



IBM Software

# IBM Systems, Storage, and Performance Management Products

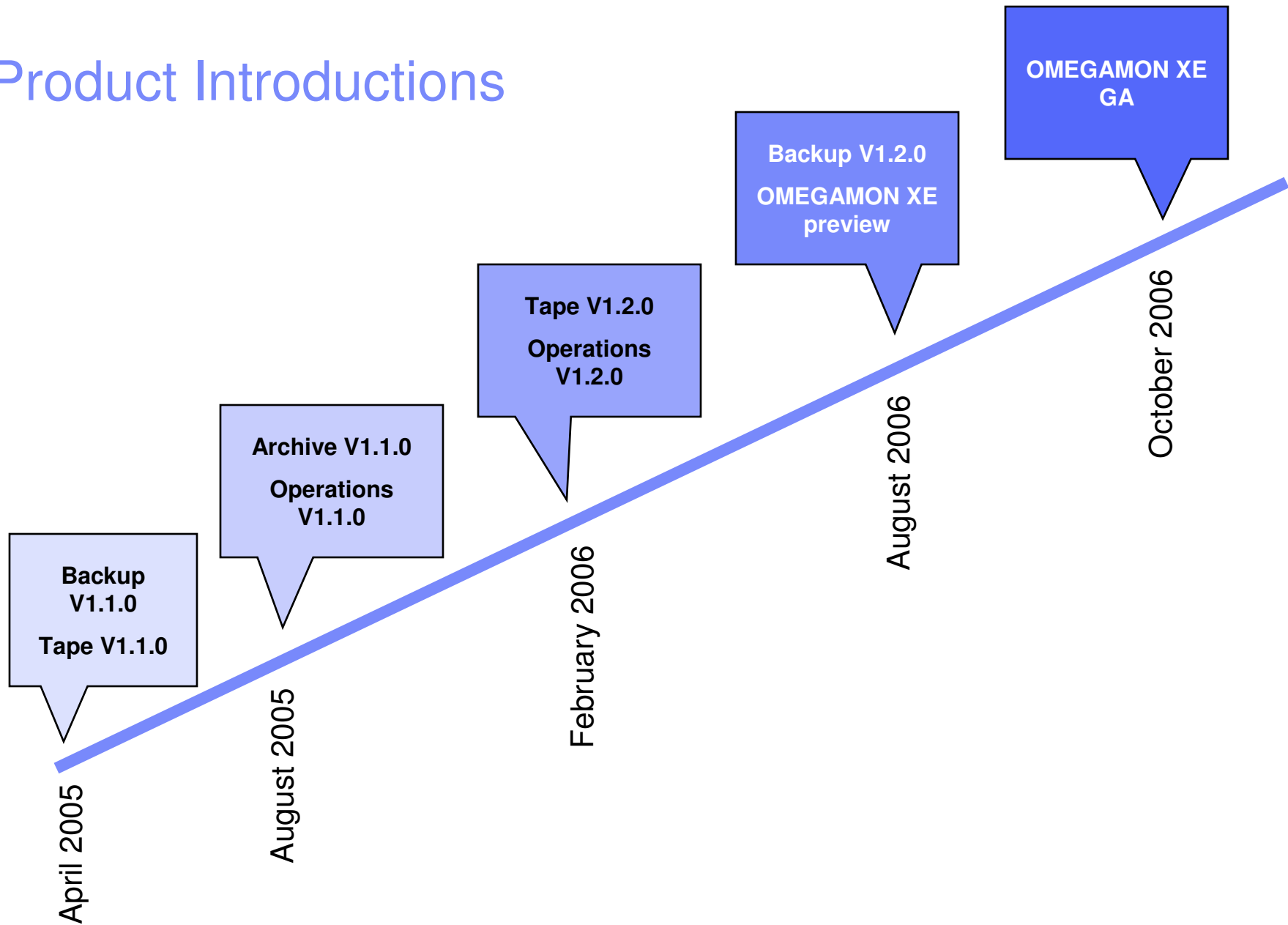
For z/VM and Linux on System z

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November 2006

## Agenda

- **Overview**
- **Systems and performance management**
  - OMEGAMON XE on z/VM and Linux
  - Operations Manager for z/VM
  - Integration points
- **Storage management**
  - Tape Manager for z/VM
  - Backup and Restore Manager for z/VM
  - Archive Manager for z/VM

# Product Introductions





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# OMEGAMON XE on z/VM and Linux

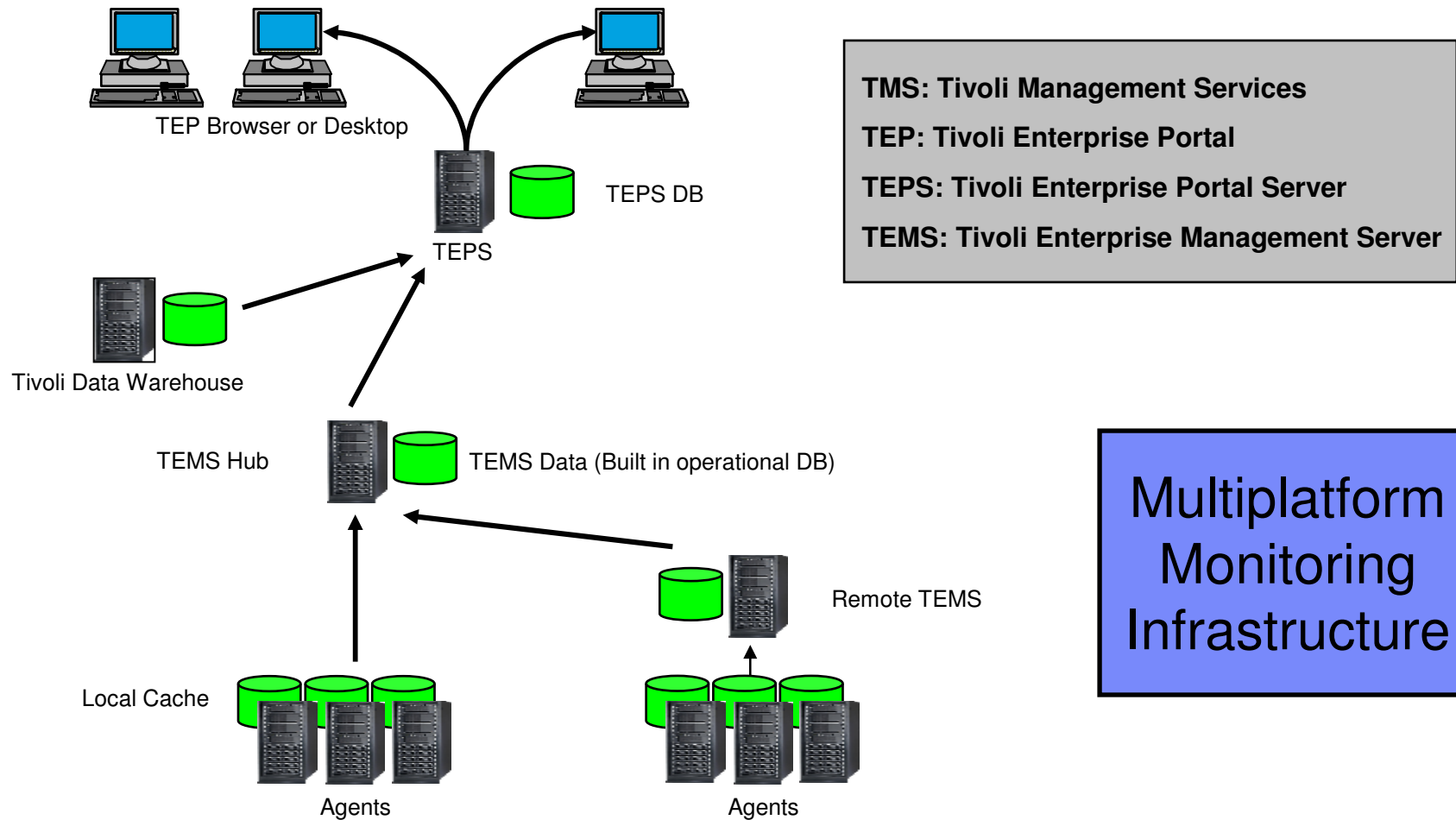
## OMEGAMON XE on z/VM and Linux

- **Provides performance monitoring for z/VM and Linux guests**
- **Supports automated actions in response to defined events or situations**
- **Part of the Tivoli Management Services infrastructure and OMEGAMON family of products**
  - Specifically focused on z/VM and Linux guests
- **Linux agents gather performance data from Linux guests**
- **z/VM agent gathers performance data from z/VM**
  - Including z/VM view of guests
  - Uses IBM Performance Toolkit for VM as its data source

## Performance Toolkit for VM Overview

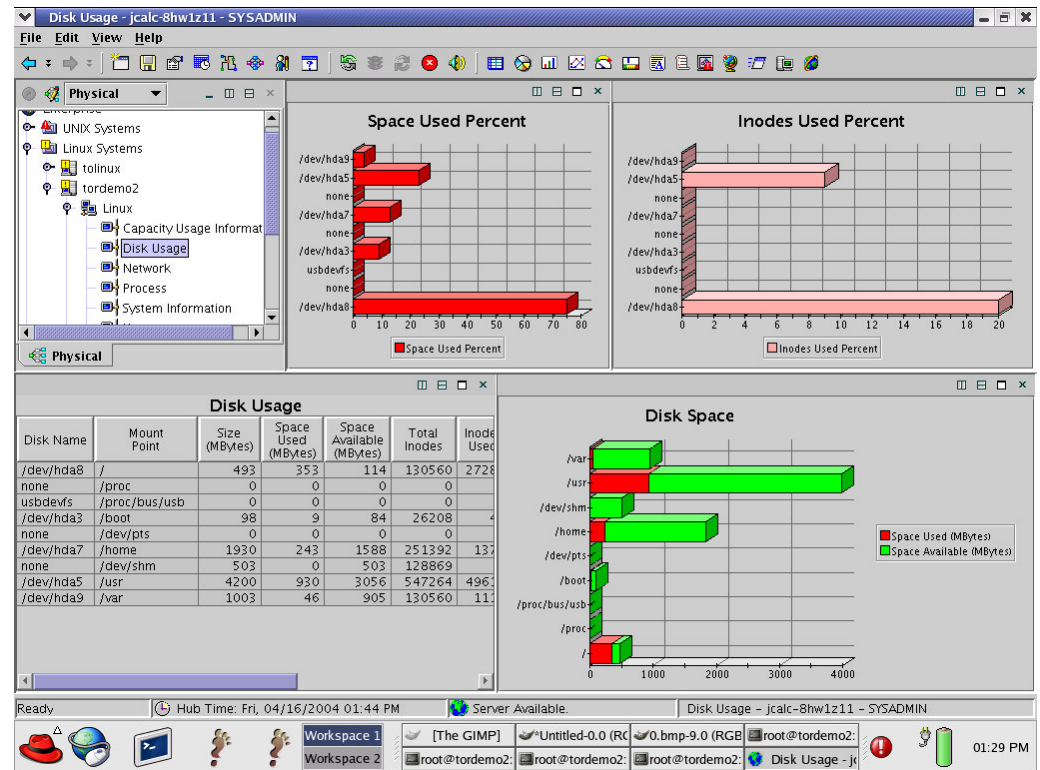
- **Real Time performance monitor capability for z/VM**
  - CPU Performance
  - Storage Utilization
  - Channel, I/O Device Performance
  - Detailed I/O Analysis
  - Detailed User Performance data
  - TCP/IP Server Performance
  - Linux Performance data
- **3270 interface, with ability to exploit GDDM graphics**
- **Web browser interface**
- **Some ability to customize screens**
- **Used as the data source for OMEGAMON XE on z/VM and Linux**

