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Managing z/VM and Linux on System z (and Other Guests)

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Agenda

- **System management, automating operations**
 - Operations Manager for z/VM
- **Storage management**
 - Backup and Restore Manager for z/VM
 - Tape Manager for z/VM
 - Archive Manager for z/VM
- **Demos**
 - Automation scenarios
 - Backup and recovery scenarios, including automation
- **References**



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Automating Operations
Operations Manager for z/VM

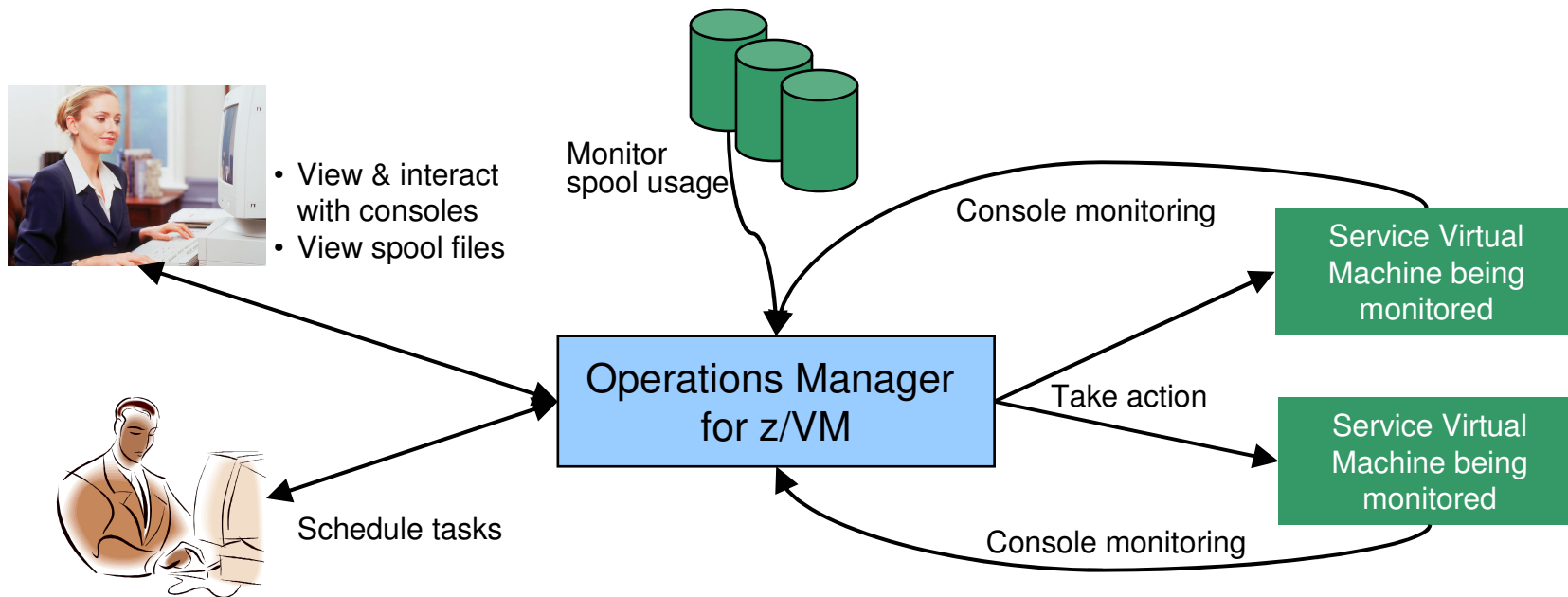
Operations Manager for z/VM

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
- Schedule tasks to occur on a regular basis

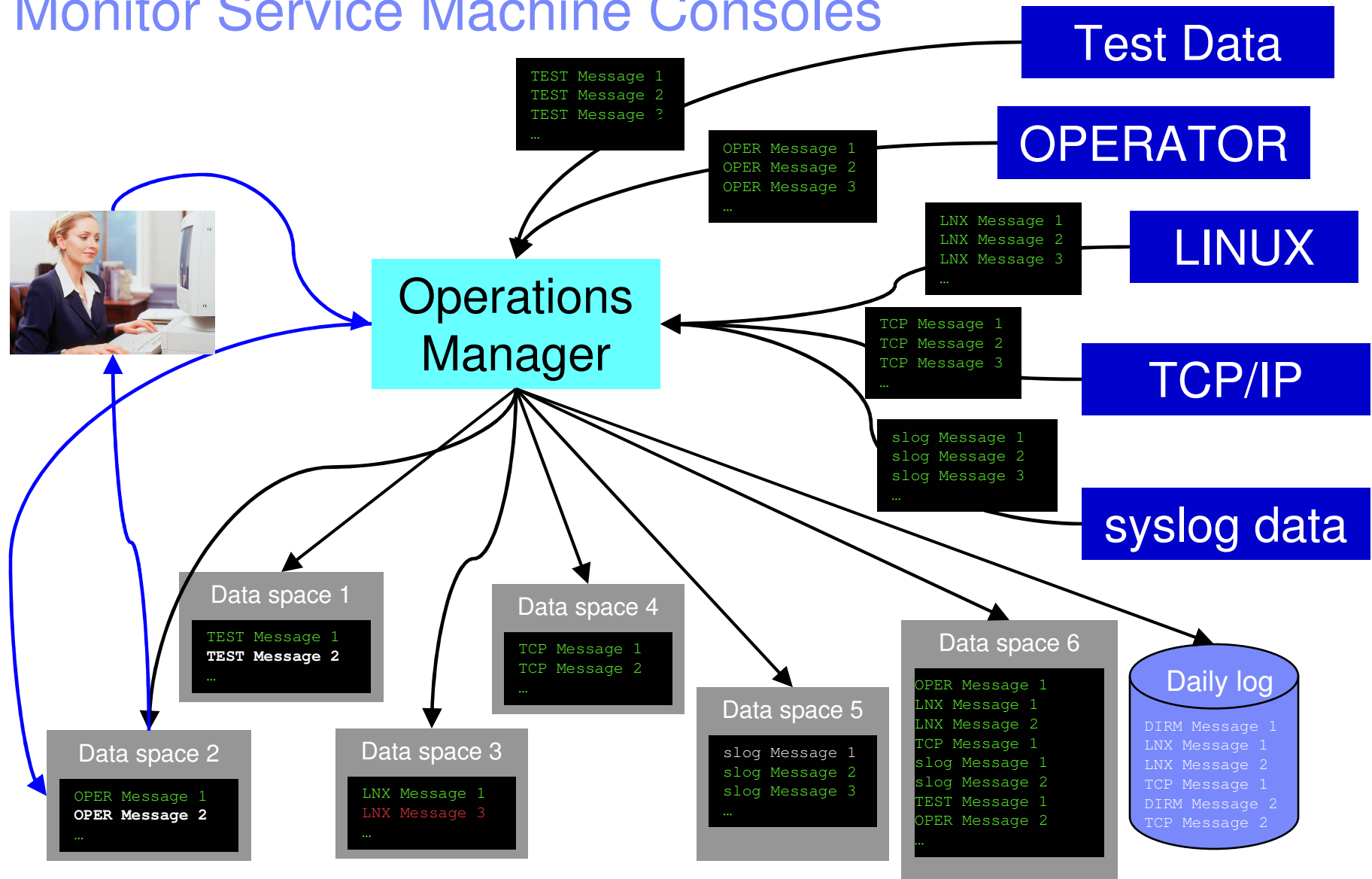
Integration

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

Features and Functions

- **Monitor service machine consoles**
- **Monitor spool usage**
- **Monitor system events**
- **View and interact with monitored consoles from authorized user IDs**
- **Find and view spool files**
- **Schedule events/actions**
- **Dynamic configuration**
- **Separation of access control**

