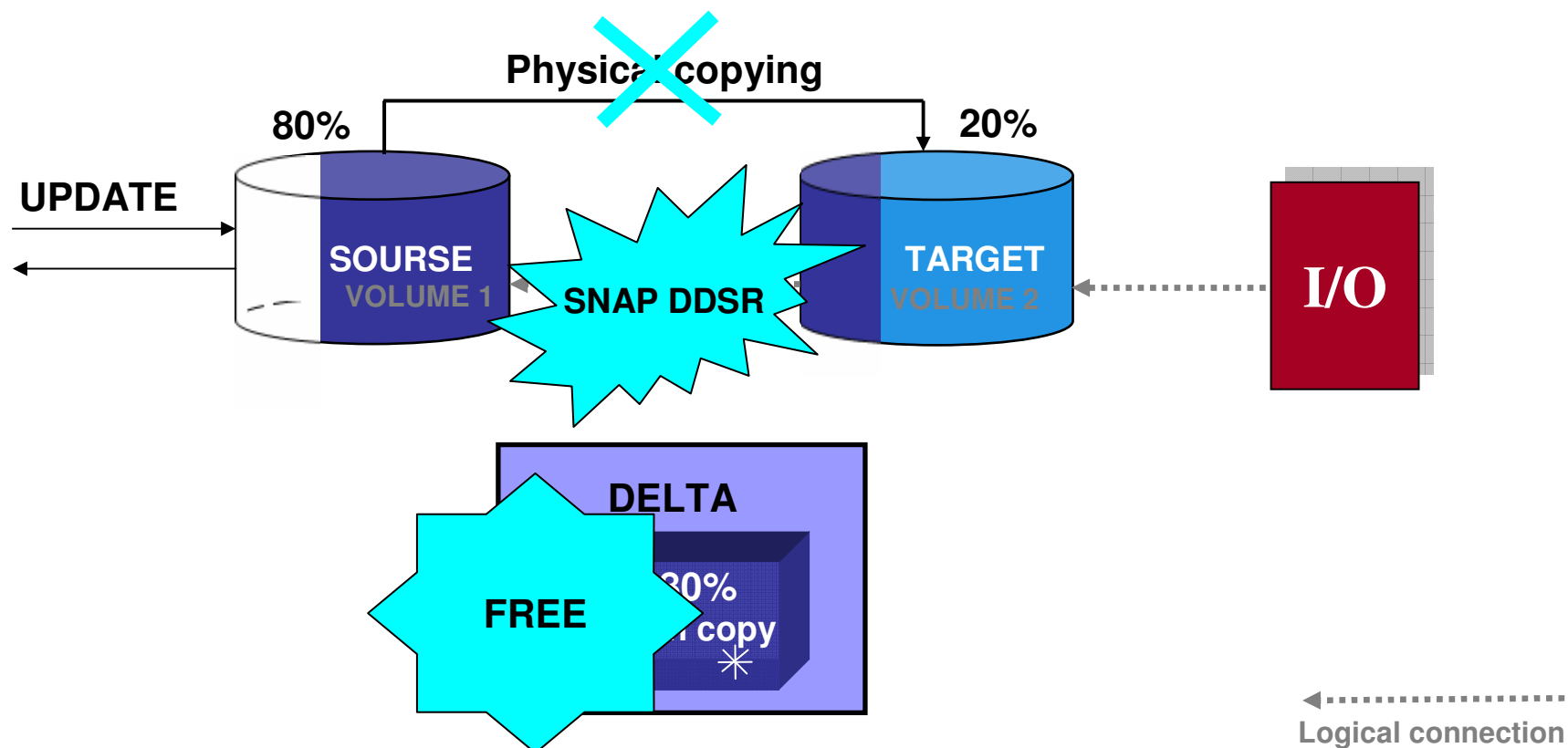
IDCAMS SNAP **NOCOPY** parameter

The NOCOPY parameter of the IDCAMS SNAP command allows the user to eliminate real copying of source volumes to the target volumes for temporary FlashCopy and thus eliminate the superfluous I/O activity.



IDCAMS SNAP **DDSR** parameter

The DDSR (Deleted Data Space Release) parameter of the IDCAMS SNAP command allows the user to delete FlashCopy relations and thus to stop unnecessary managing of a Delta File and to release internal ESS resources as soon as they are no longer needed.



Sample job: SNAP AND VSAM BACKUP

```

// JOB SNAP AND BACKUP FROM SNAPPED VOLUMES
// ASSGN SYS005,180
// DLBL IJSYSUC,'VSESP.SNAP.CATALOG',,VSAM
// EXEC IDCAMS,SIZE=AUTO
/* STEP 1: DO THE SNAPSHOT */
SNAP
    SOURCEVOLUMES (SYSWK1,DOSRES)
    TARGETVOLUMES (SNPWK1,SNPRES)
/* AFTER STEP 1 THE ONLINE SYSTEM MAY BE STARTED */
/* STEP 2: SYNONYM NAME FOR THE SNAPPED CATALOG */-
IMPORT CONNECT OBJECTS ((VSESP.SNAP.CATALOG
    VOLUMES (SNPWK1) DEVT (3390))
    CATALOG (VSAM.MASTER.CATALOG)
/* STEP 3: BACKUP FROM SNAPPED VOLUMES */
BACKUP (*)
    SYNONYMLIST (
        SOURCEVOLUMES (SYSWK1,DOSRES)
        TARGETVOLUMES (SNPWK1,SNPRES)
-
        CATALOG (VSESP.USER.CATALOG)
        SYNONYMCATALOG (VSESP.SNAP.CATALOG) )
/*
/ &

```

Backup with synonym list

```
EXEC IDCAMS
  BACKUP ( ..... ) -
    SYNONYMLIST -
      (SOURCEVOLUMES (SYSWK1, DOSRES)
-
      TARGETVOLUMES (SNPWK1, SNPRES)
-
-
      CATALOG (VSESP . USER . CATALOG)
-
      SYNCAT (VSESP . SNAP . CATALOG) )
```

Sample job: SNAP AND VSAM BACKUP

```

// JOB SNAP AND BACKUP FROM SNAPPED VOLUMES
// ASSGN SYS005,180
// DLBL IJSYSUC, 'VSESP.SNAP.CATALOG',,VSAM
// EXEC IDCAMS,SIZE=AUTO
/* STEP 1: DO THE SNAPSHOT */
SNAP
    SOURCEVOLUMES (SYSWK1,DOSRES)
    TARGETVOLUMES (SNPWK1,SNPRES)
/* AFTER STEP 1 THE ONLINE SYSTEM MAY BE STARTED */
/* STEP 2: SYNONYM NAME FOR THE SNAPPED CATALOG */-
IMPORT CONNECT OBJECTS ( (VSESP.SNAP.CATALOG
    VOLUMES (SNPWK1) DEVT (3390))
    CATALOG (VSAM.MASTER.CATALOG)
/* STEP 3: BACKUP FROM SNAPPED VOLUMES */
BACKUP (*)
    SYNONYMLIST (
        SOURCEVOLUMES (SYSWK1,DOSRES)
        TARGETVOLUMES (SNPWK1,SNPRES)
        CATALOG (VSESP.USER.CATALOG)
        SYNONYMCATALOG (VSESP.SNAP.CATALOG) )
/*
/ &

```

IDCAMS BACKUP produces a normal Backup-Medium for IDCAMS RESTORE

Sample of SNAP COPY, NOCOPY, DDSR

COPY

```

1) SNAP SVOL(VSE222) TARGETVOLUMES(VSE444) COPY NOPROMPT
2) IMPORT CONNECT -
   OBJECTS((COPY.UCAT VOLUMES(VSE444) DEVT(3390))) -
   CAT(VSAM.MASTER.CATALOG)
3) BACKUP (FILE1) BPFIL(BF) SYNONYMLIST( -
   SOURCEVOLUMES(VSE222) TARGETVOLUMES(VSE444) -
   CATALOG(UCAT) SYNCATALOG(COPY.UCAT))
4) RESTORE OBJECTS(FILE1) BPFIL(BF) CAT(UCAT)
SNAP TARGETVOLUMES(VSE444) DDSR NOPROMPT
5) EXPORT COPY.UCAT DISCONNECT

```

NOCOPY

```

SNAP SOURCEVOLUMES(VSE222) TVOL(VSE333) NOCOPY NOPROMPT
IMPORT CONNECT -
  OBJECTS((NOCOPY.UCAT VOLUMES(VSE333) DEVT(3390))) -
  CAT(VSAM.MASTER.CATALOG)
BACKUP (FILE1) BPFIL(BF) SYNONYMLIST( -
  SOURCEVOLUMES(VSE222) TARGETVOLUMES(VSE333) -
  CATALOG(UCAT) SYNCATALOG(NOCOPY.UCAT))
RESTORE OBJECTS(FILE1) BPFIL(BF) CAT(UCAT)
SNAP TARGETVOLUMES(VSE333) DDSR NOPROMPT
EXPORT NOCOPY.UCAT DISCONNECT

```

Note: Release of the relations source-target are done automatically with COPY option, after physical copy complete.