# Tivoli Management Services Infrastructure



# Tivoli Enterprise Portal

- **Principal user interface**
- **Browser-based or desktop application**
- **Flexible formatting**
  - Multiple views per workspace
  - Discrete queries to populate each view
  - Many ways to represent data
  - Many navigation options





# Tivoli Enterprise Portal

**Navigator**

**Selectable Chart Options**

**Personalized Views**

**View Zoom**

**Splitter controls**

**Intelligent Linking**

**Persistent customized workspaces**

**UNIX Run Time**

**CPU Times**

**OS/390 UNIX Processes for WebSphere**

MVS Status	Process Status	Execution State	Process ID	Parent Process ID	Leader Session ID	Process Group	Foreground Pro
Normal	Multiple_Tasks_In_Process_+Pthrea...	Running_not_in_kernel_wait	50462821	1	50462821	50462821	
Normal	Multiple_Tasks_In_Process_+Pthrea...	Running_not_in_kernel_wait	33685615	1	33685615	33685615	
Normal	Multiple_Tasks_In_Process_+Pthrea...	Running_not_in_kernel_wait	50462832	1	50462832	50462832	
Normal	Multiple_Tasks_In_Process_+Pthrea...	Running_not_in_kernel_wait	33685672	1	33685672	33685672	
Swapped_Out	Multiple_Tasks_In_Process_+Pthrea...	Running_not_in_kernel_wait	16908492	1	16908492	16908492	
Swapped_Out	Multiple_Tasks_In_Process_+Pthrea...	Running_not_in_kernel_wait	33685727	1	33685727	33685727	
Normal	Multiple_Tasks_In_Process_+Pthrea...	Running_not_in_kernel_wait	16908519	1	16908519	16908519	
Normal	Multiple_Tasks_In_Process_+Pthrea...	Running_not_in_kernel_wait	50462998	1	50462998	50462998	

## Automation Using Situations

- **A situation describes one or more conditions that you want to test**
  - Each condition compares a user-specified value against attribute data collected from managed systems
- **If all conditions are met, the situation evaluates to true and an alert indicator icon appears on the TEP to let you know that a problem exists**
- **When you create a situation, you can also specify automated responses to take place when the situation becomes true (Take Action)**
- **Each management agent comes with a set of pre-defined situations that start running as soon as the management agent is connected**
- **Each situation may examine the values of one or more attributes**

## z/VM Workspaces

- **z/VM Linux Default Workspace**
- **PAGING and SPOOLING Utilization**
- **DASD**
- **LPAR Utilization**
- **NETWORK Utilization (Hiper Socket and Virtual Switch)**
- **REAL STORAGE Utilization**
- **TCPIP Utilization – Server**
- **TCPIP Utilization - Users**
- **SYSTEM Utilization**
- **System Terminal Workspace**
- **Workload (z/VM User ID) Activity**
- **Linux Workload Workspace**
- **AppIData Workspace**

# z/VM Linux Default Workspace

The screenshot displays the z/VM Linux Systems administration interface. The main window is titled "z/VM Linux Systems - PHKMSM - SYSADMIN \*ADMIN MODE\*" and contains several panels:

- Left Panel:** A tree view showing the system hierarchy: Enterprise > Linux Systems > vmlnx10 > Linux OS > z/VM Linux Systems. Other categories include CP-Owned\_Devices(P), DASD, LPAR, Network, Real\_Storage, System, TCPIP, and Workload.
- z/VM PTK Collector Status:** A table listing various collectors and their status.
- Situation Event Console:** A table showing system events.
- DASD Activity:** A horizontal bar chart showing the percentage of busy DASD devices.
- z/VM User CPU Utilization:** A horizontal bar chart showing CPU usage for different users.
- z/VM User Working Set and Storage:** A horizontal bar chart showing memory usage for different users.

**z/VM PTK Collector Status Table:**

Time	Collector Name	Status
06/21/06 09:49:40	Performance Toolkit Collector	ACTIV
06/21/06 09:49:40	LPAR	ACTIV
06/21/06 09:49:40	System	ACTIV
06/21/06 09:49:40	Storage	ACTIV
06/21/06 09:49:40	CP Owned	ACTIV
06/21/06 09:49:40	DASD	ACTIV
06/21/06 09:49:40	Workload	ACTIV
06/21/06 09:49:40	Hipersocket	ACTIV
06/21/06 09:49:40	Virtual Switch	ACTIV
06/21/06 09:49:40	TCPIP	ACTIV
06/21/06 09:49:40	TCPIP User	ACTIV
06/21/06 09:49:40	Linux Application	INACT

**Situation Event Console Table:**

Status	Situation Name	Display Item	Source
Open	ZVM_Avail_Mean2G_Low		vmlnx10.tivlab.raleigh
Open	ZVM_LPAR_Busy_Critical		vmlnx10.tivlab.raleigh

**DASD Activity Chart Data (Approximate):**

Device	Percent Busy
5632	100
3211	65
1621	45
2619	15

**z/VM User CPU Utilization Chart Data (Approximate):**

User	CP % of CPU	CPU Percent	Virtual CPU %
PERFKIT	40	85	90
VMLNX3	35	35	35

**z/VM User Working Set and Storage Chart Data (Approximate):**

User	Resident Pages	Resident Pages 2G	Working Set Size
OPERT	1000	1000	45000
VMLNX41	500	500	10000
VMLNX1	500	500	10000

The bottom of the screen shows a Windows taskbar with the Start button, taskbar icons for Windows Task Manager, CNPS, Manage Tivoli Enterprise..., and z/VM Linux Systems. The system tray shows the time as 9:47 AM and the date as Wed, 06/21/2006 09:47 AM.

# Paging and Spooling Utilization Workspace

**Paging\_Spooling - PHKMSM - SYSADMIN \*ADMIN MODE\***

File Edit View Help

View: Physical

**Paging and Spooling Space**

**Top 5 Page Extent Utilization**

**Top 5 Dump Extent Utilization**

**Top 5 Spool Extent Utilization**

**CP-Device Table (Paging and Spooling)**

Time	System ID	LPAR Name	Device VOLSER	Device Address	PAGING/SPOOLING	Allocation	Avilable Slots	Device Type	Device End Extent	Device Percent Full	Device Start Extent	Device Slots Used
06/21/06 09:49:40	WLAVMXA	LPAR001	VMSY03	2412	PAGING	10	1	3390	540	1	5	3
06/21/06 09:49:40	WLAVMXA	LPAR001	VMSY03	2114	SPOOLING	23	12	3390	540	52	5	3
06/21/06 09:49:40	WLAVMXA	LPAR001	VMSY03	2213	SPOOLING	33	33	3390	540	0	5	3
06/21/06 09:49:40	WLAVMXA	LPAR001	VMSY03	1423	UNKNOWN	12	1	3390	540	8	5	3

Hub Time: Wed, 06/21/2006 09:50 AM    Server Available    Paging\_Spooling - PHKMSM - SYSADMIN \*ADMIN MODE\*

Windows Task Manager: CNPS, Manage Tivoli Enterprise ...

Taskbar: Paging\_Spooling - PH..., Document1 - Microsoft W...

System Tray: 9:50 AM

## Summary – OMEGAMON XE on z/VM and Linux

- **New addition to the IBM Tivoli and OMEGAMON family of products**
- **Specific focus on performance of z/VM and Linux guests**
- **Uses Performance Toolkit for VM as its data source for z/VM data**
- **Supports automated actions in response to defined events or situations**



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# Operations Manager for z/VM

