# New z/VM Systems and Storage Management Products from IBM Part 1

Session V66

IBM zSeries Expo

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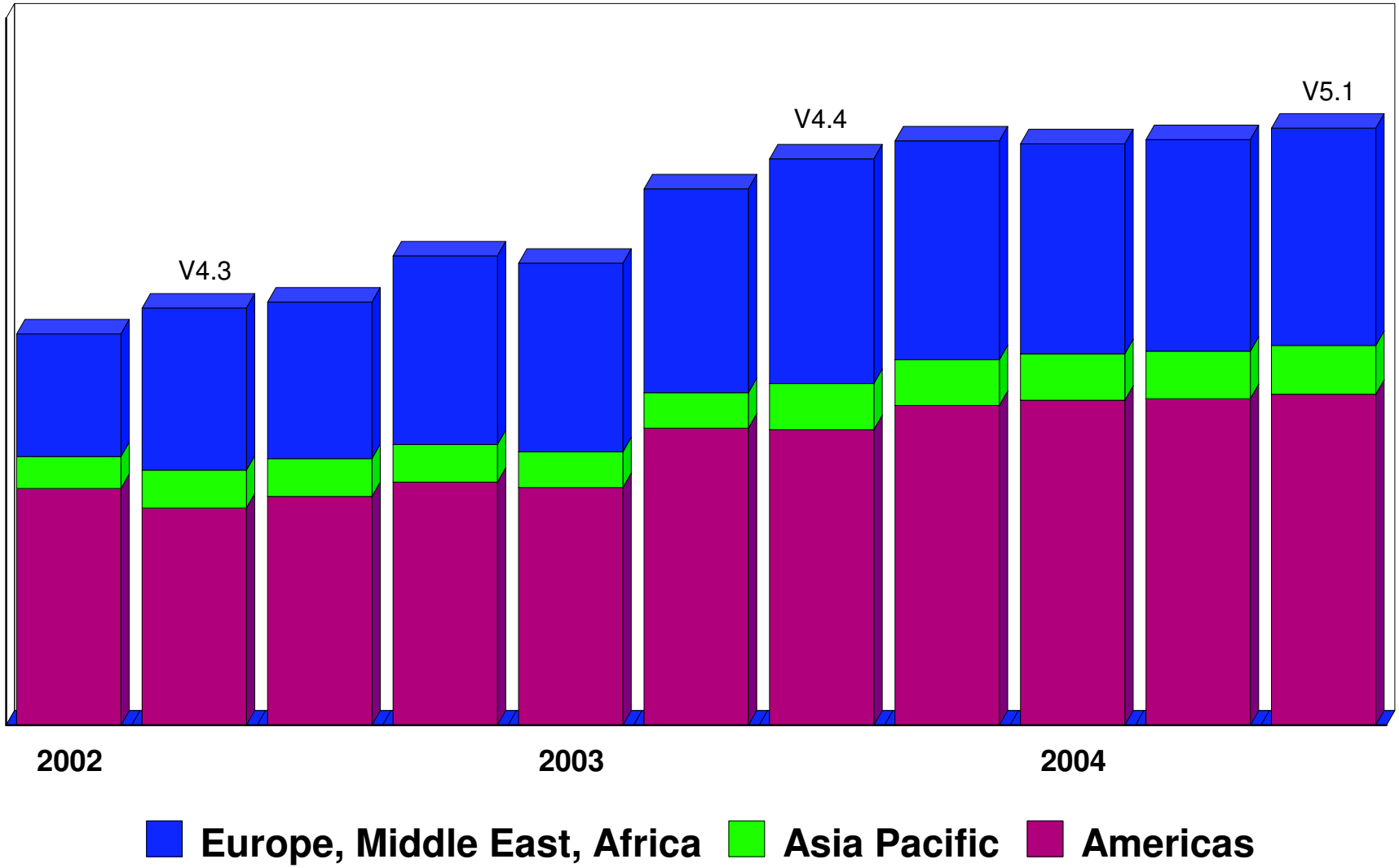
# Agenda