Monitor Service Machine Consoles



Monitor Service Machines

- **Define rules to**
 - Scan console messages for text matching
 - Includes column, wildcard, and exclusion support
 - Optionally restrict to specific user ID(s)
 - 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

View and Interact with Consoles

- **Authorized users can view live consoles of monitored service machines and guests**
 - Multiple users can view the same console simultaneously
 - No need to logon to the service machine to see its console
 - Test data and Linux syslog data treated as a “console”
 - Views can be defined to look at a group of consoles in one view
- **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
- **Amount of data that is visible depends on specified or default data space size**
- **Rules/actions may modify the view**
 - Suppress messages from the console
 - Hold or highlight messages with color, blinking, etc.
- **Authorized users can view the log file**
 - Can also request a copy of the log file from today or a previous day

Monitor and View Spool Files

- **Create spool monitors to trigger actions when**
 - Percent of spool usage falls within a specified range
 - Percent of spool usage increases at a specified rate
- **Actions triggered can be the same actions used by console monitoring**
- **Authorized users can**
 - Display a list of spool files based on one or more attributes
 - Owner
 - Size
 - Date created
 - From the list the user can
 - View the contents of an individual spool file
 - Transfer, change, or purge a spool file

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 and spool monitoring

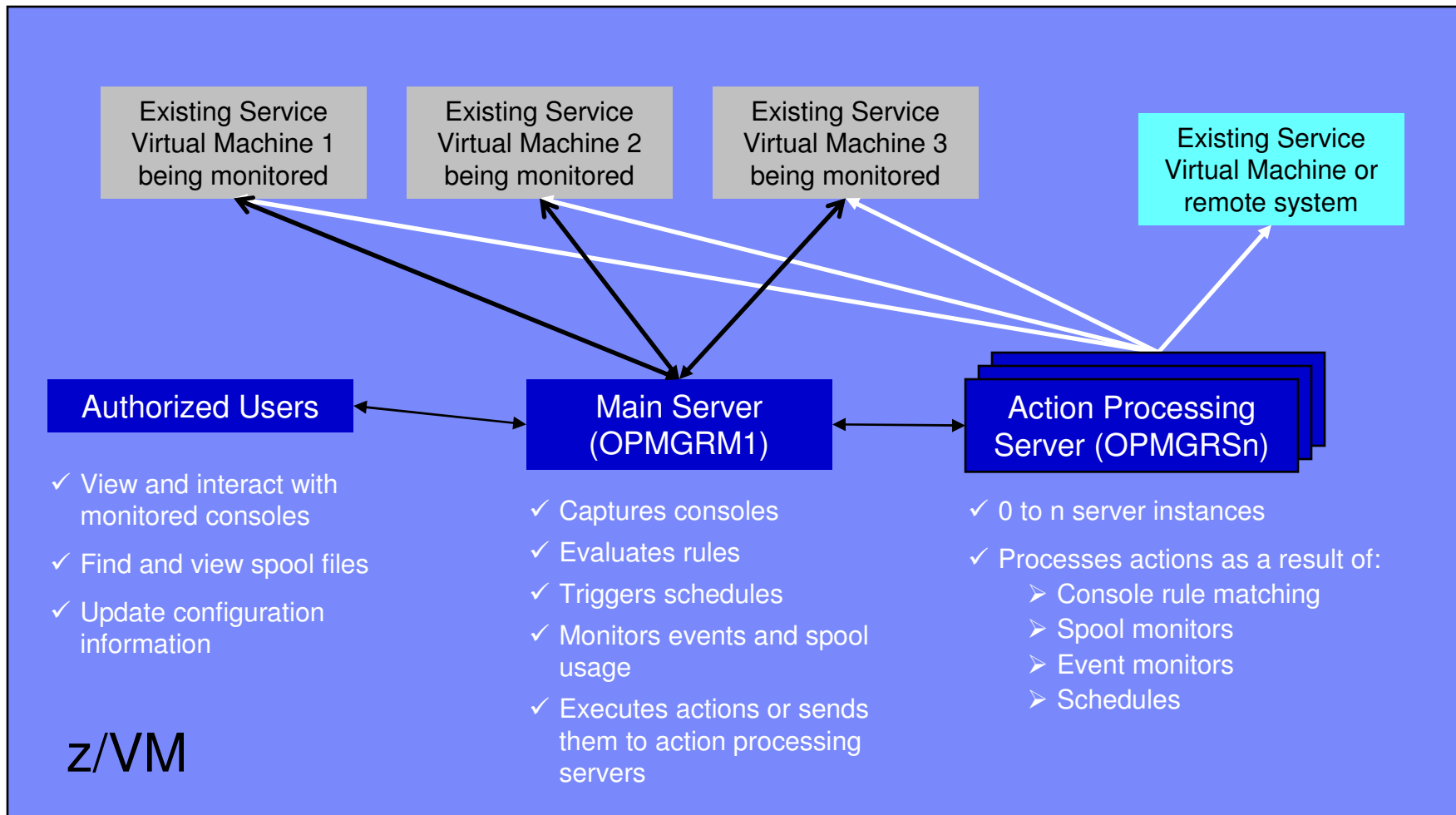
Respond to System Events

- **Create monitors for z/VM system events (*VMEVENT) related to user IDs**
 - Logon
 - Logoff
 - Failure condition (typically CP READ)
 - Logoff timeout started
 - Forced sleep started
 - Runnable state entered (VM READ)
 - Free storage limit exceeded
- **Optionally restrict to specific user ID(s)**
- **Specify the action associated with the event**
 - Actions specified are the same as those for schedules and console and spool monitors

Dynamic Configuration

- **Initial configuration file loaded at startup**
 - May imbed other configuration files
- **Most configuration options can be updated while Operations Manager is running**
 - Add, delete, or change:
 - Rules, actions, monitors, schedules, holidays, groups, user authorization
 - Suspend or resume rules, monitors, schedules
- **Multiple methods**
 - GOMCMD command interface
 - Load a new or updated configuration file
 - Commands in DEFACTN statements

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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Managing Backup and Recovery
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

