IBM

z/VSE VTAPE – All you need to know

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Agenda

- **Basics**
  - Remote vs. VSAM
  - Formats (AWS, Zipped, PTF)
  - Transferring tape images
  - Actions

- **Enhancements**
  - VTAPE QUERY
  - Simplified Use of DLBL Statements for VSAM Files
  - Tivoli Storage Manager Support
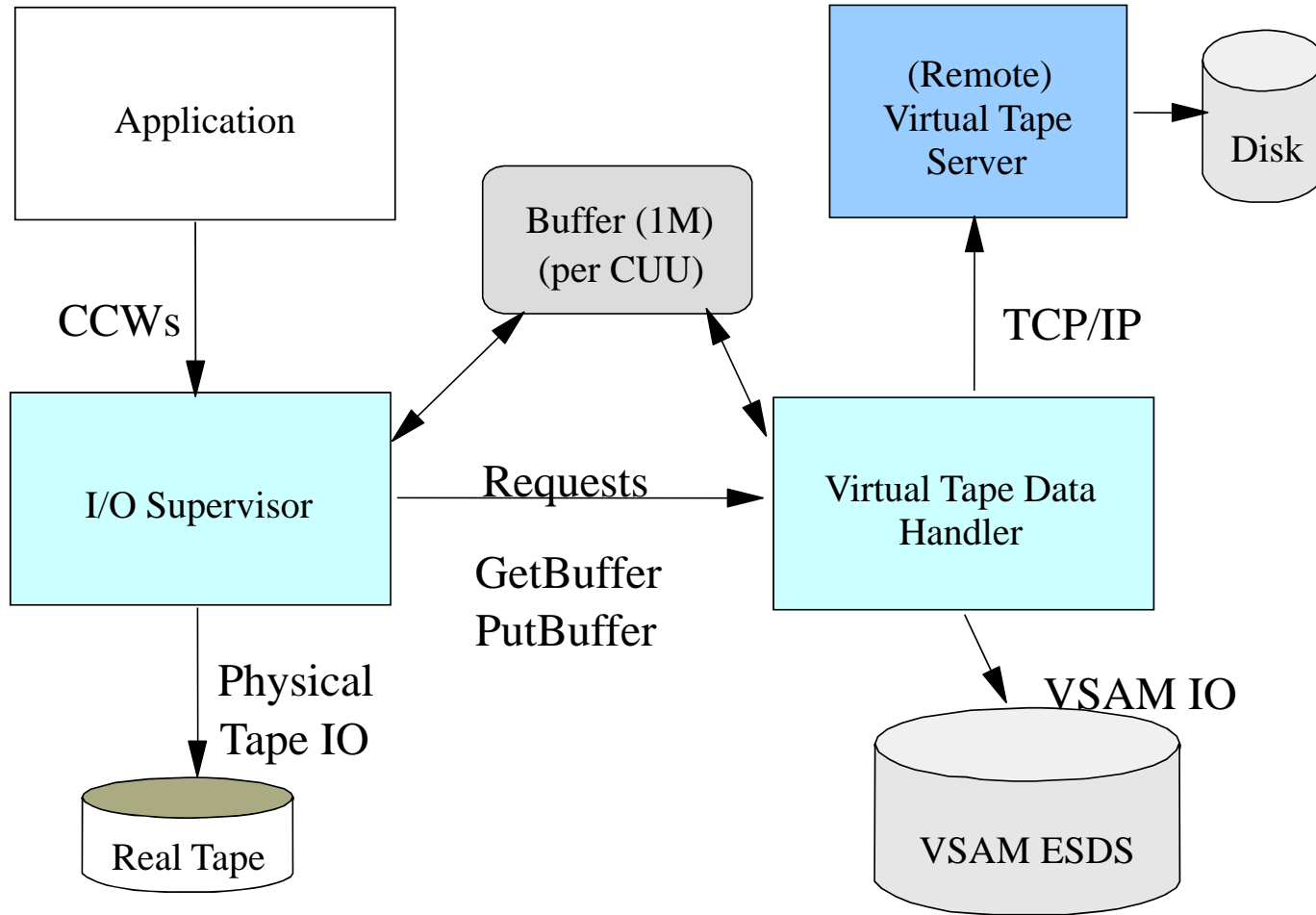 - Stacking Tape Support

IBM Corporation

Overview

- VSE VTAPE support is part of z/VSE since VSE/ESA 2.6

- Emulates a complete tape
  - Can contain multiple tape files, not just one tape file

- Uses a tape image file instead of a physical tape

- Tape image file can reside in
  - VSAM ESDS
  - Remote file (e.g. on a workstation)

- Tape image file has AWSTAPE format
  - known from P/390, R/390, Hercules, Flex-ES

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Overview

```
┌─────────────────┐                              ┌─────────────────┐
│                 │                              │   (Remote)      │        ┌──────┐
│                 │                              │ Virtual Tape    │───────▶│ Disk │
│  Application    │                              │   Server        │        └──────┘
│                 │                              └─────────────────┘
└─────────────────┘        ┌──────────────┐              ▲
        │                  │ Buffer (1M)  │              │
     CCWs                  │  (per CUU)   │           TCP/IP
        │                  └──────────────┘              │
        ▼                    ▲        ▲                  │
┌─────────────────┐         ╱          ╲        ┌─────────────────┐
│                 │◀───────              ───────▶│                 │
│                 │       Requests              │ Virtual Tape Data│
│ I/O Supervisor  │───────────────────────────▶│    Handler      │
│                 │                             │                 │
└─────────────────┘       GetBuffer            └─────────────────┘
        │                 PutBuffer                     │
    Physical                                          VSAM IO
    Tape IO                                             │
        │                                               ▼
        ▼                                        ┌─────────────┐
   ┌─────────┐                                   │             │
   │Real Tape│                                   │  VSAM ESDS  │
   └─────────┘                                   └─────────────┘
```

