New z/VM Systems Management Products from IBM

SHARE Session 9147

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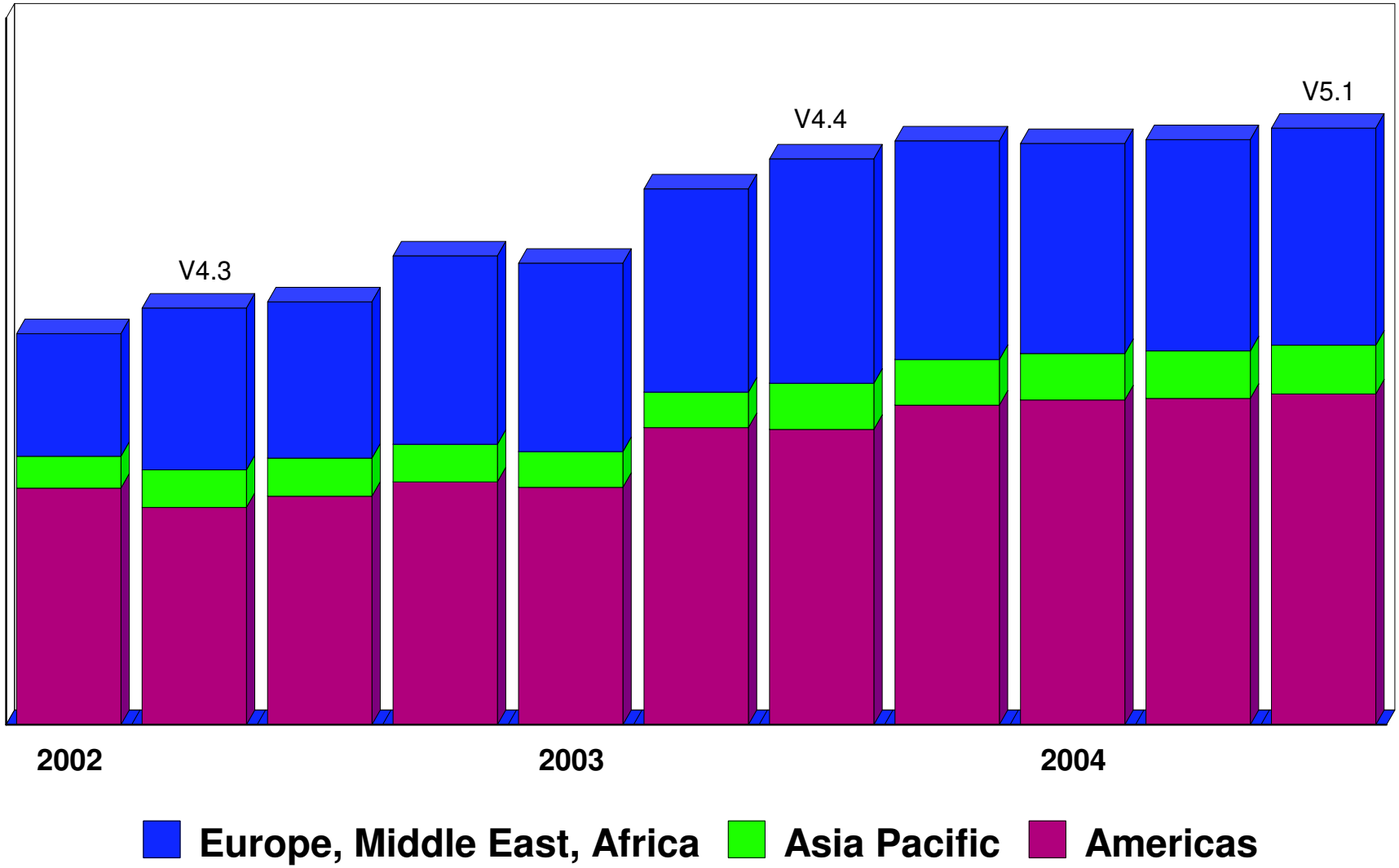
Agenda

- Overview
- Tape Manager
  - Key features
  - Concepts and terms
  - Product architecture
  - Configuration overview, with and without RMM
- Backup and Restore Manager
  - Key features
  - Product architecture
  - Configuration

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 - designed for administrators
  - Full or incremental
  - Source data on CMS minidisk, SFS, CKD images
  - Target output to tape, twin tapes, disk
  - Include/exclude minidisks or filepools
  - Mask by filename
- Restore - designed for administrators and users
  - Source data on tape or disk
  - Target output to CMS minidisk, SFS, CKD 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

Archive Manager for z/VM

- Archive - designed for users and administrators
  - Manage disk space by moving infrequently used or accessed files to tape or other disk
  - Source data on CMS minidisk, SFS, CKD images
  - Select files by filename filetype filemode
    - Wildcard support for filename filetype
  - Target output (a parcel) to tape or disk
    - Always copied to staging disk first
- Recall
  - Source data on tape or disk
  - Target output to CMS minidisk, SFS, CKD DASD, virtual reader
  - User or administrator requested
  - Search for file(s) to recall
    - Wildcard support for filename and filetype
    - Selection by date
    - Can include other files in that archive parcel
- Catalog
  - Contains all metadata for archive jobs and files
- Product information
  - Announced August 23, 2005
  - GA August 26, 2005

Operations Manager for z/VM

- Monitor service machines
  - Take predefined actions based on message text matching
  - Suppress messages
  - Highlight messages with color, blinking, etc.
- Schedule events/actions
- Automate tasks with Terminal Device Manager
- Supports multiple installations of Operations Manager on one z/VM system
  - Performance (monitoring a large number of consoles)
  - Separation of access control
- Product information
  - Announced August 23, 2005
  - GA August 26, 2005