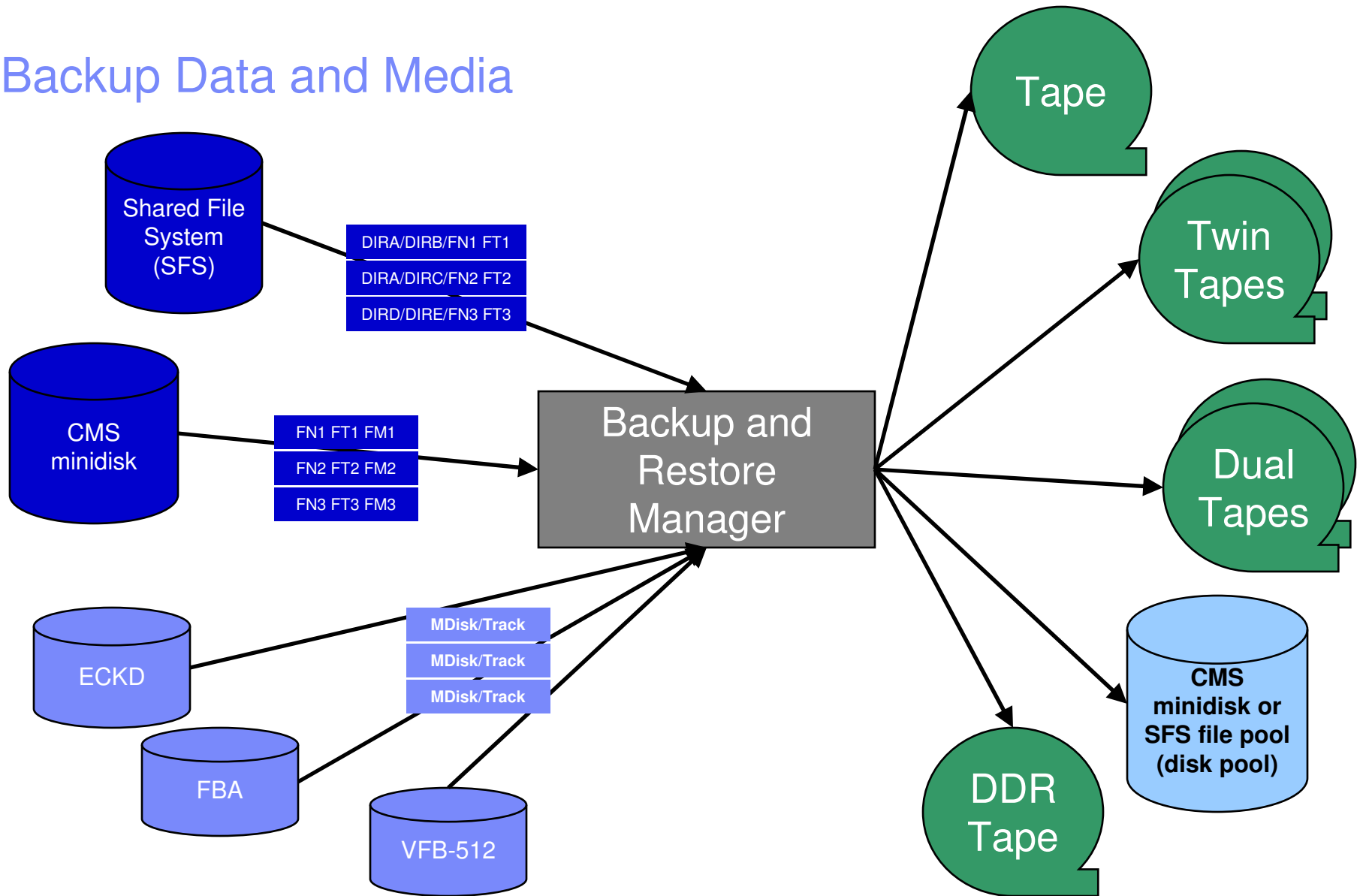
▪ Optional compression of data during backup

