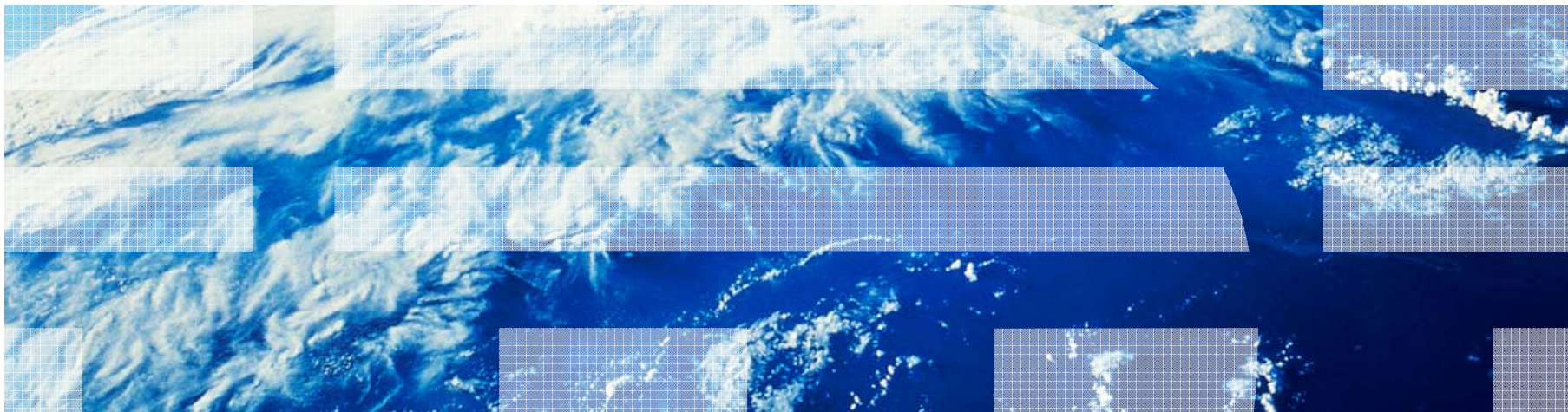


# Backup Lösungen für System z mit und ohne Bänder



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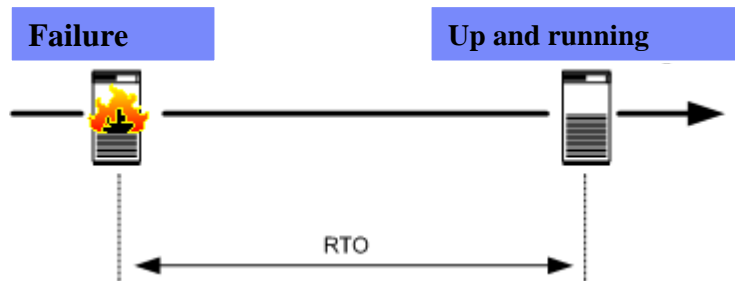
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# Identify RTO, RPO und NRO

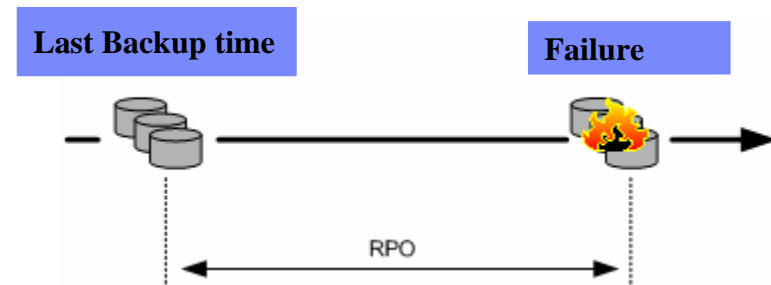


Business Resiliency Plan



## Recovery Time Objective (RTO)

What time difference can be between Failure and a total productional run level ?



## Recovery Point Objective (RPO)

What is the toleration for data loss?

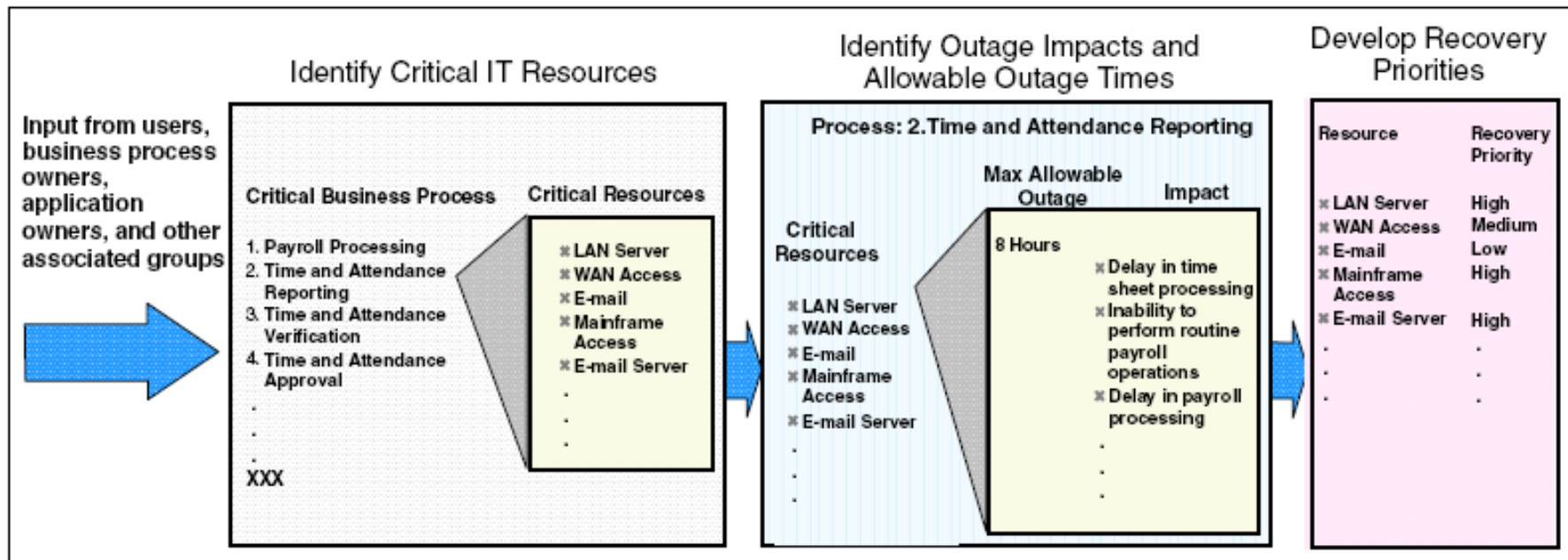
RPO = "0" means, NULL data loss acceptable

RPO = "5" means, data loss in last 5 min acceptable

**TREND: RPO = 0**

## The Business impact analysis (BIA)

- IT Resource relation and priorities for Recovery
- Consider all environments
- Prioritize based on business importance



*Example of the Business Impact Analysis process*

---

## Agenda

- **Step 1: Define your Backup strategy based on BIA (Business Impact Analysis)**
  - Data Level Backup
  - Bare Metal / System Level Backup – High Availability
  - Disaster Recovery Backup
  
- **Step 2: Select the right products – enterprise focus**
  - Native products (i.e. Acronis, tar, DFSMS)
  - Backup & Restore Manager for z/VM
  - Tivoli Flashcopy Manager
  - TSM – Tivoli Storage Manager
  
- **Step 3: Define and Implement Your Solution**
  - Reference Solution 1: Native products for special requirements
  - Reference Solution 2: z/VM based recovery
  - Reference Solution 3: Linux/TSM based recovery
  - Get Prepared for the restoration process
  
- **Hints & Tips**

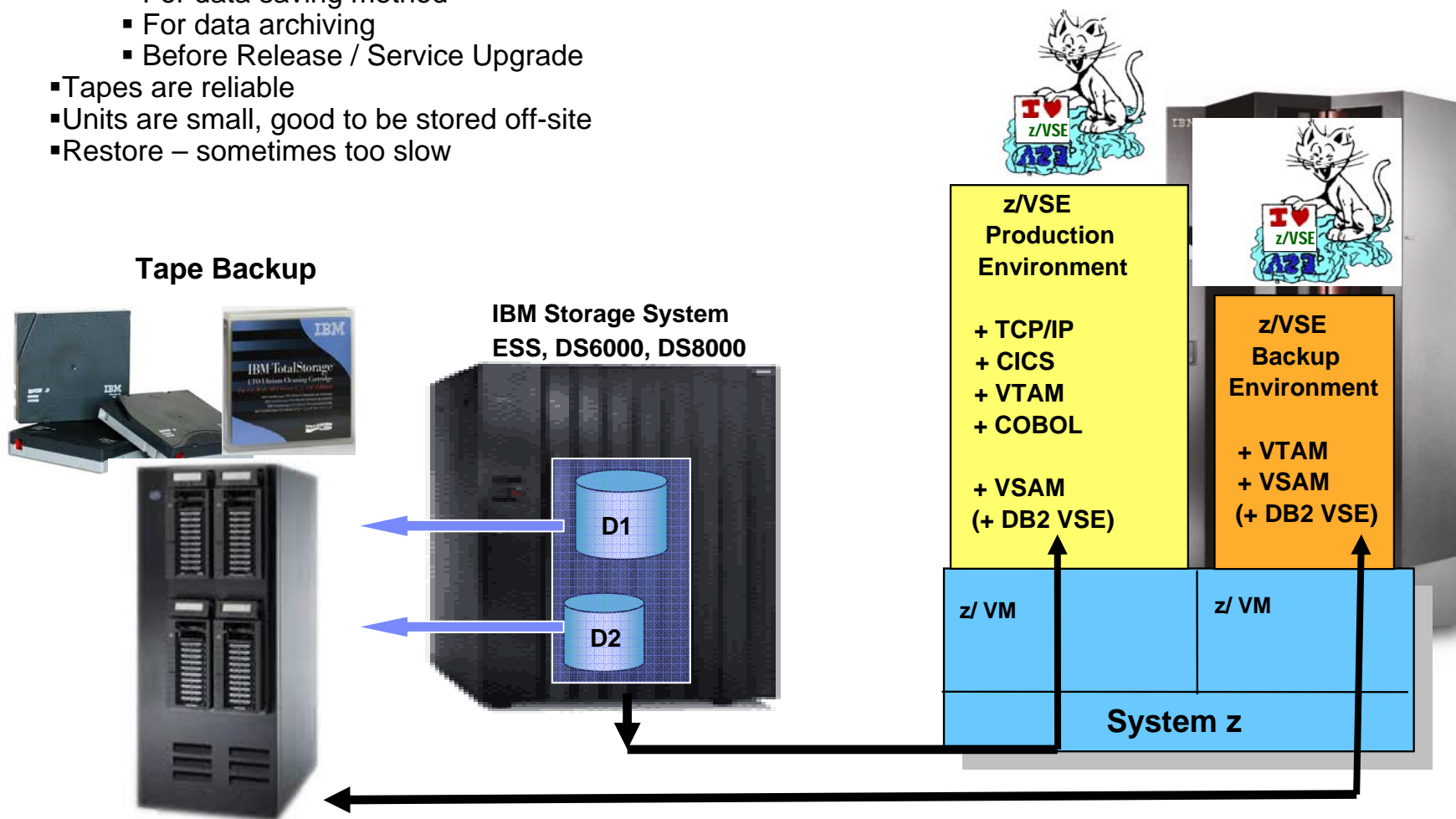
## Agenda

- **Step 1: Define your Backup strategy based on BIA (Business Impact Analysis)**
  - **Data Level Backup**
    - Backup using tapes – Virtual Tapes for short time backups
    - Temporary Backup using Copy Services – Flashcopy
    - Backup on Real tapes - for long time archiving
  - **Bare Metal / System Level Backup – High Availability**
  - **Disaster Recovery Backup**
  
- **Step 2: Select the right products – enterprise focus**
  - Native products (i.e. Acronis, tar, DFSMS)
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  - TSM
  
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  - Reference Solution 1: Native products DFSMS based disaster recovery
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  - Reference Solution 3: Linux/TSM based recovery
  - Get Prepared for the restoration process
  
- **Hints & Tips**

### Traditional Backup to tape:

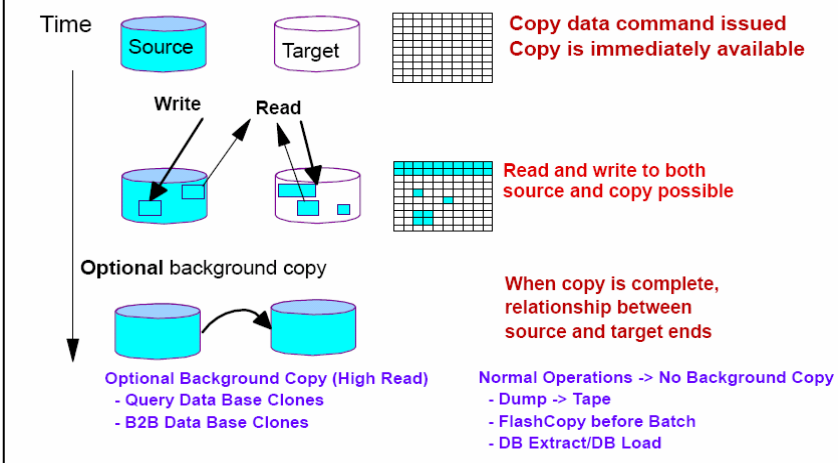
- Before batch run
- After batch run
- Before system updates
- For data saving method
- For data archiving
- Before Release / Service Upgrade
- Tapes are reliable
- Units are small, good to be stored off-site
- Restore – sometimes too slow