Tape Manager for z/VM

- Automation
- Efficiency
- Productivity

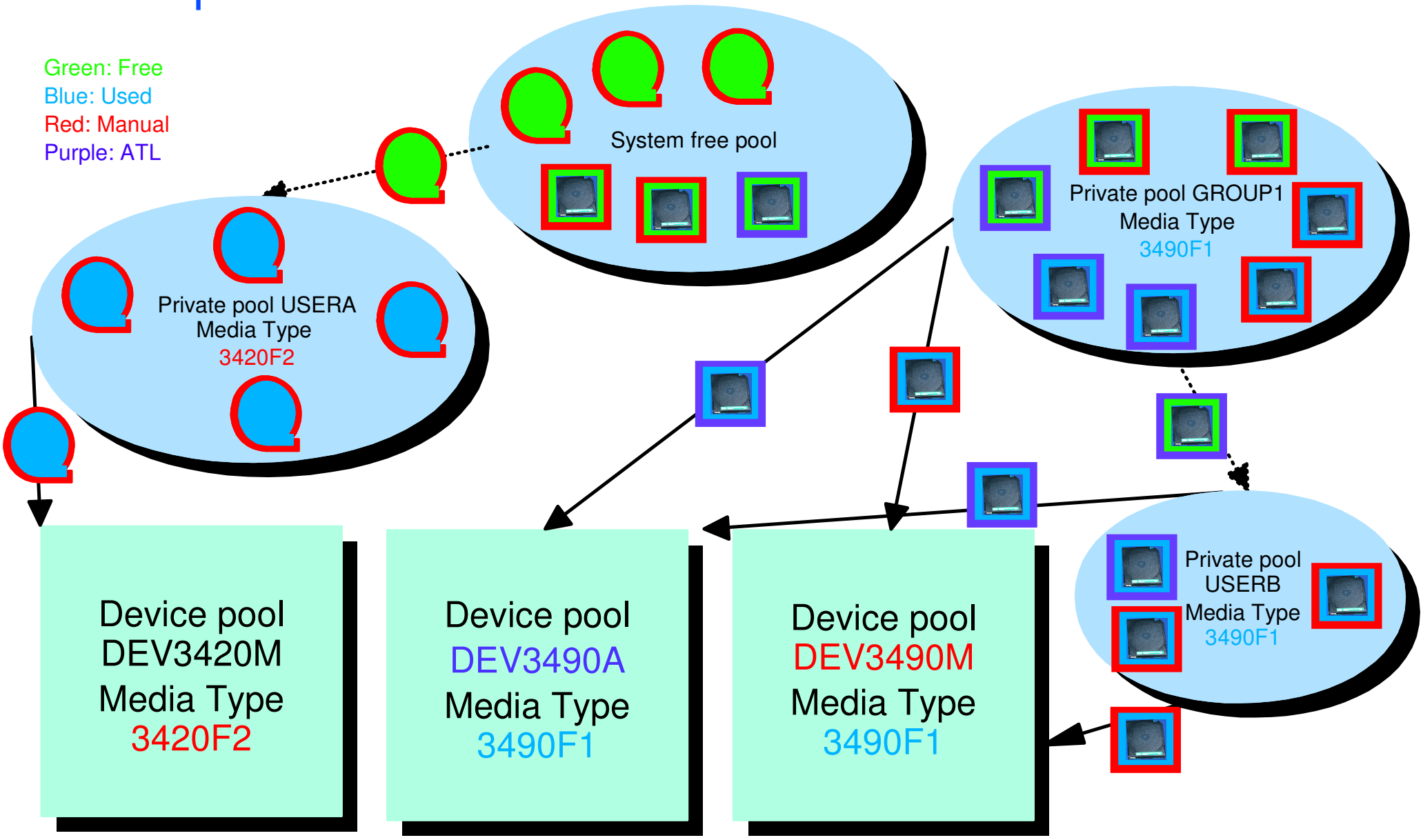
Key Features

- 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
  - 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

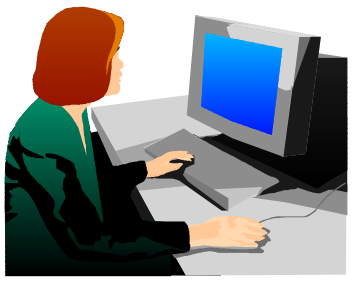


Access Control

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					✓	✓	
Free							✓
None							

- 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)

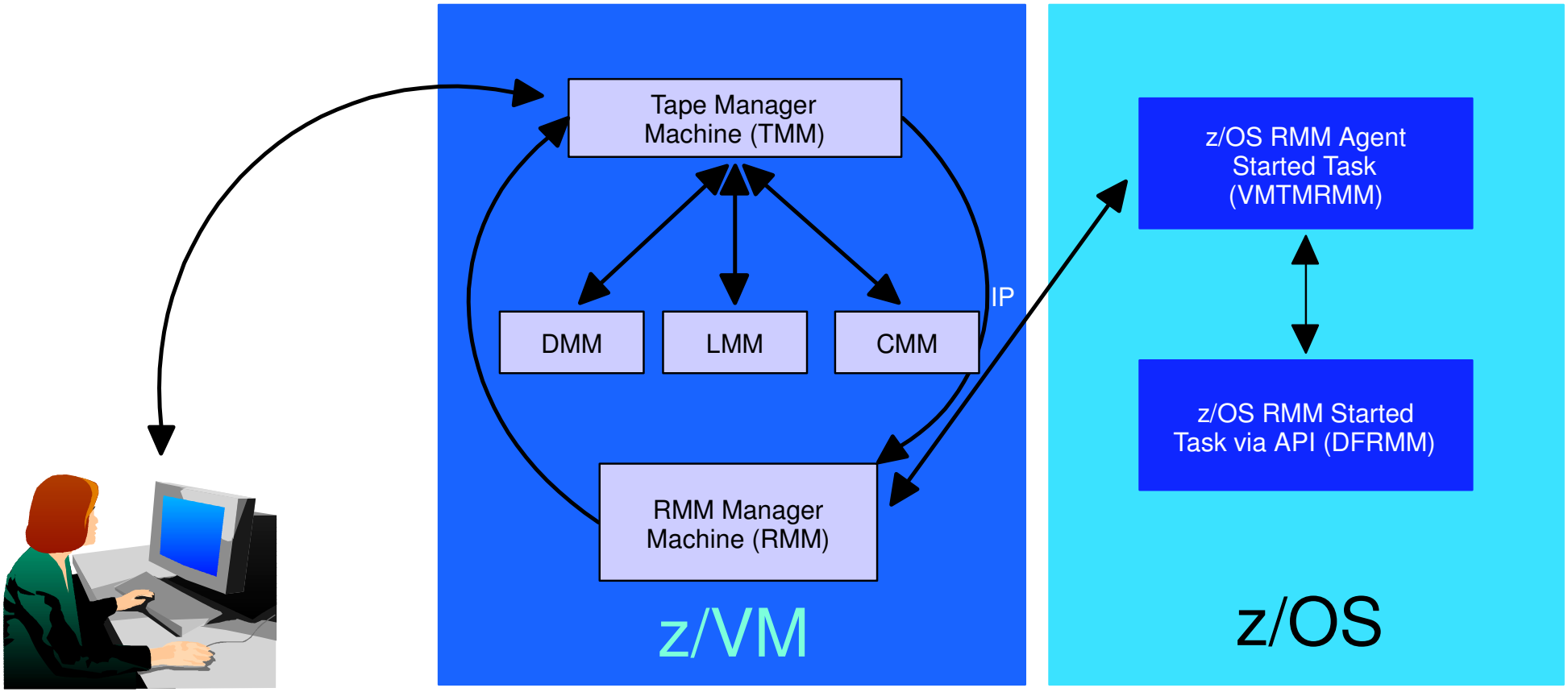
- ✓ Interacts with DFSMSrms to handle library mounts
- ✓ Handles volume specific and scratch requests

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

```
/* 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
/*                                                                    */
/* No ATL device pool statement                                       */
/*                                                                    */
DEVPOOL    3490A    A00-A01
DEVPOOL    3590A    B00-B01
/*                                                                    */
/* ATL device pool statement showing device list continuation         */
DEVPOOL    3590A    ATL NWAPPL1 530-531
DEVPOOL    3590A    630-63
/*                                                                    */
DEVWAIT    4                   /* Max device wait time in minutes     */
/*                                                                    */
/*     Name   Vaddr Mode                                              */
DISK   DB1    0200  U
DISK   DB2    0210  V
DISK   USER   0191  Z
```

