

z/VM
7.4

*Directory Maintenance Facility
Tailoring and Administration Guide*



Note:

Before you use this information and the product it supports, read the information in [“Notices” on page 301.](#)

This edition applies to version 7, release 4 of IBM® z/VM® (product number 5741-A09) and to all subsequent releases and modifications until otherwise indicated in new editions.

Last updated: 2024-09-18

© **Copyright International Business Machines Corporation 1979, 2024.**

US Government Users Restricted Rights – Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

Contents

Figures.....	ix
Tables.....	xi
About This Document.....	xv
Intended Audience.....	xv
Conventions and Terminology.....	xv
Where to Find More Information.....	xvi
Links to Other Documents and Websites.....	xvi
How to provide feedback to IBM.....	xvii
Summary of Changes for z/VM: Directory Maintenance Facility Tailoring and Administration Guide.....	xix
GC24-6283-74, z/VM 7.4 (September 2024).....	xix
GC24-6283-73, z/VM 7.3 (December 2023).....	xix
GC24-6283-73, z/VM 7.3 (May 2023).....	xix
GC24-6283-73, z/VM 7.3 (September 2022).....	xix
GC24-6283-04, z/VM 7.2 (December 2021).....	xix
GC24-6283-03, z/VM 7.2 (August 2021).....	xx
GC24-6283-03, z/VM 7.2 (December 2020).....	xx
GC24-6283-02, z/VM 7.2 (September 2020).....	xxi
Chapter 1. Introduction.....	1
Getting Started.....	1
Using DirMaint Commands.....	2
Using the DirMaint HELP Facility.....	2
Chapter 2. Directory Entries for the DirMaint Machines.....	5
DirMaint Install and Service User ID.....	5
MAINT User ID.....	5
What is a Server?.....	5
DirMaint Service Machine.....	6
DATAMOVE Service Machines.....	6
Cluster Satellite Synchronization Server Machine.....	7
Administrative and Support Users.....	7
General Users.....	7
Common PROFILE.....	7
Common PROFILE Example.....	8
Directory Statements for the DIRMAINT Virtual Machine.....	8
DIRMAINT Non-DASD Directory Statements.....	9
DIRMAINT DASD Directory Statements.....	11
Directory Statements for the DATAMOVE Virtual Machine.....	13
DATAMOVE Non-DASD Directory Statements.....	15
DATAMOVE DASD Directory Statements.....	15
Directory Statements for the DIRMSAT Virtual Machine.....	16
DIRMSAT Non-DASD Directory Statements.....	18
DIRMSAT DASD Directory Statements.....	19
Directory Entry for the RSCS Virtual Machine.....	20

Chapter 3. Tailoring the DIRMAINT Service Machine.....	21
Data Files.....	21
Accessing Disks.....	23
PROFILE XEDIT.....	23
DVHPROFA DIRMAINT.....	24
CONFIG DATADVH.....	24
Step 1. Select Directory Update Options.....	25
Step 2. Select Restart and Recovery Characteristics.....	28
Step 3. Select Security and Auditing Characteristics.....	29
Step 4. Select Password Control Characteristics.....	32
Step 5. Select RACF-Specific Characteristics.....	34
Step 6. Select IVP Characteristics.....	46
DIRMAINT DATADVH.....	48
DIRMAINT DATADVH File Example.....	48
DVHNAMEs DATADVH.....	51
DIRMMAIL SAMPDVH.....	52
DVHLINK EXCLUDE.....	52
PWMON CONTROL.....	54
RPWLIST DATA.....	54
SUBSCRIB DATADVH.....	55
AUTHFOR CONTROL.....	56
USER INPUT.....	58
Overriding and Supplementing DirMaint Commands.....	61
Overriding and Supplementing DirMaint Messages.....	62
Message Destination.....	62
Restart or Shutdown Processing After Encountering an Error.....	63
Moving or Updating DirMaint or RACF Owned Minidisks.....	63
Chapter 4. Tailoring the DATAMOVE Service Machine.....	65
Defining the DATAMOVE Service Machines.....	65
Step 1. Define a DATAMOVE Service Machine to DIRMAINT.....	65
Step 2. Identify the Communication Path.....	66
Step 3. Define the DATAMOVE Retry and Autolog Limits.....	67
Step 4. Enabling DATAMOVE Exits.....	67
DATAMOVE DATADVH.....	68
DATAMOVE DATADVH File Example.....	68
Chapter 5. Tailoring the DIRMSAT Service Machine.....	69
Defining the DIRMSAT Service Machines.....	69
Step 1. Define a Satellite Service Machine to DIRMAINT.....	69
Step 2. Identify the Communication Path.....	70
Step 3. Configure the DVHPROFA DIRMSAT file.....	71
DIRMSAT DATADVH.....	71
DIRMSAT DATADVH File Example.....	71
Chapter 6. DASD Management.....	73
Preparing Your DIRMAINT Machine.....	73
Defining a DATAMOVE Machine to the DIRMAINT Server.....	73
The Extent Control File.....	74
Extent Control File Sections.....	75
The AUTHDASD File.....	83
The AUTHDASD DATADVH Control File.....	83
Automatic Allocation Algorithms.....	85
Protecting System Areas on DASD.....	86
Volume Control File.....	86
Volume Control File Example.....	87

Operation.....	87
Directory Initialization.....	88
Manipulating Extents.....	88
Work Unit Control File.....	88
Transaction File Example.....	89
Subsystem Control.....	91
DATAMOVE Control File.....	91
xxxxFDEV DVHTABLE File.....	92
Unassigned Queue.....	92
Processing Retry or Stalled Work Units.....	92
Commands For Diagnosing Work Units.....	92
Commands For Processing Work Units.....	93
Error Recovery.....	93
Soft Failures.....	93
Hard Failure – Recoverable.....	93
Hard Failure – Nonrecoverable.....	94
Error Recovery Scenarios.....	94
Chapter 7. User Tailoring.....	103
The ACCESS DATADVH File.....	103
The CONFIG* DATADVH File.....	104
CONFIG* DATADVH File Example.....	104
The REQUIRED_USER_FILE= Entries.....	106
The LOADABLE_USER_FILE= Entries.....	107
The DEFAULT_CMDLEVEL= Entry.....	108
National Language Support.....	109
The lang_BATCH_HEADER_1x0A= Entries.....	110
The lang_HELP_1x0A= Entries.....	110
The lang_MENU_DEFS_1x0A= Entries.....	111
The lang_USER_MSGS_1x0A= Entries.....	111
Messages and Return Codes.....	112
The PARSER_1x0A= Entries.....	113
The COMMANDS_1x0A= Entries.....	113
The Various USER_EXIT= Entries.....	113
The PW_MIN_LENGTH= Entry.....	114
The FROM= DEST= Entries.....	114
Chapter 8. Delegating Administrative Authority.....	117
Command Classes.....	117
Command Sets on the DIRMAINT Server.....	117
Defining a New Command Set.....	118
DirMaint Server Authorization Procedures.....	119
AUTHFOR CONTROL File.....	119
Chapter 9. Exit Routines.....	121
Command and Exit Routine Interactions.....	121
User Virtual Machine.....	121
DATAMOVE Service Machine.....	121
DIRMSAT Service Machine.....	122
DIRMAINT Service Machine.....	122
Exit Routines Summary.....	123
DirMaint Exit Routine Descriptions.....	128
Command After Processing (DVHCXA).....	129
Command Before Processing (DVHCXB).....	130
Command Before Parsing (DVHCXC).....	131
DATAMOVE CMS Copying (DVHDXC).....	132
DATAMOVE DDR Processing (DVHDXD).....	134

DATAMOVE ERASE Processing (DVHDXE).....	136
DATAMOVE FORMAT Processing (DVHDXF).....	137
DATAMOVE non-CMS Copying (DVHDXN).....	138
DATAMOVE non-CMS Copying (DVHDXP).....	140
ESM Log Recording (DVHESMLR).....	142
Password After Processing (DVHPXA).....	144
Password Random Generator (DVHPXR).....	145
Password Syntax Checking (DVHPXV).....	146
Random Password Generator (DVHPXR).....	148
ACCOUNT Number Notification (DVHXAN).....	149
ACCOUNT Number Verification (DVHXAV).....	150
Check User Privilege (DVHXCP).....	151
DASD Authorization Checking (DVHXDA).....	152
DASD Ownership Notification (DVHXDN).....	154
FOR Authorization Checking (DVHXFA).....	155
Link Authorization (DVHXLA).....	156
LOGONBY Change Notification (DVHXLB).....	157
Message Logging Filter (DVHXLF).....	158
Link Notification (DVHXLN).....	160
Pre-startup Exit for Switching Service Levels (DVHXLVL).....	161
Minidisk Password Notification (DVHXMN).....	162
Minidisk Password Checking (DVHXMP).....	163
Multiple User Prefix Authorization (DVHXMU).....	164
Asynchronous Update Notification (DVHXNE).....	165
NICDEF Notification Exit (DVHXNN).....	167
ESM Password Authentication (DVHXPA EXEC).....	168
POSIX Change Notification (DVHXPESM).....	169
Password Change Notification (DVHXPN).....	170
Password Notice Printing (DVHXPP).....	172
Request After Processing (DVHXRA).....	173
Request Before Processing (DVHXRB).....	174
Request Before Parsing (DVHXRC).....	176
Local STAG Authorization (DVHXTA).....	177
Backup Tape Mount (DVHXTP).....	178
User Change Notification (DVHXUN).....	180
Guidelines for Creating or Modifying Exit Routines.....	181
Product Specific Program Interface.....	181
General Program Interface.....	181
Communication with RACF and other non-DirMaint Servers.....	183
Message Numbers Available for Installation-Written Exits.....	184
Global Variables Available for the DVHCX* and DVHPX* Exits.....	184
Global Variables Available for the DVHX* Exits.....	186
Utility Routines.....	189
Chapter 10. Planning for Diagnosis.....	191
Planning Checklist for Diagnosis and Recovery.....	191
Diagnosing Problems Using DirMaint Facilities.....	191
Displaying Service Level Information.....	191
Establishing Information-Collecting Procedures.....	192
Chapter 11. Installation Verification Procedure (IVP).....	193
How the IVP Works.....	193
Characteristics of the IVP.....	193
Other IVP Files.....	194
Appendix A. External Security Manager Considerations.....	195
Installing DirMaint With an External Security Manager Other Than RACF.....	195

Installing DirMaint with RACF.....	195
RACF-Specific Characteristics in the CONFIG DATADVH File.....	196
Enabling DirMaint to Access the RACF Profile in the VMCMD Class	196
Enabling Auditing Using RACROUTE.....	196
Enabling DirMaint to Access DIAGNOSE X'88'.....	197
Enabling DirMaint to Access User's Minidisks and Readers.....	198
Enabling Satellite Servers to Act on Behalf of the DIRMAINT Server.....	200
Improving Performance with RACF.....	200
Enabling Mandatory Access Control for DirMaint Resources.....	201
Appendix B. DirMaint Support for Systems Management APIs.....	203
Linking and Accessing the DirMaint Interface Disk.....	203
Configuring Use of the ASUSER Prefix.....	203
Enabling the Asynchronous Update Notification Exit.....	204
Coordination Between DirMaint and an External Security Manager.....	204
DirMaint Command Set Authorizations.....	204
DASD Management.....	208
Image Disk Modes.....	208
Image_Create_DM: Adding A New Image.....	209
Prototype_Create_DM: Adding A New PROTODIR File.....	209
Replacing an Image Definition.....	210
Asynchronous DASD Management Operations.....	211
Other Asynchronous Operations.....	211
Asynchronous Notifications.....	211
Configure Request Log Processing.....	212
DirMaint Optimization: Static_Image_Changes_Activate_DM, _Deactivate_DM, and _Immediate_DM.....	212
Appendix C. Tuning DirMaint Performance.....	215
Optimizing the User Machine.....	215
Optimizing the DirMaint Service Machines.....	215
Setting CP Performance Options.....	217
SET RESERVE Command.....	217
SET QUICKDSP Command.....	218
Appendix D. DirMaint Configuration Data Files.....	219
Language Dependent Configuration Entries.....	229
Multiple-System Cluster Configuration Entries.....	231
Network Configuration Entries.....	232
System Performance.....	232
System Exit Routines Entries.....	233
User Performance Entries.....	233
User Exit Entries.....	233
Appendix E. WAKEUP Command.....	235
The WAKEUP Times File.....	235
WAKEUP Times File Format.....	235
The Date Field (Columns 1–8).....	236
The Time Field (Columns 10–17).....	237
Date/Time Stamp Field (Columns 19–26).....	238
The Rest of the Record (Columns 28–255).....	238
Items Stacked by WAKEUP.....	238
Appendix F. Making Multiple Updates to a Directory.....	241
Appendix G. Tests Run by the Automated IVP.....	243

Test 0010 - DA0010, DM0010, and DS0010.....	243
Test 0020 - DA0020, DM0020, and DS0020.....	244
Test 0030 - DM0030.....	246
Test 0100 - DA0100, DM0100, and DS0100.....	246
Test 0110 - DA0110, DM0110, and DS0110.....	246
Test 0140 - DM0140.....	247
Test 0150 - DM0150.....	247
Test 0200 - DM0200.....	248
Test 0210 - DA0210, DM0210, and DS0210.....	248
Test 0220 - DA0220, DM0220, and DS0220.....	250
Test 0300 - DM0300.....	250
Test 0310 - DM0310.....	251
Test 0320 - DM0320.....	251
Test 0330 - DM0330.....	251
Test 0420 - DA0420, DM0420, and DS0420.....	253
Test 0430 - DM0430	253
Test 0440 - DM0440	254
Test 0500 - DM0500 and DS0500	255
Test 0700 - DM0700	256
Test 0710 - DM0710	257
Test 0810 - DM0810.....	258
Test 0820 - DM0820.....	260
Test 0830 - DM0830.....	260
Test 0840 - DM0840.....	261
Test 0850 - DM0850.....	262
Test 0860 - DM0860	262
Test 0870 - DM0870	263
Test 0880 - DM0880	264
Appendix H. Test the Installation/Service for DirMaint.....	269
Summary of the Installation Process.....	269
Test the DIRMAINT Server Machine.....	269
Test the DIRMSAT Server Machine.....	275
Test the DATAMOVE Server Machine.....	280
Post Test Instructions.....	286
Quick Test After Installing Service.....	287
Appendix I. DirMaint Tailorable and Non-Tailorable System Files.....	291
Notices.....	301
Programming Interface Information.....	302
Trademarks.....	302
Terms and Conditions for Product Documentation.....	302
IBM Online Privacy Statement.....	303
Bibliography.....	305
Where to Get z/VM Information.....	305
z/VM Base Library.....	305
z/VM Facilities and Features.....	306
Prerequisite Products.....	308
Related Products.....	308
Index.....	309

Figures

1. Common PROFILE Example.....	8
2. DIRMAINT Non-DASD Directory Statements.....	9
3. DIRMAINT DASD Directory Statements for New Customers.....	11
4. DATAMOVE Non-DASD Directory Statements.....	15
5. DATAMOVE DASD Directory Statements.....	15
6. DIRMSAT Non-DASD Directory Statements.....	18
7. DIRMSAT DASD Directory Statements.....	19
8. Selecting Directory Update Options.....	25
9. Selecting Restart and Recovery Characteristics.....	28
10. Selecting Security and Auditing Characteristics.....	29
11. Selecting Password Control Characteristics.....	32
12. Selecting RACF-Specific Characteristics.....	35
13. Selecting IVP Characteristics.....	46
14. EXTENT CONTROL File.....	75
15. Volume Control File.....	87
16. Transaction File.....	89
17. AMDISK With No DATAMOVE Interaction.....	95
18. AMDISK With DATAMOVE Interaction.....	96
19. CMDISK.....	97
20. DMDISK With No DATAMOVE Interaction (NOCLEAN).....	98
21. DMDISK With No DATAMOVE Interaction (CLEAN).....	99
22. ZAPMDISK (Auxiliary DMDISK).....	100
23. TMDISK.....	101

24. CONFIG* DATADVH File.....	104
25. CONFIG DATADVH File.....	106
26. CONFIGAA DATADVH File.....	106
27. REQUIRED_USER_FILE= Entries.....	107
28. LOADABLE_USER_FILE= Entries.....	108
29. National Language Support.....	109
30. Copying all files from the 155 disk to the new V-disk.....	217

Tables

1. New Files for DirMaint.....	22
2. New Files for DirMaint Containing Static Information.....	22
3. New Files for Bringing up DASD Management with DirMaint.....	23
4. Volatile Files to Change Just Before Bringing Up DirMaint.....	23
5. Tags in the CMS NAMES File.....	27
6. RAC Commands Issued by DirMaint RACF Connector EXECs.....	36
7. Tags in the CMS NAMES File.....	51
8. DVHNAMES DATADVH Nickname Entries.....	51
9. DVHNAMES Event Entries.....	52
10. Summary of Extent Control File Sections.....	75
11. Allocation Classes.....	84
12. Summary of CONFIG* DATADVH File Entries.....	104
13. Privilege Classes.....	117
14. Exit Routines Summary.....	124
15. COMMAND_BEFORE_PROCESSING_USER_EXIT.....	130
16. COMMAND_BEFORE_PARSING_USER_EXIT.....	131
17. DATAMOVE_COPY_CMS_EXIT Return Codes.....	132
18. DATAMOVE_DDR_EXIT Return Codes.....	134
19. DATAMOVE_ERASE_EXIT Return Codes.....	136
20. DATAMOVE_FORMAT_EXIT Return Codes.....	137
21. DATAMOVE_COPY_NONCMS_EXIT Return Codes.....	138
22. DATAMOVE_NONCMS_COPYING_EXIT Return Codes.....	140
23. PASSWORD_RANDOM_GENERATOR_EXIT Return Codes.....	145

24. PASSWORD_SYNTAX_CHECKING_USER_EXIT Return Codes.....	147
25. PASSWORD_RANDOM_GENERATOR_EXIT Return Codes.....	148
26. ACCOUNT_NUMBER_VERIFICATION_EXIT Return Codes.....	150
27. CHECK_USER_PRIVILEGE_EXIT Return Codes.....	151
28. DASD_AUTHORIZATION_CHECKING_EXIT Return Codes.....	152
29. FOR_AUTHORIZATION_CHECKING_EXIT Return Codes.....	155
30. LINK_AUTHORIZATION_EXIT Return Codes.....	156
31. MESSAGE_LOGGING_FILTER_EXIT Return Codes.....	158
32. DVHXLVL Return Codes.....	161
33. MINIDISK_PASSWORD_CHECKING_EXIT Return Codes.....	163
34. MULTIUSER_VERIFICATION_EXIT Return Codes.....	164
35. ASYNCHRONOUS_UPDATE_NOTIFICATION_EXIT Return Codes.....	165
36. ESM_PASSWORD_AUTHENTICATION_EXIT Return Codes.....	168
37. PW_NOTICE_PRT_EXIT Return Codes.....	172
38. REQUEST_BEFORE_PROCESSING_EXIT Return Codes.....	174
39. REQUEST_BEFORE_PARSING_EXIT Return Codes.....	176
40. LOCAL_STAG_AUTHORIZATION_EXIT Return Codes.....	177
41. BACKUP_TAPE_MOUNT_EXIT Return Codes.....	178
42. LASTING GLOBALV Variables for the DVHCX* and DVHPX* Exits.....	184
43. SESSION GLOBALV Variables for the DVHCX* and DVHPX* Exits.....	185
44. LASTING GLOBALV Variables for the DVHX* Exits.....	187
45. SESSION GLOBALV Variables for the DVHX* Exits.....	187
46. Format of Housekeeping Utility Fields.....	189
47. IBM-Supplied Defaults for DirMaint Commands and Command Sets.....	205
48. CONFIG* DATADVH Entries Summarized.....	219

49. Format of Records in a WAKEUP Times File.....	235
50. DirMaint Tailorable System Files.....	291
51. DirMaint Non-Tailorable System Files.....	295

About This Document

This is a reference document for the z/VM® Directory Maintenance Facility (DirMaint™) function level 740, for use on IBM® z/VM 7.4.

DirMaint is a Conversational Monitor System (CMS) application that helps you manage your z/VM directory. Directory management is simplified by the DirMaint command interface and automated facilities. The DirMaint directory statement-like commands initiate directory transactions. The DirMaint error checking ensures that only valid changes are made to the directory, and that only authorized personnel are able to make the requested changes. Any transaction requiring the allocation or deallocation of minidisk extents can be handled automatically. All user initiated transactions can be password controlled and can be recorded for auditing purposes.

The DirMaint functions are performed by two disconnected virtual machines equipped with an automatic restart facility. The DIRMAINT virtual machine owns and manages the directory, and the DATAMOVE virtual machine performs the copying and formatting of CMS minidisks. Users invoke DirMaint functions by submitting commands to the DIRMAINT virtual machine. Large systems may have multiple DATAMOVE machines.

Except for the documented exit routines, this information should not be used for programming purposes. DirMaint provides a safe, efficient, and interactive way to maintain the z/VM user directory. You can manage the directory with DirMaint through the use of commands. Thus, you avert errors that are often made during direct updating of the directory source file. You can also use DirMaint to audit the security of relevant tasks that it performs.

The DirMaint feature may be used with:

- RACF Security Server for z/VM
- Other external security managers (ESMs) providing equivalent interfaces for password verification and audit recording; and optionally providing equivalent function for user enrollment and disenrollment, resource registration and removal, and resource authorization checking.

Intended Audience

This document is intended for anyone responsible for tailoring, planning, updating, and maintaining the DirMaint product.

You should know about the purpose, structure, and contents of the system directories and how they can be used. This knowledge should also include the understanding of z/VM.

Conventions and Terminology

The terminology used in this document is as follows:

DirMaint

An abbreviation for the program name.

DIRMAINT

Default user ID of the disconnected service machine that owns and maintains the z/VM source directory. This default name is subject to customer tailoring. See [“What is a Server?”](#) on page 5.

DIRMaint

The command used to send a transaction to the DIRMAINT service machine when entered from the CMS command line. When issued from within a program, the full command name of DIRMAINT should be used, usually preceded by the keyword EXEC. See [z/VM: Directory Maintenance Facility Commands Reference](#) for more information.

DIRM

The minimum abbreviation of the DIRMaint command. See [z/VM: Directory Maintenance Facility Commands Reference](#) for more information.

DATAMOVE

A DirMaint server that provides shared services to users. See [“What is a Server?” on page 5](#)

DIRMSAT

A DirMaint server that provides shared services to users. Synonymous with SATELLITE. See [“What is a Server?” on page 5](#)

SATELLITE

A DirMaint server that provides shared services to users. Synonymous with DIRMSAT. See [“What is a Server?” on page 5](#)

Where to Find More Information

For a list of the documents that can provide you with additional information on DirMaint and z/VM, see [“Bibliography” on page 305](#).

For further up-to-date information specific to DirMaint, see the official DirMaint website at [IBM Directory Maintenance for z/VM \(DirMaint\) \(https://www.ibm.com/vm/related/dirmaint\)](https://www.ibm.com/vm/related/dirmaint)

Links to Other Documents and Websites

The PDF version of this document contains links to other documents and websites. A link from this document to another document works only when both documents are in the same directory or database, and a link to a website works only if you have access to the Internet. A document link is to a specific edition. If a new edition of a linked document has been published since the publication of this document, the linked document might not be the latest edition.

How to provide feedback to IBM

We welcome any feedback that you have, including comments on the clarity, accuracy, or completeness of the information. See [How to send feedback to IBM](#) for additional information.

Summary of Changes for z/VM: Directory Maintenance Facility Tailoring and Administration Guide

This information includes terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations for the current edition are indicated by a vertical line (|) to the left of the change.

GC24-6283-74, z/VM 7.4 (September 2024)

This edition supports the general availability of z/VM 7.4. Note that the publication number suffix (-74) indicates the z/VM release to which this edition applies.

Miscellaneous updates for September 2024

DirMaint has been updated in z/VM 7.4 to remove the use of the DVHWAKE MODULE. While the DVHWAKE MODULE is still shipped with DirMaint, any customized user exits should be updated to use the CMS WAKEUP command.

GC24-6283-73, z/VM 7.3 (December 2023)

This edition includes terminology, maintenance, and editorial changes.

GC24-6283-73, z/VM 7.3 (May 2023)

This edition includes minor technical, terminology, maintenance, and editorial changes.

GC24-6283-73, z/VM 7.3 (September 2022)

This edition supports the general availability of z/VM 7.3. Note that the publication number suffix (-73) indicates the z/VM release to which this edition applies.

GC24-6283-04, z/VM 7.2 (December 2021)

This edition includes changes to support product changes provided or announced after the general availability of z/VM 7.2.

DirMaint Performance Enhancements

The PTF for APAR VM66298 provides enhancements to DirMaint that are intended to improve the performance of the DirMaint servers and enhance the automated IVP (installation verification program) to problems.

The performance enhancements improve the throughput of DirMaint requests in the environment where DirMaint is managing multiple z/VM systems using satellite servers by doing the following:

- Reducing the types of requests that require DirMaint servers to obtain the intersystem locking disk for serialization of changes to the source directory. Commands that do not change source-directory-related files no longer obtain the lock. This reduces the possibility of delays in updating the object directories due to either DirMaint or the satellite servers requiring the lock while the other server requires it.
- Improving throughput of requests that require the DirMaint server to interact with the satellite servers or DATAMOVE servers. Responses from satellite and DATAMOVE servers are given priority over new requests from non-DirMaint servers.

Enhancements to the automated IVP are intended to prevent future problems, detect current problems, or reduce the complexity of interacting with DirMaint to perform debugging operations. These new tests have been added:

- [“Test 0030 - DM0030” on page 246](#). This test verifies that the DirMaint and satellite servers are configured for UPDATE_IN_PLACE.
- [“Test 0210 - DA0210, DM0210, and DS0210” on page 248](#). This test verifies that non-informational messages have not been generated by the server within the last 24 hours.
- [“Test 0220 - DA0220, DM0220, and DS0220” on page 250](#). This test verifies that the server termination messages (DVHxxx2194T or DVHxxx3895t) have not been generated by the server within the last 24 hours.
- [“Test 0880 - DM0880 ” on page 264](#). This test verifies that the DATAMOVE machines do not own disks that are related to previously failed or canceled work units.

GC24-6283-03, z/VM 7.2 (August 2021)

This edition includes terminology, maintenance, and editorial updates.

Satellite servers

Satellite servers must not run on the same system that is running the Directory Maintenance Facility (DirMaint). The following topics are updated:

- [“What is a Server?” on page 5](#)
- [“Cluster Satellite Synchronization Server Machine” on page 7](#)

Satellite server definitions must be in the CONFIGSS DATADVH file. The following topics are updated:

- [“Step 1. Define a Satellite Service Machine to DIRMAINT” on page 69](#)
- [“Step 1. Define a DATAMOVE Service Machine to DIRMAINT” on page 65](#)
- [“Usage Notes” on page 73](#)
- [Appendix D, “DirMaint Configuration Data Files,” on page 219](#)

GC24-6283-03, z/VM 7.2 (December 2020)

This edition includes changes to support product changes provided or announced after the general availability of z/VM 7.2.

DirMaint Health Checker

With the PTF for APAR VM66175, the Directory Maintenance Facility (DirMaint), function level 720, includes enhancements that reduce the service cost of the product to the customer. These enhancements can prevent future problems, detect current problems, and reduce the complexity of interacting with DirMaint to perform debugging operations. These enhancements include the following:

- The automated install verification procedure (IVP) runs tests to validate the DirMaint servers and their interaction with each other and the rest of z/VM.
- Improvements to the DIRM FILE command provide additional file protection so that well known files are not accidentally placed on an incorrect disk.
- Changes to the DIRM BACKUP function allow you to backup files that are not on the primary directory files disk, such as CONFIG* DATADVH files. Some files are allowed on other disks but are not backed up.
- See [“Step 6. Select IVP Characteristics” on page 46](#) for a description of the configuration statements added with this support.
- See [Chapter 11, “Installation Verification Procedure \(IVP\),” on page 193](#) for a description of the IVP.
- See [Appendix G, “Tests Run by the Automated IVP,” on page 243](#) for a description of each test, a list of possible warnings and their resolution along with parameters that can modify the test criteria.

This edition includes changes to support the general availability of z/VM 7.2.

NEEDPASS_RESPECT Configuration Option

The Directory Maintenance Facility (DirMaint), function level 720, includes a new configuration option, `NEEDPASS_RESPECT= NO | YES`. When the value is NO, DirMaint will no longer prompt for passwords. This is the default value. For compatibility, the `NEEDPASS_RESPECT` configuration option can be set to YES. Specifying YES indicates to DirMaint that password prompting should occur based on the user's DIRM `NEEDPASS` command setting.

Chapter 1. Introduction

z/VM Directory Maintenance Feature (DirMaint) is a CMS application that helps manage your z/VM directory. Directory statements can be added, deleted, or altered using the DirMaint directory statement-like commands. DirMaint provides automated validation and extent allocation routines to reduce the chance of operator error.

Getting Started

Before you can use DirMaint, you must install and customize it. Other than giving the DIRMAINT server your existing source directory file for initialization, no other tailoring, customization, or modification is required.

This book provides information to help you tailor DirMaint to suit your installations needs. Tailoring and administration involves setting up, configuring, and modifying DirMaint. The tailoring and administration tasks are:

Installation.

DirMaint works with other products, each of which may have certain requirements that will impact how you configure and install DirMaint. Planning for those requirements from other products is essential to installing DirMaint.

DirMaint is installed using the Virtual Machine Serviceability Enhancements Staged/Extended (VMSES/E) component of z/VM. For more information on installation planning considerations, see the *DirMaint Program Directory*.

Customization and Modification.

DirMaint must be adapted to work in your environment to handle your particular needs; to do so, you may need the IBM-supplied code. You must understand what DirMaint needs to perform the basic functions you desire, what options it offers, and what implications those options may have in your environment. These changes should be made by your system programmer.

Migration from an earlier version of DirMaint.

By knowing what is required to migrate from another release of DirMaint, you can plan when it will be done, how long it will take, who should do it, and which of the new features you should install.

Tailoring.

By knowing what is required to tailor your data files, you can plan when the tailoring should be done, how long it should take, who should do it, and which of the new features you should implement.

Operation.

By understanding what DirMaint requires for operation, you can determine how it should be managed within your network. You may have to decide who will be handling the operations (system operators or automated procedures) and whether any training will be required.

Administration.

Knowing what DirMaint functions will be available to your users should help you determine what administrative tasks to perform. For example, will users be responsible for operational tasks on remote devices? Will users need to identify themselves on remote systems to which they submit jobs?

Diagnosis.

Problems are not always with the DirMaint product. They may be with communications lines or network connections with other systems. How you plan to handle problem situations and follow-up diagnosis at your installation can help speed recovery and save time.

Using DirMaint Commands

DirMaint runs on z/VM, which is an interactive, multiple-access operating system. Interactive means two-way communication between users and the system. Multiple-access means many people can use a z/VM system at the same time. Therefore, productivity is increased by sharing data more quickly and easily between you and other users.

The Control Program, usually referred to as CP, is a component of z/VM that manages the resources of a single computer so that multiple computing systems appear to exist. When you are working in the CP environment, you are provided with processor functions, input and output devices, and processor storage.