Note: In SNAP, the NOCOPY parameter cannot be specified together with EXCLUDE, NOVSAM or NOEXPIRED

Output of SNAP COPY, NOCOPY, DDSR

COPY

SNAP SVOL(VSE222) TARGETVOLUMES(VSE444) COPY NOPROMPT

IDC32204I RACROUTE RESOURCE NOT PROTECTED OR BATCH SECURITY=OFF
 IDC0935I IXFP/SNAPSHOT FUNCTION COMPLETED SUCCESSFULLY
 IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

IMPORT CONNECT -

OBJECTS((COPY.UCAT VOLUMES(VSE444) DEVT(3390))) -
 CAT(VSAM.MASTER.CATALOG)

IDC0603I CONNECT FOR USER CATALOG COPY.UCAT SUCCESSFUL
 IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

**BACKUP (FILE1) BPFIL(BF) SYNONYMLIST(-
 SOURCEVOLUMES(VSE222) TARGETVOLUMES(VSE444) -
 CATALOG(UCAT) SYNCATALOG(COPY.UCAT))**

IDC01300I BACKUP FILE CREATED ON XX/XX/2008 AT XX:XX:XX
 IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

RESTORE OBJECTS(FILE1) BPFIL(BF) CAT(UCAT)

IDC01301I RESTORE'S BACKUP FILE CREATED ON XX/XX/2008 AT XX:XX:XX
 IDC01304I SUCCESSFUL DEFINITION OF FILE1
 IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

SNAP TARGETVOLUMES(VSE444) DDSR NOPROMPT

IDC32204I RACROUTE RESOURCE NOT PROTECTED OR BATCH SECURITY=OFF
 IDC0935I IXFP/SNAPSHOT FUNCTION COMPLETED SUCCESSFULLY
 IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

EXPORT COPY.UCAT DISCONNECT

IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

NOCOPY

SNAP SOURCEVOLUMES(VSE222) TVOL(VSE333) NOCOPY NOPROMPT

IDC32204I RACROUTE RESOURCE NOT PROTECTED OR BATCH SECURITY=OFF
 IDC0935I IXFP/SNAPSHOT FUNCTION COMPLETED SUCCESSFULLY
 IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

IMPORT CONNECT -

OBJECTS((NOCOPY.UCAT VOLUMES(VSE333) DEVT(3390))) -
 CAT(VSAM.MASTER.CATALOG)

IDC0603I CONNECT FOR USER CATALOG NOCOPY.UCAT SUCCESSFUL
 IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

**BACKUP (FILE1) BPFIL(BF) SYNONYMLIST(-
 SOURCEVOLUMES(VSE222) TARGETVOLUMES(VSE333) -
 CATALOG(UCAT) SYNCATALOG(NOCOPY.UCAT))**

IDC01300I BACKUP FILE CREATED ON XX/XX/2008 AT XX:XX:XX
 IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

RESTORE OBJECTS(FILE1) BPFIL(BF) CAT(UCAT)

IDC01301I RESTORE'S BACKUP FILE CREATED ON XX/XX/2008 AT XX:XX:XX
 IDC01304I SUCCESSFUL DEFINITION OF FILE1
 IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

SNAP TARGETVOLUMES(VSE333) DDSR NOPROMPT

IDC32204I RACROUTE RESOURCE NOT PROTECTED OR BATCH SECURITY=OFF
 IDC0935I IXFP/SNAPSHOT FUNCTION COMPLETED SUCCESSFULLY
 IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

EXPORT NOCOPY.UCAT DISCONNECT

IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

The FLASHCOPY VSAM CATALOG/FILES dialog

The „FLASHCOPY VSAM CATALOG / FILES“ dialog (fastpath 3719) is enhanced to allow user to choose the option to create a FlashCopy of the source volumes on the target volumes

DSF\$SNP2 FLASHCOPY VSAM CATALOG / FILES

Enter the required data and press ENTER.

Enter all entire Source Disk Volumes where the CATALOG and all its Datasets reside and the Target Volumes to which the FlashCopy has to be done.

SOURCE VOLUME 1..... _____	Enter the Volume-id where the CATALOG resides
TARGET VOLUME 1..... _____	Enter the Volume-id to which Flash Copy has to be done
MORE VOLUMES..... 2	Enter 1 to add more volumes. Otherwise, enter 2
COPY/NOCOPY..... 1	Enter 1 to initiate a FlashCopy relation and copy source to target volumes, otherwise, enter 2 to initiate a FlashCopy relation with option NOCOPY.

PF1=HELP 2=REDISPLAY 3=END

Securing IDCAMS SNAP with Basic Security Manager

Administering the usage of the IDCAMS SNAP command can be done with the following Basic Security Manager Facilities:

VSAM.SNAP.COPY for IDCAMS SNAP COPY

VSAM.SNAP.NOCOPY for IDCAMS SNAP NOCOPY

VSAM.SNAP.DDSR for IDCAMS SNAP DDSR

If no BATCH security is enabled in the zVSE system (**SYS SEC=NO**) or it is enabled but no **VSAMSNAP.[COPY|NOCOPY|DDSR] RACROUTE** facility was defined using **BSTADMIN**, then the **IDCAMS SNAP [COPY|NOCOPY|DDSR]** statements are executed as requested but with a warning:

```
IDC32204I RACROUTE RESOURCE NOT PROTECTED OR BATCH SECURITY=OFF
```

If BATCH security is enabled and the corresponding VSAMSNAP Facility has been defined to the BSM, then an ID statement has to be supplied in the job to identify the user.

If at least one of the following is true:

- ✓ the user has at least **READ** access for the corresponding VSAMSNAP Facility related to the issued **IDCAMS SNAP** command,
- ✓ the **VSAMSNAP** Facility is defined with universal access,
- ✓ the supplied user ID is an administrator ID and, therefore, the user has access to all the **BSTADMIN** resources,

then the appropriate **IDCAMS SNAP** function is executed, accompanied by the following message:

```
IDC32200I RACROUTE (AUTH) SUCCESSFUL
```

In all the other cases the requested IDCAMS SNAP function is suspended.

IDCAMS SNAP using the Basic Security Manager

z/VSE administrator enabled to control the usage of the IDCAMS SNAP command.

SAMPLE (z/VSE console):

```
r rdr,pausebg
```

```
0 exec bstadmin
```

```
BG 0000 1S54I PHASE BSTADMIN IS TO BE FETCHED FROM IJSYSRS.SYSLIB
```

```
BG-0000 BST901A ENTER COMMAND OR END
```

everybody is allowed to use SNAP...COPY command

```
0 add facility vsam.snap.copy uacc(read)
```

```
BG 0000 BST904I RETURN CODE OF ADD IS 00
```

```
BG-0000 BST901A ENTER COMMAND OR END
```

everybody is allowed to use SNAP...DDSR command

```
0 add facility vsam.snap.ddsr uacc(read)
```

```
BG 0000 BST904I RETURN CODE OF ADD IS 00
```

```
BG-0000 BST901A ENTER COMMAND OR END
```

nobody is allowed to use SNAP...NOCOPY command

```
0 add facility vsam.snap.nocopy uacc(none)
```

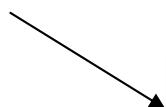
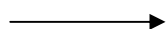
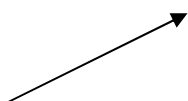
```
BG 0000 BST904I RETURN CODE OF ADD IS 00
```

```
BG-0000 BST901A ENTER COMMAND OR END
```

```
0 end
```

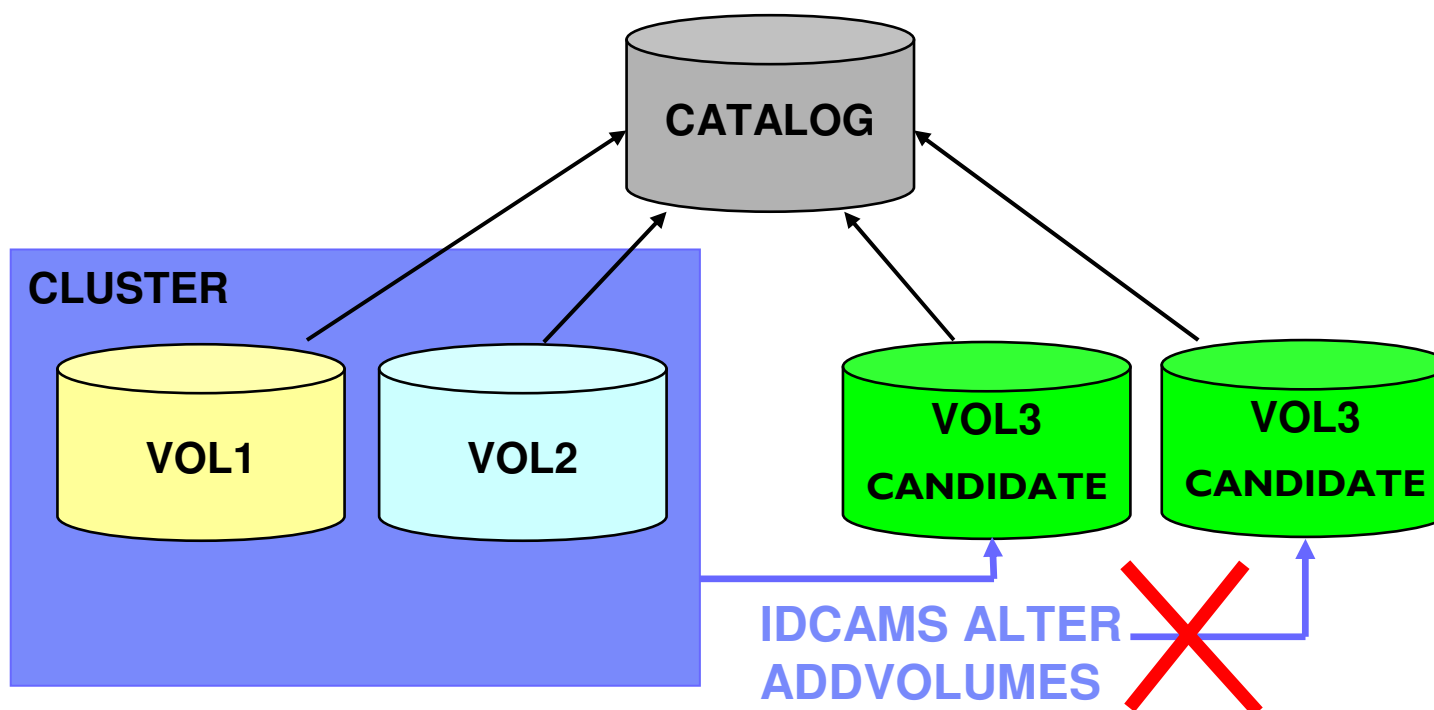
```
BG-0000
```

```
0
```



Preventing Duplicate Candidate Volumes

The IDCAMS ALTER command will allow to add any volume as candidate only once.



