Managing z/VM and Linux on System z

*Brief Overview*

Tracy Dean, IBM
tld1@us.ibm.com
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Agenda

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

- Backup V1.1.0 Tape V1.1.0
  - August 2005

- Archive V1.1.0 Operations V1.1.0
  - February 2006

- Tape V1.2.0 Operations V1.2.0
  - August 2006

- Backup V1.2.0 OMEGAMON XE preview
  - October 2006

- OMEGAMON XE V4.1 GA
  - October 2006
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

Operations Manager

DIRMAINT

LINUX

TCP/IP

Data space 1
- DIRM Message 1
- DIRM Message 2

Data space 2
- LNX Message 1
- LNX Message 2

Data space 3
- TCP Message 1
- TCP Message 2

Data space 4
- DIRM Message 1
- LNX Message 1
- LNX Message 2
- TCP Message 1
- DIRMAINT 2
- TCP Message 2

Daily log
- DIRM Message 1
- LNX Message 1
- LNX Message 2
- TCP Message 1
- DIRM Message 2
- TCP Message 2
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
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

- **Fullscreen 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
Operations Manager

- Existing Service Virtual Machine 1 being monitored
- Existing Service Virtual Machine 2 being monitored
- Existing Service Virtual Machine 3 being monitored

/ checkbld
- Captures consoles
- Evaluates rules
- Triggers schedules
- Executes actions or sends them to action processing servers

Authorized Users
- View and interact with monitored consoles
- Automate multi-step tasks

Main Server (OPMGRM1)

Action Processing Server (OPMGRSn)
- 0 to n server instances
- Processes actions as a result of rule matching

z/VM

Existing Service Virtual Machine
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
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

Share File System (SFS)

CMS minidisk

ECKD

FBA

VFB-512

FN1 FT1 FM1

FN2 FT2 FM2

FN3 FT3 FM3

DIRA/DIRB/FN1 FT1

DIRA/DIRC/FN2 FT2

DIRD/DIRE/FN3 FT3

Track 0

Track 1

Track 2

Backup and Restore Manager

DDR Tape

Tape

Twin Tapes

CMS minidisk (disk pool)
Restore Data and Media

Backup and Restore Manager

- Tape
- CMS minidisk
- Share File System (SFS)
- CMS minidisk
- Spool/reader
- FBA
- ECKD
- VFB-512
- Track 0
- Track 1
- Track 2
- DIRA/DIRB/FN1 FT1
- DIRA/DIRC/FN2 FT2
- FN1 FT1 FM1
- FN2 FT2 FM2
- FN3 FT3 FM3
- FN2 FT2 FM2
- FN2 FT2 FM2
Backup and Restore Manager and Linux Guests

Using Backup and Restore Manager with Tivoli Storage Manager

Choose the solution that meets your needs

<table>
<thead>
<tr>
<th>z/VM</th>
<th>Backup and Restore Manager</th>
<th>Other guest</th>
<th>Other guest</th>
<th>Other guest</th>
<th>Linux</th>
</tr>
</thead>
</table>

- FBA or ECKD DASD
- CMS minidisk and SFS files
- TSM Server
- TSM Client
- dirA/file1.ext
- dirB/file2.ext
- dirC/file3.ext
- FN FT FM
- FN FT FM
- FN FT FM
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 volser
    - 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

```c
/* 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   MAINT     =  0124 *     * =  * =  *
|-----------|----------|--------|--|----|------|--------|--|----------|--|----------|--|-------|EXCLUDE    MINIDISK   *        =  *   ...   SFS        VMSYSU:  *        SFS =  *
|-----------|----------|--------|--|----|------|--------|--|----------|--|----------|--|-------|EXCLUDE    SFS        VMSYSU:  VMSERVU  *

*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
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INCLUDE RDEVICE A0*
INCLUDE RDEVICE 900-90F

FUNCTION MEDIATYPE VOLSER
|-----------|----------|--------|

INCLUDE RDEVVOL 510*

FUNCTION MEDIATYPE POOLNAME OWNER FS
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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
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
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
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
Summary

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

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*IBM Software*

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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
  - 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**
    - Publications
    - Pre-requisites
    - Announcements
    - Support

- **e-mail**
  - Tracy Dean, tld1@us.ibm.com