Aktualisieren Sie Ihr Wissen rund um VSAM

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Agenda

- **Erweiterungen für Flashcopy**

- **Backup/Restore Neuerungen**

- **Verhindern doppelte Candidate Volumes**

- **Neue VSAM internals die Sie wissen sollten**

  - **VSAM Meaningful Cluster Names**

  - **Neuer VSAM Extent Prodexit**

  - **Task ID fürr VSAM Lock requests x'A8'**

- **VSAM data Encryption / Protection**

- **Neue VSAM Redirector Erweiterungen**

  - **AIX Support**

- **Tips und Tools für VSAM**

Hohe Verfügbarkeit der Daten

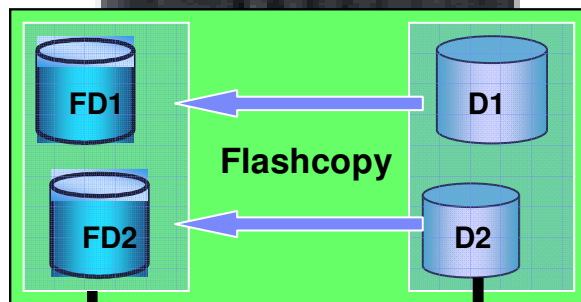**Disaster Recovery Site - IBM Storage System**

FD1

D1

FD2

D2
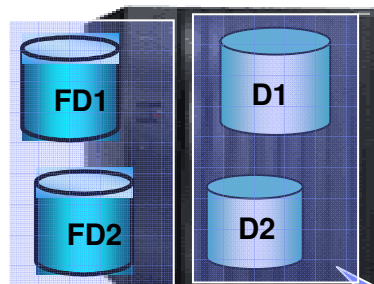
(TPC) Totalstorage Productivity Center for Replication

GLOBAL / Metro Mirror

IBM Storage System ESS, DS6000, DS8000

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

FD1

FD2

Flashcopy

D1

D2

z/VSE Production Environment

+ TCP/IP
+ CICS
+ VTAM
+ COBOL

+ VSAM
(+ DB2 VSE)

z/VSE Backup Environment

+ VTAM
+ VSAM
(+ DB2 VSE)

z/ VM

z/ VM

System z

(offline backup process)

IDCAMS SNAP Erweiterungen

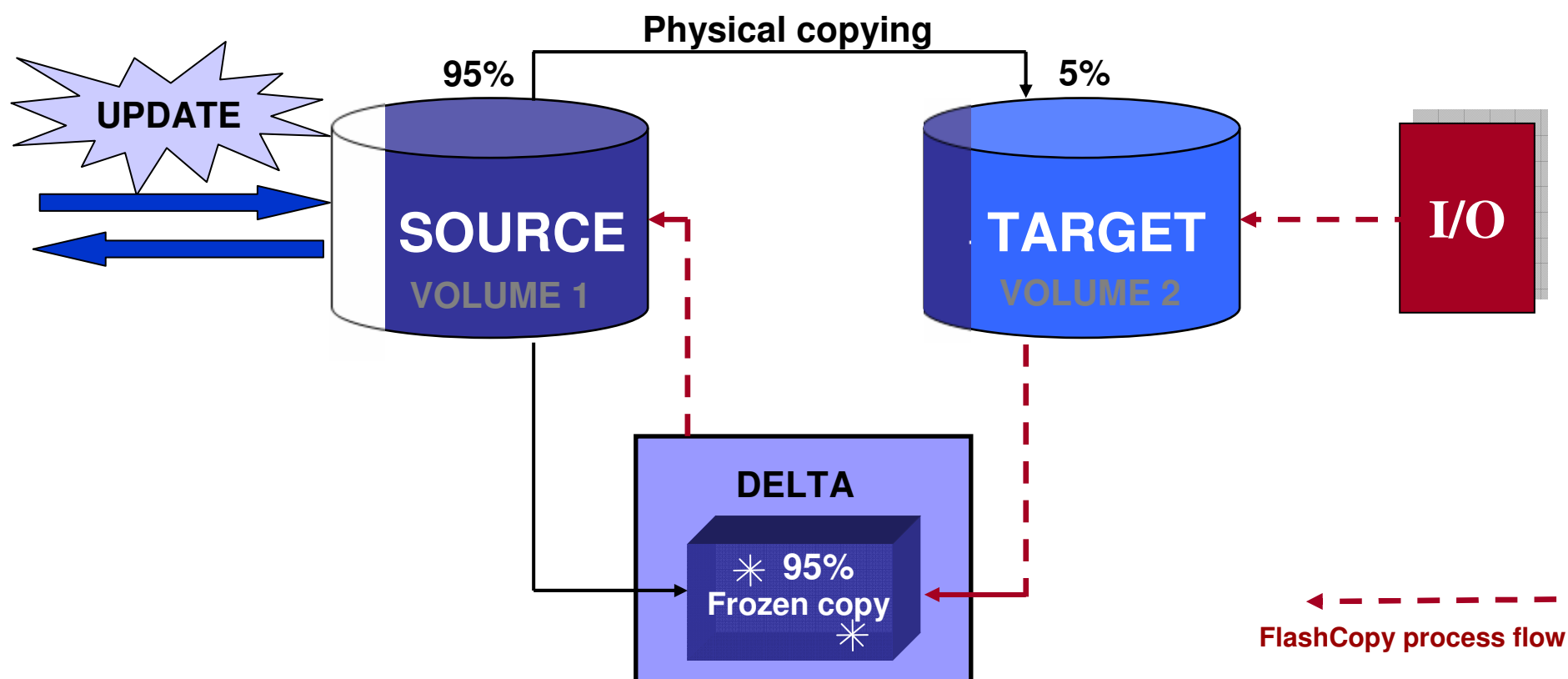**Das IDCAMS SNAP Kommando – das steuern von FlashCopy.**

- **Neuer NOCOPY Parameter für IDCAMS SNAP**
  Das physikalische Kopieren von Daten auf die Ziel Platten wird nicht gemacht.

- **Neuer DDSR parameter für IDCAMS SNAP.**
  Terminiert die FlashCopy Relation zwischen source und Ziel Platten und gibt die Resourcen frei.

- **Neuer COPY Parameter für IDCAMS SNAP.**
  Ist implizit und kann aber auch angegeben werden.