Define a list or range of dedicated devices

Configuration File - Standard Mode

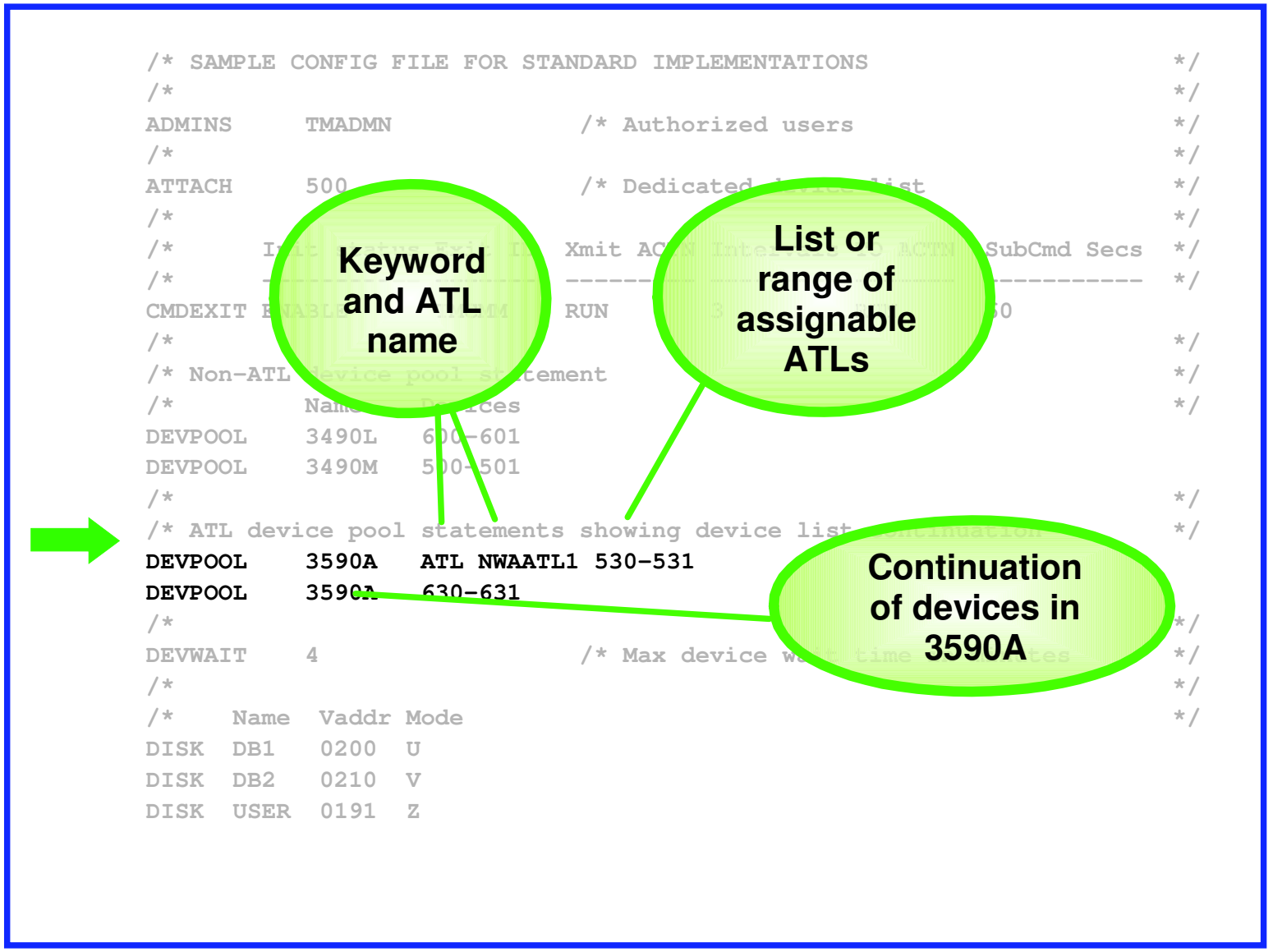
```
/* SAMPLE CONFIG FILE FOR STANDARD IMPLEMENTATIONS              */
/*                                                              */
ADMINS                         /* Authorized users              */
/*                                                              */
ATTACH                         /* Dedicated dev                 */
/*                                                              */
/*       Ini                ID   Xmit ACTN Interv               */
/*       ----          ------- --------- ------                 */
CMDEXIT ENABLE       TMCMM     RUN       3                      
/*                                                              */
/* 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
/*                                                              */
DEVWAI                         /* Max device wait time in minutes */
/*                                                              */
/*                                                              */
DIS
DIS
DISK
```

Device pool name

List or range of assignable devices for manual mount

Continuation of manual mount device pools

Configuration File - Standard Mode



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                   /* Wait device                 minute */
/*                                                                    */
/*     Name  Vaddr Mode                                               */
DISK   DB1   0200  U
DISK   DB2   0210  V
DISK   USER  0191  Z
```

User disk linked/accessed by TMM when FILE option specified

... 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 - Standard Mode

```
DMM         TMDMM                 /* Userid for the Dev. Mgt. Machine      */
/*                                                                          */
EXPSTART    13:30:00              /* Start time for expiration processing  */
/*                                                                          */
FREEAUTH    Y                     /* Auth required for system scratch use  */
FREEACC     NONE                  /* Allow public use of sys scratch       */
/*                                                                          */
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                */
/*                                                                          */
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SCRNAME     POOL1                 /* Default scratch pool name             */
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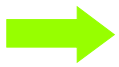
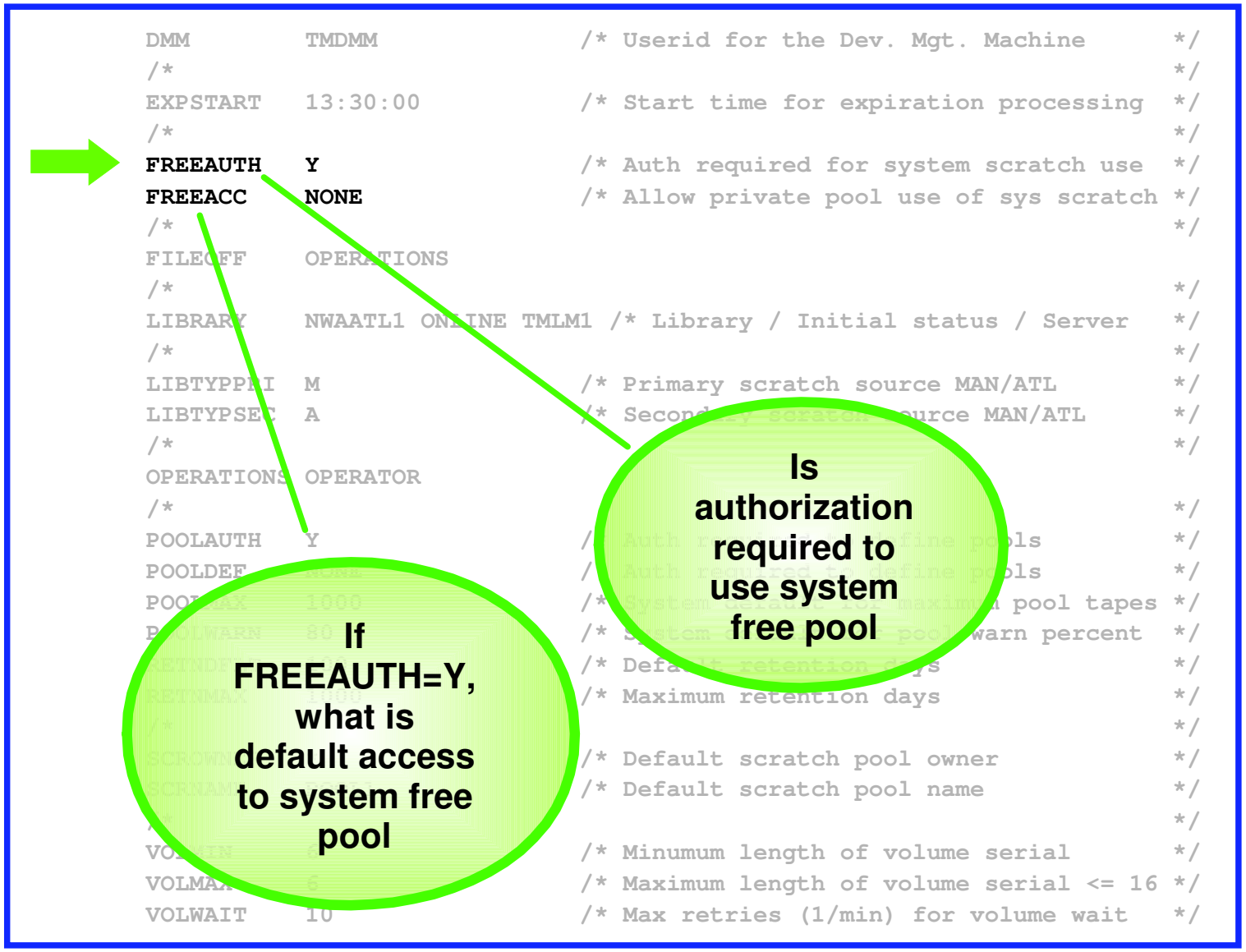


