IBM Software

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

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Agenda

- **System and performance management, automating operations**
  - OMEGAMON XE on z/VM and Linux (separate presentation)
  - Operations Manager for z/VM
- **Storage management**
  - Backup and Restore Manager for z/VM
  - Tape Manager for z/VM
  - Archive Manager for z/VM
- **Recommended practices**
- **Demos**
  - Automation scenarios
  - Backup and recovery scenarios, including automation
- **Reference information**

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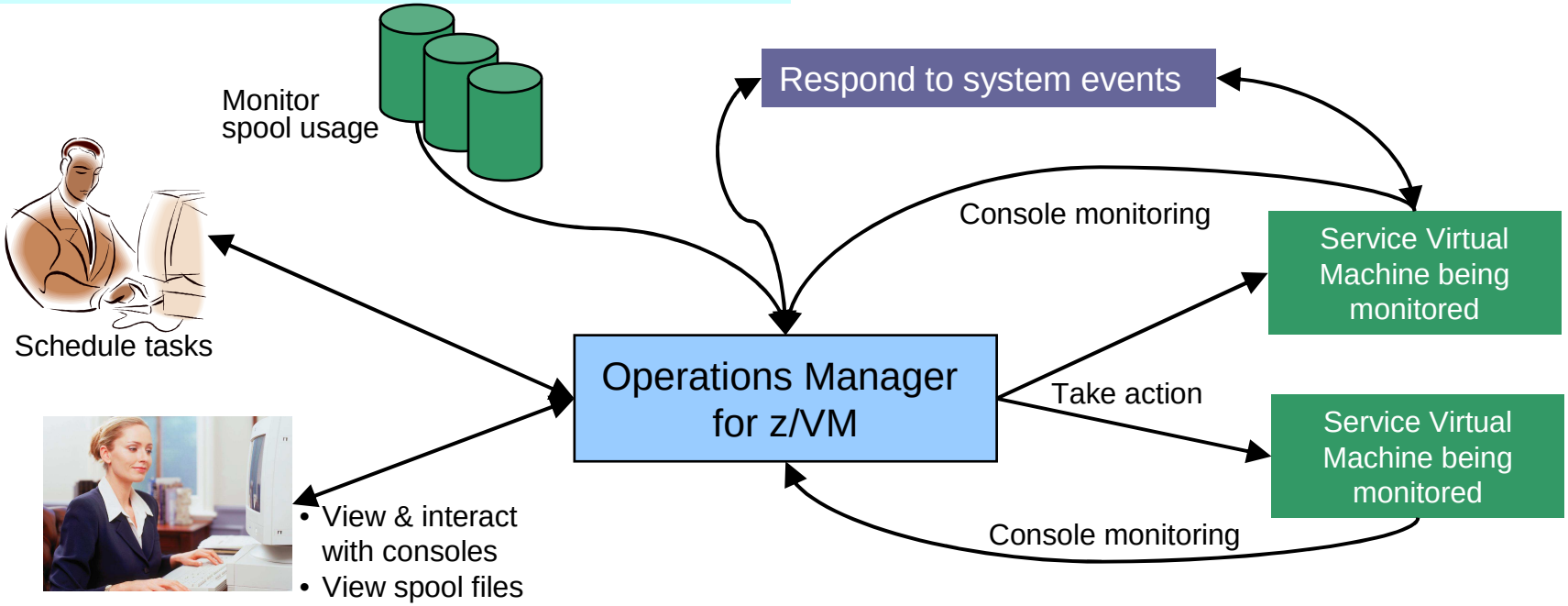
Automating Operations

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

Test Data

TEST Message 1
TEST Message 2
TEST Message 3
…

OPERATOR

OPER Message 1
OPER Message 2
OPER Message 3
…

LINUX

LNX Message 1
LNX Message 2
LNX Message 3
…

Operations Manager

TCP/IP

TCP Message 1
TCP Message 2
TCP Message 3
…

syslog data

slog Message 1
slog Message 2
slog Message 3
…

Data space 1

TEST Message 1
TEST Message 2
…

Data space 4

TCP Message 1
TCP Message 2
…

Data space 2

OPER Message 1
OPER Message 2
…

Data space 3

LNX Message 1
LNX Message 3
…

Data space 5

slog Message 1
slog Message 2
slog Message 3
…

Filtered

Data space 6

OPER Message 1
LNX Message 1
LNX Message 2
TCP Message 1
slog Message 1
slog Message 2
TEST Message 1
OPER Message 2
…

Daily log

DIRM Message 1
LNX Message 1
LNX Message 2
OPM Message 1
TCP Message 1
DIRM Message 2

Unfiltered

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, nth weekday of the month
  - 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