### Backup Procedures with Tapes

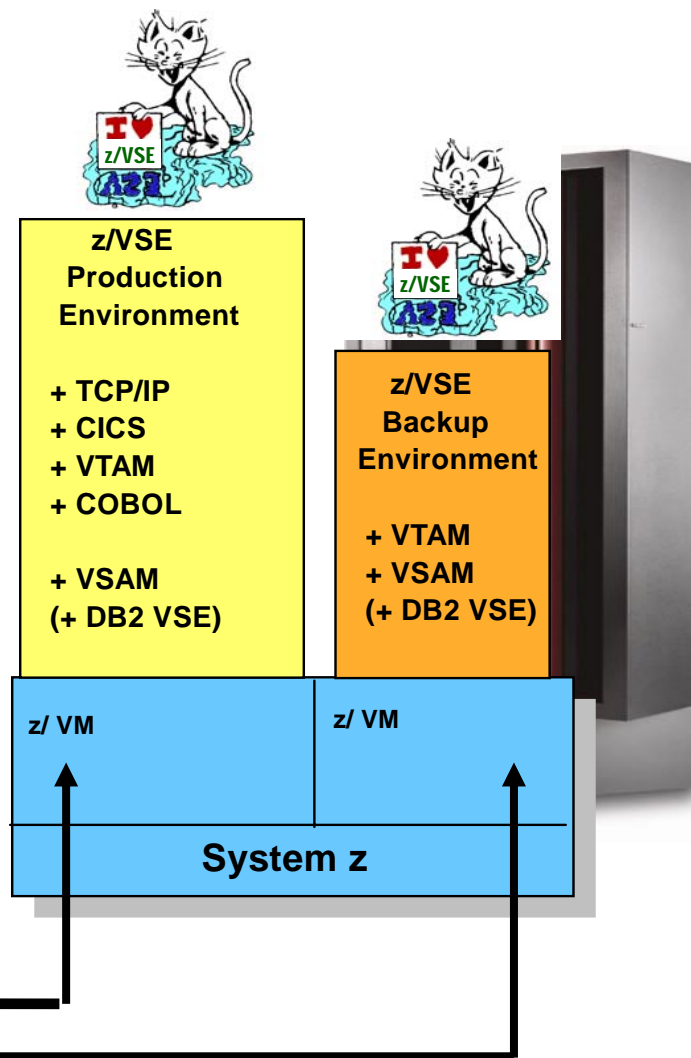




### DS8000 / DS6000 / ESS Flash Copy



## IT Environment for almost 24x7 Availability



### Flashcopy:

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

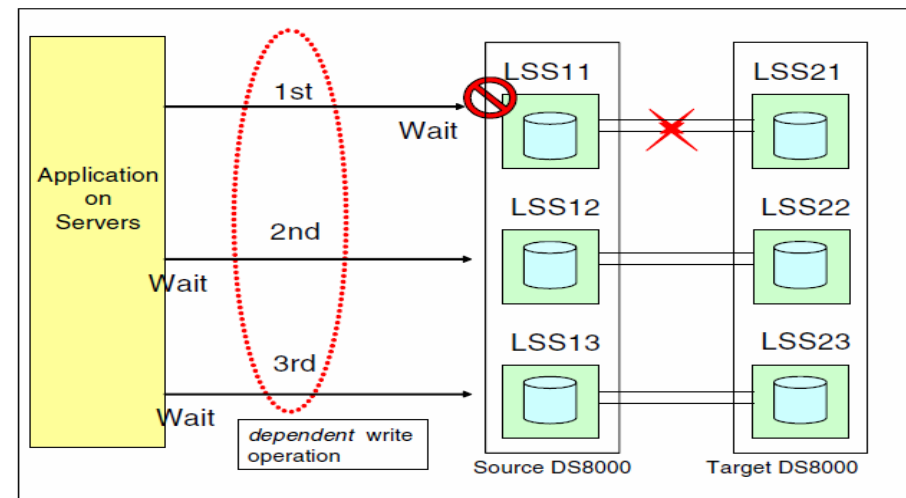
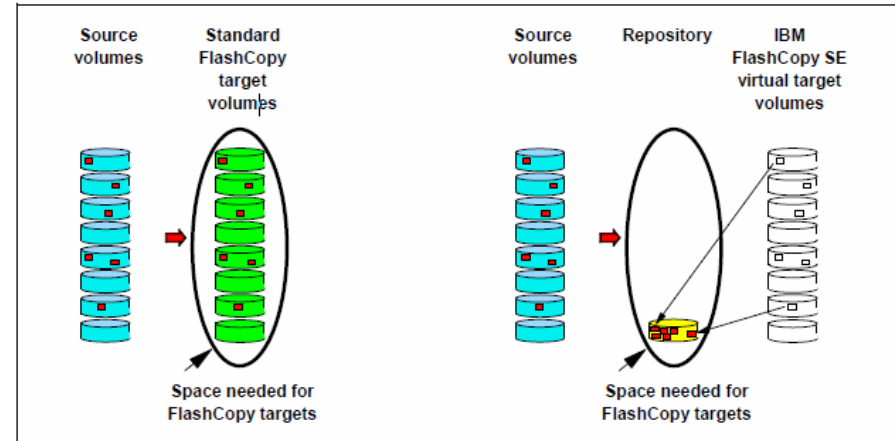
### Backup from flash copied disks



# z/VSE – System Storage Support

## FlashCopy

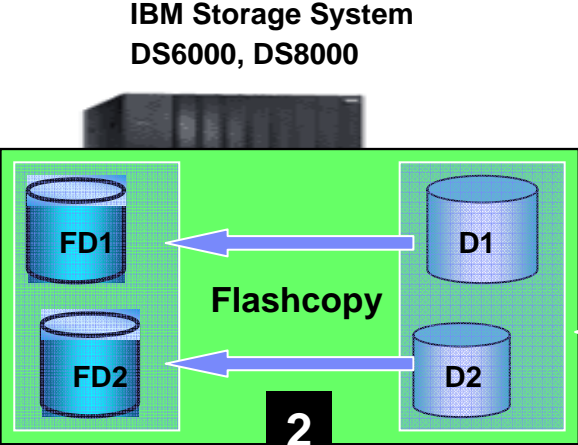
- **FlashCopy Space Efficient (SE)**
- z/VSE 4.2 +
  - volumes do not occupy physical capacity when created but are seen as a virtual volumes
  - space gets allocated from a repository when data is actually written to the volume – **NOCOPY option only**
  
- **Consistency group** (in z/VSE 4.3+)
  - applications have spread their data over multiple volumes and must be kept at a consistent level (like DB2, VSAM).
  - manage the consistency of dependent writes by FREEZE the source volume for up to 2 min



# Backup options

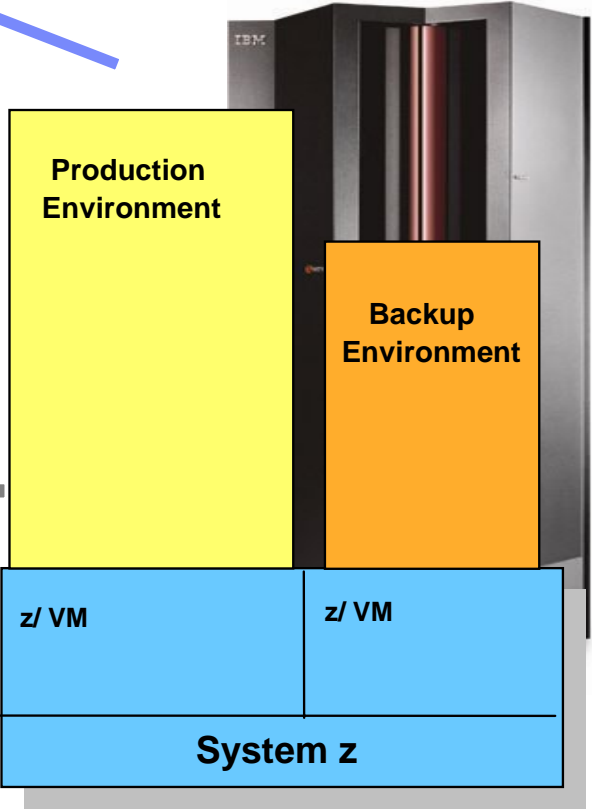
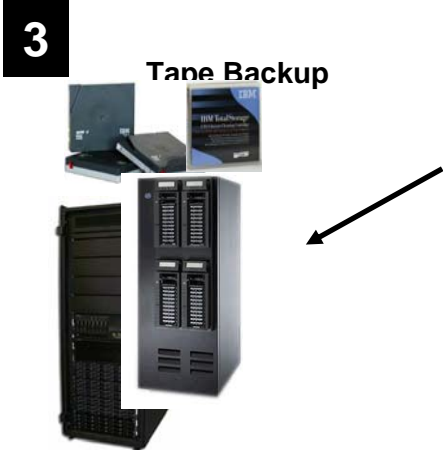


**Backup from flashed Volumes**  
- Runs in parallel with production  
- minimum impact on production



**Flashcopy backup:**

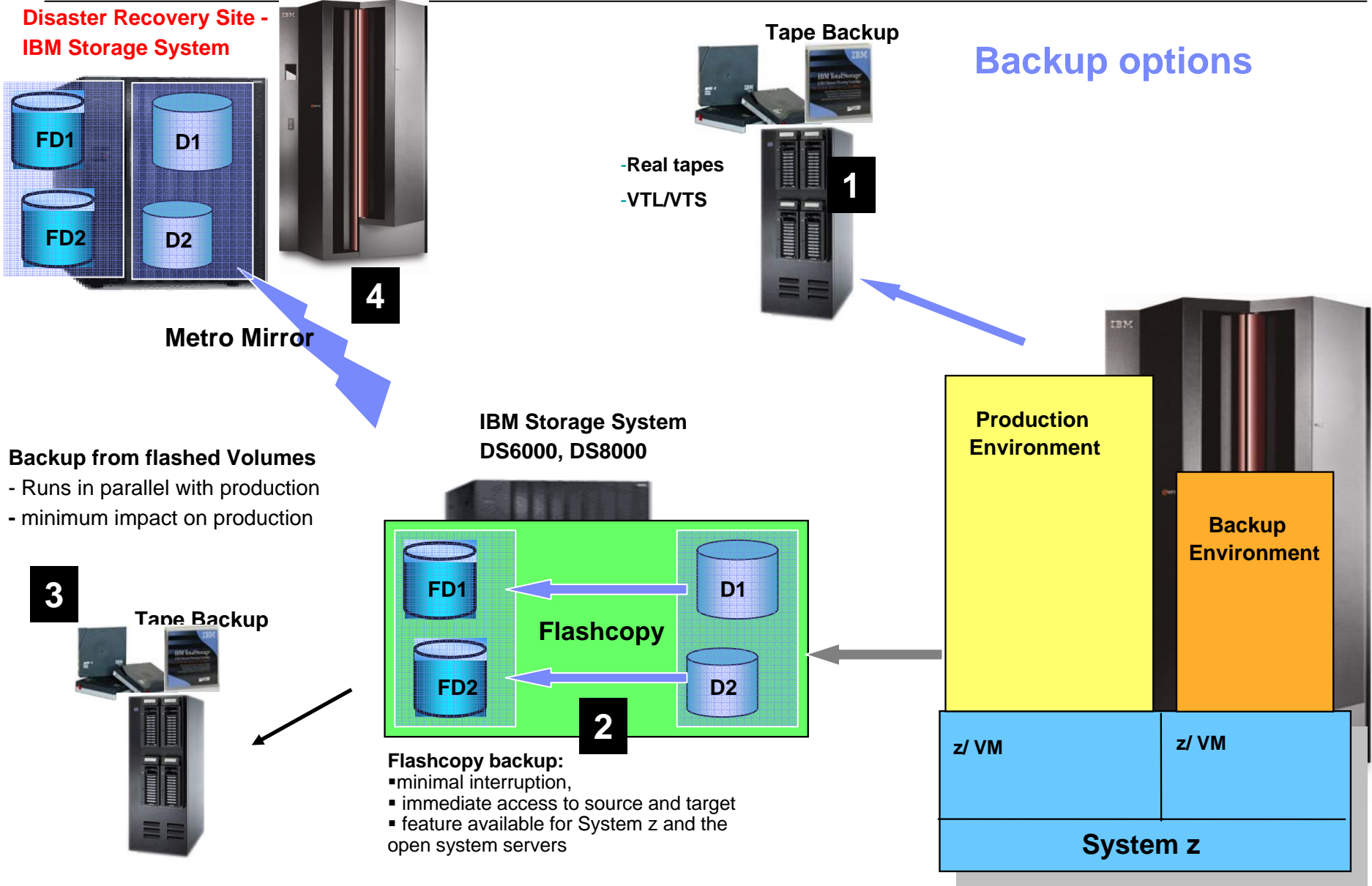
- minimal interruption,
- immediate access to source and target
- feature available for System z and the open system servers