... Configuration File - Standard Mode



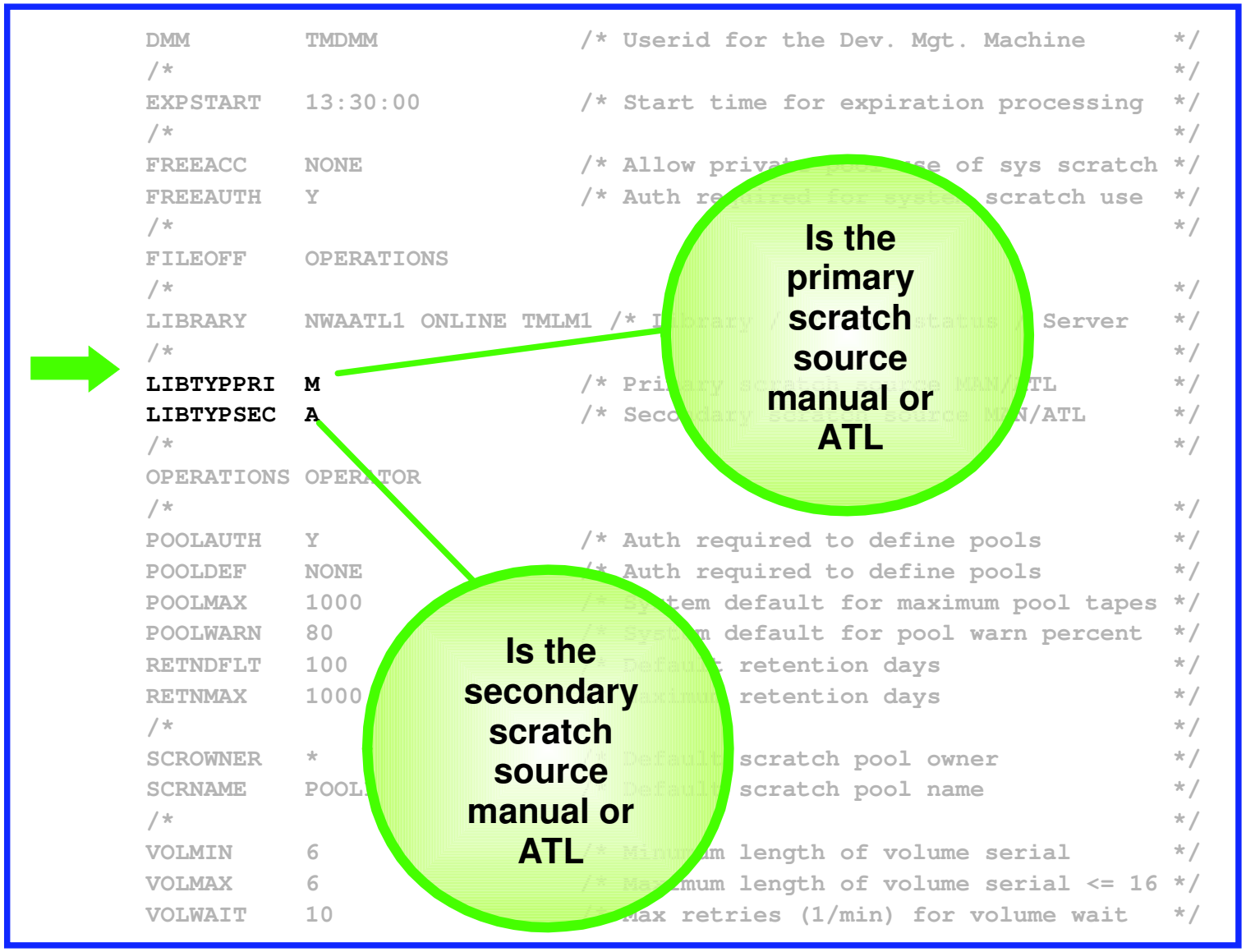
... Configuration File - Standard Mode

```
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                    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                  /* 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                   /* Minimum length of volume serial       */
VOLMAX      6                   /* Maximum length of volume serial <= 16 */
VOLWAIT     10                  /* Max retries (1/min) for volume wait   */
```

Is authorization required to define new tape pools

If POOLAUTH=Y, what is default access to create new tape pools: ALL/NONE

... Configuration File - Standard Mode



... Configuration File - Standard Mode

```
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/*                                                                        */
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/*                                                                        */
FREEACC     NONE                /* Allow private pool use of sys scratch */
FREEAUTH    Y                   /* Auth required for system scratch use  */
/*                                                                        */
FILEOFF     OPERATIONS
/*                                                                        */
LIBRARY     NWAATL1 ONLINE TMLM1 /* Library / Online Status / Server      */
/*                                                                        */
LIBTYPPRI   M                   /* Primary scratch source MAN/AUTO       */
LIBTYPSEC   A                   /* Secondary scratch source MAN/AUTO     */
/*                                                                        */
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 pool warn percent      */
RETNDFLT    100                 /* Default retention days                */
RETNMAX     1000                /* Maximum retention days                */
/*                                                                        */
SCROWNER    *                   /* Default scratch owner                 */
SCRNAME     POOL1               /* Default scratch pool                  */
/*                                                                        */
VOLMIN      6                   /* Minumum length of volume serial       */
VOLMAX      6                   /* Maximum length of volume serial <= 16 */
VOLWAIT     10                  /* Max retries (1/min) for volume wait   */
```

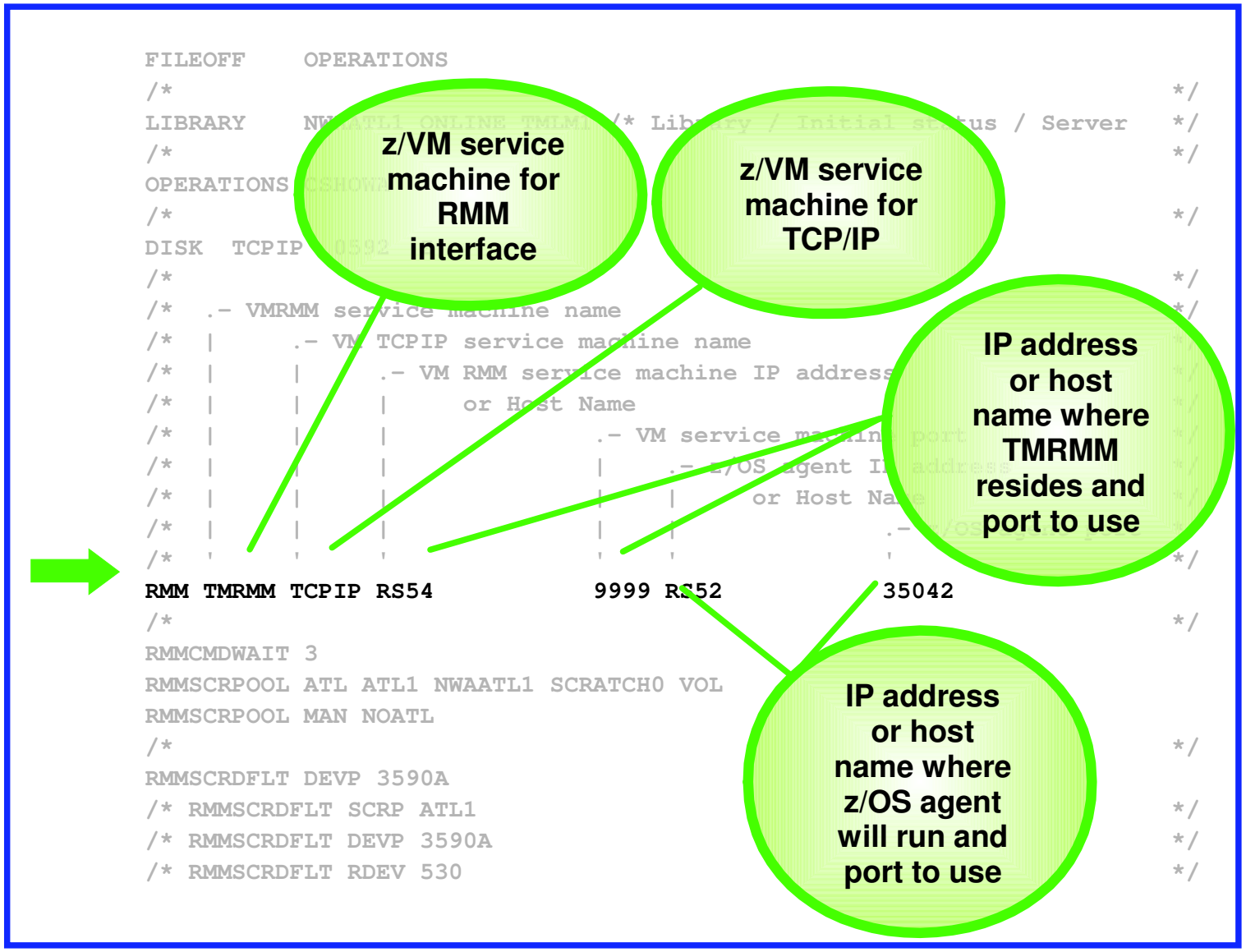
Default number of days tapes are retained