Overview - continued

- VTAPE command
  - `VTAPE START,UNIT=<cuu>,LOC=<ip or VSAM>,FILE='filename'`
  - `VTAPE STOP,UNIT=<cuu>`

- Tape image file is opened at VTAPE START

- Tape image file is closed at VTAPE STOP

- Access to tape image can be
  - READ   - read only
  - WRITE   - read and write (existing content is kept)
  - SCRATCH - read and write (content is cleared)

Virtual Tape Data Handler Partition

- Runs in a batch partition
  - Dynamic class R per default
- Accesses VSAM tape images
- Establishes TCP/IP connections to remote system
- Startup job TAPESRVR
  - Skeleton SKVTASTJ in ICCF lib 59
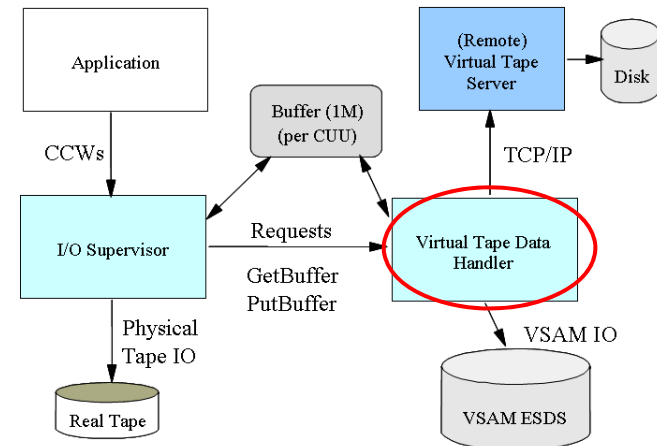
```
* $$ JOB JNM=TAPESRVR,DISP=L,CLASS=R
* $$ LST CLASS=A,DISP=D
// JOB TAPESRVR START UP VSE TAPE SERVER
// LIBDEF
*,SEARCH=(PRD2.CONFIG,PRD1.BASE,PRD2.SCEEBASE)
// ID USER=VCSRV
// EXEC $VTMAIN,SIZE=$VTMAIN
/*
/&
* $$ EOJ
```

Since z/VSE 4.2, the job name can be changed.
Use JNM= 'jobname' at VTAPE START command

VSAM tape images

- A VSAM tape image resides in a VSAM ESDS Cluster

- Recommended file attributes
    - CI size = 32768
    - Record Size = 32758 (32768-10)
    - REUSE = YES
    - Shareoption = 1
    - Records/Cylinder/Tracks depends on amount of data

VSAM

(ESDS)

- Skeleton SKVTAPE in ICCF lib 59

- Size limit is 4GB (because VSAM ESDS size limit)

Remote tape images

- A remote tape image resides in a file
  - on the remote workstation's file system

- The file is created automatically (if not existing)

- Filename (and path) are remote system dependent
  - Be careful with uppercase translation of filename

- Remote systems can be
  - Windows (95/98/NT/2000/ME/Vista/7/8/...)
  - Linux (on System z, Intel, p, ...)
  - Unix (Aix, Sun, HP, ...)
  - Any Java capable platform

- Size limit depends on file system (e.g. FAT, NTFS, ext, …) of remote system

Transferring tape images

- Transfer tape images in binary
  - From one workstation to another workstation
    - Network drive
    - File transfer
  - From a workstation to a VSAM ESDS cluster

```
ftp 9.164.186.20                    - initiate FTP session
bin                                 - transfer in binary
quote site lrecl 32758              - specify record size
quote site recfm v                  - record format variable
put d:\backup.aws VSAM.TAPE.IMAGE   - transfer the file
```

Usage Example - Backup to CD-ROM

- Step 1: Do a backup to a virtual tape

```
// JOB BACKUP
VTAPE START,UNIT=480,LOC=9.164.186.20,FILE='d:\backup.aws,SCRATCH
MTC REW 480
MTC WTM,480
// EXEC LIBR
BACKUP LIB=PRD2 TAPE=480
/*
VTAPE STOP,UNIT=480
/&
```

- Step 2: Copy (burn) d:\backup.aws to a CD-ROM
- Step 3: Archive the CD-ROM
- Step 4: Restore directly from CD-ROM

Usage Example – Reduce offline time

- Step 1: Backup all your files, databases, libraries, … onto separate VSAM VTAPEs
  - During this time your CICS needs to be down (offline)

- Step 2: Backup all the VSAM VTAPE files to a real tape
  - This can be done while CICS is up (online)
  - Can even be done on a separate VSE system, if the DASDs are shared

- Reduces the backup time (offline time)
- Only one real tape needed for all backup steps