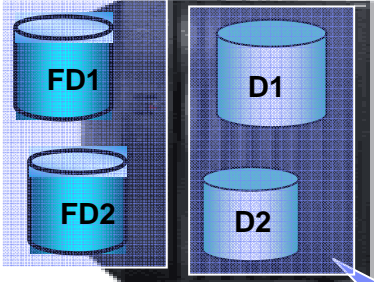
## Agenda

- **Step 1: Define your Backup strategy based on BIA (Business Impact Analysis)**
  - **Data Level Backup**
    - Temporary Backup using Copy Services – Flashcopy
    - Backup using tapes – Virtual Tapes for short time backups
    - Backup on Real tapes - for long time archiving
  - **Bare Metal / System Level Backup – DR**
    - Periodically full system/disk backups
    - Automatically with Replication services
  - **Disaster Recovery Backup**
  
- **Step 2: Select the right products – enterprise focus**
  - Native products (i.e. Acronis, tar, DFSMS)
  - Backup & Restore Manager for z/VM
  - Tivoli Flashcopy manager
  - TSM
  
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  - Get Prepared for the restoration process
  
- **Hints & Tips**

# Backup options



**Disaster Recovery Site -  
IBM Storage System**




**Metro Mirror**

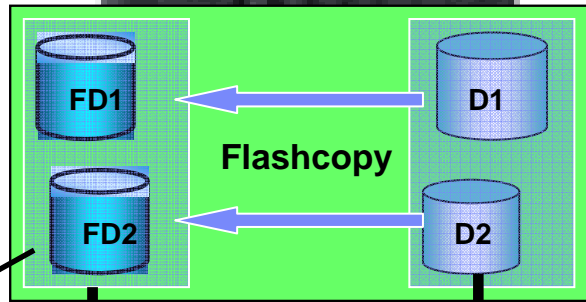
- Flashcopy:**
- minimal interruption,
  - immediate access to source and target
  - feature available for zSeries and the open system servers



**Tape Backup**

  
(TPC) Totalstorage Productivity Center  
for Replication  
IBM Tivoli Flashcopy Manager

**IBM Storage System  
ESS, DS6000, DS8000**



**Flashcopy**

**Backups with 2-site Real-Time  
Replication for Disaster Recovery**



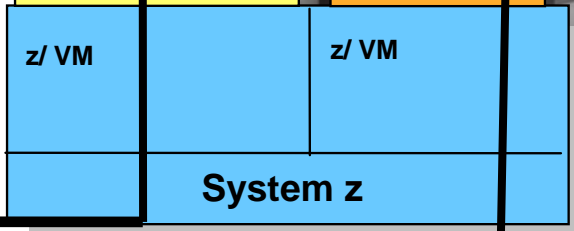
**z/VSE  
Production  
Environment**

- + TCP/IP
- + CICS
- + VTAM
- + COBOL
  
- + VSAM  
(+ DB2 VSE)



**z/VSE  
Backup  
Environment**

- + VTAM
- + VSAM  
(+ DB2 VSE)



( offline backup process )

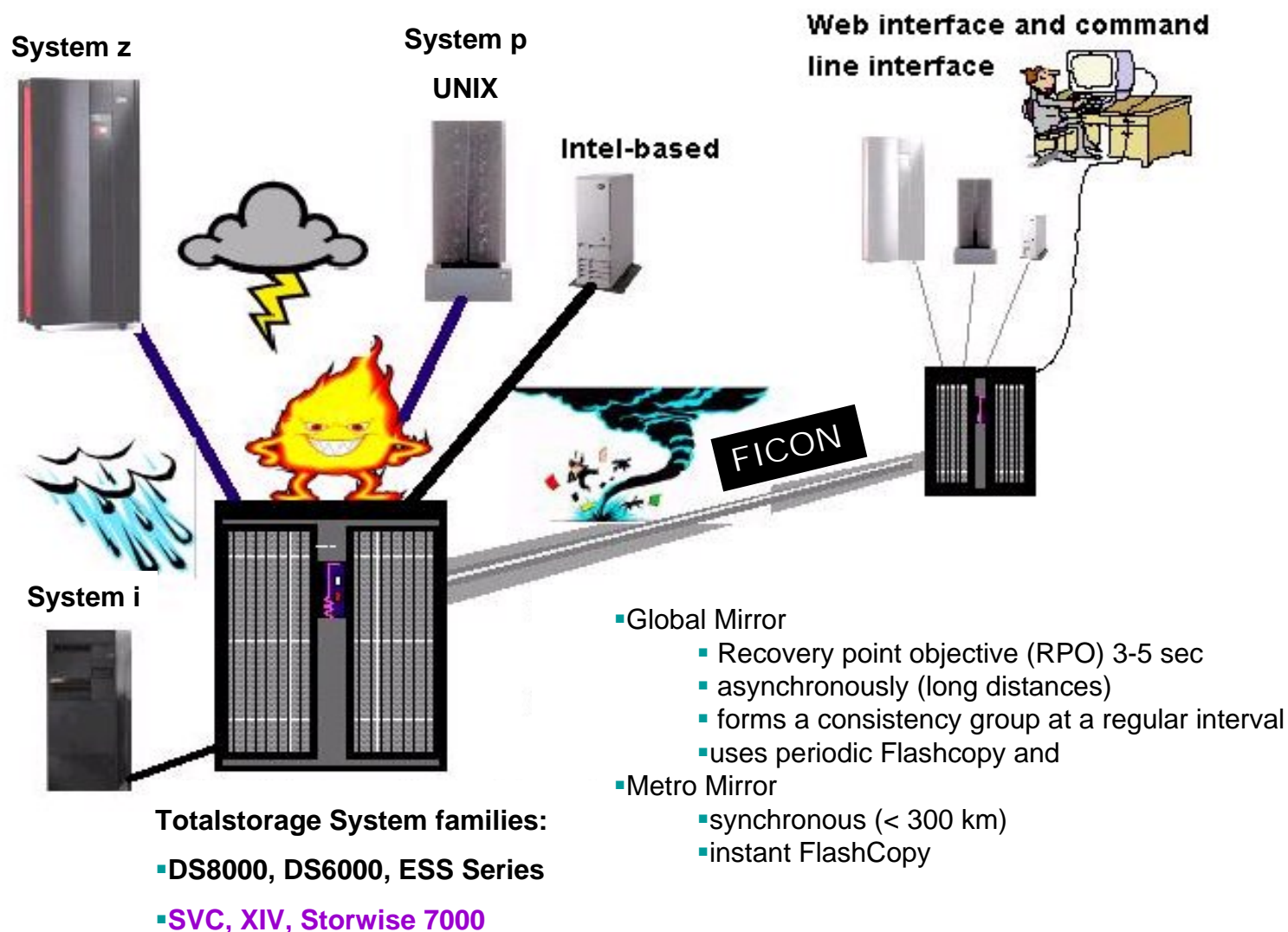
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  - **Data Level Backup**
    - Temporary Backup using Copy Services – Flashcopy
    - Backup using tapes – Virtual Tapes for short time backups
    - Backup on Real tapes - for long time archiving
  - **Bare Metal / System Level Backup – High Availability**
    - Periodically full system/disk backups
    - Automatically with Replication services
  - **Disaster Recovery Backup**
    - Disk Replication services
    - Off-site tapes for entire environment
  
- **Step 2: Select the right products – enterprise focus**
  - **Native products (i.e. Acronis, tar, DFSMS)**
  - **Backup & Restore Manager for z/VM**
  - **Tivoli Flashcopy manager**
  - **TSM**
  
- **Step 3: Define and Implement Your Solution**
  - **Reference Solution 1: Native products for special requirements**
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  - **Reference Solution 3: Linux/TSM based recovery**
  - **Get Prepared for the restoration process**



## Enterprise Storage solutions

– Disaster Recovery (DR) and the ‘Peer to Peer Remote Copy’ (PPRC)



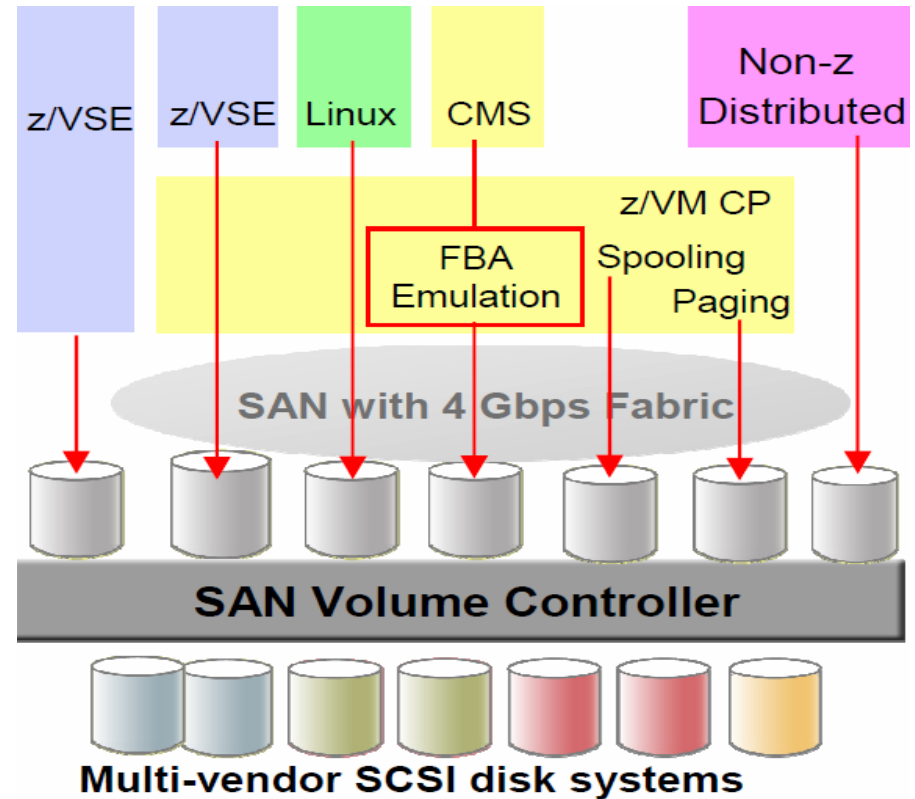


# Storage Virtualization -SVC

## SVC (SAN Volume Controller) :

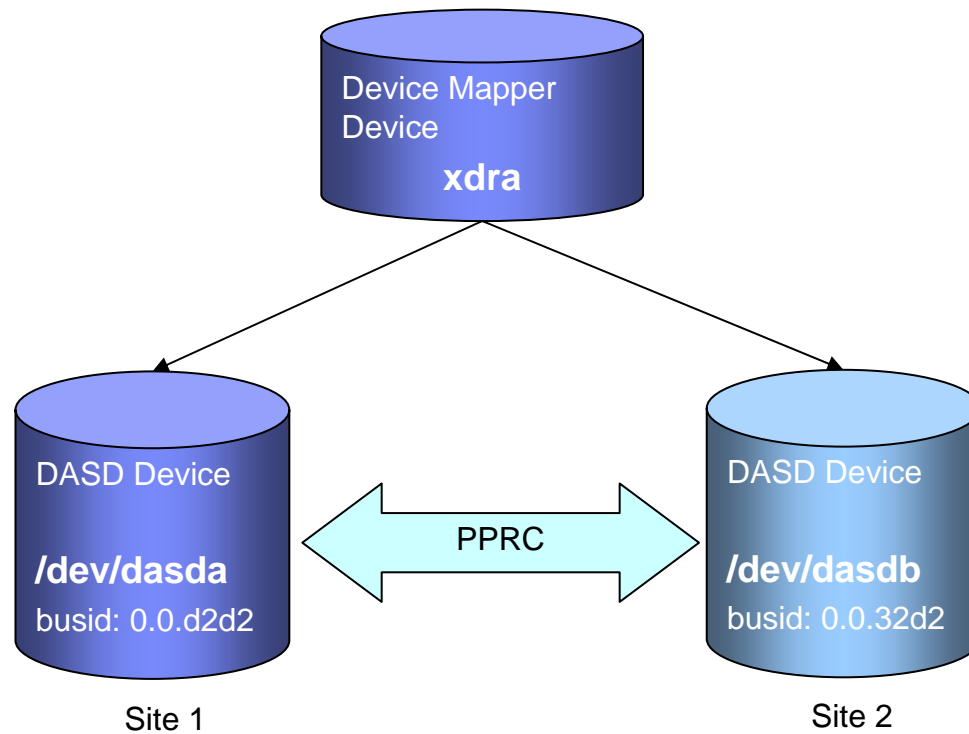
- SAN Volume Controller (SVC) creates a single pool of SCSI disk capacity
- Disk storage options include IBM DS8000, DS4000, etc. XIV, Storvise 7000 plus qualified systems from various non-IBM vendors

- Copy Services available via SVC (i.e disk `Flashcopy` and HA via streched SVC)
- Tivoli Flashcopy Manager handles and automates Totalstorage Flashcopy and SVC Copy Services