System maximum number of days tapes are retained

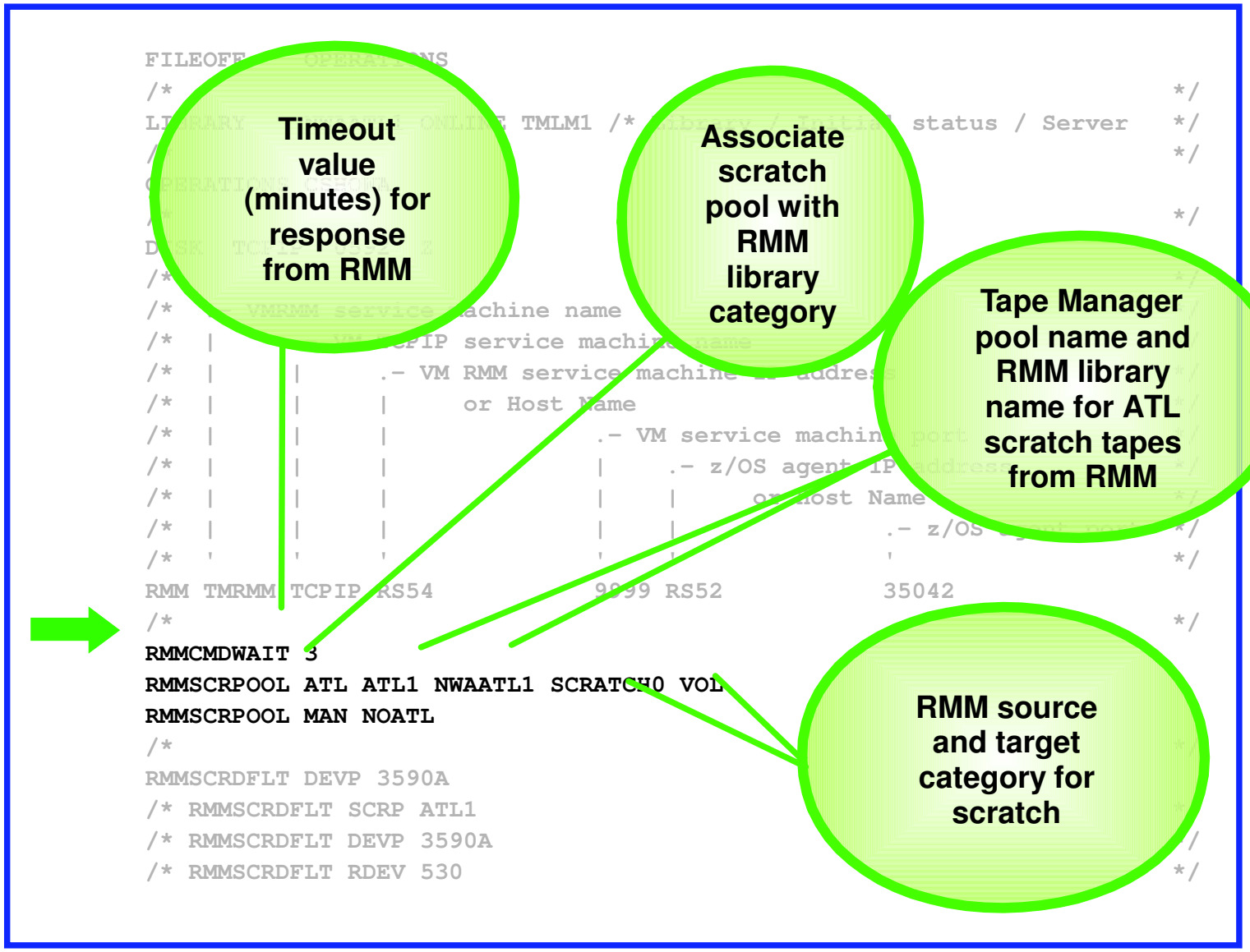
... Configuration File - RMM Mode

```
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                                             */
```

... Configuration File - RMM Mode



... Configuration File - RMM Mode



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

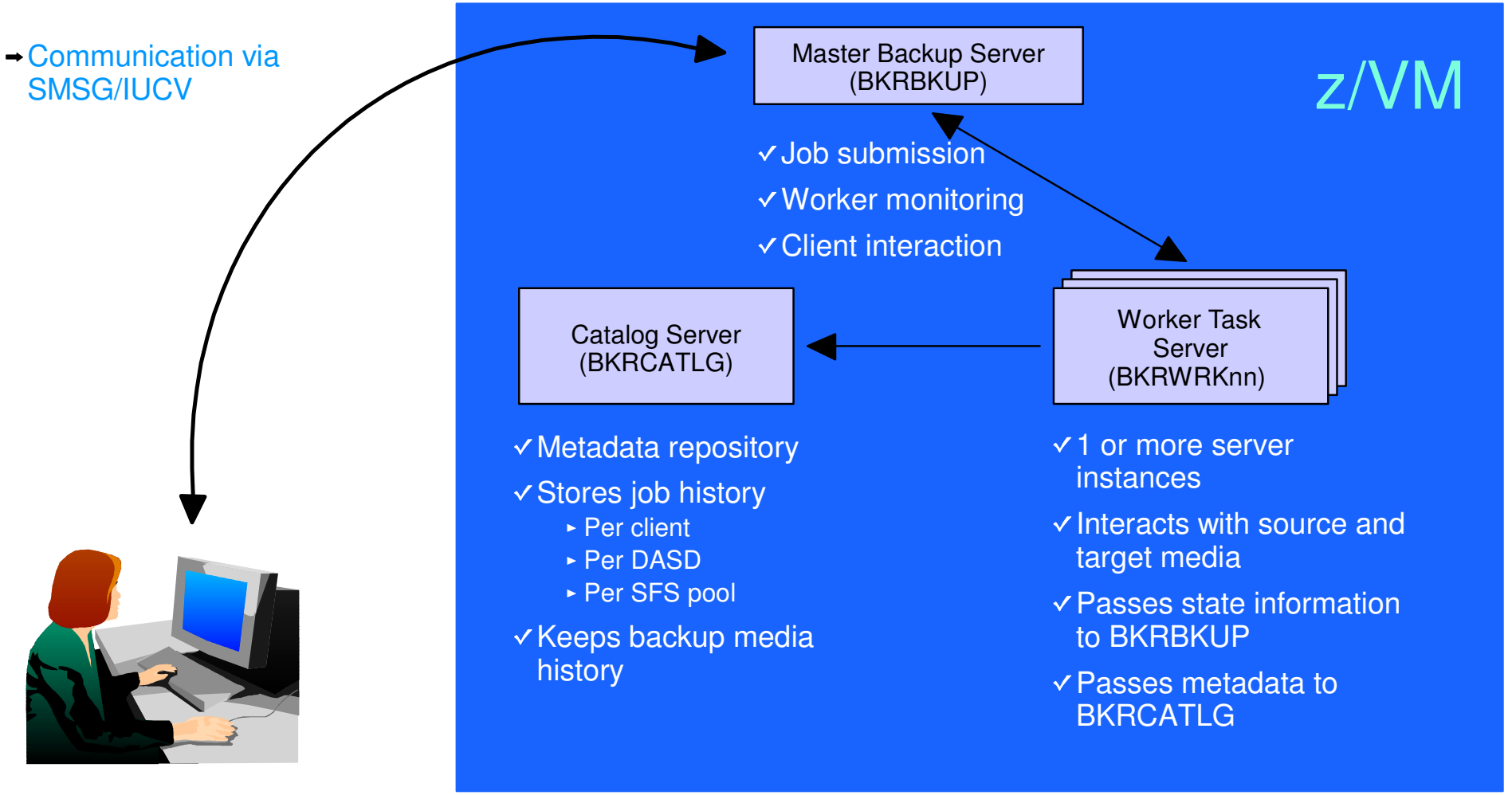
Key Features

- Modular design with an eye to the future
  - Data handlers for each data type (minidisk, SFS, CKD, 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



