



IBM Software

Managing z/VM and Linux on System z

Technical Overview

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Agenda

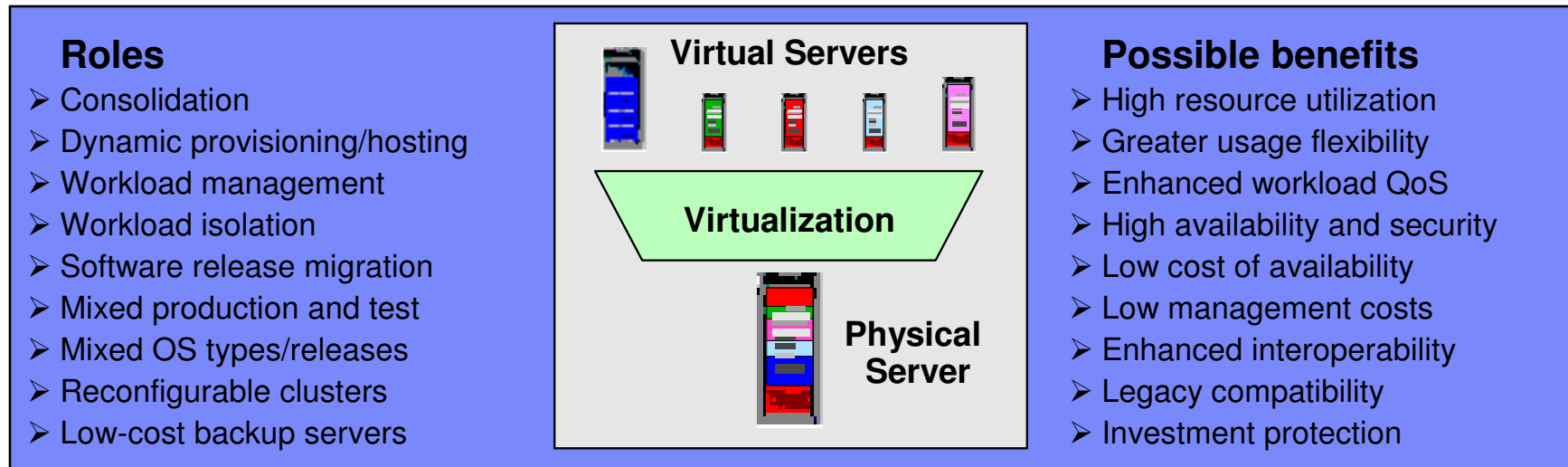
- **Overview**
- **System management**
- **Storage management**
- **Demo**
- **Summary**



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Overview

Server Virtualization Business Value



- **In the final analysis, the potential virtualization benefits take three forms:**
 - **Help reduce hardware costs**
 - Help increase physical resource utilization
 - Small footprints
 - **Can improve flexibility and responsiveness**
 - Virtual resources can be adjusted dynamically to meet new or changing needs and to optimize service level achievement
 - Virtualization is a key enabler of on demand operating environments
 - **Can reduce management costs**
 - Fewer physical servers to manage
 - Many common management tasks become much easier

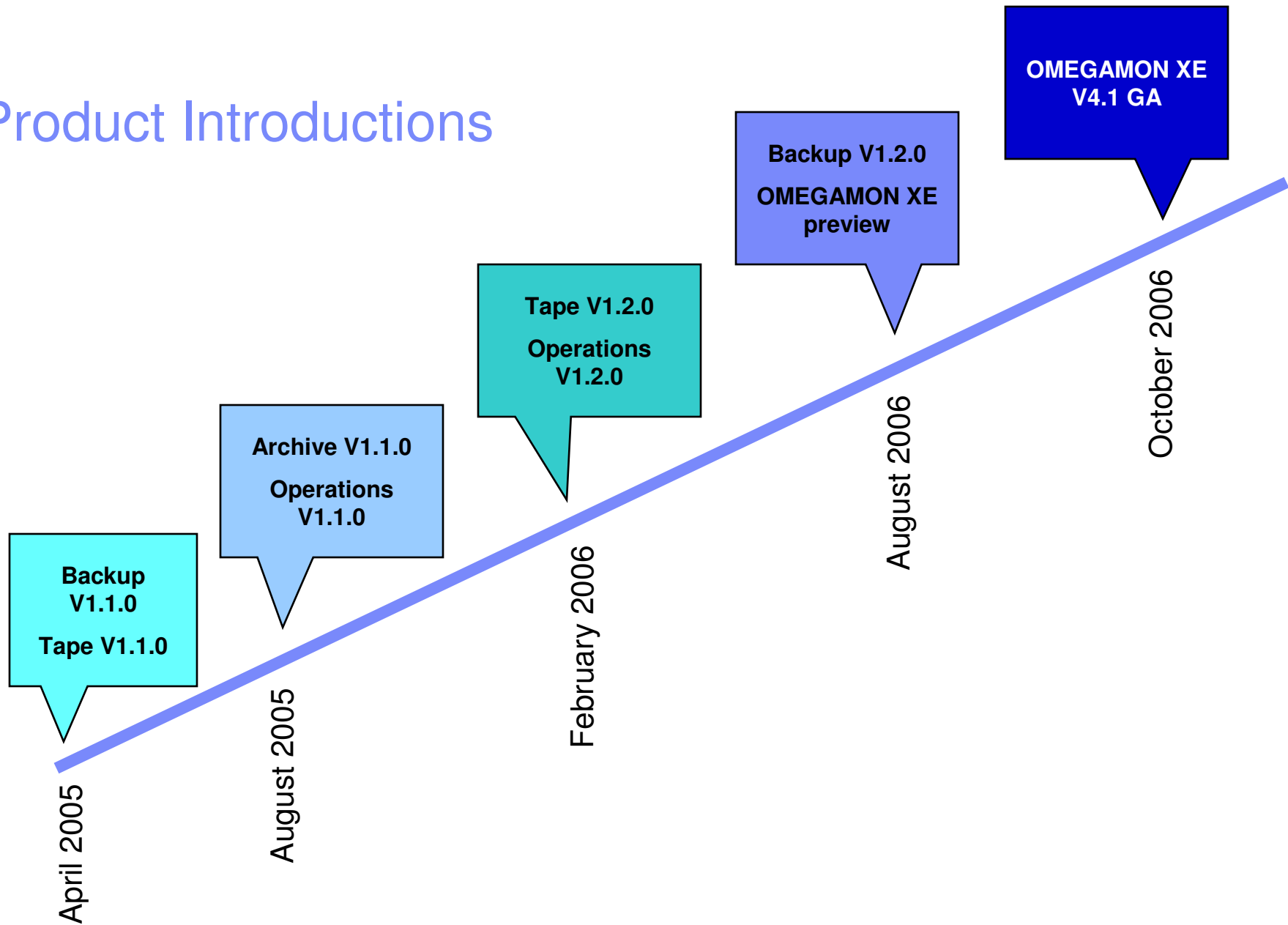
Requirement for System Management

- **Traditional z/VM customers**
 - Longtime z/VM (VM/ESA, VM/SP) customers
 - Running business applications on z/VM
 - Also installing and using Linux on System z
 - Require full set of management solutions for z/VM and Linux guests
- **Customers using z/VM to host Linux only**
 - New to z/VM
 - Understand the benefits of using z/VM to host Linux guests
 - Prefer Linux-based tools for management of Linux guests
 - Also need basic management tools for z/VM host
- **Total cost of ownership being scrutinized**
 - Automation
 - Efficiency and productivity
 - Software costs

IBM Products

- **System and Performance Management**
 - OMEGAMON XE on z/VM and Linux
 - Operations Manager for z/VM
- **Storage Management**
 - Backup and Restore Manager for z/VM
 - Tape Manager for z/VM
 - Archive Manager for z/VM

Product Introductions





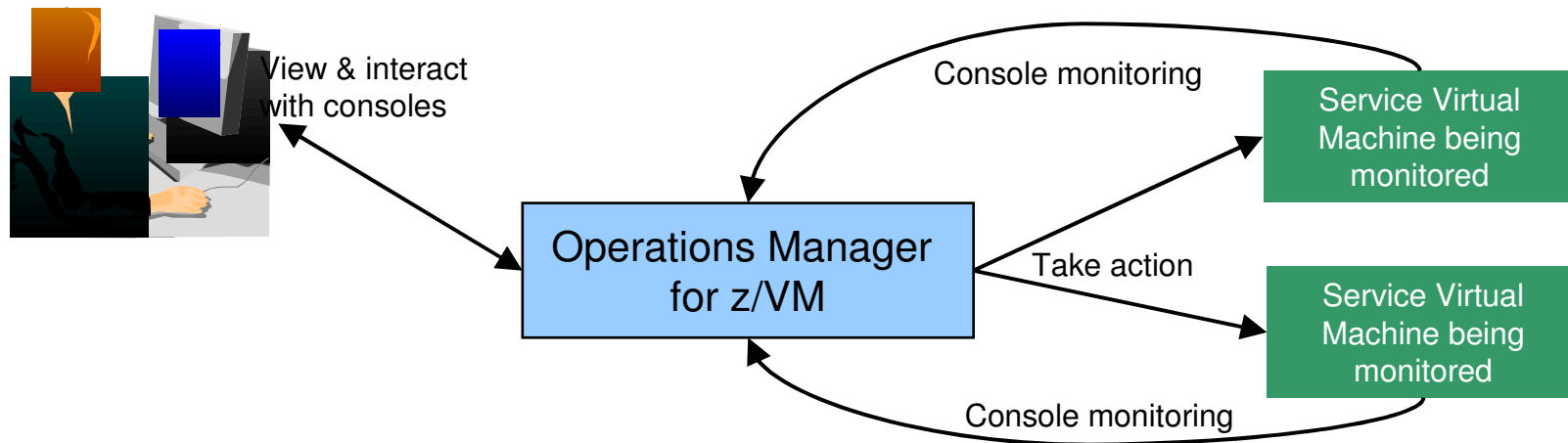
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Operations Manager for z/VM