- **Neue Möglichkeit die Administrationsrechte der Benutzer zu definieren die IDCAMS SNAP beutzen dürfen sollen. Das ist möglich mit dem Basic Security Manager (BSM).**

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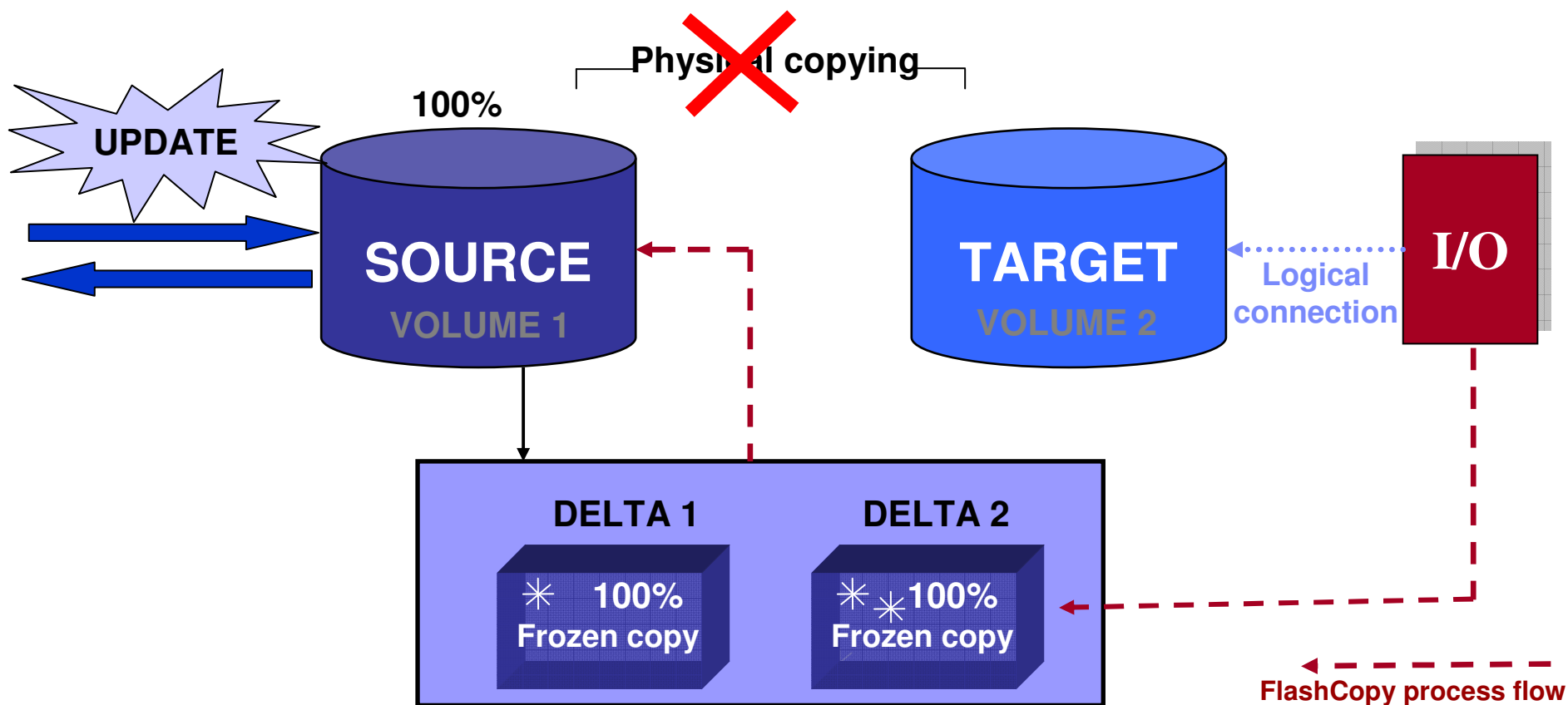 "VSE/VSAM User's Guide and Application Programming".

IDCAMS SNAP COPY Parameter

Default Parameter COPY für IDCAMS SNAP (kann auch explizit angegeben werden).
Hintergrund kopieren der Platten – immer.
Sofortiger Zugriff auf Kopie möglich.

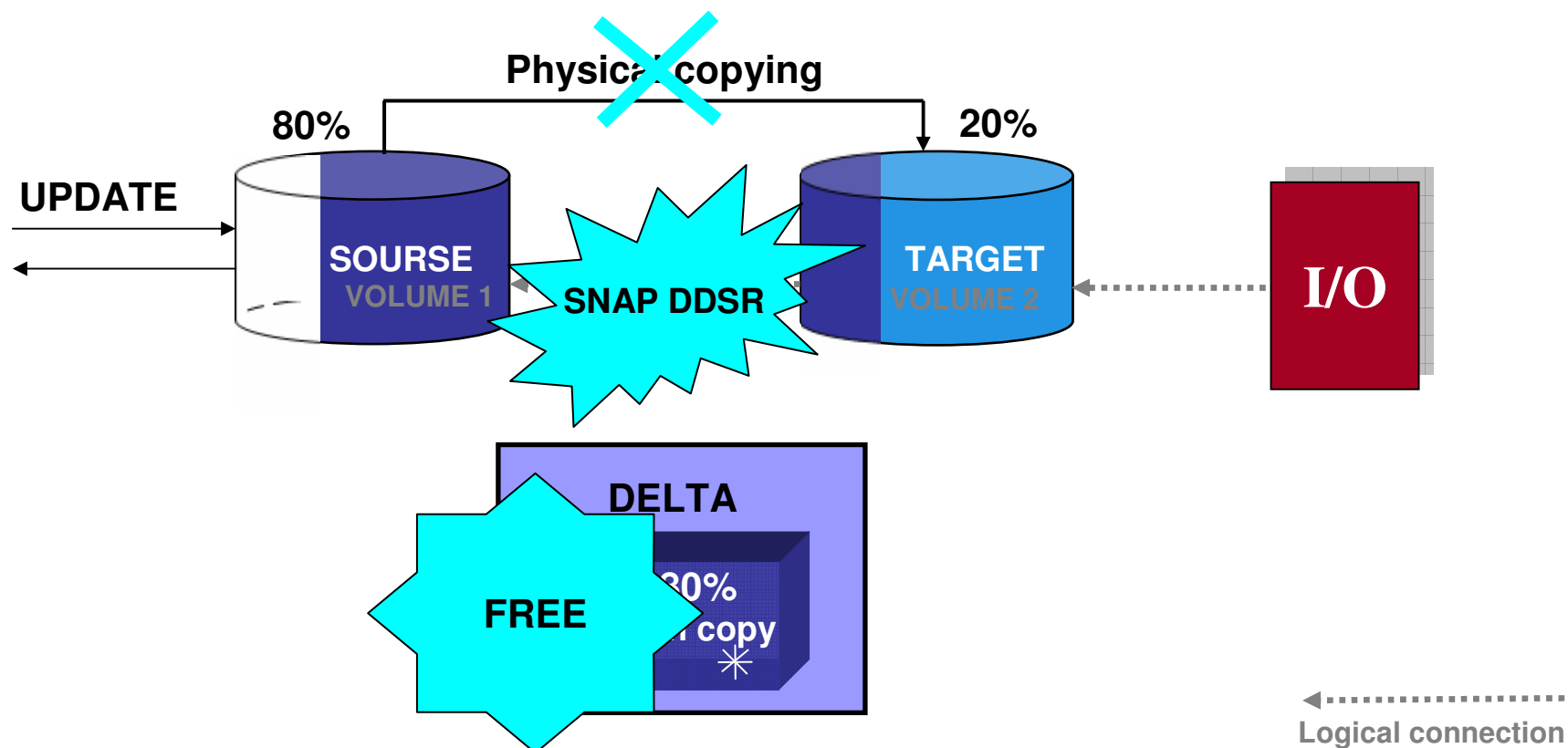# IDCAMS SNAP DDSR Parameter

Neu: Der DDSR (Deleted Data Space Release) Parameter von IDCAMS SNAP löscht existierende FlashCopy Relationen der Platten – und den Plattenplatz.
Ist implizit bei COPY Parm und muss Muss mit NOCOPY eingesetzt werden.