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
```

Configuration File

```
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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 VMUDQ (diag 25c)
* reply during INCLUDE/EXCLUDE processing. For every 1MB (256 pages) of
* buffer allocated, GETMDSK can process 17,7[illegible] 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   = EMSG
Tape_Delay_Interval = +00:0[illegible]
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
```

Time Worker SVM remains idle before logoff

Temp disk type for Worker staging area when needed (can also be T3380 or T3390)

Configuration File

```
Local_Backup_Admin_ID    = BKRADMIN
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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
```

Number of buffer pages for GETMDSK, 512 supports 35K mdisks

Configuration File

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

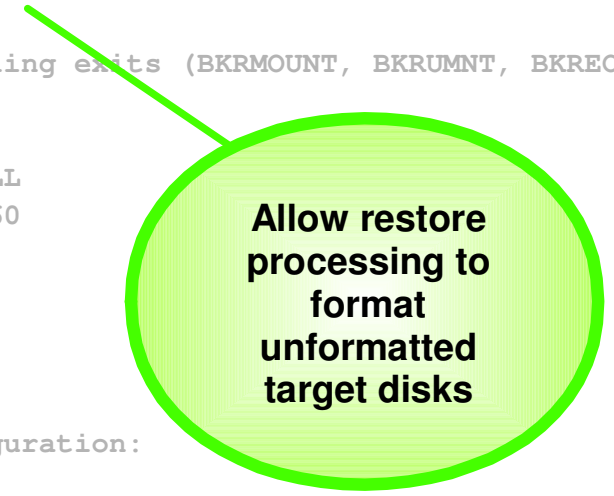
* Temporary staging area info for worker virtual machines
Worker_Stage_Type = VFB-512

* 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
```



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 GE
* reply during INCLUDE/EXCLUDE processing.  Fo
* buffer allocated, GETMDSK can process 17,746 mi
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
```

Interaction with tape management process

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 (BKRUSER, BKRACCNT, 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
```

SFS filepool and filespace for backup catalog

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

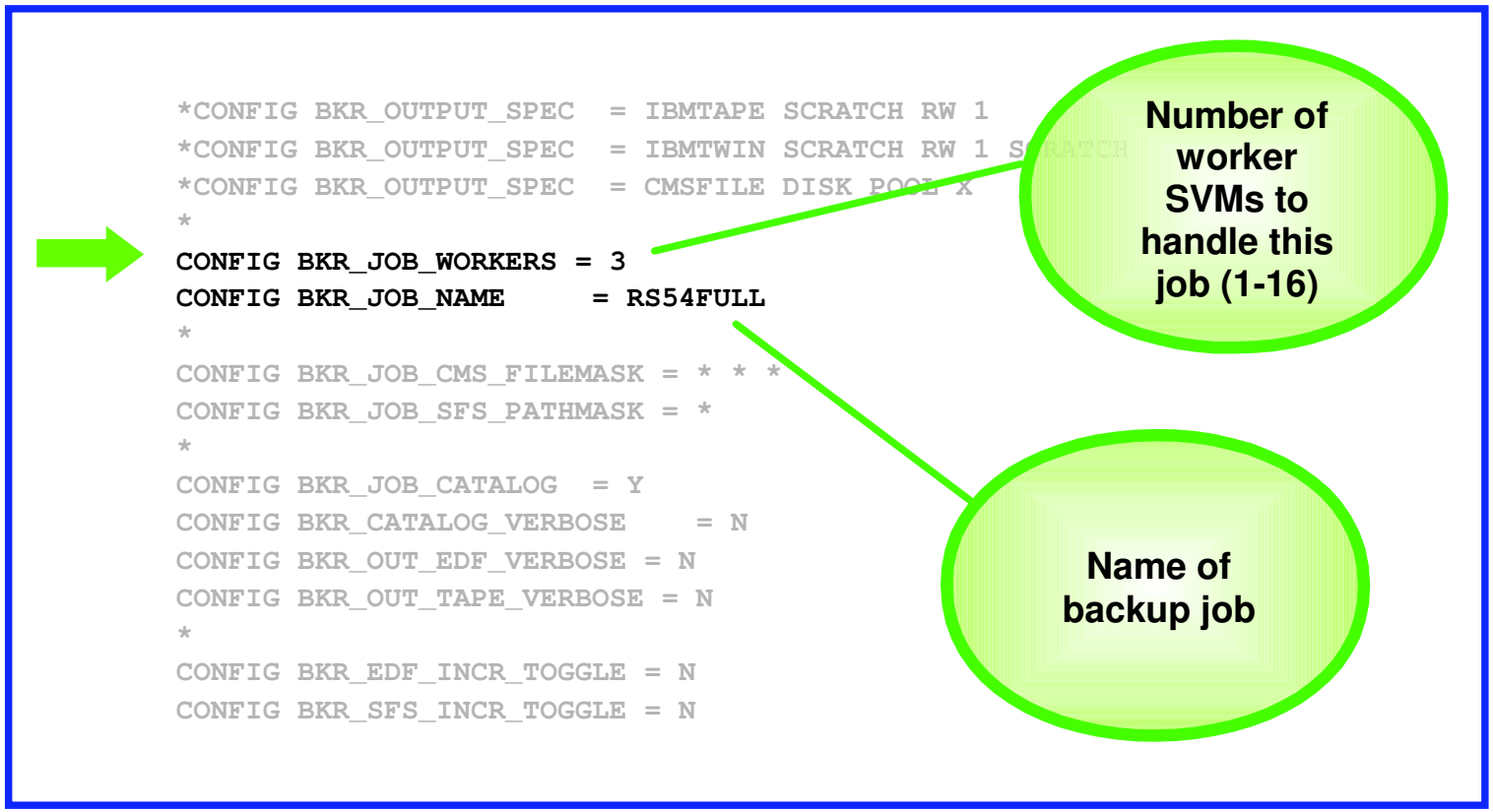
```
CONFIG BKR_OUTPUT_SPEC  = IBMTAPE SCRATCH RW 1
*CONFIG BKR_OUTPUT_SPEC  = IBMTWIN SCRATCH RW 1 SCRATCH
*CONFIG BKR_OUTPUT_SPEC  = CMSFILE DISK POOL X
*
CONFIG BKR_JOB_WORKERS = 3
CONFIG BKR_JOB_NAME     = RS54FULL
*
CONFIG BKR_JOB_CMS_FILEMASK = * * *
CONFIG BKR_JOB_SFS_PATHMASK = *
*
CONFIG BKR_JOB_CATALOG  = Y
CONFIG BKR_CATALOG_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
```