Operations Manager for z/VM

- Increase productivity
 - Authorized users view and interact with monitored virtual machines without logging onto them
 - Multiple users view/interact with a virtual machine simultaneously

- Improve system availability
 - Monitor virtual machines and processes
 - Take automated actions based on console messages
 - Reduce problems due to operator error



Automation

Routine activities done more effectively with minimal operations staff

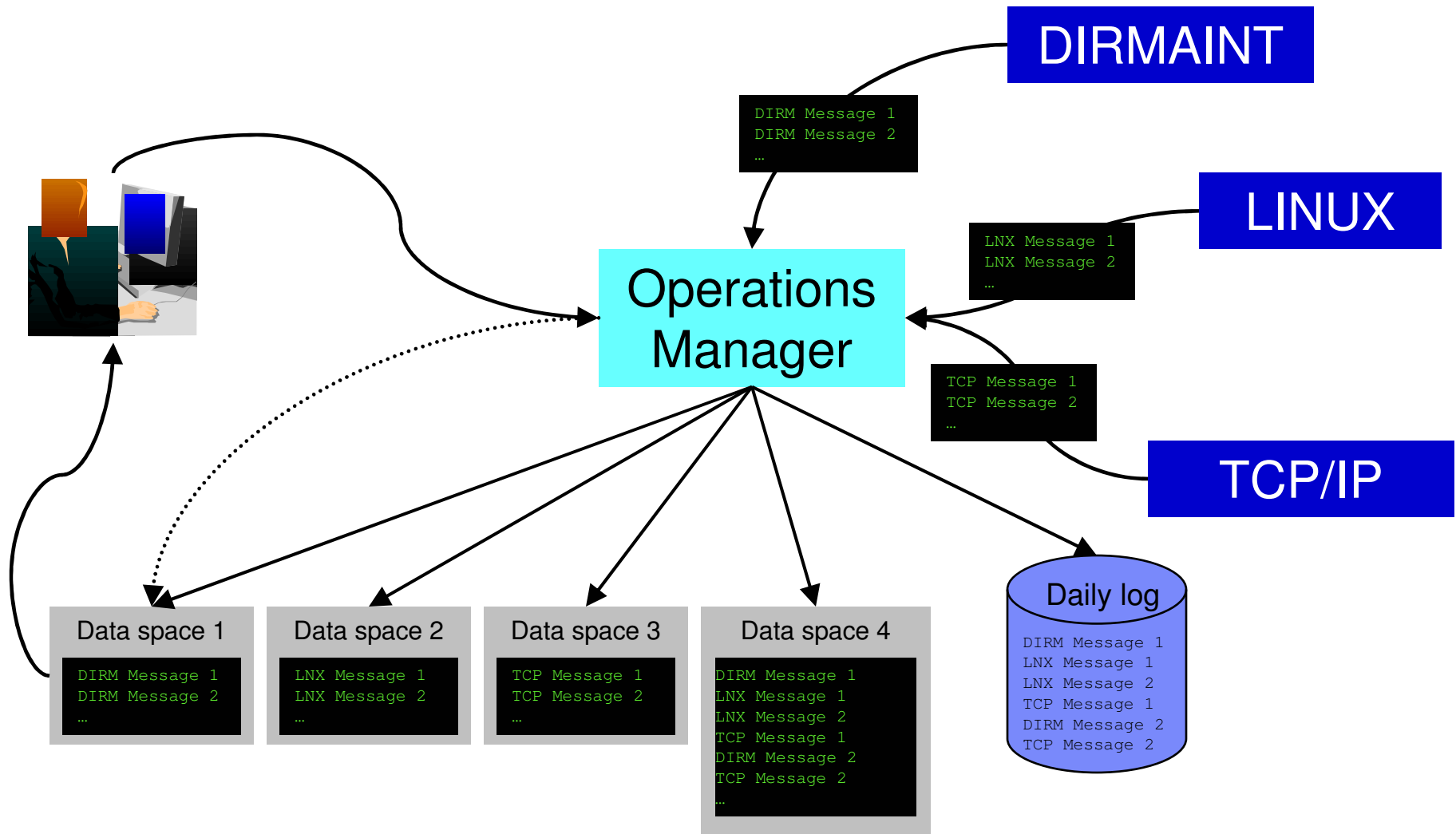
Integration

Fulfill take action requests from OMEGAMON XE on z/VM and Linux

Features and Functions

- **Monitor service machines**
- **View and interact with monitored consoles from authorized user IDs**
- **Schedule events/actions**
- **Dynamic configuration**
- **Separation of access control**

Monitor Service Machines



Monitor Service Machines

- **Define rules to**
 - Scan console messages for text matching
 - Includes column, wildcard, and exclusion support
 - Take actions based on matches
- **Multiple rules can apply to one message**
 - Rules processed in order of definition in the configuration file
 - FINAL option available to indicate no additional rules should be evaluated

In Operations Manager configuration file:

```
DEFRULE NAME (CPREAD), MATCH (*HCP*150A*CP*), MCOL (001:020), ACTION (CPREAD)
```

View and Interact with Consoles

- **Authorized users view a single server console or a group of server consoles**
 - Multiple users can view the same console simultaneously

- **Full screen mode**
 - Scroll up and down to view and search historical data
 - Auto scroll (on or off) as new output is displayed on the console
 - From command line, issue commands back to the monitored console

- **Rules/actions may modify the view**
 - Suppress messages from the console
 - Hold or highlight messages with color, blinking, etc.

Schedule Events and Actions

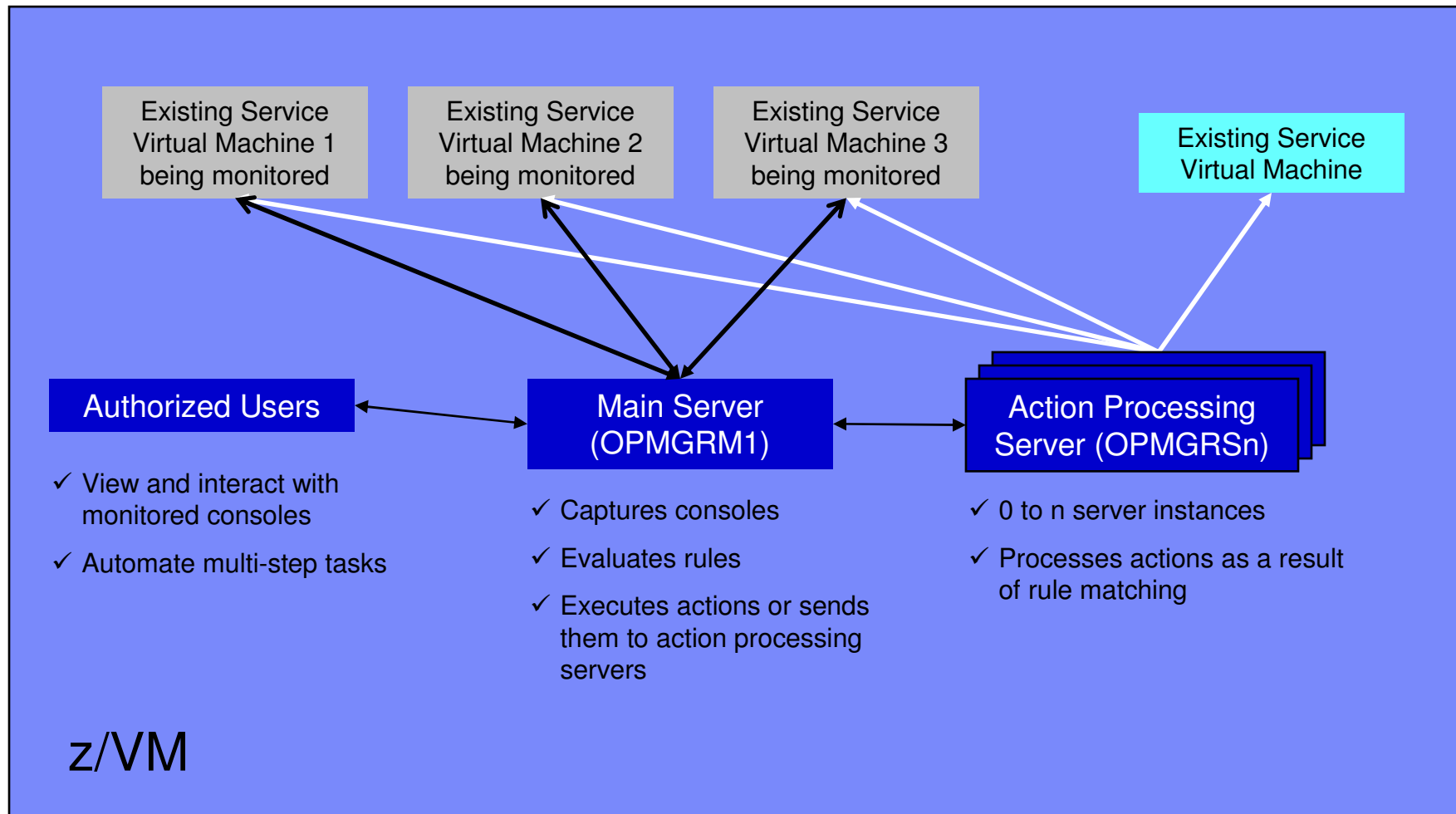
- **Define schedules**
 - Hourly, daily, weekly, monthly, or yearly
 - Once on specified month, day, year, and time
 - At regular intervals
 - Every x hours and y minutes
 - Within a specified window of time
 - Specify start time
 - Specify conflicting schedules
 - Specify maximum time to defer this schedule
 - Within limits
 - Restrict to specific days of the week: Monday through Sunday plus holidays
 - Restrict to certain hours of the day

- **Specify the action associated with the schedule**
 - Actions specified are the same as those for console rules