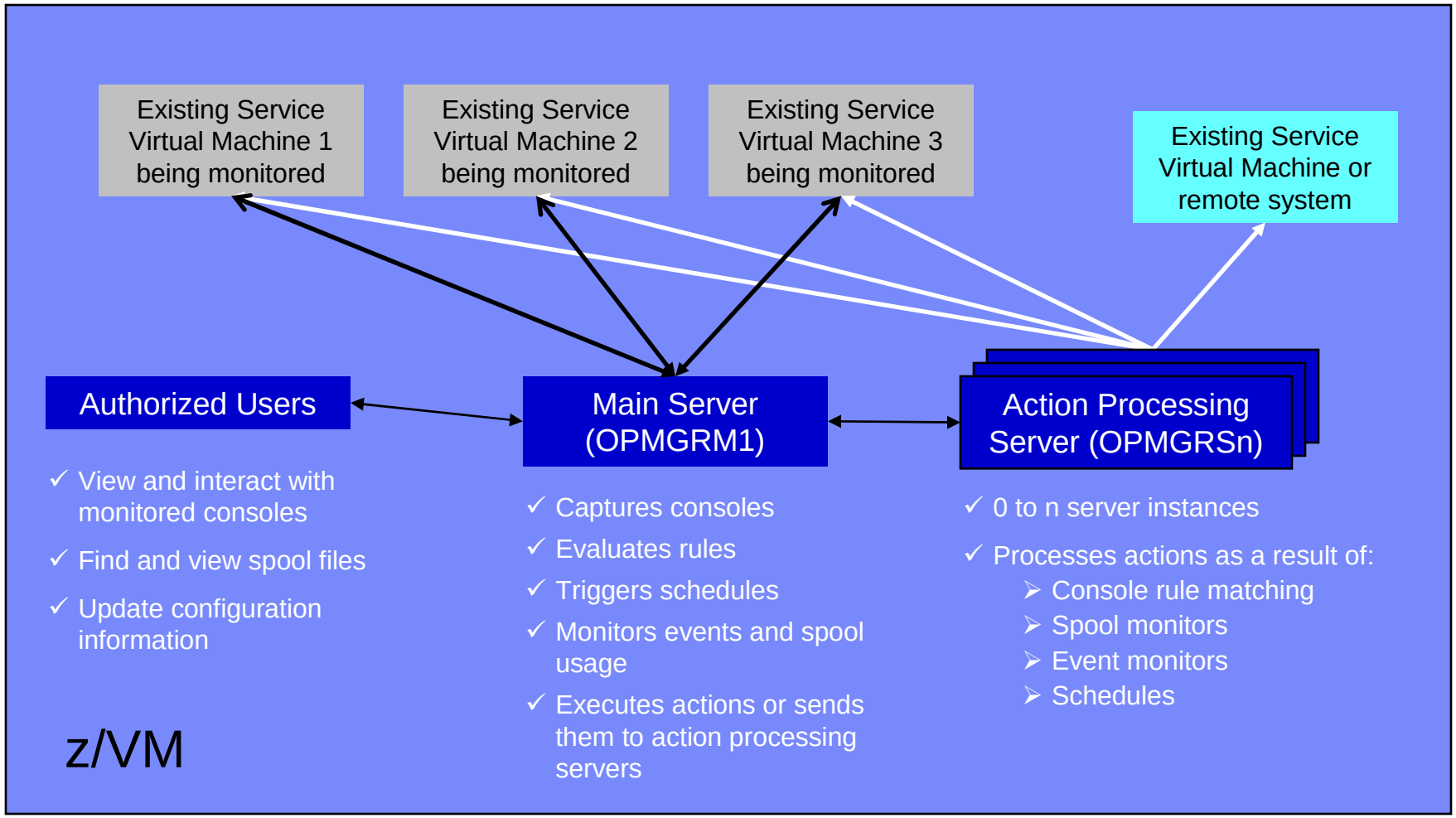
Respond to System Events

- **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

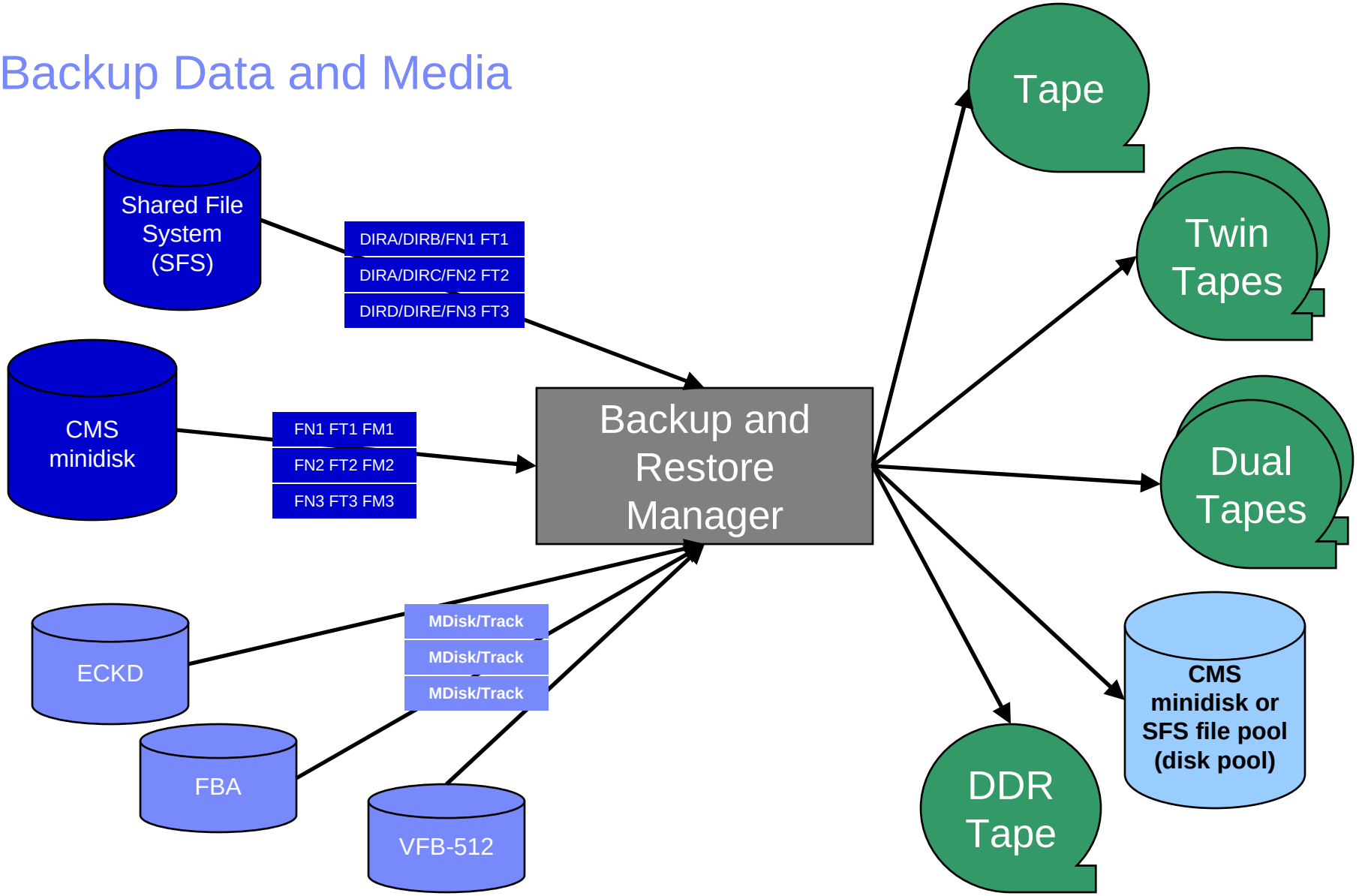
Product Overview

- **Backup**
  - Requested by administrators
  - Full or incremental
  - Flexible selection of disks and files to back up
  - Review job before submitting for backup
- **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