Usage Example - Dump offload

- Create a (remote) virtual DUMP tape
  - DUMP Fx,cuu
  - DUMP SVA,cuu
  - DUMP SUF,cuu
  - Offload function in IUI Dialog (Fastpath 43)

- Send the tape image containing the DUMP to IBM for analysis
  - Attach it to a e-mail
  - Put in onto IBM's FTP server

Usage Example - PTF install

- Order one ore more PTFs via IBM ShopzSeries
  - You will get a notification when the PTF is ready for download
  - Download the file containing the PTF(s)
    - e.g. eptf5375.bin
  - Unzip (if zipped) and rename it to eptf5375.ptf

- Apply the PTF(s) as usual
  - Use PTF Apply Dialog 1423
  - Use Virtual Tape pointing to the downloaded PTF data
  - Indirect apply is also possible

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News – by VSE release/version

z/VSE release	Function
VSE/ESA 2.6	▪ VTAPE functionality was introduced
VSE/ESA 2.7	▪ Binary PTF data (for PTF install) ▪ Zipped AWSTAPE and PTF data ▪ Removed DVCDN/DVCUP requirements
z/VSE 3.1	▪ FakeTape (FLEXES) and zipped FakeTape
z/VSE 4.1 & 4.2	▪ AWSTAPE with ZLIB compressed records ▪ Support for Tivoli Storage Manager (TSM) ▪ QUERY command to query active VTAPEs ▪ Simplified Use of DLBL for VSAM VTAPEs ▪ Many Interactive Interface Dialogs have been adopted to allow use of VTAPE
z/VSE 5.1	▪ SCOPE=JOB: Automatically stop VTAPE at EOJ ▪ RLE Compressed AWSTAPE format (used/created by TapeStream) ▪ Over time several Interactive Interface Dialogs have been a adapted to support VTAPE
z/VSE 5.2	▪ Stacking Tape Support for VTAPE

Note: "FLEXES" and "FakeTape" are trademarks of "Fundamental Software, Inc" and "TapeStream" is a trademarks of "Fischer International Systems Corporation".

News – Supported formats

Format	VSAM	Remote
AWSTAPE	Yes	Yes
Zipped AWSTAPE	No	Yes (read only)
FakeTape (FLEXES)	No	Yes
Zipped FakeTape (FLEXES)	No	Yes (read only)
AWSTAPE with ZLIB compressed records	Yes (since z/VSE 4.3)	Yes
Binary PTF data	No	Yes (read only)
Zipped binary PTF data	No	Yes (read only)
RLE Compressed AWSTAPE (TapeStream)	No	Yes

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Zipped AWSTAPE format

- To save disk space a AWSTAPE image can be zipped (PKZIP)
  - one or more tape images in one ZIP file
- To save download time
  - Extended VTAPE START filename syntax
  - Allows to read directly from a zipped image
  - without unzipping it first

```
VTAPE START,UNIT=cuu,LOC=ip-addr,FILE='zip-file.zip!aws-file.aws'
```

Binary PTF data

- Simulates a PTF tape (read only)
  - can be directly installed with IUI Dialog 1423

- Input data is a binary PTF stream
  - PTF job stream with LRECL=80 (binary)
  - As downloadable from IBM ShopzSeries
  - PTF data can also reside in a ZIP file

- Extended VTAPE START filename syntax for ZIPed data
  - File must have extension '.PTF'

```
VTAPE START,UNIT=cuu,LOC=ip-addr,FILE='ptf-file.ptf'

VTAPE START,UNIT=cuu,LOC=ip-addr,FILE='zip-file.zip!ptf-file.ptf'
```

AWSTAPE with ZLIB compressed tape records

- To save space, the tape records stored within a AWSTAPE file can be compressed using ZLIB 1.2.1.
  - Every single tape record is compressed separately
  - Compression ratio is not as good as zipped AWSTAPE files

- Per default uncompressed tape images are created
  - You can force compression by using a file extension of '.zaws'.

- ZLIB compression is supported for remote tapes
  - Since z/VSE 4.3, its also supported for VSAM virtual tapes

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VTAPE Exits

- Virtual Tape Server can call exits (also called actions)
    - VTAPE START (open of tape image)
    - VTAPE STOP (close of tape image)

- Can be used for tape management tools
    - start backup of tape image
    - notify operators

- The IBM provided default action can execute a command or shell script/batch script

VirtualTapeServer.properties

```
...

action=com.ibm.vse.vtape.DefaultAction

actionparam=open:open.bat close:close.bat

...
```

VTAPE QUERY command

- With z/VSE 4.1 a new QUERY command has been added

```
 _____
|                                                                  |
|  >>__ _____ __VTAPE QUERY__ _____ _____><  |
|      |_// _|              |_,UNIT=cuu_|                           |
|                                                                  |
|_____|
```

- If the UNIT operand is omitted, information about all virtual tapes will be displayed

- If the UNIT operand is specified, detailed information about the specified virtual tape cuu is displayed

- Example:

```
R2 0047 Display all virtual tapes
R2 0047 ------------------------------------------------------------
R2 0047
R2 0047 182   9.152.2.70, 2386                TAPE.AWS            WRITE
R2 0047
R2 0047 181   VSAM                            VTAPE1              WRITE
R2 0047
R2 0047 ------------------------------------------------------------
```