Access Control

- **Users defined with access to one or more:**
 - **Control commands**
 - Manage the Operations Manager infrastructure
 - Define additional service machines to execute actions
 - Authorize users
 - Display status
 - Issue CP and CMS commands on an Operations Manager service machine
 - Define data space sizes
 - **Configuration commands**
 - Define rules, schedules, actions
 - Define holidays
 - Define user IDs to monitor for logoff status
 - Define groups
 - **Consoles**
 - Define user access to monitored consoles

Operations Manager



Summary

- **Use Operations Manager to**
 - Automate daily operations
 - Prevent problems rather than react to them
 - Automate reactions to problems when they can't be prevented
 - Improve problem determination procedures
 - Increase programmer and operator productivity



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Backup and Restore Manager for z/VM

Product Overview

▪ Backup

- Requested by administrators
- Full or incremental
- Flexible selection of disks and files to back up
- Review job before submitting for backup
- Catalog housed in Shared File System

▪ Restore

- Performed by users for their own data
- Extending to other users available via exit
- Performed by administrators for any data
- Selection of data to restore
 - Full screen interface or commands

▪ Integration with Tape Manager for z/VM

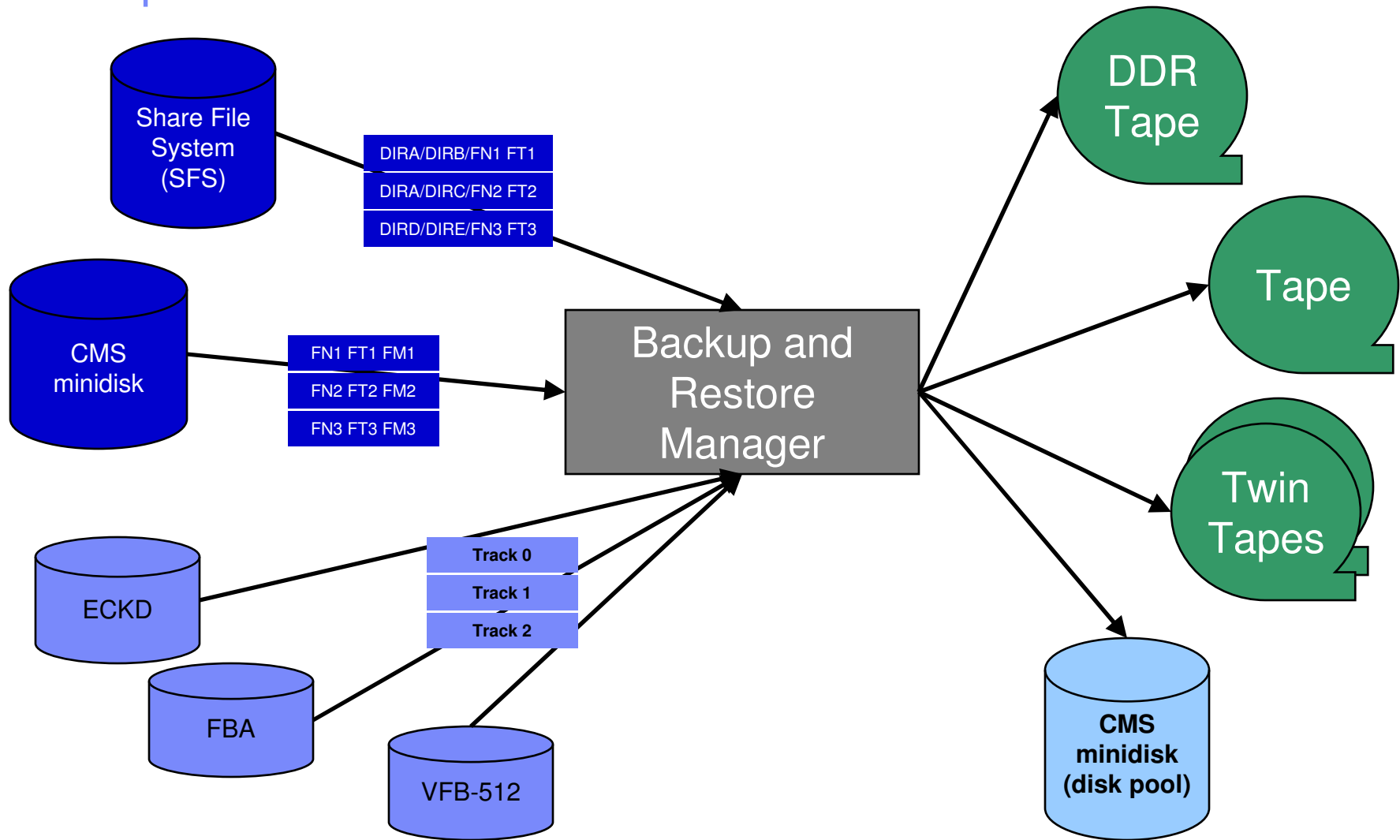
▪ Optional compression of data during backup

- Call your own compression algorithm
- Use IBM provided routine

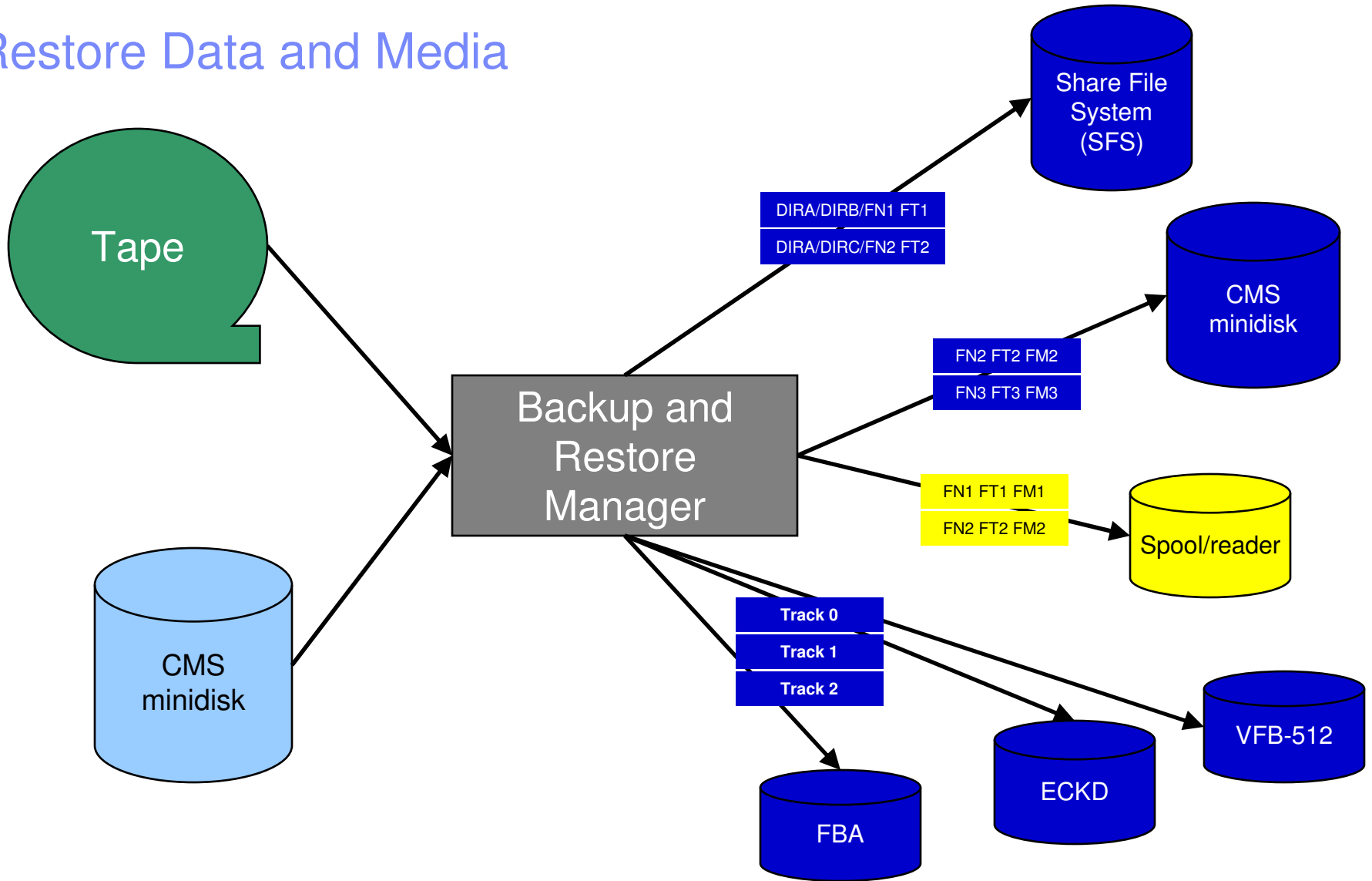
▪ Encryption exits available

- Call your own routine
- Use vendor-written routine, such as V/Soft Software's Encrypt/Backup for z/VM