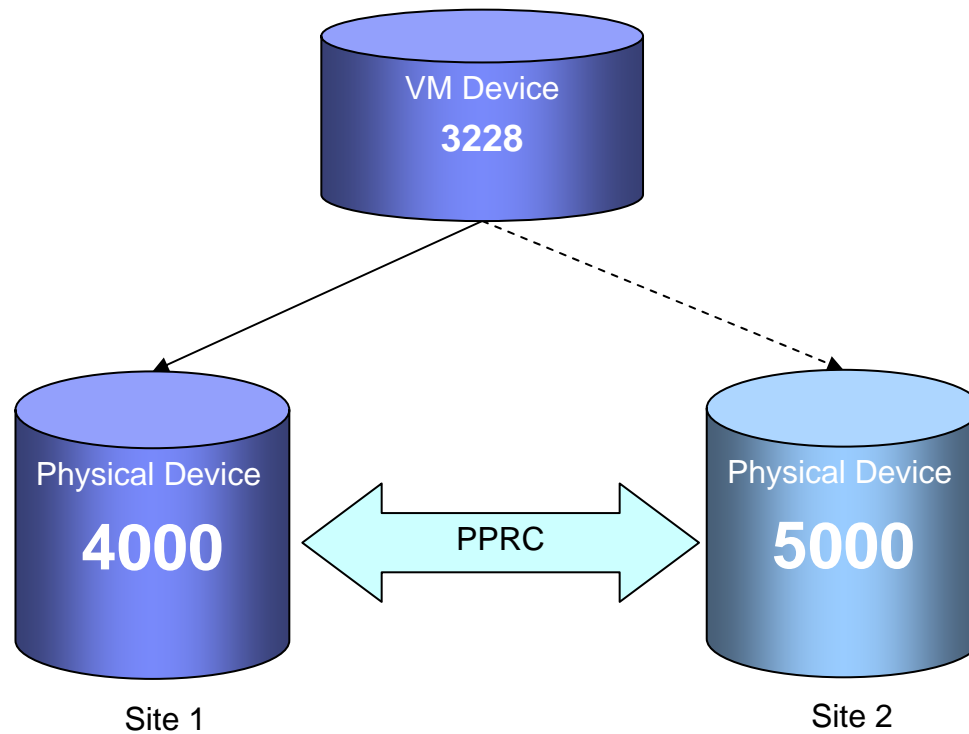
# HyperSwap: Implementation in Native Mode for Linux

- Linux device mapper is used for logical mapping (target is multipath)
- Multipath tools are used to set up the device pairs during IPL automatically
- Explicit control commands to the DASD devices and the device mapper are used to do the HyperSwap



## HyperSwap: Implementation in z/VM

- Standard VM mechanisms are used for logical mapping
- VM provides a CP interface that allows to configure PPRCed devices and do the HyperSwap



---

## Purpose of Tapes – why tapes are still important today

### Tapes can be REAL TAPES or Virtual Tapes

- Per usage definition tapes are for another media to keep data
- Backup of data
  - For ensured alternative long life media
  - For archiving data over a long period
  - For storing data in a extreme secured place (i.e.bunker)
- Historically shown as very reliable
- Many procedures that ensure Backup of:
  - vital data,
  - subsystems,
  - Entire DASD images
- Tape replacements have to be compatible with existing procedures
  - Virtual tapes
  - Virtual Tape Libraries (VTL, VTS)

## Tape options for z/VSE

### Standalone tape drives :

- (3480)
- 3490, 3490E
- 3590 Model A, E and H
- 3592 J1A , E05 (TS1120) and E06 (TS1130)  
(where E05 and E06 are encryption capable drives)



### Tape Library : physical

- TS3500



### Tape Library : logical

- TS7680 Protect Tier Deduplication Gateway
- TS7700 Virtualization Engine



## TS7700 Virtualization Engine - Family

- **TS7720 (disk only )** - supported with z/VSE 4.2
- **TS7740 (attaches to a TS3500)** supported with z/VSE 3.1
- Single Cluster GRID support only up to z/VSE 4. 3
- Multi Cluster GRID support with z/VSE 5. 1
- Copy Export support with z/VSE 5.1



**!New!** Disaster Recovery (DR) support with the TS7700 Virtualization Engine

## TS7700 Virtualization Engine

### TS7720 Virtualization Engine

- **disk-only** configuration
- Tape Volume Cache capacity up to 70 TB of uncompressed data
- NO physical tape library for back-end processing
- The number of logical volumes is limited by the size of the cache





## TS7700 Virtualization Engine

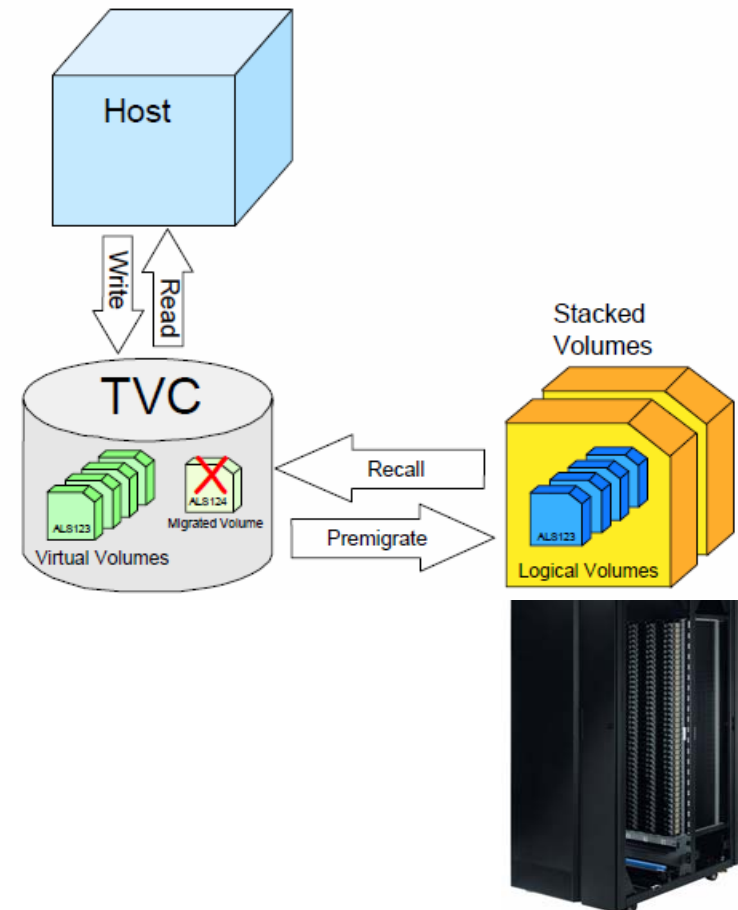
### **TS7740** Virtualization Engine (attaches to a TS3500)

- Maximum of 256 virtual drives (3490E)  
and 1,000,000 virtual volumes
- Web-based management tools
- up to 6 TB native tape volume cache
- Supports TS1120 / TS1130 tape drive-based encryption
- Supports logical WORM (Write Once Read Many) ,  
in z/VSE 4.3 and newer

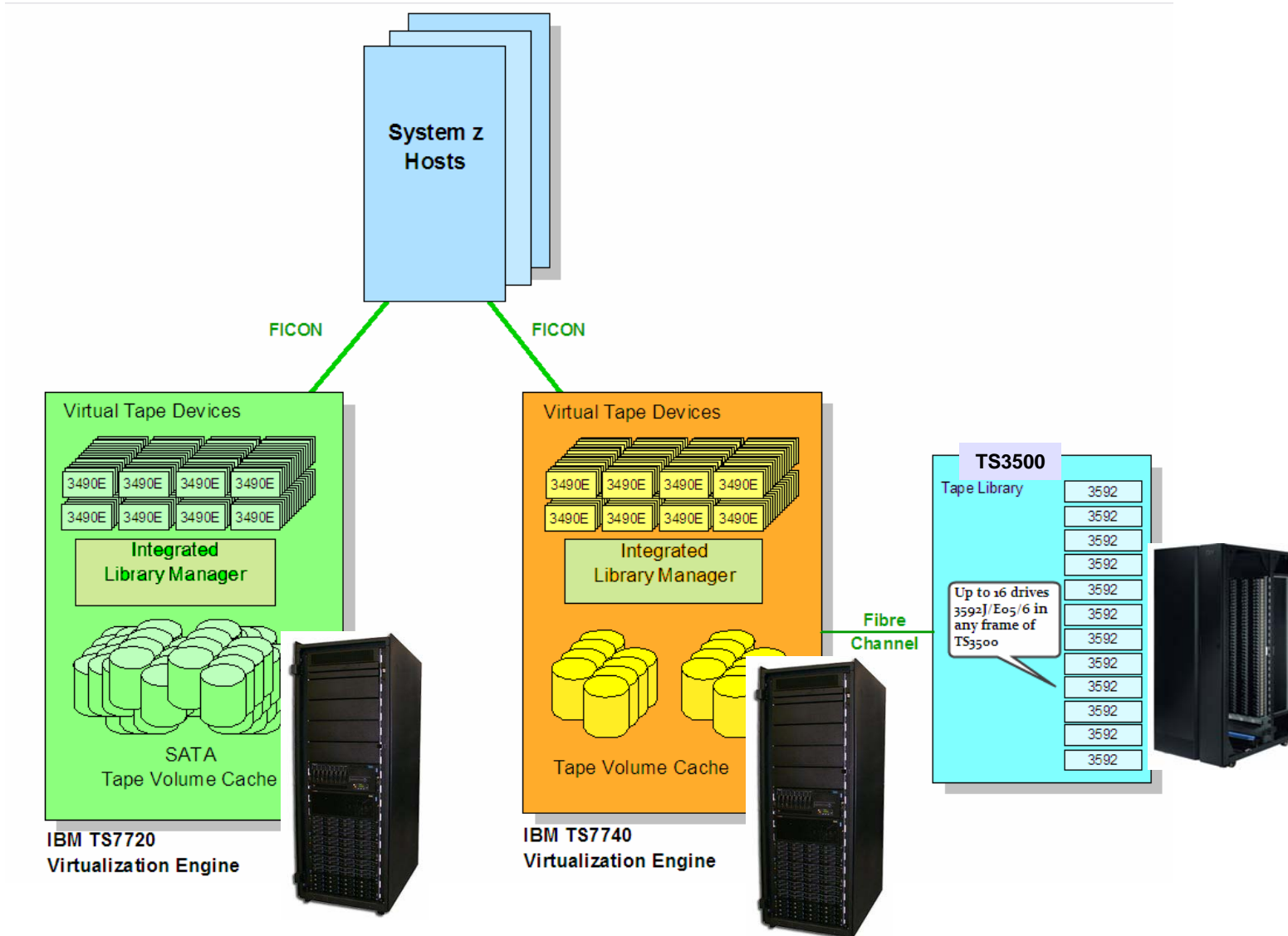


## TS3500 Tape Library – attachment option for TS7740

- The physical tape drives of the **TS3500** are managed by the **TS7740** Virtualization Engine internal management software.
- They cannot be accessed from any other attached host
- These drives are used exclusively by the TS7740 Virtualization Engine
  - for the mounts required for copying virtual volumes to stacked volumes,
  - recalling virtual volumes into the cache,
  - reclaiming stacked volume space

