



**VELOCITY**  
**S O F T W A R E**

# ***Customization and Use of z/VM Dirmaint and SMAPI***

***Session 15728***



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- What is Dirmaint?
- Dirmaint Advantages
- Finishing the Install
- Set Up Configuration Files
- Command Entry
- Integration with RACF
- Programming Dirmaint
- Common Tasks

# What is Dirmaint?

- Pre-installed, priced, optional feature of z/VM
- CMS application that manages the directory
- Provides multiple interfaces
  - Primarily a command interface
  - Full screen – field entry
  - Program driven
    - REXX
    - SMAPI

# *Dirmaint Advantages*

- Installed and Maintained with z/VM
  - RSU service delivered and installed with service stream
- Most commands to maintain the directory mimic regular directory statements
- Completing the install is simple and well documented
- Automated disk allocation eliminates costly mistakes
  - Not using a current diskmap +
  - Allocating a minidisk = potential disaster

# Finishing Dirmaint install

- A few steps remaining before full use
- Chapter 4 in “z/VM: Getting Started With Linux on System z”
  - Enable Dirmaint
  - Change service machine passwords
  - Create/Modify configuration files \*
  - Import current user directory
  - Put Dirmaint into production
  - Start Dirmaint

# Set up Configuration Files

- Three types of primary configuration files
- **CONFIGxx DATADVH**
  - Configuration control keyword parameters
- **AUTHFOR CONTROL**
  - User command authorization
- **EXTENT CONTROL**
  - Minidisk allocation/boundaries

# Set up Configuration Files

- **CONFIGxx DATADVH**
  - Dirmaint configuration override file(s)
  - xx=one or two EBCDIC characters
  - Processed in reverse EBCDIC sequence
    - Numbers before letters, 99-0 (zero-blank), Z9-AA
    - Standard CMS filemode search used across minidisks
  - CONFIG DATADVH is processed last
    - The default list of all keyword values
    - Should not ever be modified, always use an override
  - Contains keyword values controlling the function of Dirmaint

# Set up Configuration Files

- **AUTHFOR CONTROL**
  - Contains a list of IDs that can issue Dirmaint commands for other IDs and the privileges available to them
    - EG: USERA can issue commands against the directory of USERB
  - Resides as a file under Dirmaint's control
  - Maintained by AUTHFOR and DROPFOR commands

```
*TARGETI  ORIGUSER  ORIGNODE  CMDL  CMDSETS
ALL       MAINT     *         140A  ADGHMOPS
ALL       MAINT     *         150A  ADGHMOPS
```



# Set up Configuration Files

- AUTHFOR CONTROL
  - Adding/Removing user authorizations
  - Via command
    - Dirmaint AUTHFOR and DROPFOR
- Editing the file
  - Get a copy from Dirmaint
  - Use XEDIT to modify the file
  - Send it back to Dirmaint
  - Load the new version of the file into memory
- “Directory Maintenance Facility Tailoring and Administration Guide”, Chapter 8
  - “Delegating Administrative Authority”

# Set up Configuration Files

- EXTENT CONTROL
  - Controls minidisk allocations
  - Divided into a number of sections
    - REGIONS
    - GROUPS
    - EXCLUDE
    - AUTOBLOCK
    - DEFAULTS

# Set up Configuration Files

- EXTENT CONTROL

- **REGIONS**

- Defines an area on a disk device that is used for minidisk allocation
    - Can be one or more parts of a volume
    - Typically a full volume

```
:REGIONS.
```

*RegionId	VolSer	RegStart	RegEnd	Dev-Type	Comments
VM5RES	VM5RES	0	END	3390-03	
VM5W01	VM5W01	0	END	3390-03	
VM5W02	VM5W02	0	END	3390-03	
VM5WK1	VM5WK1	0	END	3390-03	
VM5WK2	VM5WK2	0	END	3390-03	

```
:END.
```

# Set up Configuration Files

- EXTENT CONTROL

- **GROUPS**

- Collection of one or more regions
    - Forms a pool of disk space from which to allocate
    - Allocations can be first to last or rotating

```
:GROUPS.  
  *GroupName RegionList  
  VMSYSTEM   (ALLOCATE ROTATING)  
  VMSYSTEM   VM5RES VM5W01 VM5W02  
  LNXDSK1    (ALLOCATE ROTATING)  
  LNXDSK1    VM5WK1 VM5WK2  
:END.
```

# Set up Configuration Files

- **EXTENT CONTROL**
  - **EXCLUDE** – Defines which minidisks are excluded from extent checking
  - **AUTOBLOCK** – Specifies device architecture values for each type of DASD
    - Taken from AUTOBLK DATADVH
  - **DEFAULTS** – Device capacity table
    - Taken from DEFAULTS DATADVH

# Set up Configuration Files

## • EXTENT CONTROL

```
:EXCLUDE.  
* USERID ADDRESS  
MAINT 012*  
SYSDUMP1 012*  
:END.  
:AUTOBLOCK.  
  * IBM supplied defaults are contained in the  
  * The following are customer overrides and s  
  *  
  *DASDType BlockSize Blocks/Unit Alloc_Unit Ar  
:END.  
:DEFAULTS.  
  * IBM supplied defaults are contained in the  
  * The following are customer overrides and su  
  *  
  *DASDType Max-Size  
:END.
```

```
:AUTOBLOCK.  
  *DASDType BlockSize Blocks/Unit Alloc_Unit Architecture  
    3390          512          735           1          CKD  
    3390          1024         495           1          CKD  
    3390          2048         315           1          CKD  
    3390          4096         180           1          CKD
```

```
:DEFAULTS.  
    3390-01          1113  
    3390-02          2226  
    3390-03          3339  
    3390-09         10017  
    3390-084         1084  
    3390-151         2226  
    3390-153         4365  
    3390-455          455  
    3390-568         1568  
    3390-32K        32760  
    3390-64K        65520  
    3390            1113
```

- Import USER DIRECT
  - Copy directory from MAINT
- Put into production
- Bring up Dirmaint
  - DVHBEGIN
- Disconnect from Dirmaint
- Logon to MAINT