Backup Data and Media



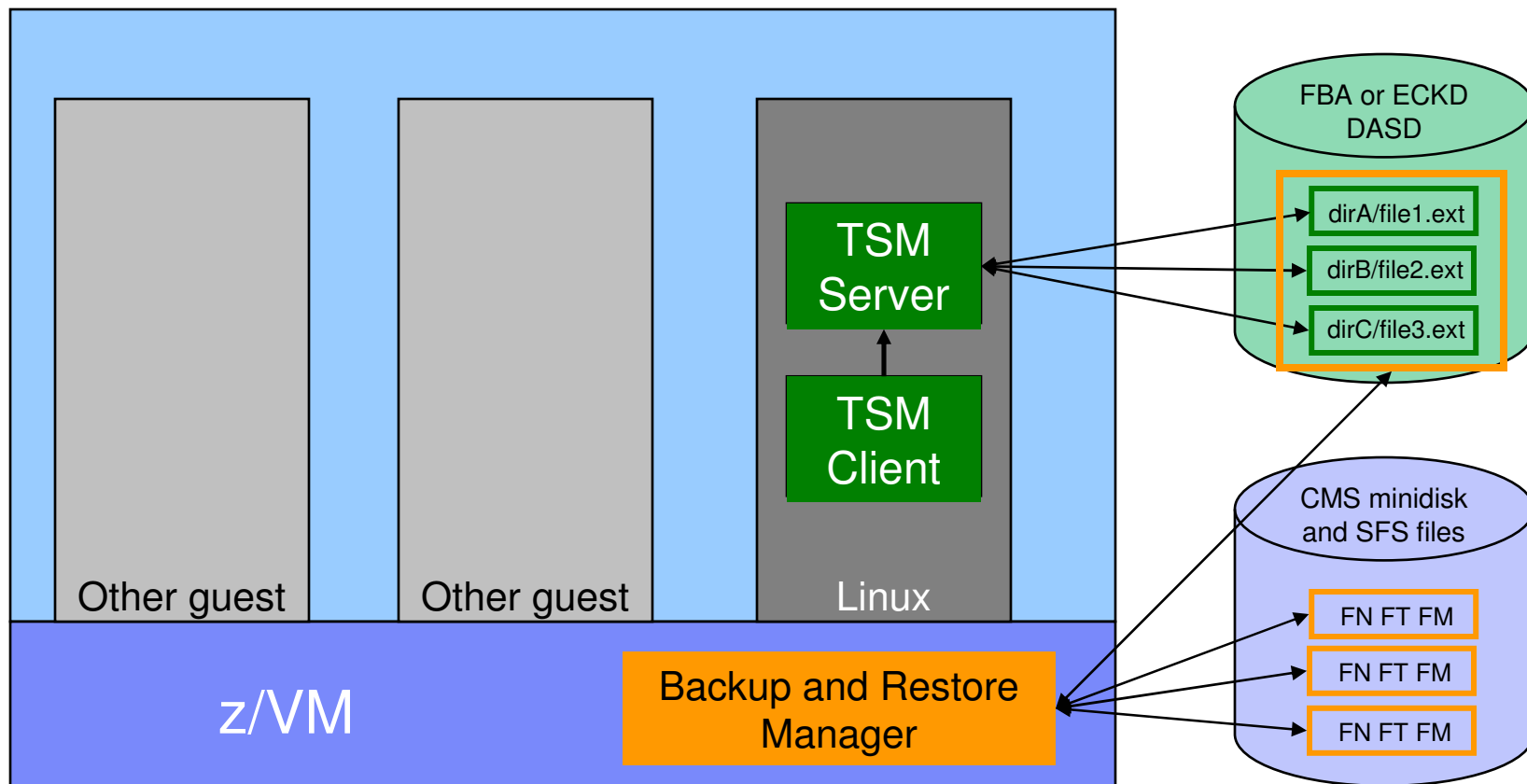
Restore Data and Media



Backup and Restore Manager and Linux Guests

Using Backup and Restore Manager with Tivoli Storage Manager

Choose the solution that meets your needs



Key Benefits

- **System backups available for Disaster Recovery**
 - Option to restore using DDR or Backup and Restore Manager
 - Manage retention of DR backups
 - Retrieve a list of tapes associated with a specific backup
 - Pull list for movement to off-site storage
- **Guest backups available for restoring to a previous state or level**
- **Backups of user data available for**
 - Restoring to a previous state or level
 - Replacing files accidentally erased or corrupted
- **Users restore their own data**
 - No administrator interaction required

Key Benefits

- **Flexible selection of data to back up**
 - Include/exclude
 - Minidisks, directories
 - Real device addresses or volsers
 - Extents
 - Mask by filename, filetype, or SFS path
 - Review a defined backup job before submission
- **Management of backup data**
 - Retention set as part of the backup job
 - Automatic aging and pruning of the backup catalog
 - Including associated tapes and disk pools
 - View/query the list of expired backups
- **Reduced backup window with concurrent processing**
 - Multiple worker service machines sharing the job
 - Suggest one worker service machine for each available tape drive

Defining a Backup Job

```

/* Include/Exclude definitions */
/*****/
FUNCTION MEDIATYPE OWNER VDEV VOLUME DEVTYPE START END SIZE
-----|-----|-----|---|-----|-----|-----|---|-----|---|-----|
INCLUDE MINIDISK * = * * * * = * = * = *
EXCLUDE MINIDISK *LNX* = * * * * = * = * = *
EXCLUDE MINIDISK MAINT = 0123 * * * * = * = * = *
EXCLUDE MINIDISK MAINT = 0124 * * * * = * = * = *
EXCLUDE MINIDISK * = * * * * = * = END = *
EXCLUDE MINIDISK * = * * * * = * = * > 3300
INCLUDE MINIDISK MAINT = 012* * * * = * = * = *
*SELECT MINIDISK MAINT 0123 0-0,1-20,391.45,436-480,3230.4,3238-end
*SELECT MINIDISK MAINT 0124 0-End

FUNCTION MEDIATYPE ADDRESS
-----|-----|-----|
INCLUDE RDEVICE A0*
INCLUDE RDEVICE 900-90F

FUNCTION MEDIATYPE VOLSER
-----|-----|-----|
INCLUDE RDEVVOL 510*

FUNCTION MEDIATYPE POOLNAME OWNER FS
-----|-----|-----|-----|-----|
INCLUDE SFS VMSYSU: * SFS
EXCLUDE SFS VMSYSU: VMSERVU *

```

Summary

- **Use Backup and Restore Manager to**
 - Perform file-level backups of z/VM data
 - Perform image level backups on non-z/VM guest data
 - Perform disaster recovery backups of entire system
 - Easily find and restore data as needed
 - Manage retention of backup data



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Tape Manager for z/VM

Product Overview

■ Manage tapes

- Define tapes in a catalog, including:
 - Free or used
 - Retention/expiration information
 - ATL or manual mount
 - Data Security Erase
- Group tapes together into pools
 - Ownership and access control
 - Media type

■ Manage devices

- Define available devices
 - Dedicated or assignable
- Group devices together into device pools
 - ATL/VTS or manual mount
 - Any other grouping you choose (read only vs. write, location, etc.)
- Share devices with other systems

■ Manage mount requests

- Volume specific and scratch requests
 - Standard Label
 - Non-Label
 - Bypass Label Processing

Key Benefits

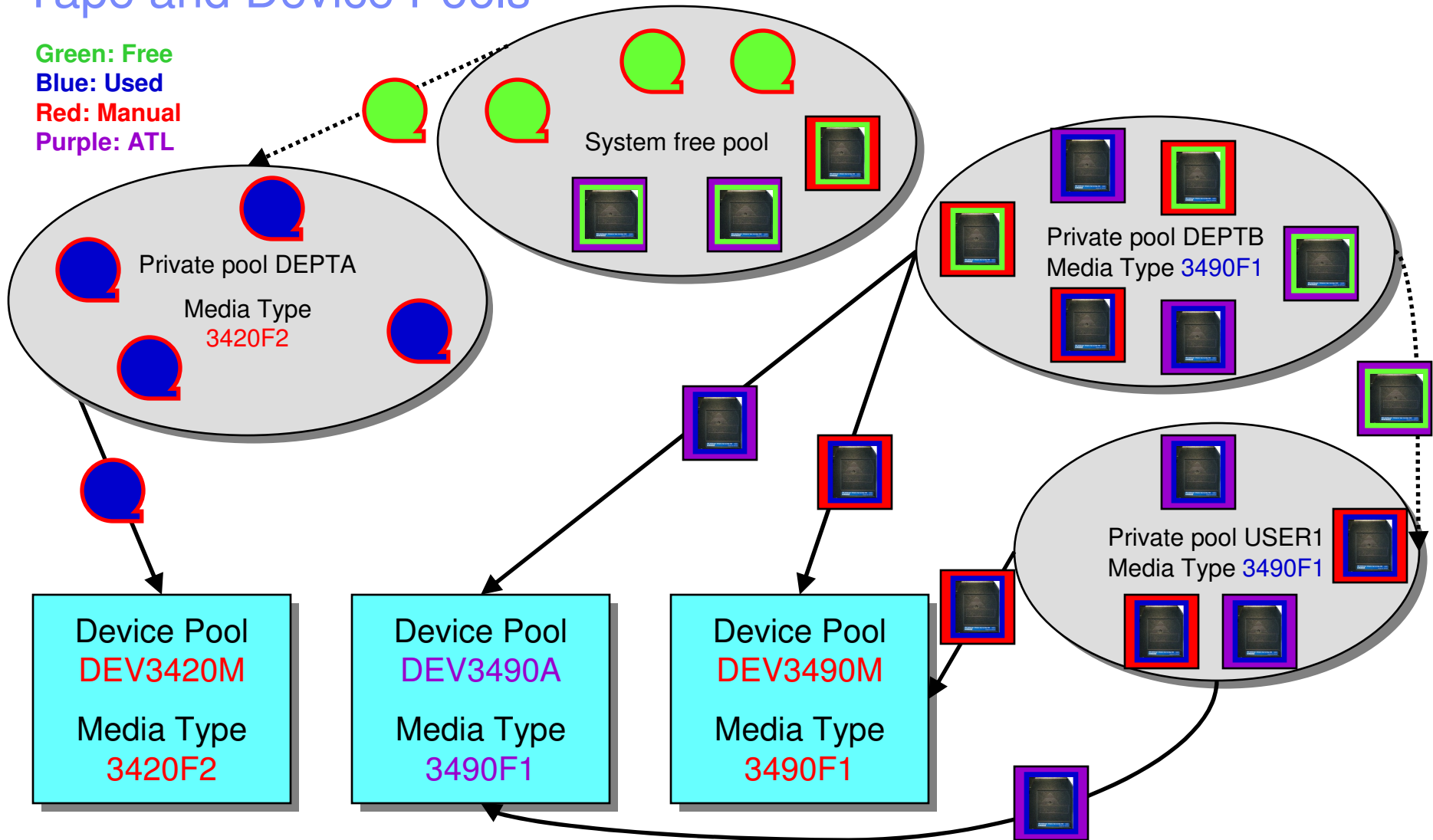
- **Effective management of tapes in ATLs**
 - Granular access control
 - Expiration processing
 - Notification for low threshold for tape resources
 - Interacts with devices through DFSMSRMS on z/VM