- Call your own compression algorithm
- Use IBM provided routine

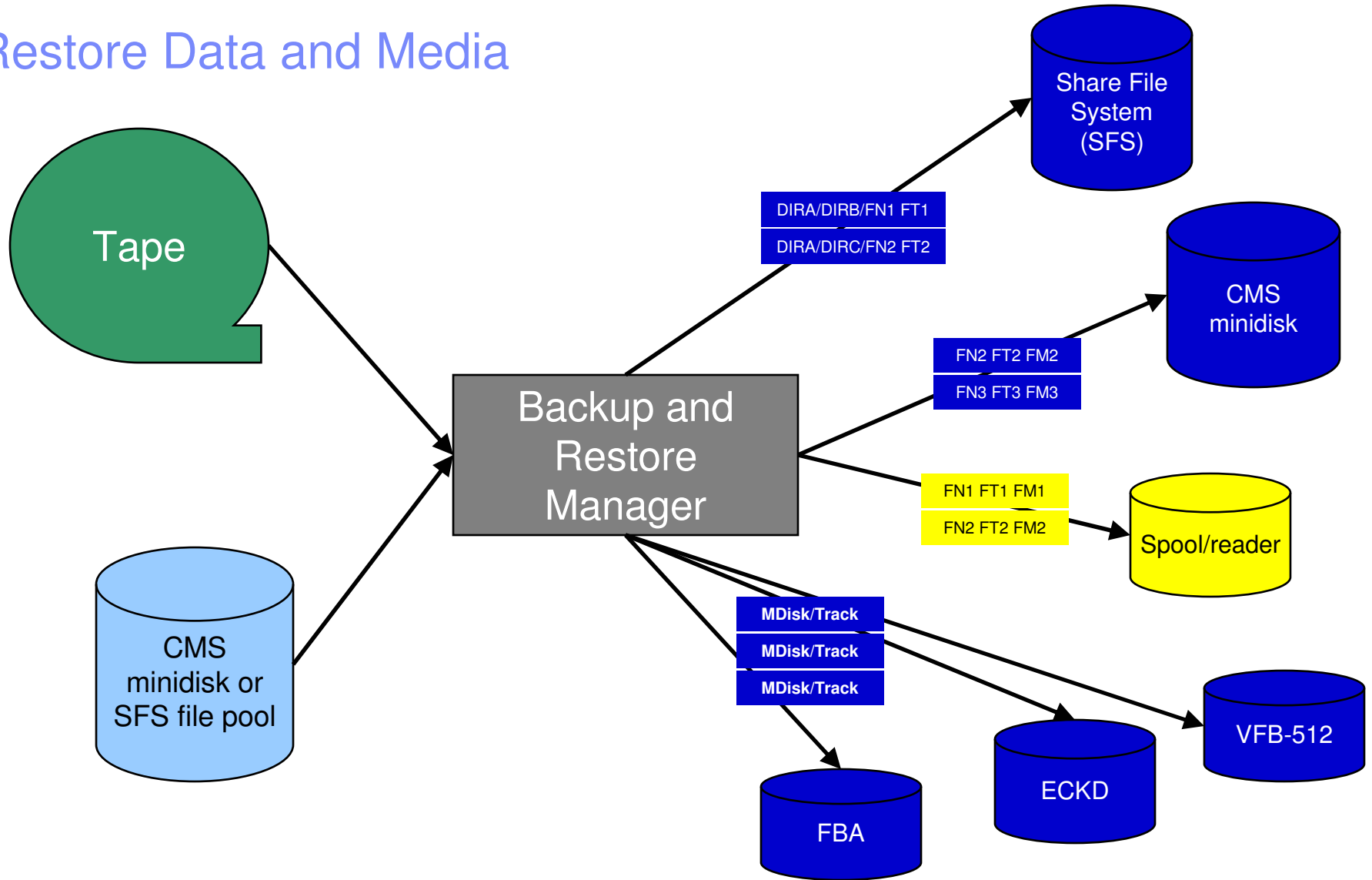
▪ Encryption exits available

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

Backup Data and Media



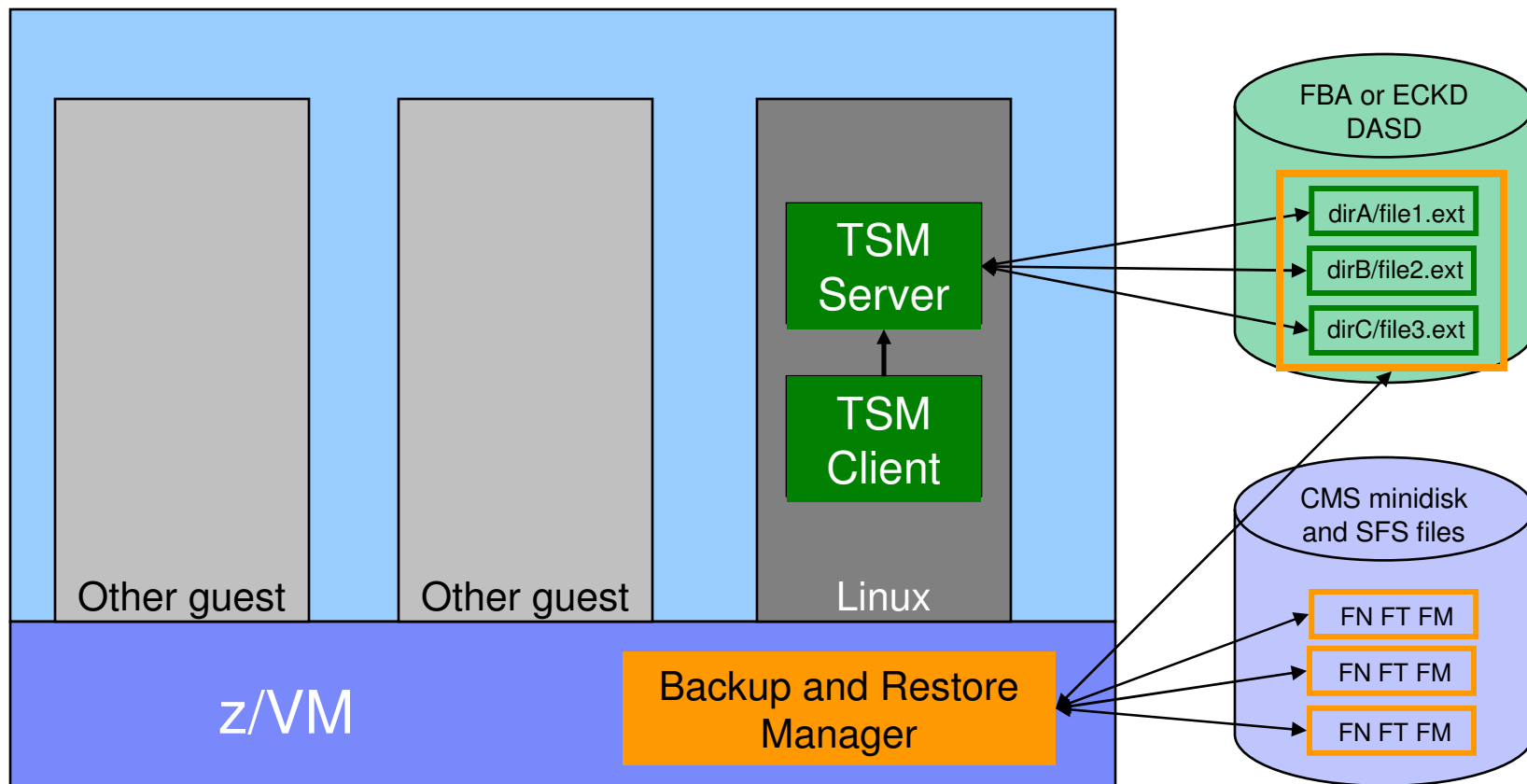
Restore Data and Media



Backup and Restore Manager and Linux Guests

Using Backup and Restore Manager with Tivoli Storage Manager

Choose the solution that meets your needs – or combine for file recovery and DR



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 Cont...