# Cluster operations

- Single source directory
  - Managed by DIRMAINT on one member
- Each member has it's own object directory
  - Directory changes signaled from DIRMAINT to DIRMSAT
  - DIRMSAT runs on other cluster members
  - Directory management commands on satellite members are routed to DIRMAINT
- DASD allocation changes
  - Handled by DATAMOVE virtual machines
  - Each member can have one or more allocated to them



# Cluster operations

- IDENTITY and SUBCONFIG(s) are maintained separately
- Adding an IDENTITY

```
dirm add zmap
```

```
IDENTITY ZMAP VELOCITY 32M 64M G  
INCLUDE VSIPROF  
IPL CMS  
XAUTOLOG ZSERVE  
LINK ZWRITE 0191 0100 RR
```

# Cluster operations

- The SUBCONFIG(s) are in different files
- Adding a SUBCONFIG

```
dirm add zmap-1 build on vsivm5 in zmap
```

```
SUBCONFIG ZMAP-1
```

```
MDISK 0191 3390 1142 100 VM5W02 MR
```

```
MDISK 0192 3390 1242 300 VM5W02 MR
```

# Cluster operations

- Dirmaint diskmap

-----									
VM5W01	3390	\$ALLOC\$	0A03	0	0	1	Overlap		
		MAINT	0124	0	10016	10017		MAINT-1	VSIVM5
-----									
VM5W02	3390	\$ALLOC\$	0A04	0	0	1			
		SFSVM5	0191	1	60	60			
		SFSVM5	0301	61	80	20			
		SFSVM5	0302	81	90	10			
		SFSVM5	0303	91	100	10			
		SFSVM5	0304	101	110	10			
		SFSVM5	0305	111	1110	1000			
		VSIMMAINT	0191	1111	1140	30		VSIM-1	VSIVM5
		ZVSE43	0191	1141	1141	1			
				1142	1541	400	Gap		
		ZWRITE	0191	1542	1939	398		ZWRITE-1	VSIVM5

# *Dirmaint Command Entry*

- Commands invoked using the DIRM EXEC
- First parameters can be a modifier
  - TOsys | TOnode - route command to another VM network node
  - ASuser - when used with TO, issue command AS this user
  - BYuser - issue command with auth of this user (like LOGONBY)
  - FORuser - command affects named user (most common)
  - ATsys | ATnode - route command to a node in a multi-system cluster
  - If no modifier is used, command is invoked for the current user at \*
- Remainder is a Dirmaint command

# Dirmaint Command Entry

- Dirmaint commands are similar to most directory equivalents

*DVHAMENG	CHVaddr	DLink	IOPriori	NOTAPE	Qry	SHUTDOWN
*DVHUCENG	CLAss	DMDisk	IPL	OFFline	QUery	SPECIAL
*UDVH	CLEANUP	DROPBy	IUCV	ONline	REPlace	SPOOL
?	CLONEDisk	DROPFor	Link	OPTion	REView	STAG
:ADVH	CMDisk	DROPScif	LOADDEV	PAValias	RLDCode	STATUS
:HELP	CMS	DSECuser	LOCK	POOL	RLDData	STDEVopt
ACCount	COMMAND	DUMP	LOGmsg	POSIXFSRo	RLDExtn	Storage
ACIgroup	CONsole	D8ONECMD	LOGONBY	POSIXGLIs	RMDisk	SUBscribe
ACNTAdd	CP	ELink	MACHine	POSIXGROu	SATellite	SUPGLIST
ACNTDel	CPU	ENable	MAIL	POSIXINFo	SCAN	SYSaffin
Add	CRYpto	EXECDrop	MAXSPool	POSIXIUPg	SCReen	Term
AMDisk	DASDOPT	EXECLoad	MAXstorag	POSIXIWDi	SECuser	TESTpw
APPCpass	DATAmove	EXTNchk	MAXstore	POSIXOPT	SEND	TMDisk
AUTHBy	DATEForma	FILE	MDAUDit	PRIORity	SETAcnt	UNLock
AUTHFor	DEDicate	FREEExt	MDisk	PRIOset	SETClass	USEDext
AUTHLink	DEFAULTs	Get	MDPW	PRIVclass	SETCPU	USER
AUTHScif	DEFINESTa	GETCONsol	MINIOPT	PURGE	SETMach	USERMAP
AUTOlog	DIRECT	GLOBALOpt	MMDisk	PW	SETOptn	USEROPTn
BACKUP	DIRECTORY	GLObalv	NAMEsave	PW?	SETPriori	WORKUNIT
BATch	DIREDIT	HELP	NEEDPASS	PWGen	SETpw	XAUTolog
CHECK	DIRMAP	HISTory	NEWS	PWMON	SETSTAG	XCONfig
CHKsum	DISABle	INClude	NICDEF	QLog	SHARE	XSTORE
CHngid	DISTrib	INVen	NOPdata			

# *Dirmaint Command Entry*

- All directory entries now managed by Dirmaint
  - Commands must be used to perform directory maintenance
  - Changes are put online immediately
  - Individual directory entries can be modified
    - GET/REPLACE
  - Wildcards can be used to affect matching virtual machines
    - MULTIUSER prefix option, MULTIUSER\_VERIFICATION\_EXIT
  - Changes can be batched
    - Multiple commands in a file, invoked with one execution

# Dirmaint Command Entry

- Command verification

```
dirm for sysadmin get nolock
```

```
DVHXMT1181R Enter the current logon password of SYSADMIN at RKS2LV for  
DVHXMT1181R authentication. It will not be displayed on the  
DVHXMT1181R terminal. To exit without processing the command, just  
DVHXMT1181R press ENTER.
```

```
DVHXMT1191I Your GET request has been sent for processing.
```

- If the user is not authorized to use Dirmaint

```
DVHREQ2283E Userid SYSADMIN at RKS2LV is not authorized to issue the GET  
DVHREQ2283E command for SYSADMIN at *.
```