Dump to tape mounted as scratch

Dump to twin tapes mounted as scratch

Dump to disk from disk pool

Job Template



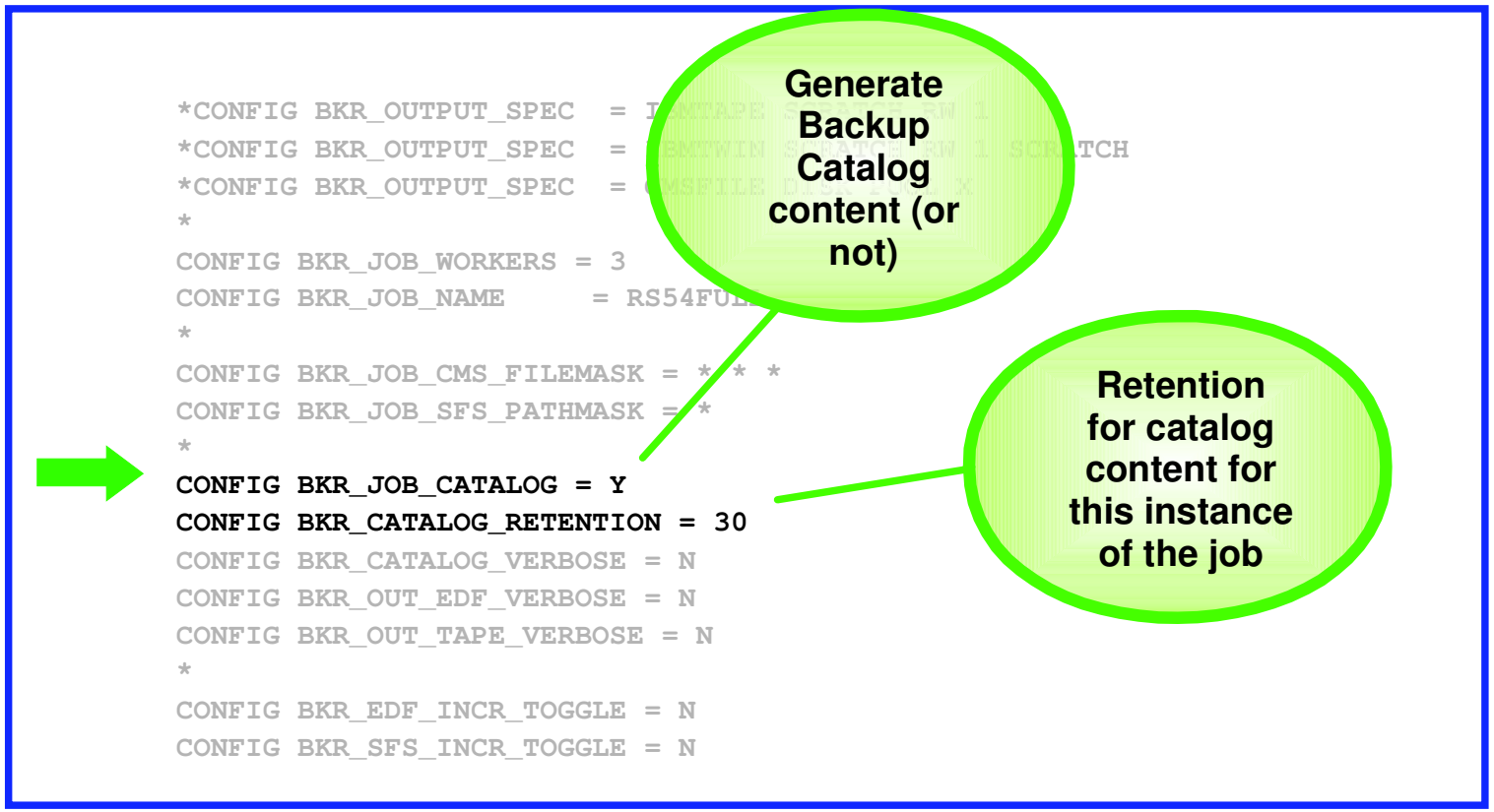
Job Template

```
*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_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
```

Files to backup after INCLUDE and EXCLUDE

SFS directory paths to backup after INCLUDE and EXCLUDE

Job Template



Job Template

```
*CONFIG BKR_OUTPUT_SPEC  = IBMTAPE SCRATCH RW 1
*CONFIG BKR_OUTPUT_SPEC  = IBMTWIN SCRATCH RW 1
*CONFIG BKR_OUTPUT_SPEC  = CMSFILE DISK POOL W
*
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_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
```

Include diagnostic details

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_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
```

Incremental or full backup

... 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)

Archive Manager for z/VM

- Efficiency
- Productivity
- Control

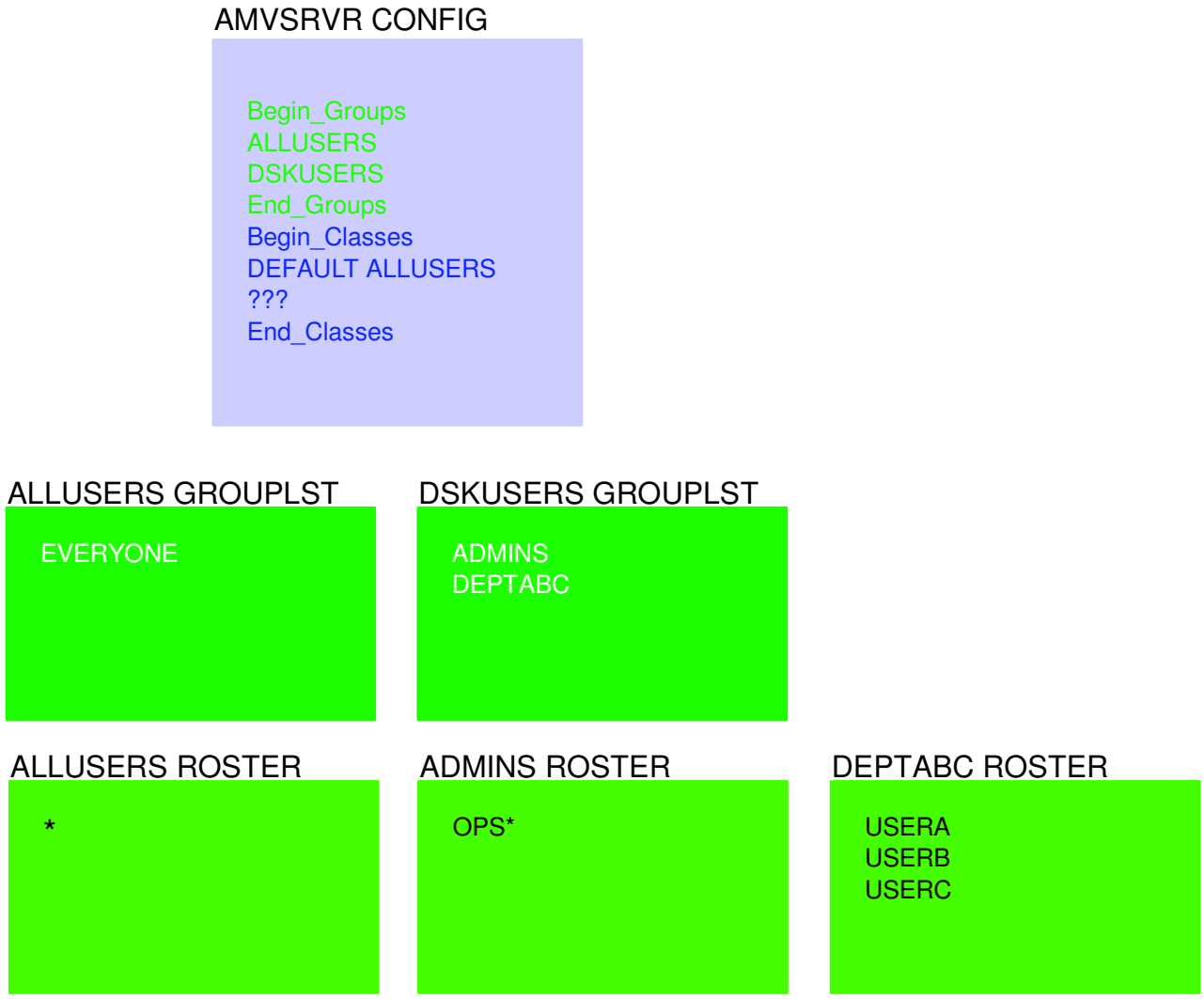
Key Features

- Based on design of Backup and Restore Manager
  - Modular data handlers and media drivers
  - Catalog housed as a hierarchical structure in SFS
  - Standard CMS interfaces
  - Recalls with original date
  - Expiration processing
- Asynchronous user interface
  - Immediate (synchronous) notification if no files found to archive
  - User warned not to modify files until archive complete
  - User notified when archive or recall is complete
- Concurrent processing available when tapes are involved
  - Multiple service machines available
  - 1 job assigned to 1 service machine
  - Assigned by master server
- Automatic aging and pruning of the archive catalog and data
  - Tape consolidation available to remove gaps created by expired archives

Access Control

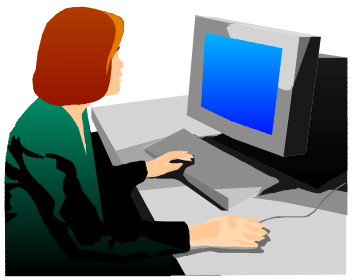
- Administrators
  - Submit archive and recall requests for any data
  - Archive and recall from anywhere to anywhere
  - Manipulate contents of archive catalog
  - Receive all service machine consoles
  - Full screen interface for navigating the catalog and requesting recalls
- Users
  - Archive and recall files they own
  - Archive to any authorized storage class
  - Full screen interface to find files available for recall
- Groups
  - Can recall files authorized to any storage group to which they are a member

Storage Groups and Storage Classes



Archive Manager - Architecture

➡ Communication via SMSG/IUCV



z/VM

Master Archive Server (AMVARKIV)

- ✓ Job submission
- ✓ Client interaction
- ✓ Manage catalog
- ✓ Copy data to staging
- ✓ Move data to target disk
- ✓ Assign tape work to worker server

Worker Task Server (AMVWRKnn)

- ✓ 1 or more server instances
- ✓ Moves data from staging to tape for archive
- ✓ Moves data from tape to target for recall
- ✓ Passes state information to AMVARKIV

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)
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* buffer allocated, GETMDSK can process 17,746 minidisk definitions.
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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
```