## Key Benefits

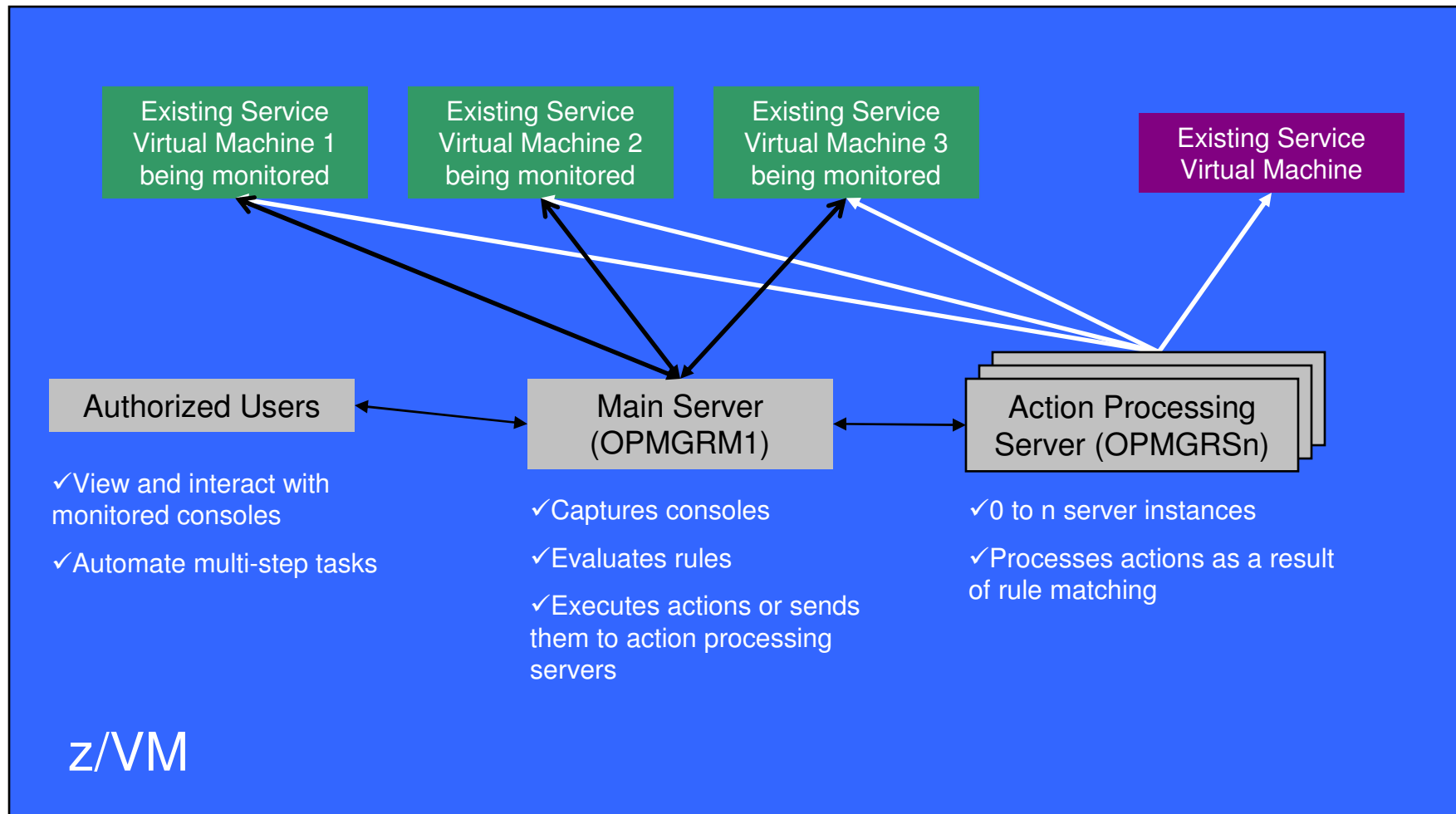
- **Automation, automation, automation**
  - Routine tasks
    - Starting guest systems
    - Scheduling backups
  - Respond to predictable situations requiring some form of intervention
    - Route warning messages to users, administrators, or programmers
    - Re-ipl a service machine
    - Archive service machine log files to tape when approaching disk full
- **Increase productivity**
  - Problems can be identified and debugged faster
    - Administrators and operators can work together to resolve problems
  - Users receive faster response to typical roadblocks
  - Routine off-shift activities can be done more effectively with minimal operations staff
- **Improve system availability**
  - Monitor virtual machines and processes
    - Action instead of reaction
  - Reduce problems due to operator error
- **Resolve problems faster**



## Features and Functions

- **Monitor service machines**
  - Capture console messages
  - Take predefined actions based on message text matching rules
- **View and interact with monitored consoles from authorized user IDs**
  - View a single server console or a group of server consoles
    - Multiple users can view the same console simultaneously
  - Fullscreen mode
    - Scroll up and down to view 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/actions**
  - To occur on a regular schedule
  - To occur immediately
- **Automate multi-step tasks**
- **Dynamic configuration**
- **Separation of access control**

# Operations Manager





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## Sample Scenarios

Using Operations Manager for z/VM

Requires customization and coding by customer

Not “out of the box”

## Managing Utilization of Logging Disks

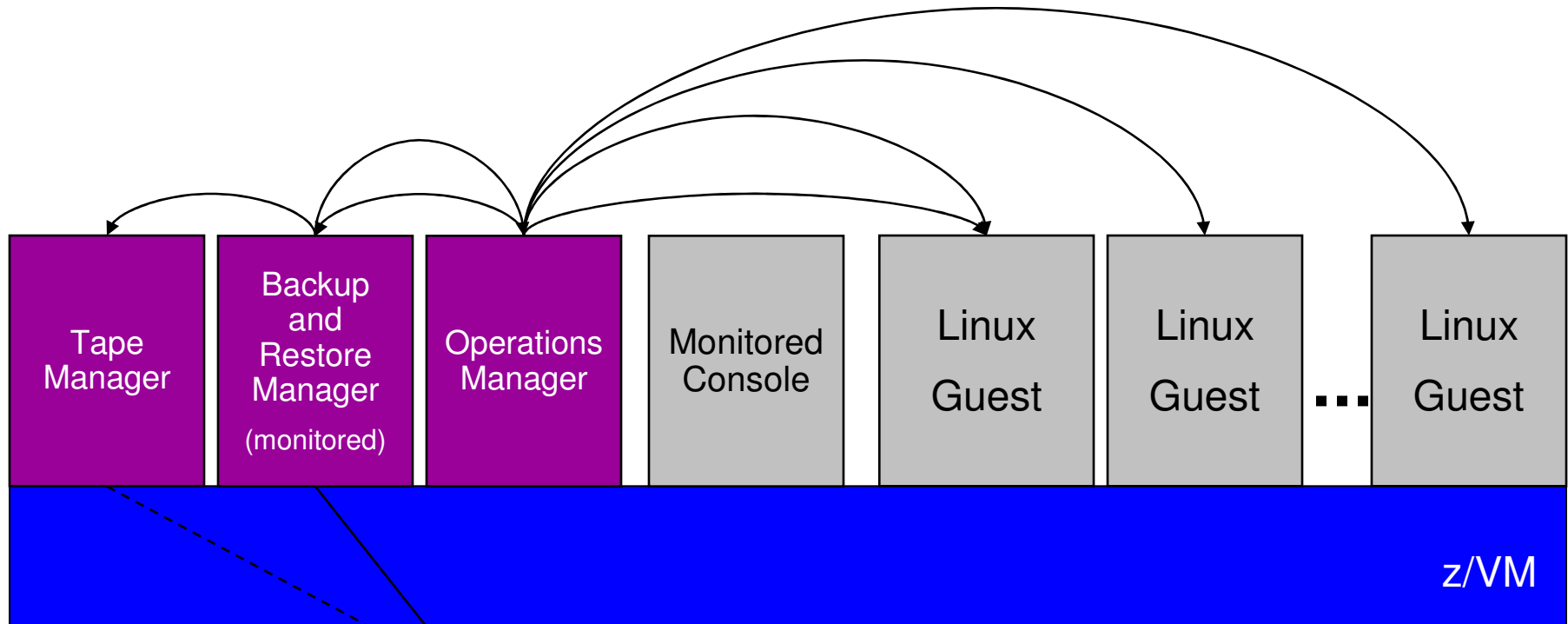
- **DIRMAINT log disk exceeds threshold**
  - DIRMAINT runs hourly check for threshold
  - If threshold exceeded, warning message is displayed on DIRMAINT console
  - Operations Manager monitoring the DIRMAINT console
  - Operations Manager automatically takes action based on this message
    - Finds log files from previous days
    - Sends the log files to another user ID (for archiving)
      - Disk utilization is now below the threshold again

## 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 requested
    - Operations Manager notified when the action is complete
      - Use CONFLICT function in Operations Manager schedules to ensure the backup of each Linux guest is complete before the next one is started
    - Linux guest is resumed

# Scheduling Image Backups of Linux Guests

## Scheduled by Operations Manager



## Operations Manager Summary

- **Assist with automated operations**
  - Monitoring service machine consoles
  - Taking actions based on console text matching
  - Viewing consoles
  - Scheduling actions
- **Focus on integration with Tivoli system management portfolio**



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## Integrated Solutions

OMEGAMON XE on z/VM and Linux  
Operations Manager for z/VM  
Performance Toolkit for VM