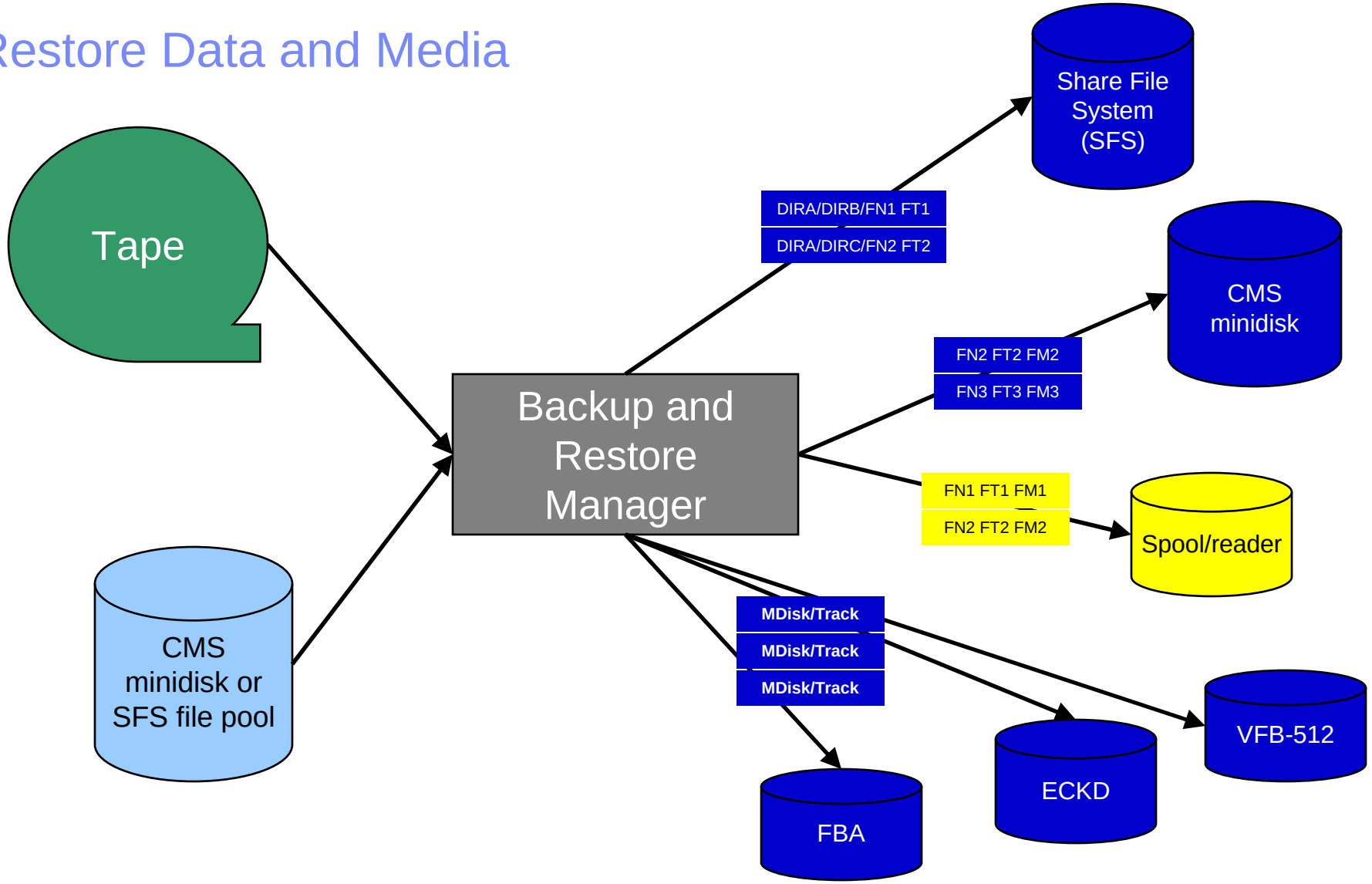
Catalog in Shared File System (SFS) – presentation on web site for installation and setup

- **Integration with Tape Manager for z/VM**
- **Optional compression of data during backup via exits**
  - **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