- **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 900-90F

FUNCTION MEDIATYPE VOLSER
-----|-----|-----|
INCLUDE RDEVVOL 530*

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

```


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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Managing Tapes and Tape Devices

Tape Manager for z/VM

Product Overview

■ Manage tapes

- Define tapes in a catalog, including:
 - Free or used
 - Retention/expiration information
 - ATL/VTs 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

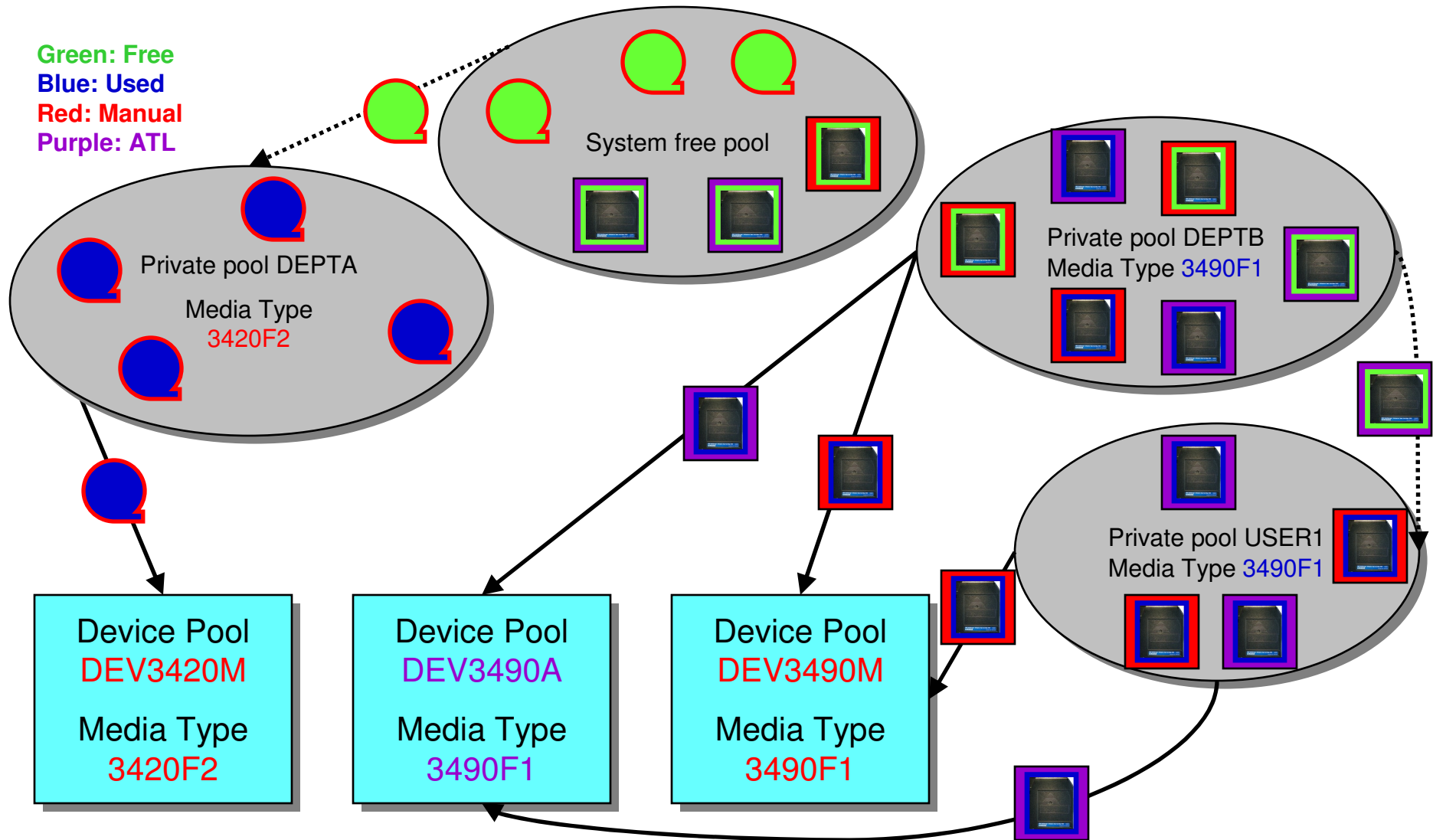
Key Benefits

- **Effective management of tapes in ATL or VTS**
 - 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**
 - Granular access control
 - 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

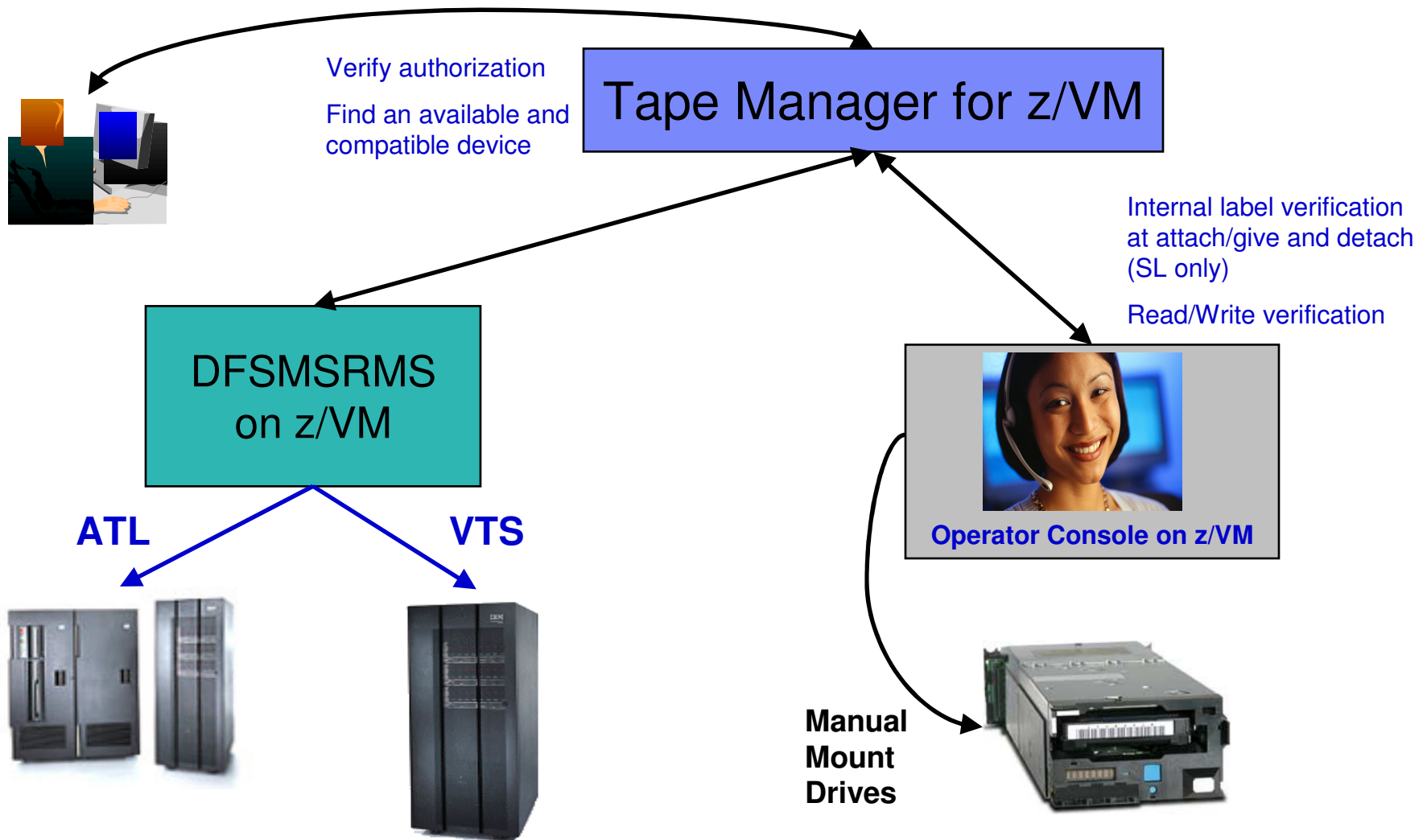
Tape Volumes, Tape, Pools, and Device Pools



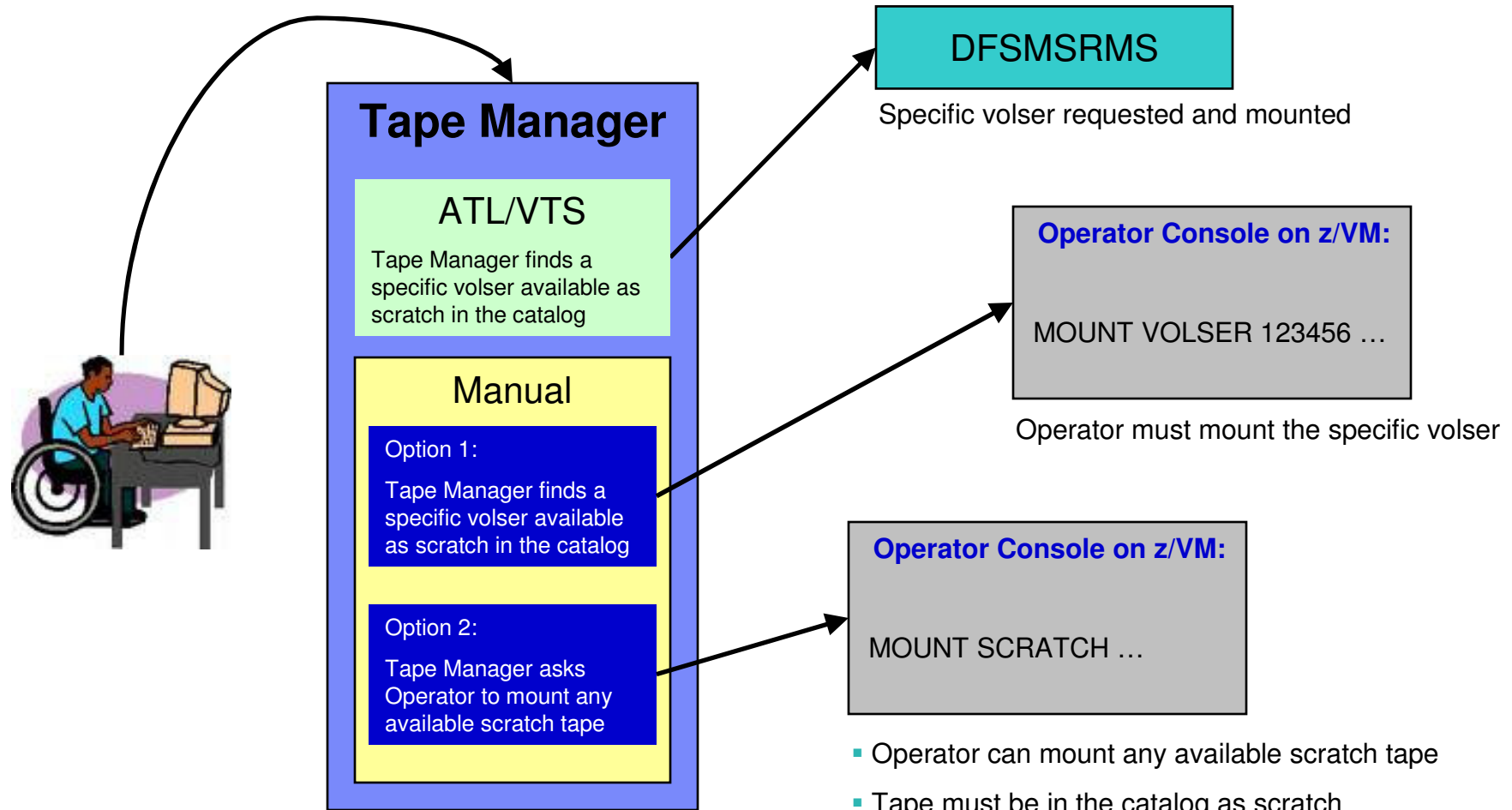
Access Control

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



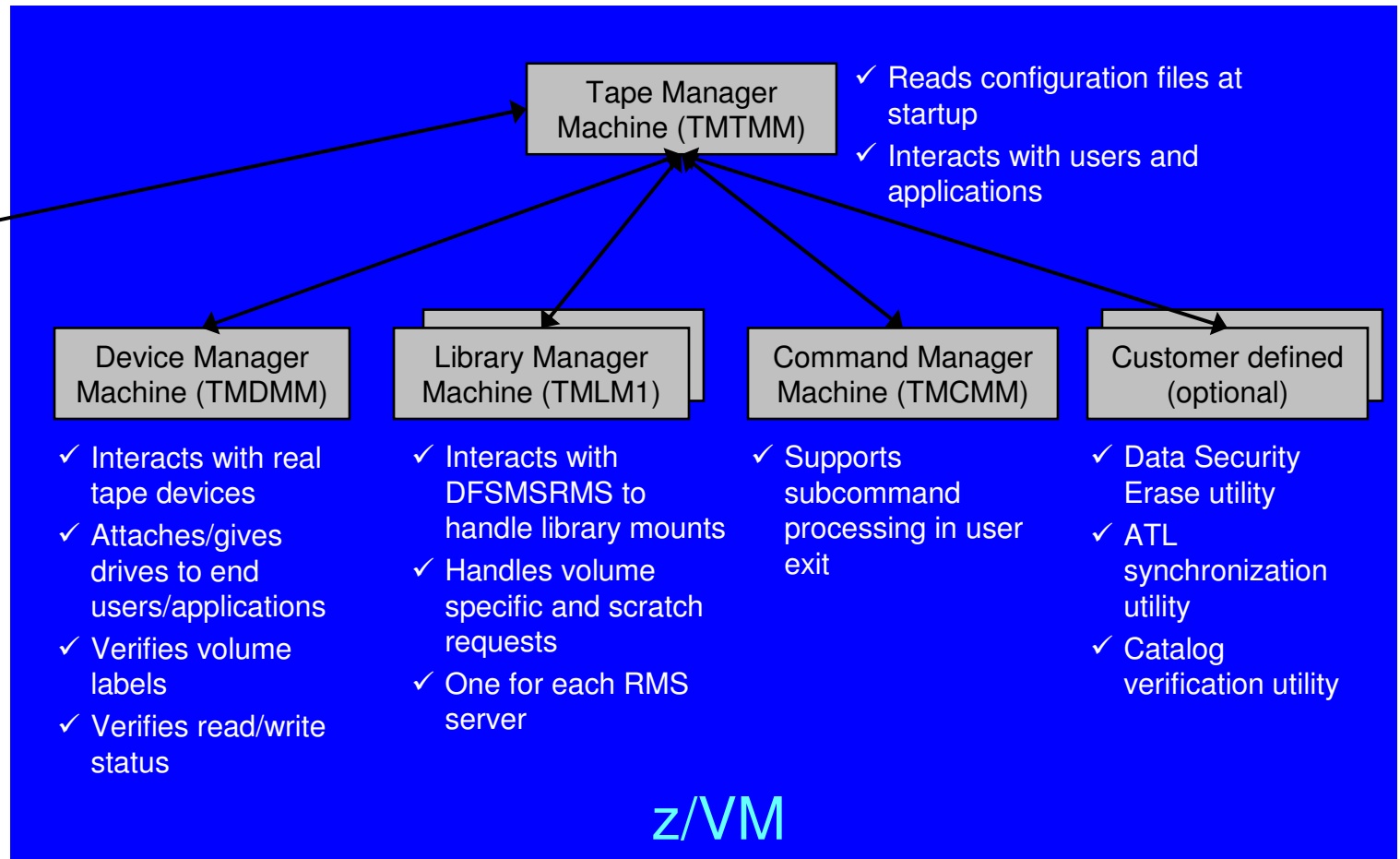
- Operator can mount any available scratch tape
- Tape must be in the catalog as scratch
- Tape must be in requesting mount pool or free pool

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

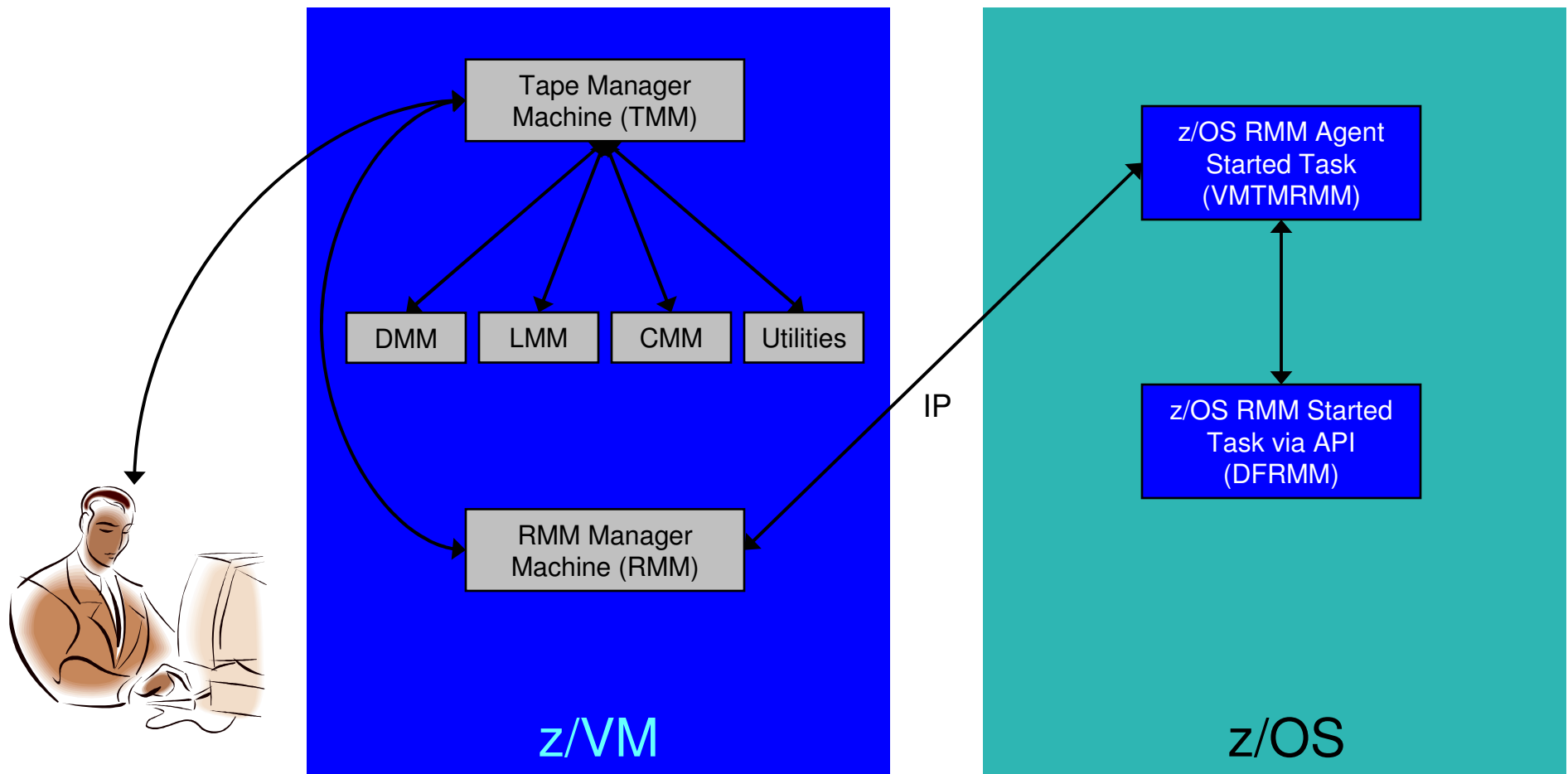
Data Security Erase (DSE)

- **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 (TMDSE) 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

Tape Manager in Standard Mode

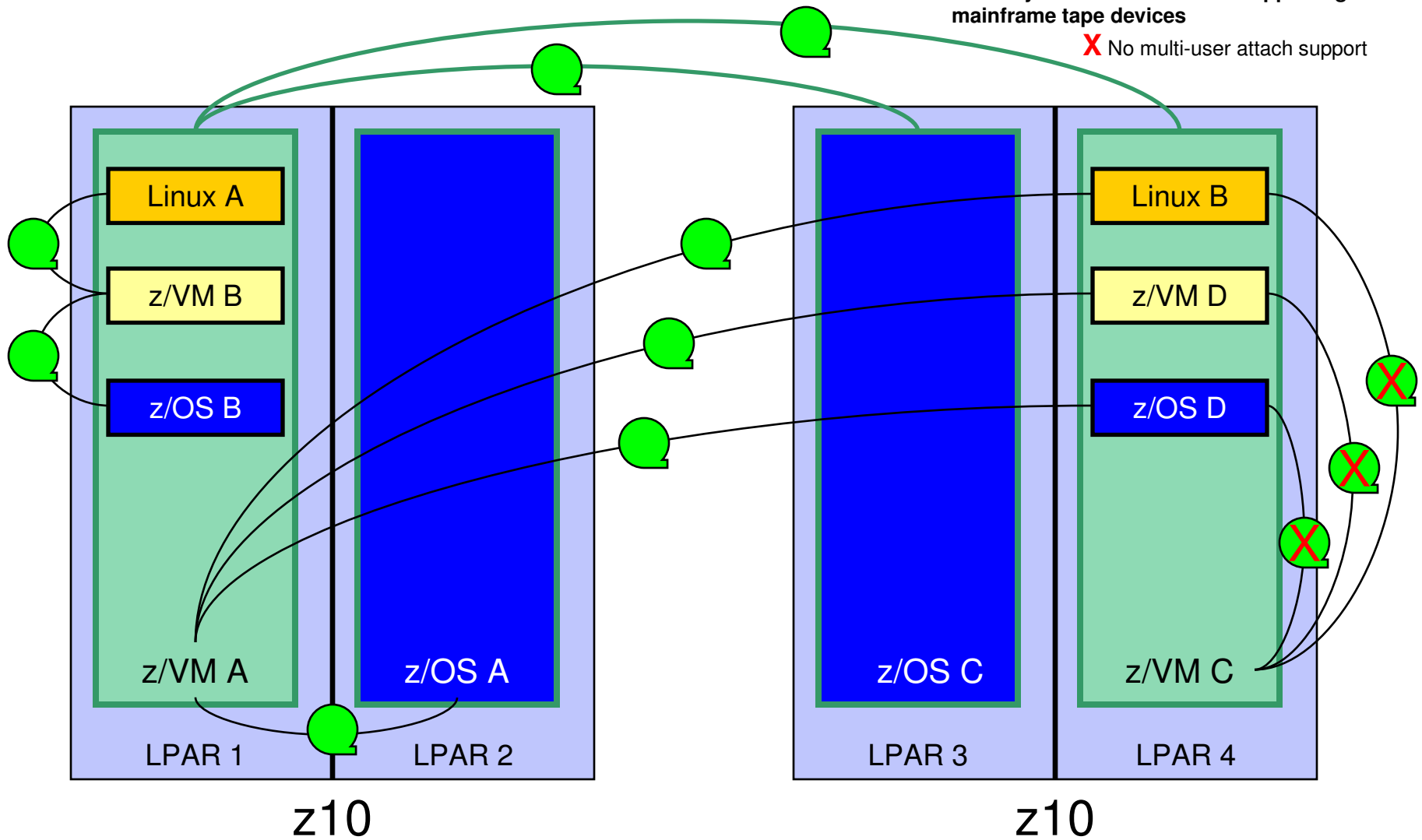


Tape Manager in RMM Mode



Sharing of Tape Devices

- z/VM systems with IBM Tape Manager
 - z/OS systems with IBM Automated Tape Allocation Manager
 - Linux systems with software supporting mainframe tape devices
- X** No multi-user attach support



Summary

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

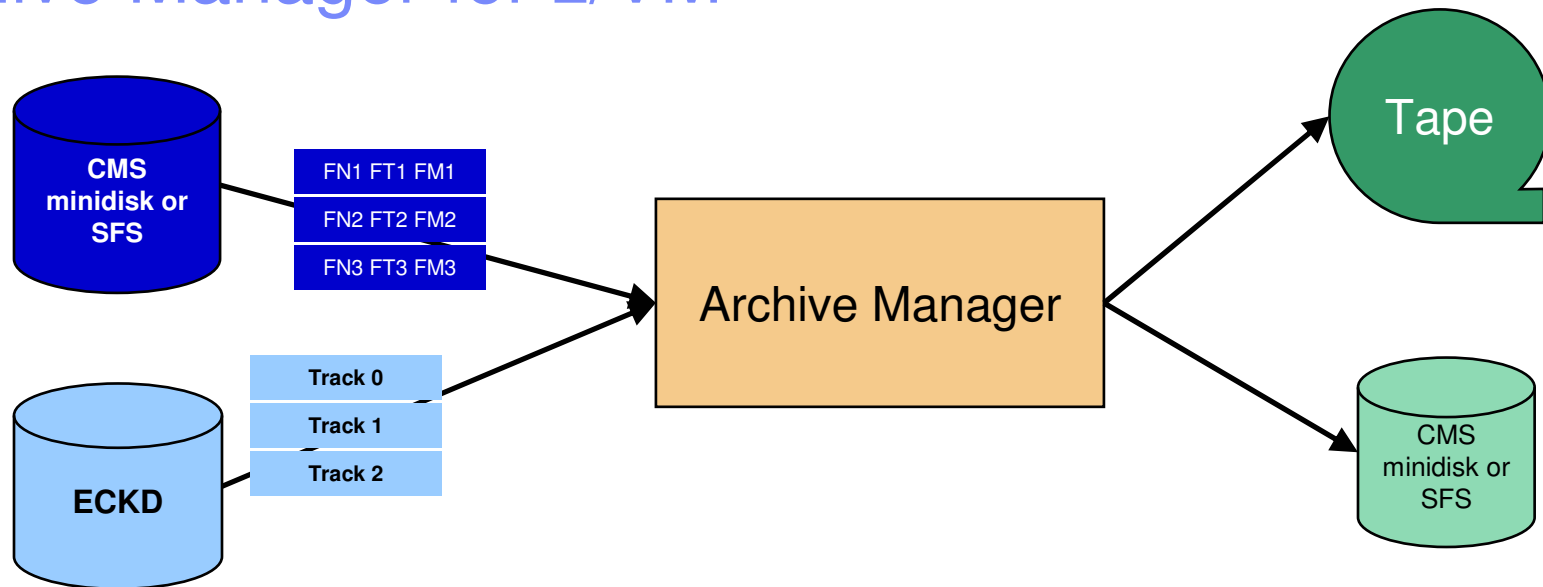


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Managing Disk Space

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**

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

Summary

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

Reference Information

- **Product Web site**