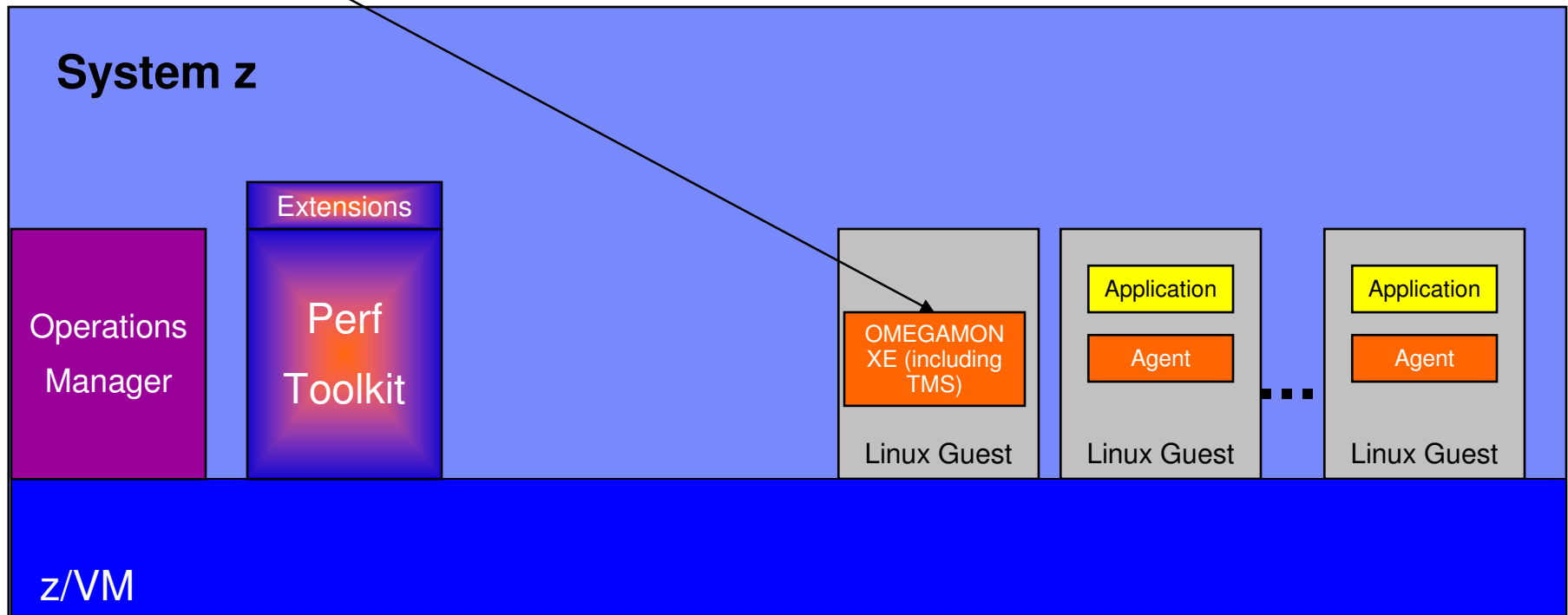
# Integration with Other IBM Products



Web browser

## OMEGAMON XE on z/VM and Linux

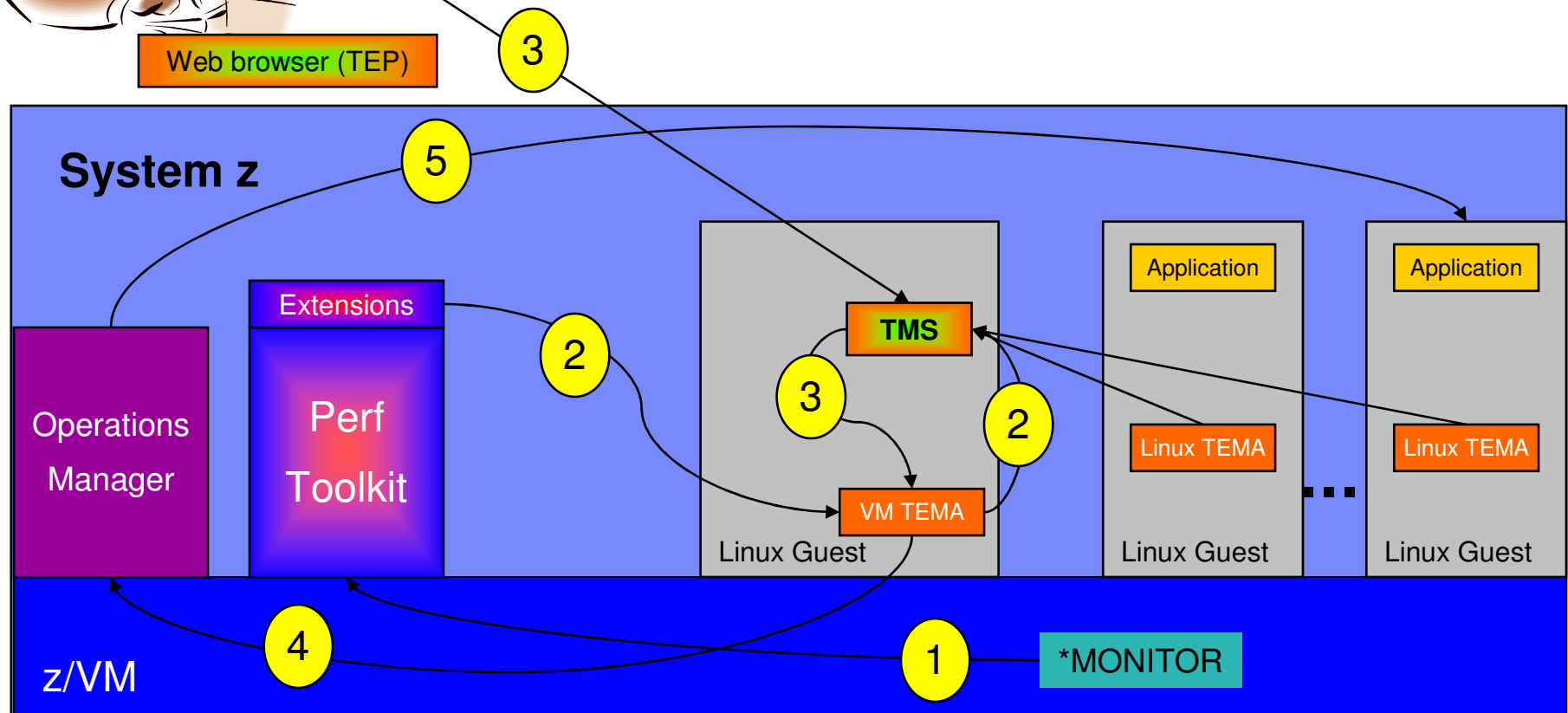
- z/VM agent: Tivoli Enterprise Management Agent (TEMA)
  - ✓ OMEGAMON Dashboard Edition (DE)
  - ✓ Command processor
  - ✓ Monitoring agent
- Tivoli Management Services (TMS), multiplatform
  - ✓ Tivoli Enterprise Portal (TEP), a browser-based interface
  - ✓ Agents (TEMAs), including VM and Linux on System z
  - ✓ Additional components, multiplatform



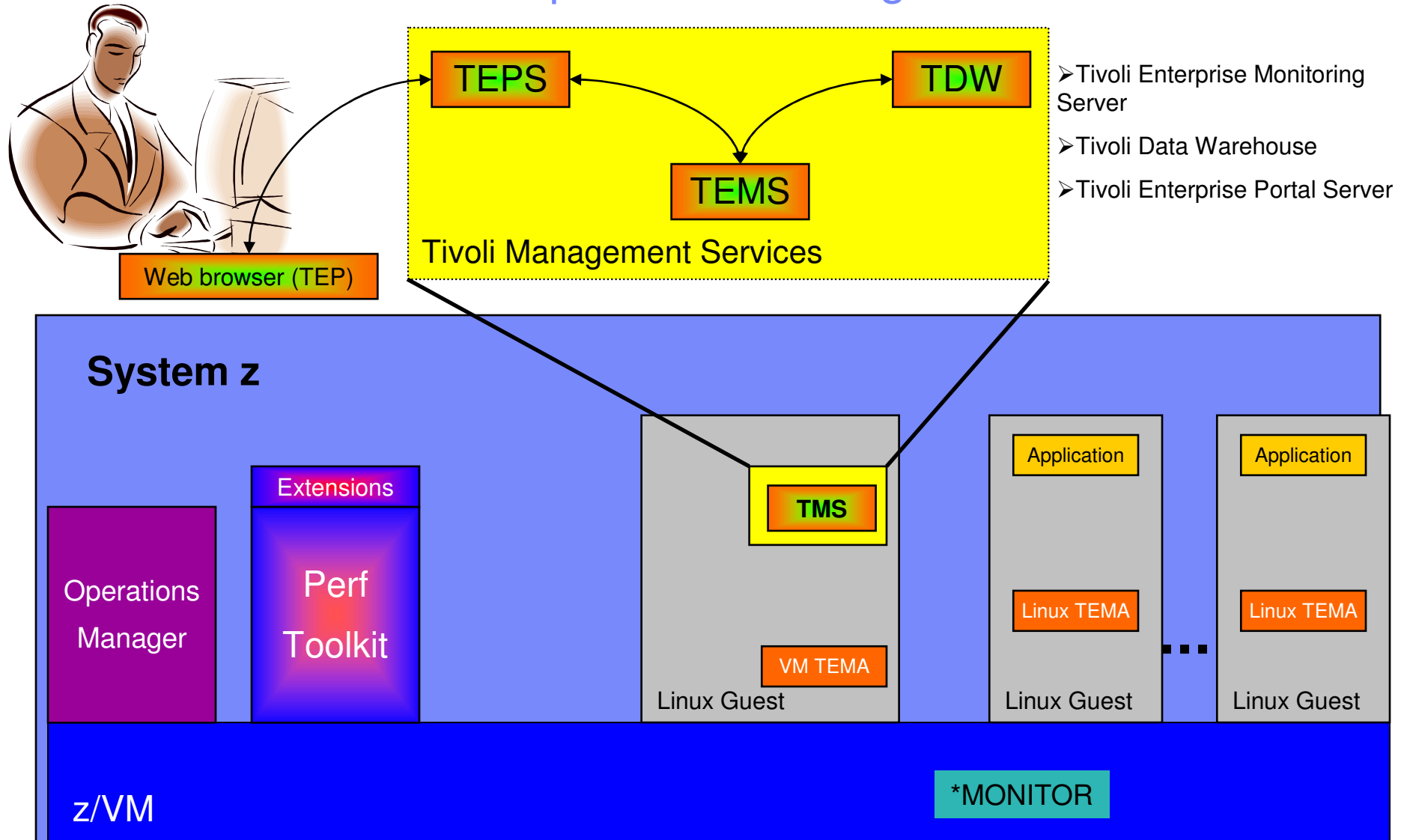
# OMEGAMON XE and Operations Manager for z/VM



## Process Flow



# OMEGAMON XE and Operations Manager for z/VM



## Sample Scenario – Live Demo

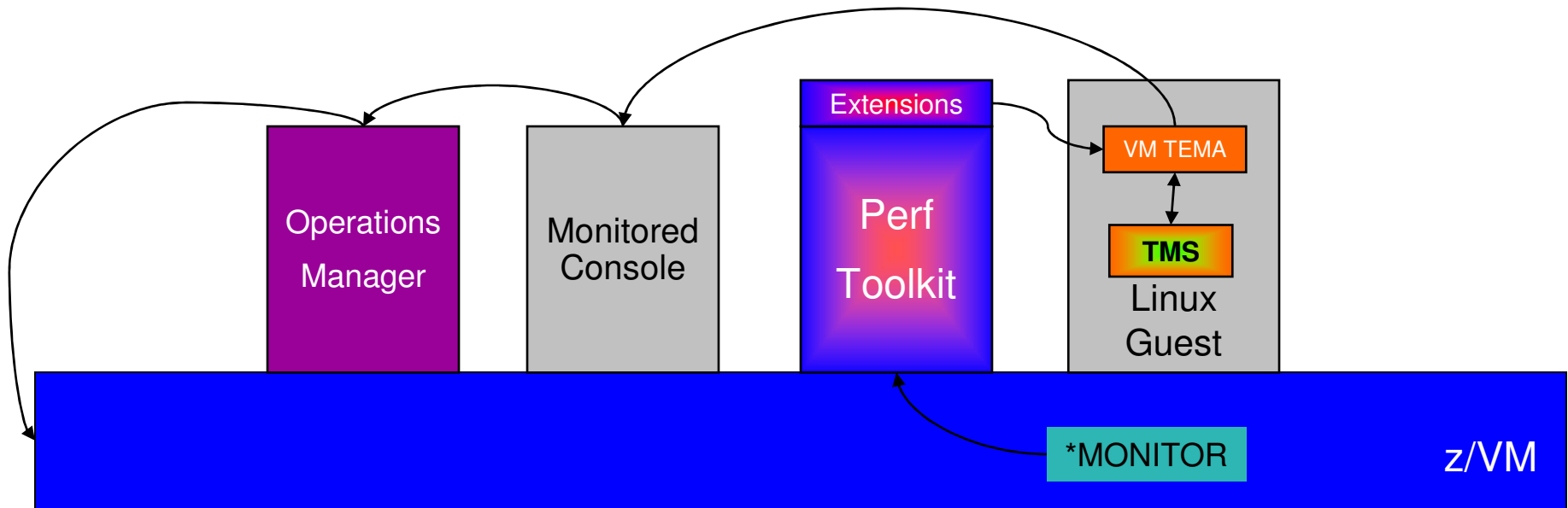
- **Adjusting resources for a Linux guest**
  - Virtual CPU consumption is high for a Linux guest running WAS
  - OMEGAMON XE detects the situation
    - Sends message to Operations Manager
  - Action is triggered by a rule in Operations Manager
  - Operations Manager issues CP commands to tune the guest
    - SET QUICKDSP
    - SET SHARE
  - The triggered policy and action are viewable from TEP