Simplified Use of DLBL Statements for VSAM Files

Job running in F4   Running in R1

```
// JOB BACKUP
// ON $CANCEL OR $ABEND GOTO VTAPSTOP
* FIRST DEFINE THE CLUSTER
// EXEC IDCAMS,SIZE=AUTO
  DEFINE CLUSTER ( -
         NAME (VTAPE.TEST.FILE) -
         ...
         CATALOG (MY.USER.CATALOG)
  IF LASTCC NE 0 THEN CANCEL JOB
/*
* NOW DO THE BACKUP INTO THE NEWLY CREATED CLUSTER
// DLBL MYVTAPE,'VTAPE.TEST.FILE',,VSAM,CAT=MYUCAT
// DLBL MYUCAT, 'MY.USER.CATALOG',,VSAM
VTAPE START,UNIT=480,LOC=VSAM,FILE='MYVTAPE'
// EXEC LIBR
   BACKUP LIB=PRD2 TAPE=480
/*
/. VTAPSTOP
VTAPE STOP,UNIT=480
/&
```

VTAPE
Data Handler

Label Area of R1
→ IJVTcuu
→ IJVCcuu

VSAM OPEN is performed
using IJBVTcuu DLBL

VTAPE SCOPE parameter

- With z/VSE 5.1 a new SCOPE parameter has been added

```
►►─────────────VTAPE START,UNIT=cuu──,[      ┌─,SCOPE=SYSTEM─┐
      └─ // ─┘                                │              ├──
                                              └─,SCOPE=JOB───┘
```

- The SCOPE parameter defines the lifetime of the VTAPE definition:

  - **SYSTEM** (default) specifies that the association can only be released by an explicit VTAPE STOP request

  - **JOB** specifies that the association can be released either by an explicit VTAPE STOP request or automatically during end-of-job (/&) processing
    - In this case the VTAPE definition is limited to a single job

Tivoli Storage Managers – Backup VSE data

Tivoli software

Server (e.g. Linux)

TSMAction
(Exit)

Virtual
Tape
Server

Temp

TSM
Server

Tivoli Storage Managers – Backup VSE data

Backup of a VSAM Clusters using TSM

```
* $$ JOB JNM=VSAMBKUP,DISP=L,CLASS=0
// JOB VSAMBKUP
// LIBDEF PHASE,SEARCH=IJSYSRS.SYSLIB
*   THIS JOB BACKS UP VSAM DATASETS
// DLBL IJSYSUC,'VSESP.USER.CATALOG',,VSAM
*
* THIS FUNCTION USES A VTAPE FOR OUTPUT
VTAPE START,UNIT=181,LOC=9.152.216.105,FILE='TSM:VSAM.AWS(BACKUP)',SCRATCH
// ASSGN SYS005,181
// EXEC IDCAMS,SIZE=AUTO
        BACKUP ( -
                VSAM.CONN.SAMPLE.DATA  -
                ... -
                )  -
                REW –
                NOCOMPACT –
                BUFFERS(3)
/*
// ASSGN SYS005,UA
VTAPE STOP,UNIT=181
/&
* $$ EOJ
```
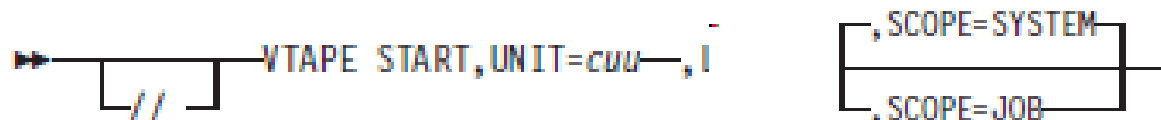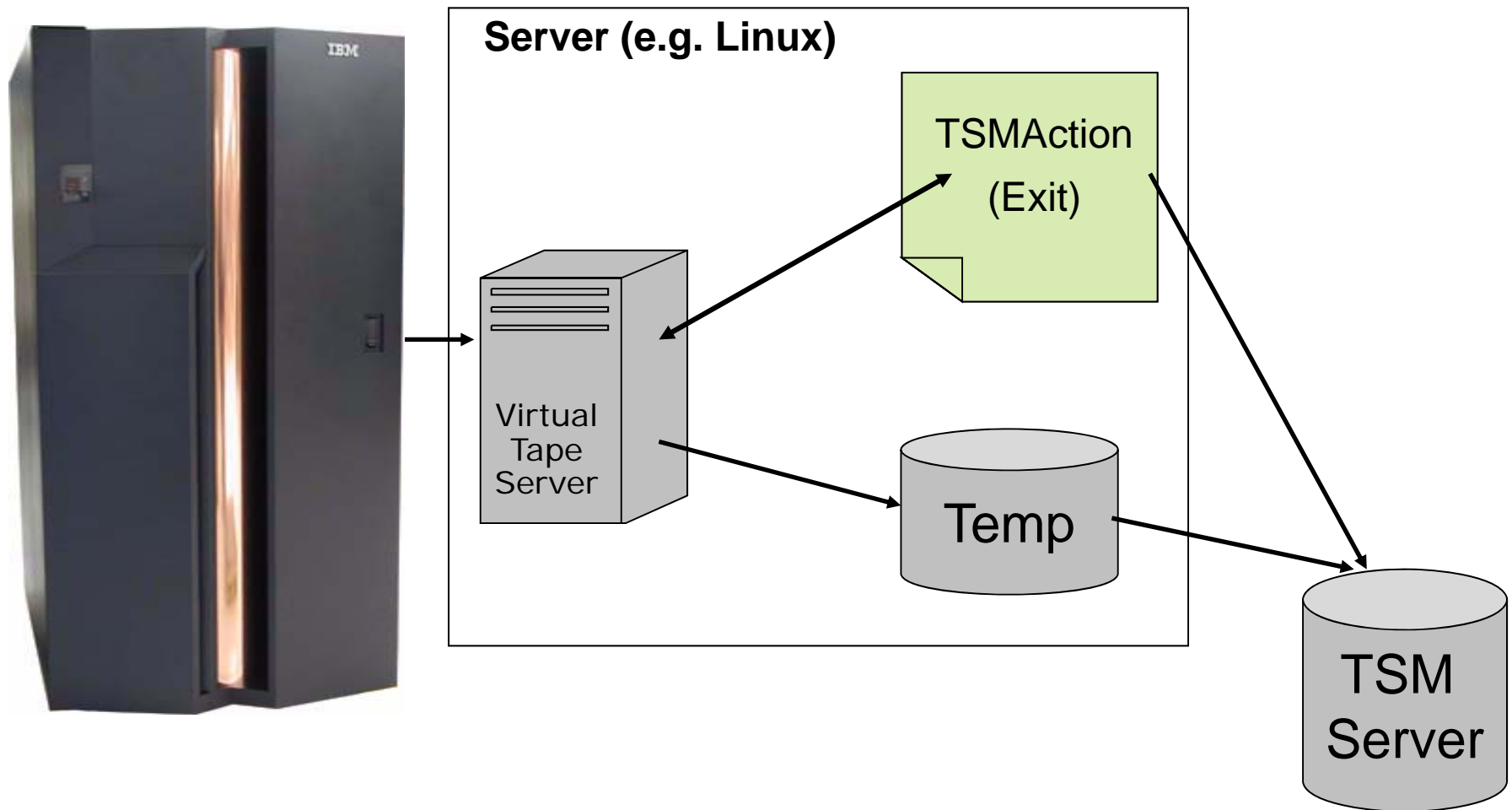
Syntax:
TSM:<name>(<mode>,<optionset>,
            <fromdate>,<fromtime>)