# Dirmaint Command Entry

- Password required for each Dirmaint command entered

```
dirm needpass no
```

```
DVHXMT1181R Enter the current logon password of SYSADMIN at RKS2LV for  
DVHXMT1181R authentication. It will not be displayed on the  
DVHXMT1181R terminal. To exit without processing the command, just  
DVHXMT1181R press ENTER.
```

```
DVHXMT1191I Your NEEDPASS request has been sent for processing.
```

```
Ready; T=0.04/0.05 13:08:57
```

```
DVHREQ2288I Your USEROPTN request for SYSADMIN at * has been accepted.
```

```
DVHBIU3450I The source for directory entry SYSADMIN has been updated.
```

```
DVHBIU3456I Object directory update is not required for this source
```

```
DVHBIU3456I update.
```

```
DVHREQ2289I Your USEROPTN request for SYSADMIN at * has completed;
```

```
DVHREQ2289I with RC = 0.
```

- Dirmaint commands now execute without intervention



# Dirmaint Command Entry

- Commands typically return data in the RDR

```
dirm for sysmaint get nolock

DVHXMT1191I Your GET request has been sent for processing.
Ready; T=0.03/0.03 13:06:51
  DVHREQ2288I Your GET request for SYSMaint at * has been accepted.
  DVHGET3305I Entry SYSMaint sent, no lock attempt was made.
RDR FILE 0002 SENT FROM DIRMAINT PUN WAS 0354 RECS 0016 CPY 001 A NOHOLD NOKEEP
  DVHREQ2289I Your GET request for SYSMaint at * has completed; with RC
  DVHREQ2289I = 0.
```

- Use PEEK/RECEIVE to look at the directory

# Dirmaint Command Entry

- Commands typically return data in the RDR

```
dirm for sysmaint
```

```
DVHXMT1191I Your C
```

```
Ready; T=0.03/0.0
```

```
DVHREQ2288I Your
```

```
DVHGET3305I Entry
```

```
RDR FILE 0002 SEN
```

```
DVHREQ2289I Your
```

```
DVHREQ2289I = 0.
```

```
0002      PEEK      A0  V 80  Trunc=80 Size=12 Line=0 Col=1 Alt=0  
File SYSMOINT DIRECT from DIRMAINT at RKS2LV Format is NETDATA.
```

```
* * * Top of File * * *
```

```
USER SYSMOINT SYSMOINT 32M 32M ABCDEFG
```

```
INCLUDE IBMDFLT
```

```
AUTOLOG AUTOLOG1 OP1 MAINT
```

```
ACCOUNT 1 SYSPROG
```

```
MACH ESA
```

```
IPL 190
```

```
LINK MAINT 123 123 RR
```

```
LINK MAINT 191 192 RR
```

```
*
```

```
*****
```

```
*
```

```
*DVHOPT LNK0 LOG1 RCM1 SMS0 NPW1 LNGAMENG PWC20110223 CRCç"
```

```
* * * End of File * * *
```

```
1= Help
```

```
2= Add line
```

```
3= Quit
```

```
4= Tab
```

```
5= Clocate
```

```
6= ?/Change
```

```
7= Backward
```

```
8= Forward
```

```
9= Receive
```

```
10= Rgtright
```

```
11= Spljoin
```

```
12= Cursor
```

```
====>
```

```
X E D I T 1 File
```

# Dirmaint Command Entry

- Another way to see a directory entry

```
dirm for sysmaint review
DVHXMT1191I Your REVIEW request has been sent for processing.
Ready; T=0.02/0.03 14:18:18
  DVHREQ2288I Your REVIEW request for SYSMaint at * has been accepted.
RDR FILE 0004 SENT FROM DIRMAINT PUN WAS 0356 RECS 0034 CPY 001 A NOHOLD NOKEEP
  DVHREQ2289I Your REVIEW request for SYSMaint at * has completed; with RC
  DVHREQ2289I = 0.
```

- PEEK the RDR file

# Dirmaint Command Entry

- Another way

```
dirm for sysmaint review  
DVHXMT1191I Your REVIEW  
Ready; T=0.02/0.03 14:1  
DVHREQ2288I Your REVIEW  
RDR FILE 0004 SENT FROM  
DVHREQ2289I Your REVIEW  
DVHREQ2289I = 0.
```

- PEEK the RDR

```
USER SYSMANT XXXXXXXX 32M 32M ABCDEFG  
DVHRXV3355I The following records are included from profile: IBMDFLT  
PROFILE IBMDFLT  
SPOOL 000C 2540 READER *  
SPOOL 000D 2540 PUNCH A  
SPOOL 000E 1403 A  
CONSOLE 009 3215 T  
LINK MAINT 0190 0190 RR  
LINK MAINT 019D 019D RR  
LINK MAINT 019E 019E RR  
LINK MAINT 0402 0402 RR  
LINK MAINT 0401 0401 RR  
LINK MAINT 0405 0405 RR  
*  
*****  
*DVHOPT LNK0 LOG1 RCM1 SMS0 NPW1 LNGAMENG PWC20110223 CRCe¼  
DVHRXV3355I The preceding records are included from profile: IBMDFLT  
AUTOLOG AUTOLOG1 OP1 MAINT  
ACCOUNT 1 SYSPROG  
MACH ESA  
IPL 190  
LINK MAINT 123 123 MR  
LINK MAINT 191 192 RR  
*  
*****  
*  
*DVHOPT LNK0 LOG1 RCM1 SMS0 NPW1 LNGAMENG PWC20110223 CRCç"  
DVHREV3356I The following are your user option settings:  
DVHREV3356I Links DISABLED Logging ON RcvMsg ON Smsg OFF NeedPW ON  
DVHREV3356I Lang AMENG
```

# Integration with RACF

- Dirmaint can call RACF for the following functions
  - User add or change
  - Password or passphrase change
  - LOGONBY change
  - POSIX parameter change
  - Minidisk commands (AMDISK, DMDISK, etc)
- All are optional
- Controlled by CONFIGRC SAMPDVH
  - Which must be copied to Dirmaint
  - Renamed CONFIGRC DATADVH