## Sample Scenario

- **Adding paging space when needed**
  - OMEGAMON (via Performance Toolkit) monitors the % of slots full for paging
  - Situation is defined in TEMS
    - Triggered if goes above 60%
    - OMEGAMON sends message to Operations Manager
  - Action is triggered by a rule in Operations Manager
    - Find a free pack (using site conventions)
    - Format it
    - Attach it to the system to make it available for paging

# Adding Paging Space as Needed





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# Tape Manager for z/VM



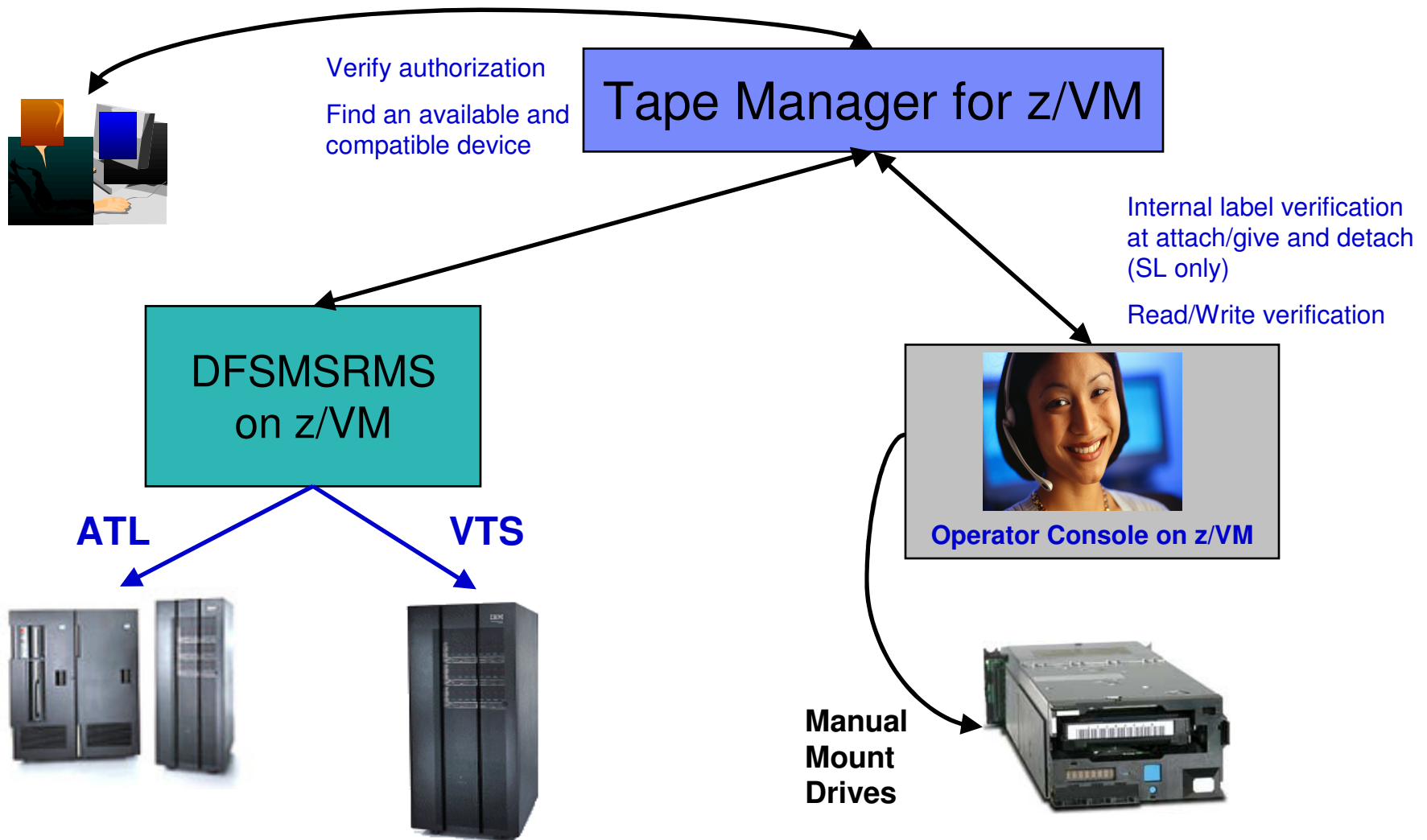
# Product Overview

- **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

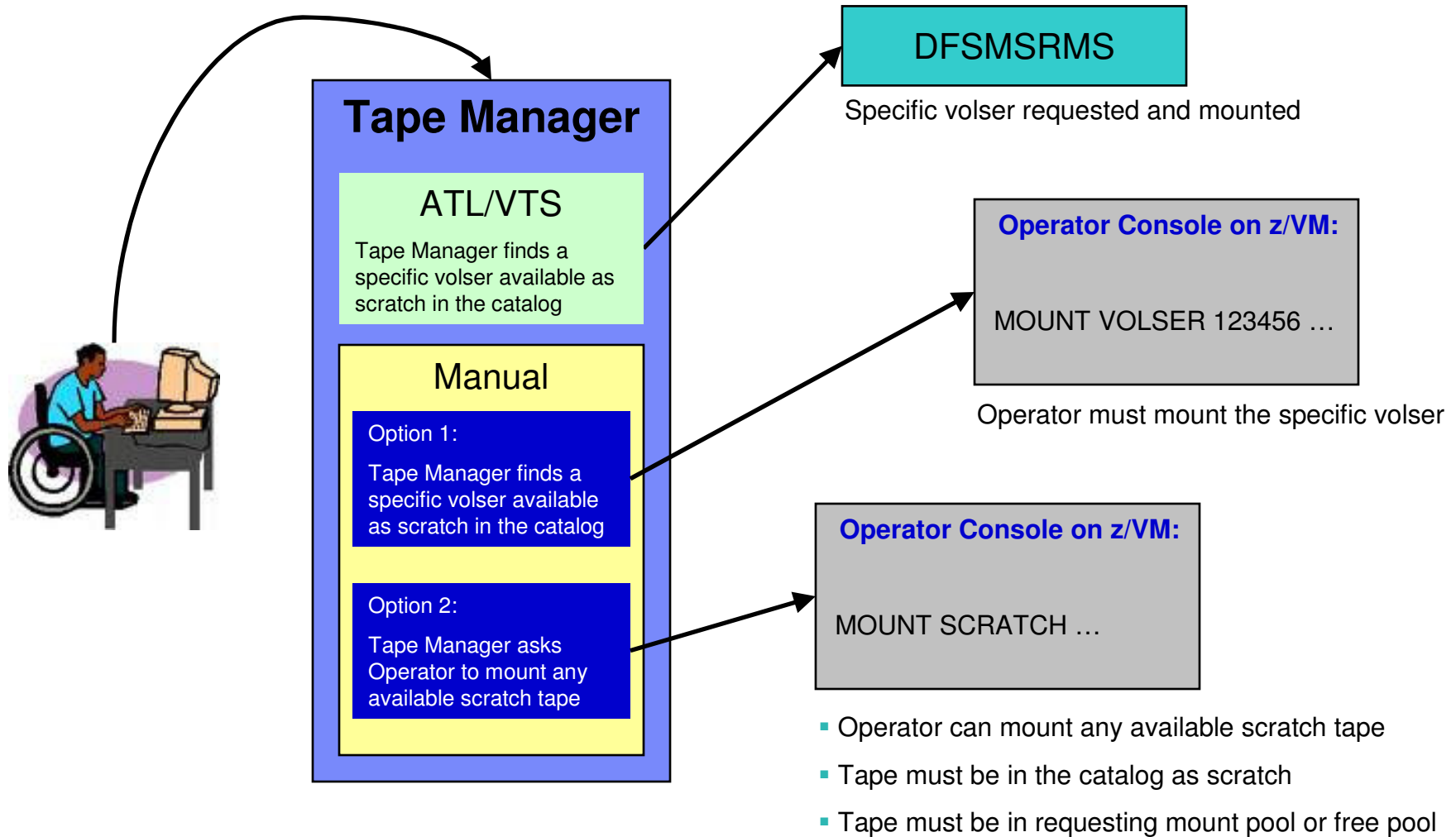
## Key Benefits

- **Effective management of tapes in ATLs**
  - Granular access control
  - Expiration processing
  - Notification for low threshold for tape resources
    - Utilization and threshold information provided per pool
    - Immediate notification if threshold is reached
    - Daily pool status report sent to administrator
- **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
- **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