New error message

If the candidate volume is already present in the list of object candidate volumes, the request will be rejected with IDCAMS Return Code 60 and new Reason code 40

```
IDC3009I ** VSAM CATALOG RETURN CODE IS nnn - REASON CODE IS IGG0CLxx - mmm
```

Return code	Reason code	Explanation
60	40	Explanation: An attempt was made to add a volume to the object which already has this volume as candidate. Request rejected.



See “z/VSE Messages and Codes Volume 2”.

Agenda



- Enhancements for Flashcopy
- Preventing Duplicate Candidate Volumes
- ➔ ■ Backup/Restore Enhancements
- New VSAM internals you should know
 - VSAM Meaningful Cluster Names
 - New VSAM Extent Prodexit
 - Task ID for VSAM Lock requests x'A8'
- VSAM data Encryption / Protection
- New VSAM Redirector enhancements
 - AIX Support
- Tools for VSAM

Backup/Restore Enhancements

- **Produce cross-reference listings with BACKUP / RESTORE command**
 - Producing cross-reference listings without objects being restored
 - Identification of compressed files in cross-reference listings
 - Identification of empty files in cross-reference listings



Backup/Restore Enhancements

Invocation and Description

VSE/VSAM Backup/Restore provides a new capability to produce cross-reference listings of objects backed up and their place on the tape or disk volumes as a result of the RESTORE command processing.

For a backup file on *tape*, the following two listings are produced:

- *Volume cross-reference listing*
- *Object cross-reference listing*

For a backup on *disk*, the following three listings are produced:

- *Extent cross-reference listing*
- *Object cross-reference listing*
- *Extent list*

Note: Thus, the same set of cross-reference listings are produced by both the BACKUP command and the RESTORE command.

Backup/Restore Enhancements Invocation and Description

NOXREF|XREF|XREFONLY

Specify whether the cross-reference listings are to be produced.

- **NOXREF** specifies that the cross-reference listings will not be produced but objects will be processed.

Abbreviations: NXREF

- **XREF** specifies that both the cross-reference listings will be produced and objects restoration will be performed.

Abbreviations: None

- **XREFONLY** specifies that only the cross-reference listings will be only produced and thus objects restoration will not be performed.

Abbreviations: XREFY

- **Default: NOXREF**

Backup/Restore Enhancements Sample

XREFONLY

RESTORE

```

RESTORE OBJECTS (*) XREFY
IDC01301I RESTORE'S BACKUP FILE CREATED ON XX/XX/2008 AT 13:38:25
IDCAMS SYSTEM SERVICES                                TIME: 13:38:38                XX/XX/2008    PAGE    2

BACKUP EXTENT CROSS-REFERENCE LISTING (BECL)
  EXTSEQ    VOLSER    OBJECT NAME                                OBJECT TYPE    SEGMENT TYPE
  001       WRK002    VSMCKD.KSDS.KEY8.A.C001 .....          KSDS          CMP          ONLY
                                     VSMCKD.KSDS.KEY8.A.C002 .....          KSDS          ONLY
                                     VSMCKD.KSDS.KEY8.A.C003 .....          KSDS          ONLY
                                     VSMCKD.KSDS.KEY8.A.C004 .....          KSDS          ONLY
                                     VSMCKD.KSDS.KEY8.A.C005 .....          KSDS          CMP          EMPTY
                                     VSMCKD.KSDS.KEY8.A.C006 .....          KSDS          CMP          ONLY
                                     VSMCKD.KSDS.KEY8.A.C007 .....          KSDS          CMP          ONLY
                                     VSMCKD.KSDS.KEY8.A.C008 .....          KSDS          CMP          ONLY

IDCAMS SYSTEM SERVICES                                TIME: 13:23:45                XX/XX/2008    PAGE    3
  
```

Backup/Restore Enhancements Sample

BACKUP OBJECT CROSS-REFERENCE LISTING (BOCR)

OBJECT NAME	OBJECT TYPE	EXTSEQ	VOLSER	SEGMENT TYPE
VSMCKD.KSDS.KEY8.A.C001	KSDS	CMP 001	WRK002	ONLY
VSMCKD.KSDS.KEY8.A.C002	KSDS	001	WRK002	ONLY
VSMCKD.KSDS.KEY8.A.C003	KSDS	001	WRK002	ONLY
VSMCKD.KSDS.KEY8.A.C004	KSDS	001	WRK002	ONLY
VSMCKD.KSDS.KEY8.A.C005	KSDS	CMP 001	WRK002	EMPTY
VSMCKD.KSDS.KEY8.A.C006	KSDS	CMP 001	WRK002	ONLY
VSMCKD.KSDS.KEY8.A.C007	KSDS	CMP 001	WRK002	ONLY
VSMCKD.KSDS.KEY8.A.C008	KSDS	CMP 001	WRK002	ONLY

IDCAMS SYSTEM SERVICES TIME: 10:10:06 XX/XX/2008 PAGE 4

BACKUP EXTENT LIST

EXTSEQ	VOLSER	LOW LIMIT	HIGH LIMIT
001	WRK002	00010005	0043000E

DISK ADDRESS LAST USED : 000100050B

IDCAMS SYSTEM SERVICES TIME: 10:10:06 XX/XX/2008 PAGE 5

IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

Restore Cross Reference Listing

- The Restore VSAM File dialog (fastpath 3714) is enhanced to allow user to choose the option to produce cross-reference listings of objects backed up and their place on the tape or disk volumes as a result of the RESTORE command processing.

A new section has been introduced in the following **UI dialog: Fastpath 3714**

```

DSF$RES1                                RESTORE VSAM FILE

Enter the required data and press ENTER.

CATALOG TYPE..... 3                    Enter 1 to restore into the
                                         MASTER catalog, or enter 2 to
                                         restore into a USER catalog, or enter
                                         3 to restore MULTIPLE catalogs.

Enter the identification of the user catalog if you specify 2 for USER in
the CATALOG TYPE field.

_____

RESTORE ALL..... _                      Enter 1 to restore EVERYTHING from
                                         your backup file. Otherwise enter
                                         2 to restore SELECTED files only.

INPUT MEDIUM..... 2                     Enter 1 for DISK or 2 for TAPE or
                                         3 for Virtual Tape.

XREFERENCE LISTINGS..... 2           Enter 1 to restore objects or 2 to
                                         produce cross-reference listings or
                                         3 to do both.

```

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VSAM Meaningful Clusternames

If not specified explicitly by the user, meaningful cluster names are now generated by VSAM for AIX/Cluster data and index component.

The generated data component and index component names will use:

- the specified clustername + **.DATA** or **.D** for the data component
- the specified clustername + **.INDEX** or **.I** for the index component

Old VSAM generated names

Up to now, VSAM generated the 44-characters name of the data and index components using the following data:

- the current value of bits 0-55 of the time-of-date (TOD) clock at the moment of the name creation,
- the year and the day of creation,
- inserting in the name some constants and the period signs.