Sample of SNAP COPY, NOCOPY, DDSR

COPY	NOCOPY
1) SNAP SVOL(VSE222) TARGETVOLUMES(VSE444) COPY NOPROMPT	SNAP SOURCEVOLUMES(VSE222) TVOL(VSE333) NOCOPY NOPROMPT
2) IMPORT CONNECT – OBJECTS((COPY.UCAT VOLUMES(VSE444) DEVT(3390))) – CAT(VSAM.MASTER.CATALOG)	IMPORT CONNECT – OBJECTS((NOCOPY.UCAT VOLUMES(VSE333) DEVT(3390))) – CAT(VSAM.MASTER.CATALOG)
3) BACKUP (FILE1) BPFILE(BF) SYNONYMLIST(– SOURCEVOLUMES(VSE222) TARGETVOLUMES(VSE444) – CATALOG(UCAT) SYNCATALOG(COPY.UCAT))	BACKUP (FILE1) BPFILE(BF) SYNONYMLIST(– SOURCEVOLUMES(VSE222) TARGETVOLUMES(VSE333) – CATALOG(UCAT) SYNCATALOG(NOCOPY.UCAT))
4) RESTORE OBJECTS(FILE1) BPFILE(BF) CAT(UCAT)	RESTORE OBJECTS(FILE1) BPFILE(BF) CAT(UCAT)
SNAP TARGETVOLUMES(VSE444) DDSR NOPROMPT	SNAP TARGETVOLUMES(VSE333) DDSR NOPROMPT
5) EXPORT COPY.UCAT DISCONNECT	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	NOCOPY
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	**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((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
	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) BPFILE(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
	BACKUP (FILE1) BPFILE(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) BPFILE(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	**RESTORE OBJECTS(FILE1) BPFILE(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	**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 COPY.UCAT DISCONNECT IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0	**EXPORT NOCOPY.UCAT DISCONNECT** IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

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

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.

<u>**SAMPLE (z/VSE console):**</u>

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
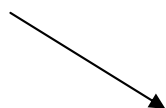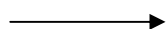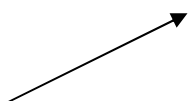
Doppelte Candidate Volumes verhindern

IDCAMS ALTER command will allow to add any volume as candidate only once.
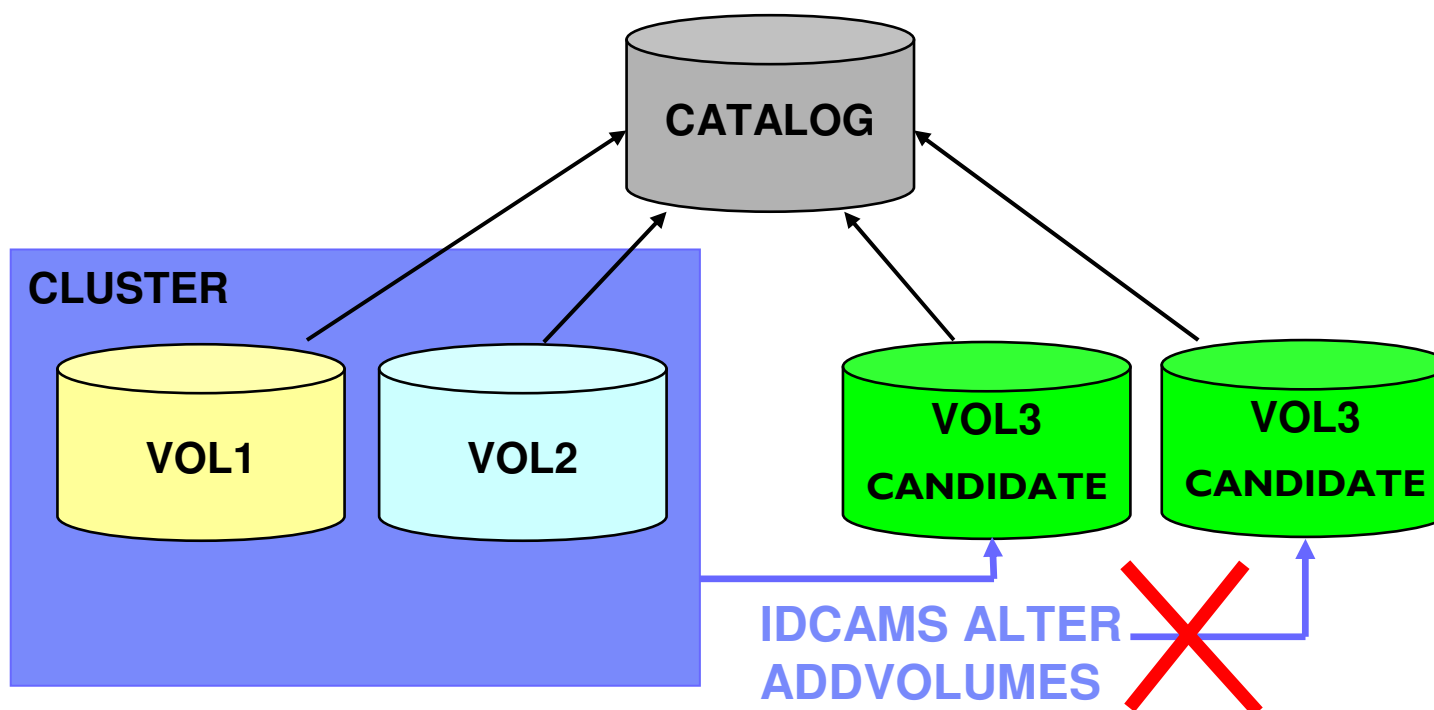
New error message

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 IGG0CL`*xx* `–` *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".