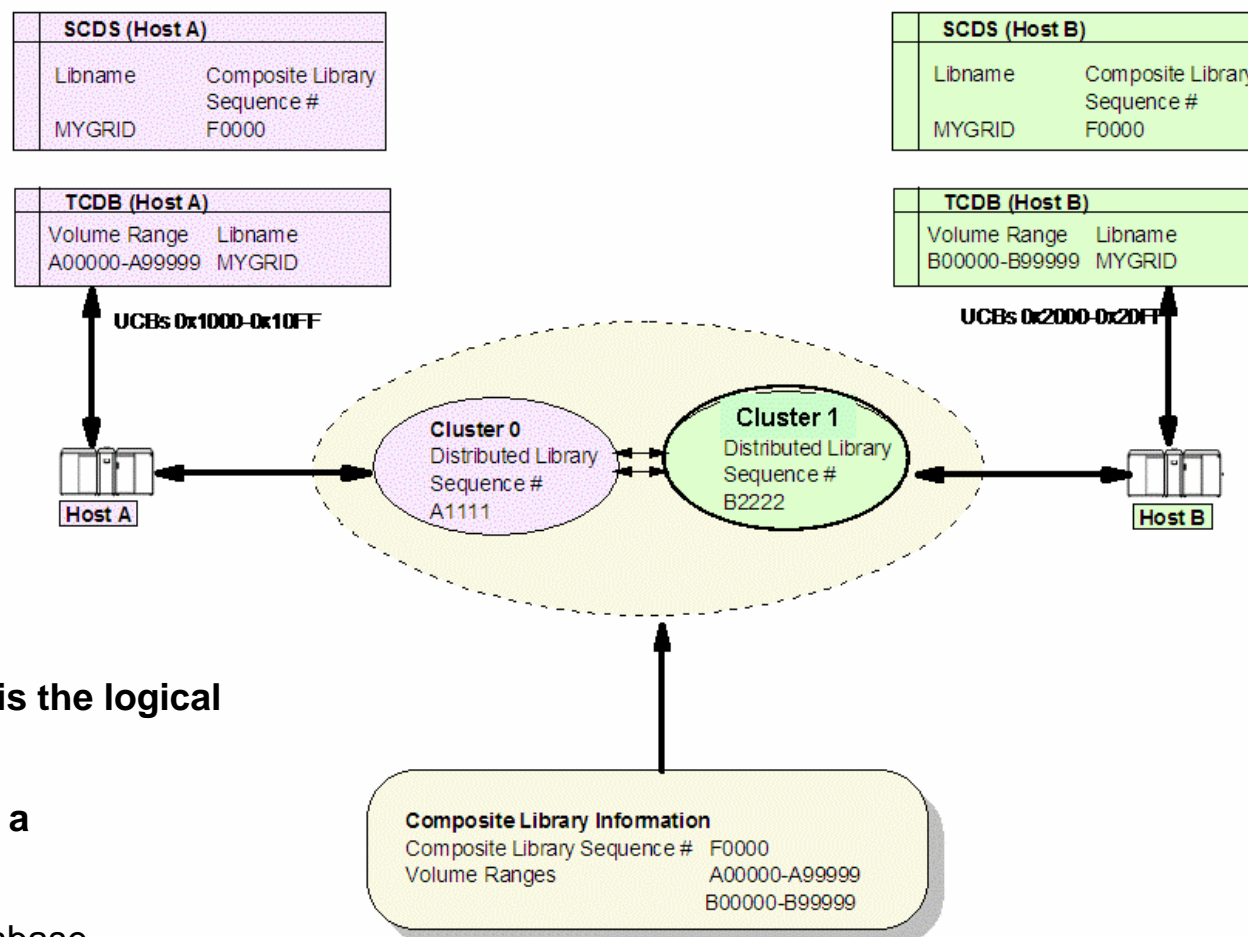


# TS7700 Virtualization Engine - Summary



# TS7700 Virtualization Engine - Grid

## TS7700 : two - Cluster GRID



The Composite Library is the logical image of the grid

Each cluster in a grid is a Distributed Library

TCDB - Tape Config Database  
SCDS - Source Control Dataset

---

## TS7700 Virtualization Engine – z/VSE Grid support

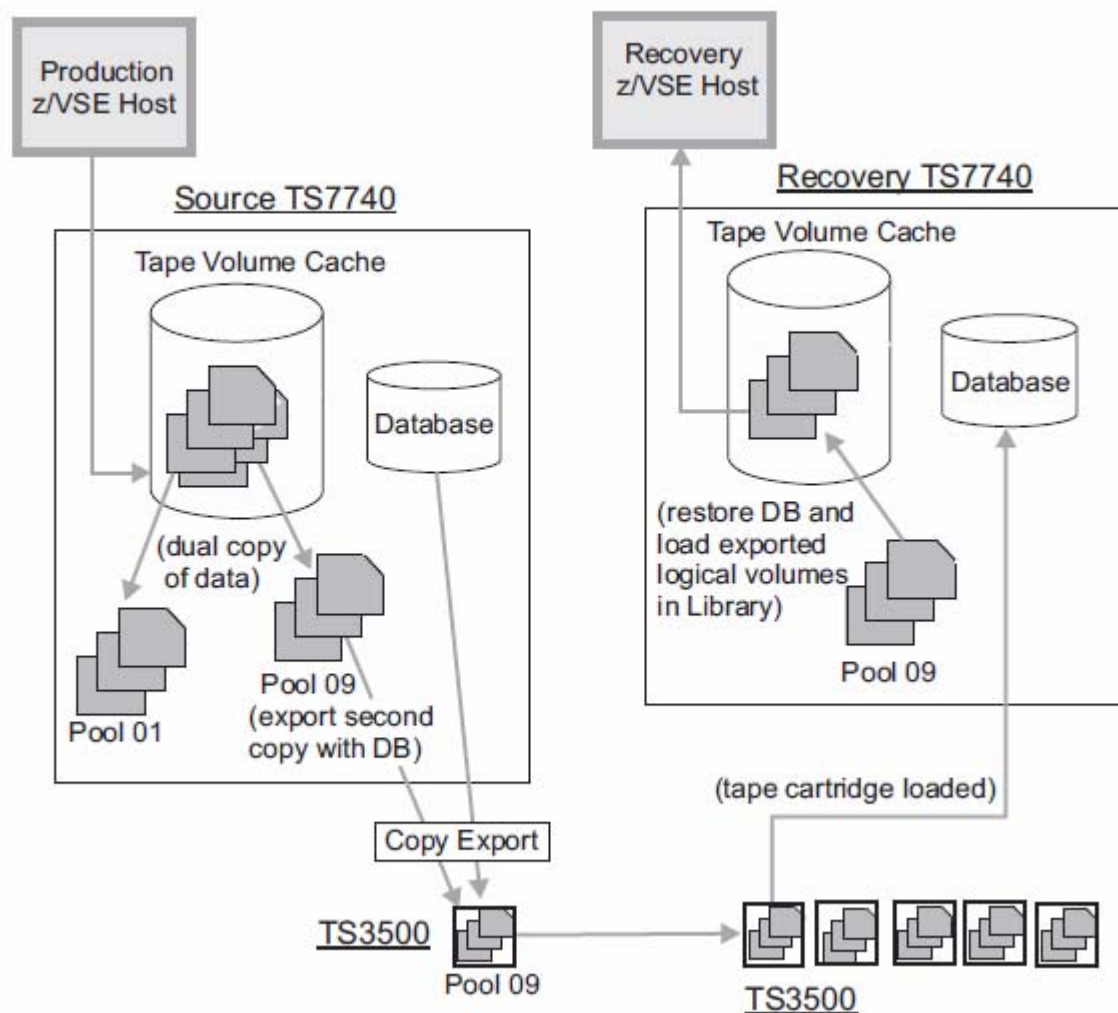
### **TS7700 Multi Cluster GRID support introduced in z/VSE 5.1**

- Two, three or four TS7700 Virtualization Engines can be interconnected through Ethernet links to form a *Multi Cluster Grid configuration*.
- Any data replicated between the clusters is accessible through any other cluster in a Grid configuration.
- Through remote volume access, you can reach any virtual volume through any virtual device.
- By setting up policies on the TS7700 Virtualization Engines Management Interface (MI), you define where and when you want to have multiple copies of your data.
- A Grid configuration looks like a single storage subsystem to the hosts.
- Whether a single- or multi-cluster configuration, the entire subsystem appears as a single tape library to the attached hosts. This can be described as a composite library with underlying distributed libraries.

The distributed libraries are not seen from the host.

# TS7700 Virtualization Engine – Copy Export - z/VSE 5.1

## TS7700 Copy Export support



---

## TS7700 Virtualization Engine

### **TS7700 Copy Export support** with z/VSE 5.1

- Copy export provides a new function that allows a copy of selected logical volumes written to the TS7700 to be removed and taken offsite for disaster recovery (DR) purposes.
- Since the data being exported is a copy of the logical volume, the logical volume data remains accessible by the production host systems.
- During the Copy Export operation, a copy of the current TS7700's database is written to the exported physical volumes.
- To restore access to the data on the physical volumes removed, all exported physical volumes for a source TS7700 are placed into a library that is attached to an empty TS7700.
- A disaster recovery procedure is then performed that restores access using the latest copy of the database.



# TS7700 Virtualization Engine

## TS7700 Copy Export support

```

* $$ JOB JNM=SKCOPYEX,CLASS=0,DISP=D
* $$ LST CLASS=A
// JOB SKCOPEX ...*
STEP 1 : CREATE COPY EXPORT LIST FILE VOLUME *
* *****
* PLEASE CHANGE THE ASSGN AND LIBSERV STATEMENT TO MATCH *
* THE CUU ,VOLSER AND TAPE LIBRARY NAME IN THE TS7700 *
* ATTENTION: - ALL DATA ON THE TAPE WILL GET DELETED *
* - DO NOT SPECIFY COMPACTION MODE IN ASSIGN *
* *****
// ASSGN SYS005,CUU
// LIBSERV MOUNT,UNIT=CUU,VOL=VOLSER/W,LIB=LIBRARY
// TLBL COPYTP,'COPY.EXPORT.VOL',,VOLSER
* *****
* FILE 1 : EXPORT LIST *
* PLEASE CHANGE XX TO CORRESPONDING PHYSICAL VOLUME POOL *
* THAT CONTAINS THE LOGICAL VOLUMES TO EXPORT *
* *****
// EXEC IJBCPYEX,SIZE=IJBCPYEX,PARM='TAPE=DD:SYS005-COPYTP ELFV=CR_F1'
EXPORT LIST 03
EXPORT PARAMETERS PHYSICAL POOL TO EXPORT:XX
OPTIONS1, COPY,EJECT
/*

```

# TS7700 Virtualization Engine

## TS7700 Copy Export support

```

* *****
* FILE 2 : RESERVED FILE *
* THE RESERVED FILE MUST BE PRESENT(FOR FUTURE USE) *
* *****
// EXEC IJBCPYEX,SIZE=IJBCPYEX,PARM='TAPE=DD:SYS005-COPYTP ELFV=CR_F2'
RESERVED FILE
/*
* *****
* FILE 3 : EXPORT STATUS FILE *
* CHECK THIS FILE AFTER THE EXPORT OPERATION IS COMPLETED*
* FOR COPY EXPORT RESULTS *
* *****
// EXEC IJBCPYEX,SIZE=IJBCPYEX,PARM='TAPE=DD:SYS005-COPYTP ELFV=CR_F3'
EXPORT STATUS 01
/*
// LIBSERV RELEASE,UNIT=CUU
// PAUSE
* *****
* STEP 2 : INITIATE THE COPY EXPORT OPERATION *
* *****
* INITIATE COPY EXPORT OPERATION AT THE TS7700 *
* PLEASE CHANGE VOLSER AND LIBRARY *
* *****
// LIBSERV COPYEX,VOL=VOLSER,LIB=LIBRARY
/&
* $$ EOJ

```

## Agenda

- **Step 1: Define your Backup strategy based on BIA (Business Impact Analysis)**
  - Data Level Backup
  - Bare Metal / System Level Backup – High Availability
  - Disaster Recovery Backup
  
- **Step 2: Select the right products – enterprise focus**
  - **Native products (i.e. Acronis, tar, IDCAMS, DFSMS)**
    - Are covering a small area or one backup point (i.e. raw data vs. database)
  - **Backup & Restore Manager for z/VM**
    - System Backup for z/VM data and z/VM guests
    - Raw Disk backup
  - **Tivoli Flashcopy Manager**
    - Copy services (incl. Flashcopy), for disk based backup
  - **Tivoli Storage Manager (TSM)**
    - Automated Backup for various heterogeneous platforms
    - Integration with Databases and different disk organizations (SCSI, ECKD)
  
- **Step 3: Define and Implement Your Solution**
  - Reference Solution 1: Native products for special requirements
  - Reference Solution 2: z/VM based recovery
  - Reference Solution 3: Linux/TSM based recovery
  - Get Prepared for the restoration process
  
- **Hints & Tips**

## Agenda

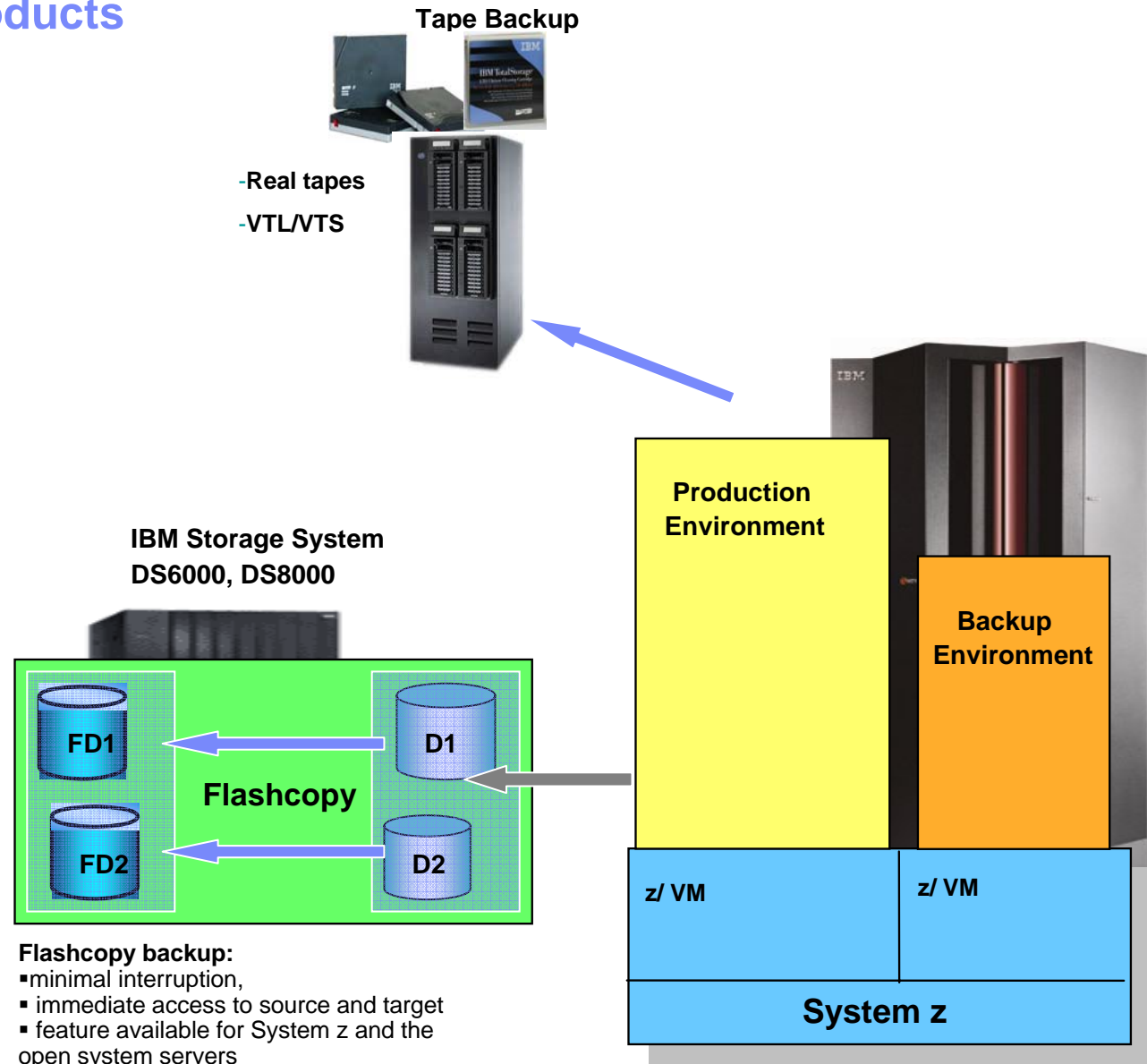
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  - Native products (i.e. Acronis, IDCAMS, tar, DFSMS)
  - Backup & Restore Manager for z/VM
  - Tivoli Flashcopy manager
  - Tivoli Storage Manager (TSM)
  