# Integration with RACF

- CONFIGRC SAMPDVH

```
USE_RACF= YES|NO ALL|exit_name
PASSWORD_CHANGE_NOTIFICATION_EXIT= DVHXPXN EXEC
POSIX_CHANGE_NOTIFICATION_EXIT= DVHXPESM EXEC
LOGONBY_CHANGE_NOTIFICATION_EXIT= DVHXLB EXEC
USER_CHANGE_NOTIFICATION_EXIT= DVHXUN EXEC
DASD_OWNERSHIP_NOTIFICATION_EXIT= DVHXDN EXEC
RACF_ADDUSER_DEFAULTS= UACC(NONE)
RACF_RDEFINE_VMMDISK_DEFAULTS= UACC(NONE) AUDIT(FAILURES(READ))
RACF_DISK_OWNER_ACCESS= ACC(ALTER)
RACF_RDEFINE_VMPOIX_POSIXOPT.QUERYDB= UACC(READ)
RACF_RDEFINE_VMPOIX_POSIXOPT.SETIDS= UACC(NONE)
RACF_RDEFINE_SURROGAT_DEFAULTS= UACC(NONE) AUDIT(FAILURES(READ))
RACF_RDEFINE_VMBATCH_DEFAULTS= UACC(NONE) AUDIT(FAILURES(READ))
RACF_RDEFINE_VMRDR_DEFAULTS= UACC(NONE) AUDIT(FAILURES(READ))
RACF_VMBATCH_DEFAULT_MACHINES= BATCH1 BATCH2
TREAT_RAC_RC.4= 0 | 4 | 30
ESM_PASSWORD_AUTHENTICATION_EXIT= DVHXPA EXEC
```

# Integration with RACF

- Start with RACF Program Directory
  - Chapter 5, Step 13
    - “Set Up the DirMaint-RACF Connector if DirMaint is Installed (Optional)”
- CONFIGRC DATADVH values are explained
  - Chapter 3, Step 5
  - Dirmaint Tailoring and Administration Guide
- Additional steps
  - Appendix A
  - Dirmaint Tailoring and Administration Guide

# Programming with Dirmaint

- Two primary ways to interface with Dirmaint
  - REXX
    - SMAPI
- Systems Management Application Programming Interface (SMAPI)
  - A method for internal or external programs to invoke Dirmaint functions
  - Uses an IP connection to send function requests
- Configuration
  - Appendix B
  - “Dirmaint Tailoring and Administration Guide”
- Programming and more
  - “z/VM Systems Management Application Programming”
- SMAPI allows internal and external programs to drive Dirmaint and z/VM functions
  - Extensively used by zPro
  - Providing a web based front end to Dirmaint, RACF and z/VM



# *A Few Common Dirmaint Tasks*

- Changing Storage
- Adding/Removing a LINK
- Creating a disk map
- Adding a Minidisk
- Adding Logonby entries
- Changing users password

# Changing Storage

- The STORAGE command can be used to query or change a STORAGE value on the USER statement

## **dirm for sysadmin storage ?**

```
DVHXMT1191I Your STORAGE request has been sent for processing.
```

```
Ready; T=0.02/0.03 20:06:57
```

```
DVHREQ2288I Your STORAGE request for SYSADMIN at * has been accepted.
```

```
DVHSTO3207I SYSADMIN currently has a maxstorage value of 16M and a
```

```
DVHSTO3207I default storage value of 16M.
```

```
DVHREQ2289I Your STORAGE request for SYSADMIN at * has completed; with
```

```
DVHREQ2289I RC = 0.
```

## **dirm for sysadmin storage 24m**

```
DVHXMT1191I Your STORAGE request has been sent for processing.
```

```
Ready; T=0.02/0.03 20:11:07
```

```
DVHREQ2288I Your STORAGE request for SYSADMIN at * has been accepted.
```

```
DVHSTO3213E Your current maximum storage size is 16M, your requested
```

```
DVHSTO3213E amount was 24M. Your request can not be satisfied.
```

```
DVHREQ2289E Your STORAGE request for SYSADMIN at * has failed; with RC =
```

```
DVHREQ2289E 3213.
```

- Must change the MAXSTORE value before the STORAGE value

```
dirm for sysadmin maxstor 24m
```

```
DVHXMT1191I Your MAXSTORE request has been sent for processing.
```

```
Ready; T=0.02/0.03 20:18:01
```

```
DVHREQ2288I Your MAXSTORE request for SYSADMIN at * has been accepted.
```

```
DVHBIU3450I The source for directory entry SYSADMIN has been updated.
```

```
DVHBIU3423I The next ONLINE will take place via Diagnose 84.
```

```
DVHBIU3428I Changes made to directory entry SYSADMIN have been placed
```

```
DVHBIU3428I online.
```

```
DVHREQ2289I Your MAXSTORE request for SYSADMIN at * has completed;
```

```
DVHREQ2289I with RC = 0.
```

```
dirm for sysadmin storage 24m
```

```
DVHXMT1191I Your STORAGE request has been sent for processing.
```

```
Ready; T=0.02/0.03 20:20:41
```

```
DVHREQ2288I Your STORAGE request for SYSADMIN at * has been accepted.
```

```
DVHBIU3450I The source for directory entry SYSADMIN has been updated.
```

```
DVHBIU3423I The next ONLINE will take place via Diagnose 84.
```

```
DVHBIU3428I Changes made to directory entry SYSADMIN have been placed
```

```
DVHBIU3428I online.
```

```
DVHREQ2289I Your STORAGE request for SYSADMIN at * has completed; with
```

```
DVHREQ2289I RC = 0.
```

# Changing Storage

- Check the change with the STORAGE and GET commands

```
dirm for sysadmin storage ?
```

```
DVHXMT1191I Your STORAGE request has been sent for processing.
```

```
Ready; T=0.02/0.03 20:27:43
```

```
DVHREQ2288I Your STORAGE request for SYSADMIN at * has been accepted.
```

```
DVHSTO3207I SYSADMIN currently has a maxstorage value of 24M and a
```

```
DVHSTO3207I default storage value of 24M.
```

```
DVHREQ2289I Your STORAGE request for SYSADMIN at * has completed; with
```

```
DVHREQ2289I RC = 0.
```

```
dirm for sysadmin get noload
```

```
USER SYSADMIN SYSADMIN 24M 24M G
```

```
ACCOUNT SYSTEMS
```

```
IPL CMS
```

```
MACH ESA
```

```
CONSOLE 0009 3215
```

```
SPOOL 000C 2540 READER *
```