 - Start at <http://www.ibm.com/software/sysmgmt/zvm/operations/>
 - Product pages include
 - Publications
 - Pre-requisites
 - Announcements
 - Presentations
 - Support
- **e-mail**
 - Mike Sine, sine@us.ibm.com, Technical Marketing
 - Tracy Dean, tld1@us.ibm.com, Product Manager
- **White paper for routing Linux syslog data**
 - <http://www.ibm.com/support/techdocs/atmastr.nsf/WebIndex/WP101379>
- **White paper for sending alerts from Operations Manager to Netcool/OMNibus**
 - <http://www.ibm.com/support/techdocs/atmastr.nsf/WebIndex/WP101492>



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Automation Scenarios

Live demos and/or screenshots available from
Tracy Dean: tld1@us.ibm.com

Scenario 1: Send an E-mail if Abend or Fatal Message Occurs

- **Watch all monitored consoles for an error message that includes the word “fatal” or “abend”**
 - Message must also contain the word “mail” (for demo purposes only)
- **Send an e-mail if one of the words appears on a console**
- **Dynamically include in the e-mail**
 - User ID that received the error message
 - Indicator of whether the word was fatal or abend
 - Full text of the error message

Scenario 2: Send a Message Alert to OMNIBUS

- **Watch all monitored consoles for an error message that includes the word “fatal” or “abend”**
 - Message must also contain the word “omni” (for demo purposes only)
- **Send a message to OMNIBUS if one of the words appears on a console**
 - Use POSTZMSG, running on Linux guest
 - Do not trigger the action if the message is on this guest
- **Dynamically include in the message**
 - User ID that received the error message
 - Indicator of whether the word was fatal or abend
- **Watch out for 160 character limit on Linux guest virtual console**

Scenario 3:

Send a Message or E-mail if Spool Usage is Too High

- **Operations Manager monitors the spool usage (percent full)**
- **Usage exceeds the specified limit**
 - We'll add large files to the spool to force this
- **Automatically send a message to a VM user ID or an e-mail to someone else who can evaluate and take action**

Scenario 4: Find and View Spool Files – Clean up the Spool

- **Authorized user specifies spool search criteria**