The Conversational Monitor System, usually referred to as CMS, performs two roles; as an end-user interface, it is the part of z/VM that is most often seen by your users. It is also the part of the operating system that supports the running of your programs, thus, it is your application programming interface.

Entering Commands

When you enter a command, z/VM must be able to recognize that it is a DirMaint command. As the following command shows, **dirm** must precede the command name.

Example—Entering a DirMaint Command:

Enter:

```
dirm account ?
```

Where

dirm

Indicates a DirMaint command.

account

DirMaint command to be entered.

?

Indicates the command parameters.

Note: When entering commands from the console of the service machines: DIRMAINT, DIRMSAT, and DATAMOVE, you must omit the keyword **dirm**.

For more information on entering commands, see [z/VM: Directory Maintenance Facility Commands Reference](#).

Using the DirMaint HELP Facility

You can receive online information using the DirMaint HELP Facility. For example, to display a menu of DirMaint HELP information, enter:

```
DIRM HELP
```

Place the cursor under a command or topic you want information about and press Enter.

To display information about a specific DirMaint operand (ADD in this example), enter:

```
DIRM HELP ADD
```

or

```
DIRM HELP AD
```

or

```
DIRM HELP A
```

The DirMaint HELP facility recognizes the minimum abbreviation for a DIRMAINT operand.

To display information about the DIRMAINT command, enter:

```
DIRM HELP DIRM
```

You can also display information about a message (DVH1093 in this example), by entering:

```
DIRM HELP DVH1093
```

The DIRMAINT HELP command and its operands are described in [*z/VM: Directory Maintenance Facility Commands Reference*](#).

Chapter 2. Directory Entries for the DirMaint Machines

This chapter describes defining the DirMaint service machines to CP.

Before you use a virtual machine, you must know how to communicate with the operating system you are going to run in your virtual machine. DirMaint involves using several virtual machines with each performing different tasks. The following sections describe the tasks you must perform to prepare to run DirMaint on a z/VM system.

DirMaint Install and Service User ID

The DirMaint install and service user ID, 7VMDIR40 by default, owns:

- All DASD space containing IBM-supplied DirMaint product code
- Customer tailored files
- Customized exit routines.

Other local modifications to the product should also be located on disks owned by this user ID. All of these disks are maintained using the z/VM installation and service tool, VMSES/E.

MAINT User ID

The general user needs to access two product files: DIRMAINT EXEC and ACCESS DATADVH. These files usually reside on the MAINT 19E disk, the system Y-disk, and are copied from the 7VMDIR40 29E disk, a DirMaint production disk. The general user also needs to access the DirMaint HELP files, usually residing on the MAINT 19D disk, which are copied from the 7VMDIR40 29D disk.

What is a Server?

A server in z/VM provides shared services to z/VM. The DirMaint product provides shared services to users with these servers:

Server Type Description

DIRMAINT

The primary server; the DIRMAINT server handles all aspects of source directory manipulation and controls the actions of all other servers. There is only one DIRMAINT server per SSI cluster. Only one DIRMAINT server can manipulate a single source directory at one time.

DATAMOVE

A DATAMOVE server is responsible for manipulating minidisks on behalf of the DIRMAINT server. These tasks can include formatting, copying, and cleaning. There can be multiple DATAMOVE servers being utilized by the one DIRMAINT server. In an SSI cluster, there must be one DATAMOVE server for each member of the cluster where DASD available to that member will be formatted, copied, or cleaned.

SATELLITE (or DIRMSAT)

The SATELLITE server, also called the DIRMSAT server, is responsible for manipulating the object directory on systems other than the system the DIRMAINT server is on. There can be multiple SATELLITE servers all being used by the one DIRMAINT server. If using DirMaint to synchronize the object directory in an SSI cluster, there must be one SATELLITE server running on each system that is *not* running the DIRMAINT server.

Note:

1. For maximum integrity, duplicate satellite servers can be used on each system to maintain duplicate object directories.
2. It is not necessary to define all of these virtual machines, only the 7VMDIR40 and the DIRMAINT user IDs are required.
3. If you choose not to define the DATAMOVE or DIRMSAT service machines now, you will lose the function they provide.

You may define one or more DATAMOVE or DIRMSAT machines during installation and may define additional machines later, or you may remove them if they are no longer needed.

In an SSI cluster, it is recommended to have at least one DATAMOVE server per SSI member. Also, it is recommended that there be at least one DIRMSAT server on each SSI member that is *not* running the DIRMAINT server.

For more information on the changes you will need to make to the product configuration definition files when you add or remove a DATAMOVE server, see [Chapter 4, “Tailoring the DATAMOVE Service Machine,”](#) on page 65 and when you add or remove a DIRMSAT server, see [Chapter 5, “Tailoring the DIRMSAT Service Machine,”](#) on page 69.

4. The DIRMAINT, DATAMOVE and DIRMSAT service machines must have access to the DirMaint service machine code. They must access:

- 7VMDIR40 491 disk, for production use
- 7VMDIR40 492 disk, for testing new service or modifications.

The service machines will share this single disk by linking as their own 191 disk.

DirMaint Service Machine

The directory maintenance service machine user ID, DIRMAINT by default:

- Owns the CP source directory
- Receives transactions from authorized users
- Verifies that the transactions are valid
- Makes the appropriate updates to the source directory.

To place directory changes online and log the results, the directory maintenance service machines use the DIRECTXA command.

The service machine optionally:

- Monitors the directory for user IDs' passwords that have not been changed during installation
- Controls allocation of DASD space to user virtual machines.

If full DASD services are enabled, the server virtual machine:

- Allocates work among one or more DATAMOVE service machines
- Monitors the progress of each machine.

In a multiple-system cluster, the DIRMAINT service machine will:

- Notify the satellite service machines in the cluster whenever an update is made to the source directory so the satellite servers can put the corresponding update online on the other systems in the cluster
- Run on any system in the cluster; however, it can only run on one system in the cluster at a time.
- Maintain a duplicate copy of the source directory on a second disk.

DATAMOVE Service Machines

If a command changes any DASD space allocations, the productivity of the system administrator and the end user can be further improved by the DATAMOVE service machines.

The DATAMOVE servers, which have a user ID of DATAMOVE by default:

- Format newly allocated DASD space for the user with an optional user-specified minidisk label or block size.
- Format a new extent to receive files from an existing disk, copy files from an existing disk to the new extent, optionally with user-specified disk label or block size, and optionally format the old extent to prevent exposure of residual data to the next user who acquires the space.
- Format an old extent being deallocated again to prevent exposure of any residual data to the next user.

If the workload warrants it, or if DirMaint is running in an SSI cluster, additional DATAMOVE server machines may be defined and the work divided among them.

In an SSI cluster, the DirMaint service machine will:

- Assign each DATAMOVE server to handle a specific SSI member
- Allocate work to the various DATAMOVE servers.

Cluster Satellite Synchronization Server Machine

The DIRMSAT server is responsible for manipulating the object directory on systems other than the system on which the primary DIRMAINT server runs. There can be multiple copies of the DIRMSAT server.

In an SSI cluster, the satellite service machine will:

1. Receive notifications from the DIRMAINT server whenever the directory has been updated and put online by the DIRMAINT machine on the system where DIRMAINT is running.
2. Then place the update online on its own system to keep the object directories synchronized.

In an SSI cluster, the satellite service machine will additionally route DirMaint commands from users on its own system to the DIRMAINT machine and also route command output files from the DIRMAINT machine to command users on the satellite server's own system.

Administrative and Support Users

By entering commands, administrative users can initiate changes to the source directory. The system programmer and other members of the support staff are responsible for maintaining the DirMaint configuration. This is usually done by invoking the DIRMAINT EXEC, which sends the transaction to the DIRMAINT service machine. Generally, users do not have the authority to make changes to the DirMaint operational configuration; however, they may have the authority to make changes to the source directory.

To link and access the DirMaint user component for performance, enter:

```
DIRMAINT EXECLOAD
```

General Users

Your installation can determine which DirMaint commands are available to users. This allows the user to make some changes to the directory without having to involve the system administrator, improving the productivity of both. A subset of the DirMaint commands may be used by the general user community. For more information about commands, see [z/VM: Directory Maintenance Facility Commands Reference](#).

Common PROFILE

A PROFILE statement defines the start of a profile entry in the source directory. All profile entry definitions must follow the last DIRECTORY statement and the global definition section and precede the first USER statement. There are no restrictions on the number of profile entries that may be specified.

When the directory control statements are used in a profile definition, they perform the same function as they do when used in a user definition. However, they may operate differently when used in both the profile and user definitions.

Directory profiles are implemented by defining a profile entry in the source directory and specifying an INCLUDE statement in the user entries that refer to the profile. The DIRECTXA command will run in less time if your system creates a PROFILE.

If you use a different name for your common profile, you will need to change the name on the INCLUDE statements for each sample directory shown.

If you choose not to use a profile, you will need to include the statements as shown in “Common PROFILE Example” on page 8 (excluding the PROFILE statement) in each sample directory shown.

Common PROFILE Example

```
1 PROFILE name
2 IPL CMS PARM AUTO CR
3 MACHINE ESA
4 CONSOLE 009 3215
5 SPOOL 00C 2540 READER *
5 SPOOL 00D 2540 PUNCH A
5 SPOOL 00E 1403 A
6 LINK MAINT 190 190 RR
6 LINK MAINT 19D 19D RR
6 LINK MAINT 19E 19E RR
```

Figure 1. Common PROFILE Example

These notes will help you with the example shown in [Figure 1 on page 8](#).

- 1** Specifies *name* of the PROFILE.

Where:

name

Is a 1 to 8 character alphanumeric string. A valid character is any character that can be used in a user ID name. Only one profile name may be specified on a PROFILE statement. The name assigned to the profile entry references the profile. A suggested profile name is COMMON.

- 2** Specifies CMS to be IPLed when the user ID is logged on. AUTO CR avoids a VM READ when the VM message is issued by CP.

- 3** Specifies the virtual machine type to be used.

```
MACHINE ESA, MACHINE XA, or MACHINE XC
```

are all acceptable for use by any of the DIRMAINT service machines: DIRMAINT, DATAMOVEs, and DIRMSATs.

The MACHINE statement is optional, if the virtual machine directory entries include a MACHINE statement, or if the system uses a GLOBALOPTS MACHINE directory statement to set the default for all virtual machines.

- 4** Specifies the console device of the virtual machine
- 5** Specifies the reader, punch, and printer devices of the virtual machine.
- 6** Specifies links to CMS system disks.

Directory Statements for the DIRMAINT Virtual Machine

The directory statement examples are divided into two parts. The first part contains all of the non-DASD directory statements. The second part contains all of the DASD directory statements.

IBM recommends using the default of DIRMAINT as the user ID of the directory management service machine.

Note:

1. If you are defining DIRMAINT in an SSI cluster, DIRMAINT must be defined as a USER machine so that DIRMAINT can be logged on to only one member of the cluster at a time, and so that it may have access to the shared spool of each DIRMSAT machine. This way, DIRMSAT can act as a spool file bridge between the DIRMAINT machine and users on the satellite server's own system.
2. All systems in the cluster must be running the same level of DirMaint code.
3. Once you have a license for DirMaint, you must enable use of the DirMaint feature by following the instructions in the "Memo To Users for the z/VM Directory Maintenance Facility". Note that if you are *not* using a single SYSTEM CONFIG file in an SSI cluster, then the SYSTEM CONFIG file for each system in the cluster must have DirMaint enabled.
4. You must add a 15D minidisk to the DIRMAINT machine.

DIRMAINT Non-DASD Directory Statements

```

USER DIRMAINT 1 AUTOONLY 2 128M 3 2047M 3 BDG 4
5 INCLUDE COMMON
6 ACCOUNT SYSTEM SYSPROG
7 D80NECMD FAIL LOCK
8 IUCV ANY PRIORITY MSGLIMIT 100
9 OPTION CONCEAL DIAG88 D84NOPAS IGNMAXU

```

Figure 2. DIRMAINT Non-DASD Directory Statements

These notes will help you with the example shown in [Figure 2 on page 9](#):

- 1** Specifies the user ID of the DIRMAINT virtual machine.
- 2** Specifies the password for the DIRMAINT virtual machine.
- 3** Specifies the required virtual storage size. DIRMAINT will function on as little as 16MB of storage for small source directories. IBM recommends using the largest virtual machine size available for better performance. If you chose to use a default size less than 128MB, you should leave the maximum size at 2047MB.
- 4** Specifies the privilege classes based on z/VM-provided defaults.

This virtual machine is authorized to use:

- Privilege class B; this is required to do the following:
 - Allows DIRMAINT to suppress CP message headers by using the CP MSGNOH command.
 - Allows DIRMAINT to issue the DIAGNOSE code X'84'.
 - Allows DIRMAINT to issue the DIAGNOSE code X'3C'.
 - Allows DIRMAINT to issue the DIAGNOSE code X'D4' for SECLABEL use. With SECLABEL support and Mandatory Access Control (MAC) enabled for spool files, DIRMAINT must be authorized to use DIAGNOSE code X'D4'.

Note: By default, these are all CP privilege class B functions. If your site has changed these to other privilege classes, then DIRMAINT must be authorized for the privilege classes containing these functions.

- Privilege class D; this is required to issue the CP QUERY ALLOC command for displaying the number of cylinders or pages that are allocated, in use, and available for DASD volumes attached to the system. The DIRMAINT server will then map these as used extents.

Note: There are risks associated with granting a user ID class D authority. You may want to create a separate class for the CP QUERY command granting only a few user IDs authorization.

- Privilege class G; this is for general user commands.

5

Specifies the directory PROFILE

6

Specifies the appropriate account to charge for the DIRMAINT virtual machine installation, and to route the printed output to the system programmer responsible for DirMaint operation.

7

The D8ONECMD statement is an optional statement. This ensures all DIRM CP and DIRM CMS commands are properly audited.

8

The IUCV statement is optional unless your system is running with RACF or another ESM, and chooses to record commands received by DIRMAINT and messages sent by DIRMAINT in the ESM audit log. If ESM audit logging is enabled, an initial value of 100 is suggested for the MSGLIMIT.

9

Specifies the directory options required by the DIRMAINT user ID.

The CONCEAL option tells CP to automatically restart the DIRMAINT machine if certain error conditions occur.

The DIAG88 option authorizes the DIRMAINT virtual machine to use DIAGNOSE X'88' for ESM password and password phrase authentication. This is needed by DirMaint when the ESM_PASSWORD_AUTHENTICATION_EXIT (DVHXP) is configured, because DVHXP uses the DMSPASS Callable Services Library routine (which in turn uses DIAGNOSE X'88') to authenticate ESM passwords and password phrases. If the ESM_PASSWORD_AUTHENTICATION_EXIT is not configured, this option is not needed.

The D84NOPAS option is optional for a standalone system without an ESM, or for a standalone system with RACF as the ESM. It may also be optional for systems with other ESMs. This is recommended for systems in a multiple-system cluster. It is required in a multiple-system cluster if any directory entries contain the SYSAFFIN EXIST_AT, SYSAFFIN LOGON_AT, or SYSAFFIN NOLOG_AT statements.

The IGNMAXU option allows the DIRMAINT machine to LOGON or to be AUTOLOGged on, even if your installation has reached a limit on the maximum number of users allowed on your system when this limit is already exceeded.

DIRMAINT DASD Directory Statements

```

1 LINK 7VMDIR40 491 191 MR - Product code, primary.
2 LINK 7VMDIR40 492 192 MR - Product code, alternate.
3 LINK 7VMDIR40 11F 11F MR - Interface code, primary.
4 LINK 7VMDIR40 41F 21F MR - Interface code, alternate.
5 LINK MAINT 123 123 MW - Object directory disk.
6 LINK PMAINT 551 551 RR - SSI highest level part utilities
7 LINK TCPMAINT 592 592 RR - TCP/IP client code.
8 MDISK 155 MR - Read/write scratch space, A-disk.
9 MDISK 1FA MR - Spool file staging space, Z-disk.
10 MDISK 1DF MR - Primary directory files.
11 MDISK 2DF MR - Optional secondary directory files.
12 MDISK 1AA MR - Primary transaction history files (optional).
13 MDISK 2AA MR - Optional secondary history files.
14 MDISK 1DB MR - Primary directory backup (optional).
15 MDISK 15D RR - Intersystem locking disk.
16 MDISK 1DE MR - Delta object directory work edit disk.

```

Figure 3. DIRMAINT DASD Directory Statements for New Customers

The DirMaint product code and data files should be on conventional minidisk space rather than SFS space. However, any of these DIRMAINT MDISKS, except the 15D disk, may in fact reside in a directory in a shared file system.

Note: Although this is allowed, it is not recommended. It would be possible to get into a situation where the shared file servers are out of available DASD space and are not operational; DirMaint would be unable to allocate additional DASD space because the SFS servers are not operational.

If you choose to use shared file pool space, IBM recommends that a separate DIRCONTROL directory be used in the place of each *disk*. You will need to enter GRANT AUTHORITY commands to all of the DIRMAINT servers for READ access (or READ and NEWREAD access if you chose to use FILECONTROL directories) to the directories that replace these 1DF and 2DF disks. You will need to update the DVHPROFA DIRMAINT and the DVHPROFA * files. For more information, see [“DVHPROFA DIRMAINT”](#) on page 24.

Ensure that access to minidisks is controlled by explicit link authorization. None of the DirMaint MDISKS should have any directory passwords (except for the 11F and 21F disks, which must have a read password of ALL, or if an ESM is installed, must be defined as UACC (READ) or PUBLIC (READ)). Any virtual machine needing access to these disks should do so through a LINK directory statement. Using passwords on any of these disks increases the risk of unauthorized access to your system.

Access to backup tapes of any of these disks must be carefully controlled to prevent unauthorized access to your system.

The logon password of any virtual machine with either read or write access to any of these disks or with access to the backup tapes for any of these disks must be carefully chosen and controlled, to minimize the risk of unauthorized access to your system. DirMaint also supports control of minidisk links by an ESM.

The MDISK addresses shown in [Figure 3 on page 11](#) are arbitrary. However, if any of these addresses are changed, you must make corresponding changes to several data files. The addresses shown in [“DIRMAINT DASD Directory Statements” on page 11](#) have been chosen to provide a mnemonic association between the address and the purpose for which the disk is used.

These notes will help you with the example shown in [Figure 3 on page 11](#).

1 - 4 and 8 - 14

If you chose to locate any of the MAINT or 7VMDIR40 “disks” being linked by the DIRMAINT machine into shared file system space, omit the LINK or MDISK statements for them from the directory entry of the DIRMAINT machine.

LINK statements for the MAINT disks have been omitted from the directory entry of the DIRMAINT machine. If they are not contained in the included PROFILE, they will have to be added here. If you have installed the optional national language HELP files, you should also include a LINK statement for those disks, either in the directory entry of the DIRMAINT machine or in the included profile.

5

The choice of 123 as the address of the object directory disk is arbitrary. It must match the address used on the DIRECTORY statement in the USER INPUT file. The PLANINFO file shows this as a link to the MAINT 123 disk. In practice, it appears that most customers use either the real system residence volume disk address (the system IPL address) or the virtual address used by the MAINT user ID to refer to the system residence volume (usually 123).

The use of link mode MW on the object directory disk is correct. This is necessary for the MAINT user ID to update the CP nucleus on the system residence volume without shutting DIRMAINT down. This is one of the rare situations where MW is appropriate for use with a CMS application program.

The default size of the object directory disk is 20 cylinders. For larger directories, the following formula may be used to determine the size needed based on the number of users in the directory:

$$\text{num_cylinders} = \frac{\text{num_users} * 4 \text{ (4K Blocks)}}{180 \text{ (4K blocks)}}$$

6

Specifies the 551 disk for the SSI highest level part utilities disk, which contains the DIRECTXA utility.

7

Specifies the 592 disk for the TCP/IP client code, for use with the z/VM systems management APIs. This disk is not accessed by default. Refer to “Asynchronous Update Notification (DVHXNE)” on page 165 for more information on how to access this disk when using the asynchronous notification update exit TCP or UDP function.

8

Specifies the read/write scratch space, A-disk.

9

Specifies the spool file staging space, Z-disk.

10

The 1DF¹⁰ and 1AA¹² disks may, but need not reside on a single DASD volume, possibly the same volume or volumes as the 191, 11F, and 19E disks. Also, the 2DF¹¹ and 2AA¹³ disks, if used, may reside on a single DASD volume, possibly the same volume as the 192, 21F, and 29E disks. It is recommended that the two groups reside on different physical DASD volumes attached to different physical control units connected to different physical channels or adapters. This allows one set to remain available in the event of a hardware error that makes the other set unavailable, which may make the difference whether or not the system remains operational pending repairs. Maximum redundancy will be obtained if the 1DB¹⁴ disk is on a third volume, control unit, and channel or adapter. The other disks may be on any volumes.

11

The 2DF disk is optional. It ensures that the DirMaint machine can continue operations without loss of data in the event of a hardware or human error that prevents use of the 1DF disk. There is a slight degradation in response time because of this redundancy.

If the risk of regression is acceptable, you may omit the 2DF disk and rely on the 1DB disk for backup.

Note: If the 1DF disk becomes unavailable either temporarily or permanently, your directory could be regressed to the time of the previous backup.

By default, a backup is taken once per day, after Midnight. If you are running without a 2DF disk, you may schedule additional backups throughout the day. (For example, 0800 (8:00AM.), 1200 (Noon), and 1600 (4:00PM.).) For more information on scheduling additional backups, see “DIRMAINT DATADVH” on page 48.

Note: IBM recommends use of the 2DF disk.

12

The 1AA disk is optional. The most complete log of DIRMAINT activity is the DIRMAINT machine console spool file. By default, these console spool files are kept for nine days, for nine invocations of the DVHNDAY EXEC. The activity archive files on the 1AA disk contain less detail than the console

spool file, but are retained until the disk becomes nearly full. Alternatively, if your system has an ESM with the ability for authorized virtual machines to write log records into the ESM audit trail, the DIRMAINT machine can use the ESM audit trail instead of the 1AA disk. Depending on the ESM in use, it may be either easy or difficult to isolate the DIRMAINT records from the other data in the ESM audit trail. Either form of recording involves a certain amount of overhead.

Note: IBM recommends use of an audit trail other than the console spool file. If your system is not using an ESM or is not including DIRMAINT records in the ESM audit trail, then you should use the 1AA disk. If you are recording the DIRMAINT activity in the ESM audit trail, you may omit the duplicate recording to the 1AA disk and obtain a slight improvement in system performance.

13

The 2AA disk is optional. If used, the contents are a duplicate of the 1AA disk.

Note: IBM recommends that the 2AA disk be defined and CMS formatted, but recommends that you do not enable the duplicate logging. This avoids the additional processing required when other types of logging occurs. However, this provides for continuous logging in the event of a hardware error that makes the 1AA disk unavailable. If a hardware failure should occur, DirMaint will shutdown, therefore IBM recommends updating the DVHPROFA file to use the 2AA disk. For more information, see “DVHPROFA DIRMAINT” on page 24.

14

Specifies the primary directory backup. This is optional.

15

The 15D disk does not need to be formatted and contains no data. The ability or inability to obtain a link to the disk at any given time synchronizes directory updates between the DIRMAINT machine and the various DIRMSAT service machines in use. The DirMaint machine needs to link to the 15D disk before the DIRMSAT machine otherwise it is possible that no DirMaint commands will get processed.

The 15D disk **is not** required and should not be present on a system maintaining only a single copy of the object directory.

The 15D disk **is** required on a:

- System maintaining duplicate copies of the object directory
- System in an SSI cluster.

16

The 1DE disk is required when the ONLINE_VIA_DELTA= ON option is used in the CONFIG DATADVH file (the default setting). In this case, the 1DE disk must be formatted and allocated in the following manner: cylinder 0 must be allocated as PERM space and cylinder 1 through END must be allocated as DRCT space for delta object directory processing. The ONLINE_VIA_DELTA value determines whether directory changes are applied by calling DIRECTXA, specifying the DELTA option and a mini-source-directory containing only the current directory changes. This creates a mini-object-directory on the 1DE disk, which is applied to the current online directory on the 123 disk.

In order to use the 1DE disk for performance enhancement, the 1DE disk must be associated with a file mode in the DVHPROFA DIRMAINT and DVHPROFA * files. The default file mode in the sample configuration file is X.

When ONLINE_VIA_DELTA processing is **not** used (ONLINE_VIA_DELTA= OFF), the 1DE disk is optional and directory changes are applied by running DIRECTXA against the full user directory file.

Directory Statements for the DATAMOVE Virtual Machine

The directory statement examples are divided into two parts. The first part contains all of the non-DASD directory statements. The second part contains all of the DASD directory statements.

Note:

1. If you are defining DATAMOVE in an SSI cluster, DATAMOVE must be defined as a USER machine so that it may be logged on to only one system in the cluster at a time, and so that it may have access to all publicly-defined minidisks within the SSI cluster. Also, each member of the SSI cluster should have

a DATAMOVE machine defined for that member. IBM recommends naming the DATAMOVE machines in the SSI cluster as DATAMOVE for the DATAMOVE machine associated with slot 1 in the cluster, and DATAMOV2, DATAMOV3, and DATAMOV4 for the DATAMOVE machines associated with slots 2, 3, and 4, respectively.

2. All systems in the cluster must be running the same level of DirMaint code.
3. Once you have a license for DirMaint, you must enable use of the DirMaint feature by following the instructions in the "Memo To Users for the z/VM Directory Maintenance Facility". Note that if you are *not* using a single SYSTEM CONFIG file in an SSI cluster, then the SYSTEM CONFIG file for each system in the cluster must have DirMaint enabled.

DATAMOVE Non-DASD Directory Statements

```

USER DATAMOVE 1 AUTOONLY 2 32M 3 256M 3 BG 4
5 INCLUDE COMMON
6 ACCOUNT SYSTEM SYSPROG
7 D8ONECMD FAIL LOCK
8 IUCV ANY PRIORITY MSGLIMIT 100
9 OPTION CONCEAL IGNMAXU LNKECLV LNKSTABL

```

Figure 4. DATAMOVE Non-DASD Directory Statements

These notes will help you with the example shown in [Figure 4 on page 15](#).

- 1** Specifies the user ID of the DATAMOVE virtual machine.
- 2** Specifies the password for the DATAMOVE virtual machine.
- 3** Specifies the required virtual storage size. DATAMOVE will function on as little as 32MB of storage for small source directories. IBM recommends using the largest virtual machine size available for better performance. If you chose to use a default size less than 32MB, you should leave the maximum size at 256MB.
- 4** Specifies the privilege classes based on z/VM-provided defaults. Privilege class B allows DATAMOVE to suppress CP message headers by using the CP MSGNOH command. Privilege class G is for general user commands.
- 5** Specifies the directory PROFILE
- 6** Specifies the appropriate account to charge for the DATAMOVE virtual machine installation, and to route the printed output to the system programmer responsible for DATAMOVE operation.
- 7** The D8ONECMD statement is an optional statement. This ensures all DIRM DATAMOVE CP and DIRM DATAMOVE CMS commands are properly audited.
- 8** The IUCV statement is optional unless your system is running with RACF or another ESM, and chooses to record commands received by DATAMOVE and messages sent by DATAMOVE in the ESM audit log. If ESM audit logging is enabled, an initial value of 100 is suggested for the MSGLIMIT.
- 9** Specifies the directory options required by the DATAMOVE user ID.

DATAMOVE DASD Directory Statements

```

1 LINK 7VMDIR40 491 191 RR - Product code, primary.
2 LINK 7VMDIR40 492 192 RR - Product code, alternate.
3 LINK 7VMDIR40 11F 11F RR - Interface code, primary.
4 LINK 7VMDIR40 41F 21F RR - Interface code, alternate.
5 LINK PMAINT 551 551 RR - SSI highest level part utilities
6 MDISK 155 MR - Read/write scratch space, A-disk.
7 MDISK 1FA MR - Spool file staging space, Z-disk.
8 MDISK 1AA MR - Primary transaction history files (optional).
9 MDISK 2AA MR - Optional secondary history files.

```

Figure 5. DATAMOVE DASD Directory Statements

The same cautions regarding SFS and security, described in [“DIRMAINT DASD Directory Statements” on page 11](#), also apply to the DATAMOVE machines.

The following notes are provided to help you with your [Figure 5 on page 15](#).

1 - 9

If you have chosen to locate any of the MAINT or 7VMDIR40 “disks” being linked by the DATAMOVE machine into shared file system space, omit the LINK or MDISK statements for them from the DATAMOVE machine directory entry.

LINK statements for the MAINT disks have been omitted from the DATAMOVE machine directory entry. If they are not contained in the included PROFILE, they will have to be added here. If you have installed the optional national language Help files, you should also include a LINK statement for those disks, either in the DATAMOVE machine directory entry or in the included profile.

5

Specifies the 551 disk for the SSI highest level part utilities disk, which contains the CPFMTXA utility.

6

Specifies the read/write scratch space, A-disk.

7

Specifies the spool file staging space, Z-disk.

8

The 1AA disk is optional. The most complete log of DATAMOVE activity is the DATAMOVE machine console spool file. By default, these console spool files are kept for nine days, for nine invocations of the DVHNDAY EXEC. The activity archive files on the 1AA disk contain less detail than the console spool file, but are retained until the disk becomes nearly full. Alternatively, if your system has an ESM with the ability for authorized virtual machines to write log records into the ESM audit trail, the DATAMOVE machine can use the ESM audit trail instead of the 1AA disk. Depending on the ESM in use, it may be either easy or difficult to isolate the DATAMOVE records from the other data in the ESM audit trail. Either form of recording involves a certain amount of overhead.

Note: IBM recommends use of an audit trail other than the console spool file. If your system is not using an ESM or is not including DATAMOVE records in the ESM audit trail, then you should use the 1AA disk. If you are recording the DATAMOVE activity in the ESM audit trail, you may omit the duplicate recording to the 1AA disk and obtain a slight improvement in system performance.

9

The 2AA disk is optional. If used, the contents are a duplicate of the 1AA disk.

Note: IBM recommends that the 2AA disk be defined and CMS formatted, but recommends that you do not enable the duplicate logging. This avoids the additional processing required when another type of logging occurs. However, this provides for continuous logging in the event of a hardware error that makes the 1AA disk unavailable.

If the 1AA⁸ and 2AA⁹ disks are both used, it is recommended that they reside on different physical DASD volumes attached to different physical control units connected to different physical channels or adapters. This allows one to remain available in the event of a hardware error that makes the other unavailable, which may make the difference between whether the system remains operational pending repairs.

Directory Statements for the DIRMSAT Virtual Machine

The DIRMSAT directory example is divided into two parts. The first part contains all of the non-DASD directory statements. The second part contains all of the DASD directory statements.

Note:

1. If you are defining DIRMSAT in an SSI cluster, the satellite server machine must be defined as a USER machine so that it may be logged on to only one system in the cluster at a time, and so that it may have access to the shared spool of the DIRMAINT virtual machine. This way, it can act as a spool file bridge between the DIRMAINT machine and users on the satellite server's own system. Also, each member of the SSI cluster should have a DIRMSAT machine defined for that member. IBM recommends naming the satellite service machines in the SSI cluster as DIRMSAT for the satellite service machine associated with slot 1 in the cluster, and DIRMSAT2, DIRMSAT3, and DIRMSAT4 for the satellite service machines associated with slots 2, 3, and 4, respectively.