- **Step 3: Define and Implement Your Solution**
  - **Reference Solution 1: Native products for special requirements**
    - z/VSE or z/OS based Backup for FICON attached tape units
  - **Reference Solution 2: z/VM based recovery**
    - z/VM Backup for Full volume Backup and full System
  - **Reference Solution 3: Linux/TSM based recovery**
    - TSM Backup for all platforms and application data
  - **Get Prepared for the restoration process**
    - Define procedures for automatic Restore or Recovery to meet RTO and RPO
  
- **Hints & Tips**

## Backup via native products

### Native products for special requirements

**z/VSE based Backup** requires:

- FICON attached tape units
- **Linux Backup via native functions** is not very efficient
- **Backup z/VM data** in Linux requires SLES11 SP2 or RHEL6 for R/W CMSFS access
- Flashcopy brings efficiency
- Tivoli Flashcopy Manager helps automate and control

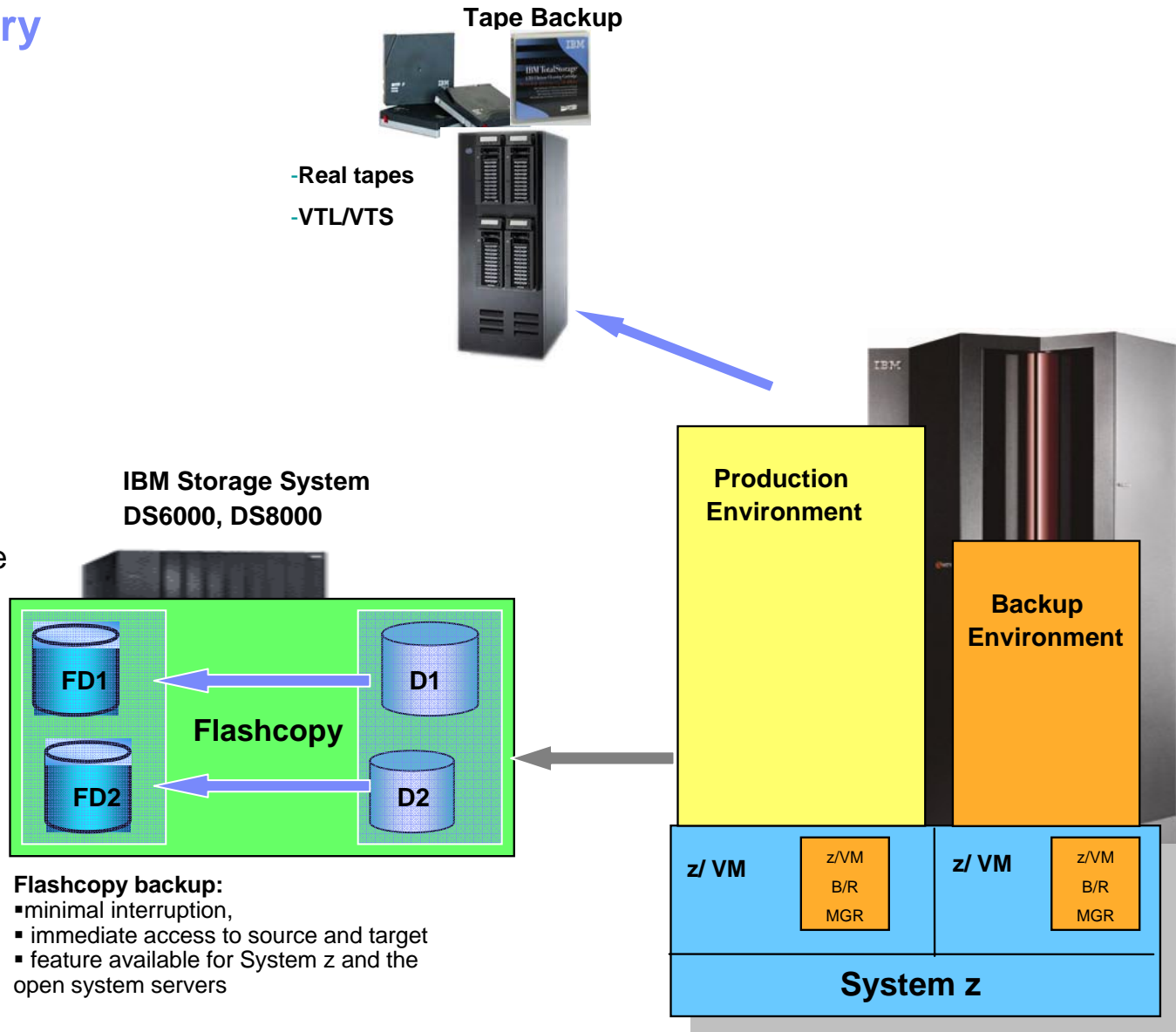


## z/VM based recovery

### z/VM Backup and Restore Manager

z/VM based Backup requires:

- FICON attached tape units
- **Linux Backup** via its native functions on NFS device, is not very efficient but manageable
- Flashcopy brings efficiency
- Tivoli Flashcopy Manager helps



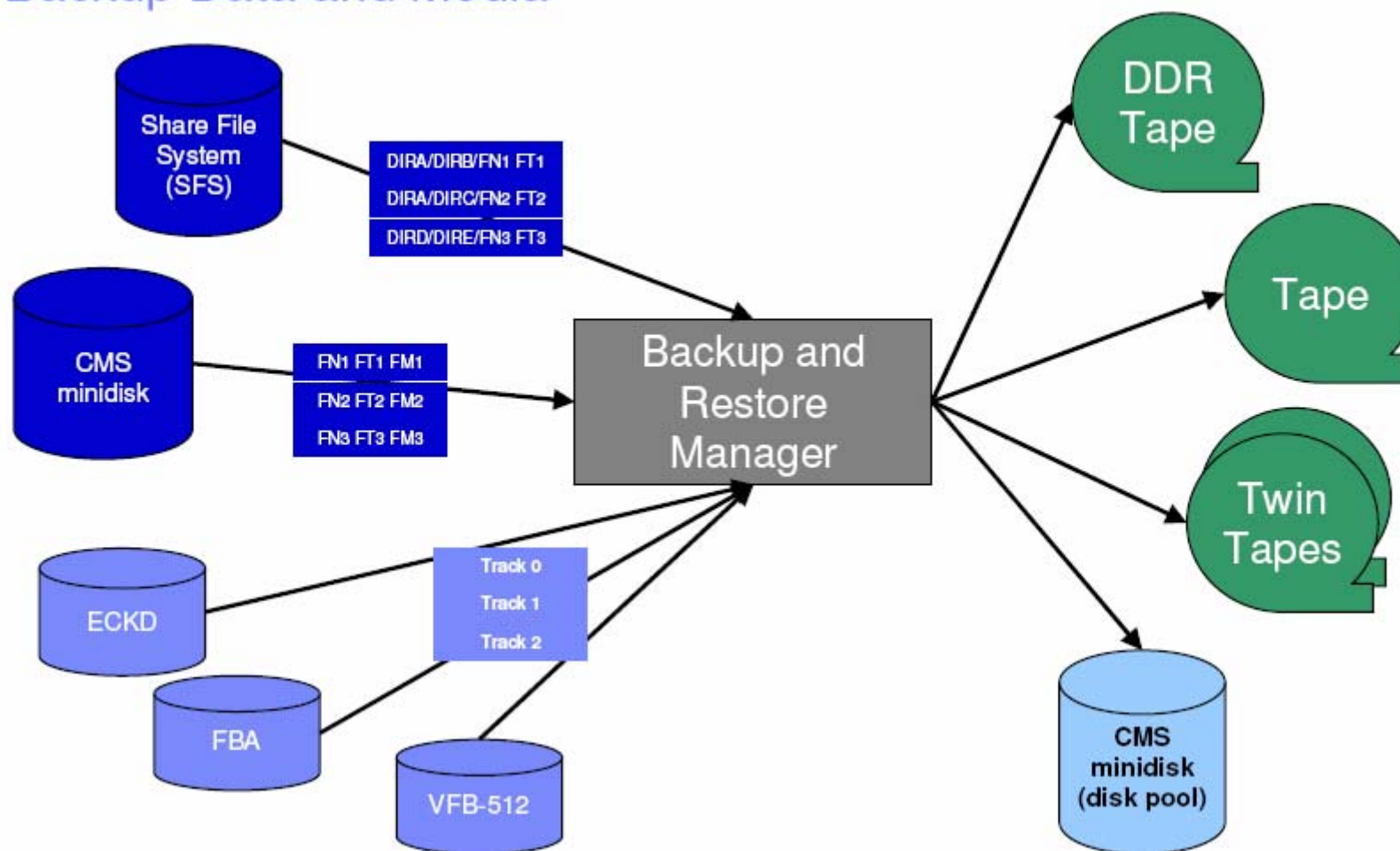
**Flashcopy backup:**

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

# z/VM based Recovery

## Backup / Restore Manager - for System and Bare metal Restore

### Backup Data and Media



---

## z/VM Backup and Restore Manager

Backup and Restore Manager enables you to back up and restore the following types of data:

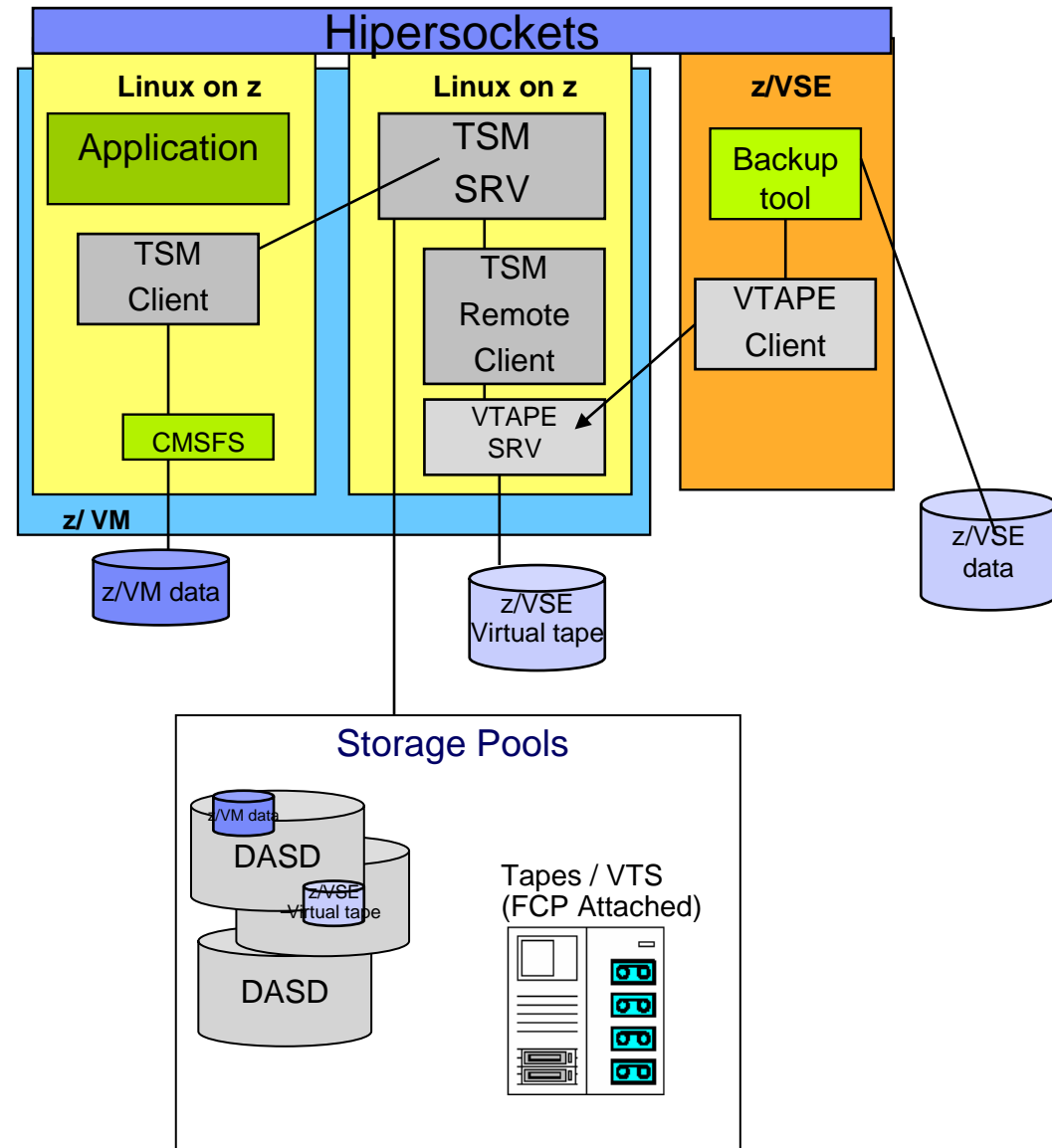
- Files on CMS formatted minidisk or in SFS (Shared File System)
- Raw image dumps of non-CMS data on minidisk
- Raw image dumps of CKD (Count Key Data) volumes, including those containing z/VSE, Linux on System z, and z/OS data
- Raw image dumps of FBA (Fixed-Block Architecture) DASD devices