mode   - BACKUP or ARCHIVE
optionset - Name of the configuration
fromdate   - Date (for Restore)
fromtime   - Time (for Restore)

Hints & Tips for best performance

- **VSAM virtual tapes**
  - Traditional VSAM tuning helps to increase performance
    - Buffers
    - Optimization for sequential processing

- **Remote virtual Tapes**
  - Performance tuning falls back to TCP/IP and network tuning
    - Make sure the TCP Receive Window Size is set to 32K
    - High network throughput requires increased CPU Power
    - Reduce the number of hops between VSE and the VTAPE server
  - Make sure the partition priorities are right
    - ...,TCP/IP,VTAPE Server, ... , Job that uses VTAPE, ...

Latest PTFs and APARs

- Please check for latest PTFs on the following web page:
  - http://www.ibm.com/systems/z/os/zvse/support/vtape.html

- **Additional Information about VTAPE can be found in the following document:**
  - ftp://public.dhe.ibm.com/eserver/zseries/zos/vse/pdf3/VSEVirtualTapeSupport.pdf

AWSTAPE Format – tools and resources

- **AWSTAPE format descriptions:**
  - http://www.bustech.com/support/techtips/mas/awstape.htm
  - http://www.cbttape.org/awstape.htm

- **Tools:**
  - **AWSBROWS:** PC based browser for AWSTAPE files:
    http://www.cbttape.org/ftp/adhoc/Awsbrows.zip
    http://www.cbttape.org/~fish/AWSBrowse-1.5.1.1805-bin.zip

  - **LISTVOL1 Tool:** Reads the first 2 tape records of tape image in AWSTAPE format residing in a VSAM ESDS cluster and prints the VOLSER and FILEID from the VOL1 and HDR1 labels on the tape.
    http://ibm.com/vse goto Downloads and then Tools

  - **Data Extract Utility:** Extracts Tape files from a AWSTAPE image and stores each file in a separate file on your PC.
    Comes as part of VSE Virtual Tape Server

AWSBROWS – Browser for AWSTAPE files

LISTVOL1 Utility – What is on my virtual tapes?

- This tool helps to manage VSE VTAPE images stored in VSAM files
- It can display the VOLSER and File-ID of the files stored on the virtual tape without mounting it as VTAPE.
- The ListVOL1 utility reads the first 2 tape records of tape image
  - You can specify multiple VTAPE files
- It prints the VOLSER and FILE-ID from the VOL1 and HDR1 labels on the tape:

```
LISTVOL1 UTILITY - LIST VOL1/HDR1 LABELS OF VTAPES

FILENAME: VOLSER  FILE-ID
-------------------------------------------------------
VTAPE1   : TAPE00   TAPE.DATASET.00
VTAPE2   : PRDDAT   PRODUCTON.DATA
VTAPE3   : BACKUP   MY.BACKUP.FILE
-------------------------------------------------------


LISTVOL1 UTILITY - FINISHED
```

Extract Tool – Extract data from a AWSTAPE file

- Extracts Tape files from a AWSTAPE image
  - stores each file in a separate file on your PC
- Comes as part of VSE Virtual Tape Server

- To run it:
  - Extract.bat
    ```
    set
    classpath=.;VirtualTape.jar;vtapetools.jar;%classpath%
    java com.ibm.vse.vtape.tools.ExtractFiles %1
    ```

  - `Extract.bat <awstape-file>`

  - Output is one or more PC files named
    <awstape-file>.0 ... <awstape-file>. n.