2. All systems in the cluster must be running the same level of DirMaint code.
3. Once you have a license for DirMaint, you must enable use of the DirMaint feature by following the instructions in the "Memo To Users for the z/VM Directory Maintenance Facility". Note that if you are *not* using a single SYSTEM CONFIG file in an SSI cluster, then the SYSTEM CONFIG file for each system in the cluster must have DirMaint enabled.

DIRMSAT Non-DASD Directory Statements

```

USER DIRMSAT 1 AUTOONLY 2 128M 3 256M 3 BG 4
5 INCLUDE COMMON
6 ACCOUNT SYSTEM SYSPROG
7 D8ONECMD FAIL LOCK
8 IUCV ANY PRIORITY MSGLIMIT 100
9 OPTION CONCEAL D84NOPAS IGNMAXU

```

Figure 6. DIRMSAT Non-DASD Directory Statements

These notes will help you with the example shown in [Figure 6 on page 18](#).

1

Specifies the user ID of the DIRMSAT virtual machine.

2

Specifies the password for the DIRMSAT virtual machine.

3

Specifies the required virtual storage size. DIRMSAT will function on as little as 16MB of storage for small source directories. IBM recommends using the largest virtual machine size available for better performance. If you chose to use a default size less than 128MB, you should leave the maximum size at 256MB.

4

Specifies the privilege classes based on z/VM-provided defaults.

This virtual machine is authorized to use:

- Privilege class B; this is required to do the following:
 - Allows DIRMSAT to suppress CP message headers, by using the CP MSGNOH command.
 - Allows DIRMSAT to issue the DIAGNOSE code X'84'.
 - Allows DIRMSAT to issue the DIAGNOSE code X'3C'.

Note: By default, these are all CP privilege class B functions. If your site has changed these to other privilege classes, then DIRMSAT must be authorized for the privilege classes containing these functions.

- Privilege class G; this is for general user commands.

5

Specifies the directory PROFILE.

6

Specifies the appropriate account to charge for the DIRMSAT virtual machine installation, and to route the printed output to the system programmer responsible for DIRMSAT operation.

7

The D8ONECMD statement is an optional statement that ensures all DIRM SATELLITE CP and DIRM SATELLITE CMS commands are properly audited.

8

The IUCV statement is optional unless your system is running with RACF or another ESM, and chooses to record commands received by DIRMSAT and messages sent by DIRMSAT in the ESM audit log. If ESM audit logging is enabled, an initial value of 100 is suggested for the MSGLIMIT.

9

Specifies the directory options required by the DIRMSAT user ID.

The D84NOPAS option is optional for a standalone system without an ESM, or for a standalone system with RACF as the ESM. It may also be optional for systems with other ESMs. This is recommended for systems in a multiple-system cluster. It is required in a multiple-system cluster if any directory entries contain the SYSAFFIN EXIST_AT, SYSAFFIN LOGON_AT, or SYSAFFIN NOLOG_AT statements.

DIRMSAT DASD Directory Statements

```

1 LINK 7VMDIR40 491 191 MR - Product code, primary.
2 LINK 7VMDIR40 492 192 RR - Product code, alternate.
3 LINK 7VMDIR40 11F 11F RR - Interface code, primary.
4 LINK 7VMDIR40 41F 21F RR - Interface code, alternate.
5 LINK MAINT 123 123 MW - Object directory disk.
6 LINK PMAINT 551 551 RR - SSI highest level part utilities
7 LINK DIRMAINT 1DF 1DF RR - Primary directory files.
8 LINK DIRMAINT 2DF 2DF RR - Optional secondary directory files.
9 LINK DIRMAINT 15D 15D RR - Intersystem locking disk.
10 MDISK 155 MR - Read/write scratch space, A-disk.
11 MDISK 1FA MR - Spool file staging space, Z-disk.
12 MDISK 1AA MR - Primary transaction history files (optional).
13 MDISK 2AA MR - Optional secondary history files.
14 MDISK 1DE MR - Delta object directory work edit disk.

```

Figure 7. DIRMSAT DASD Directory Statements

The same cautions regarding SFS and security, described in “DIRMAINT DASD Directory Statements” on page 11, also apply to the DIRMSAT machines.

The following notes will help you with the example shown in Figure 7 on page 19.

1 - 8 and 10 - 13.

If you have chosen to locate any of the MAINT, 7VMDIR40 or DIRMAINT “disks” being linked by the DIRMSAT machine into shared file system space, omit the LINK or MDISK statements for them from the DIRMSAT machine directory entry.

LINK statements for the MAINT disks have been omitted from the DIRMSAT machine directory entry. If they are not contained in the included PROFILE, they will have to be added here. If you have installed the optional national language Help files, you should also include a LINK statement for those disks, either in the DIRMSAT machine directory entry or in the included profile.

5

The choice of 123 as the address of the object directory disk is arbitrary. In an SSI cluster, it must match the address used on the DIRECTORY statement in the USER INPUT file. The PLANINFO file shows this as a link to the MAINT 123 disk. In practice, it appears that most customers use either the real system residence volume disk address (the system IPL address), or the virtual address used by the MAINT user ID to refer to the system residence volume (usually 123). The choice is yours.

The use of link mode MW on the object directory disk is correct. This is necessary for the MAINT user ID to update the CP nucleus on the system residence volume without shutting DirMaint down. This is one of the rare situations where MW is appropriate for use with a CMS application program.

The default size of the object directory disk is 20 cylinders. For larger directories, the following formula may be used to determine the size needed based on the number of users in the directory:

$$\text{num_cylinders} = \frac{\text{num_users} * 4 \text{ (4K Blocks)}}{180 \text{ (4K blocks)}}$$

6

Specifies the 551 disk for the SSI highest level part utilities disk, which contains the DIRECTXA utility.

7

Specifies the primary directory files.

8

The 2DF disk is optional. Its use ensures that the DIRMSAT machine can continue operations without loss of data in the event of a hardware or human error that prevents use of the 1DF disk.

Note: If the DIRMAINT machine has a 2DF disk defined, IBM recommends that DIRMSAT machines link it.

9

Specifies the intersystem locking disk.

10

Specifies the read/write scratch space, A-disk.

11

Specifies the spool file staging space, Z-disk.

12

The 1AA disk is optional. The most complete log of DIRMSAT activity is the DIRMSAT machine console spool file. By default, these console spool files are kept for nine days, for nine invocations of the DVHNDAY EXEC. The activity archive files on the 1AA disk contain less detail than the console spool file, but are retained until the disk becomes nearly full. Alternatively, if your system has an ESM with the ability for authorized virtual machines to write log records into the ESM audit trail, the DIRMSAT machine can use the ESM audit trail instead of the 1AA disk. Depending on the ESM in use, it may be either easy or difficult to isolate the DIRMSAT records from the other data in the ESM audit trail. Either form of recording involves a certain amount of overhead.

Note: IBM recommends use of an audit trail other than the console spool file. If your system is not using an ESM or is not including DIRMSAT records in the ESM audit trail, then you should use the 1AA disk. If you are recording the DIRMSAT activity in the ESM audit trail, you may omit the duplicate recording to the 1AA disk and obtain a slight improvement in system performance.

13

The 2AA disk is optional. If used, the contents are a duplicate of the 1AA disk.

Note: IBM recommends that the 2AA disk be defined and CMS formatted, but recommends that you do not enable the duplicate logging. This avoids the additional processing required when another type of logging occurs. However, this provides for continuous logging in the event of a hardware error that makes the 1AA disk unavailable.

It is recommended that the 1AA¹² and 2AA¹³ disks reside on different physical DASD volumes attached to different physical control units connected to different physical channels or adapters. This allows one to remain available in the event of a hardware error that makes the other unavailable, which may make the difference between whether the system remains operational pending repairs.

14

The 1DE disk is required when the ONLINE_VIA_DELTA= ON option is used in the CONFIG DATADVH file (the default setting). In this case, the 1DE disk must be formatted and allocated in the following manner: cylinder 0 must be allocated as PERM space and cylinder 1 through END must be allocated as DRCT space for delta object directory processing. The ONLINE_VIA_DELTA value determines whether directory changes are applied by calling DIRECTXA, specifying the DELTA option and a mini-user-directory containing only the current directory changes. This creates a mini-object directory on the 1DE disk, which is applied to the current online directory on the 123 disk.

In order to use the 1DE disk for performance enhancement, the 1DE disk must be associated with a file mode in the DVHPROFA * files for each of the DIRMSAT machines accordingly. The default file mode in the sample configuration file is X.

When ONLINE_VIA_DELTA processing is **not** used (ONLINE_VIA_DELTA= OFF), the 1DE disk is optional and directory changes are applied by running DIRECTXA against the full user directory file.

Directory Entry for the RSCS Virtual Machine

If you are running DirMaint in a multiple-system cluster and your DIRMAINT service machine must accept transactions from the network, then you should enable the RSCS network machines to use DIAGNOSE code X'F8' to set the secure spool file origin. This is done by specifying the SETORIG keyword on the OPTION statement in the RSCS machine directory entry.

For more information, see [*z/VM: RSCS Networking Planning and Configuration*](#).

Chapter 3. Tailoring the DIRMAINT Service Machine

This chapter provides guidance for tailoring the various data files used by the DIRMAINT service machine. You must tailor several files so they can be used. After you make these changes, however, the files are updated by the DirMaint commands. For more information on these commands, see the [z/VM: Directory Maintenance Facility Commands Reference](#). The files will be described in the sections that follow, along with those few files that require tailoring and have no command to manipulate them.

Data Files

To aid you in tailoring your files:

- • The installation process has placed these tailorable files on the 7VMDIR40 492 minidisk:
 - DVHNames DATADVH
 - DIRMAINT DATADVH
 - DIRMSAT DATADVH
 - DATAMOVE DATADVH
 - DVHPROFM DATADVH
 - DVHPROFA DIRMAINT
 - DVHPROFA DIRMSAT
 - PROFILE EXEC
- • The installation process has placed these tailorable files on the 7VMDIR40 41F minidisk:
 - CONFIG DATADVH
 - DIRMMAIL SAMPDVH
 - 140CMDS DATADVH
 - 150CMDS DATADVH
- **Note:** These files should only be modified on the 7VMDIR40 492/41F test minidisks. Once DIR2PROD PROD has been run to place the DirMaint code into production on the 7VMDIR40 491/11F production minidisks, change these tailorable files as follows:
- 1. Request the DIRMAINT server detach the 7VMDIR40 492 and 41F disks, DIRMAINT's 192 and 21F disks.
 2. Make the changes to the tailorable file on the test disk
 3. Use the DIRM FILE command to send the updated file back to the DIRMAINT service machine and replace the previous copy on the appropriate production disk.
 4. Use the DIRM RLDDATA command to place the changed tailorable file into production.
 - You can use a DIRM SEND command to send the current copy of the file to your reader. Receive the file onto your disk. Edit the file and file the changes back onto your disk. Use a DIRM FILE command to send the file back to the DIRMAINT service machine and replace the previous copy of the file. And finally, use a DIRM RLDDATA or DIRM RLDEXTN command to place the changed file into production.
 - If you want more control and tracking of the changes to these files, you may register your changes as local modifications to VMSES/E. Make the changes using XEDIT with AUX and UPDATE files. Merge the updates using EXECUPDT. Then, use the DIRM FILE and DIRM RLDDATA or DIRM RLDEXTN commands as described above to put the updated file into production. For more information about using VMSES/E to register, edit, and merge your updates, see the *DirMaint Program Directory*.

The files you may need to tailor are addressed in the order you should perform the tailoring. Your most static, least likely to change, files should be tailored first. Volatile files that are likely to change although

you are tailoring other files should be tailored last, just before beginning the Installation Verification Procedures (IVP).

Table 1. New Files for DirMaint

File Name	Description	Topic
PROFILE XEDIT	This file determines the characteristics of your editing sessions. This file should be tailored first.	“PROFILE XEDIT” on page 23
DVHPROFA DIRMAINT	This file determines what minidisks or shared file system directories are accessed at what file mode letters during initialization. This file should be tailored second.	“DVHPROFA DIRMAINT” on page 24
CONFIG DATADVH	This file contains most of the tailorable parameters used throughout DirMaint.	“CONFIG DATADVH” on page 24
DIRMAINT DATADVH	This file identifies the schedule of events to the DirMaint service machine that happen at specific set dates, times, or intervals.	“DIRMAINT DATADVH” on page 48
DVHNAMES DATADVH	This file identifies the user ID's to be notified of any significant events that happen in the various DirMaint service machines.	“DVHNAMES DATADVH” on page 51
DIRMMAIL SAMPDVH	The file identifies a sample for the DIRMMAIL NEWFILE file.	“DIRMMAIL SAMPDVH” on page 52

The following files contain more static information. New customers may consider these files part of the previous group. Migrating customers should convert these files next.

Table 2. New Files for DirMaint Containing Static Information.

File Name	Description	Topic
DVHLINK EXCLUDE	This file contains a list of minidisk addresses and their owners that are excluded from the DVHLINK FILE, and are therefore not included in the results of a DIRM REVIEW command and are not delinked or moved if or when commands are processed that remove the underlying minidisk.	“DVHLINK EXCLUDE” on page 52
PWMON CONTROL	This file contains a list of user ID's whose passwords do not expire, do not receive password expiration notices, or have their password expiration notices sent to an alternate user ID or node ID.	“PWMON CONTROL” on page 54
RPWLIST DATA	This file contains a list of prohibited passwords.	“RPWLIST DATA” on page 54

If you intend to immediately bring DirMaint up with DASD Management functions, you will want to tailor the following two files next. Otherwise, you may defer tailoring of these two files until after completion of the IVP.

Table 3. New Files for Bringing up DASD Management with DirMaint

File Name	Description	Topic
EXTENT CONTROL	This file provides information needed for DirMaint's DASD Management functions. For more information on the EXTENT CONTROL file, see “The Extent Control File” on page 74.	Chapter 6, “DASD Management,” on page 73
AUTHDASD CONTROL	This determines who can allocate space in what DASD groups, regions, or volumes. See “The AUTHDASD File” on page 83	Chapter 6, “DASD Management,” on page 73

These last two files are the most volatile of the group. You will want to save the preparation of these files for last.

Table 4. Volatile Files to Change Just Before Bringing Up DirMaint

File Name	Description	Topic
AUTHFOR CONTROL	This file identifies what user ID's (or profile IDs) have delegated authority for another user ID to act for them, and what command sets are included in that authority.	“AUTHFOR CONTROL” on page 56
USER INPUT	This file is your existing source directory file.	“USER INPUT” on page 58

Note: For more information on linking to the necessary disks, accessing them in the proper order, and copying the output files to the correct destination disks, see the *DirMaint Program Directory*.

Accessing Disks

The following sections assume that the following disks, or the shared file system directory equivalents, have been accessed at the indicated file mode letters.

```
A - 191
B - Reserved for a VMSES/E disk
D - Reserved for a VMSES/E disk
J - 1DF (Primary Directory Files)
K - 492 (DirMaint's Test 191)
L - 41F (DirMaint's Test 11F)
```

PROFILE XEDIT

The PROFILE XEDIT will customize your editing sessions. There is none supplied with the DirMaint product, because the product itself does not require one in order to operate. From your regular z/VM user ID, enter:

Step 1.

```
SENDFILE PROFILE XEDIT *7VMDIR40
```

Step 2.

Enter, a RECEIVE command from the 7VMDIR40 user ID.

If you don't already have a the PROFILE XEDIT file to send, you can create one, enter:

```
XEDIT PROFILE XEDIT A
SET CASE M I
INPUT /* */
INPUT Address 'XEDIT'
INPUT 'COMMAND SET CASE M I'
```

```
INPUT Exit
FILE
```

You can also enter the following command if you need to logon to the DirMaint service machine and look at any files:

```
COPYFILE PROFILE XEDIT A = = K (OLDDATE)
```

DVHPROFA DIRMAINT

This is the second file you must consider tailoring. It determines what disks or shared file system directories are accessed at what file mode letters.

If you have installed DirMaint using the recommended disk addresses shown in the *DirMaint Program Directory*, then this file requires no tailoring. Otherwise, you must update the file to correspond with the disk addresses or shared file directory names you have established.

The file should be RECFM V, and must reside on the 492 disk, the format of the file is described within the file itself. The file type of this file must match the user ID name running the DIRMAINT server. If not DIRMAINT, then rename as appropriate.

Apart from renaming this file as DVHPROFA *userid*, customization also needs to be done in DVHXLVL EXEC with dirmid = '*userid*' and in ACCESS DATADVH with USE= *userid*.

CONFIG DATADVH

The CONFIG DATADVH file contains a large number of local customization options. These can be used to enable DirMaint to work with an ESM, such as IBM's RACF or an equivalent ESM available from other vendors, fine tune DirMaint for optimum performance in YOUR environment, and enable or disable selected optional capabilities.

The format of the file is described within the file itself. It should be RECFM V, and must reside on the user interface disk(s).

Multiple CONFIG* DATADVH files are allowed and recommended. There are two types of entries in these files: using single occurrence entries and using all occurrences of the keyword search string.

Important

The CONFIG DATADVH file is an IBM part that should never be modified. Desired changes should be made in an override file. An override file has a file name of CONFIG* and file type of DATADVH as explained below.

Example—Using a Single Occurrence Value Entry:

```
PASSWORD_RANDOM_GENERATOR_EXIT= DVHPXR EXEC
```

The order in which multiple CONFIG* DATADVH files are searched is significant. Files are searched in reverse alphabetical order: CONFIG99 before CONFIG0, CONFIG0 before CONFIGZZ, CONFIGZZ before CONFIGA, and CONFIGA before CONFIG. If there are two (or more) occurrences of the same file name, only the first one is used (file mode A, or the file mode letter closest to A). If there are two or more occurrences of the keyword search string:

```
PASSWORD_RANDOM_GENERATOR_EXIT=
```

in any of these files, only the first one is used.

Example—Using All Occurrences of the Keyword Search String:

```
LOADABLE_SERV_FILE= DVHWAIT EXEC
LOADABLE_SERV_FILE= DVHRDR EXEC
LOADABLE_SERV_FILE= DVHRQST EXEC
LOADABLE_SERV_FILE= DVHCEXIT EXEC
```

```
LOADABLE_SERV_FILE= DVHADZ EXEC
LOADABLE_SERV_FILE= DVHAEZ EXEC
LOADABLE_SERV_FILE= DVHMSG EXEC
```

Any and all CONFIG* DATADVH files are searched in the same order used for the single occurrence example. However, all records that match the search string are used. In this loadable file example, the order is significant. In other cases the order may not matter.

Some of the information in these CONFIG* DATADVH files is required by the user's virtual machine to enter DirMaint commands. If you split the IBM-supplied CONFIG file into multiple files, you may keep some of the files on disks accessible only to the DirMaint service machines: DIRMAINT, DATAMOVE, and DIRMSAT; but some of the files must remain on the user interface disk.

The comments within the file describe each statement, including a description of the statement keyword, the acceptable values for that statement, the significance of each of those values where not obvious, and whether only the first occurrence of the statement found in the various CONFIG* DATADVH file(s) is used or whether all occurrences are used.

For more information, see [“The CONFIG* DATADVH File” on page 104](#).

Step 1. Select Directory Update Options

The first statements to check are:

```
1 RUNMODE= TESTING | OPERATIONAL
2 // SRCUPDATE= NOP | DISABLED
3 ONLINE= OFFLINE | SCHED | IMMED
4 UPDATE_IN_PLACE= YES | NO
5 ONLINE_VIA_DELTA= ON | OFF
6 WRK_UNIT_ONLINE= NO | YES
7 // DIRECTXA_OPTIONS= MIXED | MIXED NOMIXMSG
8 DEFAULT_DIRECT_ACTION= UNCONDITIONAL | CONDITIONAL
9 SORT_DIRECTORY= NO | YES
10 SORT_BY_DEVICE_ADDRESS= NO | YES
11 BACKUP_REBUILD= CLUSTER DVHLINK <VCONTROL> | NONE
12 CLASS_LIMIT_ON_USER_STATEMENT= 8 | 0 ... 32 | 0 ... 8
13 CLASS_STATEMENT_IN_PROFILE_CHECK= NO | YES
14 WRK_UNIT_CLEANUP= ERASE | RENAME
15 LINK_MAX_INDIRECT=
```

Figure 8. Selecting Directory Update Options

- 1** The RUNMODE= TESTING statement ensures that DirMaint will not make any changes to your source directory file as the result of any commands that are issued to the DIRMAINT service machine. When you have completed the first part of the testing described in [Appendix H, “Test the Installation/Service for DirMaint,” on page 269](#), changing the statement to RUNMODE= OPERATIONAL enables DirMaint to begin making changes to the source directory.
- 2** The SRCUPDATE= NOP statement ensures that DirMaint will make changes to the source directory as requested, following an IPL or a DIRM RLDDATA command, until a DIRM DISABLE command is entered. The SRCUPDATE= DISABLED statement ensures that DirMaint will not make any changes to your source directory file as the result of any commands, following an IPL or a DIRM RLDDATA command, until a DIRM ENABLE command is entered. IBM recommends omitting this statement from the CONFIG* DATADVH file, allowing the enable/disable state established by using DIRM DISABLE and DIRM ENABLE commands to persist across an IPL or DIRM RLDDATA command.
- 3** Even with RUNMODE= OPERATIONAL and with SRCUPDATE= NOP the ONLINE= OFFLINE statement will prevent DirMaint from updating the object directory.

Changes to the source directory will have no effect on your system unless and until the updated directory is placed online using the DIRECTXA command. When you have completed the first part of the testing described in [Appendix H, “Test the Installation/Service for DirMaint,” on page 269](#), you can enable updates to the object directory by changing the following:

- ONLINE= statement to ONLINE= IMMED

or

- ONLINE= statement to ONLINE= SCHED and change the date from 4/26/02 to ==/==/== or another date value suggested for the DIRECT entry in the DIRMAINT DATADVH file. For more information, see the “DIRMAINT DATADVH” on page 48.

A small system installation would use ONLINE= IMMED and a large system installation would use ONLINE= SCHED. If the users or administrators are unable to enter subsequent commands because DIRMAINT is still busy processing the previous command, you have reached large system status, and should switch to ONLINE= SCHED.

4

The UPDATE_IN_PLACE= YES entry has no effect when the ONLINE= entry is set to OFFLINE. After the ONLINE= entry has been set to either SCHED or IMMED, you will find that use of UPDATE_IN_PLACE=YES will give better performance and response time than using UPDATE_IN_PLACE= NO. IBM recommends UPDATE_IN_PLACE= YES for all systems.

5

The ONLINE_VIA_DELTA entry determines whether directory changes are applied by calling DIRECTXA, specifying the DELTA option and a source directory subset containing only the current directory changes. This creates an object directory subset which is applied to the current online directory. ONLINE_VIA_DELTA options are ON (apply directory changes using a delta directory) or OFF (apply directory changes by running DIRECTXA against the full user directory file). The default is ON.

When ONLINE_VIA_DELTA is ON and UPDATE_IN_PLACE is YES, directory changes that can be applied using Diagnose X'84' will still be placed online using Diagnose X'84' and other directory changes will be placed online using a delta directory created by DIRECTXA with the DELTA option.

6

The WRK_UNIT_ONLINE= YES entry has no effect when the ONLINE= entry is set to OFFLINE or IMMED. If the ONLINE= entry has been set to SCHED, and the WRK_UNIT_ONLINE= is set to NO, you may find that it takes too long to complete processing the DASD management commands: AMDISK with formatting options, CMDISK, DMDISK with cleanup being performed, PURGE with cleanup being performed, and so forth. These work units can be accelerated by using WRK_UNIT_ONLINE= YES. However, this may effectively negate the difference between ONLINE= SCHED and ONLINE= IMMED. If you find that your DIRMAINT service machine is spending more time placing the directory changes online than it is in making directory source updates, and you already have ONLINE= SCHED, then you will need to use WRK_UNIT_ONLINE= NO.

7

The DIRECTXA_OPTIONS= entry is passed along to the CP DIRECTXA command. Valid options are to leave it blank, specify MIXED, or specify both MIXED and NOMIXMSG. For more information on these parameters, see the *z/VM: CP Commands and Utilities Reference*.

If you already have a clean directory that gives no error messages from DIRECTXA, then IBM recommends you leave this entry blank. This will allow DIRECTXA and therefore DirMaint to perform the maximum degree of error checking before making directory updates.

If you have migrated from VM/SP, VM/SP HPO, or VM/ESA® 370 feature and have not removed the 370 unique statements from your directory, then IBM recommends use of both MIXED and NOMIXMSG.

8

The DEFAULT_DIRECT_ACTION value specifies the default for the optional UNCONDITIONAL or CONDITIONAL parameters on the DIRMAINT DIRECT command. If specified as CONDITIONAL, the DIRECTXA command will not be issued unless there are pending changes to be processed. If specified as UNCONDITIONAL, the DIRECTXA command will be issued, regardless of any pending changes to be processed. (If omitted, the default is UNCONDITIONAL.) For more information, see the DIRMAINT DIRECT command in *z/VM: CP Commands and Utilities Reference*.

9

The SORT_DIRECTORY value specifies whether the USER DIRECT file is to be maintained in sorted order. Specifying YES increases the time and storage requirements for BACKUP processing.

10

The SORT_BY_DEVICE_ADDRESS value specifies whether the device statements in each user directory are maintained in sorted order by device address. Specifying YES increases the time and storage requirements for all updates to directory entries either PROFILE or USER containing device statements.

11

The BACKUP_REBUILD= CLUSTER DVHLINK <VCONTROL> | NONE statement controls the balance between the time taken up to complete a BACKUP operation and the amount of clean-up that was done by the BACKUP operation and the resulting DASD utilization. The keywords used within the statement are:

Table 5. Tags in the CMS NAMES File

Keyword	Description
CLUSTER	Specifies USER DIRECT file, all CLUSTER files, and all DIRMPART files are erased and rebuilt as part of BACKUP processing. This reclaims space in existing CLUSTER files from directory entries that have been updated and are now separate DIRMPART files.
DVHLINK	Specifies the DVHLINK FILE is rebuilt to reflect any changes in the DVHLINK EXCLUDE file since the previous BACKUP run.
VCONTROL	Specifies all VCONTROL files are erased and rebuilt as part of BACKUP processing. This reclaims DASD space for any VCONTROL files that describe volumes that have been removed from the system and corrects for changes made to the EXCLUDE section of the EXTENT CONTROL file that were not followed by a RLDEXTN command. If the statement is omitted or is present with no value, the default is CLUSTER DVHLINK.
NONE	Specifies the keyword value of NONE may be used.

12

The CLASS_LIMIT_ON_USER_STATEMENT= specifies how many CP privilege classes may be included on the USER statement. The valid range is 0 to 32. The default is 8. A new CLASS directory statement is created if the:

- Limit is set to 0
- Number of classes defined for a user entry exceeds the specified limit
- Classes have a system affinity other than the *

13

The CLASS_STATEMENT_IN_PROFILE_CHECK= statement specifies whether DirMaint will do the additional checking to see if an included PROFILE contains a CLASS statement. You should experiment with:

- CLASS_LIMIT_ON_USER_STATEMENT= 0
- CLASS_STATEMENT_IN_PROFILE_CHECK= NO
- CLASS_LIMIT_ON_USER_STATEMENT= 8 ... 32
- CLASS_STATEMENT_IN_PROFILE_CHECK= YES

The right combination for performance varies from system to system, and may vary depending on whether you are using the operand ONLINE= IMMED.

14

The WRK_UNIT_CLEANUP= value controls whether the WORKUNIT files will be erased or renamed to WORKSAVE after the completion of the DASD management commands. In the event of a failure, they will be renamed to WUCFFAIL in either case.

15

The LINK_MAX_INDIRECT= entry determines how deeply links to links may be nested. If set to zero, directory links are disabled. If set to 1, a LINK to an MDISK is allowed. If set to 2 or more, a LINK to a LINK is allowed. If left blank, the default value is the same as the CP limit of 50.

Step 2. Select Restart and Recovery Characteristics

Next, enable DirMaint restart recovery capabilities.

```

1 SHUTDOWN_LOGOFF_THRESHOLD= 3      /* Choose 2, 3, or 4.          */
2 SHUTDOWN_RESET_THRESHOLD= 3      /* The s_r_t must be >= 1.    */
3 SHUTDOWN_REIPL_COMMAND=      CP IPL CMS PARM AUTOOCR          */
4 1SAPI_REQUESTS_BEHAVIOR=      2 25 /* DAYS and PERCENTAGE */

```

Figure 9. Selecting Restart and Recovery Characteristics

1

The SHUTDOWN_LOGOFF_THRESHOLD value specifies the number of error induced shutdown conditions that may be encountered before the service machine logs itself off, if running disconnected. The recommended values are: 2, 3, or 4.

2

The SHUTDOWN_RESET_THRESHOLD value specifies the number of commands that must be successfully processed after one error induced shutdown before the logoff counter is reset. A successfully processed command is one that doesn't result in a shutdown condition, it does not necessarily result in a zero return code. The minimum recommended value is 2; the maximum recommended is 5.

3

Shutdown events are handled in pairs. The first shutdown, or any odd numbered shutdown, causes a re-IPL and the failing command is retried. The second shutdown, or any even numbered shutdown is *probably* the retry of the failing command. (The lower the value for the RESET threshold, the more likely this is true; a RESET value of 1 ensures this.) Even numbered shutdowns cause either a re-IPL or a LOGOFF after purging the command from the retry queue.

- After the specified number of shutdown events have occurred, a CP LOGOFF command is entered if running disconnected. If running connected the system will continue to re-IPL.
- The SHUTDOWN_REIPL_COMMAND value specifies the CP command to be performed in order to accomplish the re-IPL. The AUTOOCR keyword is required. Any other keywords that are valid on the IPL command may also be used if appropriate for your system environment.
- The DISK_SPACE_THRESHOLD_addr= value specifies warning and shutdown limitations on DASD space usage, where *addr* is the device address of the disk whose threshold is being changed. When DASD space usage reaches the warning threshold, hourly messages will be broadcast to the support staff asking for assistance. When usage reaches the shutdown threshold, the DirMaint service machines will disable directory updates and log themselves off.

4

The 1SAPI_REQUESTS_BEHAVIOR statement determines how the 1SAPI REQUESTS file (which contains a log of the synchronous application programming interface requests and their return codes) is processed. Large amounts of SAPI requests can cause the DIRMAINT 155 disk to become full. In order to prevent disk full errors (which can cause the DIRMAINT server to shutdown), the DIRMAINT server will automatically prune the 1SAPI REQUESTS file when the remaining space on the DIRMAINT 155 disk is less than or equal to the amount of disk space needed to prune the file plus 5 percent of the disk.

The 1SAPI_REQUESTS_BEHAVIOR statement can be used to configure the number of previous days for which to keep request information and the percentage of the 1SAPI REQUESTS file to prune when it is growing too large. The options on this statement are as follows:

PREVIOUS_DAYS

This is an integer between 1 and 9 that represents the number of previous days for which to keep request information. The default value is 2 days.

PRUNE_PERCENTAGE

This is an integer between 5 and 90 that represents the percentage of total requests which should be pruned from the 1SAPI REQUESTS file if the space on the DIRMAINT 155 disk becomes smaller than the space needed to prune the file plus 5 percent of the disk. The default value is 25 percent.