 - By user ID
 - By date
 - By file size
- **Result list presented**
 - Sort
 - Open/view a specific spool file
 - Purge, modify metadata, or transfer a file

Scenario 5: Automated Spool Clean Up

- **Use z/VM SFPURGER utility to manage spool files based on criteria, e.g.**
 - User ID
 - Days in spool
 - Class
 - Number of records
- **Automate SFPURGER execution**
 - Regularly scheduled using Operations Manager
 - Triggered by Operations Manager spool monitor

Scenario 6: 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**
 - Quiesce or shut down DIRMAINT
 - Send the log files to a separate service machine
 - Erase the log files from DIRMAINT's logging disk
 - Restart DIRMAINT
 - Separately, other service machine automatically archives all files it receives (in Archive Manager for z/VM)
 - Log files are safely archived in Archive Manager and DIRMAINT is running with a clean log disk

Scenario 7: Process a File of Test Messages as a Console

- **Create a file containing lines of test messages**
 - Test rules and actions without creating critical conditions
- **Use Operations Manager to send the file for processing**
 - Treat it as the console of one user
 - Send it again treating it as the console of another user
 - Notice triggered rules and actions are different
- **View the “consoles” of these two users**

Scenario 8: Process Linux Syslog Data as a Console

- **Route syslog data from a Linux guest to Operations Manager for z/VM**
- **Treat it as the console of a “fake” user ID**
- **Trigger rules and actions based on syslog data**
- **View the “console” containing syslog data**

Scenario 9: Create a Central Operations Console

- **User Operations Manager to watch for error, warning, fatal messages on service machine consoles**
 - DIRMAINT, TCP/IP, RACF, etc.
 - Linux guests
 - Linux syslog
- **Route these messages to a central operations console**
- **Operations staff watches operations console for signs of trouble**
 - View individual service machine consoles for more details when needed



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Backup and Recovery Scenarios *Including Automation*