- Overview
- Tape Manager for z/VM
  - Key features
  - Concepts and terms
  - Product architecture
  - Configuration for standalone
  - Configuration with RMM
- Backup and Restore Manager for z/VM
  - Key features
  - Product architecture
  - Configuration
  - Demo
- Session V67: Thursday, 9:00am
  - Archive Manager for z/VM
  - Operations Manager for z/VM

# z/VM Market - Licenses and Releases/Versions



# Overall z/VM Marketplace

- Traditional z/VM customers
  - Longtime z/VM (VM/ESA, VM/SP) customers
  - Running business applications on z/VM
  - Also installing and using Linux on zSeries
  - Require full set of systems management solutions for z/VM and the 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 systems management of Linux guests
  - Also need basic systems management tools for z/VM host
- Total cost of ownership being scrutinized
  - Automation
  - Efficiency and productivity
  - Software costs

# Tape Manager for z/VM

- Tape management
  - Define tapes in a catalog, including:
    - Free or used
    - Internal or external
    - Retention/expiration information
    - ATL or manual mount
  - Group tapes together into pools
    - Ownership and access control
    - Media type
    - Include free and used tapes, with an optional link to a free pool
- Device management
  - Define devices
    - Dedicated or assignable
  - Group devices together into device pools
    - ATL or manual mount
    - Any other grouping you choose (read only vs. write, location, etc.)
- Product information
    - Announced February 22, 2005
    - GAed April 29, 2005

# Backup and Restore Manager for z/VM

- Backup
  - Full or incremental
  - Source data on CMS minidisk, SFS, ECKD images
  - Target output to tape, twin tapes, disk
  - Include/exclude minidisks or filepools
  - Mask by filename
- Restore
  - Source data on tape or disk
  - Target output to CMS minidisk, SFS, ECKD DASD, virtual reader
  - User or administrator requested
  - Selection of data to restore
    - Individual files (with wildcard support), by minidisk, by volume, or by backup instance
- Catalog
  - Contains all metadata for backup jobs and files
- Product information
  - Announced February 22, 2005
  - GAed April 29, 2005