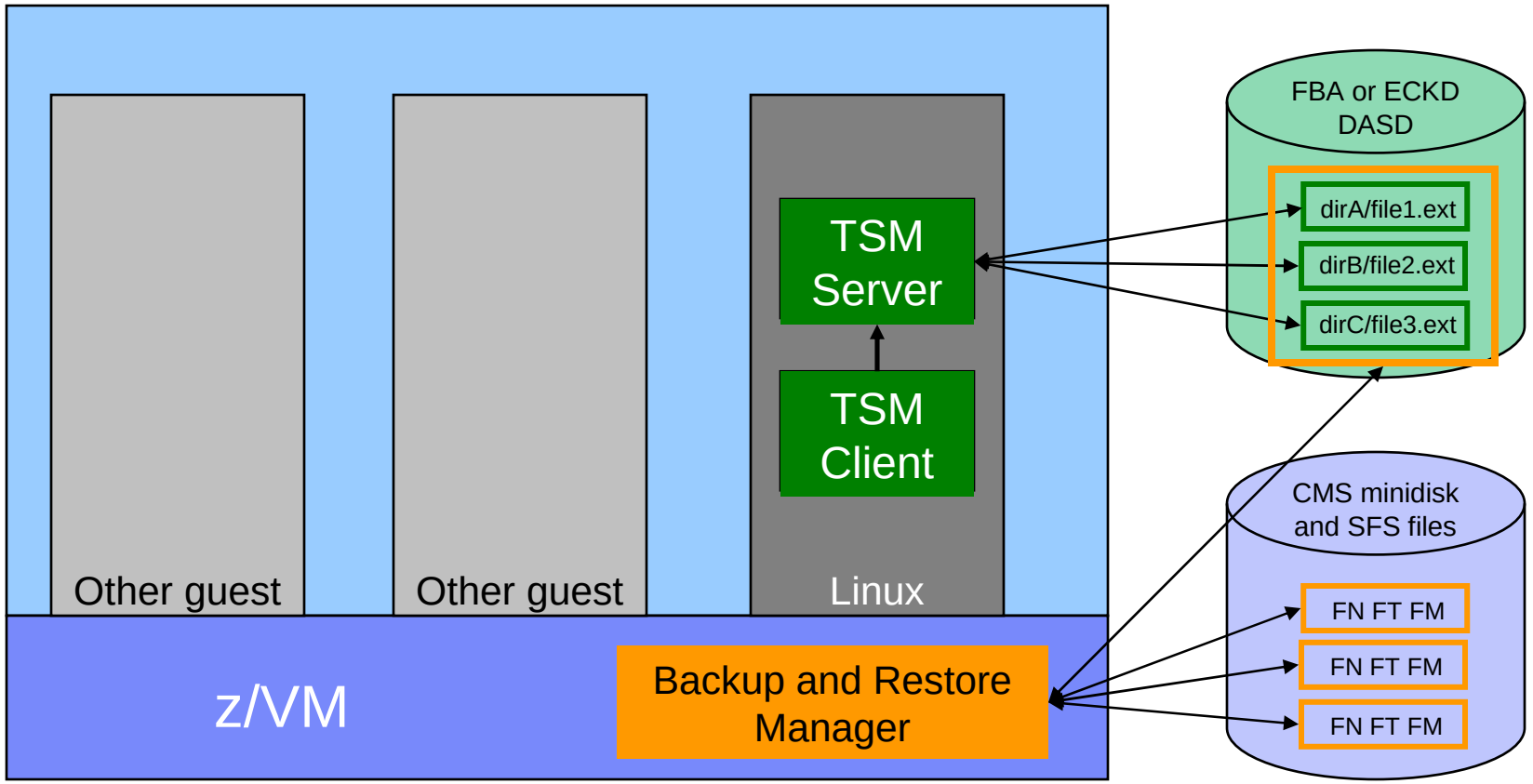
Restore Data and Media



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

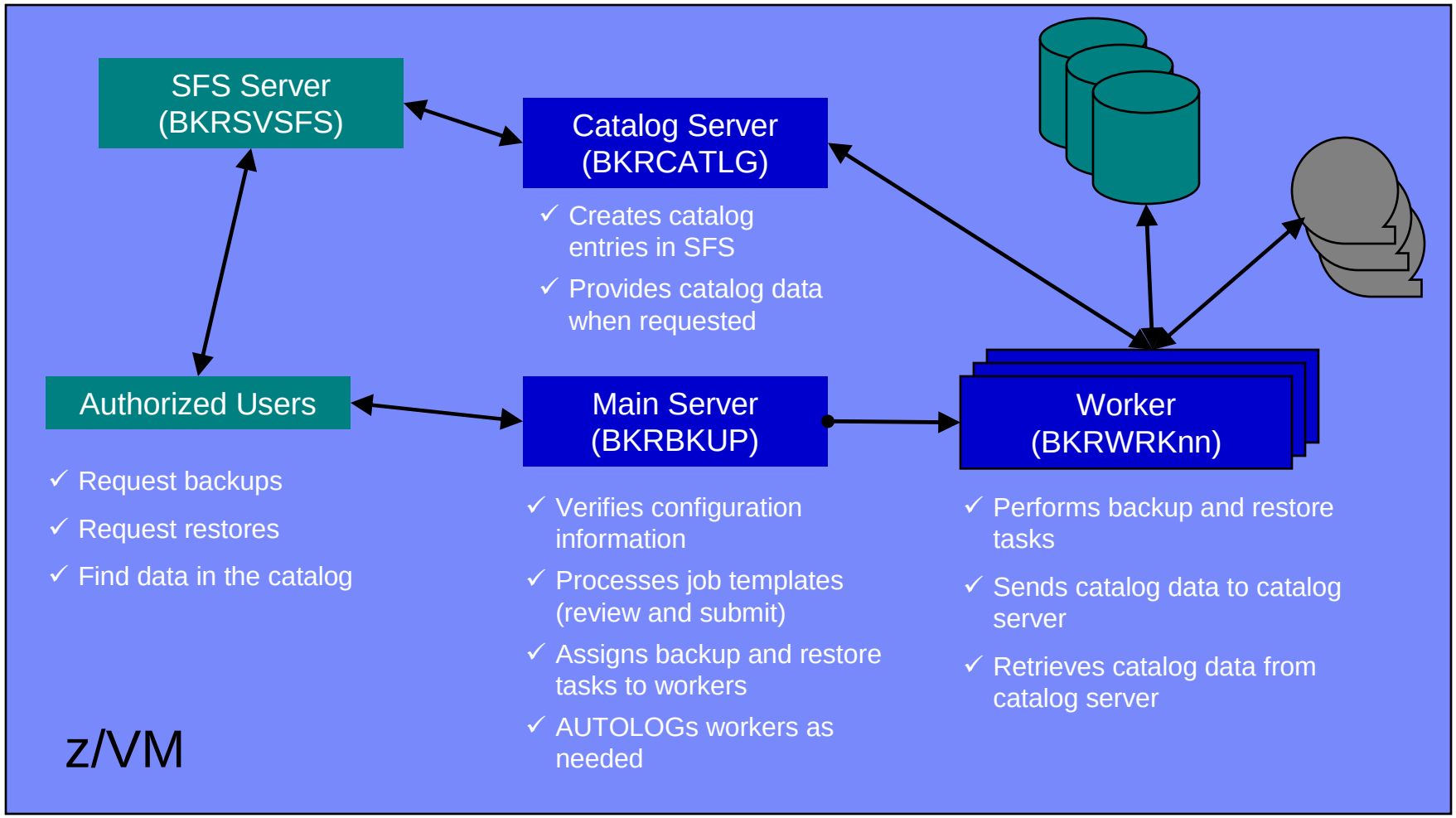
```
/* Include/Exclude definitions                                        */
/*********************************************************************/
  FUNCTION  MEDIATYPE   OWNER      VDEV VOLUME DEVTYPE       START          END          SIZE
|----------|----------|--------|--|----|------|--------|--|----------|--|----------|--|-------|
 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
```