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- **Erweiterungen für Flashcopy**

- **Verhindern doppelte Candidate Volumes**

- **Backup/Restore Neuerungen**

- **Neue VSAM internals die Sie wissen sollten**

  - **VSAM Meaningful Cluster Names**

  - **Neuer VSAM Extent Prodexit**

  - **Task ID fürr VSAM Lock requests x'A8'**

- **VSAM data Encryption / Protection**

- **Neue VSAM Redirector Erweiterungen**

  - **AIX Support**

- **Tips und Tools für VSAM**

Backup/Restore Erweiterungen

- **Cross-reference listings mit BACKUP / RESTORE**

    - **Erzeugen von cross-reference listings ohne Verarbeitung der Obiekte**
    - **Identification von compressed files in cross-reference listings**
    - **Identification von 'empty files' in cross-reference listings**

Backup/Restore Erweiterungen - Anwendung

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 Erweiterungen - Anwendung

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 Beispiel

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 (BECR)
        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 Beispiel cross-Ref

```
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 **IUI 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 Cluster names

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.
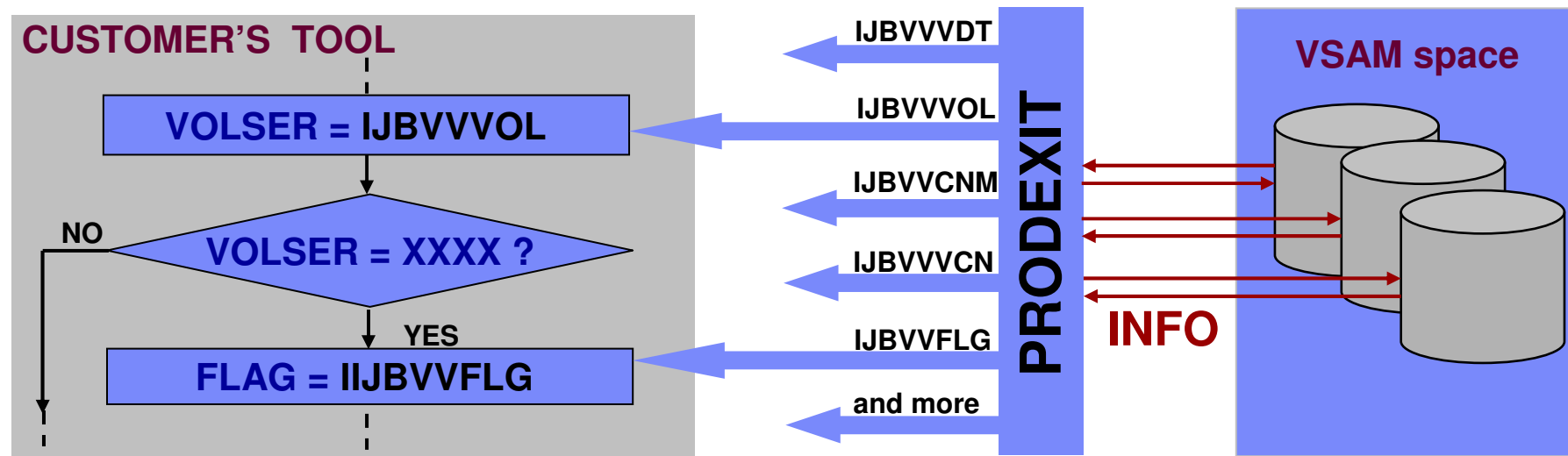
New VSAM Extent PRODEXIT

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