# Tape Manager for z/VM

- Automation
- Efficiency
- Productivity

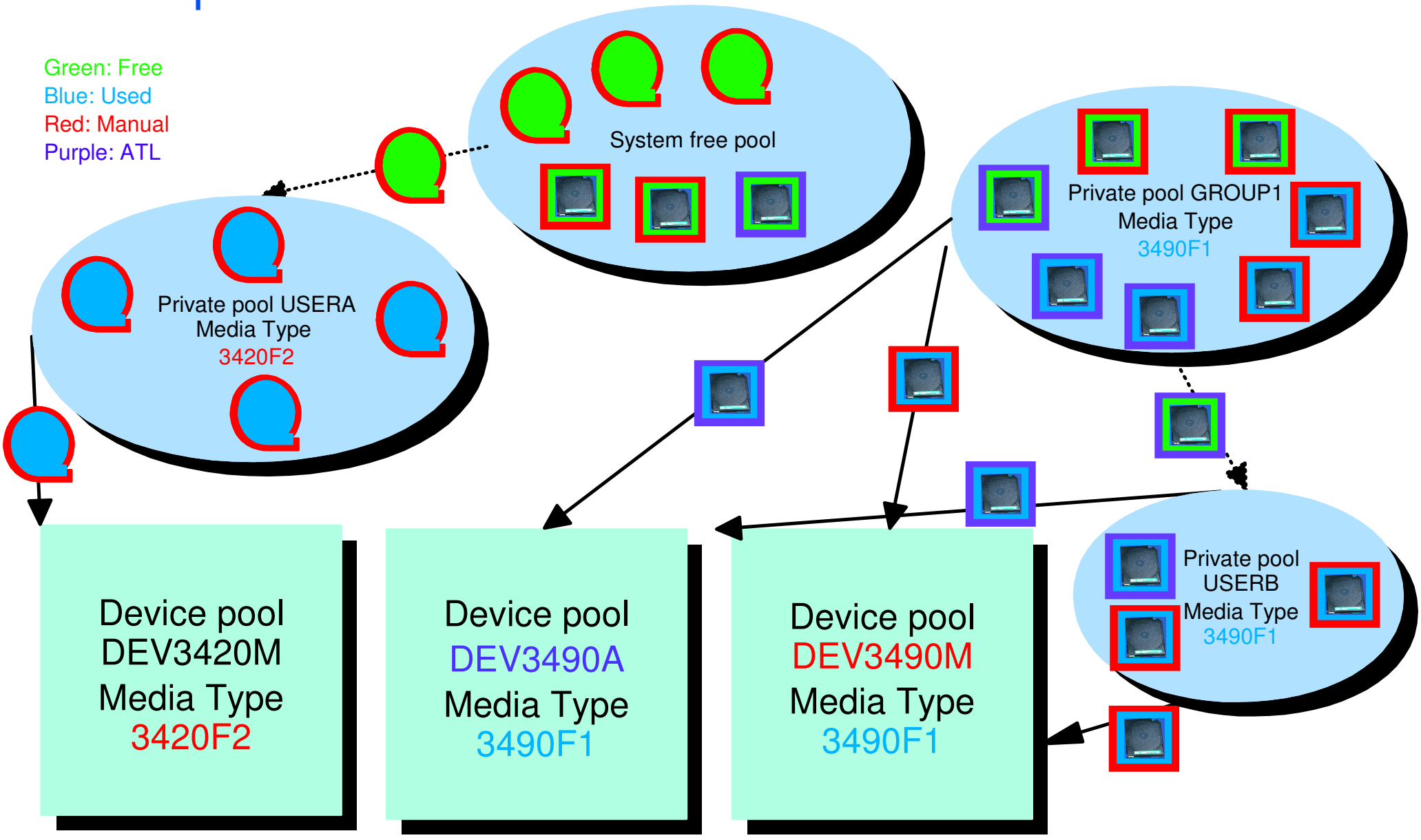
# Key Features

- Dynamic sharing of existing tape devices between multiple images
  - Devices must be assignable and not using multiuser attach feature of z/VM
- Effective management of tapes in ATLs
  - Granular access control
  - Expiration processing
  - Notification of low threshold for tape resource
    - Utilization information provided per pool
    - Report created and sent to administrator after expiration processing
- Improved accuracy of manual tape processing
  - Automatic request and notification of manual mounts
  - Internal label verification at attach/give and detach
  - Read/Write verification
- Optional use of RMM as the tape catalog
  - Tapes, access control, and retention managed by existing RMM catalog
  - Accessible via commands on z/VM

# Concepts and Terms

- Tape pool
  - Private pool
    - Logical group of physical tapes owned by a CMS userid
    - Free or used
    - Same media type, access control, and defaults
    - Internal or external
  - System free pool
    - One (and only one) list of free tapes which are not in private pools
- Device pool
  - Logical group of physical devices that can handle the same physical media
  - Same mount attribute and media type
  - Can define one or more
  - One device can be in more than one pool
  - Admin-specified name
- Media type
  - Admin defined name that associates devices in device pools with tapes in tape pools
  - One media type can be associated with more than one device pool
  - Example: 3590 drives on 1st floor vs. 3590 drives on 2nd floor