# Add/Remove a LINK

- Specify the LINK command exactly as it is in the directory when adding a LINK

```
dirm for sysadmin link maint 193 193 rr
```

```
DVHXMT1191I Your LINK request has been sent for processing.
```

```
Ready; T=0.02/0.03 20:48:58
```

```
DVHREQ2288I Your LINK request for SYSADMIN at * has been accepted.
```

```
DVHBIU3450I The source for directory entry SYSADMIN has been updated.
```

```
DVHBIU3424I The next ONLINE will take place immediately.
```

```
DVHBIU3428I Changes made to directory entry SYSADMIN have been placed
```

```
DVHBIU3428I online.
```

```
DVHREQ2289I Your LINK request for SYSADMIN at * has completed; with RC =
```

```
DVHREQ2289I 0.
```

# Add/Remove a LINK

- Specify the LINK command exactly as it is in the directory when adding a LINK

```
dirm for sysadmin link maint 193 193 rr
```

```
DVHXMT1191I Your LINK  
Ready; T=0.02/0.03 20  
DVHREQ2288I Your LINK  
DVHBIU3450I The sour  
DVHBIU3424I The next  
DVHBIU3428I Changes  
DVHBIU3428I online.  
DVHREQ2289I Your LINK  
DVHREQ2289I 0.
```

```
USER SYSADMIN SYSADMIN 24M 24M G
```

```
ACCOUNT SYSTEMS
```

```
IPL CMS
```

```
MACH ESA
```

```
CONSOLE 0009 3215
```

```
SPOOL 000C 2540 READER *
```

```
SPOOL 000D 2540 PUNCH A
```

```
SPOOL 000E 1403 A
```

```
LINK MAINT 0190 0190 RR * CMS SYSTEM DISK
```

```
LINK MAINT 019E 019E RR * PRODUCT CODE DISK
```

```
LINK 5VMRAC40 029E 029E RR
```

```
LINK 5VMRAC40 0505 0505 RR
```

```
LINK 5VMRAC40 0191 0192 RR
```

```
LINK RACFVM 0305 0305 RR
```

```
LINK MAINT 0193 0193 RR
```

```
MDISK 0191 3390 2149 001 VM5RES MR READ WRITE MULTIPLE
```

# Add/Remove a LINK

- No 'Change LINK' command
- Any change to the LINK requires it to be deleted and re-added
- Specify DELETE for the link mode to remove the link

```
dirm for sysadmin link maint 193 193 delete
DVHXMT1191I Your LINK request has been sent for processing.
Ready; T=0.02/0.03 21:31:34
  DVHREQ2288I Your LINK request for SYSADMIN at * has been accepted.
  DVHBIU3450I The source for directory entry SYSADMIN has been updated.
  DVHBIU3424I The next ONLINE will take place immediately.
  DVHBIU3428I Changes made to directory entry SYSADMIN have been placed
  DVHBIU3428I online.
  DVHREQ2289I Your LINK request for SYSADMIN at * has completed; with RC =
  DVHREQ2289I 0.
```

# Creating a Disk Map

- **Traditionally used as a way to find available space**
  - With the DISKMAP EXEC
- **Dirmaint provides a set of commands to produce information related to disk usage**
  - DIRM DIRMAP
  - DIRM FREEEXT
  - DIRM USEDEXT



# Creating a Disk Map

- **DIRM DIRMAP**
  - By itself returns a RDR file that contains a map of each minidisk allocated on each volume on the system
  - Additional options
    - link map
    - gap file
    - eliminate excluded extents
    - sorting by device type

# Creating a Disk Map

- DI

```
0-----
VM5WK1  3390 $ALLOC$  0A04 *           0           0           1
                1           165          165 Gap
                SFSZVPS  0191 *          166          205           40
                SFSZVPS  0307 *          206          210            5
                SFSZVPS  0302 *          211          225           15
                SFSZVPS  0301 *          226          235           10
                SFSZVPS  0303 *          236          250           15
                SFSZVPS  0304 *          251          255            5
                256          499          244 Gap
                RSSERV1  0191 *          500          569            70
                RSSERV1  0302 *          570          584            15
                RSSERV1  0301 *          585          644            60
                RSSERV1  0303 *          645          659            15
                RSSERV1  0304 *          660          709            50
                RSSERV1  0305 *          710         1709          1000
                MAINT    0500 *         1710         2509            800
                ZPRO     0391 *         2510         2514             5
                SFSZVPS  0305 *         2515         3014            500
                3015         3338          324 Gap
                $END$    0A04 *         3339         3339            1
0-----
VM5WK2  3390 $ALLOC$  0A05 *           0           0           1
                RSSERV1  0306 *           1          1000          1000
                SFSZVPS  0306 *          1001         1500            500
                1501         3338          1838 Gap
                $END$    0A05 *         3339         3339            1
```

# Adding a Minidisk

- **Can still perform manual allocation with Dirmaint**
  - Defeats one of the major benefits
- **Automatic allocation will look for open disk space**
  - Based on volumes/regions defined in EXTENT CONTROL
  - Proper volume sizing is important
- **To add a minidisk with automatic allocation**

```
DIRM FOR SYSADMIN AMDISK 199 X AUTOG 20 VMSYSTEM MR PW RADM WADM MADM
```

# Adding a Minidisk

- Can still perform manual allocation with Dirmaint

```
dirm for sysadmin amdisk 199 x autog 20 vmsystem mr pw radm wadm madm  
DVHXMT1191I Your AMDISK request has been sent for processing.
```

- Ready; T=0.02/0.03 08:06:08

```
DVHREQ2288I Your AMDISK request for SYSADMIN at * has been accepted.  
DVHSCU3541I Work unit 27080609 has been built and queued for processing.  
DVHSHN3541I Processing work unit 27080609 as MAINT from RKS2LV,  
DVHSHN3541I notifying MAINT at RKS2LV, request 200 for SYSADMIN sysaffin  
DVHSHN3541I *; to: AMDISK 0199 XXXX AUTOG 20 VMSYSTEM MR PWS XXXX XXXX
```