- **Erweiterungen für Flashcopy**

- **Verhindern doppelte Candidate Volumes**

- **Backup/Restore Neuerungen**

- **Neue VSAM internals die Sie wissen sollten**

  - **VSAM Meaningful Cluster Names**

  - **Neuer VSAM Extent Prodexit**

  - **Task ID fürr VSAM Lock requests x'A8'**

- **VSAM data Encryption / Protection**

- **Neue VSAM Redirector Erweiterungen**

  - **AIX Support**

- **Tips und Tools für VSAM**

VSAM data Encryption / Protection

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

Encryption Facility for z/VSE V1.1 (1)

encrypt/decrypt – compress/decompress

Encryption Facility for z/VSE V1.1 (1)

encrypt/decrypt – compress/decompress

Encryption Facility for z/OS V1.1/1.2 (2)

dncrypt/decrypt – compress/decompress

Decryption Client for z/OS (2), (3)

decrypt – decompress only

EF for z/OS Java-Client (2), (3)

encrypt/decrypt only

EF for z/OS Java-Client (3), (4)

encrypt/decrypt only
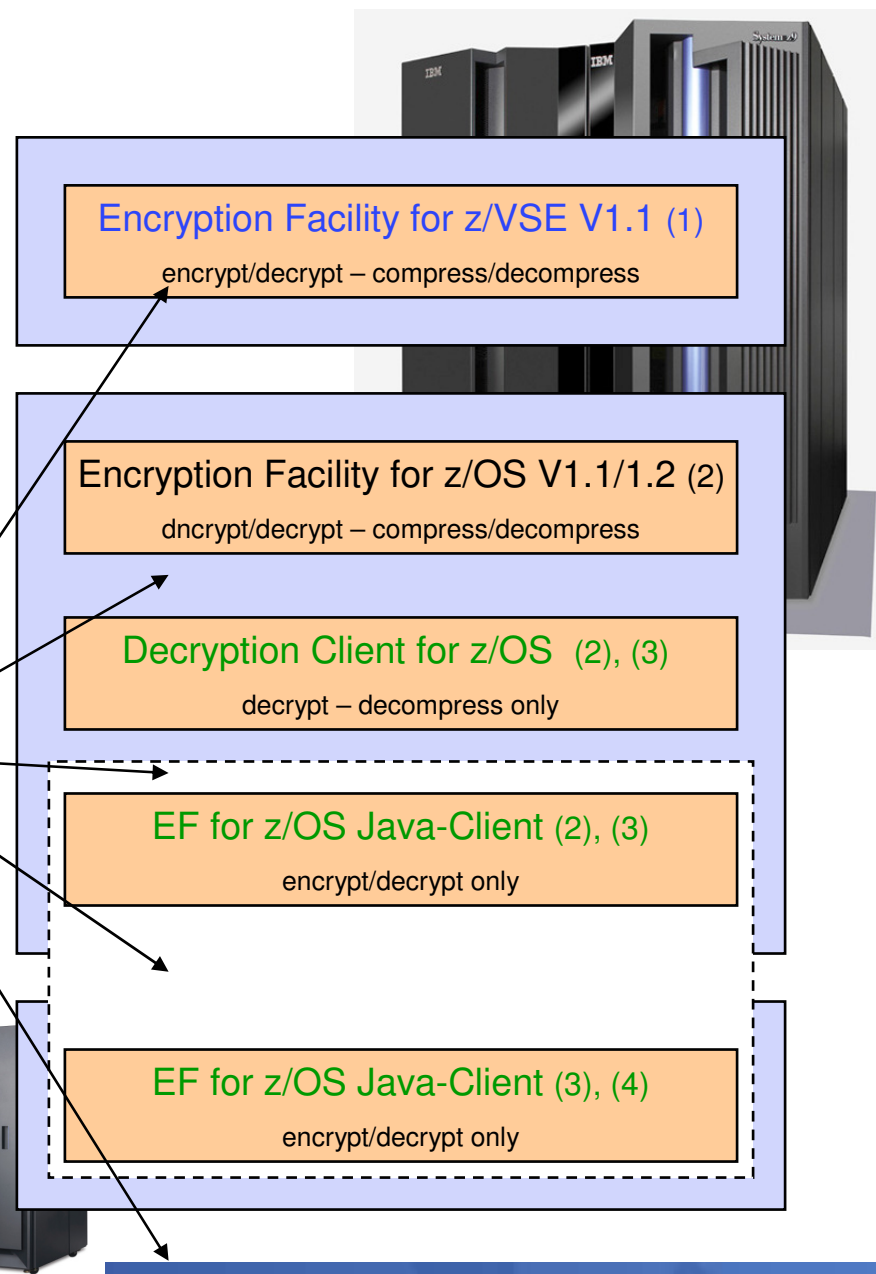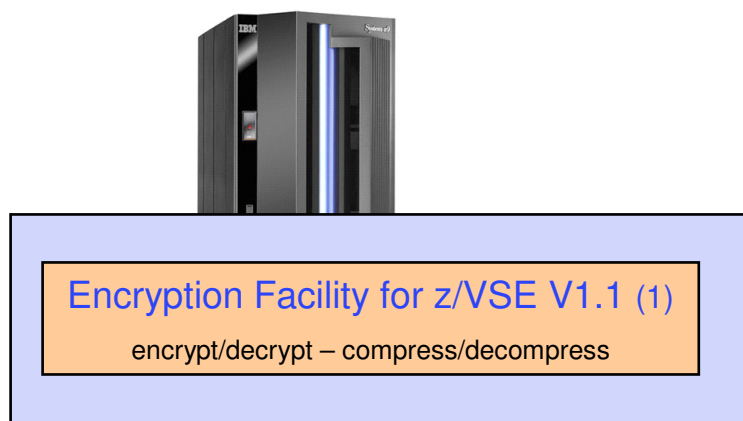
Note 1: z10 EC, z9 EC, z9 BC, z990/890

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

Note 3: No charge, downloadable from web

Note 4: <u>Any</u> 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**

System z format

OpenPGP format

Encrypted tapes

- Data exchange with IBM System z servers
- Data exchange with external business partners
- High volume backup/ archive

TS1120
TS1130