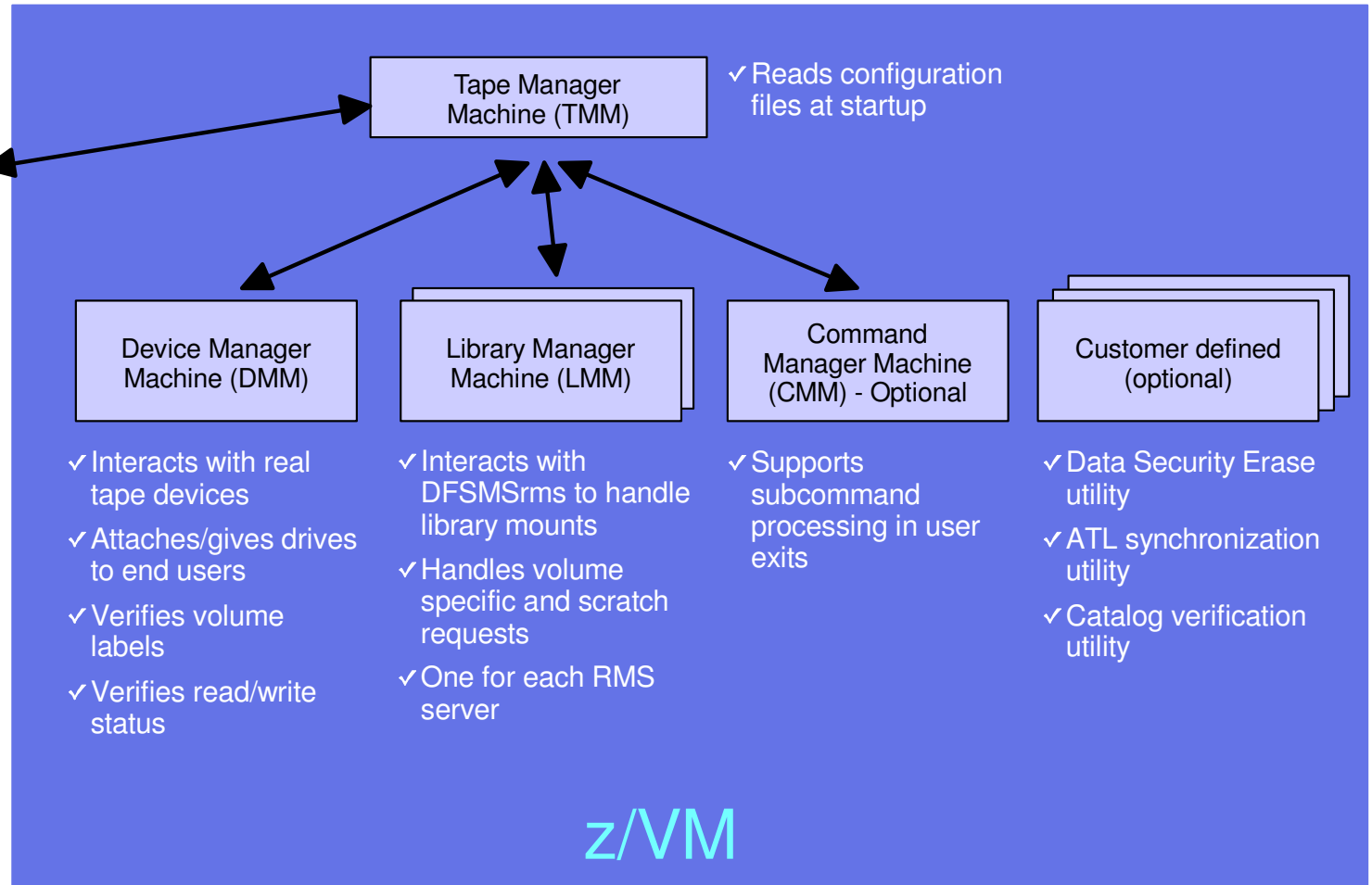
# Tape Mount Support: ATL, VTS, Manual



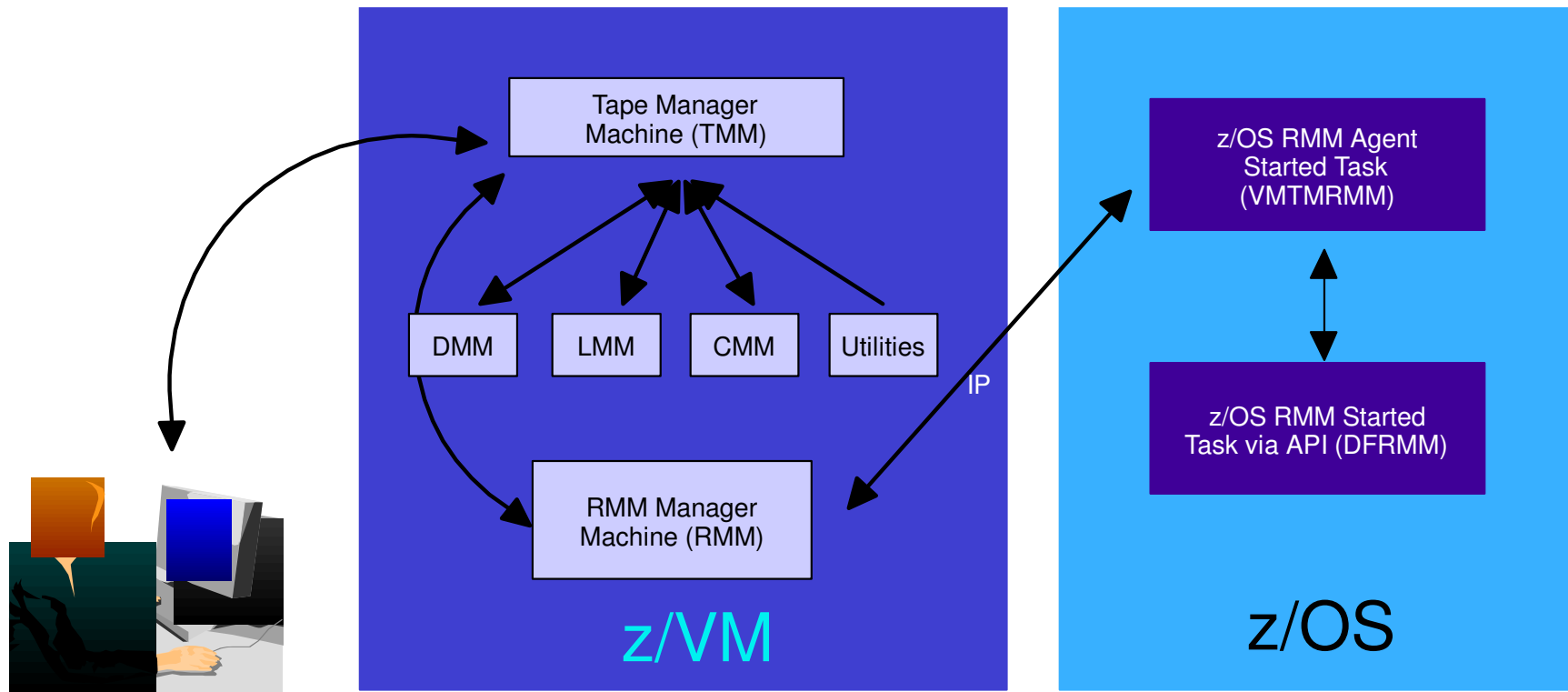
# Scratch Mount Requests in Standard Mode



# Tape Manager in Standard Mode



# Tape Manager in RMM Mode



## Data Security Erase (DSE)

- **Erase (sensitive) data before tape is reused**
- **Option to enable DSE at tape pool or individual tape level**
  - DSE flag included in each catalog entry
- **Tape marked as DSE-ready when it is freed**
- **DSE process executed on a separate user ID**
  - Started manually or as part of Operations Manager schedule
- **Queries the catalog to find all tapes with DSE-ready flag on**
- **Mounts each tape**
  - Verifies volume label if possible
  - Erases tape
  - Turns off DSE-ready flag in catalog
  - Tape is now available for scratch unless its HOLD flag is on

# Tape Manager Summary

- **Automate daily tape operations**
  - Manage mount requests
  - Control tape access
  - Perform label verification
  - Expire tapes
- **Efficiently manage tapes and tape drives**
  - Share devices
  - Control access to individual tapes in an ATL
  - Erase sensitive data before tape is reused
- **Improve productivity**
  - Support manual and ATL mount requests
  - Notify and interact with Operator on behalf of user for manual mounts
  - Perform label verification before and after tape use
  - Verify read/write attribute on manual mounts





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# Backup and Restore Manager for z/VM

## Product Overview

### ▪ Backup

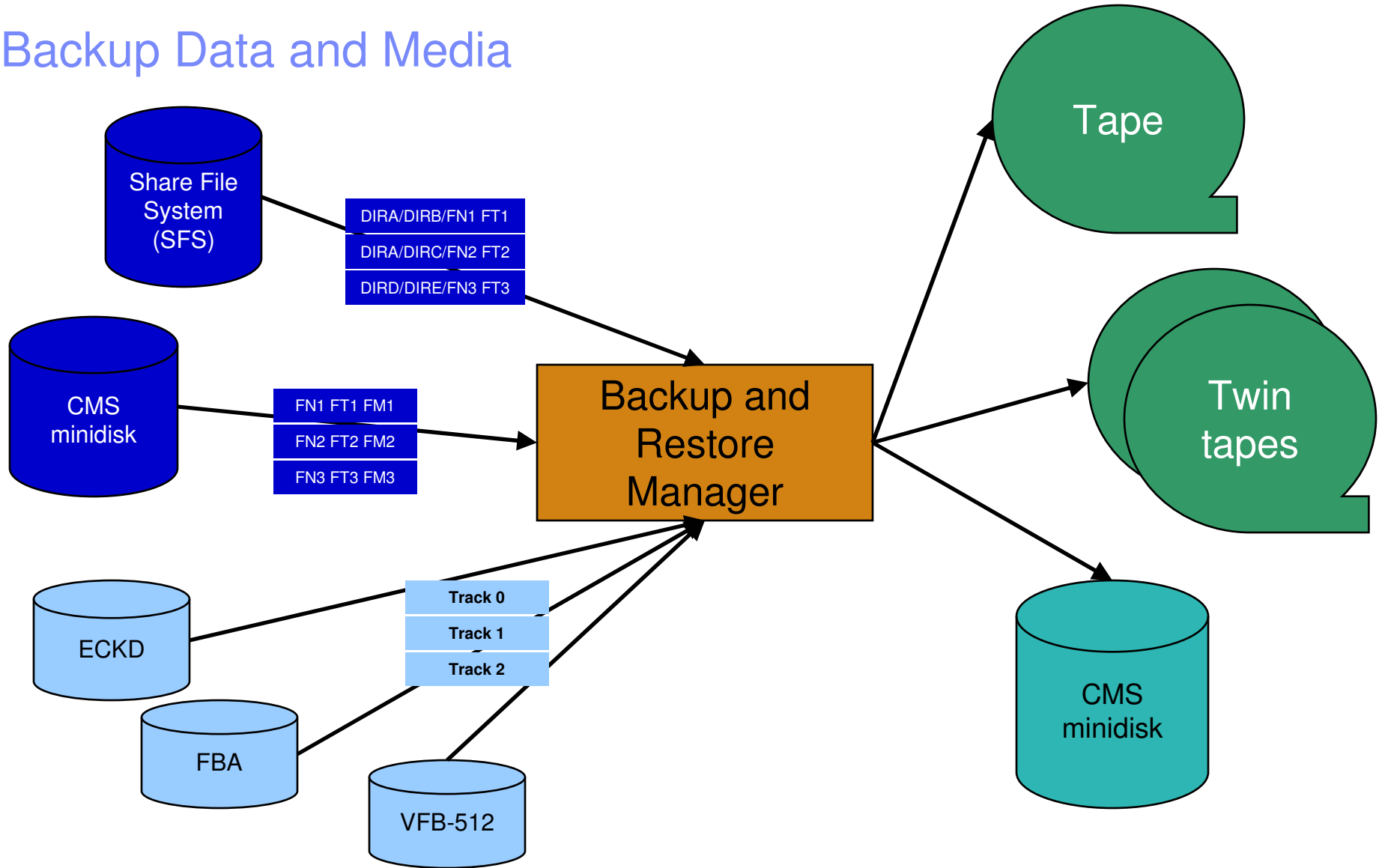
- Requested by administrators
- Full or incremental
- Flexible selection of disks and files to back up
- Review job before submitting for backup
- Catalog housed in Shared File System