- T  
DIRM

```
DVHSHN3541I XXXX  
DVHBIU3450I The source for directory entry SYSADMIN has been updated.  
DVHDRC3428I Changes made to directory entry SYSADMIN have just been  
DVHDRC3428I placed online.  
DVHSHN3430I AMDISK operation for SYSADMIN address 0199 has finished  
DVHSHN3430I (WUCF 27080609).  
DVHREQ2289I Your AMDISK request for SYSADMIN at * has completed; with RC  
DVHREQ2289I = 0.
```

# Adding a Minidisk

- From EXTENT CONTROL

VMSYSTEM (ALLOCATE ROTATING)  
VMSYSTEM VM5RES VM5W01 VM5W02

- Minidisk confirmed with DIRMAP

```
0-----  
VM5PG1  3390 $PAGE$  0A03 *           0      1113      1114  
          .PAGE.  0127 *           1      3338      3338  
0-----  
VM5RES  3390 $ALLOC$  0A01 *           0           0           1 Overlap  
          MAINT    0123 *           0      3338      3339 Overlap  
          SYSDUMP1 0123 *           0      3338      3339 Overlap  
          .DRCT.   0123 *           1           20           20 Overlap  
          $DIRECT$ 0A04 *           1           20           20  
          $SYSCKP$ 0A06 *           21          29            9  
          $SYSWRM$ 0A07 *           30          38            9  
          MAINT    0CF1 *           39          158          120  
          MAINT    0CF2 *           159         278          120  
          .....  
          MAINT    049B *           899        1298          400  
          MAINT    051D *           1299        1324           26  
          SYSADMIN 0199 *           1325       1344         20  
          MAINT    0990 *           1925        1984           60
```

# Adding a Minidisk

- This method has one huge problem
  - Parameter overload!
- An easier way is to start the command:  
**DIRM FOR SYSADMIN AMDISK**

# Adding a Minidisk

- This method
  - Parallel
  - An easier
- DIRM FOR**

```
-----DirMaint AMDISK-----
To add a new minidisk to a user definition, fill in the following:
  Minidisk Address ==> 199      Device Type ==> 3390
Fill in one of the following rows:
  Explicit Start ==>          Size ==>          Volser ==>
  AUTOV          Size ==>          Volser ==>
  VBLK  Blksize ==>          Blocks ==>          Volser ==>
  AUTOG          Size ==> 20      Grpname ==> VMSYSTEM
  GBLK  Blksize ==>          Blocks ==>          Grpname ==>
  AUTOR          Size ==>          Region ==>
  RBLK  Blksize ==>          Blocks ==>          Region ==>
  T-DISK          Size ==>
  TBLK  Blksize ==>          Blocks ==>
  V-DISK          Size ==>
  VDBS  Blksize ==>          Blocks ==>
  DEVNO          Real Device Number ==>
Optionally fill in:
  Link Mode ==> MR
  BLKSIZE  ==>          LABEL ==>
  PWS  Read ==>          Write ==>          Multi ==>          (passwords)

5741-A05 (c) Copyright IBM Corporation 1979, 2008.
  1= Help      2= Prefix Operands      3= Quit      5=Submit      12=Cursor
==>
```

# Adding a Minidisk

- **Regardless of the method chosen**
  - **Directory is updated**
  - **Minidisk can be optionally formatted**



# Adding a Minidisk

- **Regardless of the method chosen**

- **Directory is up**

- **Minidisk can b**

```
USER SYSADMIN SYSADMIN 24M 24M G
ACCOUNT SYSTEMS
IPL CMS
MACH ESA
CONSOLE 0009 3215
SPOOL 000C 2540 READER *
SPOOL 000D 2540 PUNCH A
SPOOL 000E 1403 A
LINK MAINT 0190 0190 RR * CMS SYSTEM DISK
LINK MAINT 019E 019E RR * PRODUCT CODE DISK
LINK 5VMRAC40 029E 029E RR
LINK 5VMRAC40 0505 0505 RR
LINK 5VMRAC40 0191 0192 RR
LINK RACFVM 0305 0305 RR
MDISK 0191 3390 2149 001 VM5RES MR READ WRITE MULTIPLE
*
*****
*
MDISK 0199 3390 1325 20 VM5RES MR RADM WADM MADM
```

# Adding LOGONBY Entries

- **LOGONBY is different than other commands**
  - Values specified are **ADDED** or **DELETED** from the **LOGONBY** statement
  - Use **'?'** to see current **LOGONBY** setting

```
DIRM FOR SYSADMIN LOGONBY ADD USER1
```

```
DIRM FOR SYSADMIN LOGONBY ADD USER2
```

```
USER SYSADMIN SYSADMIN 24M 24M G
ACCOUNT SYSTEMS
IPL CMS
MACH ESA
LOGONBY USER1 USER2
CONSOLE 0009 3215
SPOOL 000C 2540 READER *
```

# Changing User's Password

- **Change another user's logon password**  
`dirm for tcpmaint pw tcpboss`
- **Users can also change their own password**  
`dirm pw tcpboss1`
- **Both take effect immediately**

# Changing User's Password

- **Change another user's logon password**

```
dirm for tcpmaint pw tcpboss
DVHXMT1191I Your PW request has been sent for processing.
Ready; T=0.03/0.03 14:39:33
DVHREQ2288I Your PW request for TCPMAINT at * has been accepted.
DVHBIU3450I The source for directory entry TCPMAINT has been updated.
DVHBIU3423I The next ONLINE will take place via Diagnose 84.
DVHBIU3428I Changes made to directory entry TCPMAINT have been placed
DVHBIU3428I online.
DVHREQ2289I Your PW request for TCPMAINT at * has completed; with RC =
DVHREQ2289I 0.
```