# Sample Pool Structure

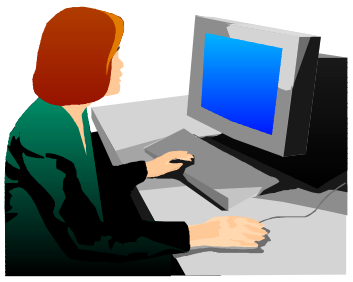


# Access Control

| Authority | Modify Pool Attributes and Delete Pool | Modify Tape Attributes | Add/Delete Tapes to the Pool | Modify Tapes | Read Tapes | Tape Attributes Modified Only as a Byproduct of Other Commands | Use Tape Pool as a Free Pool |
|---|---|---|---|---|---|---|---|
| Sys Admin | ✓ | ✓ | ✓ | | | ✓ | |
| Pool Admin | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Tape | | | ✓ | ✓ | ✓ | ✓ | |
| Write | | | | ✓ | ✓ | ✓ | |
| Read | | | | | ✓ | ✓ | |
| None | | | | | | | |
| Free | | | | | | | ✓ |

- Defined using POOL commands
- Can set defaults for each pool, then add or restrict access via specific user authorization

# Tape Manager - Standard Mode



Tape Manager Machine (TMM)

- ✓ Reads configuration files at startup

Device Manager Machine (DMM)

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

Library Manager Machine (LMM)

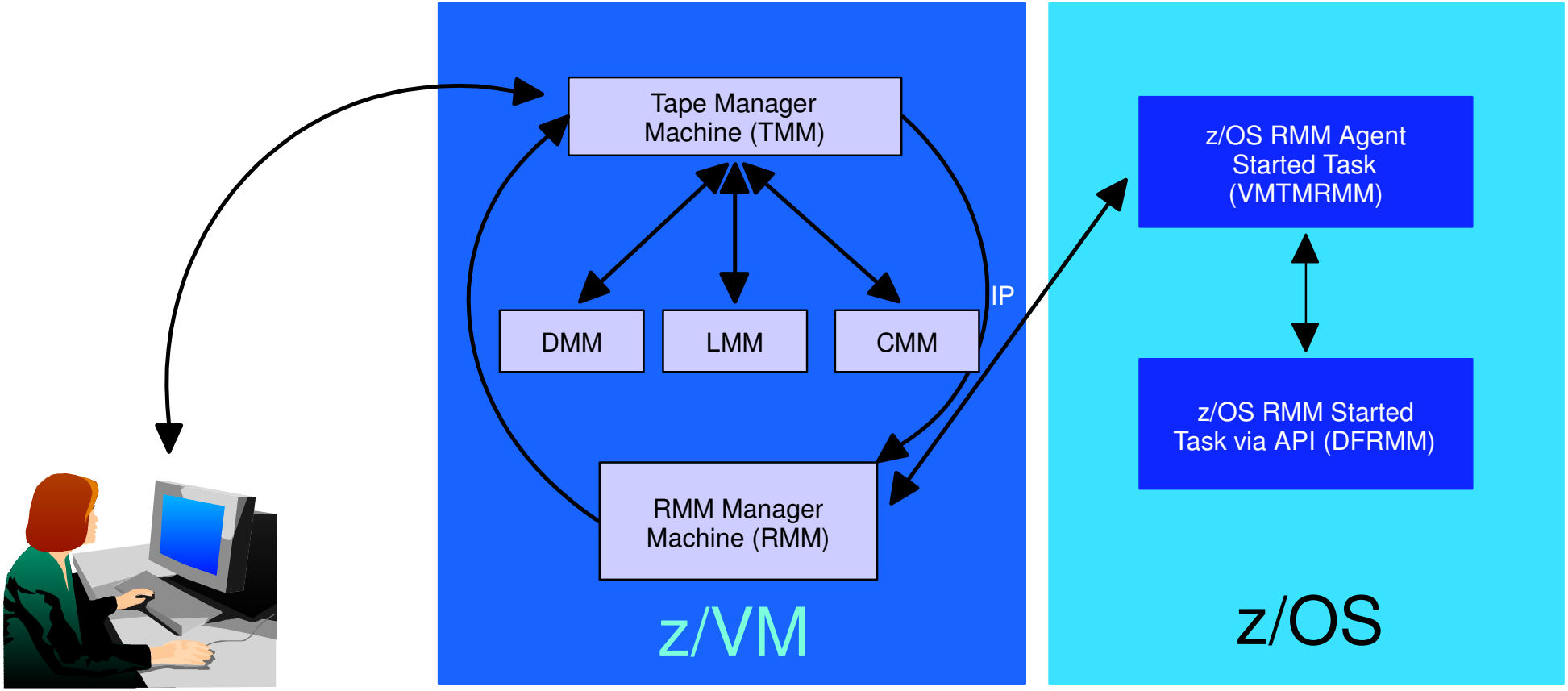
- ✓ Interacts with DFSMSrms to handle library mounts
- ✓ Handles volume specific and scratch requests