Backup and Restore Manager Service Machines



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

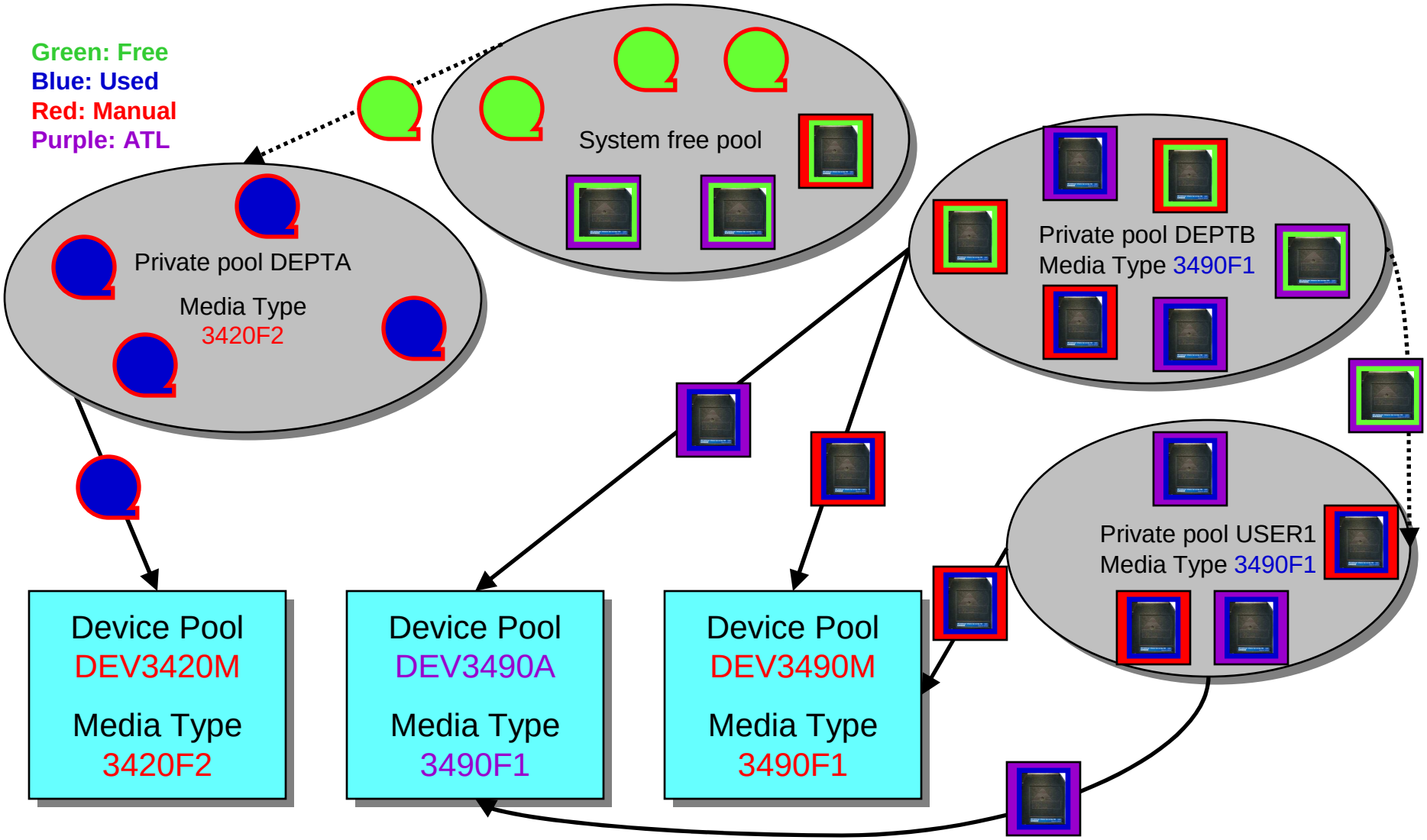
- **Manage devices**
  - Define available devices
    - Dedicated or assignable
  - Group devices together into device pools
    - ATL/VTS or manual mount
    - Any other grouping you choose
      (read only vs. write, location, etc.)
  - Share devices with other systems

- **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

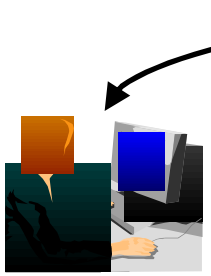
Tape Volumes, Tape, Pools, and Device Pools



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



Verify authorization

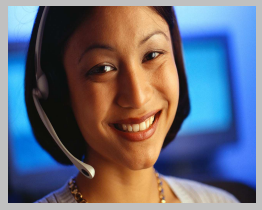
Find an available and compatible device

Tape Manager for z/VM

Internal label verification at attach/give and detach (SL only)

Read/Write verification

DFSMSRMS on z/VM



Operator Console on z/VM

ATL

VTS

Manual Mount Drives

Scratch Mount Requests in Standard Mode

Tape Manager

ATL/VTS

Tape Manager finds a specific volser available as scratch in the catalog

Manual

Option 1:

Tape Manager finds a specific volser available as scratch in the catalog

Option 2:

Tape Manager asks Operator to mount any available scratch tape

DFSMSRMS

Specific volser requested and mounted

Operator Console on z/VM:

MOUNT VOLSER 123456 …

Operator must mount the specific volser

Operator Console on z/VM:

MOUNT SCRATCH …

- 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 Machine (TMTMM)

- ✓ Reads configuration files at startup
- ✓ Interacts with users and applications

Device Manager Machine (TMDMM)