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Stacking Tape Support

zVSE 5.2

- Backups of vital business data must be kept for a long time (e.g. 10 years)

- How can you ensure that the old-generation tape cartridges can still be read after 10 years?
  - Are there any tape drives available that can read old 3490 tapes?

- Customer often have to copy the old-generation tapes to tapes of a newer HW generation when migrating to new tape hardware

- Today's tape capacity is quite high (e.g. 4 TB for a 3592)
  - Old 3480 tapes usually contain only very little data
  - Waste of space and money (expensive tape cartridges)
    - if the copy is done on a 1 to 1 basis

- **Requirement:**
  - Allow to 'stack' several smaller tapes onto one larger tape
  - A modern 3592 cartridge has space for dozens/hundreds of old-generation tapes

Migrate
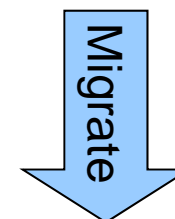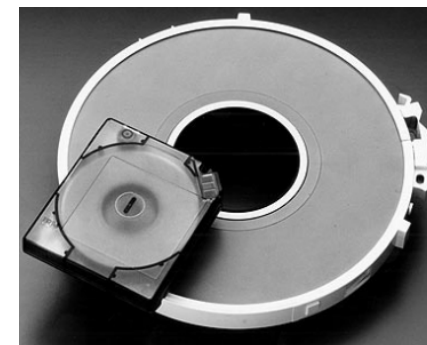
Stacking multiple smaller tapes onto one large tape

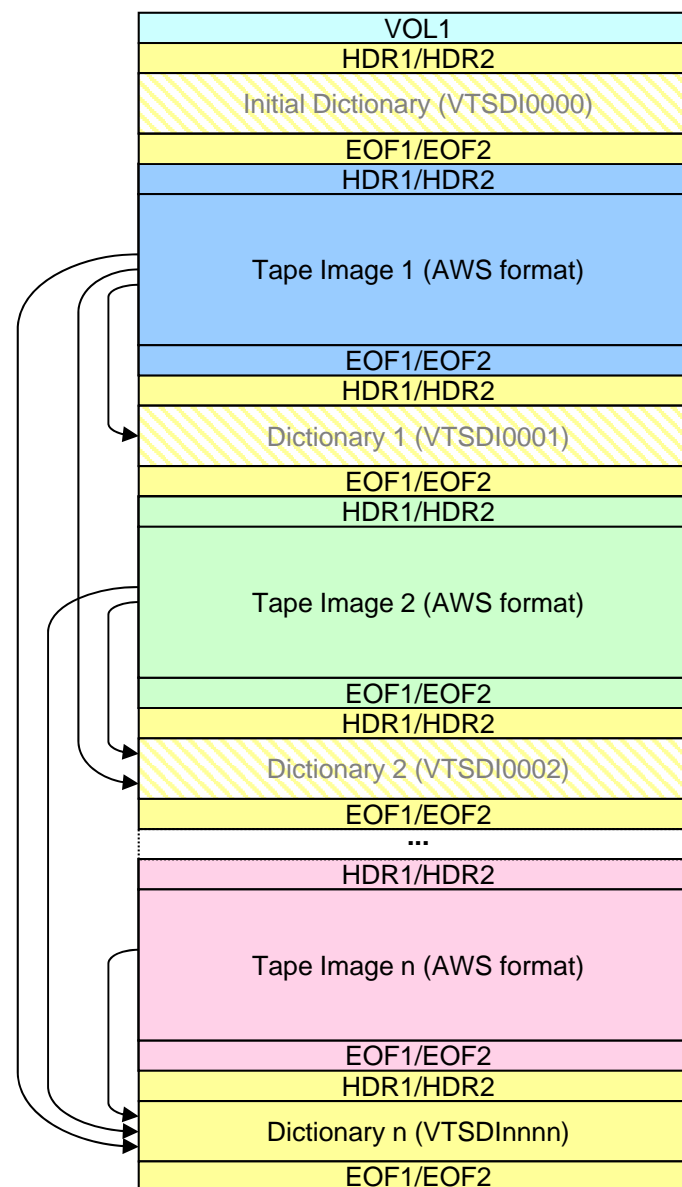A 3592 cartridge has space for dozens/hundreds of old-generation tapes

z/VSE's Stacking Tape Support

- **With z/VSE 5.2 z/VSE provides Stacking Tape support**
  - The VTAPE function provides tape-to-tape copy on a n:1 basis
    - by stacking multiple tape images on a single high-capacity tape cartridge (3592)
  - Basically its a VTAPE-on-Tape
    - Similar to VTAPE-on-VSAM ESDS or VTAPE-on-remote file
- **Allows you to stack multiple (old-generation) tapes onto a single high capacity tape**
  - You copy an entire old-generation tape onto the stacking tape
  - The stacking tape contains a directory of tape images contained
  - Later you can mount such a tape image on the stacking tape, and copy it back onto a smaller tape