Operations Manager for z/VM

- Monitoring
- Scheduling
- Task automation

Monitor Service Machines

- Capture console messages
  - Must SECUSER to Operations Manager GOMMAIN server
  - Dataspaces used to hold the log of captured messages
- Define rules to
  - Scan console messages for text matching
    - Includes wildcard support
  - Take actions based on matches
- Multiple rules can apply to one message
  - FINAL option available to indicate no additional rules should be evaluated
- Predefined actions
  - Suppress messages from the GOMMAIN console
    - Always sent to the log
  - Highlight messages with color, blinking, etc.
- Customer defined actions
  - CP or CMS command, or EXEC to be executed

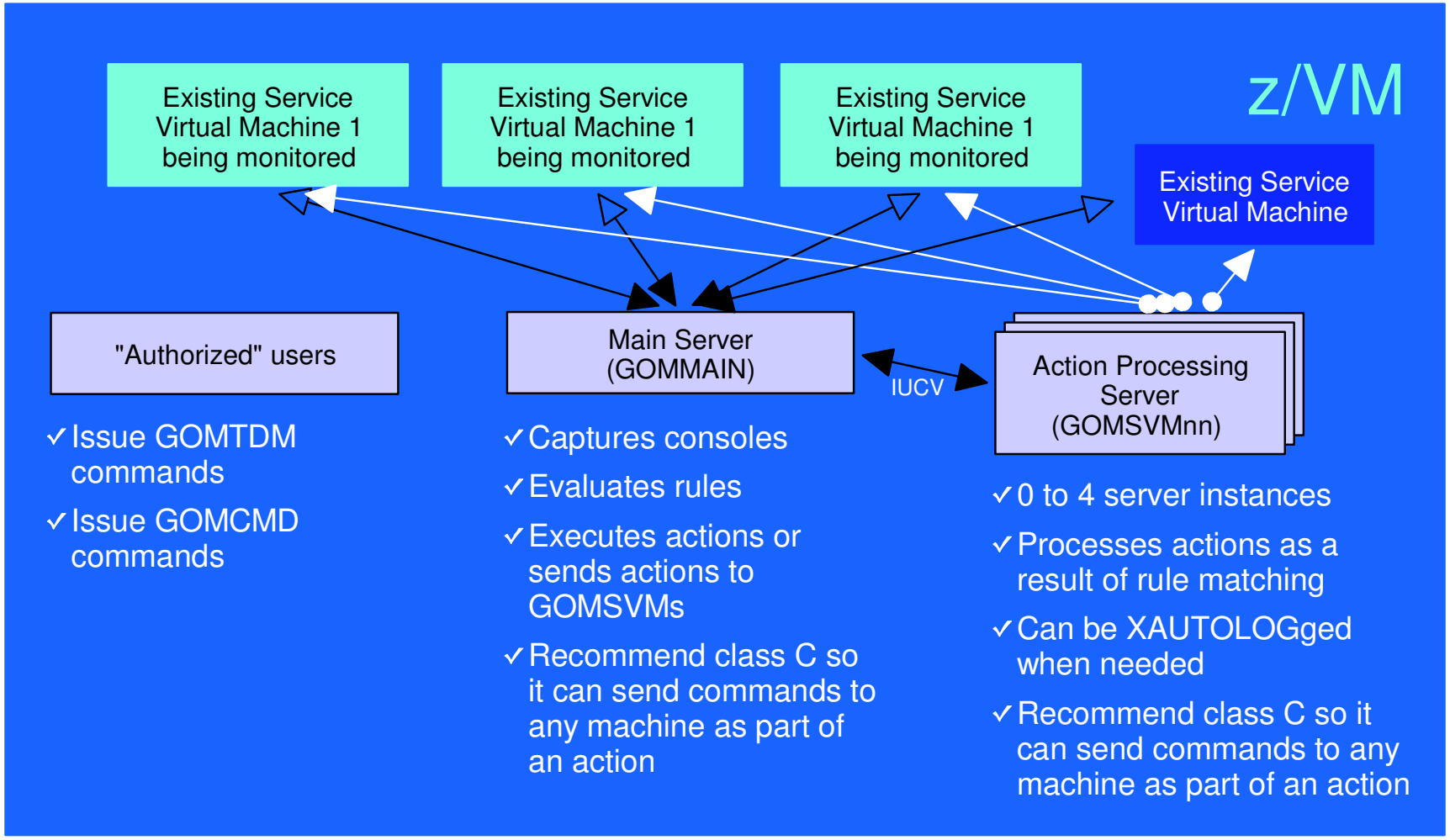
Schedule Events and Actions

- Define timers to occur
  - Hourly at a specified number of minutes past the hour
  - Daily at a specified time
  - Weekly on a specified day of the week and at a specified time
  - Monthly on a specified day of the month and at a specified time
  - Yearly on a specified month and day and at a specified time
  - Once on specified month, day, year, and time
- Time based on local time of system
  - Same as Query TIME
  - Picks up dynamic time zone changes
- Specify the action associated with the timer
  - Actions specified the same as those for console rules
- Only future timers are activated on start-up
  - Won't execute a timer scheduled for earlier today
    - Will execute it at its next occurrence

Automate Multi-step Tasks

- Using Terminal Device Management (TDM)
  - Create scripts (REXX EXECs) to logon to a user and perform specific actions
  - EXEC contains special calls to Operations Manager GOMTDM functions
    - OPTION: set up the environment for this session
      - Suppressing or displaying messages
      - Imbedded delays after input or output displayed on console
      - Maximum wait for console response to a GOMTDM query
      - Stacking returned values LIFO vs FIFO
      - Coded character set to use
      - Put all console output to a file or not
      - Wait for keyboard input lock to clear or not
    - INIT: start a new session at this z/VM system's logon screen and return session id (handle)
    - INPUT: enter data from session command line by specifying:
      - Handle
      - Data to enter
      - Return cursor position or not
      - Key to simulate (Enter, Clear, PA1-PA3, PF1-PF24, Forward tab, Backward tab, Up, Down, Left, Right, Newline, Home, EraseEOF)
    - QUERY: get information about the session
      - Cursor position
      - Position of next occurrence of a specified string on the screen, based on cursor position
      - Put copy of the screen in a specified file
      - Version of Operations Manager code running
    - TERM: end a session specified by a handle

Operations Manager - Architecture



Monitoring GOMMAIN using the GOMCMD command

- Issued by users with access to the command
- Executes an Operations Manager command on GOMMAIN
  - User must have authorization to issue the command on GOMMAIN
  - Includes any valid Operations Manager control or configuration command
- Passes output back to user console in "fullscreen mode"
  - Scrolling up and down
  - Autoscrolling (on or off) as new output is displayed on the console
  - Can issue valid Operations Manager commands from fullscreen command line
- Typically used to view a log or query status

Access Control

- Users defined with access to one or more:
  - Control commands
    - Manage the Operations Manager infrastructure
    - Define additional service machines to do monitoring
    - Authorize users
    - Display status
  - Configuration commands
    - Define rules
    - Define timers
    - Define actions
  - Consoles
    - Define machines/consoles to monitor
- Additional access based on access to modules
  - GOMCMD: issue commands on GOMMAIN and return output
  - GOMTDM: terminal device management

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
  - Improved user management of disk space with archive functions
  - Automated operations
- April 29, 2005
  - GAed Tape Manager for z/VM V1.1
  - GAed Backup and Restore Manager for z/VM V1.1
- August 26, 2005
  - GA Archive Manager for z/VM V1.1
  - GA Operations Manager for z/VM V1.1
- Gathering and prioritizing additional customer requirements
- Web site:
  - http://www.ibm.com/software/stormgmt/zvm/