Example of the OLD NAME Format:

part 1	part 2	part 3	part 4	part 5
T99EFB7B.	VSAMDSET.	DFD08086.	TC05B8EF.	T99EFB7B

The TOD clock value (bits 0-63) stored by STCK instruction: C05B8EF9 9EFB7B40

New VSAM Meaningful Clusternames

- **If the last qualifier of the name is CLUSTER : CLUS.TESTNAME.CLUSTER**

Generated data name = CLUS.TESTNAME.**DATA**

Generated index name = CLUS. TESTNAME.**INDEX**

- **If the cluster name <= 38 characters : DEPTABC.TEST.INFO**

Generated data name = DEPTABC.TEST.INFO.**DATA**

Generated index name = DEPTABC.TEST.INFO.**INDEX**

- **If the cluster name is between 39 and 42 characters inclusive :
DEPTABCD.RESOURCE. ABCDEFGH.DATA1234.STUFF**

Generated data name = DEPTABCD.RESOURCE.ABCDEFGH.DATA1234.STUFF.**D**

Generated index name = DEPTABCD.RESOURCE. ABCDEFGH.DATA1234.STUFF.**I**

- **If longer than 42 characters, and the last qualifier is not CLUSTER :**

COMPANY.DEVISION.DEPT.DLREPORT.DECADE.MONTH

Generated data name = COMPANY.DEVISION.DEPT.DLREPORT.**D99EFB7B**

Generated index name = COMPANY.DEVISION.DEPT.DLREPORT.**I1A12FAE**

VSAM Meaningful Clusternames

Note:

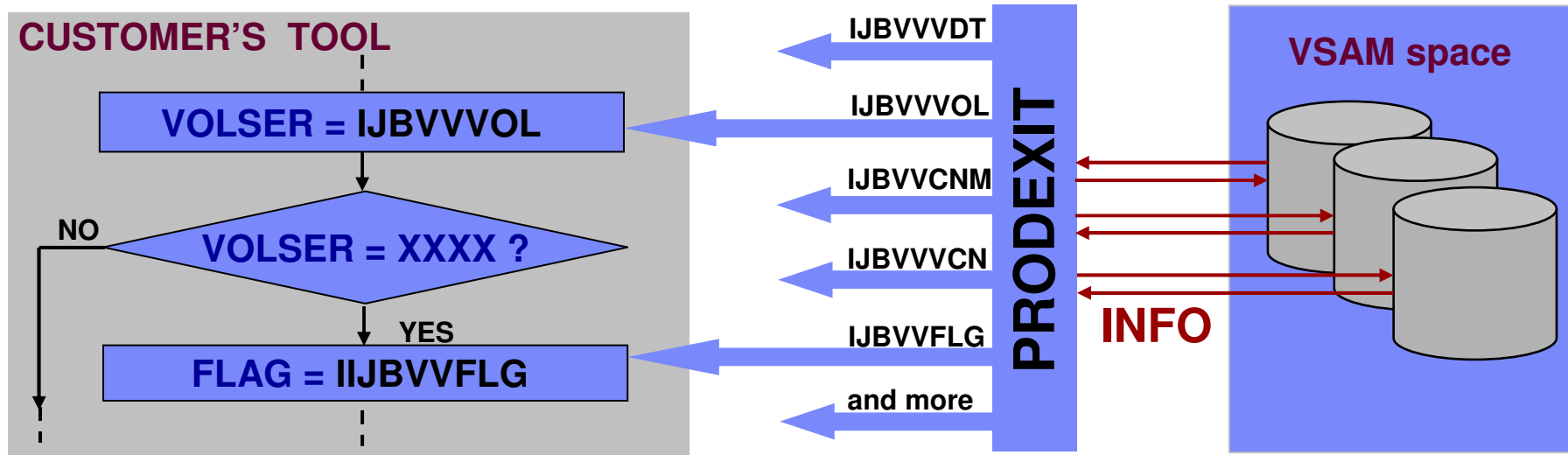
- In 4.2 the name of DATA and INDEX portion generated by VSAM is always the same
- In releases before the name for DATA and INDEX portion generated by VSAM was always a different one because of the timestamp
- This may affect your IDCAMS ALTER / REDEFINE strategy since ALTER of the Base Cluster name is no longer enough in order to redefine a VSAM Cluster

New VSAM Extent PRODEXIT

- New IJBVVEXU VSAM PRODEXIT allows monitoring of allocations of VSAM data space extents and the suballocation of VSAM cluster extents.

Advantages:

- The PRODEXIT provides to the customers facilities to create his own tools to monitor VSAM events and optimize DASD space usage.



New VSAM Extent PRODEXIT

SAMPLE OUTPUT:

```
BG 0000 VEXU: 10 VSE300 0000000F 00000087 UCAT          DEFINE CATALOG
BG 0000 VEXU: 00 VSE300 0000000F 0000004B UCAT          VSAM.CATALOG.B
BG 0000 VEXU: 10 VSE300 00000096 000005DC UCAT          DEFINE SPACE
BG 0000 VEXU: 00 VSE300 00000096 0000012C UCAT          SAMESDS.DATA
BG 0000 VEXU: 80 VSE300 00000096 0000012C UCAT          SAMESDS.DATA
BG 0000 VEXU: 90 VSE300 00000096 000005DC UCAT          DELETE SPACE
BG 0000 VEXU: 90          FFFFFFFF FFFFFFFF UCAT          DELETE CATALOG
```



Please find the information about macros for PRODEXITs in “Preparing a product for VSE”.

<http://publibz.boulder.ibm.com/epubs/pdf/iespve10.pdf>

Updated with 4.2.1 Refresh

Task ID for VSAM Lock requests

- For VSAM X'A8 Lock requests the task id of the owner of the lock will be returned in case the lock cannot be acquired because the resource is locked already by another task.

Advantages:

- This information will help to find the reason for locked tasks without the necessity to use the LOCKTRACE on all VSAM locking activities.

Examples:

Trying to open a file, which is already in use within 1 VSE system:

```
Y2 0047 4228I FILE OPEN ERROR X'A8'(168) CAT=IJSYSCT  
(OPNH1-45) FILE ALREADY OPEN IN ANOTHER PARTITION, RC X'04' TASK X'0020'
```

Trying to open a file, which is locked on a different VSE system (shared system):

```
Y1 0045 4228I FILE OPEN ERROR X'A8'(168) CAT=  
(OPNH1-45) FILE ALREADY OPEN IN ANOTHER PARTITION, RC X'04' TASK X'FFFF'
```

Reusable XXL VSAM cluster

**Extended VSAM Support for KSDS XXL
(EXTRALARGEDATASET) files**

**Support of REUSEABLE files as KSDS to go over
the 4 gigabyte limitation.**

Example:

```
// EXEC IDCAMS,SIZE=AUTO
DEFINE CLUSTER
....
XXL or EXTRALARGEDATASET
...
REUSE
/*
```

VSAM data Encryption / Protection

z/VSE V4.2 Additional Enhancements

Planned availability: July 17, 2009



- **Parallel Access Volume (PAV)** feature of System Storage series DS8000 and DS6000
 - ▶ I/O performance improvements
- **IBM DS8000 Full Disk Encryption**
 - ▶ Highest security for business-critical data
- IBM Virtualization Engine TS7700 Release 1.5 including support for the **TS7720 virtual tape system**
 - ▶ Support includes disk-only virtual tape systems with up to 70 TB of disk cache
- Encryption Facility for z/VSE V1.2 supporting the **OpenPGP** format
 - ▶ Flexible and highly secure data exchange with business partners and peers
- **IBM Rational COBOL Runtime** for z/VSE V7.5
 - ▶ Execute modern **Enterprise Generation Language (EGL)** developed with **Rational Business Developer**
- **IBM WebSphere MQ** for z/VSE V3.0
 - ▶ Improved interoperability on distributed and mainframe platforms

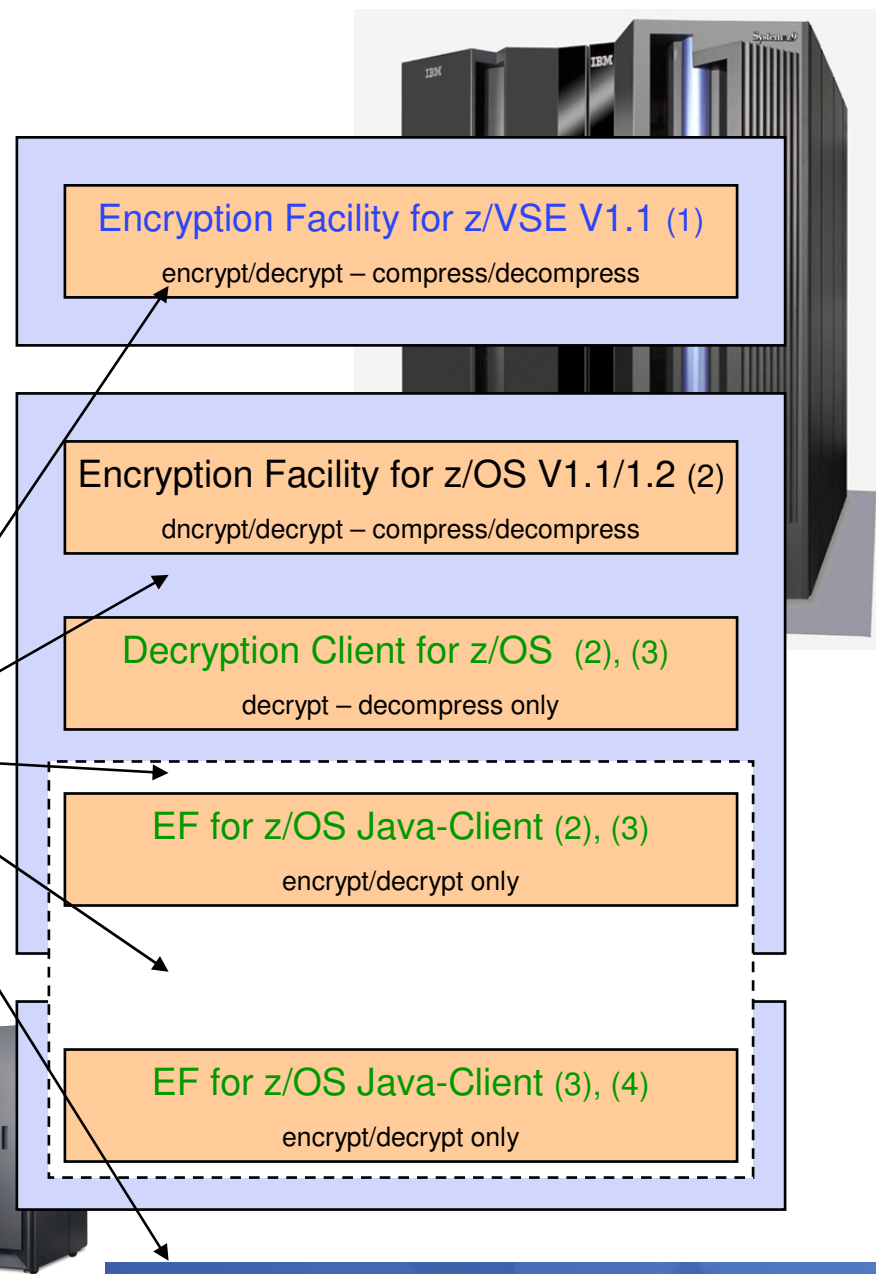
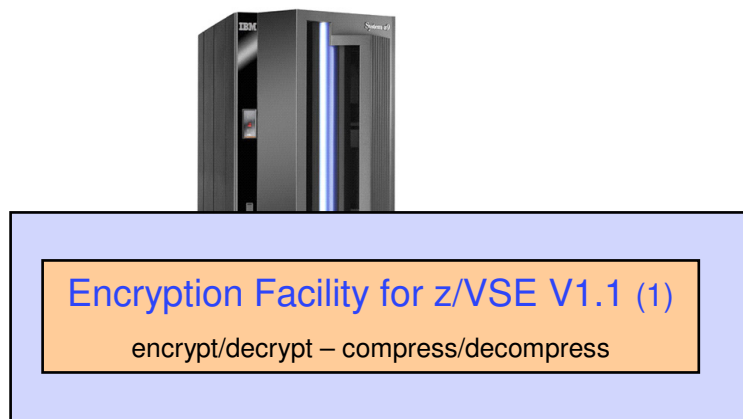
Agenda