Command Manager Machine (CMM) - Optional

- ✓ Supports subcommand processing in user exits

z/VM

# Tape Manager - Integration with RMM




- Communication within z/VM via SMSG/IUCV
  - IP for TMM to RMM
- Communication between z/VM and z/OS via TCP/IP

# Configuration File - Standard Mode

```
/* SAMPLE CONFIG FILE FOR STANDARD IMPLEMENTATIONS                    */
/*                                                                    */
ADMINS     TMADMN              /* Authorized users                    */
/*                                                                    */
ATTACH     500                 /* Dedicated device list               */
/*                                                                    */
/*       Init status Exit ID  Xmit ACTN Intervals TO ACTN  SubCmd Secs */
/*       ----------- -------- --------- --------- -------  ----------- */
CMDEXIT ENABLE       TMCMM    RUN       3         RUN      60
/*                                                                    */
/* Non-ATL device pool statement                                      */
/*          Name    Devices                                           */
DEVPOOL     3490L   600-601
DEVPOOL     3490M   500-501
/*                                                                    */
/* ATL device pool statements showing device list continuation        */
DEVPOOL     3590A   ATL NWAATL1 530-531
DEVPOOL     3590A   630-631
/*                                                                    */
DEVWAIT     4                   /* Max device wait time in minutes    */
/*                                                                    */
/*     Name  Vaddr Mode                                               */
DISK   DB1    0200  U
DISK   DB2    0210  V
DISK   USER   0191  Z
```

# ... Configuration File - Standard Mode

```
DMM         TMDMM               /* Userid for the Dev. Mgt. Machine      */
/*                                                                        */
EXPSTART    13:30:00            /* Start time for expiration processing  */
/*                                                                        */
FREEACC     NONE                /* Allow private pool use of sys scratch */
FREEAUTH    Y                   /* Auth required for system scratch use  */
/*                                                                        */
FILEOFF     OPERATIONS
/*                                                                        */
LIBRARY     NWAATL1 ONLINE TMLM1 /* Library / Initial status / Server     */
/*                                                                        */
LIBTYPPRI   M                   /* Primary scratch source MAN/ATL        */
LIBTYPSEC   A                   /* Secondary scratch source MAN/ATL      */
/*                                                                        */
OPERATIONS OPERATOR
/*                                                                        */
POOLAUTH    Y                   /* Auth required to define pools         */
POOLDEF     NONE                /* Auth required to define pools         */
POOLMAX     1000                /* System default for maximum pool tapes */
POOLWARN    80                  /* System default for pool warn percent  */
RETNDFLT    100                 /* Default retention days                */
RETNMAX     1000                /* Maximum retention days                */
/*                                                                        */
SCROWNER    *                   /* Default scratch pool owner            */
SCRNAME     POOL1               /* Default scratch pool name             */
/*                                                                        */
VOLMIN      6                   /* Minumum length of volume serial       */
VOLMAX      6                   /* Maximum length of volume serial <= 16 */
VOLWAIT     10                  /* Max retries (1/min) for volume wait   */
```