### ▪ Restore

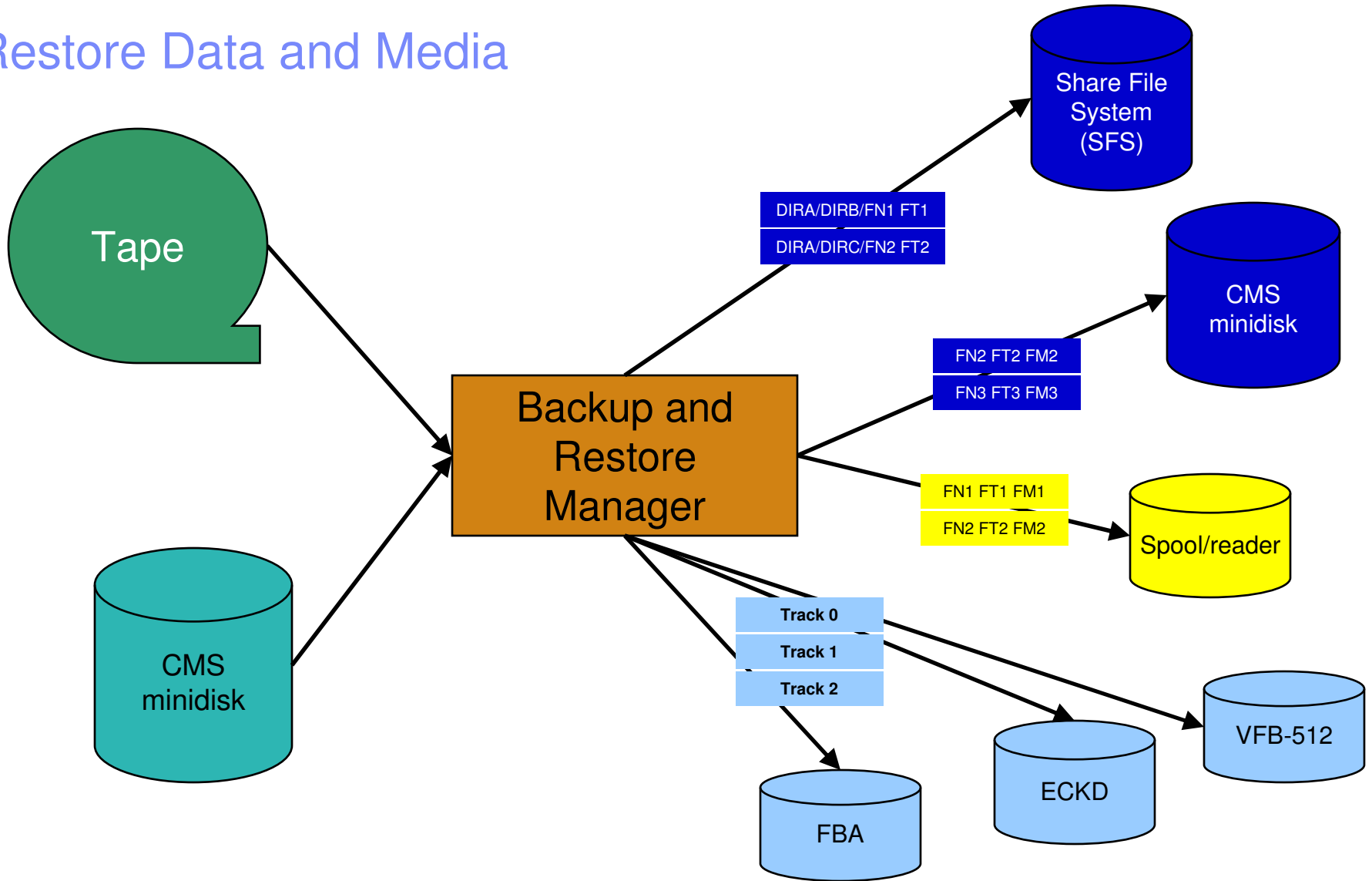
- Performed by users for their own data
  - Extending to other users available via exit
- Performed by administrators for any data
- Selection of data to restore
  - Full screen interface or commands
  - Individual files, with wildcard support
    - By file ID
    - By minidisk
    - By volume
    - By backup instance

## Integration with Tape Manager for z/VM

# Backup Data and Media

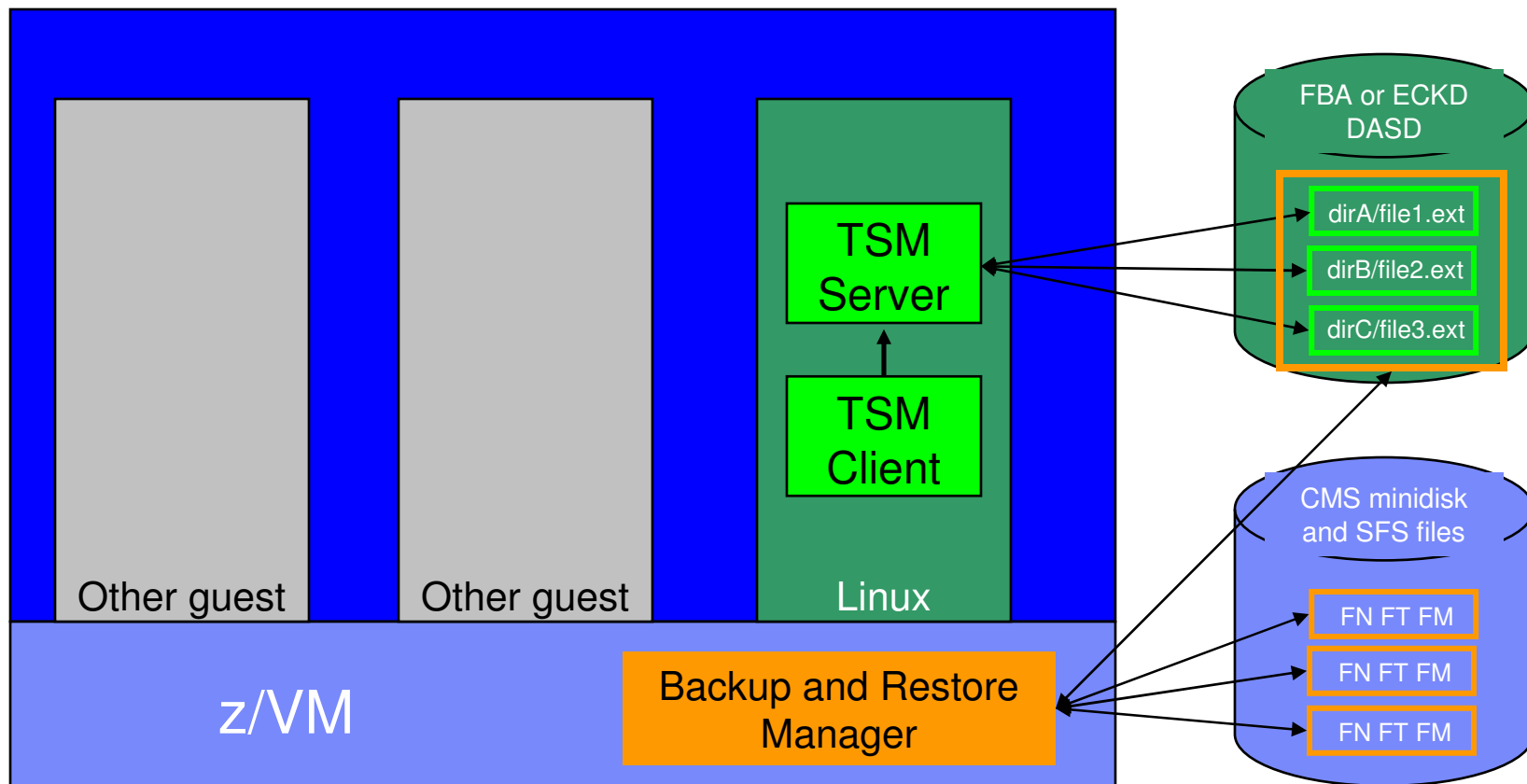


# Restore Data and Media



# Backup and Restore Manager and Linux Guests

*Using Backup and Restore Manager with Tivoli Storage Manager*



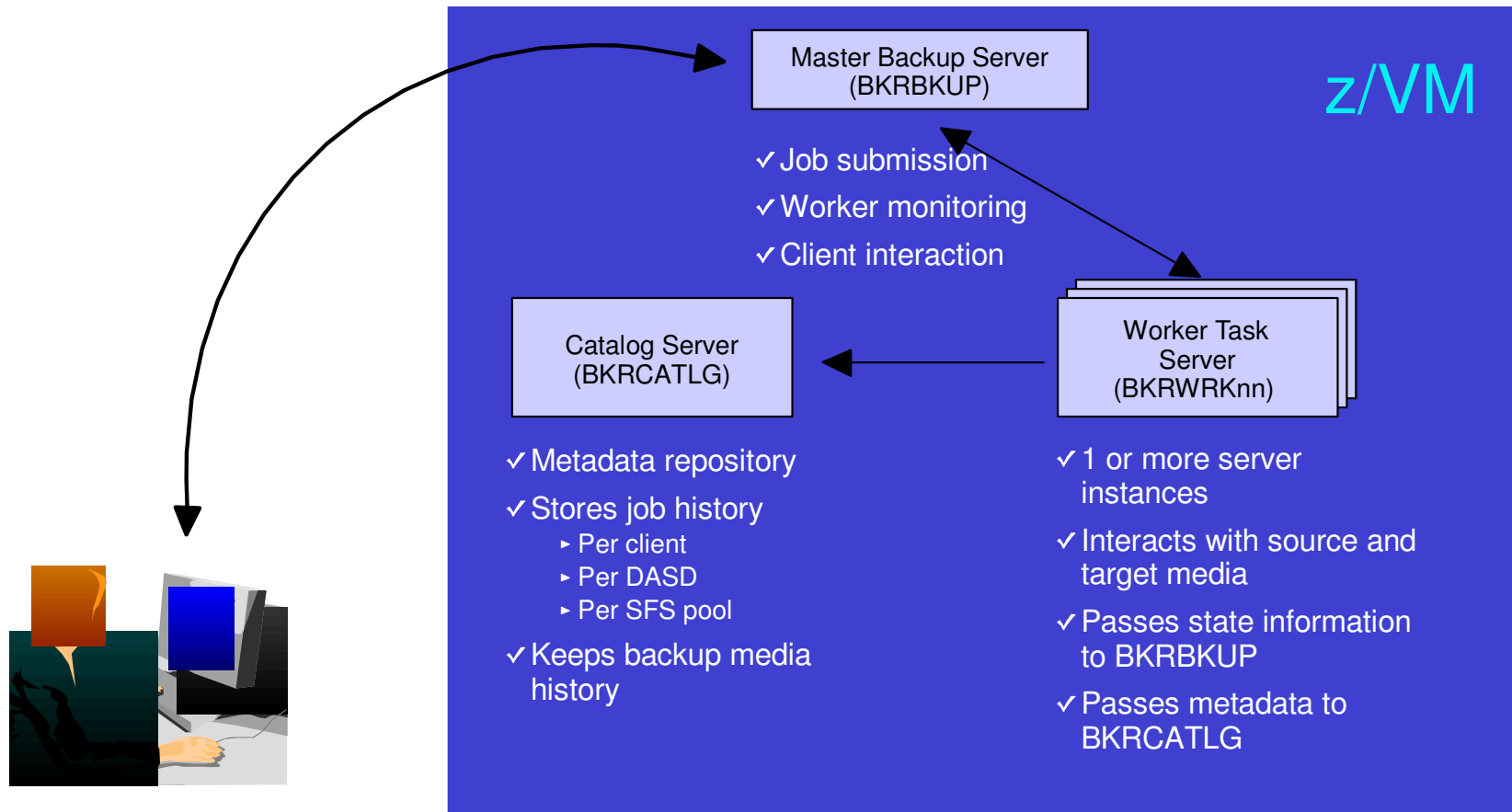
## Key Benefits

- **System backups available for Disaster Recovery**
  - 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, extents
  - Mask by filename, filetype, or SFS path
  - Review of 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
  - 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