## TSM based recovery

TSM based Backup to tape requires:

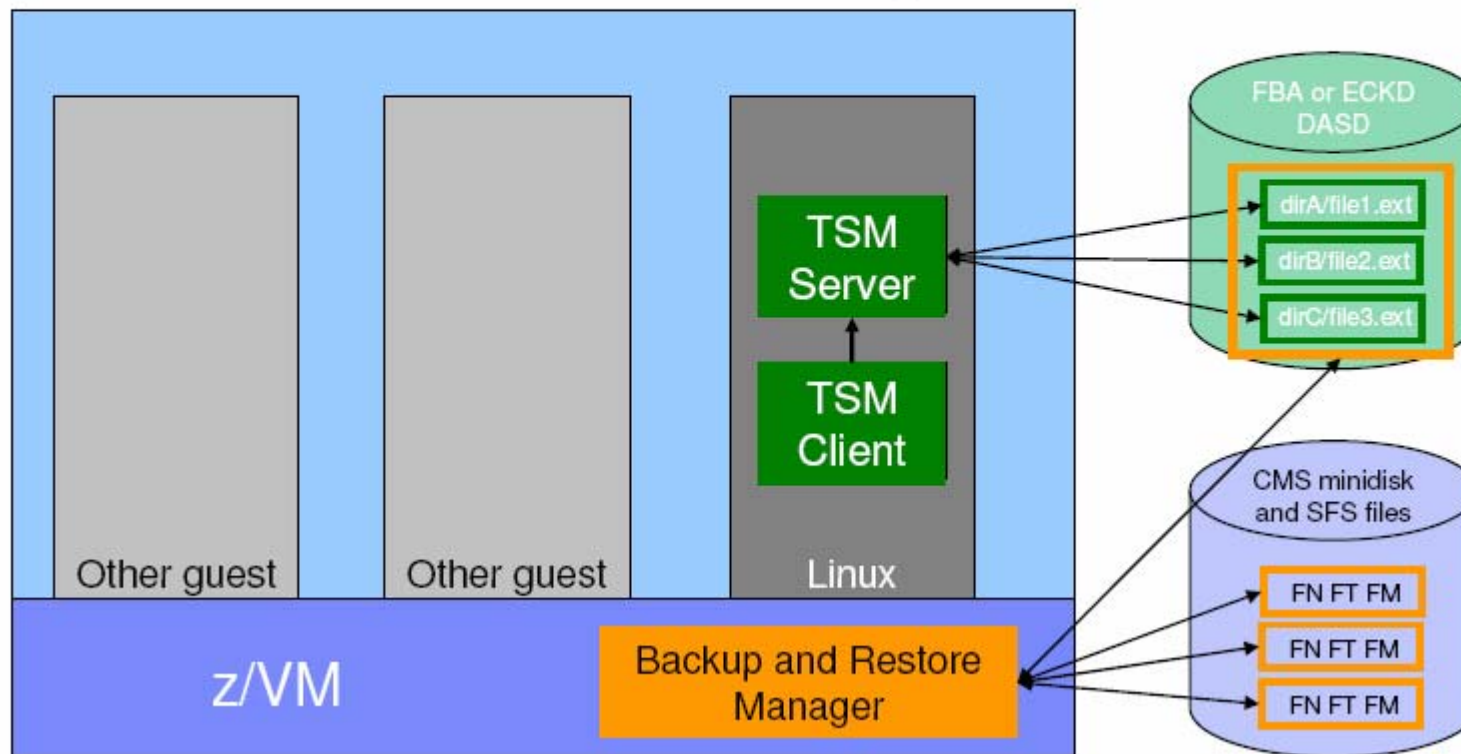
- FCP attached tape units
- Linux Backup via TSM Agents and clients
- z/VM data backup via Linux CMSFS
- Flashcopy brings efficiency and decouples from production interrupt
- NOT possible – full System Backups
- Tapes can only be assigned to zEnterprise, not to zBX
- zBX backup can be fully integrated with TSM



## Most complete and integrated Backup Strategy: TSM and z/VM Backup / Restore Manager

- **TSM for automated well managed Backup of data**
- **z/VM Backup / Restore Manager for System / Volume Backup/Restore**

*Choose the solution that meets your needs*



## Strategies to achieve tiers of DR using TSM

- IBM Tivoli Storage Manager (TSM) can be used to help provide all the tiers of DR
- Use of Disaster Recovery Manager (DRM) which can automate the TSM server recovery process and manage offsite volumes.
- Vaulting of TSM database, recovery log, volume history information, device configuration information, DRP file (if using DRM) and copy pools for storage at an offsite location.
- Use of TSM server-to-server communications to enable enterprise configuration (multiple TSM servers), enterprise event logging and monitoring, and command routing.
- TSM servers installed at multiple locations, optionally setup as peer to peer servers (that is, each server able to recover at the alternate site).
- Use of TSM virtual volumes over TCP/IP connection to allow storage of TSM entities (TSM database backups, recovery log backups, and primary and copy storage pools, DRM plan files) on remote target servers.
- Use of high bandwidth connections and data replication technology (such as IBM PPRC, EMC SRDF) to support asynchronous/synchronous data replication of TSM databases backups, recovery log backups, TSM database and recovery log mirrors, and storage pools.
- Use of remote electronic tape vaulting of TSM database and recovery log backups, primary or copy storage pools. Extended distances can be achieved by using distance technologies, for example, extended SAN, DWDM, IP/WAN channel extenders.

## DR Plan Generation for TSM Server

- Generate the recovery plan using the PREPARE command in TSM
- The plan is stored in a time-stamped file in the local directory as defined in **SET DRMPLANPREFIX**

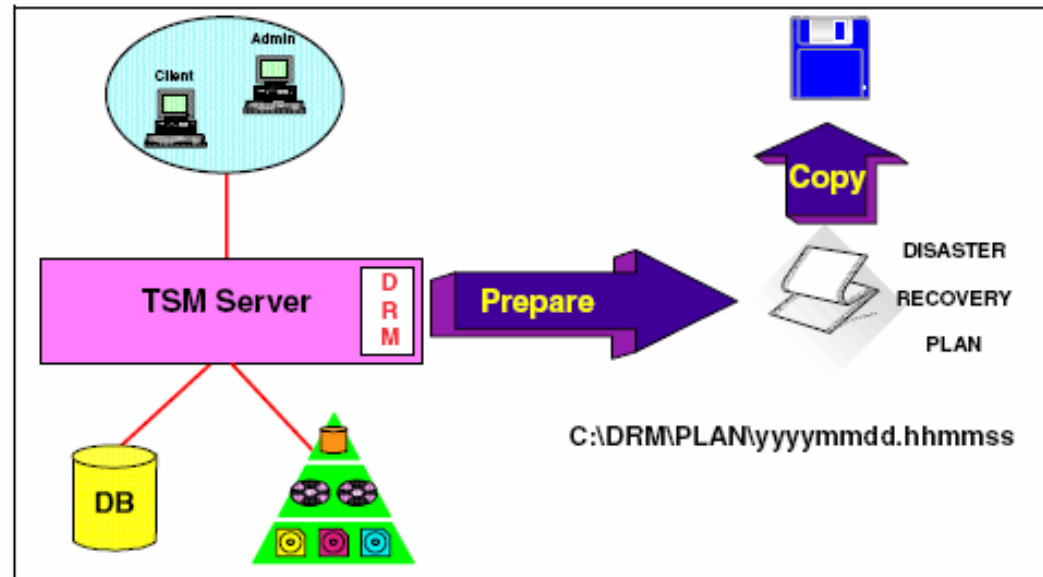


Figure 8-12 Disaster Recovery Plan generation

## TSM with warm DR site

- DRM output sent to the remote site using a secure network using FTP
- The TSM database backups can be manually vaulted along with the copy storage pool data to the warm site environment for disaster