Copy 1:1

Virtual Tape

z/VSE's VTAPE Support

Tape Image Tape Image

Tape Image Tape Image

Dictionary
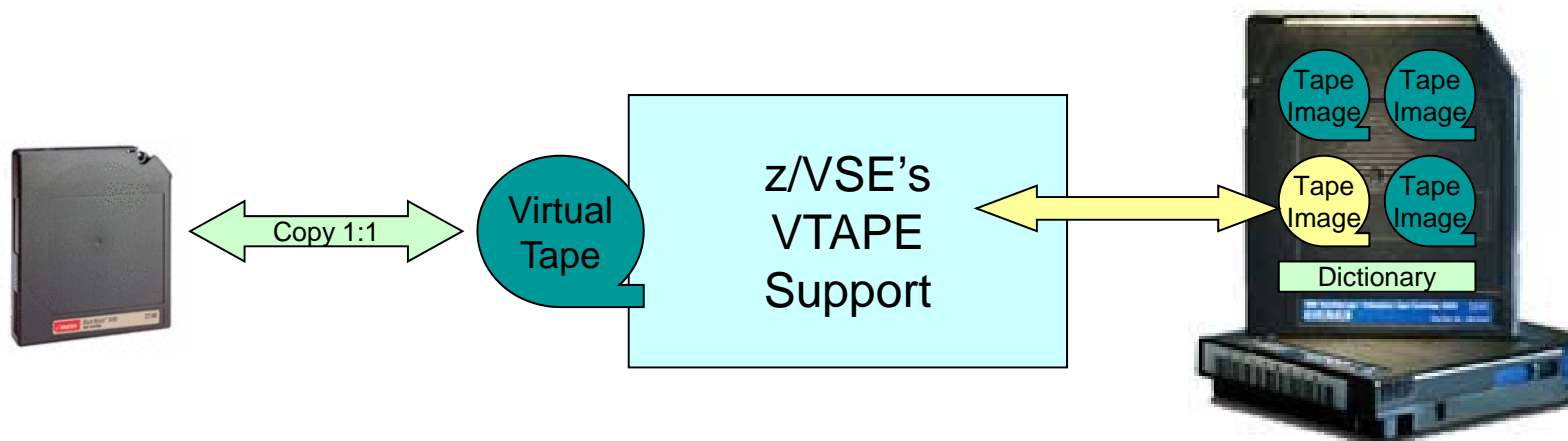
Stacking Tape - Layout

- **Stacking Tapes are standard IBM labeled tapes**
- **Each copied tape image is stored as regular SAM tape-file**
  - AWSTAPE format
  - RECFM=U
  - BLKSIZE=65528
  - Filename: as specified on VTAPE command
- **The AWS tape image file contains the <u>entire</u> copied tape, including**
  - Data
  - Tapemarks
  - Volume/file headers
- **Dictionary files contain a dictionary of all tape images on the stacking tape**
  - Only the last dictionary file on the tape is valid
  - For each tape image written to the stacking tape, a new dictionary file is written
  - Format: RECFM=F, LRECL=80
  - File name: VTSDInnnn (nnnn is a counting number)
- **A dictionary entry contains**
  - Name of the tape image
  - Size in mega bytes
  - Creation date
  - VOLSER (if tape image contains labeled tape)

VOL1
HDR1/HDR2
Initial Dictionary (VTSDI0000)
EOF1/EOF2
HDR1/HDR2
Tape Image 1 (AWS format)
EOF1/EOF2
HDR1/HDR2
Dictionary 1 (VTSDI0001)
EOF1/EOF2
HDR1/HDR2
Tape Image 2 (AWS format)
EOF1/EOF2
HDR1/HDR2
Dictionary 2 (VTSDI0002)
EOF1/EOF2
...
HDR1/HDR2
Tape Image n (AWS format)
EOF1/EOF2
HDR1/HDR2
Dictionary n (VTSDInnnn)
EOF1/EOF2

Initializing a stacking tape

- Before you can add tape images onto a stacking tape, you need to initialize it

      `// VTAPE INIT,STACKTAPE=cuu`

- Where `cuu` must be a
  - IBM standard label tape (must already contain a volume label)
  - An 3592 tape
- On **VTAPE INIT** the Virtual Tape Data Handler partition writes an initial directory as first file to the tape and issues a completion message on the console
- Once a stacking tape is initialized, it cannot be initialized again
  - Any subsequent **VTAPE INIT** function causes an error message
  - The **VTAPE LIST** and **VTAPE START** functions will fail, if the stacking tape has not been initialized

- **Note:** Do not mix up **VTAPE INIT** with DITTO INT or the INTTP utility
  - DITTO INT and the INTTP utility write new volume labels to the tape and the tape data is completely cleared
  - Once a stacking tape contains data it must not be initialized with DITTO INT or INTTP
    - unless the tape data is obsolete, and you really want to initialize the tape from scratch

Copying data onto a stacking tape
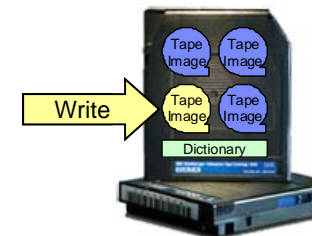
- Mount the stacking tape to start writing (copying) a new tape image onto it:

```
// VTAPE START,UNIT=cuu1,LOC=TAPE,STACKTAPE=cuu2,
                    FILE='MY-FIRST-FILE',WRITE
```