- ✓ Interacts with real tape devices
- ✓ Attaches/gives drives to end users/applications
- ✓ Verifies volume labels
- ✓ Verifies read/write status

Library Manager Machine (TMLM1)

- ✓ Interacts with DFSMSRMS to handle library mounts
- ✓ Handles volume specific and scratch requests
- ✓ One for each RMS server

Command Manager Machine (TMCMM)

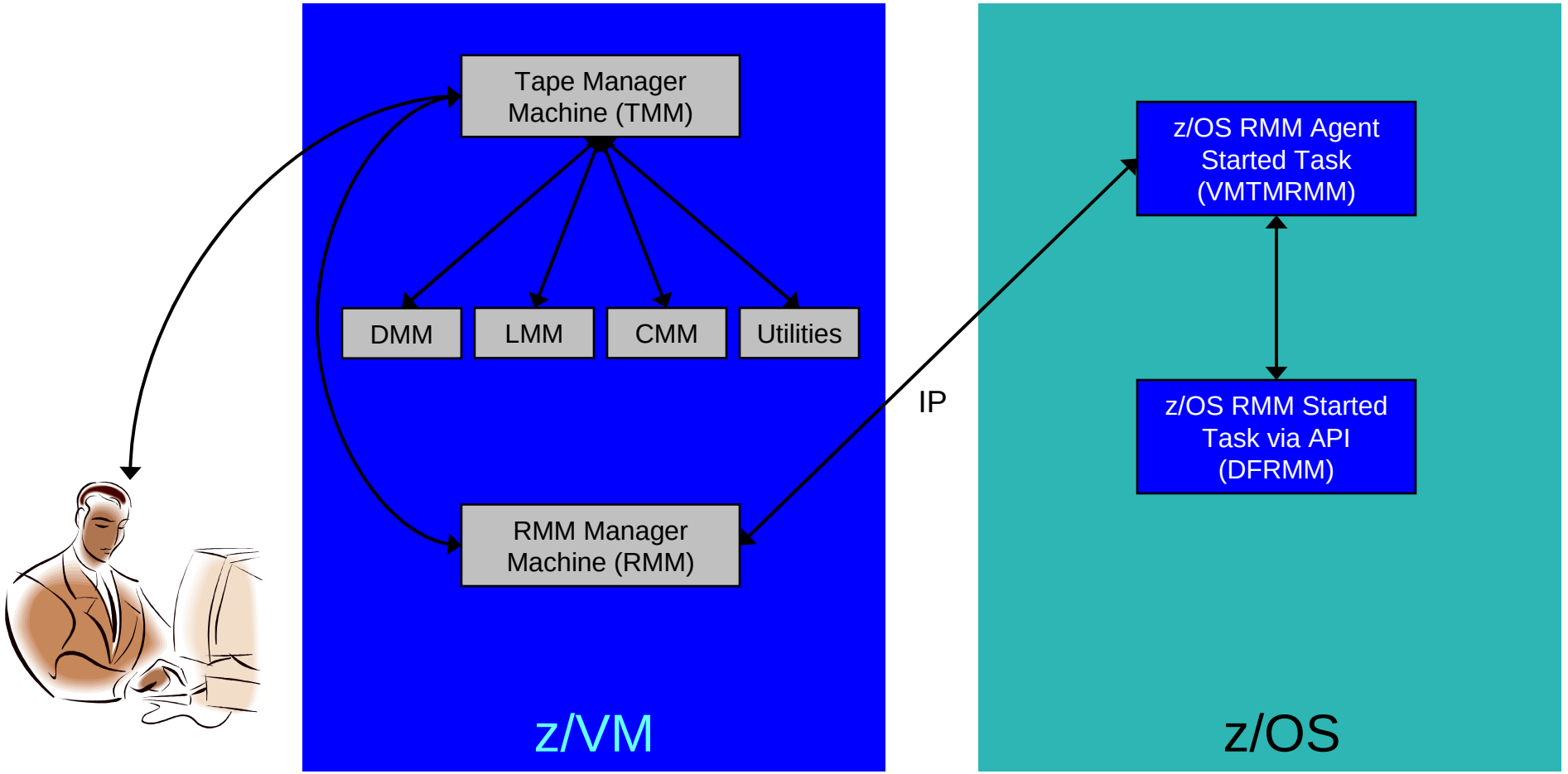
- ✓ Supports subcommand processing in user exit

Customer defined (optional)

- ✓ Data Security Erase utility
- ✓ ATL synchronization utility
- ✓ Catalog verification utility