# ... Configuration File - RMM Mode

```
FILEOFF    OPERATIONS
/*                                                                  */
LIBRARY    NWAATL1 ONLINE TMLM1 /* Library / Initial status / Server   */
/*                                                                  */
OPERATIONS CSHOWA
/*                                                                  */
DISK  TCPIP  0592  Z
/*                                                                  */
/*  .- VMRMM service machine name                                   */
/*  |     .- VM TCPIP service machine name                          */
/*  |     |     .- VM RMM service machine IP address                */
/*  |     |     |     or Host Name                                  */
/*  |     |     |              .- VM service machine port           */
/*  |     |     |              |    .- z/OS agent IP address        */
/*  |     |     |              |    |     or Host Name              */
/*  |     |     |              |    |              .- z/OS agent port  */
/*  '     '     '              '    '              '                 */
RMM TMRMM TCPIP RS54           9999 RS52           35042
/*                                                                  */
RMMCMDWAIT 3
RMMSCRPOOL ATL ATL1 NWAATL1 SCRATCH0 VOL
RMMSCRPOOL MAN NOATL
/*                                                                  */
RMMSCRDFLT DEVP 3590A
/* RMMSCRDFLT SCRP ATL1                                            */
/* RMMSCRDFLT DEVP 3590A                                           */
/* RMMSCRDFLT RDEV 530                                             */
```

# Tape Manager Summary

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

# Backup and Restore Manager for z/VM

- Flexibility
- Productivity
- Control

# Key Features

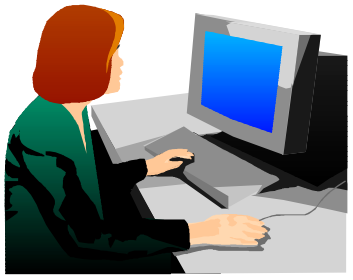
- Modular design with an eye to the future
  - Data handlers for each data type (minidisk, SFS, ECKD, reader)
  - Media drivers for each media type (tape, twin tapes, CMS file)
- Standard CMS interfaces
  - Support for new hardware when CMS supports it
  - Backup/restore catalog housed as a hierarchical structure in SFS
- Documented interfaces to data packaging tools
- Review of a defined backup job before submission
- Reduced backup window with concurrent processing
  - Multiple service machines sharing the job
  - Assigned by master server
- Automatic aging and pruning of the backup catalog

# Access Control

- Administrators
  - Review and submit jobs
  - Manipulate contents of backup catalog
  - Backup and restore from anywhere to anywhere
  - Receive all service machine consoles
  - Full screen interface for navigating the catalog and requesting restores
    - By job, then instance, ownerid, resource type, resource (specific filespace or minidisk)
    - By user, then resource, resource type, job name, instance objects
    - By DASD volid, then extent start, extent size, ownerid, minidisk address, job name, instance
    - By DASD volid, then ownerid, minidisk address, extent start, extent size, job name, instance
- Users
  - Restore files they own
  - Full screen interface to find files available for restore

# Backup and Restore Manager - Architecture

➡ Communication via SMSG/IUCV



z/VM

Master Backup Server (BKRBKUP)

- ✓ Job submission
- ✓ Worker monitoring
- ✓ Client interaction

Catalog Server (BKRCATLG)

- ✓ Metadata repository
- ✓ Stores job history
  - ▸ Per client
  - ▸ Per DASD
  - ▸ Per SFS pool
- ✓ Keeps backup media history

Worker Task Server (BKRWRKnn)

- ✓ 1 or more server instances
- ✓ Interacts with source and target media
- ✓ Passes state information to BKRBKUP
- ✓ Passes metadata to BKRCATLG

# Configuration File

```
Local_Backup_Admin_ID    = BKRADMIN
Local_Backup_Master_ID   = BKRBKUP
Local_Backup_Catalog_ID = BKRCATLG
*
Worker_Idle_Timeout = +00:15:00

* Temporary staging area info for worker virtual machines
Worker_Stage_Type = VFB-512

* Tunes the number of buffer pages allocated by GETMDSK for VMUDQ (diag 25c)
* reply during INCLUDE/EXCLUDE processing.  For every 1MB (256 pages) of
* buffer allocated, GETMDSK can process 17,746 minidisk definitions.
Template_MDISK_Buffer_Pages = 512

BKR_Allow_EDF_Target_Format = 1

* Configuration for tape handling exits (BKRMOUNT, BKRUMNT, BKREOV):
Tape_Exit_Context = BKR
Tape_Operator = OPERATOR
Tape_Request_Method = EXEC TELL
Tape_Delay_Interval = +00:00:60
Tape_Times_To_Poll  = 5
TAP1_Virtual_Address = 181
TAP2_Virtual_Address = 182
Tape_Retain_After_EOJ = 0

* Master Backup Catalog configuration:
CatalogPool = ROCKSFS2
CatalogSpace = RVBCATLG
```