- **Enhancements for Flashcopy**
- **Preventing Duplicate Candidate Volum**
- **Backup/Restore Enhancements**
- **New VSAM internals you should know**
 - **VSAM Meaningful Cluster Names**
 - **New VSAM Extent Prodexit**
 - **Task ID for VSAM Lock requests x'A8'**
- ➔ ■ **VSAM data Encryption / Protection**
- **New VSAM Redirector enhancements**
 - **AIX Support**
- **Tools for VSAM**

VSAM data Encryption / Protection

z/VSE V4.2 tool:
Encryption Facility for z/VSE V1.1



Note 1: z10 EC, z9 EC, z9 BC, z990/890

Note 2: z10 EC, z9 EC, z9 BC, z990/890, z900/800

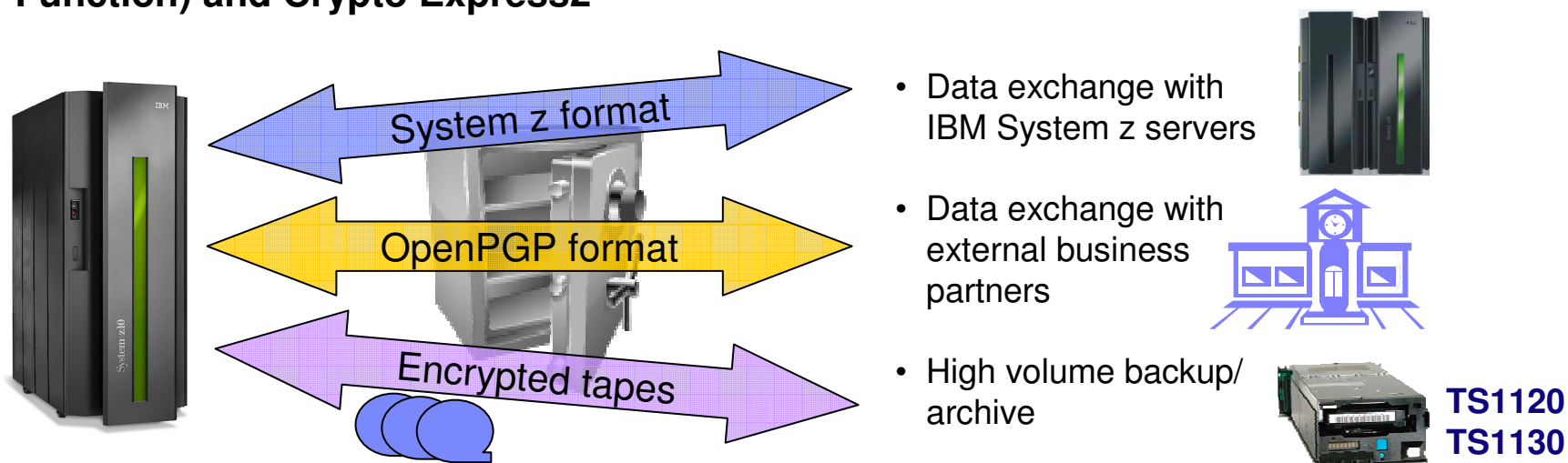
Note 3: No charge, downloadable from web

Note 4: Any Java-capable platform

VSAM data Encryption / Protection

Encryption Facility for z/VSE V1.2 (EF)

- **OpenPGP**
 - ▶ Complies with selected OpenPGP standard (RFC 4880) requirements
 - ▶ Encryption of SAM files, VSE/VSAM files, VSE library members, tapes, or virtual tapes
- **Choice of two formats:**
 - ▶ System z format (introduced with EF for z/VSE V1.1) - compatible with EF for z/OS
 - ▶ OpenPGP - compatible with other products that are OpenPGP-compliant
- **EF is an optional priced feature for VSE Central Functions V8**
 - ▶ Requires z/VSE V4.1 or later
 - ▶ MWLC-eligible
- **Exploits hardware encryption technology: CPACF (CP Assist for Cryptographic Function) and Crypto Express2**

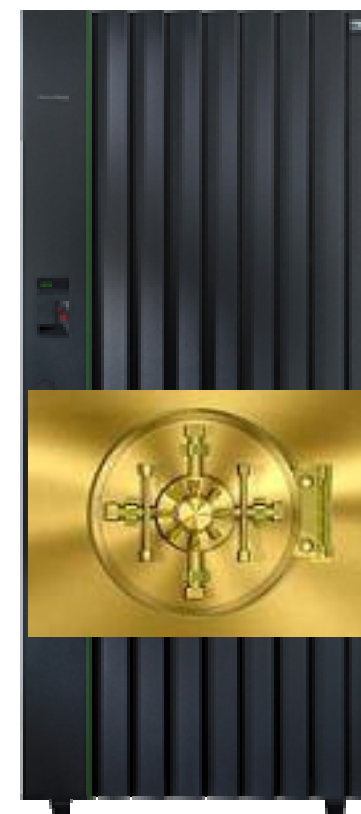


VSAM data Encryption / Protection

Full Disk Encryption on DS8000

- **Encrypted data on DS8000 series storage controller**
 - ▶ Capability to install encrypted 146 GB, 300 GB, and 450 GB 15,000 rpm Fibre Channel drives
 - ▶ Full Disk Encryption drive sets are optional to DS8000 series
 - ▶ Available only as plant order
 - ▶ Transparent to applications
 - ▶ Can be used by z/VSE V3.1 or later

- **Helps to mitigate the threat of**
 - ▶ **Theft**
 - ▶ **Data-mis-management**
 - ▶ **Loss of critical data**



VSAM data Encryption / Protection

IBM System Storage TS7700 Virtualization Engine Release 1.5

- **TS7720 is a new member of IBM's family of virtualization products**
 - ▶ Virtual tape system designed for use in a mainframe environment
 - ▶ Tape Volume Cache capacity up to 70 TB but without a physical tape library for back-end processing
- **TS1130 Model E06 and Model EU6 Tape Drive support**

The TS7700 Virtualization Engine tape solution is well suited for

- ▶ **Disaster recovery**
- ▶ **Data consolidation**
- ▶ **Data protection**
- ▶ **Data sharing**