# Changing User's Password

- **Change another user's logon password**

```
dirm pw tcpboss1
```

```
DVHXMT1181R Enter the current logon password of TCPMAINT at RKS2LV for  
DVHXMT1181R authentication. It will not be displayed on the  
DVHXMT1181R terminal. To exit without processing the command, just  
DVHXMT1181R press ENTER.
```

```
DVHXMT1191I Your PW request has been sent for processing.
```

```
Ready; T=0.04/0.04 14:47:15
```

```
DVHREQ2288I Your PW request for TCPMAINT at * has been accepted.
```

```
DVHBIU3450I The source for directory entry TCPMAINT has been updated.
```

```
DVHBIU3423I The next ONLINE will take place via Diagnose 84.
```

```
DVHBIU3428I Changes made to directory entry TCPMAINT have been placed  
DVHBIU3428I online.
```

```
DVHREQ2289I Your PW request for TCPMAINT at * has completed; with RC =
```

```
DVHREQ2289I 0.
```

- **Systems Management Application Programming Interface**
  - **Set of callable functions**
  - **Used to manipulate the user directory**
  - **Control a z/VM system**
  - **Requires a directory manager**

- **SMAPI functions**
  - **Create a new virtual image**
  - **Allocate and manage resources**
    - **Disk, Network, Memory**
    - **DASD volumes and groups**
    - **LAN access lists**
  - **Activate/Deactivate image(s)**
  - **Query image configuration information**
  - **Manage directory profiles**
  - **Cluster functions**
    - **Image relocation**
    - **Test relocation**

- **SMAPI servers**
  - **Request servers**
    - VSMREQIN – IPv4 (AF\_INET)
    - VSMREQI6 – IPv6 (AF\_INET6)
    - VSMREQIU – IUCV (AF\_IUCV)
    - VSMPROXY – SE communications (AF\_SCLP)
    - VSMEVSRV – Handles \*VMEVENT (AF\_EVNT)
  - **Worker servers**
    - VSMWORK1 – Short call requests
    - VSMWORK2, VSMWORK3 – Other requests
    - VSMGUARD – Controller, “guard”, for other workers



- **Dirmaint changes**

- **Create the following file on Dirmaint**

CONFIGSM DATADVH D

```
ALLOW_ASUSER_NOPASS_FROM= VSMGUARD *  
ALLOW_ASUSER_NOPASS_FROM= VSMWORK1 *  
ALLOW_ASUSER_NOPASS_FROM= VSMWORK2 *  
ALLOW_ASUSER_NOPASS_FROM= VSMWORK3 *  
ASYNCHRONOUS_UPDATE_NOTIFICATION_EXIT.TCP= DVHXNE EXEC  
ASYNCHRONOUS_UPDATE_NOTIFICATION_EXIT.UDP= DVHXNE EXEC
```

- **Modify AUTHFOR CONTROL**

```
ALL VSMGUARD * 140A ADGHMOPS  
ALL VSMGUARD * 150A ADGHMOPS  
ALL VSMWORK1 * 140A ADGHMOPS  
ALL VSMWORK1 * 150A ADGHMOPS  
ALL VSMWORK2 * 140A ADGHMOPS  
ALL VSMWORK2 * 150A ADGHMOPS  
ALL VSMWORK3 * 140A ADGHMOPS  
ALL VSMWORK3 * 150A ADGHMOPS
```

- **SMAPI configuration**
  - **Modify SMAPI authorization list**
  - **From MAINT**

```
access vmsys:vsmwork1. z (forcerw
xedit vsmwork1 authlist z
```

```
VSMWORK1 AUTHLIST 21  F 195  Trunc=195 Size=6 Line=0 Col=1 Alt=1
====> █
00000 * * * Top of File * * *
00001 DO.NOT.REMOVE DO.NOT.RE
MOVE
00002 MAINT ALL
00003 VSMPROXY ALL
00004 VSMWORK1 ALL
00005 VSMREQIN ALL
00006 ZPRO01 ALL
00007 * * * End of File * * *
```

- **SMAPI configuration**

- For non-ensemble systems, SMAPI needs an additional step

- **From MAINT**

```
acc 193 f
acc vmsys:vsmwork1.data g (forcerw
copy dmssisvr names f = = g
xedit dmssisvr names g
```

- **Comment out all lines under this banner**

```
*****
*** the following machines are only available in ensembles ***
*****
```

- **Then...**

```
file
rel g
```

- **Bring up the SMAPI servers**
  - **VSMGUARD brings up everything else**
  - **From MAINT**

```
xautolog vsmguard
```

- Bring up SMAPI servers
  - Verify the SMAPI servers are listening

```
vm link tcpmaint 592
netstat
```

Active IPv4 Transmission Blocks:

User Id	Conn	Local Socket	Foreign Socket	State
----	--	-----	-----	-----
FTPSERVE	1001	*..FTP-C	*..*	Listen
INTCLIEN	1000	*..TELNET	*..*	Listen
INTCLIEN	1003	192.168.5.185..TELNET	192.168.5.73..56808	
Established				
SNMPD	UDP	192.168.5.185..161	*..*	UDP
SNMPD	1002	*..1024	*..*	Listen
ZTCP	UDP	*..1024	*..*	UDP
ZADMIN	1005	*..81	*..*	Listen
ZWEB01	1006	*..80	*..*	Listen
ZWEB04	1007	*..80	*..*	Listen
ZWEB03	1008	*..80	*..*	Listen
ZWEB05	1009	*..80	*..*	Listen
ZWEB02	1010	*..80	*..*	Listen
VSMREQIN	1011	*..44444	*..*	Listen
VSMEVSRV	1012	*..55555	*..*	Listen

# SMAPI Programming

```
/* SMAPI function Image_Activate accepts one or multiple */
/* userids to autolog */
Parse value Image_Activate('SUSE017 SUSE003')

=====
Image_Activate:
Parse arg target_id

/* Build the plist, supplying the function to be called */
/* and the list of userids to xautolog */
Call plist_Init 'Image_Activate', target_id

/* Calculate the length of entire plist and prepend */
plist = (length(plist),4)
plist = ' ' || plist

Call Send_s

If response <> '' & (return_code = 0 | (return_code = 200 & reason_code = 28))
/* More response to be translated */
/* 1) number of images activated */
/* 2) number of images failed to activate */
/* 3) array of failure details(one per count in 2) */
/* name of image, return code and reason code */
Parse value zparsers('(INT4 INT4 ARRAY{STR INT4 INT4})', response) with
elements '\/' response
End

Return resplen request_id return_code reason_code elements
```