# Job Template

```
CONFIG BKR_OUTPUT_SPEC  = IBMTAPE SCRATCH RW 1
*CONFIG BKR_OUTPUT_SPEC  = IBMTWIN SCRATCH RW 1 SCRATCH
*CONFIG BKR_OUTPUT_SPEC  = CMSFILE DISK POOL X
*
CONFIG BKR_JOB_WORKERS = 3
CONFIG BKR_JOB_NAME     = RS54FULL
*
CONFIG BKR_JOB_CMS_FILEMASK = * * *
CONFIG BKR_JOB_SFS_PATHMASK = *
*
CONFIG BKR_JOB_CATALOG  = Y
CONFIG BKR_CATALOG_RETENTION = 30
CONFIG BKR_CATALOG_VERBOSE    = N
CONFIG BKR_OUT_EDF_VERBOSE = N
CONFIG BKR_OUT_TAPE_VERBOSE = N
*
CONFIG BKR_EDF_INCR_TOGGLE = N
CONFIG BKR_SFS_INCR_TOGGLE = N
```

# ... Job Template

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

 EXCLUDE    MINIDISK   FDISK    =  *    *      *        =  *          =  *          =  *          *
 EXCLUDE    MINIDISK   $ALLOC$  =  *    *      *        =  *          =  *          =  *          *

 EXCLUDE    MINIDISK   MACK0*   =  *    *      *        =  *          =  *          =  *          *
 INCLUDE    MINIDISK   MACK0*   =  019* *      *        =  *          =  *          =  *          *

 EXCLUDE    MINIDISK   MAINT    =  0123 *      *        =  *          =  *          =  *          *
 EXCLUDE    MINIDISK   MAINT    =  0124 *      *        =  *          =  *          =  *          *

 EXCLUDE    MINIDISK   ROCKSFS* =  *    *      *        =  *          =  *          =  *          *
 INCLUDE    MINIDISK   ROCKSFS* =  019* *      *        =  *          =  *          =  *          *
 EXCLUDE    MINIDISK   VMSERV*  =  *    *      *        =  *          =  *          =  *          *
 INCLUDE    MINIDISK   VMSERV*  =  019* *      *        =  *          =  *          =  *          *

 EXCLUDE    MINIDISK   *        =  *    *      *        =  *          =  *          >  3300       *
 EXCLUDE    MINIDISK   *        =  *    *      *        =  *          =  *          =  END        *
 INCLUDE    MINIDISK   MAINT    =  012* *      *        =  *          =  *          =  *          *

  FUNCTION  MEDIATYPE  POOLNAME  OWNER    FS
|----------|----------|--------|--------|---|
 INCLUDE    SFS        VMSYSU:   *        SFS
 EXCLUDE    SFS        VMSYSU:   DFSMS*   *
 INCLUDE    SFS        ROCKSFS2:*        *
 EXCLUDE    SFS        ROCKSFS2:RVBCATLG *
 INCLUDE    SFS        VMDEVU:   *        *
```

# 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)

# Summary

- New z/VM tools for systems and storage management
  - Improved flexibility, productivity, and control of backup and restore operations
  - Automated, efficient, and productive tape management and operations
- V1.1 GAed April 29, 2005
- Refer to session V67 for additional products that GAed in August 2005
- Gathering and prioritizing additional customer requirements
- Web site:
  - http://www.ibm.com/software/stormgmt/zvm