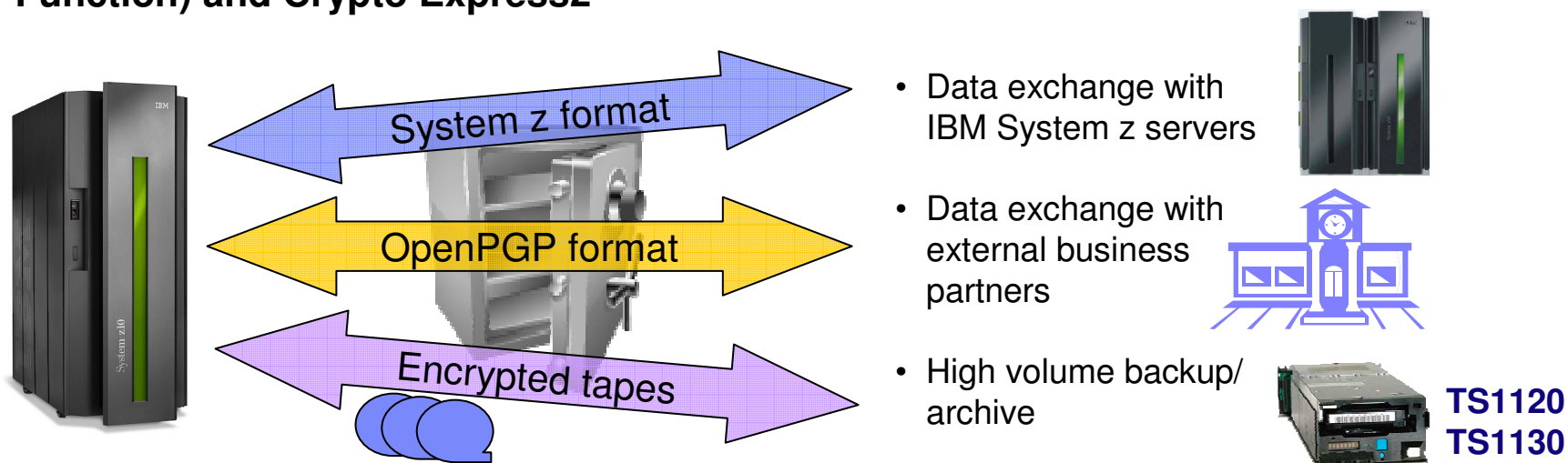
Full Disk Encryption on DS8000

- **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**
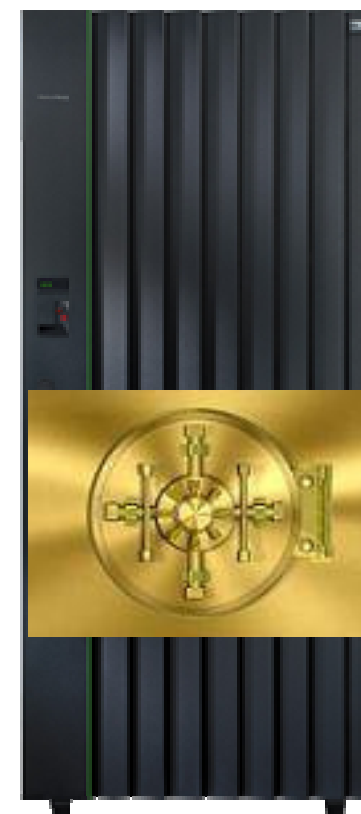
VSAM data Encryption / Protection
IBM System Storage TS7700 Virtualization Engine Release 1.5

- **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**

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**

New VSAM Redirector AIX Support

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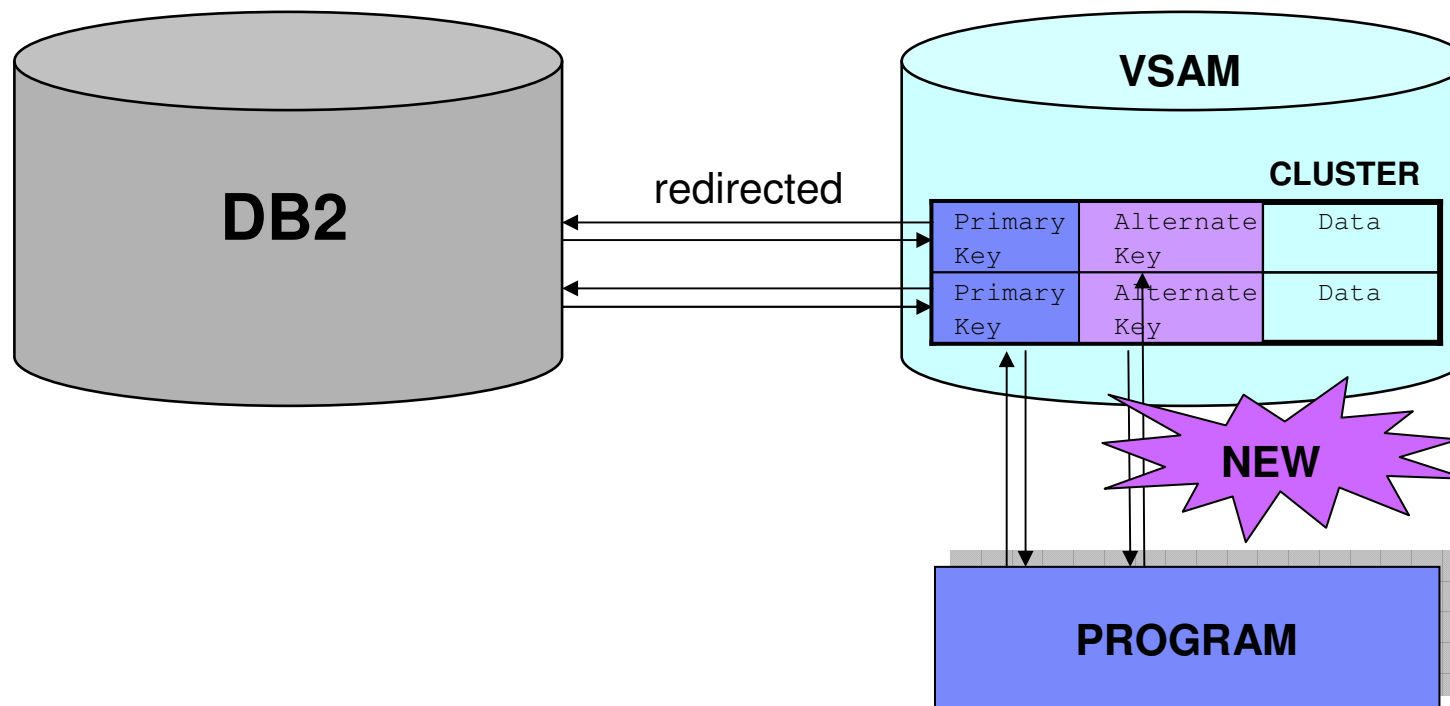
New VSAM Redirector AIX Support

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.**
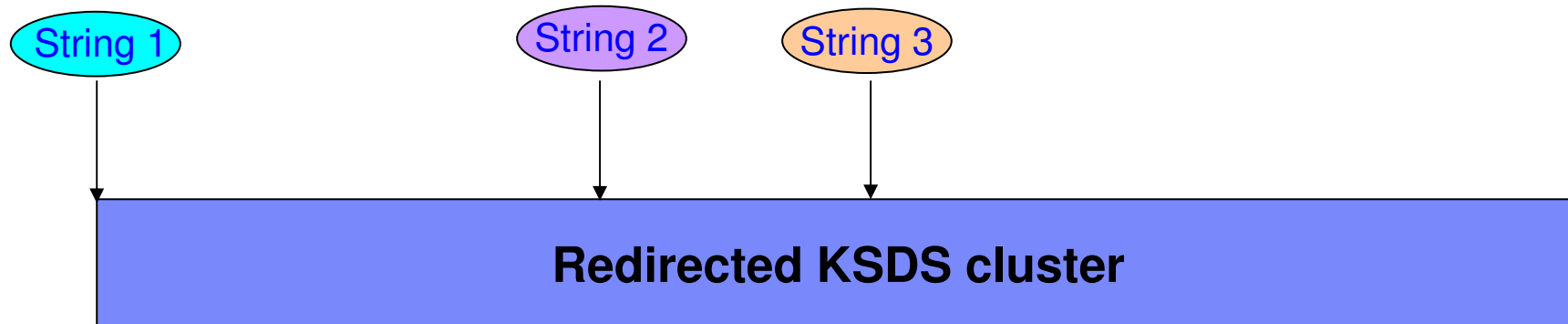
String 1   String 2   String 3

Redirected KSDS cluster

Agenda

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  - **Neuer VSAM Extent Prodexit**

  - **Task ID fürr VSAM Lock requests x'A8'**

- **VSAM data Encryption / Protection**

- **Neue VSAM Redirector Erweiterungen**

  - **AIX Support**

➡ - **Tips und Tools für VSAM**

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

ECKD
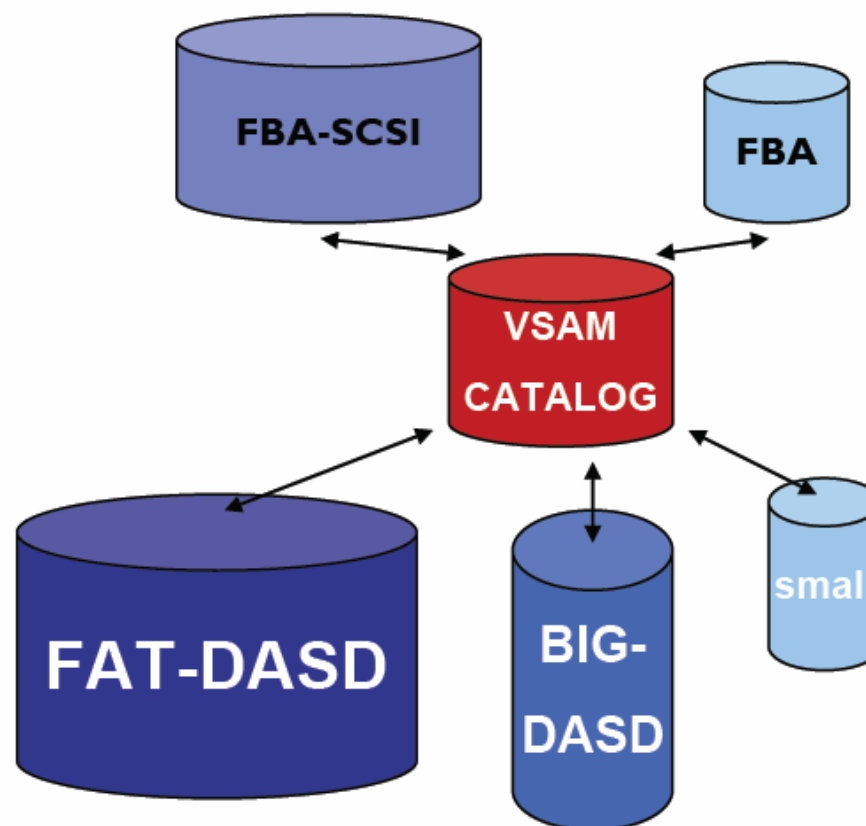
FAT-DASD
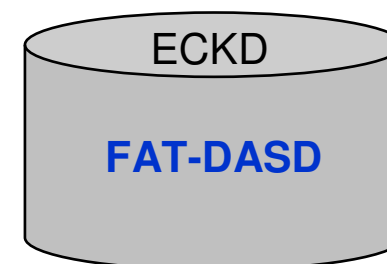
- 123 Extents per data component & 123 Extents per Index component
- 123 Volumes per data component & 123 Volumes per Index component
- UNIQUE, REUSEable files & catalogs only 16 Extents & 16 Volumes
- 4.3 GB (X'FFFFFFFF') RBA for ESDS, SAM-ESDS, RRDS, VRDS and AIX