- **Improved accuracy of manual tape processing**
 - Automated interface to Operator for manual mounts
 - Internal label verification at attach/give and detach (SL only)
 - Read/Write verification at attach/give

- **Integrated management of z/OS and z/VM tapes using DFSMSrmm on z/OS**
 - Optionally use RMM on z/OS as the tape catalog for z/VM and z/OS tapes
 - Tapes, access control, and retention managed by the existing RMM catalog
 - Accessible via Tape Manager on z/VM
 - Tapes managed by RMM
 - Devices managed by Tape Manager

Tape and Device Pools

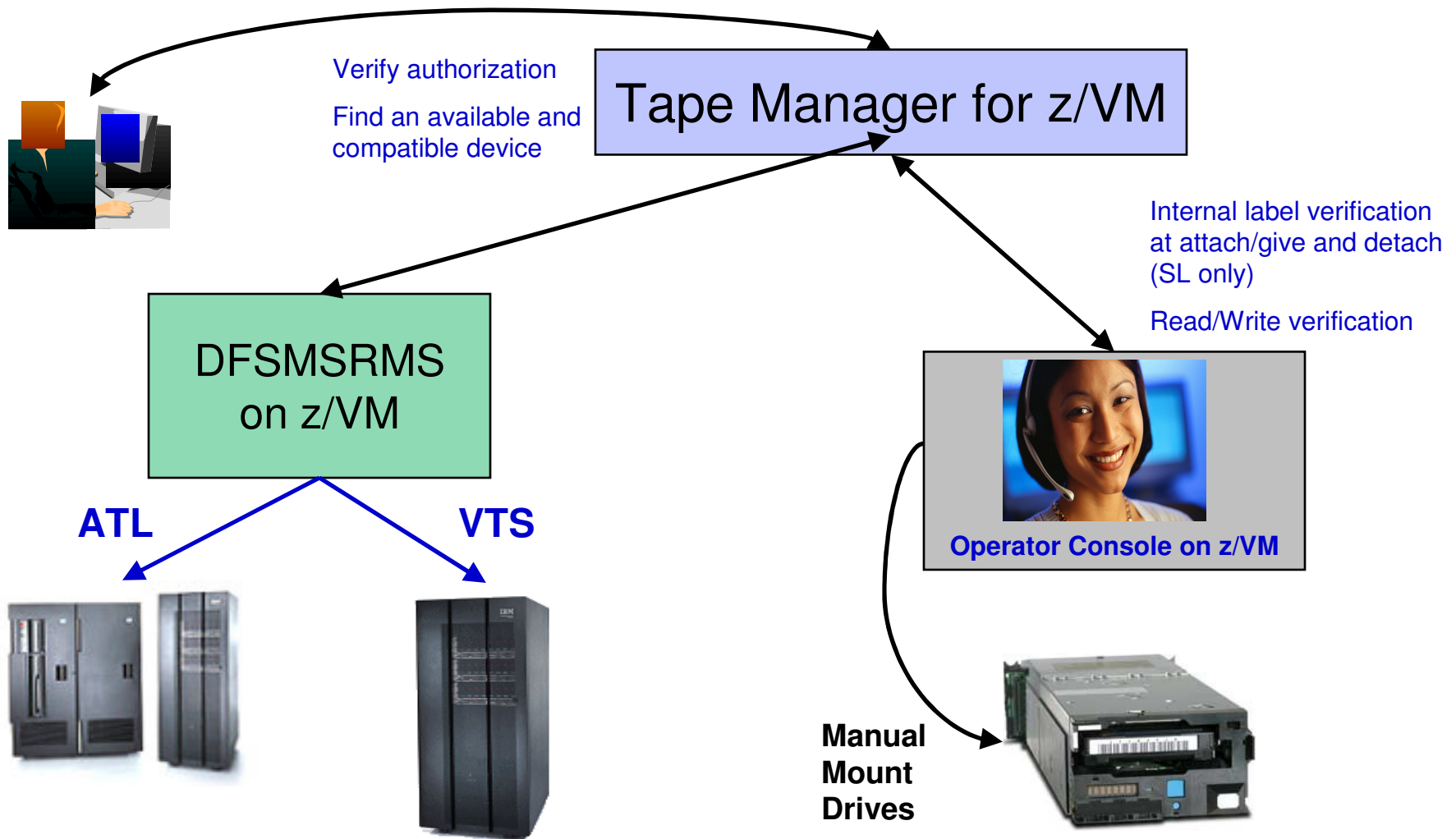
Green: Free
 Blue: Used
 Red: Manual
 Purple: ATL



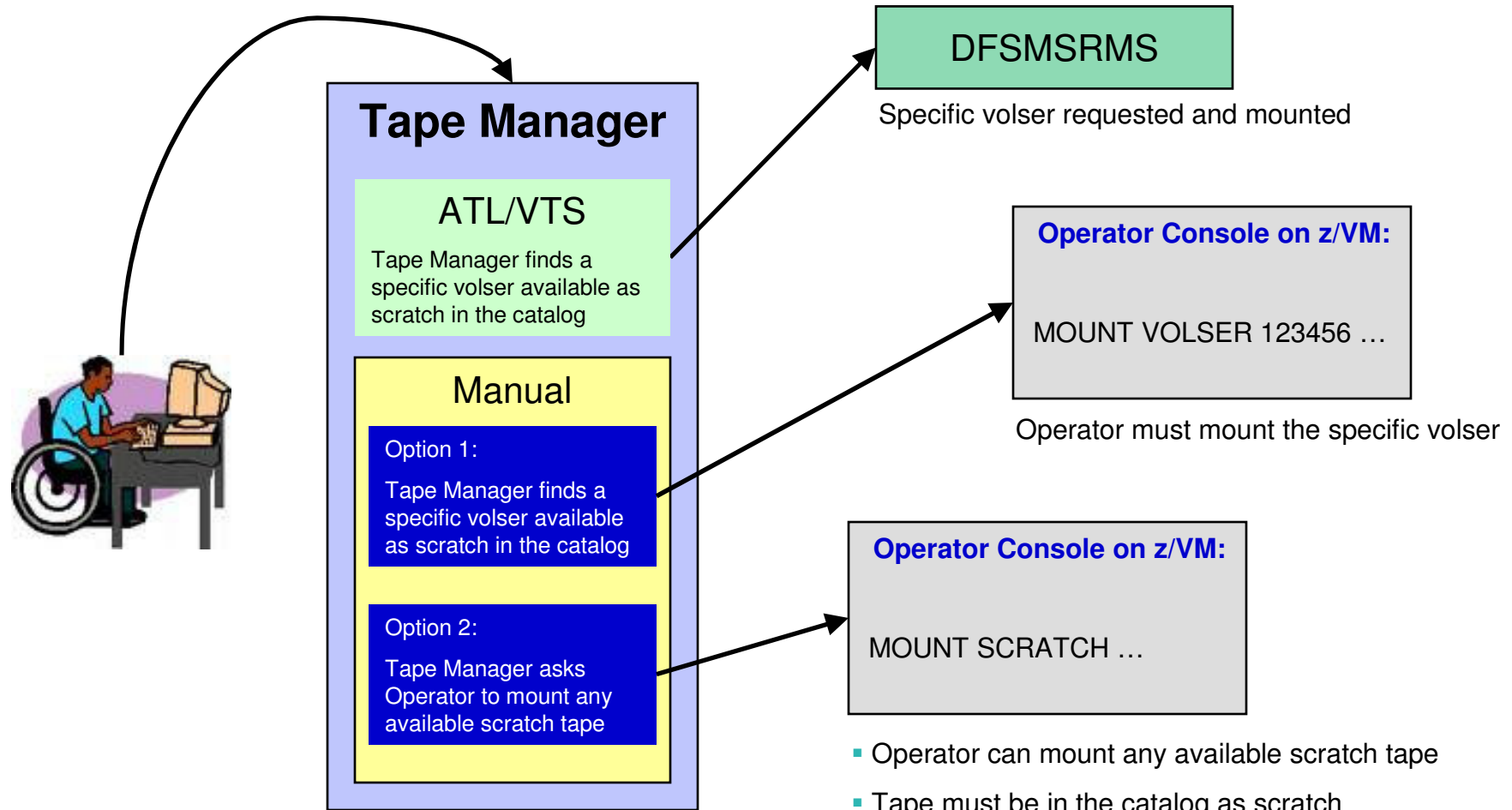
Access Control

Authority	Modify Pool Attributes and Delete Pool	Modify Tape Attributes	Add Tapes to the System Inventory (System Free Pool or Private Pools)	Delete Tapes from the System Inventory	Transfer Tapes into or out of this Pool; Delete External Tapes from this Private Pool	Modify Tapes	Read Tapes	Tape Attributes Modified Only as a Byproduct of Other Commands	Use Tape Pool as a Free Pool	Receive messages related to this pool
Sys Admin	✓	✓	✓	✓	✓			✓		
Pool Admin	✓	✓			✓	✓	✓	✓		
Tape					✓	✓	✓	✓		
Write						✓	✓	✓		
Read							✓	✓		
None										
Free									✓	
ExceptID										Threshold messages
MntID1 and MntID2										Mount messages, query and cancel mounts