Refer to the *DirMaint Program Directory* for information on how to determine the size of the DIRMAINT 155 disk when DirMaint is used with the z/VM Systems Management APIs.

Step 3. Select Security and Auditing Characteristics

Next, configure DirMaint to work with your ESM (if one is installed), and enable other security related options.

```

1 / ESM_PASSWORD_AUTHENTICATION_EXIT= DVHXPX EXEC
2 / SPOOL_FILE_SECLABEL= SYSLOW
3 / DISK_CLEANUP= NO | YES
3 / CYL0_BLK0_CLEANUP= NO | YES
4 / MESSAGE_LOGGING_FILETYPE= TRANSLOG
4 / MESSAGE_LOGGING_FILTER_EXIT= DVHXLF EXEC
4 / MESSAGE_LOG_RETENTION_PERIOD= 3 (MONTHS)
5 / ESM_LOG_FILTER_EXIT= DVHXLF EXEC
5 / ESM_LOG_RECORDING_EXIT= DVHESMLR EXEC
6 / SHUTDOWN_MESSAGE_FAILURE= LOGOFF | REIPL
7 / POSIX_UID_AUTO_RANGE= lowerbound | upperbound
8 / ADD_COMMAND_PROCESSING= FULL | SHORT
9 / PURGE_COMMAND_PROCESSING= FULL | SHORT
10 SPOOL_CONSOLE= START FOR * CLASS 0 HOLD
11 ALLOW_ASUSER_NOPASS_FROM= serverid *|servernode
12 / NEEDPASS_RESPECT= NO | YES

```

Figure 10. Selecting Security and Auditing Characteristics

1

If you have an ESM installed, you will need to remove the slash (/) from the ESM_PASSWORD_AUTHENTICATION_EXIT statement, and perhaps change the routine statement name. The IBM-supplied routine (DVHXPX EXEC) is ready for use with RACF or other ESMs issuing a call to the DMSPASS CSL routine for the password verification interface.

2

If your system is running with Mandatory Accessed Control (MAC), and you followed the directions in [Appendix A, “External Security Manager Considerations,”](#) on page 195, you will find that spool files sent by DIRMAINT will have a SECLABEL of SYSHIGH and will be inaccessible by general users. To make DIRMAINT send these spool files with a more suitable SECLABEL, remove the slash from the SPOOL_FILE_SECLABEL statement. You may choose a different SECLABEL; however, it should be one available to all or most users.

3

Use of the defaults during this IVP activity is satisfactory. IBM recommends that you remove the leading slash from the DISK_CLEANUP statement and change the keyword value to YES if your users have minidisks containing sensitive information. Depending on the nature of the minidisks your system may have defined beginning on cylinder 0 of a CKD volume or block 0 of an FB-512 volume, you should consider changing the CYL0_BLK0_CLEANUP entry to YES also.

Note: The statement DISK_CLEANUP= YES will **not** clean a minidisk that overlaps another minidisk; although it will clean a minidisk that is overlapped by another minidisk. Thus deleting a full volume minidisk containing many other minidisks will not harm any of the other minidisks, but deleting one of the many smaller minidisks will clean that small minidisk without harm to the full volume minidisk.

4

IBM recommends use of the MESSAGE_LOGGING_FILETYPE during IVP. Simply remove the slash prefix from this statement to enable logging.

As you review the entries in the TRANSLOG files, you may find many messages that are of no interest to you. If so, you may use the MESSAGE_LOGGING_FILTER_EXIT, the IBM-supplied exit, to suppress future collection of these messages.

A MESSAGE_LOG_RETENTION_PERIOD of 3 months is suggested. This value may need to be adjusted up or down, depending on the amount of DirMaint activity on your system and the size of the minidisk you have allocated for the transaction history files.

The MESSAGE LOG RETENTION PERIOD value in the IBM supplied CONFIG SAMPDVH file specifies that the interval may be MONTHS (the default) or DAYS (or DAY). If:

- Set to DAYS or DAY, the TRANSLOG file will be closed daily, using a file type of TLyymmdd.
- Specified as anything other than DAYS or DAY, the TRANSLOG file will continue to be closed monthly, using a file type of TLOGyymm.
- The interval is specified as DAYS or DAY, the valid range is between 1 and 730 days, and a non-numeric value will be treated as 90 days.
- The interval is not DAYS or DAY, the valid range is 1 to 24 months, and a non-numeric value will be treated as 3 months.

5

If you have an ESM installed with the necessary capabilities, you may choose to record DirMaint activity in the ESM log files. To do so, enable the ESM_LOG_RECORDING_EXIT. The IBM-supplied exit, DVHESMLR EXEC, calls the DVHRACLR MODULE to record activity into the RACF log. If you are using another ESM, you may tailor either the DVHESMLR EXEC to call the appropriate logging module for your ESM, if supplied by your ESM vendor; or you may tailor the DVHRACLR ASSEMBLE file to communicate with your ESM using the interfaces documented by the ESM.

As you review the entries in the ESM log, you may find many DirMaint messages that are of no interest to you. If so, you may use the ESM_LOG_FILTER_EXIT to suppress future collection of these messages.

6

It is possible that an error condition may arise in the message handling routines. Your best alternative is to set the SHUTDOWN_MESSAGE_FAILURE= entry to REIPL. If running disconnected, this will cause the service machines: DIRMAINT, DATAMOVE, DIRMSAT to re-IPL CMS and attempt an automatic restart. If you wish to DirMaint shut itself down if unable to issue or log a message for any reason, this is done by setting the SHUTDOWN_MESSAGE_FAILURE= entry to LOGOFF. If running disconnected, this will cause the service machines to LOGOFF if and when an error is encountered in the message handling routines. In either case, if running logged on, the service machine will not LOGOFF, but will re-IPL CMS, run through the PROFILE EXEC to access all necessary disks, then wait at CMS Ready for manual problem diagnosis and restart.

7

The POSIX_UID_AUTO_RANGE= entry specifies a UID range for use during automatic assignment of POSIX UIDs to users during DIRM ADD and DIRM POSIXINFO operations:

- The valid range for POSIX UIDS is 0 to 4294967295. This field will be considered null if nonnumeric data is provided in this field:
 - lowerbound < 0
 - upperbound > 4294967295
 - upperbound < lowerbound
- When this setting is found, DirMaint operations will sequentially assign a UID to the target user. The next UID to use is saved in the POSIXUID CONTROL file on the DIRMAINT server's primary directory disk (1DF by default).
- DIRM ADD operations done with directory entries that already have a POSIX UID are not affected by this setting.
- If the range is exhausted, the operation will continue but a warning message will be issued indicating that the automatic addition of a UID did not take place.
- DIRM POSIXINFO, DIRM ADD, and DIRM REPLACE operations that explicitly set a UID that falls between lowerbound and upperbound will receive a warning message and operation will continue. DIRM REPLACE will only receive the warning message if the UID changes during the DIRM REPLACE operation.

- Should your installation exhaust the range of UIDs established, it is recommended that the upperbound be advanced or that the entire range be advanced beyond the exhausted range. This is due to the fact that DirMaint does not catalog used UIDs as it assigns them. It simply advances through the range assigning each UID sequentially.
- If you chose to use a lower range you should delete the POSIXUID CONTROL file after establishing the new range. This will cause DirMaint to start at the new lowerbound. Care should be taken to ensure that the new range does not overlap any used UIDs as DirMaint sequentially assigns them and does not check to ensure the UID has not been previously used.

8 and 9

- ADD_COMMAND_PROCESSING
- PURGE_COMMAND_PROCESSING

Note:

1. These entries may be given as either FULL or SHORT.
2. The ADD_COMMAND_PROCESSING and PURGE_COMMAND_PROCESSING entries could also affect the OBJECT REUSE policy. Use of the ADD_COMMAND_PROCESSING SHORT will bypass the extent overlap checking for the ADD command and use of the PURGE_COMMAND_PROCESSING= SHORT will bypass the disk cleanup.

If FULL is specified or defaulted then all LINK and MDISK statements are removed from the directory entry being added or purged, and are separately processed as a batch file. Full authentication and authorization checking is done for all commands in the batch file, and all appropriate exit routines are called. The ADD and PURGE commands may be left in command set A, allowing use of the ADD and PURGE commands to be delegated more widely.

If SHORT is specified, then all LINK and MDISK processing for the ADD and/or PURGE commands are processed in line, like REPLACE, with no authorization checking performed for the use of the LINK, AMDISK, or DMDISK commands that would have been included in the batch file. Calls to the following exits are bypassed for ADD and PURGE processing:

- DASD_AUTHORIZATION_CHECKING_EXIT
- LINK_AUTHORIZATION_CHECKING_EXIT
- MINIDISK_PASSWORD_SYNTAX_CHECKING_EXIT

This makes the ADD and PURGE commands comparable to REPLACE in privilege, and requires them to be moved from command set A to command set S along with REPLACE; unless use of command set A is not delegated to anyone who does not already have REPLACE authority.

Note: When SHORT is specified, the FULL processing is done if any of the these exits are used:

- DASD_OWNERSHIP_NOTIFICATION_EXIT
- LINK_NOTIFICATION_EXIT
- MINIDISK_PASSWORD_NOTIFICATION_EXIT

10

The SPOOL_CONSOLE= entry identifies the USER id to receive the console spool files from the various DirMaint service machines. The data following the equals sign (=) is usually the command syntax after the CP SPOOL CONSOLE command.

Note: When the DIRM GETCONSOLE command is issued, a copy of the spool file is sent to the command issuer and a copy is sent to the user ID identified. If the user ID's are the same, only one copy is sent. The same action will occur if the DIRM GETCONSOLE command is to retrieve a spool file residing in the virtual printer.

11

The ALLOW_ASUSER_NOPASS_FROM= *serverid* *|*servernode* entry identifies the *userid* and *nodeid* of trusted service machines who can make requests including the ASUSER prefix

keyword (which generally forces authentication) without supplying a password and thus without authentication. For example, they are allowed to issue:

```
EXEC DIRMAINT AS DIRMAINT FOR anyid
```

and make any and all changes to the directory that could be made from the DIRMAINT server's console. This capability *must* only be given to virtual machine that are well trusted not to misuse this capability. A *nodeid* of * may be used to represent any system within the cluster where the DIRMAINT server is running.

Note: This statement is checked by the DIRM command user's virtual machine and therefore must be located on the DIRMAINT 11F disk.

12

When NEEDPASS_RESPECT is NO (the default), DirMaint will not prompt for passwords when executing DirMaint commands. When NEEDPASS_RESPECT is YES, DirMaint prompts for passwords based on the user's NEEDPASS setting. However, password prompting will occur when the ASUSER prefix is specified.

Step 4. Select Password Control Characteristics

If your system has an ESM installed, the ESM probably controls logon passwords and minidisk access. If so, you may keep the defaults for the following entries, or you may delete them from the CONFIG* DATADVH file(s). If your system does not have an ESM installed, or if by some chance your ESM does not control either logon passwords or minidisk access, then you need to select your password control characteristics.

```
1 PW_INTERVAL_FOR_GEN= 0 0
2 PW_INTERVAL_FOR_PRIV= 0 0
3 PW_INTERVAL_FOR_SET=
4 PW_WARN_MODE= MANUAL | AUTOMATIC
5 PW_LOCK_MODE= MANUAL | AUTOMATIC
6 PW_NOTICE_PRT_CLASS= A | 1 letter A-Z | NONE
7 PW_NOTICE_RDR_CLASS= A | 1 letter A-Z | NONE
8 MDPW_INTERVAL= 0 0
9 PW_MONITOR=userid
10 PW_REUSE_HASHING_EXIT=
11 PW_REUSE_INTERVAL=
```

Figure 11. Selecting Password Control Characteristics

1

The PW_INTERVAL_FOR_GEN= entry indicates how long a general user may keep a given logon password (in days) before DirMaint begins sending password expiration warning notices, and how long the user may keep that password before having the password changed to NOLOG to deny access to the system. The default values are 0 and 0, indicating that notices are not sent and users are not locked out. If nonzero, the number of days before warning must be less than the number of days before lockout.

2

The PW_INTERVAL_FOR_PRIV= entry identifies how long privileged users may keep a given logon password (in days) before DirMaint begins sending password expiration warning notices, and how long the user may keep that password before having the password changed to NOLOG to deny access to the system. The default values are 0 and 0, indicating that notices are not sent and users are not locked out. If nonzero, the number of days before warning must be less than the number of days before lockout.

All users are considered to be general users, unless a CHECK_USER_PRIVILEGE_EXIT= record identifies an exit routine that determines which users are privileged. For more information, see [“Check User Privilege \(DVHXCP\)” on page 151](#).

3

Unless specified otherwise, a password that is set by using an: ADD, CHNGID, or SETPW command; will be valid for the full duration specified on the respective PW_INTERVAL_FOR_GEN=

or PW_INTERVAL_FOR_PRIV= entry. If you choose to make users change their password in a shorter time after having their password set by the administrator, you may specify an alternate lockout period by using the PW_INTERVAL_FOR_SET= entry. The first value specifies the number of days a password is valid following one of the commands that set the password for a general user, the second value specifies the number of days a password is valid for a privileged user.

4

The PW_WARN_MODE= entry identifies whether DirMaint will send password warning notices automatically at the time scheduled in the DIRMAINT DATADVH file (AUTOMATIC), or whether password warning notices are sent only when the administrator enters the PWMON MONITOR command (MANUAL).

5

The PW_LOCK_MODE= entry identifies whether DirMaint will change expired passwords to NOLOG automatically at the time scheduled in the DIRMAINT DATADVH file (AUTOMATIC), or whether expired passwords are only changed to NOLOG when the administrator enters the PWMON LOCKOUT command (MANUAL).

Note:

Before setting PW_LOCK_MODE= AUTOMATIC, you should ensure that:

- PW_WARN_MODE= AUTOMATIC
- The PW_INTERVAL_FOR_GEN= and PW_INTERVAL_FOR_PRIV entries specify reasonable periods for your installation,
- The disconnected service machines have a surrogate designated in the PWMON CONTROL file to receive their notices,
- Critical system resource user ID's (for example, the DIRMAINT service machine itself, MAINT, OPERATOR, PVM, and RSCS) are listed in the PWMON CONTROL file as being exempt from lockout.

For more information on the PWMON CONTROL file, see [“PWMON CONTROL” on page 54](#).

If you comply with these rules, your system should be safe from becoming unusable through having all user ID's on your system getting their password set to NOLOG.

6

The PW_NOTICE_PRT_CLASS= entry identifies the spool file class to be used for printed password expiration notices. A value of NONE indicates that password expiration notices will not be printed.

7

The PW_NOTICE_RDR_CLASS= entry identifies the spool file class to be used for password expiration notices sent to a user's reader. A value of NONE indicates that password expiration notes are not to be sent to the user's reader.

8

The MDPW_INTERVAL= entry determines how old a minidisk password may become before entering a WARNING period, and before entering the EXPIRED period. The first value must be less than the second value, the second value must be less than or equal to 373 (one year plus one week grace), use of 0 0 disables checking. DirMaint takes no action for old passwords, but does flag them appropriately on the MDAUDIT report.

9

The PW_MONITOR= userid statement is used when the user needs to contact someone authorized to issue a SETPW command for their user ID in the event their logon password has expired and been set to NOLOG.

10

The PW_REUSE_HASHING_EXIT routine hashes the user's password for storage in the password history file. The file type may be either EXEC or MODULE. The IBM supplied default is DVHHASH MODULE. If not specified, the passwords will be stored in the history file as hexadecimal digits.

11

The PW_REUSE_INTERVAL identifies how long an entry is kept in the password history file. It may be either a time period with a DAYS suffix, or a count with no suffix. The IBM supplied default is 365 DAYS.

Note: If the IBM supplied default of 365 DAYS is changed, you need to enable a PASSWORD CHANGE NOTIFICATION EXIT = DVHXPXN EXEC statement in the CONFIG* DATADVH file.

Step 5. Select RACF-Specific Characteristics

If your system specifically has RACF® installed as the ESM, the following entries set defaults for the DirMaint RACF connector function. The RACF connector function issues RACF commands in order to communicate RACF updates associated with certain DIRM commands. This includes user creation and deletion, password management, POSIX segment management, ACI group management, permission requirements for facilities that require additional coordinated CP and RACF privileges, and discrete resource profile creation and deletion.

In order for the DIRMAINT service machine to be able to issue RACF commands and control RACF functions, the DIRMAINT service machine must be given the group-SPECIAL or SPECIAL attribute as shown below.

Note that if RACF administration is decentralized, then DirMaint should have the group-SPECIAL attribute. This attribute makes DirMaint an administrator at a group level, thereby enabling it to control access to its group and to issue RACF commands.

Verifying that RACF Administration is Decentralized

To verify this attribute, enter:

```
RAC LU DIRMAINT
```

On the console, look to see if it says:

```
CONNECT ATTRIBUTES=SPECIAL
```

If you do *not* see this attribute, enter:

```
RAC CONNECT DIRMAINT GROUP(grpname) SPECIAL
```

If RACF administration is centralized, then DirMaint should have the SPECIAL attribute, which makes it an administrator and enables it to issue RACF commands and to control access to all users.

A sample file, CONFIGRC SAMPDVH, is supplied with the product code on the 7VMDIR20 2C2 disk. If no RACF communication is desired, no action is required. If RACF communication is desired, this file should be copied to the DIRMAINT 11F disk and renamed to CONFIGRC DATADVH, to be used as an override file for RACF-specific configuration entries. The sample override file contains a USE_RACF= YES ALL configuration statement to configure the DirMaint server to use all default IBM-supplied RACF connector support. The sample file should be reviewed and changed to meet the needs of the installation, if required.


```
1 USE_RACF= YES|NO ALL|dirm_file_name|exit_name
2 RACF_ADDUSER_DEFAULTS= UACC(NONE)
3 RACF_RDEFINE_VMMDISK_DEFAULTS= UACC(NONE) AUDIT(FAILURES(READ))
4 RACF_DISK_OWNER_ACCESS= ACC(ALTER)
5 RACF_RDEFINE_VMPOIX_POSIXOPT.QUERYDB= UACC(READ)
6 RACF_RDEFINE_VMPOIX_POSIXOPT.SETIDS= UACC(NONE)
7 RACF_RDEFINE_SURROGAT_DEFAULTS= UACC(NONE) AUDIT(FAILURES(READ))
8 RACF_RDEFINE_VMBATCH_DEFAULTS= UACC(NONE) AUDIT(FAILURES(READ))
9 RACF_RDEFINE_VMRDR_DEFAULTS= UACC(NONE) AUDIT(FAILURES(READ))
10 RACF_VMBATCH_DEFAULT_MACHINES= BATCH1 BATCH2
11 TREAT_RAC_RC.4= 0|4
12 ESM_PASSWORD_AUTHENTICATION_EXIT= DVHXPX EXEC
13 RACF_RDEFINE_VSWITCH_LAN= YES|NO
```

Figure 12. Selecting RACF-Specific Characteristics

1

The USE_RACF= entry enables (by specifying YES) or disables (by specifying NO) all or certain functions in the DirMaint RACF connector support. Multiple USE_RACF= statements may be used to enable/disable multiple RACF connector functions.

USE_RACF= YES ALL enables all DirMaint RACF connector support (except for the support within any RACF connector EXEC specified in a USE_RACF= NO statement). For example, the combination of the following two USE_RACF= statements enables all RACF connector support except for the support included within the DVHRUN EXEC:

USE_RACF=	YES	ALL
USE_RACF=	NO	DVHRUN EXEC

USE_RACF= NO ALL indicates that all DirMaint RACF connector support is disabled (except for the support within any RACF connector EXEC specified on a USE_RACF= YES statement). USE_RACF= NO ALL is the default if no USE_RACF= YES ALL statement is configured. When USE_RACF= NO ALL is used, all USE_RACF= YES ALL statements will be ignored. For example, by specifying the following two statements, all RACF connector function is disabled except that which is included within the DVHRPN EXEC:

USE_RACF=	NO	ALL
USE_RACF=	YES	DVHRPN EXEC

The following table shows the RAC commands issued by each DirMaint RACF connector EXEC during the processing of specific DIRM commands. You can enable/disable the RACF connector support provided by a specific EXEC by specifying the associated EXEC's file name and file type (EXEC) on the USE_RACF= statement.

Table 6. RAC Commands Issued by DirMaint RACF Connector EXECs

File Name	Type of Change	DIRM Command	RAC Commands Issued (in order of execution)
DVHRDN	DASD	ADD, AMDISK, CLONEDISK	RDEFINE VMMDISK <i>resource_name</i> OWNER(<i>target_id</i>) <i>racf_rdefine_vmmdisk_defaults</i> PERMIT <i>resource_name</i> CLASS(VMMDISK) ID(DIRMAINT) DELETE PERMIT <i>resource_name</i> CLASS(VMMDISK) ID(<i>target_id</i>) <i>racf_disk_owner_access</i>
		CHNGID, CHVADDR, TMDISK	If MOVELINKS: Save link authorizations for old disk using: RLIST VMMDISK <i>old_resource</i> AUTH RDELETE VMMDISK <i>old_resource</i> RDEFINE VMMDISK <i>new_resource</i> OWNER(<i>target_id</i>) <i>racf_rdefine_vmmdisk_defaults</i> PERMIT <i>new_resource</i> CLASS(VMMDISK) ID(DIRMAINT) DELETE For each saved link authorization for MOVELINKS: PERMIT <i>new_resource</i> CLASS(VMMDISK) ID(<i>id</i>) ACC(<i>access</i>)
		CMDISK	Save universal access mode, owner ID, audit information, and link authorizations using: RLIST VMMDISK <i>resource_name</i> AUTH RALTER VMMDISK <i>resource_name</i> UACC(<i>saved_uacc</i>) OWNER(<i>saved_owner</i>) AUDIT(<i>saved_audit</i>) For each saved link authorization: PERMIT <i>resource_name</i> CLASS(VMMDISK) ID(<i>id</i>) ACC(<i>access</i>)
		DMDISK, PURGE	RDELETE VMMDISK <i>resource_name</i>
DVHRLB	LOGONBY	LOGONBY	If not already there: RDEFINE SURROGAT LOGONBY. <i>target_id</i> <i>racf_rdefine_surrogat_defaults</i> PERMIT LOGONBY. <i>target_id</i> CLASS(SURROGAT) ID(DIRMAINT) DELETE If operand is ADD: PERMIT LOGONBY. <i>target_id</i> CLASS(SURROGAT) ID(<i>logonby_id</i>) ACC(READ) If operand is DELETE: PERMIT LOGONBY. <i>target_id</i> CLASS(SURROGAT) ID(<i>logonby_id</i>) DELETE If this leaves no more permitted IDs: RDELETE SURROGAT LOGONBY. <i>target_id</i>
DVHRLN	LINK	CHNGID	Save link authorizations for old link using: RLIST VMMDISK <i>resource_name</i> AUTH PERMIT <i>resource_name</i> CLASS(VMMDISK) ID(<i>target_id</i>) DELETE For each saved link authorization: PERMIT <i>resource_name</i> CLASS(VMMDISK) ID(<i>target_id</i>) ACCESS(<i>saved_access</i>)
		DLINK, PURGE	PERMIT <i>resource_name</i> CLASS(VMMDISK) ID(<i>target_id</i>) DELETE
		LINK, ADD (ADD generates LINK commands)	PERMIT <i>resource_name</i> CLASS(VMMDISK) ID(<i>target_id</i>) ACCESS(<i>highest_auth</i>)
		REPLACE	PERMIT <i>old_resource</i> CLASS(VMMDISK) ID(<i>target_id</i>) DELETE PERMIT <i>new_resource</i> CLASS(VMMDISK) ID(<i>target_id</i>) ACCESS(<i>highest_auth</i>)

Table 6. RAC Commands Issued by DirMaint RACF Connector EXECs (continued)

File Name	Type of Change	DIRM Command	RAC Commands Issued (in order of execution)
DVHRPESM	POSIX	POSIXFSROOT	<p>If specified root is not DELETE: ALTUSER <i>target_id</i> OVM(FSROOT(<i>root</i>))</p> <p>If specified root is DELETE: ALTUSER <i>target_id</i> OVM(NOFSROOT)</p>
		POSIXGLIST	<p>If operands are ADD GNAME: For each specified <i>gname</i>: CONNECT <i>target_id</i> GROUP(<i>gname</i>)</p> <p>If operands are ADD GID: For each specified <i>g_id</i>: <i>gid</i> = 'G'<i>g_id</i> Retrieve associated <i>gname</i> using: RLIST VMPOSIX <i>gid</i> ALL CONNECT <i>target_id</i> GROUP(<i>gname</i>)</p> <p>If operands are DELETE GNAME: For each specified <i>gname</i>: REMOVE <i>target_id</i> GROUP(<i>gname</i>)</p> <p>If operands are DELETE GID: For each specified <i>g_id</i>: <i>gid</i> = 'G'<i>g_id</i> Retrieve associated <i>gname</i> using: RLIST VMPOSIX <i>gid</i> ALL REMOVE <i>target_id</i> GROUP(<i>gname</i>)</p> <p>If operands are DELETE *: For each <i>gname</i> on user's POSIXGLIST statement: REMOVE <i>target_id</i> GROUP(<i>gname</i>)</p> <p>For each <i>g_id</i> on user's POSIXGLIST statement: <i>gid</i> = 'G'<i>g_id</i> Retrieve associated <i>gname</i> using: RLIST VMPOSIX <i>gid</i> ALL REMOVE <i>target_id</i> GROUP(<i>gname</i>)</p>
		POSIXGROUP	<p>If <i>gid</i> is not DELETE: If necessary: ADDGROUP <i>gname</i></p> <p>For specified <i>gid</i>: ALTGROUP <i>gname</i> OVM(GID(<i>gid</i>))</p> <p>If <i>gid</i> is DELETE: If necessary: DELGROUP <i>gname</i></p>

Table 6. RAC Commands Issued by DirMaint RACF Connector EXECs (continued)

File Name	Type of Change	DIRM Command	RAC Commands Issued (in order of execution)
DVHRPESM (cont.)	POSIX (cont.)	POSIXINFO	<p>If operands are FSROOT <i>root</i>: ALTUSER <i>target_id</i> OVM(FSROOT(<i>root</i>))</p> <p>If operands are FSROOT DELETE or DELETE: ALTUSER <i>target_id</i> OVM(NOFSROOT)</p> <p>If operands are GID <i>g_id</i>: <i>gid</i> = 'G'<i>g_id</i></p> <p>Retrieve associated <i>gname</i> using: RLIST VMPOSIX <i>gid</i> ALL</p> <p>CONNECT <i>target_id</i> GROUP(<i>gname</i>)</p> <p>If operands are GID DELETE or DELETE: Retrieve associated <i>g_id</i> from user's POSIXINFO statement. <i>gid</i> = 'G'<i>g_id</i></p> <p>Retrieve associated <i>gname</i> using: RLIST VMPOSIX <i>gid</i> ALL</p> <p>REMOVE <i>target_id</i> GROUP(<i>gname</i>)</p> <p>If operands are GNAME <i>gname</i>: If necessary: ADDGROUP <i>gname</i></p> <p>CONNECT <i>target_id</i> GROUP(<i>gname</i>)</p> <p>If operands are GNAME DELETE or DELETE: Retrieve associated <i>gname</i> from user's POSIXINFO statement</p> <p>REMOVE <i>target_id</i> GROUP(<i>gname</i>)</p> <p>If operands are IUPGM <i>iupgm</i>: ALTUSER <i>target_id</i> OVM(PROGRAM(<i>iupgm</i>))</p> <p>If operands are IUPGM DELETE or DELETE: ALTUSER <i>target_id</i> OVM(NOPROGRAM)</p> <p>If operands are IWDIR <i>iwdir</i>: ALTUSER <i>target_id</i> OVM(HOME(<i>iwdir</i>))</p> <p>If operands are IWDIR DELETE or DELETE: ALTUSER <i>target_id</i> OVM(NOHOME)</p> <p>If operands are UID <i>uid</i>: ALTUSER <i>target_id</i> OVM(UID(<i>uid</i>))</p> <p>If operands are UID NEXT: ALTUSER <i>target_id</i> OVM(UID(<i>next_uid</i>))</p> <p>If operands are UID DELETE or DELETE: ALTUSER <i>target_id</i> OVM(NUOID)</p>

Table 6. RAC Commands Issued by DirMaint RACF Connector EXECs (continued)

File Name	Type of Change	DIRM Command	RAC Commands Issued (in order of execution)
DVHRPESM (cont.)	POSIX (cont.)	POSIXIUPGM	<p>If specified <i>iupgm</i> is not DELETE: ALTUSER <i>target_id</i> OVM(PROGRAM(<i>iupgm</i>))</p> <p>If specified <i>iupgm</i> is DELETE: ALTUSER <i>target_id</i> OVM(NOPROGRAM)</p>
		POSIXIWDIR	<p>If specified <i>iwdir</i> is not DELETE: ALTUSER <i>target_id</i> OVM(HOME(<i>iwdir</i>))</p> <p>If specified <i>iwdir</i> is DELETE: ALTUSER <i>target_id</i> OVM(NOHOME)</p>
		POSIXOPT	<p>If operands are QUERYDB ALLOW or QUERYDB SYSDEFAULT: If necessary:</p> <p>RDEFINE VMPOSIX POSIXOPT.QUERYDB <i>racf_rdefine_vmposix.querydb</i></p> <p>PERMIT POSIXOPT.QUERYDB CLASS(VMPOSIX) ID(DIRMAINT) DELETE</p> <p>PERMIT POSIXOPT.QUERYDB CLASS(VMPOSIX) ID(<i>target_id</i>) ACC(READ)</p> <p>If operands are QUERYDB DELETE or QUERYDB DISALLOW: PERMIT POSIXOPT.QUERYDB CLASS(VMPOSIX) ID(<i>target_id</i>) ACC(NONE)</p> <p>If operands are SETIDS ALLOW: If necessary:</p> <p>RDEFINE VMPOSIX POSIXOPT.SETIDS <i>racf_rdefine_vmposix.setids</i></p> <p>PERMIT POSIXOPT.SETIDS CLASS(VMPOSIX) ID(DIRMAINT) DELETE</p> <p>PERMIT POSIXOPT.SETIDS CLASS(VMPOSIX) ID(<i>target_id</i>) ACC(READ)</p> <p>If operands are SETIDS DELETE or SETIDS DISALLOW: PERMIT POSIXOPT.SETIDS CLASS(VMPOSIX) ID(<i>target_id</i>) ACC(NONE)</p> <p>If operand is DELETE: If SETIDS on user's POSIXOPT statement: PERMIT POSIXOPT.SETIDS CLASS(VMPOSIX) ID(<i>target_id</i>) ACC(NONE)</p> <p>If QUERYDB on user's POSIXOPT statement: PERMIT POSIXOPT.QUERYDB CLASS(VMPOSIX) ID(<i>target_id</i>) ACC(NONE)</p>
DVHRPN	PASSWORD	PW	<p>For passphrase: ALTUSER <i>target_id</i> PHRASE(<i>passphrase</i>) NOEXPIRED</p> <p>For password: ALTUSER <i>target_id</i> PASSWORD(<i>password</i>) NOEXPIRED</p> <p>For AUTOONLY, LBYONLY, NOPASS: ALTUSER <i>target_id</i> NOPASSWORD NOPHRASE</p> <p>For NOLOG: ALTUSER <i>target_id</i> REVOKE</p>
		SETPW	<p>For passphrase: ALTUSER <i>target_id</i> PHRASE(<i>passphrase</i>)</p> <p>For password: ALTUSER <i>target_id</i> PASSWORD(<i>password</i>)</p> <p>For AUTOONLY, LBYONLY, NOPASS: ALTUSER <i>target_id</i> NOPASSWORD NOPHRASE</p> <p>For NOLOG: ALTUSER <i>target_id</i> REVOKE</p>