- 289 GB for XXL Datasets but only 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

ECKD
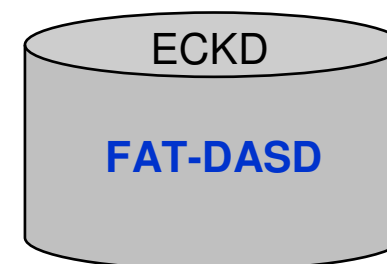
FAT-DASD

- 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 – DASD

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

z/VSE

Application

tape operation

Java platform
(Linux on System z)

Data

Virtual Tape Server

TCP/IP

Virtual Tape handler

I/O supervisor

VSAM
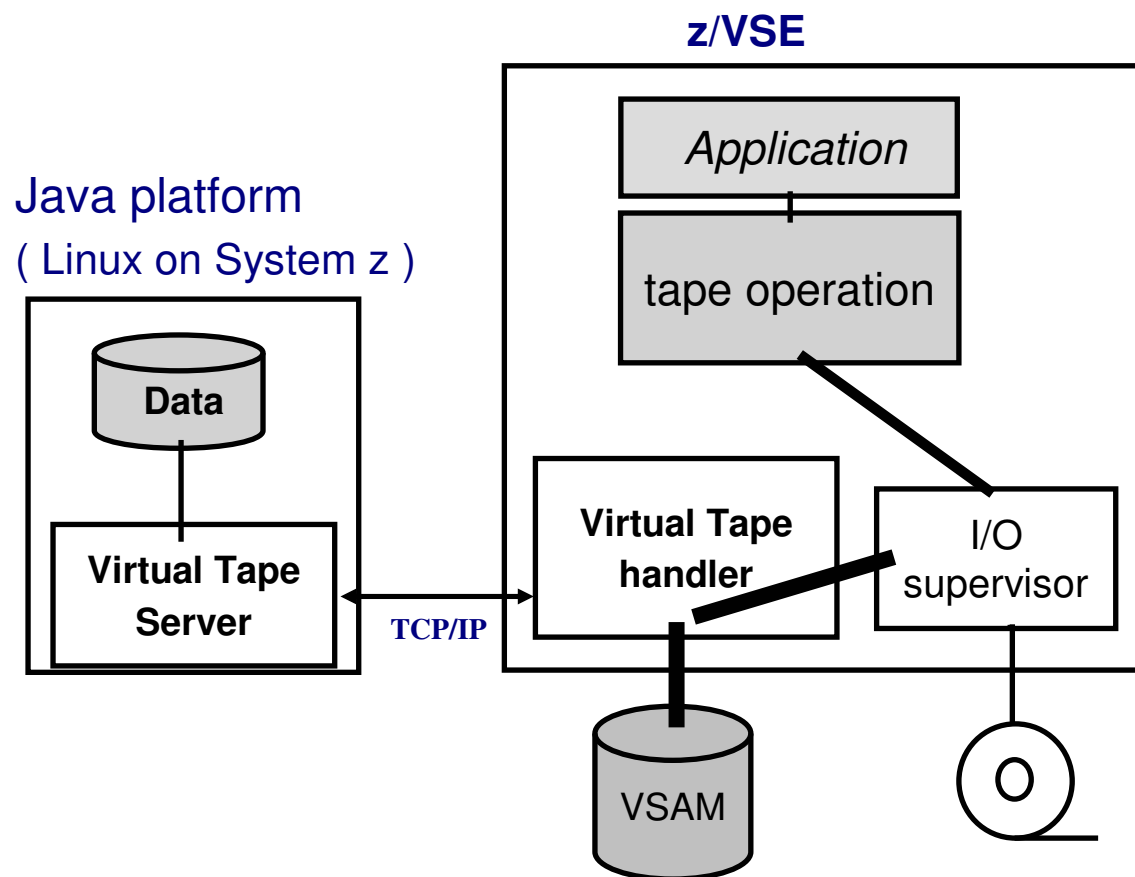
- ►simulates a real tape (tape operation supported)
- ►transparent for applications

VSE Navigator: Windows-like VSE Interface

Maptool – to map VSAM structure

- **VSAM data mapping**

- **mapping stored on VSE in a special VSAM file**

- **access from Java or JDBC interface**

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)**
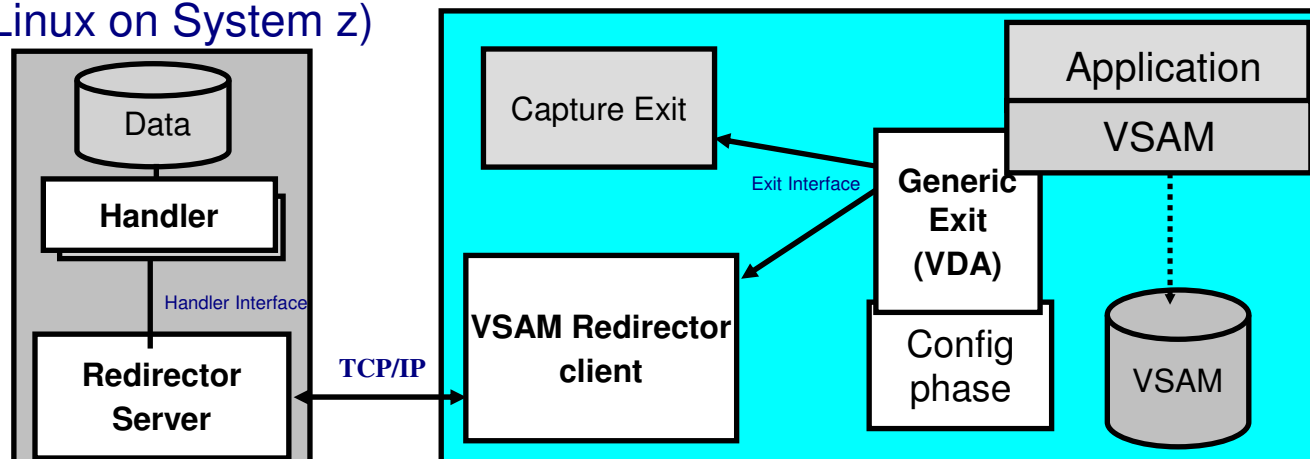
- **Analyse of VSAM Catalogs**
    - ► **find inconsistencies**
- **SNAPTRACE output analysis**
- **The tool connects directly to VSE System and requests and retrieves necessary data**
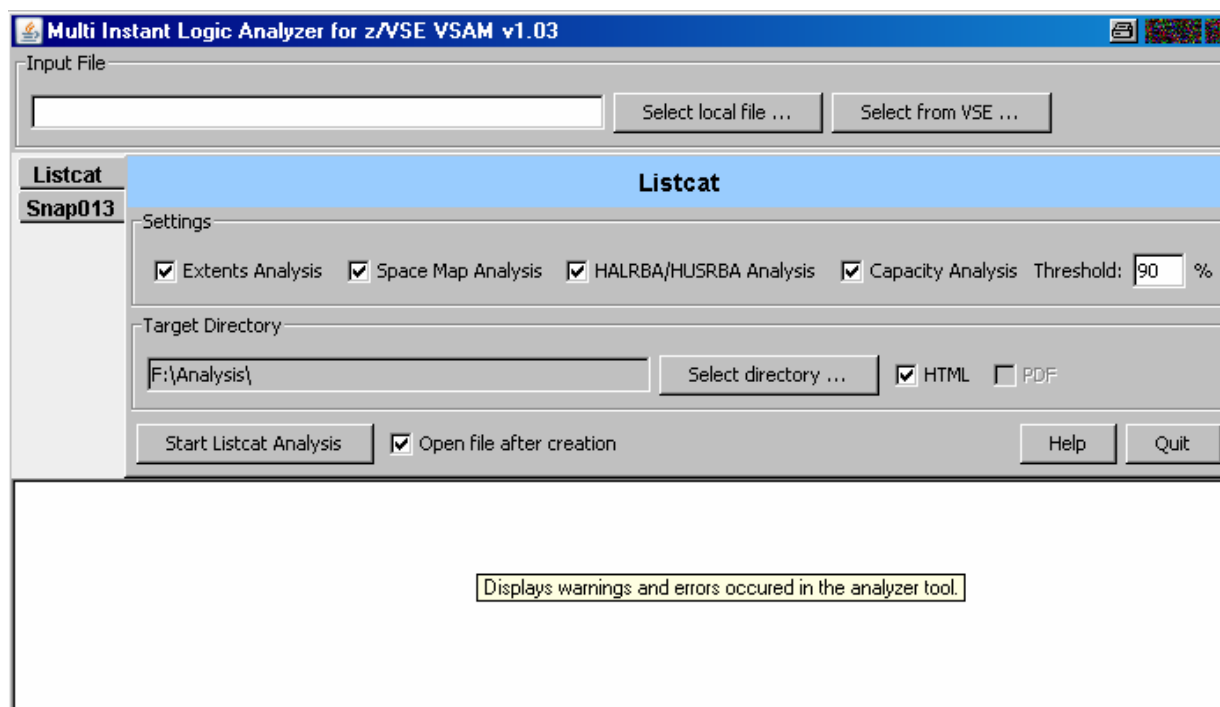
VSAM Redirector - synchronous VSAM data processing (local and remote processing)

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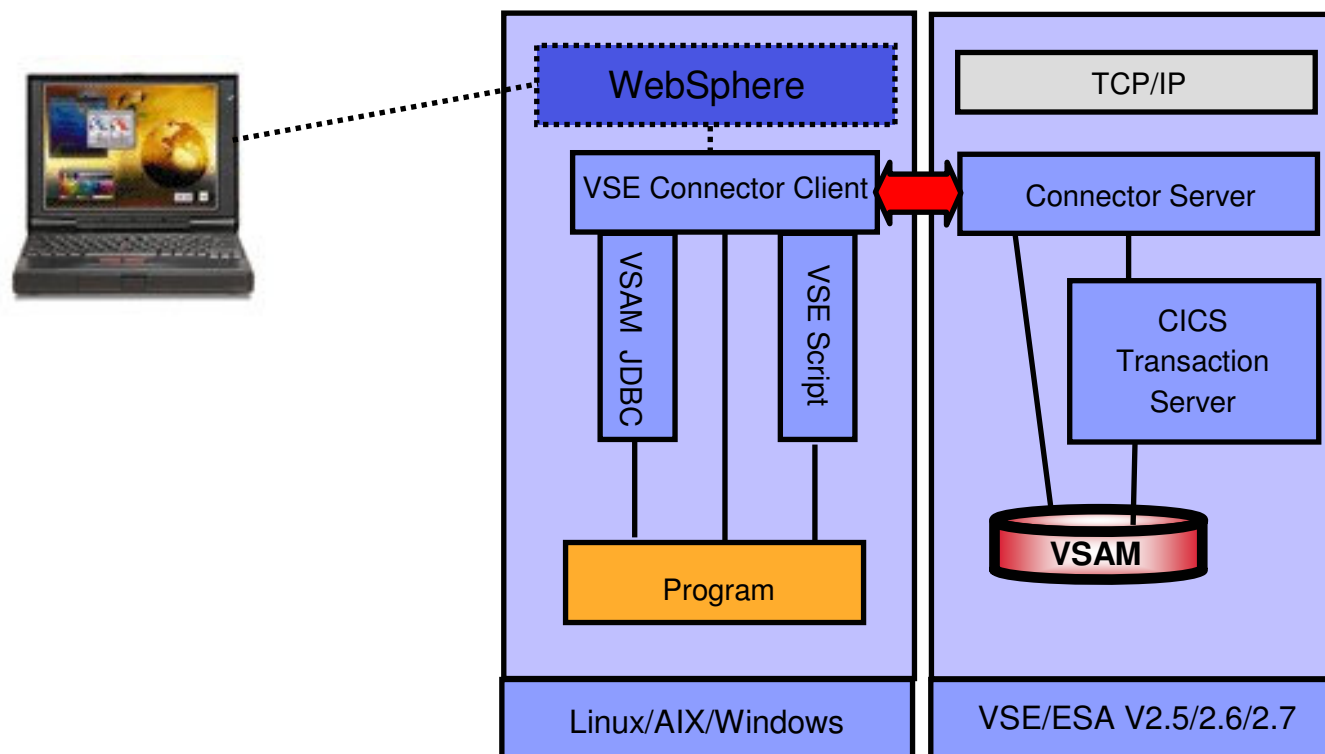
- ► real time access to mapped VSE/VSAM data from remote systems
  - ► i.e. READ in batch Mode and UPDATE via CICS
- ► VSAM access is done in batch - no impact if CICS down

Latest Service for z/VSE 4.2 VSAM (01C)