Tape Mount Support: ATL, VTS, Manual



Scratch Mount Requests in Standard Mode



Option 1 vs. Option 2 controlled by GENSCRATCH statement in SYS CONFIG

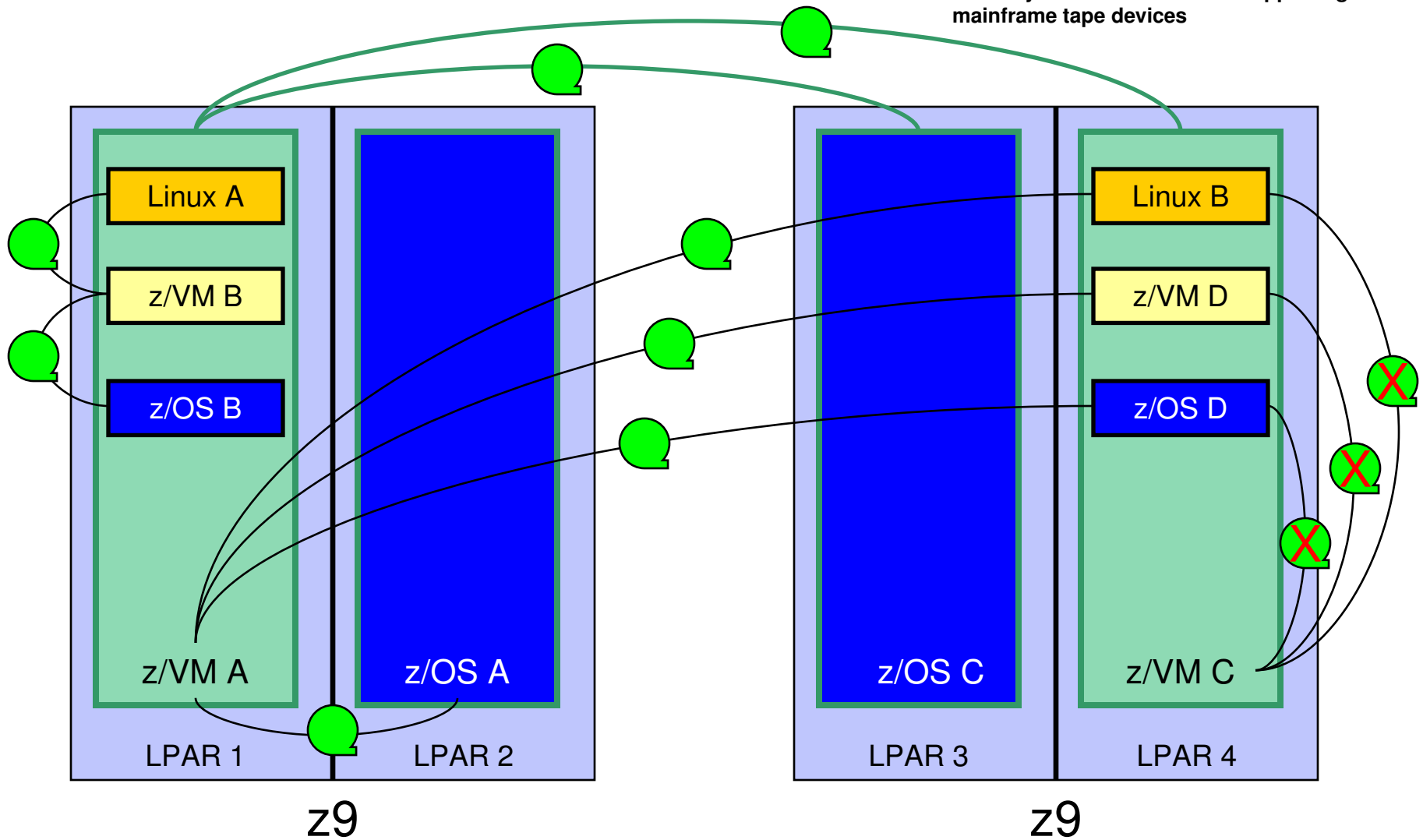
- Operator can mount any available scratch tape
- Tape must be in the catalog as scratch
- Tape must be in requesting mount pool or free pool

Data Security Erase (DSE)

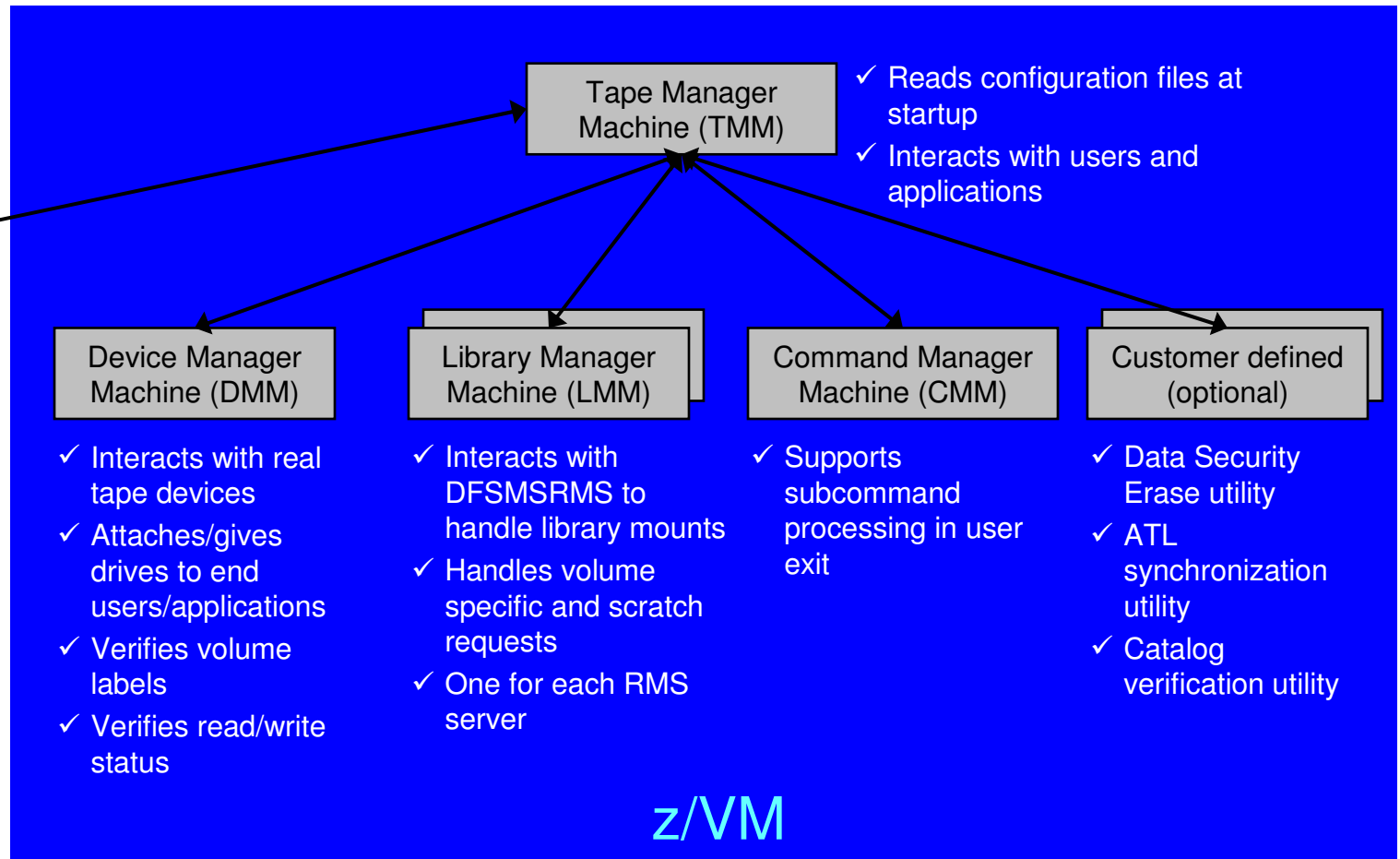
- **Erase (sensitive) data before tape is reused**
- **Option to enable DSE at tape pool or individual tape level**
 - DSE-enabled flag included in each catalog entry
- **DSE-enabled tapes marked as DSE-ready when freed**
- **Tape Manager DSE utility executed on a separate user ID**
 - Started manually or automatically with Operations Manager
 - Queries the catalog to find all tapes with DSE-ready flag on
 - Mounts each tape
 - Verifies volume label if possible
 - Configuration option to perform DSE on NL tapes or not
 - Erases tape
 - Turns off DSE-ready flag in catalog
 - Tape is now available for scratch unless its HOLD flag is on

- z/VM systems with IBM Tape Manager
- z/OS systems with IBM Automated Tape Allocation Manager
- Linux systems with software supporting mainframe tape devices