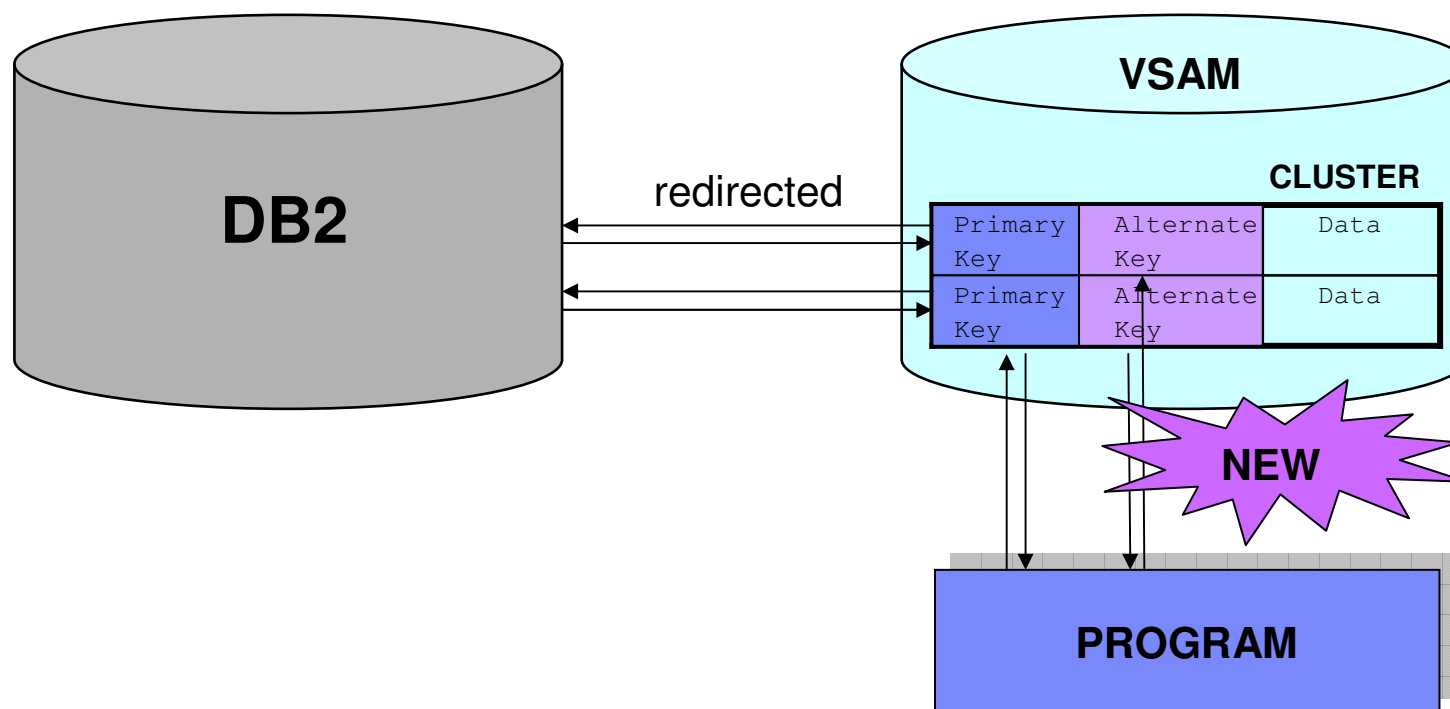
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- ➔ ■ **New VSAM Redirector enhancements**
 - **AIX Support**
- **Tools for VSAM**

New VSAM Redirector AIX Support

- VSE/VSAM redirector provides the capability to perform output requests to redirected KSDS cluster over the PATH using AIX.



New VSAM Redirector AIX Support

To perform output requests to redirected KSDS cluster over the PATH using AIX, user should perform the following tasks:

1. **DEFINE and BUILD AIX right after loading cluster with DUMMY record**
2. **Indicate AIX key field in the MAP file for redirected cluster**
3. **Point AIX key field while creating DataBase Tables (Create DBTables program 'create.bat')**

Mapname: **TSTKSDS**
Catalog: **CATNAME**
Cluster: **CLUSNAME**
System: **VSEXXX**

Fieldname	Type	Offset	Length
prefix	STRING	0	4
aix1	STRING	0	6
key	STRING	4	8
aix2	STRING	9	3
suffix	STRING	12	28

New VSAM Redirector AIX Support

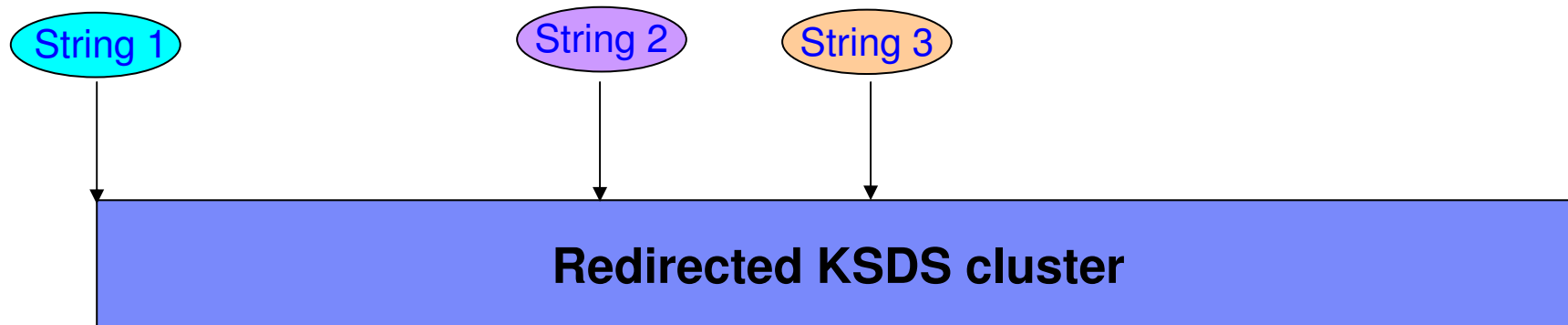
- Support of concurrent access with multiple strings to Redirected KSDS clusters is provided (over base cluster or path).

Advantage:

User is capable to keep separate positioning information for each string.

Notes:

- User should specify the number of strings with STRNO parameter of ACB macro.
- MAX 255 strings.
- User can not use primary and AIX at the same time.



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 - **AIX Support**
- ➔ ■ **Variety of VSAM usage and tools**

Do you know the VSAM tools ..

VSAM interface tools

➤ **IKQCPRED**

Compression prediction tool before the use of compressed VSAM cluster

➤ **IDCONS**

Interactive console interface to IDCAMS

➤ **VSAMIO**

REXX / VSE Interface for VSAM data manipulation

IDCAMS maintenance tools

➤ **IKQVDU:**

VTOC maintenance, VSAM ownership bit, volume scratch

➤ **IKQVEDA:**

Trace facility for VSAM

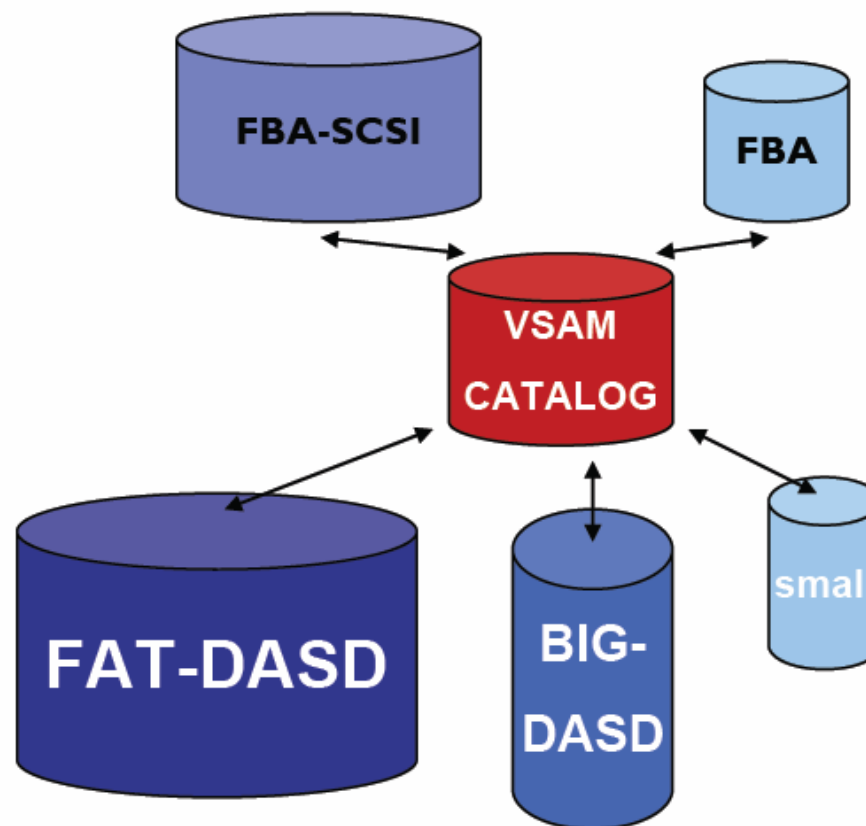
➤ **IKQVCHK:**

Catalog Consistency Checker

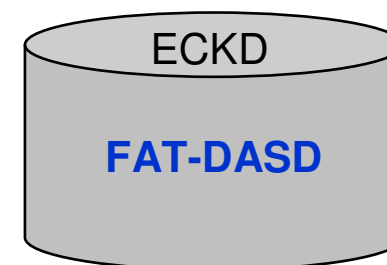
➤ **RECMAP**

IDCAMS tool to define the structure of a VSAM record for e-business connectors

VSAM DASD types and limits



VSAM Limits – FAT-DASD



- 123 Extents per data component & 123 Extents per Index component
- 123 Volumes per data component & 123 Volumes per Index component
- UNIQUE, REUSEable files & catalogs only 16 Extents & 16 Volumes
- 4.3 GB (X'FFFFFFFF') RBA for ESDS, SAM-ESDS, RRDS, VRDS and AIX
- 289 GB for XXL Datasets but only KSDS data component!!
- 32Kmax CISIZE for data component = max Recordsize without SPANNED
- 8Kmax CISIZE for index component
- 16 million records per EXTENT & allocation in RECORDS (important for Backup/Restore)
- data+index = max 16million records
- 4999 Cylinders or 8.388.096 blocks prim/sec allocation for CATALOGs (in z/VSE V4.1 and newer)
- **Migration from 3390 mod3 to Large-/BIG-/FAT-DASD using BACKUP/RESTORE can cause problems, because key length and CISIZE dependencies on the larger ECKD devices.**