Table 6. RAC Commands Issued by DirMaint RACF Connector EXECs (continued)

File Name	Type of Change	DIRM Command	RAC Commands Issued (in order of execution)
DVHRUN	USER	ADD	<p>If ACIGROUP statement exists:</p> <p>If necessary: ADDGROUP <i>aci_group</i></p> <p>DFLTGRP in <i>racf_adduser_defaults</i> is changed to <i>aci_group</i></p> <p>ADDUSER <i>target_id</i> OWNER(DIRMAINT) PASSWORD(password) <i>racf_adduser_defaults</i></p> <p>If password is AUTOONLY, LBYONLY or NOPASS: ALTUSER <i>target_id</i> NOPASSWORD NOPHRASE</p> <p>If password is NOLOG: ALTUSER <i>target_id</i> REVOKE</p> <p>If POSIXOPT QUERYDB ALLOW or POSIXOPT QUERYDB SYSDEFAULT: If necessary:</p> <p>RDEFINE VMPOSIX POSIXOPT.QUERYDB <i>racf_rdefine_vmposix.querydb</i></p> <p>PERMIT POSIXOPT.QUERYDB CLASS(VMPOSIX) ID(DIRMAINT) DELETE</p> <p>PERMIT POSIXOPT.QUERYDB CLASS(VMPOSIX) ID(<i>target_id</i>) ACC(READ)</p> <p>If POSIXOPT QUERYDB DISALLOW: If necessary:</p> <p>RDEFINE VMPOSIX POSIXOPT.QUERYDB <i>racf_rdefine_vmposix.querydb</i></p> <p>PERMIT POSIXOPT.QUERYDB CLASS(VMPOSIX) ID(DIRMAINT) DELETE</p> <p>PERMIT POSIXOPT.QUERYDB CLASS(VMPOSIX) ID(<i>target_id</i>) ACC(NONE)</p> <p>If POSIXOPT SETIDS ALLOW: If necessary:</p> <p>RDEFINE VMPOSIX POSIXOPT.SETIDS <i>racf_rdefine_vmposix.setids</i></p> <p>PERMIT POSIXOPT.SETIDS CLASS(VMPOSIX) ID(DIRMAINT) DELETE</p> <p>PERMIT POSIXOPT.SETIDS CLASS(VMPOSIX) ID(<i>target_id</i>) ACC(READ)</p> <p>If POSIXOPT SETIDS DISALLOW: If necessary:</p> <p>RDEFINE VMPOSIX POSIXOPT.SETIDS <i>racf_rdefine_vmposix.setids</i></p> <p>PERMIT POSIXOPT.SETIDS CLASS(VMPOSIX) ID(DIRMAINT) DELETE</p> <p>PERMIT POSIXOPT.SETIDS CLASS(VMPOSIX) ID(<i>target_id</i>) ACC(NONE)</p> <p>If POSXINFO UID <i>uid</i>: ALTUSER <i>target_id</i> OVM(UID(<i>uid</i>))</p> <p>If POSXINFO GID <i>g_id</i>:</p> <p><i>gid</i> = 'G'<i>g_id</i></p> <p>Retrieve associated <i>gname</i> using RLIST VMPOSIX <i>gid</i> ALL</p> <p>CONNECT <i>target_id</i> GROUP(<i>gname</i>)</p>

Table 6. RAC Commands Issued by DirMaint RACF Connector EXECs (continued)

File Name	Type of Change	DIRM Command	RAC Commands Issued (in order of execution)
DVHRUN (cont.)	USER (cont.)	ADD (cont.)	<p>If POSIXINFO GNAME <i>gname</i>: If necessary: ADDGROUP <i>gname</i> CONNECT <i>target_id</i> GROUP(<i>gname</i>)</p> <p>If POSIXINFO IWDIR <i>iwdir</i>: ALTUSER <i>target_id</i> OVM(HOME(<i>iwdir</i>))</p> <p>If POSIXINFO IUPGM <i>iupgm</i>: ALTUSER <i>target_id</i> OVM(PROGRAM(<i>iupgm</i>))</p> <p>If POSIXINFO FSROOT <i>root</i>: ALTUSER <i>target_id</i> OVM(FSROOT(<i>root</i>))</p> <p>If POSIXGLIST GNAMEs: For each specified <i>gname</i>: CONNECT <i>target_id</i> GROUP(<i>gname</i>)</p> <p>If POSIXGLIST GIDS: For each specified <i>g_id</i>: <i>gid</i> = 'G'<i>g_id</i> Retrieve associated <i>gname</i> using RLIST VMPOSIX <i>gid</i> ALL CONNECT <i>target_id</i> GROUP(<i>gname</i>)</p> <p>For each *RACF= <i>rac_command</i>: <i>rac_command</i></p> <p>If LOGONBY <i>log_users</i>: RDEFINE SURROGAT LOGONBY.<i>target_id</i> <i>racf_rdefine_surrogat_defaults</i> PERMIT LOGONBY.<i>target_id</i> CLASS(SURROGAT) ID(DIRMAINT) DELETE</p> <p>If password is LBYONLY: PERMIT LOGONBY.<i>target_id</i> CLASS(SURROGAT) ID(<i>target_id</i>) DELETE</p> <p>If password is not LBYONLY: PERMIT LOGONBY.<i>target_id</i> CLASS(SURROGAT) ID(<i>target_id</i>) ACC(READ)</p> <p>For each <i>user_id</i> on LOGONBY: PERMIT LOGONBY.<i>target_id</i> CLASS(SURROGAT) ID(<i>user_id</i>) ACC(READ)</p> <p>If there are RACF_RDEFINE_VMBATCH_DEFAULTS: RDEFINE VMBATCH <i>target_id</i> <i>racf_rdefine_vmbatch_defaults</i> RAC PERMIT <i>target_id</i> CLASS(VMBATCH) ID(DIRMAINT) DELETE</p> <p>If there are RACF_VMBATCH_DEFAULT_MACHINES: For each <i>default_machine</i>: RAC PERMIT <i>target_id</i> CLASS(VMBATCH) ID(<i>default_machine</i>) ACC(CONTROL)</p> <p>If there are RACF_RDEFINE_VMRDR_DEFAULTS: If ACIGROUP exists: RDEFINE VMRDR <i>acigroup.target_id</i> <i>racf_rdefine_vmrdr_defaults</i> PERMIT <i>acigroup.target_id</i> CLASS(VMRDR) ID(DIRMAINT) DELETE</p> <p>If ACIGROUP does not exist: RDEFINE VMRDR <i>target_id</i> <i>racf_rdefine_vmrdr_defaults</i> PERMIT <i>target_id</i> CLASS(VMRDR) ID(DIRMAINT) DELETE</p>

Table 6. RAC Commands Issued by DirMaint RACF Connector EXECs (continued)

File Name	Type of Change	DIRM Command	RAC Commands Issued (in order of execution)
DVHRUN (cont.)	USER (cont.)	CHNGID	<p>For Old ID:</p> <p>Save groups from LU <i>old_id</i></p> <p>Save OVM settings from LU <i>old_id</i> OVM NORACF</p> <p>Save QUERYDB settings from RLIST VMPOSIX.QUERYDB AUTH</p> <p>Save SETIDS settings from RLIST VMPOSIX.SETIDS AUTH</p> <p>Save LOGONBY authorizations from RLIST SURROGAT LOGONBY.<i>old_id</i> AUTH</p> <p>Save VMBATCH authorizations from RLIST VMBATCH <i>old_id</i> AUTH</p> <p>Save VMRDR authorizations from RLIST VMRDR <i>old_id</i> AUTH</p> <p>For New ID:</p> <p>ADDUSER <i>new_id</i> OWNER(DIRMAINT) PASSWORD(<i>old_password</i>) <i>racf_adduser_defaults</i></p> <p>If <i>old_password</i> is AUTOONLY, LBONLY or NOPASS: ALTUSER <i>new_id</i> NOPASSWORD NOPHRASE</p> <p>If <i>old_password</i> is NOLOG: ALTUSER <i>new_id</i> REVOKE</p> <p>For each saved group: CONNECT <i>new_id</i> GROUP(<i>group</i>)</p> <p>If QUERYDB access saved: PERMIT POSIXOPT.QUERYDB CLASS(VMPOSIX) ID(<i>new_id</i>) ACC(<i>saved_acc</i>)</p> <p>If SETIDS access saved: PERMIT POSIXOPT.SETIDS CLASS(VMPOSIX) ID(<i>new_id</i>) ACC(<i>saved_acc</i>)</p> <p>For each <i>ovm_kw</i> and <i>ovm_value</i> saved: ALTUSER <i>new_id</i> OVM(<i>ovm_kw</i>(<i>ovm_value</i>))</p> <p>If there are RACF surrogate defaults configured: RDEFINE SURROGAT LOGONBY.<i>new_id</i> <i>racf_rdefine_surrogat_defaults</i></p> <p>PERMIT LOGONBY.<i>new_id</i> CLASS(SURROGAT) ID(DIRMAINT) DELETE</p> <p>If <i>old_password</i> is LBONLY: PERMIT LOGONBY.<i>new_id</i> CLASS(SURROGAT) ID(<i>new_id</i>) DELETE</p> <p>If <i>old_password</i> is not LBONLY: PERMIT LOGONBY.<i>new_id</i> CLASS(SURROGAT) ID(<i>new_id</i>) ACC(READ)</p> <p>For each saved surrogate authorization: PERMIT LOGONBY.<i>new_id</i> CLASS(SURROGAT) ID(<i>saved_userid</i>) ACC(<i>saved_access</i>)</p>

Table 6. RAC Commands Issued by DirMaint RACF Connector EXECs (continued)

File Name	Type of Change	DIRM Command	RAC Commands Issued (in order of execution)
DVHRUN (cont.)	USER (cont.)	CHNGID (cont.)	<p>If there are VMRDR defaults configured:</p> <p>If ACIGROUP exists:</p> <p>RDEFINE VMRDR <i>acigroup.new_id</i> <i>racf_rdefine_vmrdr_defaults</i></p> <p>PERMIT <i>acigroup.new_id</i> CLASS(VMRDR) ID(DIRMAINT) DELETE</p> <p>If ACIGROUP does not exist:</p> <p>RDEFINE VMRDR <i>new_id</i> <i>racf_rdefine_vmrdr_defaults</i></p> <p>PERMIT <i>new_id</i> CLASS(VMRDR) ID(DIRMAINT) DELETE</p> <p>For each saved VMRDR authorization:</p> <p>PERMIT <i>new_id</i> CLASS(VMRDR) ID(<i>saved_userid</i>) ACC(<i>saved_access</i>)</p> <p>If there are VMBATCH defaults configured:</p> <p>RDEFINE VMBATCH <i>new_id</i> <i>racf_rdefine_vmbatch_defaults</i></p> <p>RAC PERMIT <i>new_id</i> CLASS(VMBATCH) ID(DIRMAINT) DELETE</p> <p>For each saved VMBATCH authorization:</p> <p>PERMIT <i>new_id</i> CLASS(VMBATCH) ID(<i>saved_userid</i>) ACC(<i>saved_access</i>)</p>
DVHRUN (cont.)	USER (cont.)	PURGE	<p>Retrieve surrogate authorizations for <i>target_id</i> using:</p> <p>RLIST SURROGAT LOGONBY.<i>target_id</i> AUTH</p> <p>For each surrogate user:</p> <p>PERMIT LOGONBY.<i>target_id</i> CLASS(SURROGAT) ID(<i>userid</i>) DELETE</p> <p>RDELETE SURROGAT LOGONBY.<i>target_id</i></p> <p>If <i>target_id</i> has access to VMPOSIX POSIXOPT.QUERYDB:</p> <p>PERMIT POSIXOPT.QUERYDB CLASS(VMPOSIX) ID(<i>target_id</i>) DELETE</p> <p>If <i>target_id</i> has access to VMPOSIX POSIXOPT.SETIDS:</p> <p>PERMIT POSIXOPT.SETIDS CLASS(VMPOSIX) ID(<i>target_id</i>) DELETE</p> <p>Retrieve groups to which <i>target_id</i> has access using:</p> <p>LU <i>target_id</i></p> <p>For each group to which <i>target_id</i> has access:</p> <p>REMOVE <i>target_id</i> GROUP(<i>group</i>)</p> <p>RDELETE VMBATCH <i>target_id</i></p> <p>If ACIGROUP exists:</p> <p>RDELETE VMRDR <i>acigroup.target_id</i></p> <p>If ACIGROUP does not exist:</p> <p>RDELETE VMRDR <i>target_id</i></p> <p>DELUSER <i>target_id</i></p>

Table 6. RAC Commands Issued by DirMaint RACF Connector EXECs (continued)

File Name	Type of Change	DIRM Command	RAC Commands Issued (in order of execution)
DVHRVN	NICDEF	ADD, NICDEF	RLIST VMLAN <i>resource_name</i> If the resource name is not in the list: RDEFINE VMLAN <i>resource_name</i> UACC(NONE) PERMIT <i>resource_name</i> CLASS(VMLAN) ID(<i>target_id</i>) ACCESS(<i>prom_info</i>) If NICDEF PROMISCUOUS then <i>prom_info</i> is CONTROL, otherwise <i>prom_info</i> is UPDATE.
		CHNGID	Save NICDEF authorizations using: RLIST VMLAN <i>resource_name</i> PERMIT <i>resource_name</i> CLASS(VMLAN) ID(<i>target_id</i>) DELETE For each saved NICDEF authorization: PERMIT <i>resource_name</i> CLASS(VMLAN) ID(<i>target_id</i>) ACCESS(<i>prom_info</i>) If NICDEF PROMISCUOUS then <i>prom_info</i> is CONTROL, otherwise <i>prom_info</i> is UPDATE.
		PURGE	PERMIT <i>resource_name</i> CLASS(VMLAN) ID(<i>target_id</i>) DELETE If the resource owner is DIRMAINT then issue: RAC RDELETE VMLAN resource
		REPLACE	PERMIT <i>old_resource_name</i> CLASS(VMLAN) ID(<i>target_id</i>) DELETE PERMIT <i>new_resource_name</i> CLASS(VMLAN) ID(<i>target_id</i>) ACCESS(<i>prom_info</i>) If NICDEF PROMISCUOUS then <i>prom_info</i> is CONTROL, otherwise <i>prom_info</i> is UPDATE.

Note:

1. DASD resource names are in *acigroup.target_id.disk_addr* format if an ACIGROUP statement exists in the user's directory entry. Otherwise, DASD resource names are in *target_id.disk_addr* format.
2. During CMDISK processing, the old disk authorizations are deleted and re-permitted due to the transfer of the disk to and from a DATAMOVE machine for the associated DASD management processing.

The USE_RACF= statement also controls the use of the DoRacF global variable within the DIRMAINT service machine. The DoRacF global variable can be used by your exits in order to determine if additional (user-supplied) RACF function should be executed. Whenever a configured exit is called by DIRMAINT, the DoRacF global variable is set based on all configured USE_RACF statements. DoRacF is set to true when the exit is configured to be enabled for additional RACF communication. Otherwise, DoRacF is set to false.

USE_RACF= YES ALL indicates that all DirMaint user exits will be called with a DoRacF value of true (except for those configured on a USE_RACF= NO statement, which will be called with a DoRacF value of false).

USE_RACF= NO ALL indicates that all DirMaint user exits will be called with a DoRacF value of false (except for exits overridden using USE_RACF= YES statements, which will be called with a DoRacF value of true). This is the default if no USE_RACF= YES ALL statement is configured.

USE_RACF= YES *exit_name* indicates that the specified exit will be called with DoRACF set to true.

USE_RACF= NO *exit_name* indicates that the specified exit will be called with DoRACF set to false.

Note: When specifying the file name of a user exit, the user exit must still be defined using the exit's definition statement.

2

The RACF_ADDUSER_DEFAULTS= entry specifies the defaults that will be used by DVHRUN when it issues a RACF ADDUSER command. (See the [z/VM: RACF Security Server Command Language Reference](#) for valid options.) The IBM-supplied default is UACC(NONE).

3

The RACF_RDEFINE_VMMDISK_DEFAULTS= entry specifies the defaults that will be used by DVHRDN when it issues a RACF RDEFINE VMMDISK command. (See the [z/VM: RACF Security Server Command Language Reference](#) for valid options.) The IBM-supplied defaults are UACC(NONE) AUDIT(FAILURES(READ)).

4

The RACF_DISK_OWNER_ACCESS= entry specifies the access authority that will be used by DVHRDN when it issues a RACF PERMIT command for the owner of the disk. (See the [z/VM: RACF Security Server Command Language Reference](#) for valid options.) The IBM-supplied default is ACC(ALTER). To use the default access configured in RACF, use a RACF_DISK_OWNER_ACCESS= statement without an access authority specified (i.e, a blank RACF_DISK_OWNER_ACCESS= statement).

5

The RACF_RDEFINE_VMPOSIX_POSIXOPT.QUERYDB= entry specifies the defaults that will be used by DVHRUN or DVHRPESM when it issues a RACF RDEFINE VMPOSIX POSIXOPT.QUERYDB command. (See the [z/VM: RACF Security Server Command Language Reference](#) for valid options.) The IBM-supplied default is UACC(READ).

6

The RACF_RDEFINE_VMPOSIX_POSIXOPT.SETIDS= entry specifies the defaults that will be used by DVHRUN or DVHRPESM when it issues a RACF RDEFINE VMPOSIX POSIXOPT.SETIDS command. (See the [z/VM: RACF Security Server Command Language Reference](#) for valid options.) The IBM-supplied default is UACC(NONE).

7

The RACF_RDEFINE_SURROGAT_DEFAULTS= entry specifies the defaults that will be used by DVHRUN or DVHRLB when it issues a RACF RDEFINE SURROGAT command. (See the [z/VM: RACF Security Server Command Language Reference](#) for valid options.) The IBM-supplied default is UACC(NONE) AUDIT(FAILURES(READ)).

8

The RACF_RDEFINE_VMBATCH_DEFAULTS= entry specifies the defaults that will be used by DVHRUN when it issues a RACF RDEFINE VMBATCH command. (See the [z/VM: RACF Security Server Command Language Reference](#) for valid options.) The IBM-supplied default is UACC(NONE) AUDIT(FAILURES(READ)).

9

The RACF_RDEFINE_VMRDR_DEFAULTS= entry specifies the defaults that will be used by DVHRUN when it issues a RACF RDEFINE VMRDR command. (See the [z/VM: RACF Security Server Command Language Reference](#) for valid options.) The IBM-supplied default is UACC(NONE) AUDIT(FAILURES(READ)).

10

The RACF_VMBATCH_DEFAULT_MACHINES= entry identifies the batch machines available on the system.

11

The TREAT_RAC_RC.4= entry identifies how DVHRUN, DVHRDN, DVHRPESM, and DVHRLB will interpret the RACF return code 4 (authorization decision deferred by RACF to z/VM) from the RACF commands – as if the return code was 0 (successful) or 4 (unsuccessful). The default, if not configured, is 4. The value in the CONFIGRC SAMPDVH file is 0.

12

The ESM_PASSWORD_AUTHENTICATION_EXIT= entry identifies the exit to be called to issue the necessary commands to authenticate a user using a CP logon password or External Security Manager password phrase.

13

The RACF_RDEFINE_VSWITCH_LAN= entry specifies whether or not a RACF profile (using RDEFINE) is added for a z/VM Virtual Switch or guest LAN in DVHRVN processing during an 'add' operation if a profile does not currently exist. The IBM-supplied default is YES.

Step 6. Select IVP Characteristics

You can use the installation verification program (IVP) statements in the CONFIG DATADVH file to configure the IVP. For more information, see [Chapter 11, “Installation Verification Procedure \(IVP\),”](#) on page 193 and [Appendix G, “Tests Run by the Automated IVP,”](#) on page 243.

```

1 IVP_MAX_DURATION= mm |hh:mm
2 IVP_NEW_DAY_START= YES|NO
3 IVP_RUNMODE= OPERATIONAL|TESTING|ANY
4 IVP_NOTIFY_FOR= WARNING|FAILURE
5 IVP_NOTIFY_TO= nickname|userid/node
6 IVP_NO_TESTING= userid/node
7 IVP_DISABLE_TEST= testID1[testID2 ...]
8 IVP_PARM= GLOBAL|testID parm value

```

Figure 13. Selecting IVP Characteristics

1

The IVP_MAX_DURATION parameter specifies the maximum time the IVP can run before it is considered to have failed. The value can be:

mm

A single whole number representing minutes.

hh:mm

Hours and minutes; for example, 1:20 represents 1 hour and 20 minutes. The hours value can be no greater than 24, and the minutes value can be no greater than 59. The default duration is 1 hour.

2

The IVP_NEW_DAY_START parameter controls whether the IVP is started automatically each day as part of new day processing driven by the DVHNDAY EXEC. This value can be:

YES

Starts the IVP once a day at approximate five minutes after midnight. This is the default.

NO

Does not start the IVP each day.

3

The IVP_RUNMODE parameter determines in which situations a scheduled IVP event runs. This value can be:

OPERATIONAL

The IVP runs only when DirMaint is running in its normal production mode.

TESTING

The IVP runs only when DirMaint is in testing mode.

ANY

The IVP runs anytime it is invoked. This is the default.

If IVP_RUNMODE is set to OPERATIONAL or TESTING, the DirMaint server must be configured to run in that same mode. This mode is specified using the RUNMODE configuration parameter in the CONFIG* DATADVH file. The RUNMODE value determines whether a scheduled IVP run started by a specified event actually executes. An automated IVP run is started on the DirMaint server by

a scheduled event specified in the DirMaint WAKEUP TIMES file (DIRMAINT DATADVH). For more information on RUNMODE, see [“Step 1. Select Directory Update Options”](#) on page 25).

4

The IVP_NOTIFY_FOR parameter specifies when a notification is sent to the system programmer or other personnel responsible for maintaining the DirMaint product upon completion of a scheduled IVP run.

An automated IVP run is started on the DIRMAINT server by a scheduled event specified in the DirMaint WAKEUP TIMES file (DIRMAINT DATADVH). The DVHNDAY EXEC runs the IVP as part of its processing. Invoking the DVHNDAY EXEC within the DirMaint server using the CMS EXEC DVHNDAY command also results in this property being used to determine when to send a notification.

This value can be:

ALWAYS

Sends a notification when the IVP completes, regardless of whether a warning or a failure occurs.

WARNING

Sends a notification when a warning is generated.

FAILURE

Sends a notification when a test fails. A test can generate a warning but still pass. This occurs when the test identifies issues that are not recommended practices. FAILURE is the default.

5

The IVP_NOTIFY_TO parameter specifies the user who receives notification when a scheduled IVP run completes.

A scheduled IVP run is started on the DIRMAINT server by an event specified in the DirMaint WAKEUP TIMES file (DIRMAINT DATADVH). The DVHNDAY EXEC runs the IVP as part of its processing. Invoking the DVHNDAY EXEC within the DirMaint server using the CMS EXEC DVHNDAY command also results in this property being used to determine where to send a notification.

The user can be specified as a nickname or using the format *userid/node*. In either case you can specify more than one user to be notified.

- If you specify a nickname, it must be one of the following nicknames defined in the DIRMAINT NAMES file (which is created from the DVHNAMES DATADVH file): DVHALL, DVHCERT, DVHDAILY, DVHDRCT, DVHHELP, DVHOURLY, DVHSUPT, DVHOPER, DVHPWMON. For more information, see [“DVHNAMES DATADVH”](#) on page 51.
- If you do not use a nickname, the user must be specified as *userid/node*, where:

userid

Is the user ID to notify.

node

Is the node ID to notify.

Both the user ID and the node ID are required options. An error in the IVP_NOTIFY_TO property generates an error message on the DIRMAINT console and a notification in the IVP results file. The error causes the DVHSUPT entry in the DVHNAMES DATADVH to be used for the list of users to be notified. For more information on this file, see [“DVHNAMES DATADVH”](#) on page 51.

6

The IVP_NO_TESTING parameter specifies servers (other than the DIRMAINT machine) that should not participate in the automated IVP run. The servers are specified as *userid/node*, where:

userid

Is the user ID of the server, as known by the DIRMAINT machine, that should not participate in the IVP run.

node

Is the node ID of the server, as known by the DIRMAINT machine, that should not participate in the IVP run.

An asterisk (*) can be used for the user ID value and/or the node value as a wildcard character to specify all user IDs or all nodes. For example, */IBMVM1 disables IVP testing of DATAMOVE and SATELLITE servers on the node IBMVM1.

7

The IVP_DISABLE_TEST parameter specifies specific tests that should not be run.

A test is identified by its test ID, which consists of a two-character prefix followed by a four-digit numeric ID. The format is *ssnnnn*, where:

ss

Is the prefix indicating the server where the test is run:

DA

DATAMOVE server

DM

DIRMAINT server

DS

SATELLITE server

nnnn

Is the numeric ID.

Suppose a test name is Test 0010. This test can be run on multiple server types and would have multiple IDs. For example, if Test 0010 is run on all three of the above servers it would be identified as DA0010, DM0010, and DS0010, respectively.

Multiple IDs can be specified on the same line and should be separated by blanks. Multiple DISABLE_TEST= tags can be specified.

See Appendix G, “Tests Run by the Automated IVP,” on page 243 for a list of valid test IDs and what function each test performs.

8

IVP_PARM parameter specifies either GLOBAL or specifies a test ID, configuration parameter, and the parameter's value that will override a default. The values can be:

GLOBAL

Overrides the values that apply to all tests.

testID

Specifies a specific test ID related to the parameter specified next.

parm

Specifies the parameter associated with the value specified next.

value

Specifies the value that will override a default.

For example, the following specification overrides the WARNDAYS value for test DM0330. The WARNDAYS value for this test is set to 2:

```
IVP_PARM= DM0330 WARNDAYS 2
```

DIRMAINT DATADVH

This DIRMAINT WAKEUP TIMES file controls time-driven events that take place in the virtual machines. A sample of this file (RECFM V) is supplied with the product code. As part of DIRMAINT's initialization, it will be copied to the virtual machine's A-disk. The file name will always be called DIRMAINT, regardless of the user ID of the DIRMAINT service machine.

DIRMAINT DATADVH File Example

```
1 ==/==/== 00:00:05 00/00/00 CMS EXEC DVHNDAY
2 ==/==/== 00:01:00 00/00/00 CMS EXEC DVHDAILY
```

```

3 ==/==/== 00:02:00 00/00/00 BACKUP NOTAPE
4 ==/==/== 00:03:00 00/00/00 ELINK CLEAN ALL
5 ==/==/== +01:00:00 00/00/00 CMS EXEC DVHOURLY
6 ==/==/== +01:00:00 00/00/00 DIRECT CONDITIONAL
7 ==/==/== 01:00:00 00/00/00 MDAUDIT ALLCHECK AUTOMAIL
8 ==/==/== 02:00:00 00/00/00 PWMON MONITOR
9 ==/==/== 12:00:00 00/00/00 BACKUP TAPE BOT DIRMTAPE DVHBCK
10 ==/==/== 23:59:00 00/00/00 CP SLEEP 2 MIN

```

These notes will help you with your DIRMAINT DATADVH file.

1

The DVHNDAY EXEC is run after Midnight, every day. This is an IBM-supplied housekeeping routine. IBM recommends running this EXEC at this time. If you choose to retain your console spool files for only four or five days rather than the default, nine days, you can schedule a second invocation at or near Noon.

2

The DVHDAILY EXEC is run after Midnight each day, after the DVHNDAY EXEC has been run. This is an IBM-supplied housekeeping routine. IBM recommends that this routine be run at least once per day, or more often if you choose. You may adjust the time or times to suit your needs.

3

The DIRM BACKUP NOTAPE command is processed each day, after the DVHDAILY EXEC has been run. If you have not allocated space for the primary directory backup disk or shared file system directory, you should delete this entry. IBM recommends that you do allocate space for a primary directory backup disk, and that you run the BACKUP command daily. You may adjust the time to suit your needs. Ideally, this should be scheduled to occur when users are least likely to be issuing DirMaint commands and waiting for the result.

Note: Users may enter commands while the backup is processed, but those commands will not be processed until the backup is complete, the length of the delay depends upon the size of your directory.

4

An DIRM ELINK CLEAN ALL command is processed once each day. When a user has made too many attempts to use the DIRM LINK command with incorrect passwords, that user will be prevented from using the DIRM LINK command until a site specified number of days has elapsed. The ELINK CLEAN ALL command checks for users whose ability to use DIRM LINK can be re-enabled.

5

The DVHOURLY EXEC is run every hour, every day. This is an IBM-supplied housekeeping routine.

6

An DIRM DIRECT command is automatically performed every hour. This places your directory changes online. If you are running with ONLINE= IMMED specified in your CONFIG DATADVH file, you may delete the DIRECT line. If your installation is a large processing center you may want to replace this line with a specific schedule of times throughout the day. For example:

```

==/==/== 00:05:00 00/00/00 DIRECT
==/==/== 06:00:00 00/00/00 DIRECT
==/==/== 12:00:00 00/00/00 DIRECT
==/==/== 18:00:00 00/00/00 DIRECT

```

The IBM-supplied file uses a date of 4/26/02 for the DIRECT entries to disable DirMaint from placing changes to the source directory online. This is recommended for starting IVP. When you are satisfied with your DirMaint tailoring, you may change the date to ==/==/== for production, unless you want all directory changes placed online immediately. If you want directory changes placed online immediately, leave the date on the DIRECT entries set to 4/26/02, and change CONFIG DATADVH file to ONLINE= IMMED.

7

An implicit DIRM MDAUDIT command is processed once each month. This command checks your MDISK statements to ensure that minidisk passwords are in compliance with your site policy. Depending upon the size of your source directory, this IBM recommends that it be scheduled at a time of day when users are least likely to be issuing DirMaint commands and waiting for the result.

Note: Users may enter commands although the MDAUDIT is being taken but the commands will not be processed until the MDAUDIT is complete; the length of the delay depends upon the size of your directory.

The IBM-supplied file uses a date of 4/26/02 for the MDAUDIT entry to disable DirMaint from sending notices about expired minidisk passwords before completion of the IVP.

Note: If you have an ESM, such as RACF, installed and controlling minidisk links on your system, then you may be able to delete this MDAUDIT entry. Be aware of the following:

- If your ESM is functioning with DISKP=DEFER (for RACF, or the equivalent for your particular ESM), minidisk passwords are useful for controlling write and multiple access to minidisks above and beyond the Discretionary Access Control (DAC) and perhaps even the mandatory access control (MAC) provided by the ESM.
- Whether your ESM is functioning with DISKP=ALLOW or DISKP=DEFER (for RACF, or your ESM's equivalent), minidisk passwords can still be used to establish a directory link to a minidisk, unless that capability has been suppressed by use of the LINK_AUTHORIZATION_EXIT.