z/VM

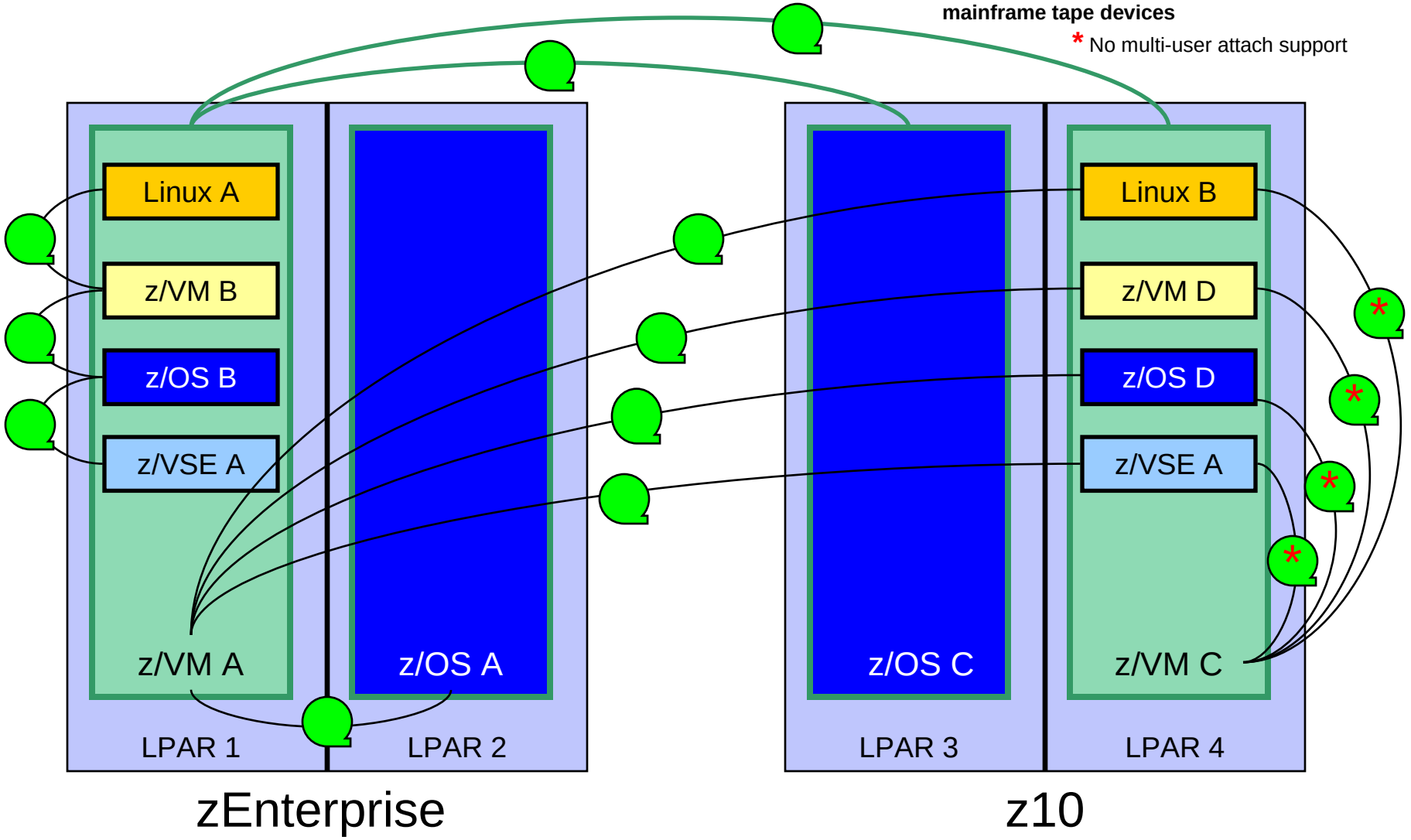
Tape Manager in RMM Mode



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**

* 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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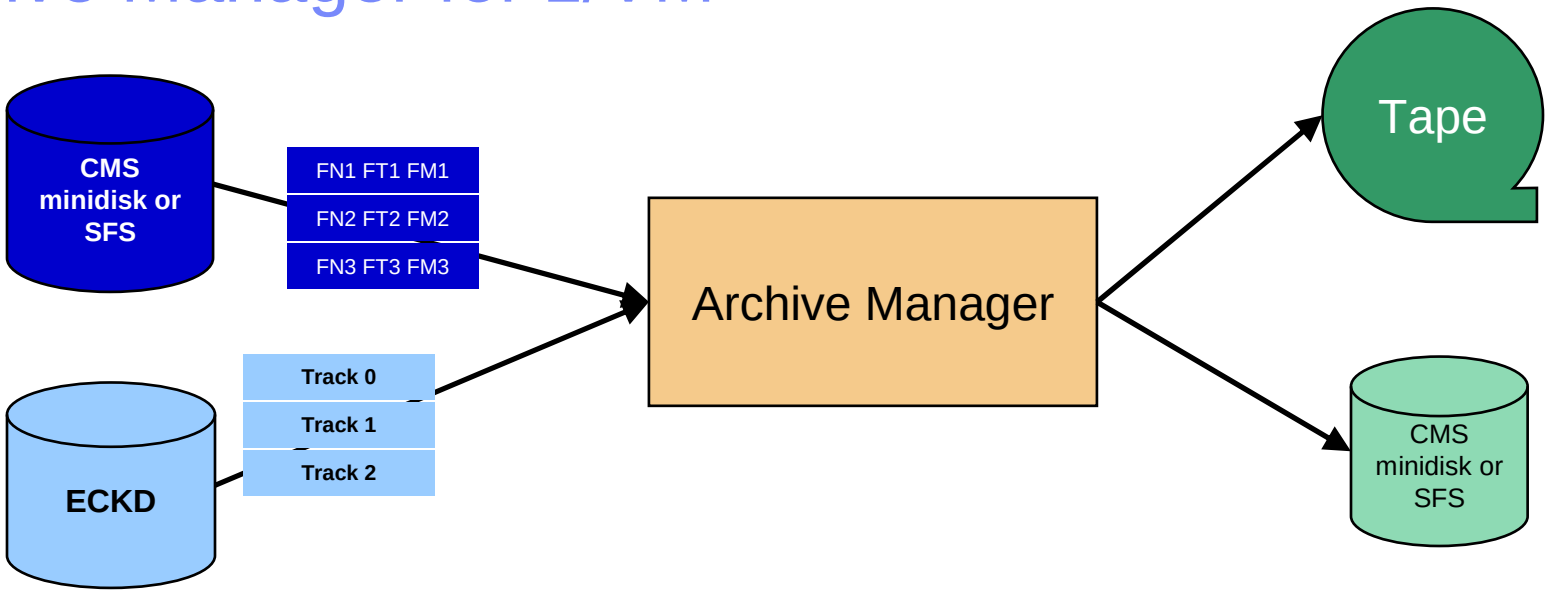
Managing Disk Space
Archive Manager for z/VM