VSAM limits – Fat-DASD

- 16 Volumes used from DEFAULT-MODEL
- NO IMBED, NO RECOVERABLE CATALOGs

FAT-DASD/BIG-DASD limitations

- Key length between 7-35 require min data CISIZE of 1024
- Key length between 36-55 require min data CISIZE of 2048
- Key length greater then 55 require min data CISIZE of 4096
- Define Catalog DEDICATE on a BIG-or FAT-DASD only on empty disk with VTOC at first or last Cylinder
- MIN allocation = 1 Cylinder
- MIN & MAX CA Size = 1 Cylinder except SPANNED recordsize limit

VSAM limits for DASDs

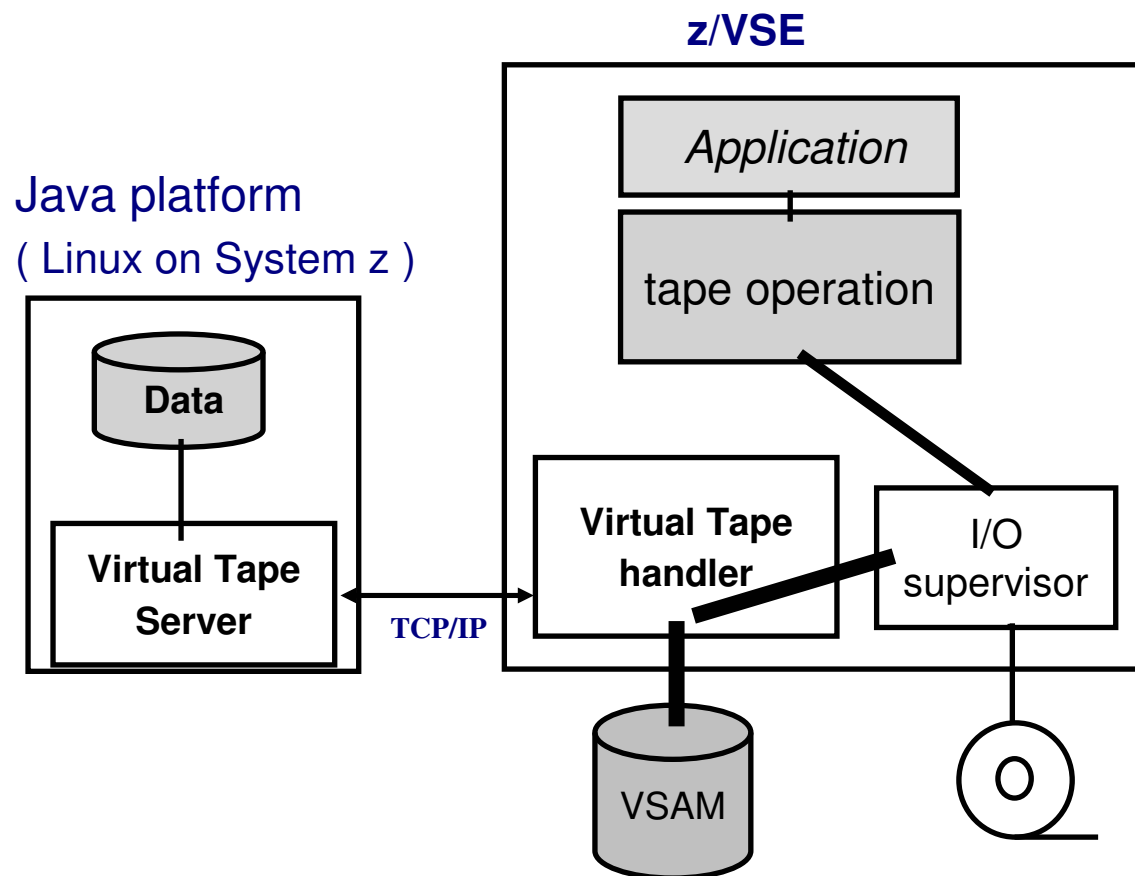
ECKD

MODEL	VSAM Capacity	Bytes/Cylinder	VSAM Classification
3380	max 2655 cylinders	712140	Small DASD
3390 mod 3	max 3339 cylinders	849960	Small DASD
3390 mod 9	max 10017 cylinders	849960	BIG-oder FAT-DASD
3390 mod 27 / DS8000	max 65520 cylinders	849960	BIG-oder FAT-DASD

SCSI- FBA

MODEL	Capacity in Blocks	Capacity in Bytes	VSAM Classification
Generic FBA	491.520 FBA blocks	2 Gigabyte	FBA
FBA-SCSI	33.553.920 FBA blocks	16 Gigabyte	FBA-SCSI

z/VSE Virtual Tape support



- ▶ **simulates a real tape (tape operation supported)**
- ▶ **transparent for applications**

VSE Navigator: Windows-like VSE Interface

The screenshot displays two windows from the VSE Navigator application. The left window, titled 'VSE Navigator - vse41PDT', shows a tree view of system components. A context menu is open over the 'vse41PDT' component, listing various actions such as 'Connect', 'Cut', 'Copy', 'Paste', 'Delete', 'Refresh', and 'Configure Host...'. The right window, titled 'VSE Navigator - VSEFRAN2', displays a table of store data. A context menu is open over a 'MAP2' entry in the table, listing actions like 'Display VSAM data', 'Export displayed data', 'Cut', 'Copy', 'Paste', 'Delete', 'Refresh', 'Rename', 'Add ...', 'Change map definition', 'Create view definition', 'Upload CSV data...', and 'Export map to XML'.

STOREID	STORENAME	LOCSTREE
000002	Hotel Sacher	Hauptstr. 66
000003	Hugo	Hauptstr. 17
000010	Cafe Mueller	MARIENPLATZ 15
000011	McDonalds	Main Street 6
000012	Cafe Howard	Harbor Road 7
000014	Cafe Dehaene	RUE DE SOL 4
000015	Cafe Stojanow	Main Street 6
000016	Cafe Chretien	Main Street 8
000018	Cafe Rasmussen	Main Street 18
000019	Cafe Lipponen	Main Street 77
000020	Cafe Jospin	Champs Elysees 66
000021	Cafe Simitis	Akropolis
000022	Strauss	Spiegelgasse 8
000023	Cafe McAleese	Main Street 2
000024	Cafe Aldo Moro	Main Street 5
000025	Cafe Jean	Main Street 6
000026	Cafe Kok	Main Street 8
000027	Cafe Harald V	Main Street 9
000028	Cafe Guterres	Main Street 5
000029	Cafe Kucan	Main Street 78
000030	Cafe Juan Carlos	Main Street 12
000031	Cafe Zampino	Main Street 1
000032	Cafe Car Gustav	Main Street 5
000033	Cafe Demirel	Main Street 12
000034	Cafe Blair	Downing Street 10
000035	Cafe Clinton	White House 3
000036	Cafe Woddy Allen	Wall Street 6
000037	IBM Cafeteria	South Road
000038	Cafe Gates	Main Street 18
000039	Cafe Diegel	Main Street 77
000040	Cafe Hemigway	Harbor Road 4
010002	INGO FRANZKI	Reeperbahn 623
100002	INGO FRANZKI	Reeperbahn 623
111102	Hotel Sacher	Hauptstr. 13sdfsfd
111111	Hotel Sacher	Hauptstr. 134
123456	Hotel Sacher	HAUPTSTR. xxx
123457	Hotel Sacher	Hauptstr. 13

Maptool – to map VSAM structure

- VSAM data mapping
- mapping stored on VSE in a special VSAM file
- access from Java or JDBC interface

Import map from COBOL copybook

Record in tree view with problems

F:\WSE\wsecon27\maptool\Flights.cb

- FLIGHTS-MAP
 - FLIGHTNUMBER
 - START
 - DESTINATION
 - DEPARTURE
 - ARRIVAL
 - SEATS
 - RESERVED
 - PRICE
 - AIRLINE

Problems in selected field

No problems in this field.