8

The DIRM PWMON MONITOR command is processed once each weekday, Monday through Friday. Depending upon the size of your source directory, IBM recommends that it be scheduled at a time of day when users are least likely to be issuing DirMaint commands and waiting for the result.

Note: Users may enter commands although the PWMON MONITOR is being taken but those commands will not be processed until the PWMON command is complete; the length of the delay depends upon the size of your directory.

The IBM-supplied file uses a date of 4/26/02 for the PWMON entry to disable DirMaint from sending notices about expired logon passwords before completion of the IVP. For more information on changing the date for automatic minidisk password monitoring, see [“The Date Field \(Columns 1–8\)” on page 236](#).

Note: If you have an ESM, such as RACF, installed and controlling logon passwords on your system, then you should delete this PWMON entry, or leave it disabled with the 4/26/02 date.

9

Once each week, an automatic DIRM BACKUP TAPE command is performed. This is optional. If used, this event should be scheduled on a day of the week and at a time of day when:

- Your site has operators and tape librarians on duty
- When users are least likely to be issuing DirMaint commands and waiting for the result.

Although there may be no time that satisfies both criteria, the IBM-supplied default has selected Noon on Friday.

Note:

1. Although this is another relatively lengthy process, depending on the size of your source directory, the delay in user responses includes only the time for tape positioning and actually dumping files from disk to tape. DirMaint is responsive to user requests although waiting for a tape to be mounted.
2. The BACKUP TAPE option requires BACKUP_TAPE_MOUNT_EXIT routine. For more information, see [“Backup Tape Mount \(DVHXTTP\)” on page 178](#).

The IBM-supplied file uses a date of 4/26/02 for the BACKUP TAPE entry to disable DirMaint from making tape backups. If you choose to enable automatic tape backup processing, you may change the date to ==/==/== for daily tape backups. For more information on changing the date daily see [“The Date Field \(Columns 1–8\)” on page 236](#).

10

An event is **REQUIRED** to be scheduled before Midnight each day, with an action that will not be completed until after Midnight. This is necessary to ensure that events scheduled for the next day are recognized. The omission of this entry causes the service machine to hang up and never wake up as scheduled and may or may not respond to incoming user requests. The action performed is arbitrary;

you may schedule one of the BACKUP, DVHDAILY, or DVHNDAY events at this time if you are sure the action will not complete until after Midnight.

Note: Do not try to schedule two or more events at or near this specific time of day. If the first does not complete until after Midnight, the other event may not be processed at all.

For more information, see “The WAKEUP Times File” on page 235.

DVHNAMES DATADVH

The DVHNAMES DATADVH file becomes the NAMES file for each of the DirMaint service machines. It is used for sending messages to designated users when events occur that require their action or awareness.

This file is in a standard CMS NAMES file format, and the file name is RECFM V. Each entry contains:

Table 7. Tags in the CMS NAMES File

Tag	Function
:NICK.	Identifies the nickname for the assigned user ID/node ID pair or to a distribution list.
:USERID.	Identifies the user to be notified.
:NODE.	Identifies the node ID where the user is located. Alternatively, a nickname may refer to a distribution list of other nicknames.
:LIST.	Specifies the nicknames in the distribution list.

These entries are required in your DVHNAMES DATADVH file for these nicknames:

Table 8. DVHNAMES DATADVH Nickname Entries

Nickname	Function
DVHALL	The distribution list to be notified when DirMaint starts up or shuts down. This distribution list usually a list of the other distribution lists, possibly excluding the DVHCERT list. <code>:nick.DVHALL :list.DVHCERT DVHHELP DVHOPER DVHPWMON DVHSUPT</code>
DVHCERT	The distribution list to be notified when a situation occurs that may indicate that a hacker is attempting to gain unauthorized access to your system.
DVHHELP	The distribution list to be notified when the DirMaint service machine becomes available to respond to user initiated transactions and when the DirMaint service machine encounters a problem or begins a lengthy task that makes it unavailable to respond to user requests.
DVHOPER	The distribution list to be notified when events occur that require physical interaction with the DirMaint service machines, such as mounting a backup tape.
DVHPWMON	The distribution list to be notified when the PWMON command has completed, to alert the appropriate people that the data files are ready and available for manipulation.
DVHSUPT	The distribution list to be notified when the DirMaint service machine encounters a problem within the DirMaint product code, the DirMaint installation, or the DirMaint tailoring that renders DirMaint unable to complete the transaction requested by the user. DirMaint will usually continue to run, however certain functions may be limited or nonoperational until the problem is resolved.

Depending upon your system configuration, certain events may happen quickly while others may take a longer to complete. When these events occur, you may have DirMaint notify, the:

- Users on the system
- Key staff personnel
- Server to perform the task quietly.

The entries in DVHNAMES for these events are:

Table 9. DVHNAMES Event Entries

Event Name	Function
DVHDAILY	<p>The distribution list to be notified when potentially time-consuming events begin and end their daily run. This distribution list is usually the same as DVHHELP, for example:</p> <pre>:nick.DVHDAILY :list.DVHHELP</pre> <p>This includes the DVHNDAY, DVHDAILY, and BACKUP events.</p>
DVHDRCT	<p>The distribution list to be notified when a potentially time-consuming call to the DIRECT or DIRECTXA command is needed to update the object directory from the current source directory file. This distribution list is usually the same as DVHHELP, for example:</p> <pre>:nick.DVHDRCT :list.DVHHELP</pre>
DVHOURLY	<p>The distribution list to be notified when a potentially time-consuming task begins or ends its periodically scheduled processing. This distribution list is usually the same as DVHHELP, for example:</p> <pre>:nick.DVHDRCT :list.DVHHELP</pre>

Notes:

1. If you omit one or more of these entries from your DVHNAMES DATADVH file, your DirMaint service machine console files will contain CP error messages about user DVHxxxxx not logged on. For the optional entries, these messages can be ignored.
2. If you have a user ID on the system that is the same as one of these nicknames, then this user ID will be getting all of these messages.

DIRMMAIL SAMPDVH

The DIRMMAIL SAMPDVH file is a sample for a DIRMAINT NEWMAIL file. The IBM supplied sample provides a description of DirMaint's key features that may be of interest to the general user community.

DVHLINK EXCLUDE

The DVHLINK EXCLUDE file is maintained by using the DIRM USEROPTN command. This file contains a listing of the global or public minidisks for example, the MAINT 190, 19D, and 19E disks for which links to that disk should be omitted from the DVHLINK FILE. The DVHLINK EXCLUDE file is RECFM V, and resides on the primary directory file mode. If you are using a secondary directory disk or directory, an identical copy of the DVHLINK EXCLUDE file will be maintained for you.

Note: If a minidisk is listed in the DVHLINK EXCLUDE file, links to that disk are omitted from the DVHLINK FILE file.

Links that are omitted from the DVHLINK FILE file are not:

- Included in the output from DIRM REVIEW
- Changed to point to the new device address when a CHVADDR is done for the minidisk
- Changed to point to the new user ID when a CHNGID is done for the user ID owning the minidisk

- Changed to point to the new user ID and address when a TMDISK is done for the minidisk
- Deleted when the minidisk is deleted or when the user ID owning the minidisk is purged
- Deleted when the owner of the minidisk uses the DIRM DLINK command

If you need any of these operations to process an excluded minidisk, the minidisk must first be removed from the DVHLINK EXCLUDE file (preferably using the DIRM USEROPTN LINKS EXCLUDE CANCEL command), and the DASD Management control files rebuilt by using the DIRM RLDEXTN command.

The LINKS EXCLUDE file has this format:

Columns 1-8

A minidisk owner's user ID.

Column 9

Blank.

Columns 10-17

The minidisk's system affinity, or an asterisk.

Column 18

Blank.

Columns 19-22

The minidisk's virtual address.

Column 23

Blank.

Columns 24-27

The link modes to be excluded. The valid link modes are:

R

Read links (R and RR) should be excluded.

RW

Read and Write links (R, RR, W and WR) should be excluded.

RWM

Read, Write and Multi Write links (all except S and E links) should be excluded.

S

Stable links (any link using the S suffix) should be excluded.

SR

Stable Read links (any read link using the S suffix) should be excluded.

SRW

Stable Read and Write links (any read or write link using the S suffix) should be excluded.

SRWM

Stable Read, Write and Multi Write links (all except Exclusive links) should be excluded.

E

Exclusive or Stable links (any link using the S or E suffix) should be excluded.

ER

Exclusive or Stable Read links (any read link using the S or E suffix) should be excluded.

ERW

Exclusive or Stable Read and Write links (any read or write link using the S or E suffix) should be excluded.

ERWM

Exclusive or Stable Read, Write and Multi Write links (all links) should be excluded.

ALL

All links should be excluded.

Note: IBM recommends only using R.

Use of an exit routine is suggested to enforce compliance. For more information, see [“Link Authorization \(DVHXL\)”](#) on page 156.

Column 28

Blank.

Note: In actuality, the file is composed of blank delimited fields. The relative position of the fields is critical – the specific columns for those fields is *not* critical. If you look at this file after DIRMAINT has been in operation for any length of time, you may find more than one blank between fields. You do not need to correct the file; if you are making an addition to the file, just align the fields under the existing entries.

PWMON CONTROL

The PWMON CONTROL file is maintained using the DIRM PWMON GET CONTROL, RECEIVE, XEDIT PWMON CONTROL, and DIRM PWMON REPLACE CONTROL commands. It contains a list of user ID's whose passwords are exempt from being changed to NOLOG when they expire (such as the OPERATOR, MAINT, and the DIRMAINT user ID itself), and a list of disconnected service virtual machines whose passwords may be allowed to expire but need warning notices sent to a human being for intervention rather than to the service machine itself. The file is RECFM V, and resides on the primary directory file mode. If you are using a secondary directory disk or directory, an identical copy of the PWMON CONTROL file will be maintained for you.

The PWMON CONTROL file has this format:

Columns 1-8

A local user ID.

Column 9

Blank.

Columns 10-12

The keyword YES if the user ID is subject to lockout, or the keyword NO if the user ID is exempt from lockout. Any other value is treated the same as YES.

Column 13

Blank.

Columns 14-21

The alternate user ID to be notified in place of the local user ID.

Column 22

Blank.

Columns 23-30

The node ID of the alternate user to be notified.

Column 31

Blank.

Note: In actuality, the file is composed of blank delimited fields. The relative position of the fields is critical – the specific columns for those fields is *not* critical. If you look at this file after DIRMAINT has been in operation for any length of time, you may find more than one blank between fields. You do not need to correct the file; if you are making an addition to the file, just align the fields under the existing entries.

RPWLIST DATA

The RPWLIST DATA file contains a list of logon passwords that are not allowed to be used on your system. When the DIRECT or DIRECTXA program is run to put the source directory on-line, any user with one of these restricted passwords as a logon password in the source directory will have it changed to NOLOG in the object directory. The user will be unable to logon to the system until the password is changed to a value not in the RPWLIST DATA file.

Note:

1. A sample RPWLIST DATA file is shipped on the MAINT_{vr}m 2CC disk, along with the default USER DIRECT file, and it is also included on the samples disk for CP (by default, MAINT_{vr}m 2C2 for minidisks, or VMPSFS:MAINT740.CPDV.SAMPLE if VM was installed in the shared file system). This sample file contains many of the sample passwords published in IBM documents. You should use this as a starting point for your tailoring. You will want to add obvious passwords such as your company's name or any password that you think unauthorized persons may know.
2. If you already have a copy of this file for use with your present method of directory maintenance, you should be able to continue using that copy without change.

The RPWLIST DATA file must be a RECFM F LRECL 80 file, with each record in the following format:

Columns 1-8

A character string whose use as a logon password is to be restricted.

Column 9

Blank.

Columns 10-80

Comments.

Note: This particular file is **NOT** composed of blank delimited fields.

The format of this file is dictated by the DIRECTXA MODULE. For more information on the DIRECTXA MODULE, see the [z/VM: CP Commands and Utilities Reference](#). The file is not altered by DirMaint in any way, and you must maintain it in exactly the format documented in the z/VM publications.

Note: If you rename or erase the RPWLIST DATA file, a warning message will be issued by the DIRECTXA program and passwords will not be checked. However, the object directory will be updated. IBM recommends placing this file on the primary directory file disk, where it will be automatically shadowed to the secondary directory file disk if you have defined one. Also, it is recommended to keep this copy of the file on the primary directory disk in sync with the copy on the MAINT_{vr}m 2CC disk, so that DIRECTXA will not accidentally use an out-of-date file.

SUBSCRIB DATADVH

The SUBSCRIB DATADVH file contains a list of subscribers to be notified when any userid, or particular userids, are changed. This file is built and maintained by the SUBSCRIBE command.

The SUBSCRIB DATADVH file has this format:

Columns 1-7

The ENTRYTYPE field – INCLUDE or EXCLUDE.

Column 8

Blank.

Columns 9-15

The TARGETID field – the userid subscribed to, or ALL.

Column 16

Blank.

Columns 17-20

The PROTOCOL field – RDR, SMSG, TCP, or UDP.

Column 21

Blank.

Columns 22-37

The DESTPARM1 field – the z/VM userid for RDR or SMSG, or the IP address for TCP or UDP.

Column 38

Blank.

Columns 39-46

The DESTPARM2 field – the node ID for RDR or SMSG, or the port number for TCP or UDP. An asterisk is allowed and will be treated as the local node ID, but such a subscription cannot be separately deleted or queried.

Column 47

Blank.

Columns 48-53

The ENCODING field – ASCII (default for TCP or UDP) or EBCDIC (default for RDR or SMSG).

Column 54

Blank.

Columns 55-119

The SUBSCRIBER_DATA_STRING field – an optional character or hexadecimal string supplied by the subscriber, which must begin with the keyword DATA, followed by a space, followed by the string with no embedded spaces. An asterisk is allowed, but such a subscription cannot be separately deleted or queried.

Note: In actuality, the file is composed of blank delimited fields. The relative position of the fields is critical – the specific columns for those fields is *not* critical. If you look at this file after DIRMAINT has been in operation for any length of time, you may find more than one blank between fields. You do not need to correct the file; if you are making an addition to the file, just align the fields under the existing entries.

AUTHFOR CONTROL

The AUTHFOR CONTROL file is maintained using the AUTHFOR and DROPFOR commands. It contains a list of user ID's who are authorized to act for other user ID's, and the privileges that have been delegated to them. The file is RECFM V, and resides on the primary directory file mode. If you are using a secondary directory disk or directory, an identical copy of the AUTHFOR CONTROL file will be maintained for you.

This file must be in this format:

Columns 1-8

A target user ID or profile name, or the keyword ALL.

Column 9

Blank.

Columns 10-17

A user ID authorized to act for the target ID.

Column 18

Blank.

Columns 19-26

The network node ID from which the authorized user may submit requests for the target ID. Specify an asterisk (*) for requests originating on the local system (the same system where the DIRMAINT server is running) or other systems within the same local SSI cluster. For requests originating beyond the local system or SSI cluster, specify the actual system node name.

Column 27

Blank.

Columns 28-31

The command level for which the authorized user may submit requests for the target ID. Valid values are 140A or 150A. A command level of 140A allows the authorized user to enter commands using DirMaint Release 4 compatibility syntax. A command level of 150A allows the authorized user to enter commands using the DirMaint Release 5 full function syntax. You may, and will probably want to, include records for both 140A and 150A command levels for each target ID / authorized user pair.

You must be authorized for both levels when issuing an ADD request in 150A level for a directly entry containing 140A format MDISK statements, and when issuing an ADD request in 140A level for a directory entry that contains 150A format MDISK statements. The 150A format is identified by use

of one or more of the keywords: BLKSIZE, LABEL, or PWS; if none of these keywords is present the statement is 140A format.

Column 32

Blank.

Columns 33-68

The command sets identifying which commands the authorized user may use on behalf of the target id. The valid command sets are determined by the command level. The IBM defined default command sets are:

A

Non-DASD user directory Administrator commands.

D

DASD management user directory administrator commands.

G

General user commands.

H

Help Desk commands. Allows looking at things without allowing them to be changed.

M

Monitoring commands. Allows use of MDAUDIT, PWGEN, PWMON, and SETPW commands.

O

Operational support commands, such as BACKUP, NOTAPE, or SHUTDOWN.

P

Commands needed by automated administration Programs, such as: CLAS, DFSMS, DSO, IPF, NV/AS, RACF.

S

Commands needed by the DirMaint owner and Support programmer.

Z

Commands needed by the DirMaint service machines to communicate with each other.

Column 69

Blank.

Example:

```
*TARGETI ORIGUSER ORIGNODE CMDL CMDSETS
ALL DIRADMIN * 140A ADGHMOPS
ALL DIRADMIN * 150A ADGHMOPS
ALL DIRADMIN DVHTEST1 140A ADGHMOPS
ALL DIRADMIN DVHTEST1 150A ADGHMOPS
ALL DIRADMIN DVHTEST2 140A ADGHMOPS
ALL DIRADMIN DVHTEST2 150A ADGHMOPS
ALL DIRADMIN DVHTEST3 140A ADGHMOPS
ALL DIRADMIN DVHTEST3 150A ADGHMOPS
ALL DIRMAINT * 140A ADGHMOPSZ
ALL DIRMAINT * 150A ADGHMOPSZ
ALL DIRMAINT DVHTEST1 140A ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890
ALL DIRMAINT DVHTEST1 150A ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890
ALL DIRMAINT DVHTEST2 140A ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890
ALL DIRMAINT DVHTEST2 150A ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890
ALL DIRMAINT DVHTEST3 140A ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890
ALL DIRMAINT DVHTEST3 150A ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890
ALL DIRMSERV GDLVME 140A ADGHMOPS
ALL DIRMSERV GDLVME 150A ADGHMOPS
ALL DVHTEST GDLVM7 140A ADGHMOPS
ALL DVHTEST GDLVM7 150A ADGHMOPS
ALL MARKERME GDLVME 140A ADGHMOPS
ALL MARKERME GDLVME 150A ADGHMOPS
ALL MARKERME GDLVM7 140A ADGHMOPS
ALL MARKERME GDLVM7 150A ADGHMOPS
ALL DRB1 GDLVM7 140A ADGHMOPSZ
ALL DRB1 GDLVM7 150A ADGHMOPSZ
DRB1 DOUGHART GDLVM7 140A ADG
DRB1 DOUGHART GDLVM7 150A ADG
ALL MAINT * 140A ADGHMOPSZ
ALL MAINT * 150A ADGHMOPSZ
```

```

ALL SYSMAINT * 140A ADGHMOPS
ALL SYSMAINT * 150A ADGHMOPS
ALL SYSMAINT DVHTEST1 140A ADGHMOPS
ALL SYSMAINT DVHTEST1 150A ADGHMOPS
ALL SYSMAINT DVHTEST2 140A ADGHMOPS
ALL SYSMAINT DVHTEST2 150A ADGHMOPS
ALL SYSMAINT DVHTEST3 140A ADGHMOPS
ALL SYSMAINT DVHTEST3 150A ADGHMOPS
ALL SYSOPER * 140A ADGHMOPS
ALL SYSOPER * 150A ADGHMOPS
ALL SYSOPER DVHTEST1 140A ADGHMOPS
ALL SYSOPER DVHTEST1 150A ADGHMOPS
ALL SYSOPER DVHTEST2 140A ADGHMOPS
ALL SYSOPER DVHTEST2 150A ADGHMOPS
ALL SYSOPER DVHTEST3 140A ADGHMOPS
ALL SYSOPER DVHTEST3 150A ADGHMOPS
ALL DATAMOVE * 140A GHMADPS
ALL DATAMOVE * 150A GHMADPS
ALL DIRECTOR * 140A GHMADPS
ALL DIRECTOR * 150A GHMADPS
ALL MNTBAT1 * 140A GHMADPS
ALL MNTBAT1 * 150A GHMADPS
ALL DOUGB * 140A GHMADPS
ALL DOUGB * 150A GHMADPS
ALL NANCYM * 140A ADGMPS
ALL NANCYM * 150A ADGMPS
DOUGHART DOUGHART * 140A ADG
DOUGHART DOUGHART * 150A ADG
DOUGHART MARKERME * 140A G
DOUGHART MARKERME * 150A G

```

Note:

1. In actuality, the file is composed of blank delimited fields. The relative position of the fields is critical – the specific columns for those fields is *not* critical. If you look at this file after DIRMAINT has been in operation for any length of time, you may find more than one blank between fields. You do not need to correct the file; if you are making an addition to the file, just align the fields under the existing entries.
2. The default command sets are:

1.....8	10....17	19....26	28..31	33.....68
TargetId	AuthedId	FromNode	CmdLvl	CmdSets
owner	owner	nodeid	140A	GS<HMADPOZ>
owner	owner	nodeid	150A	GS<HMADPOZ>
ALL	staffid	nodeid	140A	GHMADP
ALL	staffid	nodeid	150A	GHMADP
ALL	pwmonitor	nodeid	140A	GHM
ALL	pwmonitor	nodeid	150A	GHM
ALL	substaff	nodeid	140A	GH
ALL	substaff	nodeid	150A	GH
operator	operator	nodeid	140A	GO
operator	operator	nodeid	150A	GO
datamove	datamove	nodeid	150A	GZ
dirmsat	dirmsat	nodeid	150A	GZ

If the same user ID appears in more than one role (OWNER and STAFF for example), you will need to directly edit the resulting AUTHFOR CONTROL file and combine the entries.

Placing an asterisk in the FromNode field authorizes the specified user ID for the command set on the local system or, if using an SSI cluster, it authorizes the specified user ID for the command set on any system defined within the SSI cluster.

3. If you change the AUTHFOR CONTROL file on the DIRMAINT server without using the AUTHFOR or DROPFOR commands, you should issue the DirMaint RLDCODE command to activate the change.

USER INPUT

The USER INPUT file must be a RECFM F LRECL 80 file, located on the primary directory disk (the 1DF disk, file mode E, by default). The first time you type **DVHBEGIN** when there is no USER DIRECT file, to start-up the DIRMAINT machine, the USER INPUT file will be clustered, and mirrored onto the secondary directory disk (the 2DF disk by default) if the secondary directory disk is defined in the DVHPROFA DIRMAINT file.

Note: If a USER DIRECT file is in existence it must be erased so that DVHBEGIN will build a new file from the USER INPUT file.

In general, if the source directory file is acceptable to CP, then it is acceptable to DirMaint. There are a few exceptions:

- Each name given to a PROFILE, USER, IDENTITY or SUBCONFIG in the directory must be unique. You may not have two profiles with the same name, two virtual machines with the same user ID, a profile and a virtual machine with the same name/user ID, and so on.
- Each profile name and user ID must consist of valid CMS file name characters. Not all CMS file name characters are allowed, however. They must be upper case alphabetic letters (A-Z), numeric (0-9), or one of the national language special characters:

```
$ = X'5B'
# = X'7B'
@ = X'7C'
+ = X'4E'
- = X'60'
:= X'7A'
```

Specifically disallowed are lower case alphabetic (a-z) and the underscore character (_ = X'6D'), the vertical bar (| = X'4F'), the slant bar (/ = X'61'), and the question mark (? = X'6F').

Note: The following user ID's are reserved for DirMaint's exclusive use: \$DIRCTL\$, and \$DIRGRP\$. DirMaint uses the following nicknames for broadcasting messages: DVHALL, DVHCERT, DVHDAILY, DVHDRCT, DVHHELP, DVHOPER, DVHOURLY, DVHPWMON, and DVHSUPT; IBM recommends that you avoid making real directory entries with these names.

- In addition to the maximum length limitation of 6 characters, the volume identification for all MDISK statements must comply with the same character set rule as PROFILE and USER names. Each volume ID must consist of valid CMS file name characters. Not all CMS file name characters are allowed, however. They must be upper case alphabetic letters (A-Z), numeric (0-9), or one of the national language special characters:

```
$ = X'5B'
# = X'7B'
@ = X'7C'
+ = X'4E'
- = X'60'
:= X'7A'
```

Specifically disallowed are lower case alphabetic (a-z) and the underscore character (_ = X'6D'), the vertical bar (| = X'4F'), the slant bar (/ = X'61'), and the question mark (? = X'6F').

- All MDISKs allocated on a given volume must be of the same device type.
- If your directory contains comment records, they must follow the PROFILE, USER, IDENTITY or SUBCONFIG statement to which they apply. DirMaint considers a directory entry to begin with the PROFILE, USER, IDENTITY, or SUBCONFIG statement (or an external format of the SYSAFFIN statement), and includes all records up to the next PROFILE, USER, IDENTITY or SUBCONFIG statement (or external SYSAFFIN statement).

In addition, there are a few rules you should be aware of that affect how DirMaint handles your directory:

- Comments and blank lines within a continued directory statement are completely discarded by DirMaint. For example:

```
POIXINFO UID 123 GNAME Example ,
* This comment line will be deleted by DirMaint.
  FSR00T MyFSRoot ,
* So will these three comment lines,

* and the blank line in between,
* as well as the blank line below.
IWDIR 'This is my sample IW Directory' ,
```

```
IUPGM  MyPgm
```

will result in or an equivalent to:

```
POSIXINFO UID 123 GNAME Example FSR00T MyFSRoot IWDIR ,
'This is my sample IW Directory' IUPGM  MyPgm
```

- Comments in a non-System Affinity source directory (a directory that does not use the SYSAFFIN keyword in its internal form) must **follow** the directory statement to which they apply. DirMaint will re-order the sequence in which directory statements are placed, keeping comments associated with the previous real statement. For example, given the following directory segment:

```
MDISK 0197 3380 DEVNO 00AF .....
* This comment is associated with the MDISK 0197 statement.
* So is this comment.
MDISK 0191 3380 DEVNO 00AA .....
* This comment is associated with the MDISK 0191 statement.
* So is THIS comment.
```

After the directory is manipulated and sorted by address (a selectable option) the same directory segment will appear as follows:

```
MDISK 0191 3380 DEVNO 00AA .....
* This comment is associated with the MDISK 0191 statement.
* So is THIS comment.
MDISK 0197 3380 DEVNO 00AF .....
* This comment is associated with the MDISK 0197 statement.
* So is this comment.
```

Note:

- When DirMaint removes any directory statement, the comments that follow that statement are **not** removed. This may be of particular interest when processing a CMDISK command, as the MDISK is transferred to the DATAMOVE machine (removing it from the user's directory) and then transferred back to the user (but not associating it with any set of comments).
 - Blank lines are treated as comments and follow all the same rules.
- All device addresses are expanded to 4 digits when the directory entry is processed by DirMaint. For example, given the following directory segment:

```
LINK HOWLAND 191 0222 RR
MDISK 0191 3380 DEVNO 00AA .....
MDISK 197 3380 DEVNO AF .....
```

After any statement in this directory entry has been updated the same directory segment will appear as follows:

```
LINK HOWLAND 0191 0222 RR
MDISK 0191 3380 DEVNO 00AA .....
MDISK 0197 3380 DEVNO 00AF .....
```

- To allow compression of statements when dealing with System Affinity, most statements are upper cased and multiple blanks between tokens are eliminated. Comments are always excluded from being upper cased and having excess blanks removed. Other statements may be excluded by setting a pair of control variables in DVHBBSET. The POSIXGROUP and POSIXINFO statements are set to allow mixed case by default. For example, given the following directory segment:

```
PosixInfo UId 42 GName g32g FSRoot /g32g/42 IWDIr Mark
Link Howland 191 193 rr
* Attempt a link to the test disk

MDisk 197 3380 Devno af .....
```

After any statement in this directory entry has been updated the same directory segment will appear as follows:

```

POSIXINFO UID 42 GName g32g FSRoot /g32g/42 IWDIr Mark
LINK HOWLAND 0191 0193 RR
* Attempt a link to the test disk

MDISK 0197 3380 DEVNO 00AF .....

```

Observe that the:

- LINK and MDISK statement have been completely upper cased and tokenized
- POSIXINFO statement name has been upper cased but the remainder of the statement has not been changed
- Blank line and comment were not effected.
- Currently CP allows and ignores multiple copies of NOPDATA in the user directory. DirMaint allows only one copy of NOPDATA per system affinity group; extra copies are discarded.

Overriding and Supplementing DirMaint Commands

You may add new commands to DirMaint, or modify the way DirMaint processes existing commands, by adding a local override file. For example, the REPLACE request is in command set S by default for command set level 150A. If you wish to make the REPLACE command available to all administrators (command set A), you could modify the existing entry in the 150CMDS DATADVH file, changing theS. to A.....S.. However, a better way is to create a LCLCMDS DATADVH file containing just that one line:

```
REPLACE      DVHFILE    DVHREP      Y A.....S.
```

Where:

REPLACE is the command name, DVHFILE is the file name of the handling routine for the DirMaint code that runs in the user's virtual machine, DVHREP is the name of the handling routine in the DIRMAINT service machine, Y indicates that the invoker's password may be required to authenticate the request. Password authentication is not necessary if the DirMaint configuration option NEEDPASS_RESPECT is NO (the default) or the invoker has issued DIRM NEEDPASS NO, and the A.....S. string are the command sets that contain the REPLACE command.

You may have more than one command in an override file, and you may have more than one override file. The file name and file type of your override files are specified on the COMMANDS_140A= and COMMANDS_150A= records in your CONFIG* DATADVH file(s).

For example, if you want to change the MAXSTORE command from command set A (administrator) to command set G (general user), but want the administrator notified if or when any request exceeds 32M. You could use the REQUEST_AFTER_PROCESSING_EXIT= entry to accomplish the task, but it would be called for EVERY request processed. The alternative is to create an override entry in LCLCMDS DATADVH:

```

MAXSTORE      DVHXMITE    LCLMAXST  Y A.G....S.
MAXSTORAGE    DVHXMITE    LCLMAXST  Y A.G....S.

```

and create a LCLMAXST EXEC to handle your requirements:

```

/* LCLMAXST EXEC - Send msg to administrator for requests > 32M. */
Address 'COMMAND'
Parse Upper Arg new_maxst .
'GLOBALV SELECT DVH15 GET ORIG_USER ORIG_NODE' ,
'SYSAFFIN TARGETID TRACE'
orig_user = Strip(orig_user)
orig_node = Strip(orig_node)
sysaffin  = Strip(sysaffin)
targetid  = Strip(targetid)
trace     = Strip(trace)
Select
  When Pos(' LCLMAXST=', ' ' trace ' ') <> 0
    Then Parse Var trace . 'LCLMAXST=' trace_optn
  When Pos(' LCL*=', ' ' trace ' ') <> 0
    Then Parse Var trace . 'LCL*=' trace_optn
  Otherwise trace_optn = ''
End
If trace_optn <> ''

```

```

Then Do
  Say 'LCLMST2161I LCLMAXST called with' new_maxst
  Trace Value trace_optn
End
'EXEC DVHMAXST' new_maxst
If rc = 0
  Then Do
    size = Substr(new_maxst,1,Length(new_maxst)-1)
    units = Right(new_maxst,1)
    Select
      When units = 'K' & size < 32*1024
        Then Nop
      When units = 'M' & size < 32
        Then Nop
      Otherwise Do
        Push 'COMMAND CMS SENDFILE (NOTE'
        Push 'COMMAND SAVE'
        Push 'COMMAND INPUT FROM' orig_user'@'orig_node ,
              'FOR' targetid 'AT' sysaffin ,
              'MAXSTOR' new_maxst 'is > 32M'
        'EXEC NOTE SYSADMIN'
      End
    End
  End
If trace_optn <> ''
  Then Say 'LCLMST2162I LCLMAXST ending with RC='rc
Exit rc

```

Overriding and Supplementing DirMaint Messages

You may add new messages to DirMaint, or modify the way DirMaint processes existing messages, by adding a local override file. For example, you might want to modify the PASSWORD_SYNTAX_CHECKING_EXIT (DVHPXV EXEC) to look in your company's internal phone directory to prevent use of first or last names, employee serial numbers, telephone extensions, and so forth as passwords; and would want to include messages to explain these violations. Instead of modifying the IBM supplied 150AUSER MSGADVH and/or 150ASERV MSGADVH repositories, you can create your own LCLAUSER MSGADVH and/or LCLASERV MSGADVH repositories. Alternatively, you may choose any file name and file type for your supplemental repositories, as long as they are listed in the <lang>_USER_MSGS_<cmdl> and <lang>_SERV_MSGS_<cmdl> records in the CONFIG* DATADVH file(s).