Archive Manager for z/VM

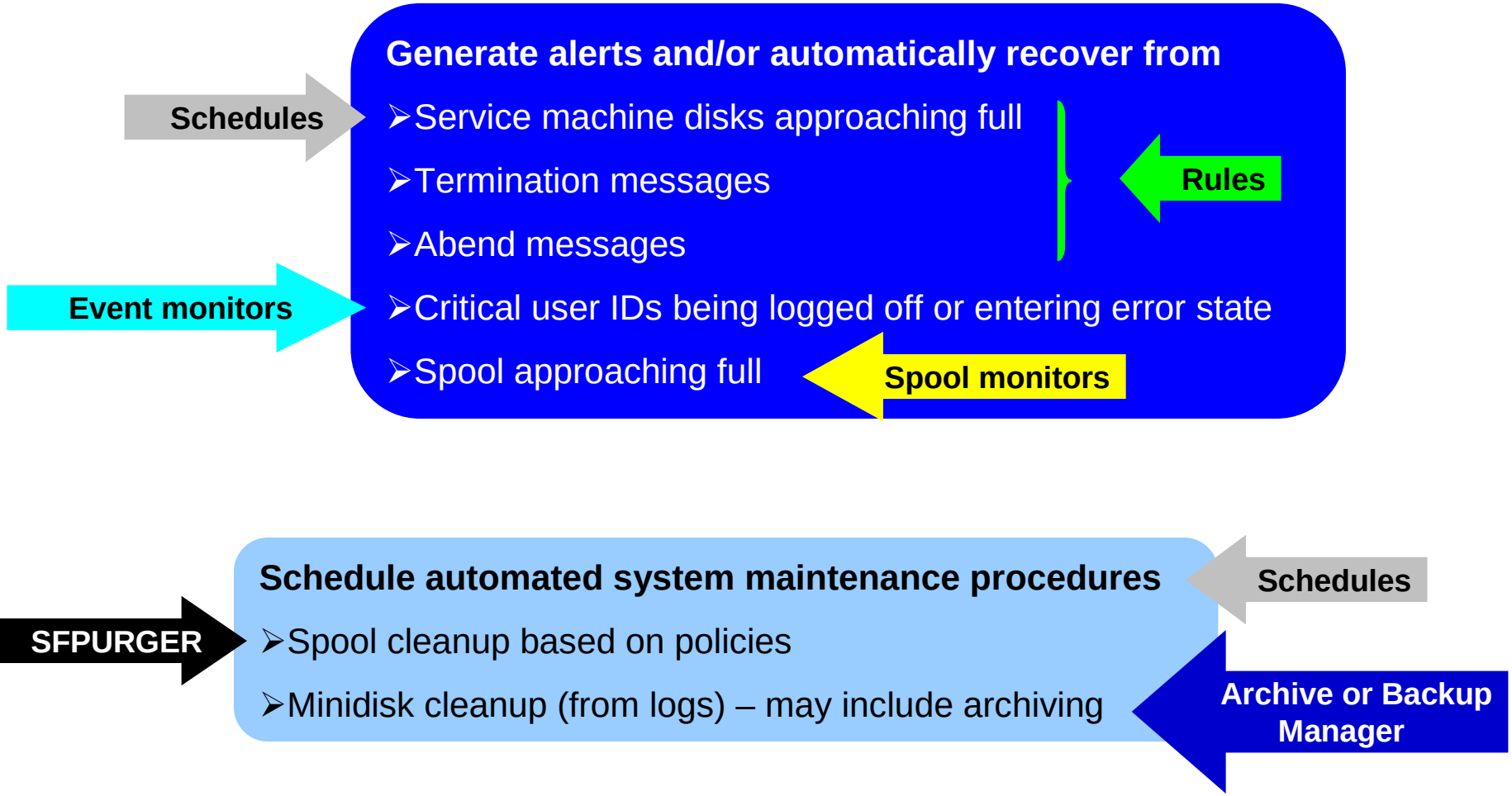


- **Improve end user satisfaction and productivity**
  - Users manage their own disk space
  - Move infrequently used files to tape or other disk
  - Archive and recall functions are controlled by the user
    - No administrator intervention required
  - Archived data staged to DASD, then tape if applicable
    - 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

Recommended Practices – Operational Management



Recommended Practices – Backup and Recovery

File level backup of z/VM data

- Directory information
- Configuration files
- Log files
- Tools – REXX EXECs, automation scripts, etc.

INCLUDE MINIDISK

INCLUDE MINIDISK
INCLUDE RDEVICE
INCLUDE RDEVVOL

Image level backup of Linux guests

- Operating system
- Applications
- Application data (maybe)

Disaster recovery of z/VM system, including Linux guest

- Dependence on z/OS

Back up from z/OS

versus

- Independent recovery in parallel with z/OS

Backup Manager using DDRTAPE output spec

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
- **Demos are available**

Demos Available

1. **Send an e-mail based on a console message**
2. **Send an alert to Netcool/OMNIbus based on a console message**
   a. Using POSTZMSG interface to Netcool/OMNIbus
   b. Using SNMP interface to Netcool/OMNIbus
3. **Send a message or e-mail based on spool usage**
4. **View and clean up spool files**
5. **Automated spool cleanup**
6. **Archiving DIRMAINT's log files when disk gets full**
7. **Process a file of test messages as a console**
8. **Process Linux syslog data as a console**
9. **Create a central operations console on one z/VM system**
10. **Create a central operations console across multiple z/VM systems**
11. **Integration with OMEGAMON XE on z/VM and Linux - take action based on CPU usage of a Linux guest**
12. **Monitor service machines for logoff – and autolog them**
13. **Perform an incremental backup**
14. **Find and restore a file from the backup catalog**
15. **Automatically shut down, back up, and restart a Linux guest**
16. **Reviewing a disaster recovery backup**
17. **Reviewing other ways to find data in the backup catalog**

Reference Information

- **Product Web site**
  - Start at http://www.ibm.com/software/stormgmt/zvm/
  - Product pages include
    - Publications
    - Pre-requisites
    - Announcements
    - Presentations
    - White papers
    - 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/atsmastr.nsf/WebIndex/WP101379
- **White paper for sending alerts from Operations Manager to Netcool/OMNIbus**
  - http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP101492

धन्यवाद

Hindi

多謝

Traditional Chinese

감사합니다

Korean

Спасибо

Russian

Gracias

Spanish

Thank You

English

شكرا

Arabic

Obrigado

Brazilian Portuguese

Danke

German

Grazie

Italian

多谢

Simplified Chinese

Merci

French

நன்றி

Tamil

ありがとうございました

Japanese

ขอบคุณ

Thai