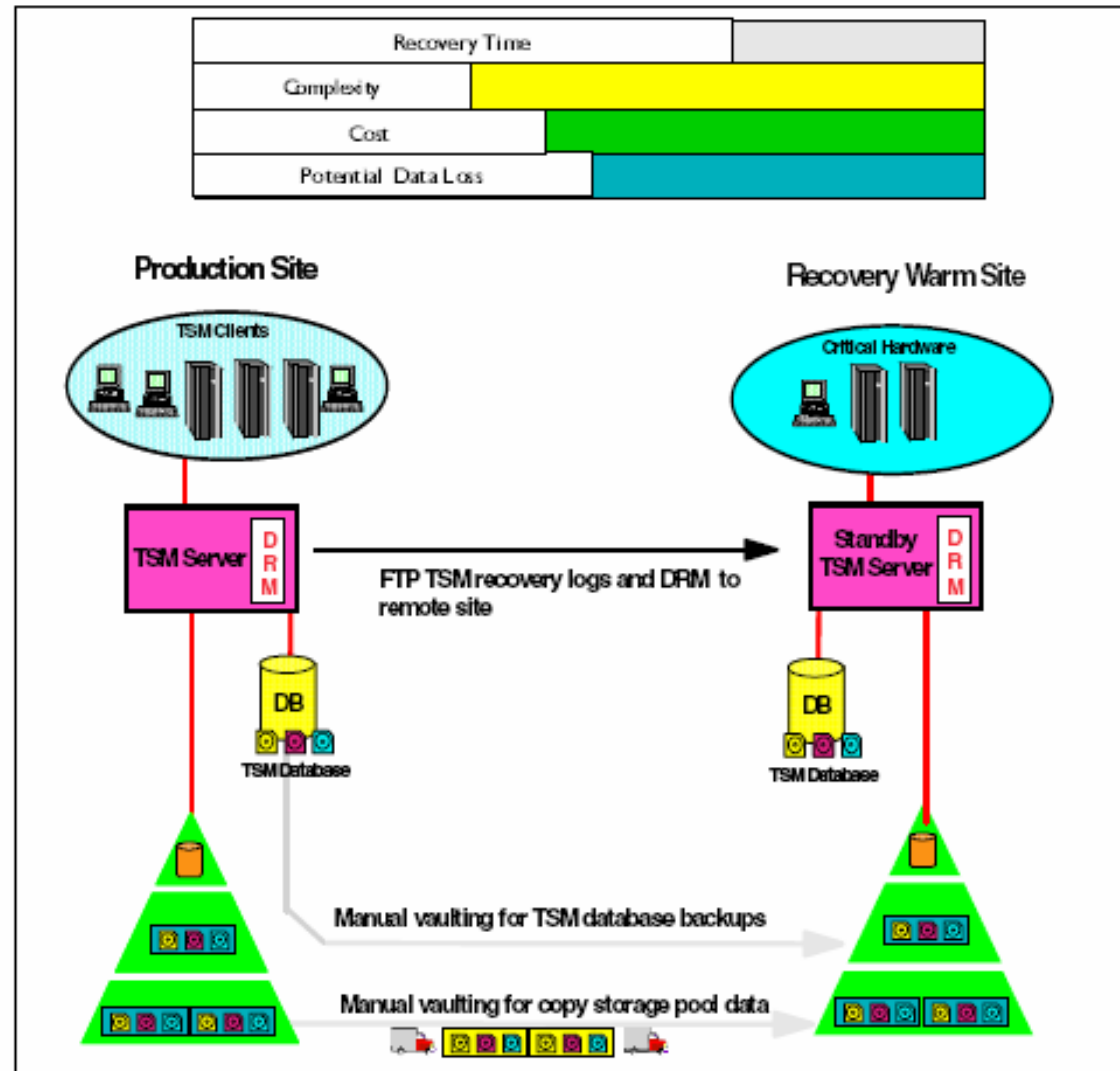


Figure 14-6 Electronic vaulting of TSM DRM, manual DB, and copy pool vaulting

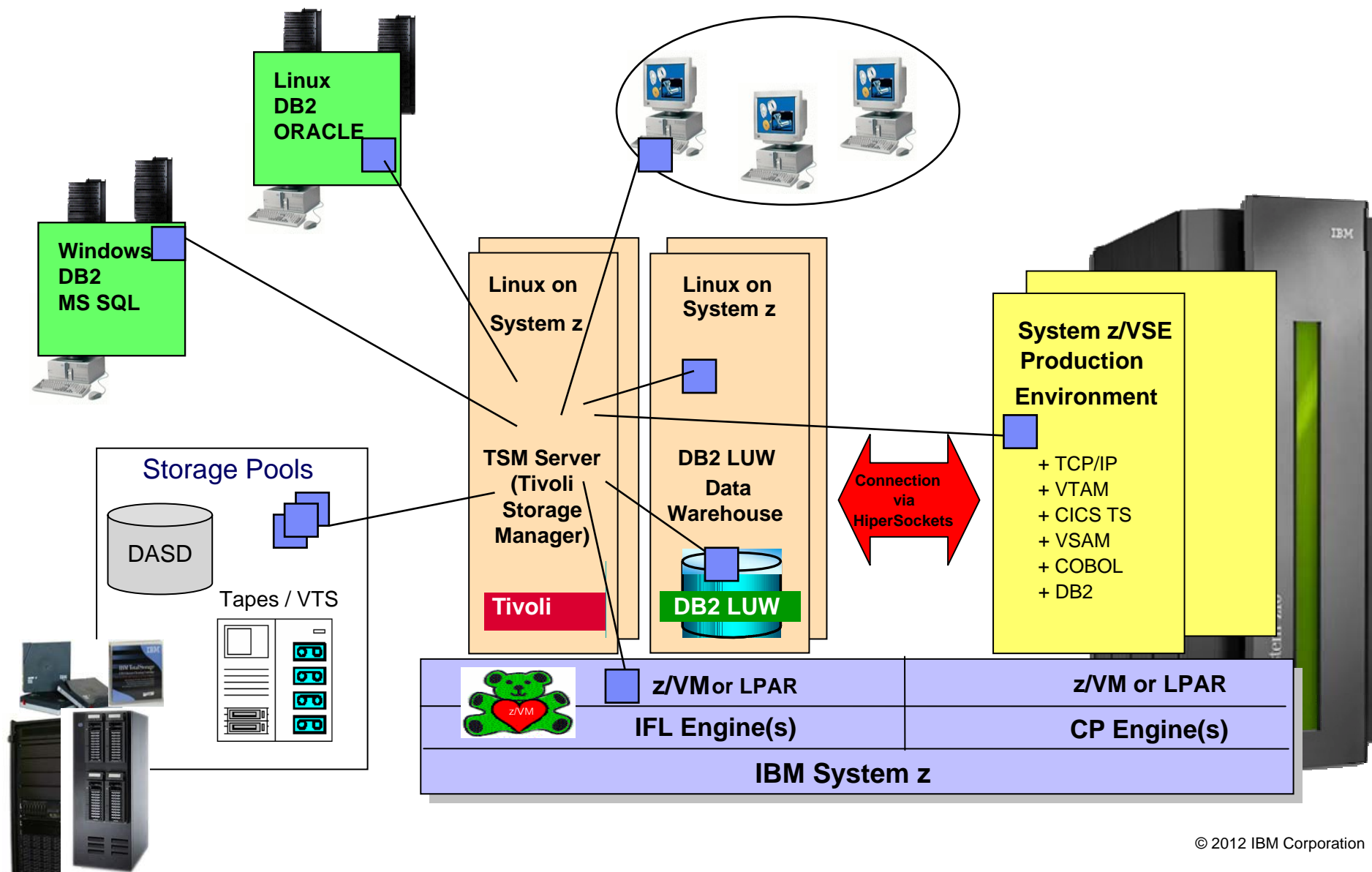


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## IBM Tivoli Storage Manager at a glance

- **Tivoli Storage Manager** — automates data backup and restore (B/R) functions, on a broad range of platforms and storage devices
- **Tivoli Storage Manager Extended Edition** — expands B/R with data de-duplication and disaster recovery functionality
- **IBM Tivoli Storage Manager for Mail** — helps secure IBM Lotus® Domino® and Microsoft Exchange data
- **IBM Tivoli Storage Manager for Databases** — helps secure IBM Informix®, Oracle and Microsoft SQL data
- **IBM Tivoli Storage Manager HSM for Windows** — provides Hierarchical Storage Management with a policy-based management system
- **IBM Tivoli Storage Manager for Advanced Copy Services** — protects your mission-critical data that requires 24x7 availability with snapshot backup
- **IBM Tivoli Storage Manager for Copy Services** — high-efficiency B/R of data and applications, eliminating backup-related performance impacts.
- **IBM Tivoli Storage Manager for Enterprise Resource Planning** — helps protect vital SAP R/3 system data efficiently, consistently and reliably.
- **IBM Tivoli Storage Manager for Space Management** — automatically moves inactive data to free online disk space for important active data.
- **IBM Tivoli Storage Manager for Storage Area Networks** — for SAN-connected Tivoli Storage Manager servers and client computers
- **IBM Tivoli Storage Manager for System Backup and Recovery** — offers a comprehensive system B/R and reinstallation tool with bare-metal restore
- **IBM Tivoli Storage Manager FastBack™** — provides a continuous data protection and recovery management platform for Microsoft Windows servers.
- **IBM Tivoli Storage Manager FastBack for Microsoft Exchange** — provides the ability to quickly and easily recover granular Microsoft Exchange data
- **IBM Tivoli Storage Manager FastBack for Bare Machine Recovery** — restores entire systems, whether to comparable hardware, dissimilar hardware, or a virtual machine.
- **IBM Tivoli Storage Manager FastBack Center** — combines the features of the IBM Tivoli Storage Manager FastBack family of products into one solution.
- **IBM Tivoli Continuous Data Protection for Files** — provides continuous, automated backup of desktop and laptop workstations.

# Implement TSM on Linux on System z as central Backup Hub





## Prepare for Restore

- Include TSM Server recovery
  - take it into account when defining Restore procedures
  - Bare Metal Restore, Installation from scratch or Flashcopy might be required
  - host TSM Server on System z AND
  - Perform disaster backup with z/VM (ECKD and EDEV)
  - OR allow to restore TSM server via z/VM cloning or Flashcopy
- If TSM Server is run on System z, you should make sure:
  - It can be IPLed in z/VM guest or LPAR alternatively
  - It can be IPLed in all target environments
    - SAN Zoning, Host Mapping, LUN masking
    - Predict initiator WWPNs using the WWPN Prediction Tool (see Links)
- Linux is configured for all intended environments
  - Prepare alternate initrd and system config per environmen

## Agenda

- **Step 1: Define your Backup strategy based on BIA (Business Impact Analysis)**
  - **Data Level Backup**
  - **Bare Metal / System Level Backup – High Availability**
  - **Disaster Recovery Backup**
  
- **Step 2: Select the right products – enterprise focus**
  - **Native products (i.e. Acronis, IDCAMS, tar, DFSMS)**
  - **Backup & Restore Manager for z/VM**
  - **Tivoli Flashcopy manager**
  - **Tivoli Storage Manager (TSM)**
  
- **Step 3: Define and Implement Your Solution**
  - **Reference Solution 1: Native products for special requirements**
    - z/VSE or z/OS based Backup for FICON attached tape units
  - **Reference Solution 2: z/VM based recovery**
    - z/VM Backup for Full volume Backup and full System
  - **Reference Solution 3: Linux/TSM based recovery**
    - TSM Backup for all platforms and application data
  - **Get Prepared for the restoration process**
    - Define procedures for automatic Restore or Recovery to meet RTO and RPO

## ▪ Hints & Tips

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## Hints & Tips

- **Plan your Backup to have a consistent synchronization point**
- ***Define the Recovery point from which you want to start***

Option 1: Fresh Install from scratch - most expensive one - risky

- Requires unattended install process
  - High Risk to result in same configuration as before failure because there are many configuration options during installation

Option 2: Fresh Install from Template (Cloning-Golden Image) – expensive but less risk

- Recommended option if:
  - system cloning procedures are in place and coordinated with backup/recovery
  - RTO allows to apply further incremental backups after recreation of system

Option 3: Restore from periodic Snap Shots of System Volumes

- Recommended option if:
  - Automated recreation of systems from golden images does not apply
  - Minimal complexity of system restoration procedure is required
  - Solution with Additional pre-requs:
    - Snap Shot feature in disk storage subsystem
    - Shared access with external backup system plus maintenance window

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## Hints & Tips

### ➤ Ensure data Consistency during Backup

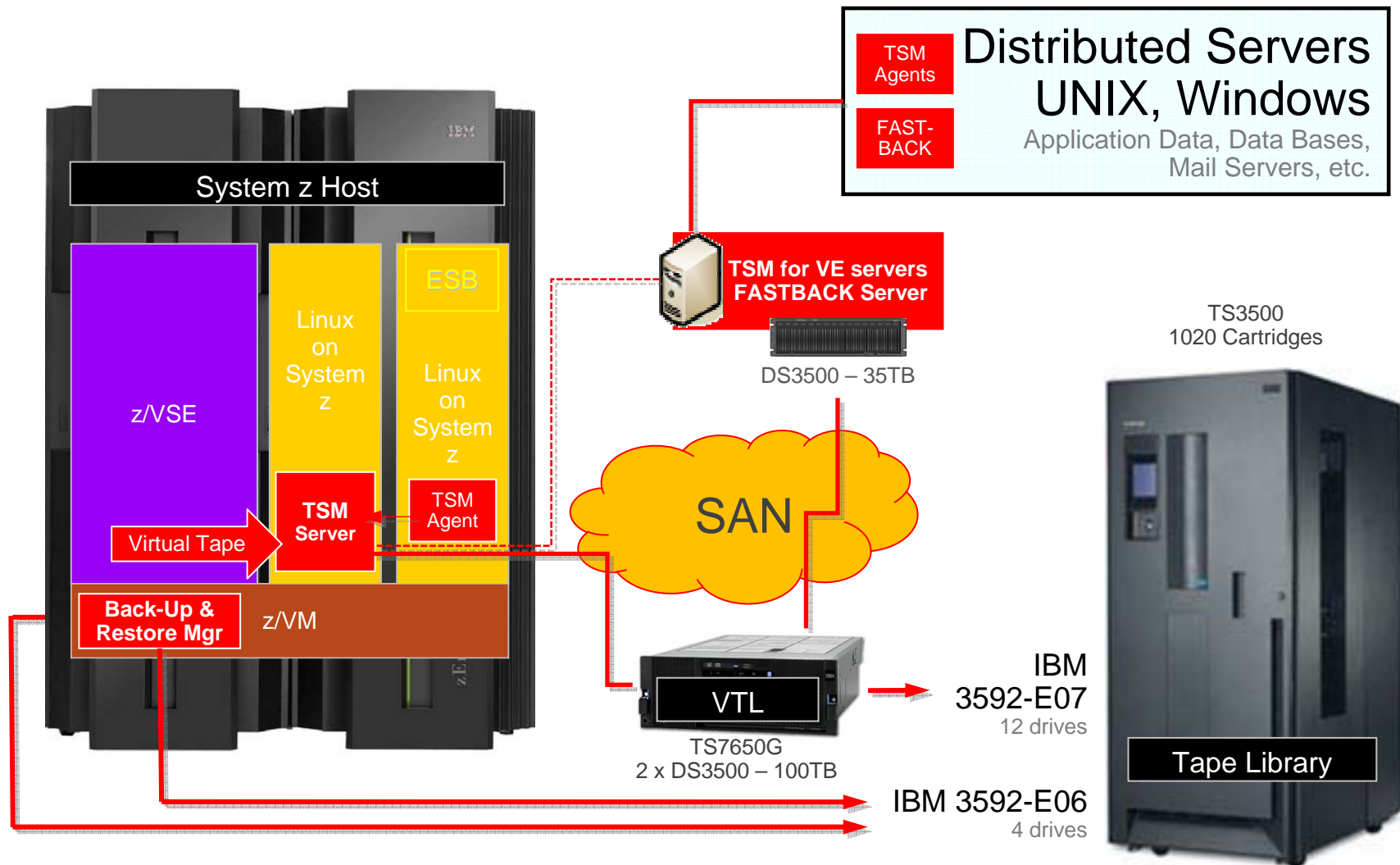
- Define all volumes to be members of the same consistency group before performing the snap shot
- Application Data
  - Avoid Backup for data without support of online backup
  - Shut down/freeze application during backup
  - If using Flashcopy, define all data belonging to one data source (database) are in a consistency group
- System data
  - Shut down system/hypervisor during backup
  - Instant Backup
    - Take a snap shot of the volumes using disk storage subsystem functions, then perform the backup with the snap shot as backup source.
    - Journaling file systems will ensure data consistency in the snap shot
  - LVM/Oracle ASM managed or other multi-volume data spaces
  - z/VM system data
    - Define z/VM owned volumes to be member of the same consistency group before performing the snap shot

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## Backup and Performance Tips

- Separate Backup/Archive workload from normal production workload
  - Use separate LAN Adapter or HiperSockets/Guest LAN for client/server communication
  - Use separate disk storage subsystem (rank) for TSM storage pool
  - Use separate FICON cards for disk and tape attachments
- TSM Storage Pool
  - Provide sufficient capacity - more than estimated data to be backed up
  - Use SCSI LUNS attached via FCP to zEnterprise, when possible, OR
  - Use many small ECKD DASD plus a significant number of Hyper PAV aliases.
- Tune the disk IO for maximum disk write performance
  - In order to reduce elapsed time of backup window
  - Read performance is secondary due to delayed destaging from storage pool to tape.

# American Bank: Linux on System z as a Backup Hub



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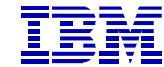
## More Information

- IBM Tivoli Storage Manager Version 6.2 information center:  
<http://publib.boulder.ibm.com/infocenter/tsminfo/v6r2/topic/com.ibm.itsm.ic.doc/welcome.html>
- Backup and Restore Manager for z/VM:  
<http://www01.ibm.com/software/stormgmt/zvm/backup/>
- What Differentiates IBM's Backup and Restore Manager for z/VM from IBM's Tivoli Storage Manager in z/VM and Linux on System z Environments? By Michael Sine, Tracy Dean, Randy Larson:  
<http://www-03.ibm.com/support/techdocs/atmastr.nsf/WebIndex/WP101879>
- Tuning Disk IO with Linux on System z:  
[http://www.ibm.com/developerworks/linux/linux390/perf/tuning\\_diskio.html](http://www.ibm.com/developerworks/linux/linux390/perf/tuning_diskio.html)
- WWPN Prediction Tool for System z FCP Channels, on IBM Resource Link,  
<https://www.ibm.com/servers/resourcelink> (Resource Link ID required)

# Questions?



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