- A new (to be written) tape image is mounted as VTAPE on **cuu1**
- VTAPE START will first read the last directory on the stacking tape **cuu2**
  – To check if a tape image with the same name exists already
- The new tape image will be appended at the end of the stacking tape **cuu2**

- Use a tape copy tool to copy the entire content from the to-be-archived tape onto **cuu1**
  – e.g. **DITTO TT**
  – You can only use **pure sequential** processing on the mounted virtual tape

- **VTAPE STOP** closes the tape image
  – and writes an updated directory right behind this newly created tape image

Listing the contents of a stacking tape
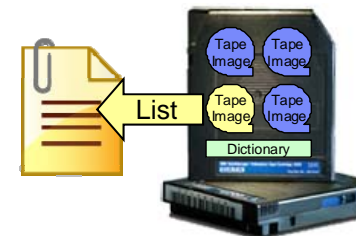
- The **VTAPE LIST** function displays information about the tape images that are listed in the last directory file on the stacking tape

```
// VTAPE LIST,STACKTAPE=cuu
```

- The contents is printed to SYSLOG (console)
- In addition the content is listed into library member <VOLSER>.LIST in PRD2.CONFIG

- A directory entry contains
  - The name of the tape image, as specified on the VTAPE START command for WRITE
  - The size in mega bytes
  - The creation date
  - The VOLSER (if tape image contains a labeled tape)

```
File------------ Date-- VOLSER Size---

MY-FIRST-FILE      140120 BKUP47    432M

MY-SECOND-FILE     140205 DATA01     97M

--------------------------------------
```

Reading from a stacking tape
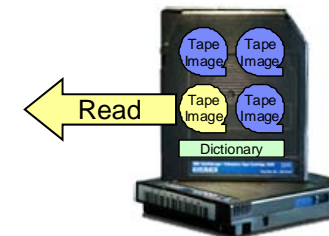
- Mount a specific tape image on the stacking tape to start reading (copying) from it:

```
// VTAPE START,UNIT=cuu1,LOC=TAPE,STACKTAPE=cuu2,
               FILE='MY-FIRST-FILE',READ
```

- **VTAPE START** will read the last directory on the stacking tape **cuu2**
    - To determine, whether a tape image with the specified file name exists
- Then, it positions the tape to the beginning of the specified file
    - … opens it and mounts it as VTAPE on **cuu1**

- Use a tape copy tool to copy the entire content from the virtual tape **cuu1** onto a physical tape (or onto another VSAM-VTAPE)
    - e.g. **DITTO TT**
    - You can only use **pure sequential** processing on the mounted virtual tape

- **VTAPE STOP** closes the tape image

Automatic repair

- In case of program abends, operator cancels or I/O problems with the stacking tape *CUU* can cause an abnormal termination of either the requester partition or the Virtual Tape Data Handler partition
  - In case of write access, the newly created virtual tape file on the stacking tape might be incomplete and therefore unusable
  - Also, the directory file might be missing or incomplete

- The next **VTAPE LIST** or **START** function detects this kind of tape corruption and performs an automatic repair
  - The tape is positioned to the last valid directory and writes two tape marks
    - thus indicating EOV (end of volume) and invalidating all data behind the last valid directory
  - If such a repair was processed, the Virtual Tape Data Handler partition writes the following message to SYSLOG:

    ```
    R1 0047 STACKING TAPE nnnnnn PROCESSED AN AUTOMATIC REPAIR.
    ```

- **Note:** The stacking tape must not be write-protected in order to allow for automatic repair
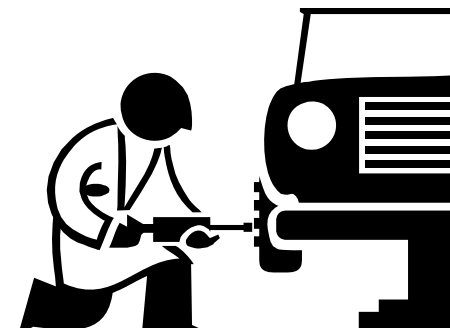
Restrictions & Considerations

- Existing virtual tape files on a stacking tape cannot be individually deleted modified, or replaced
- **VTAPE START** with **WRITE** access enabled can never change existing tape files
  - It can however add a new virtual tape file and a new directory to the stacking tape
- Stacking tapes can be accessed only with WRITE or READ access. SCRATCH access is not supported
  - If all data on a stacking tape has become obsolete, you can initialize the tape from scratch with DITTO INT or the INTTP utility
- Concurrent VTAPE access to files on one stacking tape is not supported
  - Even **VTAPE LIST** is rejected, if a virtual tape file is open for read or write via **VTAPE START**
- The Virtual Tape Data Handler partition requires ownership of the stacking tape *cuu* while processing VTAPE functions and I/O operations
  - No other partition can use this tape *cuu*, because tape ownership is exclusive
- There is no alternate tape support for stacking tapes.
  - All virtual tape files and their corresponding directory files must reside on one single tape volume
- If a virtual tape on a stacking tape is accessed with **VTAPE START**, it must not be positioned with the **MTC** command
- Only utilities, which read or write strictly sequentially without any repositioning are supported
- When running with a tape library, you must issue a LIBSERV command to mount stacking tape volumes and establish ownership for the Tape Data Handler partition

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