Each record in the message repositories begins with a control field, consisting of a 4 digit message number, a 2 digit format number, a 2 digit line number, and a severity indicator. The calling routine identifies the message number and format number to be issued, and DirMaint's message handling routine finds the specified format of the message in the first available repository (in the order specified in the CONFIG* DATADVH file(s)) and issues each line of that message.

You may add new messages to the repository, add new formats of existing message numbers, modify the text of existing message formats (by using the same message and format number in your override file), or completely eliminate a message (by specifying the message and format number in your override file with no text).

The line number *zero* is optional for each message format, and provides special override information, most notably the return code. Usually, DirMaint's message handler return code is the same as the message number, unless modified by a *line zero* override.

Message Destination

The first parameter on a call to the DVHMSG EXEC when issuing a message is the message destination. The message will be sent to one of these destination:

- :
Specifies self, as An XEDIT message for use in the menu processor. This parameter should only be used for messages issued within the command originators (users) virtual machine
- *
Specifies self, in the service machines the message may be logged. This parameter can be used for messages issued by a DirMaint Server or from within the command originators virtual machine.

?

Originator. The message may be logged.

-

Originator. The message will NOT be logged.

+

Self. The message may be logged, AS IF sent to originator.

Note: The ?, -, and the + parameters along with all nickname codes should only be used for messages issued by a DirMaint Server.

nick

Nickname for one of DirMaint's special distribution lists:

Nick	Distribution List Name	Who's in the List
A	DVHALL	All of the groups that follow in this table.
C	DVHCERT	Computer Emergency Response Team, also known as the Security Team.
M	DVHPWMON	The password Monitoring team.
O	DVHOPER	The system Operator.
S	DVHSUPT	The Support programmer (usually MAINT) for command from self, but the same as ? for a user entered command.
0	DVHDRCT	DVHDRCT progress notices.
1	DVHOURLY	DVHOURLY notices.
2	DVHDAILY	DVHDAILY notices.

Other single characters are DVHSUPT notices. The message may be logged.

Restart or Shutdown Processing After Encountering an Error

This DVHSHUT EXEC checks to see if a DVHSHUTX CONTROL file exists. This file contains two counters and an action indicator. The LOGOFF counter determines when DVHSHUT issues a CP LOGOFF command, and the RESET counter determines when DVHWAIT erases the DVHSHUTX CONTROL file. The action indicator determines whether DVHSHUT will PURGE the command retry information before doing a re-IPL.

1. If the DVHSHUTX CONTROL file did not exist previously, the file is created with both counters initialized to the threshold values. Both counters are countdown counters.
2. Whether or not the file previously existed, the LOGOFF counter is decremented by one, the RESET counter is set to the threshold value, the action indicator is toggled, and the DVHSHUTX CONTROL file is re-written.
3. The command retry information is purged, if the action indicator is set accordingly.
4. If the LOGOFF counter is not yet zero, a restart re-IPL is done.
5. If the LOGOFF counter is less than or equal to zero, and the service machine is running disconnected, a CP LOGOFF is done. If the LOGOFF counter is less than or equal to zero, and the service machine is running connected, another re-IPL is done.

Moving or Updating DirMaint or RACF Owned Minidisks

Do not attempt to move or update DirMaint minidisks or RACF owned minidisks with the CMDISK operand. This must be done manually with this procedure.

For each minidisk to be moved or updated, use the AMDISK function to allocate a new extent as desired for the minidisk to be moved or updated. Use a virtual address that you can relate to the basic MDISK. For example, if you are moving or updating the DIRMAINT 1DB minidisk, allocate a new 5DB.

After the newly-allocated extents are really available:

1. Use the OFFLINE operand. This prevents updating the online directory during the next few steps.
2. Use the GET operand. Edit the returned file (for example, DIRMAINT DIRECT) and swap the virtual addresses of the minidisks.

Original Extent:

```
MDISK 1DB 3390 123 005 vo1001 MR
```

New Extent:

```
MDISK 5DB 3390 487 006 vo1016 MR
```

Change as follows:

Original Extent:

```
MDISK 5DB 3390 123 005 vo1001 MR
```

New Extent:

```
MDISK 1DB 3390 487 006 vo1016 MR
```

3. Use the REPLACE operand. This updates the USER DIRECT file to map DirMaint's minidisks to the new extents. The OFFLINE operand prevents the USER DIRECT file from being placed online.
4. Use the SHUTDOWN operand. DirMaint logs off, but the online directory still maps DirMaint's minidisks to the original extent(s). The source directory, however, reflects the newly-allocated extents as current.
5. Log on to the user ID that owns the minidisk you are increasing. In this example, log on to the DIRMAINT service machine.
6. Format the newly-allocated minidisk(s), for example, 5DB.
7. Access the original minidisk (for example, 1DB) as a free filemode (for example, as filemode A). Then copy all files from the original minidisk (1DB – filemode A) to the newly-allocated and formatted minidisk; for example, to 5DB. Do this for all minidisks being moved at this time. When all minidisks have been copied to the newly-allocated extents, continue with the next step.
8. If you are not logged on to the DIRMAINT server, log off from the user ID that owns the newly-updated minidisks. Log on to the DIRMAINT user ID, if necessary.
9. Manually invoke the system command to update the object directory using DIRECTXA. The source directory already contains the new minidisks. The new online directory contains mapping to the newly-allocated minidisks. These new extents are mirror images of the original extents, as shown in the example above. If you are running in an SSI cluster, you should log on to DIRMAINT on each system in your SSI cluster and use DIRECTXA to update the object directory online on each member.
10. Log off, then as an authorized user, AUTOLOG the DIRMAINT service machine. The DIRMAINT machine will be operational using the new extents. When you are sure the DIRMAINT machine is operating correctly, use the ONLINE operand to re-enable execution of DIRECT. Then use the DMDISK operand to delete the original extents (now 5DB, and so on).
11. From an authorized user, force and autolog the DATAMOVE user ID. If you are running a multi-member SSI cluster, force and autolog all DATAMOV* and DIRMSAT* server machines on all members.

The purpose of this procedure is to preserve the integrity of DirMaint as an operational entity, and to ensure that any unrelated directory changes made during the time span required to perform the first few steps are preserved.

Chapter 4. Tailoring the DATAMOVE Service Machine

This chapter provides guidance for bringing up the DATAMOVE service machine(s) to format and copy minidisks.

The DirMaint functions are performed by two permanently disconnected virtual machines equipped with an automatic restart facility. The DIRMAINT virtual machine owns and manages the directory; the DATAMOVE virtual machine copies and formats CMS minidisks. Users invoke DATAMOVE functions by submitting commands to the DIRMAINT virtual machine.

DirMaint supports load balancing among multiple DATAMOVE machines, up to a maximum limit of 56 DATAMOVE machines.

Defining the DATAMOVE Service Machines

Each DATAMOVE service machine must be defined to CP, to an ESM if one is installed, and to DIRMAINT.

Although it is possible to have the same user ID for service machines on different systems within a cluster, this imposes restrictions on how spool files and SMSGs can be sent. Even with the same user ID, each DATAMOVE service machine requires its own Read/Write disk space. Therefore, IBM recommends that each DATAMOVE service machine have a unique user ID within the cluster. Except for the name of the virtual machine, each one should be defined to DirMaint as described under [“Step 1. Define a DATAMOVE Service Machine to DIRMAINT”](#) on page 65, below. If an ESM is installed each DATAMOVE machine must be defined to the ESM as described under [Appendix A, “External Security Manager Considerations,”](#) on page 195.

Step 1. Define a DATAMOVE Service Machine to DIRMAINT

To define a DATAMOVE service machine to DIRMAINT, add an entry to the CONFIG* DATADVH file. The CONFIGSS DATADVH file is appropriate because satellite definitions must be in CONFIGSS DATADVH. For more information on the CONFIG* DATADVH files, see [“CONFIG DATADVH”](#) on page 24.

Use the following format for the entry:

```
DATAMOVE_MACHINE= userid nodeid sysaffin
```

The entry contains the following variables:

userid

Identifies the DATAMOVE service machine you are logging on.

nodeid

Identifies the system on which the DATAMOVE machine is running. If DirMaint is configured to manage a single node, *nodeid* can be specified using the wildcard character (*).

sysaffin

Identifies the system affinity code that can be processed. This is a required parameter. A single DATAMOVE machine can either process requests for a single system affinity or for all system affinities. Specify an asterisk (*) if the DATAMOVE machine will process all system affinities. At least one entry with a system affinity of asterisk (*) is required.

In an SSI cluster, this field is not used and should be specified as an asterisk (*). The DATAMOVE machine is instead selected through the use of the ATnode prefix to the DIRMaint command, by the member system on which a subconfig is defined, or by the next INACTIVE DATAMOVE machine. See the [z/VM: Directory Maintenance Facility Commands Reference](#) for more information pertaining to the DIRMaint command ATnode prefix.

Example—DATAMOVE Server on a Stand-Alone System:

```
DATAMOVE_MACHINE= DATAMOVE * *
```

Example—DirMaint SSI Cluster:

```
DATAMOVE_MACHINE= DATAMOVE DVHTEST1 *
DATAMOVE_MACHINE= DATAMOV2 DVHTEST2 *
DATAMOVE_MACHINE= DATAMOV3 DVHTEST3 *
DATAMOVE_MACHINE= DATAMOV4 DVHTEST4 *
```

Note: There cannot be duplicate DATAMOVE_MACHINE= statements configured within any CONFIG* DATADVH files. If duplicate DATAMOVE_MACHINE= statements exist, the DIRMAINT server will disable DATAMOVE processing.

Step 2. Identify the Communication Path

In some configurations, it might be necessary to identify the communication path between DIRMAINT and each of the DATAMOVE machines, as well as the return path between the DATAMOVE machines and DIRMAINT.

In an SSI cluster, the default communication path between DIRMAINT and the DATAMOVE machines is automatically established using cross-system spool. To run with the default communication path, do not configure any routing statements.

If the default communication path is not sufficient to route commands between the DATAMOVE machines and the DIRMAINT machine, you can identify the appropriate communication path with the following configuration statements in a DirMaint override configuration file:

Note: This is not required for a DATAMOVE machine running on the same *nodeid* as the DIRMAINT machine.

```
FROM= fromspec DEST= destspec S= spoolid T= tagspec1 U= tagspec2
```

Where:

fromspec

Identifies the network *nodeid* or service machine *userid* where the transaction originates.

destspec

Identifies the network *nodeid* or service machine *userid* where the transaction is being sent.

spoolid

Identifies the *userid* of the machine where punch output should be sent to reach the specified destination. In a non-SSI cluster, this is the *userid* of an RSCS network machine or spool file bridge.

tagspec1

Identifies the network *nodeid* or service machine *userid* of the spool file tag.

tagspec2

Identifies the *userid* of the spool file tag.

Note:

1. In a non-SSI cluster, the routing definitions for the DIRMSAT machines should be the same as those for the DATAMOVE machines.
2. For making changes to a DirMaint override configuration file, refer to [“CONFIG DATADVH” on page 24](#).

Example—DirMaint Non-SSI Cluster With RSCS:

```
FROM= DVHTEST1 DEST= DVHTEST2 S= DIRMNET1 T= DVHTEST2
FROM= DVHTEST2 DEST= DVHTEST1 S= DIRMNET2 T= DVHTEST1
FROM= DVHTEST1 DEST= DVHTEST3 S= DIRMNET1 T= DVHTEST3
FROM= DVHTEST3 DEST= DVHTEST1 S= DIRMNET3 T= DVHTEST1
FROM= DVHTEST2 DEST= DVHTEST3 S= DIRMNET2 T= DVHTEST3
FROM= DVHTEST3 DEST= DVHTEST2 S= DIRMNET3 T= DVHTEST2
```

Where:

DIRMNET1, DIRMNET2, and DIRMNET3

identify the *userid* of the private RSCS network machines that carry only DirMaint traffic in our cluster, or the *userid* of the general RSCS machine. Use of a private network may be significantly faster than putting your DirMaint traffic on the general RSCS network.

Step 3. Define the DATAMOVE Retry and Autolog Limits

If a DATAMOVE machine is unable to link to a minidisk because a user is linked to a disk for which a CMDISK command has been issued, or because the directory change to transfer the minidisk to DATAMOVE has not been placed online, then the FORMAT/COPY/CLEAN request will be placed into the DATAMOVE machine's retry queue. The DM_MAXIMUM_RETRIES value determines the maximum size of this retry queue. After DirMaint has been notified that this limit has been reached, DirMaint will not assign any more work to that particular DATAMOVE machine. A value in the range of 0 through 9999 may be specified. The default is 10. If a value outside the valid range is specified, then the value will be set to 1.

The MAXIMUM_WORKUNIT_RETRIES value determines the number of times DirMaint will retry a specific request after the first attempt to process request. Once the number of retries are attempted without success, the request will be cancelled and rolled back. A value in the range of 0 through 999 may be specified. The default is 10. If a value outside of the valid range is specified, then the value will be set to the default 10.

The format for these entries is:

```
DM_MAXIMUM_RETRIES= integer
MAXIMUM_WORKUNIT_RETRIES= integer
```

Before assigning a workunit to a DATAMOVE machine, DirMaint will determine if the DATAMOVE machine is logged on. If the DATAMOVE machine is *not* logged on, DirMaint will attempt to autolog it. The MAXIMUM_DATAMOVE_AUTOLOGS value specifies the number of times DirMaint will attempt to autolog a DATAMOVE machine which is not logged on to the system before quiescing the machine for manual intervention. A value in the range of 0 through 99 may be specified. The default is 10. If a value outside of the valid range is specified, then the value will be set to the default 10.

Note that the autolog count is reset to zero during DAILY processing so that if an autolog is successful and no further failures occur before DAILY processing, then MAXIMUM_DATAMOVE_AUTOLOGS will be attempted again. The format of the entry is:

```
MAXIMUM_DATAMOVE_AUTOLOGS= integer
```

Note:

1. DATAMOVE machines defined on remote nodes, with respect to the DIRMAINT server, *will* be autologged in an SSI cluster.
2. If DirMaint is unable to determine if the DATAMOVE machine is logged on, the workunit will be assigned to the DATAMOVE server for processing. If the DATAMOVE machine is not logged on in this case, the workunit will not be processed until the system administrator autologs the associated DATAMOVE machine.

Step 4. Enabling DATAMOVE Exits

When adding a new minidisk, it can either be given to the user unformatted, or it can be given to DATAMOVE for formatting as a CMS minidisk before making it available to the user. When removing a minidisk from a user, any residual data may be left on that disk space, or the minidisk can be assigned to DATAMOVE for cleaning before making that space available for reuse. These functions are automatic if one or more DATAMOVE machines have been defined to DIRMAINT as shown in [“Step 1. Define a DATAMOVE Service Machine to DIRMAINT”](#) on page 65.

When changing a minidisk definition, DATAMOVE can usually format the new minidisk extent as a CMS minidisk and copy the existing CMS files from the old extent to the new minidisk extent. DATAMOVE can not copy files from OS or DOS formatted disks, or other non-CMS formatted space, nor can it correctly RECOMP the new minidisk and copy an IPLable nucleus from an existing reCOMPed minidisk, nor can

it correctly copy sparse files from a RESERVED minidisk. Some installations have customer written or vendor provided utilities that may be able to handle some of the situations that DATAMOVE can't handle. DATAMOVE can make use of these utilities by way of the DATAMOVE_NONCMS_COPYING_EXIT.

To enable use of this exit routine, specify the file name and file type; EXEC or MODULE. The format of this entry recorded in the CONFIG* DATADVH file is:

```
DATAMOVE_NONCMS_COPYING_EXIT=
```

DATAMOVE DATADVH

The DATAMOVE WAKEUP TIMES file controls time-driven events that take place in the virtual machines. A sample of this file (RECFM V) is supplied with the product code. As part of DATAMOVE initialization, it will be copied to the virtual machine's A-disk. The file name will always be called DATAMOVE, regardless of the user ID of the DATAMOVE service machine.

DATAMOVE DATADVH File Example

```
1 ==/==/== 00:00:05 00/00/00 CMS EXEC DVHNDAY
2 ==/==/== 00:01:00 00/00/00 CMS EXEC DVHDAILY
3 ==/==/== +01:00:0 00/00/00 CMS EXEC DVHOURLY
4 ==/==/== 23:59:00 00/00/00 CP SLEEP 2 MIN
5 ==/==/== +00:mm:0 00/00/00 DMVCTL WAKEUP
```

These notes will help you with your DATAMOVE DATADVH file.

1

The DVHNDAY EXEC is run after Midnight, every day. This is an IBM-supplied housekeeping routine. IBM recommends running this EXEC now. If you choose to retain your console spool files for only four or five days rather than the default, nine days, you can schedule a second invocation at or near Noon.

2

The DVHDAILY EXEC is run after Midnight each day, after the DVHNDAY EXEC has been run. This is an IBM-supplied housekeeping routine. IBM recommends that this routine be run at least once per day, or more often if you choose. You may adjust the time or times to suit your needs.

3

The DVHOURLY EXEC is run every hour, every day. This is an IBM-supplied housekeeping routine.

4

An event is **REQUIRED** to be scheduled before Midnight each day, with an action that will not be completed until after Midnight. This is necessary to ensure that events scheduled for the next day are recognized. The omission of this entry causes the service machine to hang up and never wake up as scheduled and may or may not respond to incoming user requests. The action performed is arbitrary; you may schedule one of the DVHDAILY, or DVHNDAY events at this time if you are sure the action will not complete until after Midnight.

Attention

Do not try to schedule two or more events at or near this specific time of day. If the first does not complete until after Midnight, the other event may not be processed at all.

5

The DMVCTL WAKEUP will cause the DATAMOVE server to review the DVHDMCTL QUEUE file for any pending work needed to be processed.

Where:

mm

Specifies the time interval in minutes, which best meets the performance and usability characteristics for your system. The sample shipped with the product code has the time set to 30 minutes, adjust this as required.

For more information, see the [“The WAKEUP Times File” on page 235](#).

Chapter 5. Tailoring the DIRMSAT Service Machine

This chapter provides guidance for bringing up the DIRMaint SATellite service machine(s) to synchronize multiple object directories from a single source directory.

An SSI cluster contains multiple CPUs with shared DASD. This allows a single DIRMAINT service machine to maintain a single source directory that can be used by each of the systems in the cluster. DIRMAINT can only maintain a single object directory, and each system in the cluster needs its own object directory. A satellite service machine can be used to synchronize the object directory of a node in the cluster with the object directory of the node running DIRMAINT. A satellite service machine can also be used to maintain a duplicate object directory as protection against a hardware error preventing use of the primary system residence DASD volume.

Defining the DIRMSAT Service Machines

Each DIRMSAT service machine must be defined to CP, to an ESM if one is installed, and to DIRMAINT.

Although it is possible to have the same user ID for service machines on different systems within a cluster, this imposes restrictions on how spool files and SMSGs can be sent. Even with the same user ID, each satellite service machine requires its own read/write disk space. Therefore, IBM recommends that each satellite service machine have a unique user ID within the cluster. Due to the use of the satellite servers as a spool file bridge for DIRM commands in an SSI cluster, IBM requires the satellite service machines to be defined as single-configuration (USER) virtual machines and *not* multi-configuration (IDENTITY) virtual machines.

Except for the name of the virtual machine, each one should be defined to DirMaint as described in [“Step 1. Define a Satellite Service Machine to DIRMAINT”](#) on page 69, and if an ESM is installed, each satellite must be defined to the ESM as described in [Appendix A, “External Security Manager Considerations,”](#) on page 195.

Step 1. Define a Satellite Service Machine to DIRMAINT

To define a satellite service machine to DIRMAINT, add an entry to the CONFIGSS DATADVH file. The CONFIGSS DATADVH file must be on the DirMaint server's 11F disk. For more information on the CONFIG* DATADVH files, see [“CONFIG DATADVH”](#) on page 24.

Use the following format for the entry:

```
SATELLITE_SERVER= userid nodeid
```

The entry contains the following variables:

userid

Identifies the satellite service machine you are logging on.

nodeid

Identifies the system on which the satellite machine is running.

Example—DirMaint Single Satellite Sever on a Stand-Alone System:

```
SATELLITE_SERVER= DIRMSAT  DIRMNODE
```

Example—DirMaint SSI Cluster:

```
SATELLITE_SERVER= DIRMSAT DVHTEST1
SATELLITE_SERVER= DIRMSAT2 DVHTEST2
SATELLITE_SERVER= DIRMSAT3 DVHTEST3
SATELLITE_SERVER= DIRMSAT4 DVHTEST4
```

Step 2. Identify the Communication Path

In some configurations, it may be necessary to identify the communications path between DIRMAINT and each of the DIRMSAT machines, as well as the return path between the DIRMSAT machines and DIRMAINT.

In an SSI cluster, the default communication path between DIRMAINT and the DIRMSAT machines is automatically established using cross-system spool. To run with the default communications path, do not configure any routing statements.

If the default communications path is not sufficient to route commands between the DIRMSAT machines and the DIRMAINT machine, you can identify the appropriate communications path with the following configuration statements in a DirMaint override configuration file:

Note: This is not required for a DIRMSAT machine running on the same *nodeid* as the DIRMAINT machine.

```
FROM= fromspec DEST= destspec S= spoolid T= tagspec1 U= tagspec2
```

Where:

fromspec

Identifies the network *nodeid* or service machine *userid* where the transaction originates.

destspec

Identifies the network *nodeid* or service machine *userid* where the transaction is being sent.

spoolid

Identifies the *userid* of the machine where punch output should be sent to reach the specified destination. In a non-SSI cluster, this is the *userid* of an RSCS network machine or spool file bridge.

tagspec1

Identifies the network *nodeid* or service machine *userid* of the spool file tag.

tagspec2

Identifies the *userid* of the spool file tag.

Note:

1. In a non-SSI cluster, the routing definitions for the DIRMSAT machines should be the same as those for the DATAMOVE machines.
2. For making changes to a DirMaint override configuration file, refer to [“CONFIG DATADVH” on page 24](#).

Example—DirMaint Non-SSI Cluster With RSCS:

```
FROM= DVHTEST1 DEST= DVHTEST2 S= DIRMNET1 T= DVHTEST2
FROM= DVHTEST2 DEST= DVHTEST1 S= DIRMNET2 T= DVHTEST1
FROM= DVHTEST1 DEST= DVHTEST3 S= DIRMNET1 T= DVHTEST3
FROM= DVHTEST3 DEST= DVHTEST1 S= DIRMNET3 T= DVHTEST1
FROM= DVHTEST2 DEST= DVHTEST3 S= DIRMNET2 T= DVHTEST3
FROM= DVHTEST3 DEST= DVHTEST2 S= DIRMNET3 T= DVHTEST2
```

Where:

DIRMNET1, DIRMNET2, and DIRMNET3

identify the *userid* of the private RSCS network machines that carry only DirMaint traffic in our cluster, or the *userid* of the general RSCS machine. Use of a private network may be significantly faster than putting your DirMaint traffic on the general RSCS network.

DirMaint Emergency Coverage

You will want to enable DIRMAINT to run on two or three of the systems to give yourself emergency coverage in case the system where DIRMAINT usually runs is down. However, note that the DIRMAINT machine can run on only one system at a time in the SSI cluster.

To use a single satellite server to maintain a duplicate object directory on a stand-alone system, no network routing information is required.

Step 3. Configure the DVHPROFA DIRMSAT file

In order for a satellite server to recognize that it should run as a satellite server, you must copy the DVHPROFS SAMPDVH file on the 7VMDIR40 2C2 disk as DVHPROFA *userid* on the DIRMAINT 191 disk, where *userid* is the user ID of the satellite server. This is automatically done for the DIRMSAT user ID.

DIRMSAT DATADVH

The DIRMSAT WAKEUP TIMES file controls time-driven events that take place in the virtual machines. A sample of this file is (RECFM V) is supplied with the product code. As part of DIRMSAT initialization, it will be copied to the virtual machine's A-disk. The file name will always be called DIRMSAT, regardless of the user ID of the satellite service machine.

DIRMSAT DATADVH File Example

```
1 ==/==/== 00:00:05 00/00/00 CMS EXEC DVHNDAY
2 ==/==/== 00:01:00 00/00/00 CMS EXEC DVHDAILY
3 ==/==/== +01:00:0 00/00/00 CMS EXEC DVHOURLY
4 ==/==/== 23:59:00 00/00/00 CP SLEEP 2 MIN
```

These notes will help you with your DIRMSAT DATADVH file.

- 1** The DVHNDAY EXEC is run after Midnight, every day. This is an IBM supplied housekeeping routine. IBM recommends running this EXEC now. If you choose to retain your console spool files for only four or five days rather than the default 9 days, you may wish to schedule a second invocation at or near Noon.
- 2** The DVHDAILY EXEC is run after Midnight each day, after the DVHNDAY EXEC has been run. This is an IBM-supplied housekeeping routine. IBM recommends that this routine be run at least once per day, or more often if you choose. You may adjust the time or times to suit your needs.
- 3** The DVHOURLY EXEC is run every hour, every day. This is an IBM-supplied housekeeping routine.
- 4** An event is **REQUIRED** to be scheduled before Midnight each day, with an action that will not be completed until after Midnight. This is necessary to ensure that events scheduled for the next day are recognized. The omission of this entry causes the service machine to hang up and never wake up as scheduled and may or may not respond to incoming user requests. The action performed is arbitrary; you may schedule one of the DVHDAILY or DVHNDAY events at this time if you are sure the action will not complete until after Midnight.

Attention

Do not try to schedule two or more events at or near this specific time of day. If the first does not complete until after Midnight, the other event may not be processed at all.

For more information, see the [“The WAKEUP Times File” on page 235](#).

Chapter 6. DASD Management

This chapter is intended to give a system administrator an understanding of how DirMaint can be used to perform DASD administration. It includes an overview of the methods used by DirMaint to perform these tasks and the required steps that need to be done to get your system running. In addition, some control structures used by DirMaint to handle DASD requests are discussed and the methods used for error recovery are explored. The relationship between the DIRMAINT machine and the product servers will also be explained. For more information on the product server types, see [“What is a Server?” on page 5](#).

Preparing Your DIRMAINT Machine

Before you start, you should be aware of the several tasks you must accomplish to define your DIRMAINT machine. The following sections describe the tasks you must perform to prepare for the DASD requests.

Defining a DATAMOVE Machine to the DIRMAINT Server

A single configuration file entry will define your DATAMOVE server to the DIRMAINT machine. The format is:

```
DATAMOVE_MACHINE= machname machnode sysaffin
```

Where:

machname

Identifies the user ID of the DATAMOVE machine.

machnode

Identifies the RSCS node name of the DATAMOVE machine. If DirMaint is configured to manage a single node, *machnode* can be specified using the wildcard character (*).

sysaffin

Identifies the system affinity associated with the DATAMOVE machine. For systems in an SSI cluster this value is an *.

Usage Notes

1. One entry for each DATAMOVE machine in your system is required.
2. All fields on the entry are required.
3. Duplicate entries or entries with an incorrect format will be rejected with the appropriate error messages during initialization.
4. These entries are consulted when the DirMaint server is initializing, when the DVHBEGIN command is entered or the DirMaint server is AUTOLOGed. The appropriate control structures are built for each DATAMOVE machine and they are considered ready for work.
5. The CONFIGSS DATADVH file is an appropriate container for the DATAMOVE_MACHINE statement because satellite definitions must be in CONFIGSS DATADVH. For more information on DirMaint configuration files and specifying configuration file entries, see [“CONFIG DATADVH” on page 24](#).

Example—Segment of the Configuration File: This entry defines four DATAMOVE servers: DATAMOVA, DATAMOV B, DATAMOV C and DATAMOV D on GDLVM7 with a system affinity of *. Enter:

```
DATAMOVE_MACHINE= DATAMOVA GDLVM7 *
DATAMOVE_MACHINE= DATAMOV B GDLVM7 *
DATAMOVE_MACHINE= DATAMOV C GDLVM7 *
DATAMOVE_MACHINE= DATAMOV D GDLVM7 *
```

The Extent Control File

The EXTENT CONTROL file defines any volume that is being used for minidisk allocation and provides a template, or layout, of how the space should be used. In addition, it also contains system and device default values used during allocation operations.

Note: Explicitly defined volumes done through the AUTOV operand of the AMDISK command need not be defined in the extent control file.

An example of an EXTENT CONTROL file is shown in [Figure 14 on page 75](#). This example has only an abbreviated list of autoblock and default entries, because of the size of these extent control file sections.

The extent control file contains several sections; each section may occur only once. Each section starts and ends with an identifying tag. To enhance readability in the extent control file, you can add blank lines and use the asterisk (*) to annotate your console sheet or display screen.

The extent control file must exist on the DIRMAINT 1DF disk prior to use. During installation the DIR2PROD EXEC places the extent control file on the 1DF disk.


```

* ----- *
* Any header comments are placed here. *
* All records starting with an asterisk are ignored. *
* ----- *
1:REGIONS.
* ----- *
* Regions are mapped in this section. *
* RegionId VolSer RegStart RegEnd Type *
* ----- *
* Note: The 'Type' field device in the :DEFAULTS. *
* section must be set to the correct max cylinder value. *
* ----- *
RegionA Myvol1 1 200 3380-02
RegionB Myvol1 201 400 3380-02
RegionAll Myvol1 START END 3380-02
:END.
2:GROUPS.
* ----- *
* Groups are mapped in this section. *
* GroupName RegionList *
* ----- *
MyGroup1 RegionA RegionB RegionAll
:END.
3:SSI_VOLUMES.
* ----- *
* SSI volumes used for subconfig clone are mapped here. *
* VolumeFamily Member Volser *
* ----- *
RESIDENCE DVHTEST1 RES1
RESIDENCE DVHTEST2 RES2
RESIDENCE DVHTEST3 RES3
RESIDENCE DVHTEST4 RES4
:END.
4:EXCLUDE.
* ----- *
* All excluded users and user devices are *
* placed into this section *
* ----- *

MAINT* 012*
MAINT* 013*
PMAINT 014*
SYSDUMP1 012*
SYSDMP* 012*
:END.
5:AUTOBLOCK.
* ----- *
* All autoblock allocation parameters are placed into *
* this section. *
* DASDType BlockSize Blocks/Unit Alloc_Unit Architecture *
* ----- *
3375 4096 96 1 CKD
3380 800 540 1 CKD
3380 512 690 1 CKD
:END.
6:DEFAULTS.
* ----- *
* All default capacities are placed into this section. *
* The device type must be the same as selected in *
* the :REGIONS. section. *
* ----- *
3375 959
3380-01 885
3380-02 1770
3380-03 2655
3380 885
3390-01 1113
:END.
7:END.