- **DY47012**/UD53452   Implicit DEFINE Can Specify Incorrect Cluster Names
- **DY46954**/UD53402   IDCAMS SNAP Abended When More Than 10 Pairs of Volumes Specified
- **DY46946**/UD53386   IDCAMS SNAP Terminated with IDC32020I VOLUME SERIAL ...... DOES NOT EXIST
- **DY46937**/UD53376   OPEN ERROR RC=x'74' Instead of RC=x'76'
- **DY46985**/UD53419   File defined as DSN with Multiple AIXs gets Corrupted AIX with Large Amounts of data
- **DY46919**/UD53360   Repro of a Catalog Failed Due to Incorrect Index Level
- **DY46980**/UD53416   No Record Found Due to Incorrect Index Level
- **DY46979** ENDREQ Does Not Help Alleviate Record Not Found (RNF) Situation with LSR

- **z/VSE VSAM 4.1 included already in z/VSE 4.2**
- **DY46960**/UD53394   BLDINDEX for Redirected CLUSTER Hangs
- **DY46956**/UD53391   MSG0S24I MSG0S29I SDUMP Issued by VSE/VSAM Unnecessarily
- **DY46943**/UD53371   0C4 Pgm Check when Processing a Dummy USB Entry After AIX Failed open
- **DY46942**/UD53370   Performance Degradation with Certain Applications
- **DY46918**/UD53365   LOOP Between CICS/TS and VSE/VSAM attempting to retry Exclusive Control Error
- **DY46836** Program Check in IKQAIX attempting Journaling on Alternate Index
- **DY46913**/UD53354   RESTORE Hang After Secondary Allocation Failure by Specifying a High Number of Data Buffers
- **DY46859**/UD53356   SNAP13 for Redirector

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/