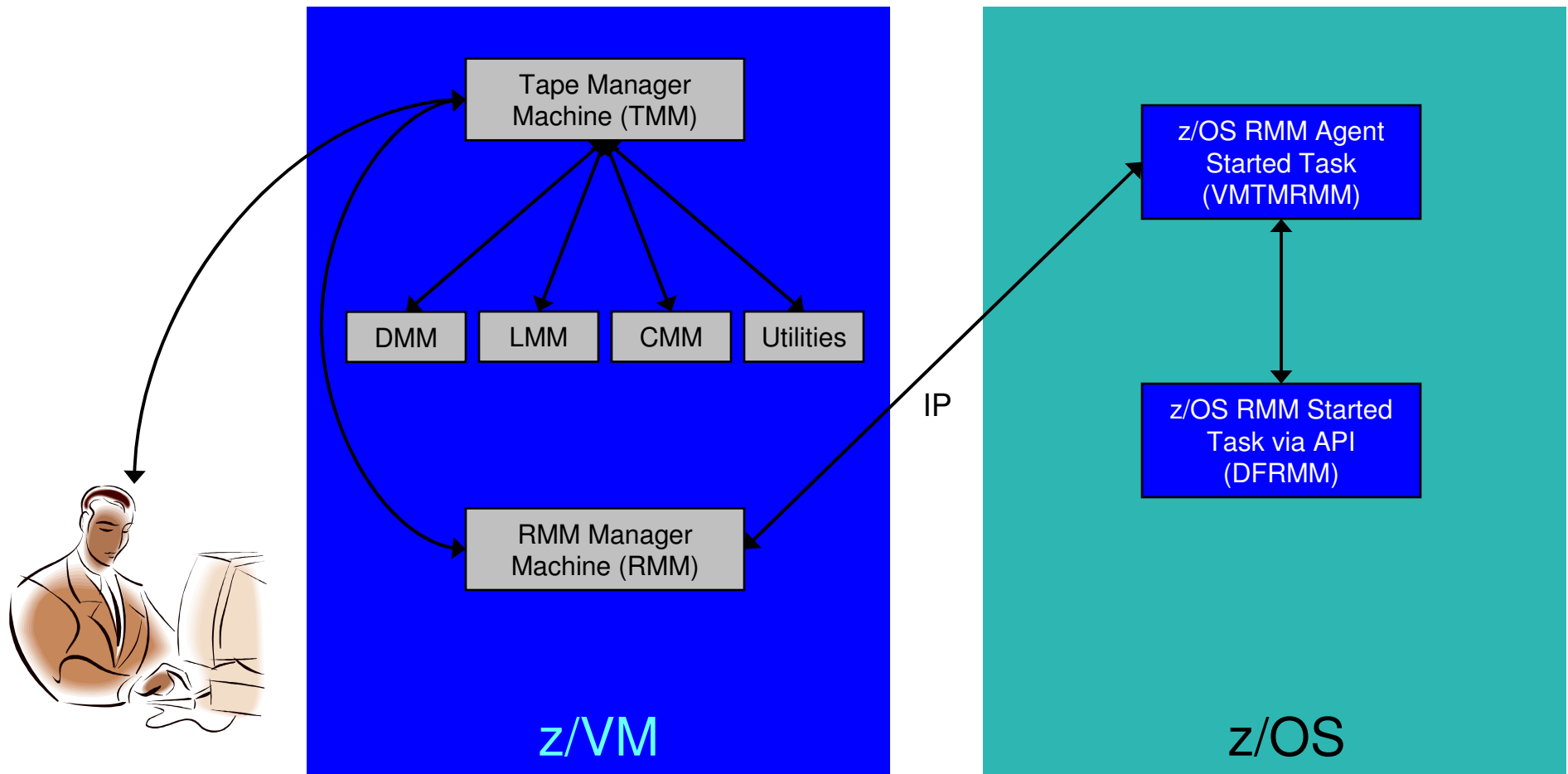
Sharing of Tape Devices



Tape Manager in Standard Mode



Tape Manager in RMM Mode



Summary

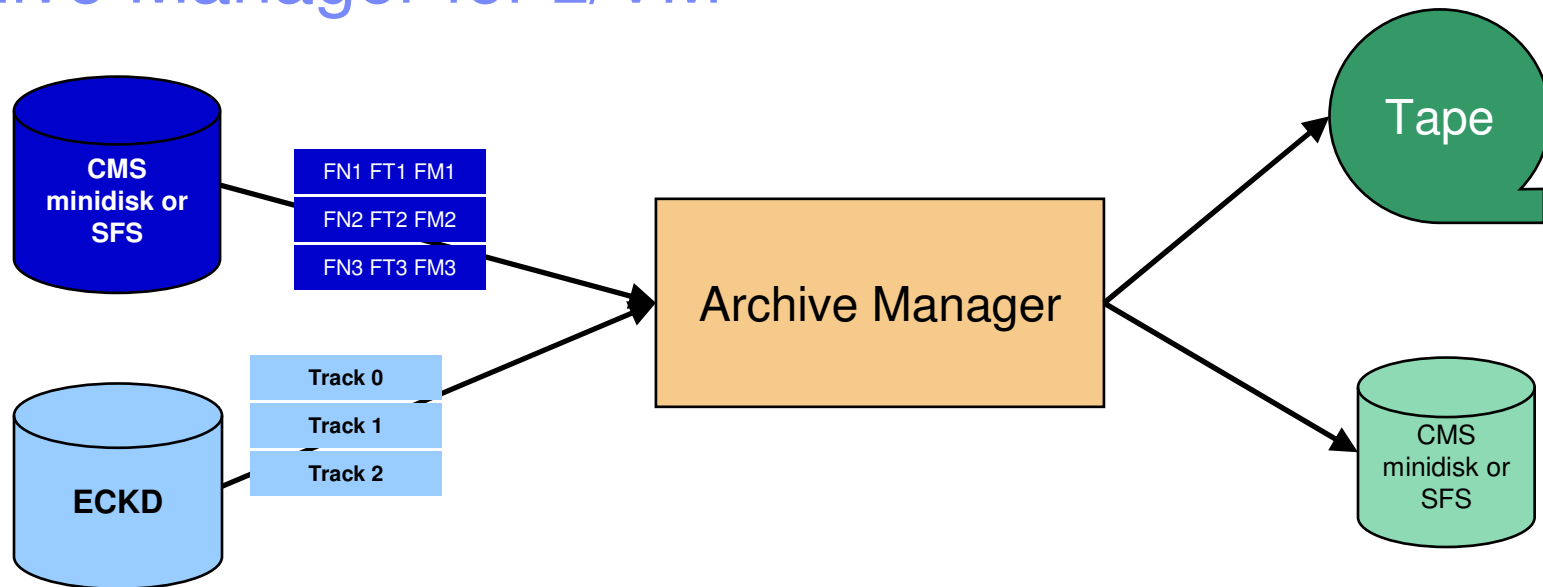
- **Use Tape Manager to**
 - Manage and share devices
 - Manage tape volumes
 - Access control
 - Retention
 - Data Security
 - Improve accuracy of mount requests



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Archive Manager for z/VM

Archive Manager for z/VM



- **Improve end user satisfaction and productivity**

- Users manage their own disk space
- Move infrequently used files to tape or other disk
- Archive and recall functions are controlled by the user
 - No administrator intervention required
- Archived data staged to DASD, then tape if applicable
 - Users don't wait for a tape mount for archive request to complete

- **Reduce DASD space requirements**

- Archive older files to less expensive storage media
- Continue to provide users access to the archived data/files

- **Control location, retention, and access to archived data**

- **Integration with Tape Manager for z/VM**

Archive Manager Benefits

- **Efficiency**
 - Users archive as needed
- **Productivity**
 - Staging disk allows immediate cleanup of user disk
 - Users don't wait for tape mounts
 - User driven archives and recalls with no administrator interaction
- **Control**
 - Each user can only recall data owned by him/her
 - Automatic aging and pruning of archive catalog
 - Administrator controls where data can be archived and how long it's kept

Summary

- **Use Archive Manager to**
 - Improve management of disk space
 - Easily and immediately archive data when a disk is approaching full
 - Manage retention of archived data



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Demos

Performing an Incremental Backup

- **Administrator previously performed a full backup**
- **Incremental job defined, using last full backup as its base**
- **Submit incremental job for review**
- **Submit incremental job for backup processing**
- **Use Operations Manager to monitor backup servers**

Restoring Files from Backup

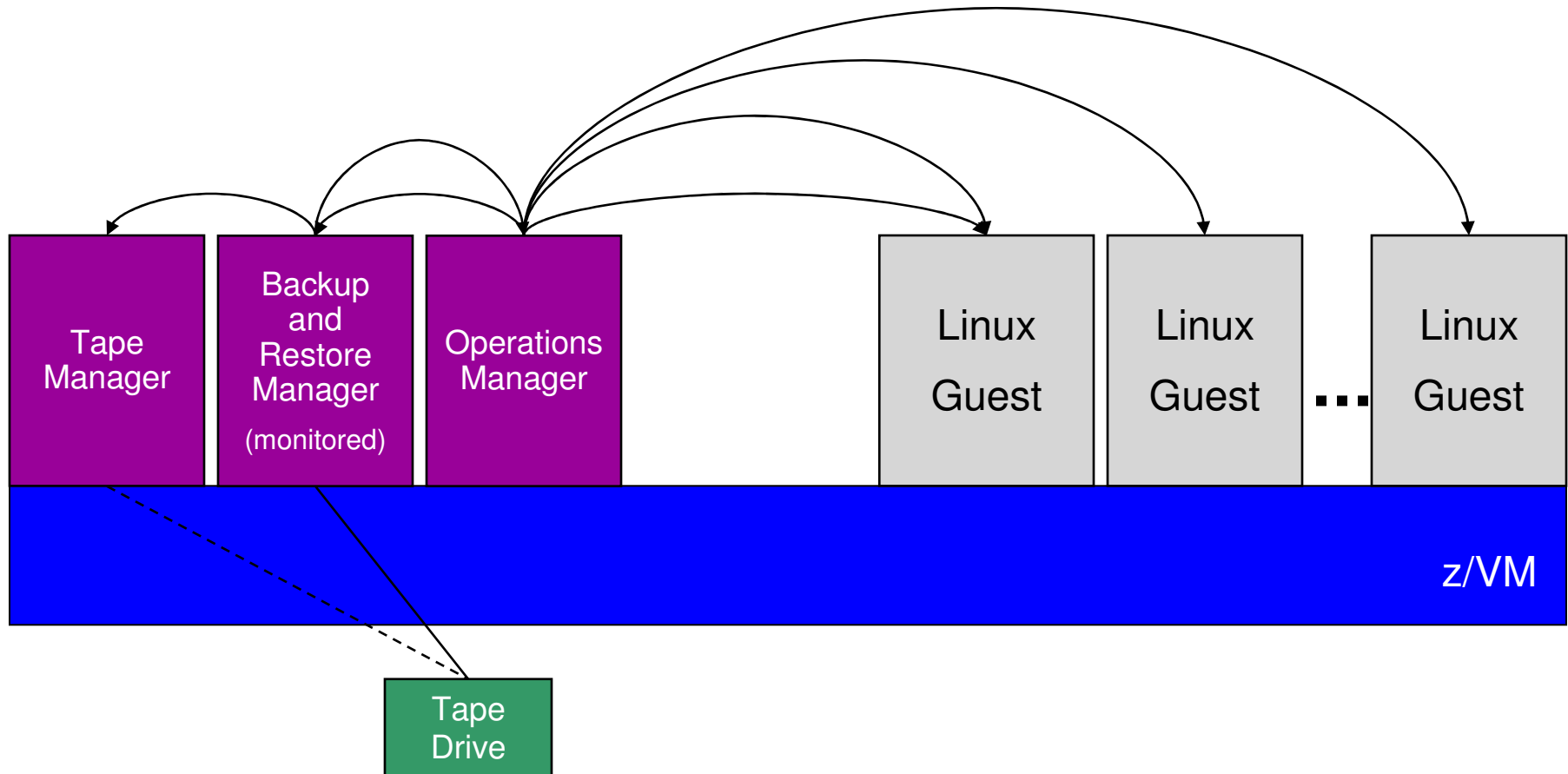
- **Full and incremental backups performed previously**
- **User accidentally erases or corrupts a file**
- **User restores the file from backup**
 - Full screen interface to see all files available in backup
 - Including multiple “versions” of the same file
 - Filters and sorting available to easily find the needed file
 - Request restore directly to disk or to reader
- **No administrator intervention required**