Call plist\_Init 'Image\_Activate', target\_id

```
plist_Init:
/* Build parmlist with common parms plus those supplied by the caller */
Parse arg func, target_id
plist = ''
/* SMAPI function */
Parse value toAscii(func) with func_l func
plist = plist || func_l || func
/* auth user */
Parse value toAscii(auth_userid) with authid_l authid
plist = plist || authid_l || authid
/* auth user password */
Parse value toAscii(auth_passwd) with passwd_l passwd
xlstr = toAscii(auth_passwd)
Parse var xlstr passwd_l passwd
plist = plist || passwd_l || passwd
/* target id */
Parse value toAscii(target_id) with target_id_l target_id
plist = plist || target_id_l || target_id
Return

server:
/* Initialize for receiving lines sent by the server */
Parse value RSocket('Socket') with src smapi_Socket
If src=0 then Call logmsg 'E', 32, 'SOCKET(SOCKET) rc='src
Call RSocket 'Connect', smapi_Socket, 'AF_INET' smapiport ipaddress
If src=0 then Call logmsg 'E', 32, 'SOCKET(CONNECT) rc='src

Send the requested data and get responses */
x = RSocket('Write', smapi_Socket, plist)
Parse value RXRead_Check(smapi_Socket,120) with .
/* Get the request_id */
Parse value S_Receive(smapi_Socket) with src response_l response
'PIPE var response | >> response data d'

If response_l > 4 then do
/* Got an error */
End
Else
req_id = c2x(response)
'PIPE var response | >> response data d'
/* Get the output plist */
Parse value RXRead_Check(smapi_Socket,120) with .
Parse value S_Receive(smapi_Socket) with src response_l response
'PIPE var response | >> response data d'
Return
```

# SMAPI Programming

```
/* SMAPI function Image_Activate accepts one or multiple */
/* ... case supplied by the caller */
Parse value RSocket('Connect', smapi_Socket, 'AF_INET' smapiport ipaddress
If src=0 then Call logmsg 'E', 32, 'SOCKET(CONNECT) rc='src

====
Image
Parse

/* Send the requested data and get responses */
/*
x = RSocket('Write', smapi_Socket, plist)
Parse value RXRead_Check(smapi_Socket,120) with .

/* Com
plist_l = d2c(length(plist),1)
plist = plist_l || plist

Call Send_server

/* convert the response values from ASCII to EBCDIC */
/* First two INT4 are the total length of response returned */
/* Followed by a hexadecimal request ID */
/* Then return code and lastly reason code */
Parse value zparsers('(INT4 HEX4 INT4 INT4)',response) with resplen
request_id ,
return_code reason_code '\/' Response

/* return code of 200 and reason code of 28 means some of */
/* userids supplied were not successfully activated */
If response <> '' & (return_code = 0 | (return_code = 200 & reason_code = 28))
/* More response to be translated */
/* 1) number of images activated */
/* 2) number of images failed to activate */
/* 3) array of failure details(one per count in 2) ) */
/* name of image, return code and reason code */
Parse value zparsers('(INT4 INT4 ARRAY{STR INT4 INT4})', response) with
elements '\/' response
End

Return resplen request_id return_code reason_code elements

plist_Init:
Parse value RSocket('Connect', smapi_Socket, 'AF_INET' smapiport ipaddress
If src=0 then Call logmsg 'E', 32, 'SOCKET(CONNECT) rc='src

====
Image
Parse

/* Send the requested data and get responses */
/*
x = RSocket('Write', smapi_Socket, plist)
Parse value RXRead_Check(smapi_Socket,120) with .

/* Com
plist_l = d2c(length(plist),1)
plist = plist_l || plist

Call Send_server

/* convert the response values from ASCII to EBCDIC */
/* First two INT4 are the total length of response returned */
/* Followed by a hexadecimal request ID */
/* Then return code and lastly reason code */
Parse value zparsers('(INT4 HEX4 INT4 INT4)',response) with resplen
request_id ,
return_code reason_code '\/' Response

/* return code of 200 and reason code of 28 means some of */
/* userids supplied were not successfully activated */
If response <> '' & (return_code = 0 | (return_code = 200 & reason_code = 28))
/* More response to be translated */
/* 1) number of images activated */
/* 2) number of images failed to activate */
/* 3) array of failure details(one per count in 2) ) */
/* name of image, return code and reason code */
Parse value zparsers('(INT4 INT4 ARRAY{STR INT4 INT4})', response) with
elements '\/' response
End

Return resplen request_id return_code reason_code elements

Send_server:
/* Initialize for receiving responses sent by the server */
Parse value RSocket('Connect', smapi_Socket, 'AF_INET' smapiport ipaddress) with target_id_l target_id
If src=0 then Call logmsg 'E', 32, 'SOCKET(SOCKET) rc='src
Call RSocket('Connect', smapi_Socket, 'AF_INET' smapiport ipaddress
If src=0 then Call logmsg 'E', 32, 'SOCKET(CONNECT) rc='src

/* Send the requested data and get responses */
x = RSocket('Write', smapi_Socket, plist)
Parse value RXRead_Check(smapi_Socket,120) with .
/* Get the request_id */
Parse value S_Receive(smapi_Socket) with src response_l response
'PIPE var response | >> response data d'

If response_l > 4 then do
/* Got an error */
End
Else
req_id = c2x(response)
'PIPE var response | >> response data d'
/* Get the output plist */
Parse value RXRead_Check(smapi_Socket,120) with .
Parse value S_Receive(smapi_Socket) with src response_l response
'PIPE var response | >> response data d'
Return
```





- z/VM Directory Maintenance Facility Commands Reference  
- SC24-6188
- z/VM Directory Maintenance Facility Tailoring and Administration Guide  
- SC24-6190
- z/VM Getting Started With Linux on System z  
- SC24-6194

# Questions?



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