COBOL source

03 FLIGHTS-MAP.		00004000
05 FLIGHTNUMBER	PIC 9(8) COMP.	00005000
05 START	PIC X(20).	00006000

problems pending: 0

Field information

Type	(file)
Length	86
Offset	0

Accept problems

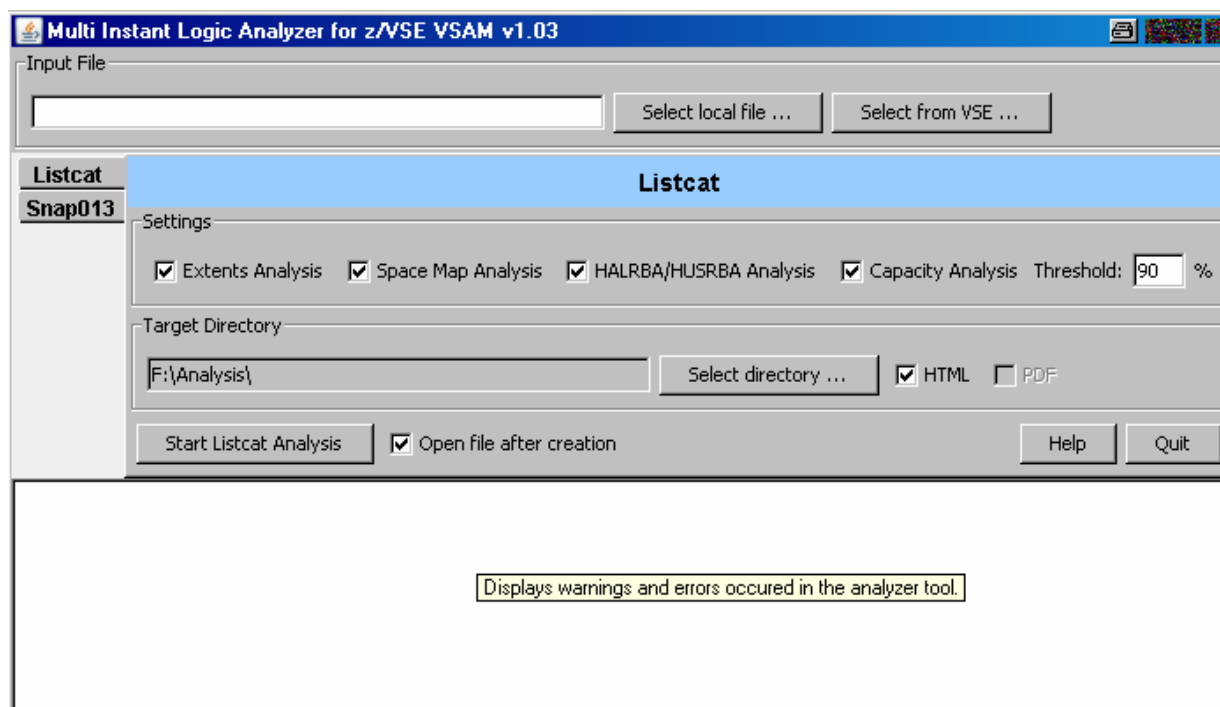
Delete this child

Undo changes

Multi Instant Logic Analyzer for VSAM

- Analysis of VSAM LISTCAT output completely
 - ▶ FAST and Easy Check all cases of overlapping or invalid extents, Space inconsistencies and CLUSTER/CATALOG capacity (adjustable)

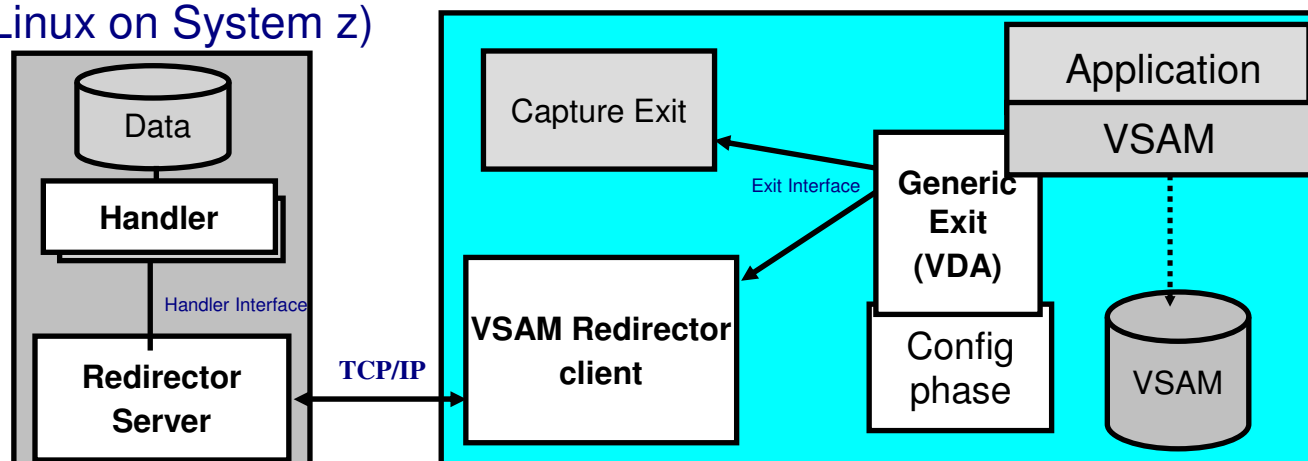
- Analyse of VSAM Catalogs
 - ▶ find inconsistencies
- SNAPTRACE output analysis
- The tool connects directly to VSE System and requests and retrieves necessary data



VSAM Redirector - synchronous VSAM data processing (local and remote processing)

Java Platform
(Linux on System z)

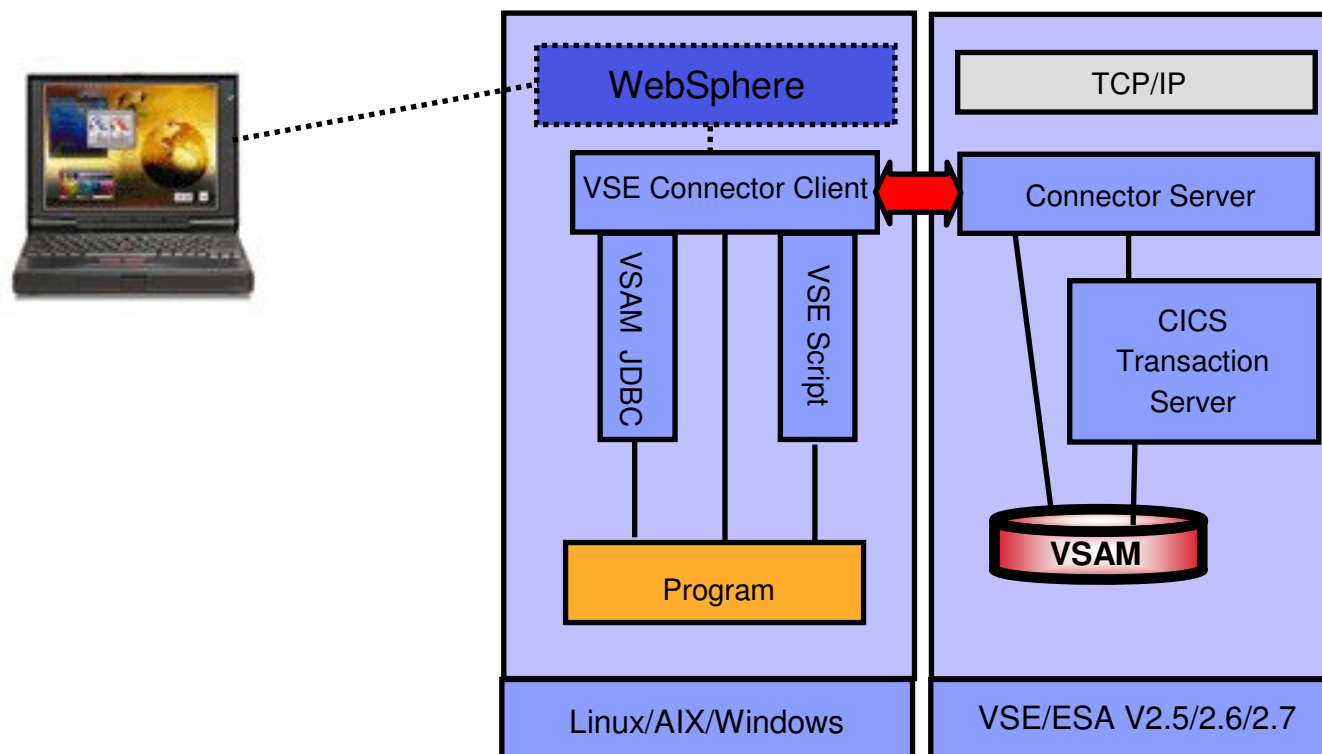
z/VSE



Catalog	Cluster	Exit	Owner	IP	Port	handler-name	option-string
MY.USER.CAT	MY.VSAM.FILE	IESREDIR	VSAM	10.0.0.1	4711	DB2Handler	user=xxx,pw=xxx,...
MY.USER.CAT	MY.RD.FILE	IESREDIR	REDIR	9.164.155.2	4711	DB2Handlernam	user=xxx,pw=xxx,...
VSESP.U.CAT	TEST.CLUST2	VENDOREX	n/a	n/a	n/a	n/a	n/a

- ▶ Redirection of VSAM Requests to any remote system without changes to VSE applications
- ▶ Synchronization, migration or remote operation with data on remote systems
- ▶ transparent for Batch or CICS

Accessing VSAM data from remote systems



- ▶ real time access to mapped VSE/VSAM data from remote systems
 - ▶ i.e. READ in batch Mode and UPDATE via CICS
- ▶ **VSAM access is done in batch - no impact if CICS down**

z/VSE Live Virtual Classes

- z/VSE V4 and MWLC Announcement Overview
 - Midrange Workload License Charges (MWLC)
 - z/VSE V4.1 Solutions based on SOA and DB2
 - IBM System z Hardware
 - New VSAM Tools
 - Bringing You up to Date with z/VSE V4
 - z/VSE Wellness
 - Encryption Facility for z/VSE
 - DB2 for z/VM and z/VSE V7.5
 - Modern Application Development for z/VSE
 - Live Demo of WebSphere Developer for System z
 - z/VSE Tools – An Overview
 - z/VSE Update – z/VSE V4.2
 - LDAP Client
 - WebSphere MQ Series for z/VSE
 - Bringing you Up-to-Date with VSAM in z/VSE V4.2 (May 6, 2009)
 - Update on Security and Cryptography on z/VSE (May 27, 2009)
 - z/VSE Update – z/VSE 4.2.1
 - + more planned ... watch z/VSE web site
-
- typically set for Thursday, 5:00 – 6:00 pm



Note: Charts are available on the z/VSE web site the day following each call. Replay available approximately one week later. For more information, please see the z/VSE web site at:

<http://www-03.ibm.com/servers/eserver/zseries/zvse/>