Scheduling Image Backups of Linux Guests

- **Initiated or scheduled by Operations Manager**
 - Schedule defined in Operations Manager to initiate backups at specific times/intervals
 - May include multiple schedules to allow quiescing/backing up one guest at a time
 - Action associated with each schedule
 - Linux guest is quiesced
 - Request sent to Backup and Restore Manager to back up the specific DASD/minidisks requested
 - Operations Manager notified when the action is complete
 - Linux guest is reactivated

Scheduling Image Backups of Linux Guests

Scheduled by Operations Manager

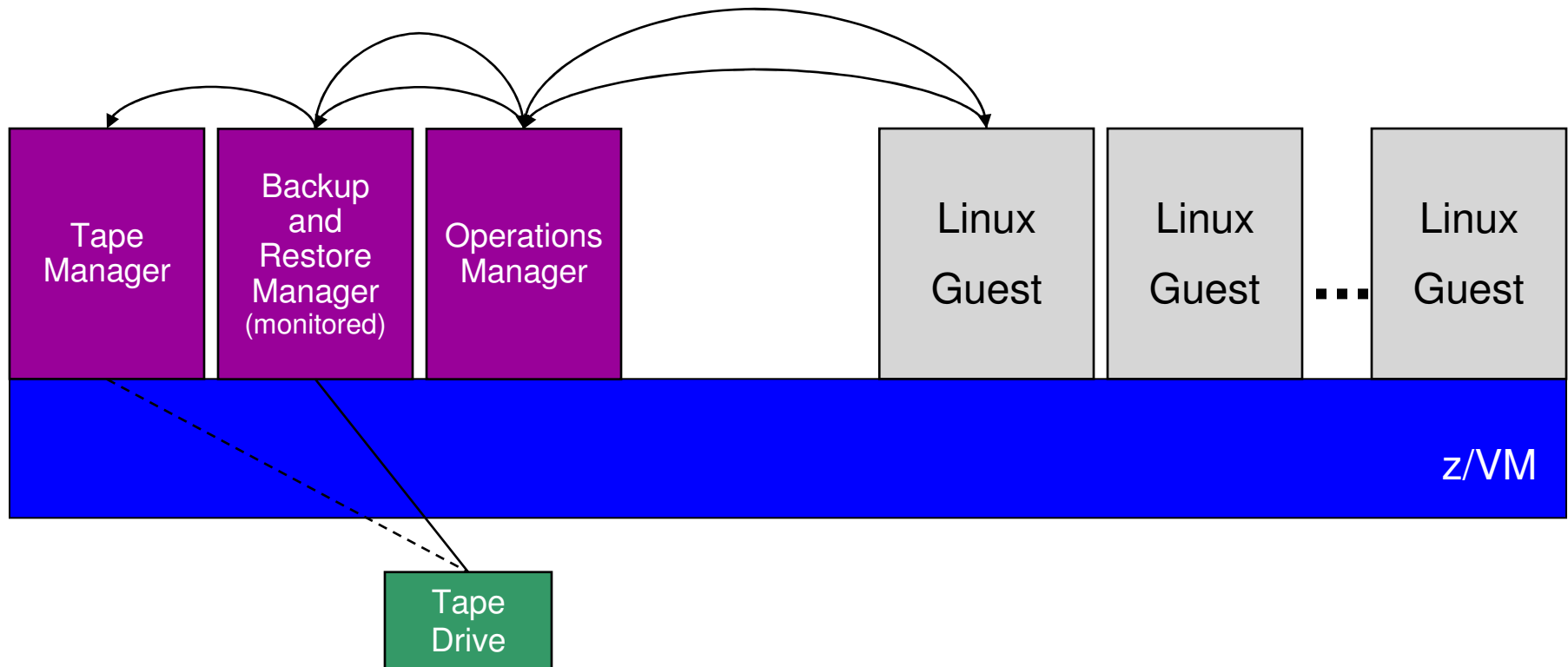


Performing an Image Backup of a Linux Guest

■ **Initiated or scheduled by the guest**

- Linux guest sends message/request to Operations Manager (or any console being monitored)
- Action is triggered by a rule in Operations Manager
 - Linux guest is quiesced
 - Perhaps quiescing only the application running there
 - Operations Manager sends request to Backup and Restore Manager
 - Back up the specific DASD/minidisks requested
 - Operations Manager monitors the console of the backup server
 - Receives the message when backup is complete
 - Triggers a rule to re-activate the guest and send a message to the Linux guest indicating completion

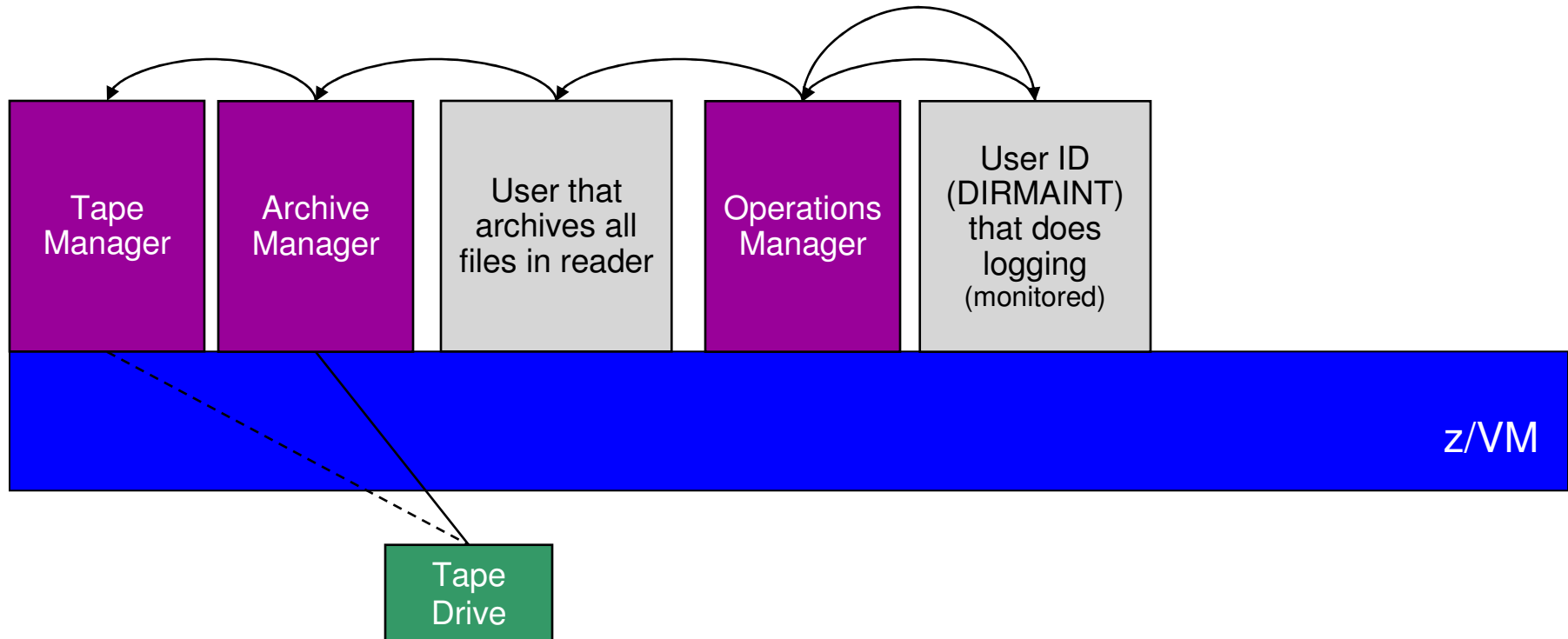
Performing an Image Backup of a Linux Guest Initiated by the Linux Guest



Detecting Disk Full Conditions of Logging IDs

- **Operations Manager monitors the console of a user ID that does logging**
 - DIRMAINT, for example
- **Disk full or early warning message triggers a rule/action in Operations Manager**
 - Shut down the service machine
 - Send the log files to a service machine which automatically archives all files it receives
 - May involve Tape Manager if archiving to tape
 - Erase the log files
 - Restart the service machine

Detecting Disk Full Conditions of Logging IDs



Summary

- **Management of z/VM systems with Linux guests requires monitoring and management tools**
- **IBM solutions exist**
 - OMEGAMON XE on z/VM and Linux
 - Operations Manager for z/VM
 - Tape Manager for z/VM
 - Backup and Restore Manager for z/VM
 - Archive Manager for z/VM

Reference Information

- **Product Web sites**

- <http://www.ibm.com/software/stormgmt/zvm/>
 - Publications
 - Pre-requisites
 - Announcements
 - Support

- **e-mail**

- Tracy Dean, tld1@us.ibm.com