# Backup and Restore Manager





## Features and Functions

- **Backups requested by administrators only**
  - Incremental or full backups
- **Restores**
  - Full screen or command level interface
  - Requested by
    - Users for their own data, with no administrator intervention
    - Administrators for any data
- **Data compression**
- **Encryption exits**
- **Integration with IBM Tape Manager for z/VM**

# Backup and Restore Manager Summary

- **Flexibility**

- Backup only what is needed via include, exclude, and masking statements
- Mix and match source and target types

- **Productivity**

- Review of backup job before submission
- User driven restores with no administrator interaction

- **Control**

- Each user can only access restore data owned by him/her
- Automatic aging and pruning of backup catalog
- Consistent backups using the object directory (not source)



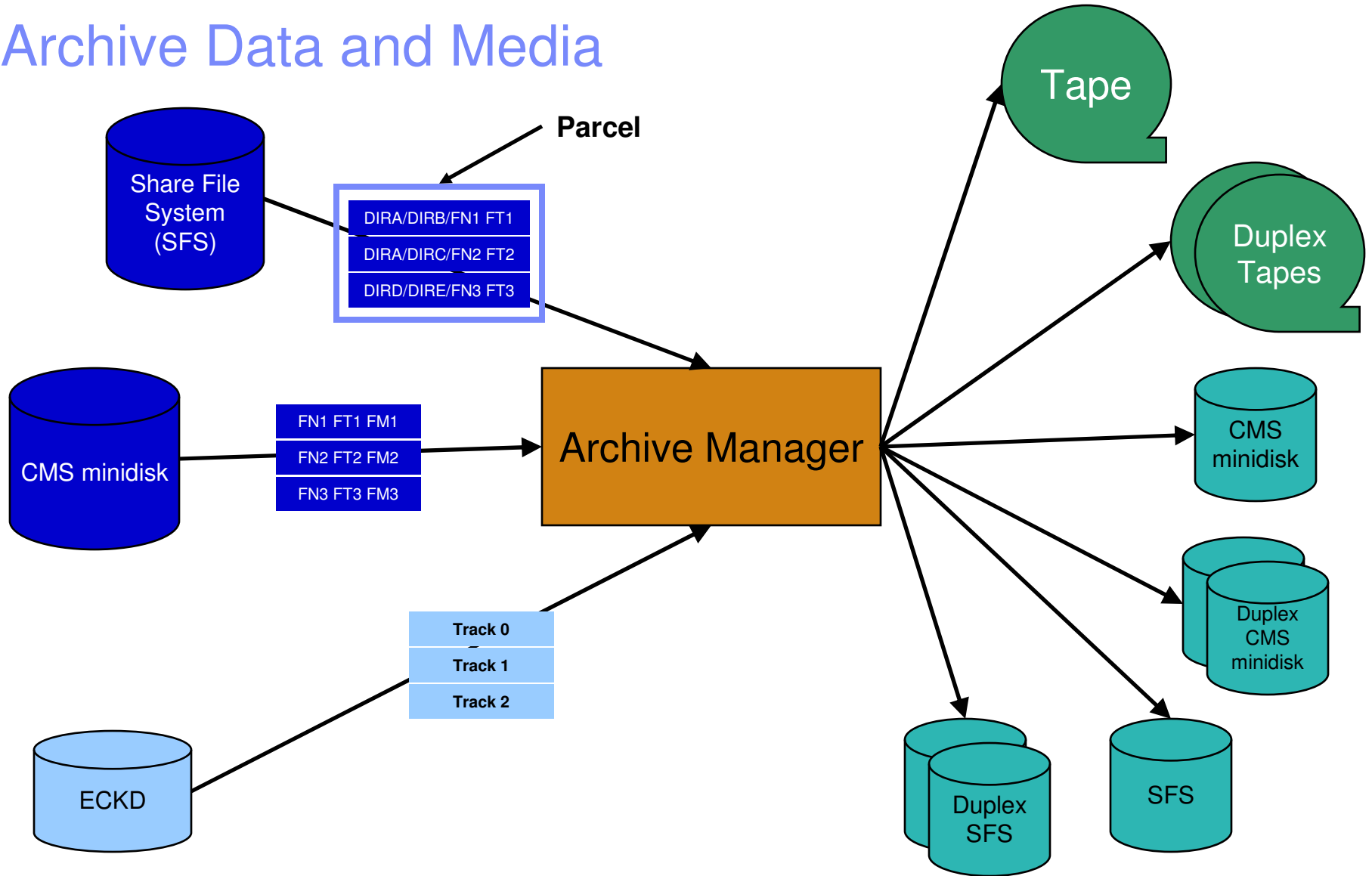
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# Archive Manager for z/VM

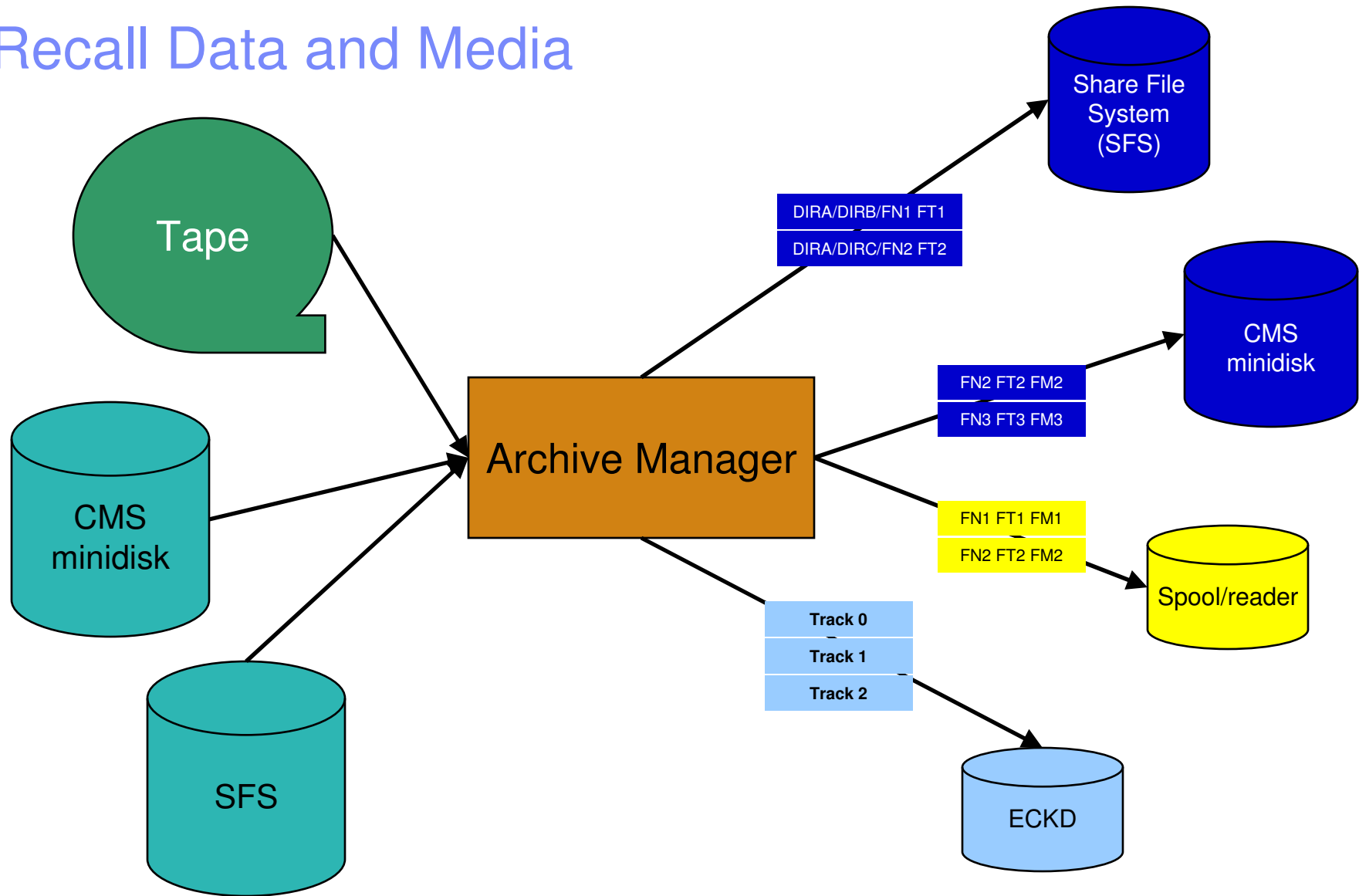
## Product Overview

- **Designed for end users and administrators to manage disk space**
  - Archive infrequently used or large files to tape or other disk
- **Archive**
  - Requested by administrators for any data
  - Requested by end users for their own data
  - Individual files or a group of files using CMS wildcard support
  - Integration with Tape Manager for z/VM
- **Recall**
  - Performed by users for their own data, or administrators for any data
  - Selection of data to recall
    - Full screen interface or command
    - Individual files, with wildcard support
    - Groups of files
- **Archive catalog maintained in Shared File System (SFS)**

# Archive Data and Media



# Recall Data and Media



## Key Benefits

- **Improve end user satisfaction and productivity**
  - Users manage their disk space by moving infrequently used or accessed files to tape or other disk
  - Archive and recall functions are controlled by the user
    - No need to wait for a request to operations to find and retrieve a file
    - File selection for recall using full screen interface
      - Filter on several fields, including file ID, date created, etc.
  - 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**
  - Via configuration options
- **Integration with Tape Manager for z/VM**

## Archive Manager Summary

- **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

- **IBM solutions exist for customers running z/VM and Linux guests**
  - 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
- **Product Web sites**
  - <http://www.ibm.com/software/stormgmt/zvm/>
    - Publications
    - Pre-requisites
    - Announcements
    - Support
- **e-mail: Tracy Dean, [tld1@us.ibm.com](mailto:tld1@us.ibm.com)**