Live demos and/or screenshots available from
Tracy Dean: tld1@us.ibm.com

Scenario 10: Performing an Incremental Backup

- **Administrator previously performed a full backup**
- **Incremental job defined, using last full backup as its base**
- **Change a file on user's A-disk**
- **Submit incremental job for review**
- **Submit incremental job for backup processing**
- **Use Operations Manager to monitor backup servers**

Scenario 11: 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**

Scenario 12: 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 shut down
 - Operations Manager watches for shutdown complete
 - Sends request to Backup and Restore Manager to back up the specific DASD/minidisks associated with the guest
 - Operations Manager watches for backup complete message
 - Restarts Linux guest
 - Guest is down for minimum time required for backup

Scenario 13: Reviewing a Disaster Recovery Backup

- **Create a backup job based on sample provided**
- **Perform image backup of DASD volumes for Disaster Recovery (DR) purposes**
 - Can include z/VM and Linux guests
- **Output of backup is a DDR tape**
 - Compatible with DDR for restore at recovery site
- **Submit DR job for review**
- **Review output of review processing**

Scenario 14: Reviewing data in the Backup catalog for recovery

- **Various backup jobs have previously been submitted and completed**
- **Full screen interfaces available for searching the backup catalog and finding data available for recovery**
 - BKRLIST
 - Useful when looking for a specific file or set of files owned by a specific user ID
 - Users with ADMIN authority beware of size
 - Use parameters to narrow the search
 - BKRUSER
 - Useful when looking for backup jobs associated with a specific user ID
 - BKRJOB
 - Useful when looking for backup jobs by job name
 - BKRVOL
 - Useful when looking for backup jobs associated with a specific DASD volume

धन्यवाद

Hindi

多謝

Traditional Chinese

감사합니다

Korean

Спасибо

Russian

Gracias

Spanish

شكراً

Arabic

Thank You

English

Obrigado

Brazilian Portuguese

Grazie

Italian

Danke

German

多谢

Simplified Chinese

Merci

French

நன்றி

Tamil

ありがとうございました

Japanese

ขอบคุณ

Thai