```

Figure 14. EXTENT CONTROL File

Extent Control File Sections

A brief explanation of the extent control file sections is shown in [Table 10 on page 75](#). The section name is also used as the identifying tag in the extent control file.

Table 10. Summary of Extent Control File Sections

Section	Function
1:REGIONS.	Defines an area or region on your DASD volume for use during DirMaint automatic allocation.
2:GROUPS.	Defines a grouping of regions for use during DirMaint automatic allocation.

Table 10. Summary of Extent Control File Sections (continued)

Section	Function
3 :SSI_VOLUMES.	Defines which DASD volumes to use for new minidisk allocation when cloning a new SUBCONFIG entry from an existing SUBCONFIG entry.
4 :EXCLUDE.	Defines directory entry or entry/device combinations that should be considered as excluded by the DirMaint DASD subsystem.
5 :AUTOBLOCK.	Defines blocking factors and device architectures for various device types. These supplement or override the IBM supplied definitions in the AUTOBLK DATADVH file
6 :DEFAULTS.	Defines the default maximum size for various DASD devices. These supplement or override the IBM supplied definitions in the DEFAULT DATADVH file
7 :END.	Defines the ending tag for all sections.

Notes:

1. Only a single occurrence of any section may occur in the EXTENT CONTROL file. If multiple occurrences of a single section do occur, the first is used.
2. Sections may be presented in any order within the EXTENT CONTROL file.
3. All tags may be specified in mixed case. DirMaint translates the EXTENT CONTROL file to upper case as it is read.

:REGIONS. Section

A region (**1**) is the basic unit of DASD segmentation used by DirMaint. It defines a single, contiguous area (a region) on a single DASD volume. Multiple region definitions are allowed within the :REGIONS. section of the extent control file. The region entry is similar to the MDISKS entry that existed in prior releases of DirMaint. The format is:

```
regionid volser regstart regend ttttmmmm
```

You can also use a region entry to define a full-volume minidisk. In this case, the *volser* value is defined twice, and the format is:

```
volser volser volstart volend ttttmmmm
```

where *regend* and *volend* are calculated using the *size* and *start* values when the EXTENT CONTROL file is updated by the DASD command. The values are calculated as follows:

```
regend = (start + size) - 1
volend = size - 1
```

The parameters are:

regionid

Specifies the name of this region entry. Specification of this field is subject to the following rules.

- Region names must be unique. If a region entry shares the same name with another region entry, the first record is used, the second entry is ignored.
- Region names may consist of the characters A-Z, 0-9, #, @ and \$. DirMaint requires that this field be eight characters or less.

volser

Specifies the volume ID of the region where the region is located.

- This value represents the value placed into volser field on any minidisks generated from this region.

- Volume IDs supported by DirMaint consist of the characters A-Z, 0-9, #, @ and \$.

regstart/volstart

Specifies the starting block or cylinder (inclusive) of the region/volume. A keyword of START can be used to define the start of a region/volume. This translates to cylinder 1 of a CKD device and block 32 of an FBA device.

regend/volend

Specifies the ending block or cylinder (inclusive) of the region/volume. A keyword of END can be used to define the end of a region/volume. This translates to the largest cylinder or block available on the volume. This value will differ with device type and model.

Attention

Specification of an ending value that exceeds the physical volume maximum cylinder or block is allowed in a region definition, but allocation requests will not be granted beyond the physical limitations of the volume.

ttttmmmm

Specifies the DASD device type and an associated model number information.

The *ttttmmmm* value specified on the :REGIONS: entry must exactly match the value specified in the :DEFAULTS. section. If unable to locate an exact match, the device type (*tttt*) determines the maximum allocatable block or cylinder.

tttt

Specifies the device type associated with this region. This value is placed into the directory source on the MDISK statement when allocations take place on a volume defined by this region.

mmmm

Specifies a string used when cross checking a :REGIONS. entry with a :DEFAULTS. entry. Generally this consists of model number information:

- The model number is optional.
- The *mmmm* value, if specified, is not limited to a specific size. It may be as small as a single character or as many characters as will fit on a single line.
- Supported characters are A-Z, 0-9, #, @, \$, or - (dash).
- Imbedded blanks are not allowed.
- Determines the maximum allocatable block or cylinder from the :DEFAULTS. section of the EXTENT CONTROL file.

Usage Notes

1. Region entries can be specified in mixed case but case is not respected. DirMaint translates all entries to upper case as they are read.
2. Any data following the last required field on each region entry is ignored.
3. DirMaint does not imposed a limit on the number of region entries.
4. Regions may overlap; however, that allocation requests that target a specific region must occur entirely within that region to be considered successful.
5. Areas of DASD volumes that are not defined through region entries are not eligible for the various automatic allocation methods supported by DirMaint. Except, AUTOV which can allocate the region. Extents in these areas must be allocated using specific extent information.
6. DirMaint does not allow the use of &SYSRES for a volume identification on an MDISK directory statement. The value of +VMRES is supported, with some restrictions.
 - The use of +VMRES is reserved by CP and can not be used as the real volume label of a physical DASD volume. (If +VMRES is a real volume label, the pseudo label can be changed by including the &SYSRES parameter on the DIRECTXA_OPTIONS= entry in the CONFIG* DATADVH file(s).
 - When using either AUTOV or VBLKnnnn allocation for an MDISK on an IPLable system residence volume, the administrator must ensure that all MDISK statements for that volume are defined the

same way, either using +VMRES (or alternate synonym) for all or using the real volume label for all; mixing the two forms is not supported.

- When allocating space by specifying an absolute starting cylinder or block, the system administrator must ensure that the volume identification used is consistent with the adjacent space, either using +VMRES (or alternate synonym) or the real volume label consistently; mixing the two forms is not supported.

:GROUPS. Section

A group (**2**) is a collection of one or more regions. The format is:

```
groupid region1 region2 ...regionn
```

Where:

groupid

Specifies the name of this group entry. Specification of this field is subject to the following rules.

- If a group entry shares the same name with another group entry, it is considered a single group. For instance, consider the following groups segment from an EXTENT CONTROL file:

```
MyGroup   Mike1 Mike2
MyGroup2  Mark1
MyGroup   Mike3
```

This series of statements actually defines two groups, MyGroup and MyGroup2. The same information could have been represented as:

```
MyGroup   Mike1 Mike2 Mike3
MyGroup2  Mark1
```

This gives the user the ability to define large groups without using excessively long records.

- Group names must not start with a valid EXTENT CONTROL file tag.
- Group names may consist of the characters A-Z, 0-9, #, @, and \$.
- DirMaint requires that this field be eight characters or less.

regionn

Specifies a region that exists within this group. The region must be defined in the :REGIONS. section.

Usage Notes

1. Regions within a group are searched, in order, for a valid location for DASD allocation.
2. Group entries can be specified in mixed case but case is not respected. DirMaint translates all entries to upper case as they are read.
3. The default scanning method when allocating DASD from a group is to scan from the first region defined within the group to the last region defined within the group each time an allocation request is made. An alternate scanning method can be used. This method is referred to as wrapping or rotating. To employ this method, an additional group definition line is required for the group using the alternate scanning method. The format of the entry is:

```
GRPNAME (ALLOCATE ROTATING)
```

This entry is in addition to the group statements.

Example—Defining a Group Name:

The following group defines a group name called GDLVM7 that contains four regions (REG1, REG2, REG3 and REG4)

```
GDLVM7 REG1 REG2
GDLVM7 REG3 REG4
```

By default each allocation attempt will attempt to allocate in REG1 before attempting to allocate in REG2, REG3 and finally REG4 in that order. By altering the group definition to:

```
GDLVM7 (ALLOCATE ROTATING)
GDLVM7 REG1 REG2
GDLVM7 REG3 REG4
```

DirMaint will track the name of the region that was last allocated on. The next allocation attempt will take place on the following region name.

Example—A Successful Allocation:

If a successful allocation took place on REG2, the next allocation attempt will be attempted on REG3, REG4, REG1 then REG2, in that order.

:SSI_VOLUMES. Section

DirMaint provides the capability to clone a new SUBCONFIG entry using an existing SUBCONFIG entry via the LIKE option on the DIRM ADD command. The :SSI_VOLUMES. (3) section allows you to define which DASD volumes DirMaint will use when allocating new minidisks associated with the new cloned SUBCONFIG entry. Entries within the :SSI_VOLUMES. section define which DASD volume corresponds to which user-defined set of volumes across each member of the SSI cluster. When cloning an existing minidisk, DirMaint will determine to which set of volumes the existing minidisk belong, and then determine which volume to use for the same set on the new member of the SSI cluster. When allocating DASD space using an SSI_VOLUME. section entry, DirMaint will use the same cylinder offsets on the new member's per-system volume as are used on the existing member's per-system volume. Similarly, the device type of the old member disk will be used as the device type for the new member disk. Note that DirMaint does not copy data from the existing subconfig disk to the new subconfig disk. The data copy must be done using DDR, as specified in the use case scenario documented in [z/VM: CP Planning and Administration](#).

The format for an :SSI_VOLUMES. section entry is:

```
volume_set_name ssi_member volser
```

Where:

volume_set_name

Specifies the name of the set of volumes DirMaint will use when allocating new minidisks on a per-system basis – for example, SYSRES for the set of system-residence volumes across the SSI cluster. Volume set names supported by DirMaint must be less than or equal to 16 characters in length and cannot contain any spaces.

ssi_member

Specifies the system name of the SSI cluster member for which new minidisks will be allocated.

volser

Specifies the volume ID of the DASD to be used when allocating new minidisks on the specified *ssi_member* system.

Note:

1. This value represents the value placed into the *volser* field on any minidisks generated from this entry.
2. Volume IDs supported by DirMaint can contain only the characters A-Z, 0-9, #, @ and \$.
3. Each entry in the :SSI_VOLUMES. section must have a unique volume ID. The same volume ID cannot be used for multiple nodes or multiple volume sets.

Usage Notes

1. :SSI_VOLUMES. section entries can be specified in mixed case, but note that case is *not* respected. DirMaint translates all entries to upper case as they are read.
2. Any data following the last required field on each :SSI_VOLUMES. entry is ignored.

3. DirMaint does not impose a limit on the number of :SSI_VOLUMES. entries.

Example—Defining a Volume Set/SSI Cluster Member Relationship:

The following entries define *volser's* RES1, RES2, RES3, and RES4 associated with a volume set called RESIDENCE for SSI members DVHTEST1, DVHTEST2, DVHTEST3 and DVHTEST4, respectively.

```
:SSI_VOLUMES.
RESIDENCE DVHTEST1 RES1
RESIDENCE DVHTEST2 RES2
RESIDENCE DVHTEST3 RES3
RESIDENCE DVHTEST4 RES4
:END.
```

:EXCLUDE. Section

DirMaint represents extents within its control structures as either extents or excluded (4) extents. Excluded extents are excluded from extent checking during DirMaint DASD allocation operations. This includes the full volume overlays for backup operations.

The EXCLUDE section of the EXTENT CONTROL file gives the system administrator the ability to map some or all of a user's extents as excluded. Multiple entries are also allowed. The format is:

```
entry_name address
```

Where:

entry_name

Identifies the directory entry name in which the minidisk with the extent or extents to be excluded is defined. This is the USER, IDENTITY or SUBCONFIG name associated with the entry. An entry name can be followed by an asterisk (*) to act as a wild card character.

address

Specifies the address or set of addresses to be excluded.

- The address is an optional field. If it is not provided, or an asterisk is specified, all minidisk specifications within the directory entry are considered excluded.
- If the address is provided it may consist of 1 to 4 digits, with an optional trailing asterisk.
 - DirMaint considers all addresses to consist of four digits.
 - The specified digits are considered the left most digits of the four digit address.
 - A trailing asterisk or specification of less than four digits implies that all addresses starting with the specified digits are to be considered excluded.

Example—Wild Card Character: If you enter:

```
HOWLAND* 0191
```

This excludes the 0191 device in any directory entry starting with HOWLAND, is shown as:

```
HOWLAND1, HOWLAND2, ...
```

If you specify an * without an *entry_name*, the entry is ignored and is treated as a comment statement.

Example—Segment of the EXCLUDE section:

```
CAMUT          * Every disk owned by CAMUT is excluded.
HOWLANDM 3*    * HOWLANDM's 3000 - 3FFF are excluded
HOWLANDM 01*   * HOWLANDM's 0100 - 01FF are excluded
HOWLANDM 1199  * HOWLANDM's 1199 is excluded
```

Any extent owned by HOWLANDM with an address that matches the addresses listed will be considered excluded. All of the following MDISK statements would be considered excluded if they occurred in the HOWLANDM directory entry:

```
MDISK 0199 3380 1 END SYSPAK      (matched '01*')
MDISK 177 3380 1 END SYSPAK      (matched '01*')
MDISK 3199 3380 1 END SYSPAK     (matched '3*')
MDISK 1199 3380 1 END SYSPAK     (matched '1199')
```

Attention

Defining a user or a user's device as excluded forces the extent to be considered as an EXCLUDED extent when DirMaint builds its volume control files. Excluded extents are not consulted before allocating new extents. This allows a new extent to overlap an EXCLUDED extent.

:AUTOBLOCK. Section

AutoBlock (5) entries are used by the DirMaint machine to calculate the number of cylinders or blocks to allocate with some automatic allocation methods. The specific architecture type for supported DASD types is also obtained from this section. The format is:

```
type blksize blkperunit allocunit architecture
```

Where:

type

Specifies the DASD type associated with each entry.

blksize

Specifies the block size of this entry.

blkperunit

Specifies the blocks per unit for this entry.

allocunit

Specifies the allocation unit for this entry.

architecture

Specifies the device architecture associated with the entry.

Usage Notes

1. This section is shipped empty. Modifications should only be made to this section if your installation is using a device type not defined in the AUTOBLK DATADVH file.
2. When initializing the volume control files, the device architecture is taken from the AUTOBLOCK section, or from the AUTOBLK DATADVH file.
3. The following automatic allocation methods use this table to determine the actual number of cylinders or blocks to allocate.
 - GBLKnnnn
 - RBLKnnnn
 - TBLKnnnn
 - VBDSnnnn
 - VBLKnnnn

Where:

nnnn

Specifies the combination of the device type of valid being targeted for allocation and the blocking factor. The automatic allocation keyword determines which entry to use.

This section may be altered if some device types do not apply to your installation. You may choose to delete or comment out the appropriate device types from this section. Should a user attempt to use the device type, DirMaint will then reject the attempt without having to resort to calling DIRECT.

Allocation Formula

```
actualalloc = roundup(allocsize / blkperunit) * allocunit
```

Where:

- actualalloc**
Specifies the number of cylinders or blocks actually obtained during the allocation request.
- allocsize**
Specifies the value passed during the allocation request.
- BlkPerUnit**
Is obtained from the AutoBlk entry.
- AllocUnit**
Is obtained from the AutoBlk entry.

:DEFAULTS. Section

As discussed in “:REGIONS. Section” on page 76, the *ttttmmm* field of your region entries determines the "device type" of the volume. When building the volume control structures within the DIRMAINT machine, DirMaint will query each volume listed in the determine their actual size. In an SSI environment, the queries are issued on each SSI member and the maximum size of the query responses is used. When the volume is not attached, a default size defined for the device type is used. Device types that are not defined in the DEFAULTS DATADVH file can be defined in this section. The format is:

```
ttttmmm Cyl/Blk
```

Where:

- ttttmmm**
Specifies the DASD device type and an associated model number information associated with this default entry.

The *ttttmmm* value specified on the :DEFAULTS. entry must exactly match the value specified in the :REGIONS. section. If unable to locate an exact match, the device type (*tttt*) determines the maximum allocatable block or cylinder.
- tttt**
Specifies the device type associated with this default entry.
- mmm**
Specifies a string used when cross checking a :REGIONS. entry with a :DEFAULTS. entry. Generally this consists of model number information.
 - The model number information is optional.
 - The *mmm* value, if specified, is not limited to a specific size. It may be as small as a single character.
 - Supported characters are A-Z, 0-9, #, @, \$, or -(dash).
 - Imbedded blanks are not supported.
 - Is used during initialization to determine the maximum allocatable block or cylinder for a :REGIONS. entry from the :DEFAULTS. section of the EXTENT CONTROL file.
- cyl|blk**
Specifies the maximum allocatable cylinder (for CKD devices) or block (for FBA devices) on this device.

Example—Fragment from the EXTENT CONTROL File:

3380	885
3380-01	885

3380-02	1770
3380-03	2655

Notice that if a region entry specifies a *ttttmmmm* entry of:

3380-03

DirMaint will consider cylinder 2654 as the maximum allocatable cylinder. If there are no region entries on this system and an extent using device type 3380 is found, DirMaint will default to the

3380	885
------	-----

entry and consider 884 as the maximum cylinder. The last example shown, if all devices in your system are Model 03, the default value for 3380 may be altered from 885 to 2655. After doing this, all devices without a corresponding region entry will use a default value of 2655.

Attention

If DirMaint cannot determine the maximum block/cylinder from an explicit region entry, the default value for the device will be used. This is usually the smallest model. This renders extents above the limit as unallocatable. To correct this, define an explicit region or change the default value for the device and rebuild the volume control files using the RLDEXTN command.

:END. Tag

The :END. tag is used to denote the end of the :REGIONS., :GROUPS., :SSI_VOLUMES., :AUTOBLOCK., :EXCLUDE., and :DEFAULTS. sections. A single :END. tag should follow each section.

The AUTHDASD File

DirMaint allows the local system to implement a DASD allocation authorization system through an exit call. For more information, see [“DASD Authorization Checking \(DVHXDA\)” on page 152](#). If the exit is not located or if the exit defers, DirMaint defaults to its native DASD allocation authorization scheme.

DASD allocation requests are provided with two levels of control under DirMaint:

- The first level is the command authority required to issue the command. For more information on command classes, see [“Command Classes” on page 117](#).
- The second level is the protection in the entries of the AUTHDASD DATADVH control file. This file is located on the primary directory disk.

The AUTHDASD DATADVH Control File

The format is:

```
userid node allocclass name1 name2 ... nameN
```

Where:

userid

Identifies the user ID issuing the allocation request.

- A value of * is valid in this field. When this value is used it indicates that all user's on the specified node are authorized for the given allocation type.

node

Identifies the node of the user issuing the allocation request.

- A value of * is valid in this field. When this value is used it indicates that the specified user on any node is authorized for the given allocation type.

allocclass

Specifies one of the following allocation classes authorized for the specified user ID.

Table 11. Allocation Classes		
Class	Allocation Types	Explanation
VOLUME	AUTOV or VLBKxxxx	Allocations requests that involve volume level authority. The values following this field are the authorized vol IDs or an * indicating that the user is authorized for volume level authorization on all volumes within the system.
REGION	AUTOR or RBLKxxxx	Allocations requests that involve region level authority. The values following this field are the authorized regions or an * indicating that the user is authorized to allocate within any defined region. Note: DASD areas not contained within a defined region can not be allocated using this authority and explicit extents can not be provided. The user is restricted to AUTOR and RBLKxxxx.
GROUP	AUTOG or GBLKxxxx	Allocations requests that involve group level authority. The values following this field are the authorized groups or an * indicating that the user is authorized to allocate within any defined group. Note: DASD areas not contained within a defined group can not be allocated using this authority and explicit extents can not be provided. The user is restricted to AUTOG and GBLKxxxx.
SPECIFIC	Numeric Value	Allocation requests that involve specific extent information on the command invocation. Allocation requests requiring this level of authority involve those requests that supply the starting cylinder, cylinder or block count and the volume ID of the intended allocation.
*	Any	Unlimited allocation requests. Any valid allocation method is allowed, including DEVNO requests. Note: This authority is required to process allocation requests involving DEVNO. Authorization at this level authorizes the user to use any available method to allocate.

namen

Specifies the REGION, GROUP or VOLUME ID to which this authorization applies.

- A value of * is valid in this field. When this value is used, all instances of the allocation type are considered authorized.

Usage Notes

1. Some allocation requests require no authority and are always authorized. V-DISK, T-DISK, TBLKxxxx and VDBSxxxx are examples of allocation methods that are always authorized.
2. Your installation may rely exclusively on the command privilege classes of the commands that allocate DASD to protect your disk resources. In this case, you may consider granting all users global authority. If you choose to permit all users, who have the command authority to enter DASD allocation commands, using any method, then place this entry in the AUTHDASD file:

```
*      *      *
```

This is the IBM shipped default setting for the AuthDASD file. If this record is being used, ensure that only authorized users have been given the command authority to enter commands that allocate DASD.

Automatic Allocation Algorithms

The DirMaint product supports two automatic allocation algorithms. The algorithm is selected by placing an entry in an accessed configuration file. The format is:

```
DASD_ALLOCATE= method
```

Where:

method

Indicates one of the following allocation methods.

FIRST_FIT

Specifies that allocation attempts within a defined DASD region be conducted on a first fit basis. The first gap found of sufficient size within the specified allocation area is allocated.

EXACT_FF

Specifies that allocation attempts will utilize an exact fit algorithm followed by first fit. Allocation will be attempted in any gap that exactly matches the size being allocated. Should there be no gap that matches this size, then a first fit algorithm is employed.

Usage Notes

1. If allowed to default, or if an unknown value is entered, the FIRST_FIT algorithm is used.
2. The FIRST_FIT algorithm should yield better performance as it only searches a region for a gap that is large enough to contain the new extent. The EXACT_FF algorithm, although slower, should minimize DASD fragmentation over time.
3. DirMaint will never allocate an extent that forms an overlap with another nonexcluded extent unless specific extent information is provided and extent checking is OFF. Extent checking can be set by using a configuration file entry. The format is:

```
EXTENT_CHECK= ON|OFF
```

Where:

ON

Is the default setting.

OFF

If a value other than ON or OFF is entered, the default value of ON is used.

4. The number of unassigned work units is controlled by the entry in the CONFIG* DATADVH file.

The format is:

```
MAXIMUM_UNASSIGNED_WORKUNITS= nnnn
```

Where:

nnnn

Is an unsigned integer and defaults to 100 if not specified. If left to default, all DASD transactions will be rejected.

For more information on the Work Unit Control File (WUCF), see [“Work Unit Control File” on page 88](#).

5. Unassigned work units may build up on your system for several reasons. The most common may be a busy DATAMOVE machine(s). When a DASD request requiring DATAMOVE interaction is received, a work unit is created and placed on the unassigned queue if all DATAMOVE machines are currently active. The work units are removed from the unassigned queue and assigned to a DATAMOVE machine as each DataMove becomes available.

- Setting this value too low may result in DASD commands being rejected if a large influx of DASD commands are received. A value of 100 is recommended for general use. You may choose to set this value higher if DirMaint is being used in an environment where a large volume of DASD allocation commands in a short period of time is expected (a university installation for instance).

Protecting System Areas on DASD

DirMaint has the ability to use the CP QUERY ALLOC command to display the number of cylinders or pages that are allocated, in use, and available for DASD volumes attached to the system.

DirMaint will use the following operands of the CP QUERY ALLOC command:

CP QUERY ALLOC Area	DirMaint Extent Owner
DRCT	.DIRECT.
PAGE	.PAGE.
SPOOL	.SPOOL.
TDISK	.TDISK.

Notes:

- The CP QUERY ALLOC command is not valid on all releases and requires that DIRMAINT machine be authorized for privilege class D where the command is valid.
- The mapping of system areas is only done on volumes known to DirMaint at the time the facility is invoked. If the command is not valid or the DIRMAINT machine is not authorized the mappings will not take place. The mapping is invoked during initialization and when the ALL option of the RLDEXTN command is used. For more information about the RLDEXTN command, see [z/VM: Directory Maintenance Facility Commands Reference](#).
- Known volumes include any volume specified in the :REGIONS. section of the EXTENT CONTROL file and any volume referenced by an MDISK statement within the source directory, at the time the volume control files are built.
- If an allocation attempt is made on a volume unknown to DirMaint it is important to note that any system areas resident on that volser have not been explicitly protected by DirMaint. It is recommended that any volume with system areas be specified in the :REGIONS. section of the EXTENT CONTROL file.
- For more information about the CP QUERY ALLOC command, see [z/VM: CP Commands and Utilities Reference](#).
- In an SSI cluster, the DIRMAINT machine issues CP QUERY ALLOC MAP commands via the CP AT command on all systems for which a satellite server is defined in the DIRMSAT CONTROL file.

Volume Control File

The volume control files are used during an allocation attempt to locate a free area for allocation. These files are also consulted when building free and used maps of DASD space.

A volume control file is built for each known volume on the system. This includes volumes that are not used in the directory but mentioned in the :REGIONS. area of the EXTENT CONTROL file. Volume control files are built with the volser as the file name and VCONTROL as the file type. These files reside on the primary directory file mode and are built and maintained automatically by DirMaint.

You can place statements in the volume control file however, if you specify more than one statement with the same operands the last operand definition overrides any previous specifications. For more information on the automatic mapping of system areas see [“Protecting System Areas on DASD” on page 86](#). This only takes place on volumes known to DirMaint at the time, the facility is invoked.

Volume Control File Example

An example of a volume control file fragment:

```

1 DEVTYPE= 3390
2 MAXBLK= 1112
3 ARCH= CKD
4 ENTRY= 11 20 HOWLANDM 0192 *
4 ENTRY= 21 40 HOWLANDM 0193 *
4 ENTRY= 41 50 RITTERME 0191 *
5 EXCLD= 6 100 7 105 8 RITTERME 9 0111 10 *
```

Figure 15. Volume Control File

The following notes are to help you with your “Volume Control File Example” on page 87:

- 1** DEVTYPE specifies the device type associated with this volume id. This value is the *ttttmmmm* field as mentioned in “:REGIONS. Section” on page 76. If this volume control file was not generated by a region entry, this field is the device type from the MDISK statement. Note that any future extents allocated on this volume with dynamic device type allocation use the first four digits from this field.
- 2** MAXBLK specifies the maximum allocatable block or cylinder. The value is obtained from the actual size of the volume. A default size for the DASD model is used when the volume is not attached to either the system where the DIRMAINT server is running or the SSI cluster member system where a DirMaint satellite server is running.
- 3** ARCH specifies the architecture associated with this volume. Currently this value is FBA or CKD.
- 4** ENTRY specifies an extent entry.
- 5** EXCLD specifies an excluded extent entry.

Example—ENTRY and EXCLD Multiple Field Records:

ENTRY and EXCLD are multiple field records representing a single contiguous extent. The format is:

```
type start end owner address sysaffin
```

- Type 5**
Specifies the type of extent entry. EXCLD and ENTRY represent an excluded entry and a typical entry respectively.
- Start 6**
Specifies the starting extent block or cylinder, inclusive.
- End 7**
Specifies the ending extent block or cylinder, inclusive.
- Owner 8**
Specifies the user ID that owns the extent.
- Address 9**
Specifies the address the owner references this extent with.
- sysaffin 10**
Specifies the system affinity associated with this extent.

Operation

The operation of the DASD subsystem involves two steps: directory initialization and manipulating extents.

Directory Initialization

When DirMaint is initialized, the DirMaint machine builds several control structures to represent the current state of allocation for each known volume. The volume control files can also be rebuilt by using the RLDEXTN command with the ALL option. For more information on the RLDEXTN command, see [z/VM: Directory Maintenance Facility Commands Reference](#). This operation is done automatically by DirMaint when it initializes for the first time.

Manipulating Extents

DirMaint provides several commands designed to allocate, change, delete and manipulate directory MDISK statements.

AMDISK

Add (allocate) a new extent.

CMDISK

Alter the size of an existing extent.

DMDISK

Deallocate an existing extent.

MMDISK

Mirror the extent information from one extent to another.

RMDISK

Redefine the extent information on an existing extent.

MDISK

Alter the mode and passwords of an existing extent.

For more information on commands, see [z/VM: Directory Maintenance Facility Commands Reference](#).

Work Unit Control File

When DirMaint receives a DASD request of AMDISK, CMDISK, DMDISK, or TMDISK, a transaction file, known as a WUCF, is built and placed on disk. The WUCF is checked to see if asynchronous processing is required. If the transaction does not require DATAMOVE activity, it is immediately acted on. WUCFs requiring asynchronous processing are assigned to an open DATAMOVE machine or placed on a queue to await the next available DATAMOVE machine.

The WUCF is a transaction file representing a DASD command, created on the primary directory disk. The format is:

```
nnnnnnnn WORKUNIT
```

Where:

nnnnnnnn

Specifies a random 8-digit number representing the specific work unit.

Transaction File Example

```

1 DMM: &DMM.NAME &DMM.NODE
2 DEV.ONE: &DEV.ONE
3 DEV.TWO: &DEV.TWO
4 ORIGNODE: GDLVM7
5 ORIGUSER: MNTDASD1
6 ORIGSEQ#: 12
7 ORIGCMD: AMDISK 0306 3390 AUTOG 500 GDLVM7 MR
8 SYSAFFIN: *
9 TARGETID: DSSERV
10 LANG: AMENG
11 CMDLEVEL: 140A
12 ASUSER: MNTDASD1
13 REQUEST: 12
14 ORIGEXTENT: N/A
15 WURETRIES: &RETRY
16 SSINODE: *
17 BEGINCMDS:
18 NTRIED 19 WORKUNIT 20 ENABLE
18 NTRIED 19 AMDISK 20 FOR DSSERV 0306 33 90 AUTOG 500 GDLVM7 MR
18 NTRIED 19 UNLOCK 20 0306 DSSERV NOMSG
18 NTRIED 19 WORKUNIT 20 RESET
18 NTRIED 19 DIRECT

```

Figure 16. Transaction File

The “Transaction File Example” on page 89 contains two separate areas.

Prefix Area

The prefix area establishes the context the command was entered in. This also lists the DATAMOVE machine that owns the WUCF and any devices currently in use by this WUCF. The following notes are to help you with your “Transaction File Example” on page 89.

1

This section contains the user ID and node ID of the DATAMOVE machine that was assigned to act on behalf of this command. In this example, the &DMM.NAME and &DMM.NODE indicate that this work unit has not been assigned to a specific DATAMOVE. This situation is common and may indicate that all DATAMOVE machines were busy when the work unit was received. If DATAMOVE interaction is not required, this field will remain &DMM.NAME and &DMM.NODE.

2

This field contains the first device being used on the DATAMOVE machine that is associated with this work unit. In this example, the &DEV.ONE is a further indication that the work unit has not been assigned. After the work unit is assigned to a DATAMOVE this field is changed to reflect a virtual address on the DATAMOVE machine. If DATAMOVE interaction is not required, this field will remain &DEV.ONE.

3

This field contains the second device being used on the DATAMOVE machine that is associated with this work unit. In this example, the &DEV.TWO is a further indication that the work unit has not been assigned. After the work unit is assigned to a DATAMOVE this field is changed to reflect a virtual address on the DATAMOVE machine. If DATAMOVE interaction is not required, this field will remain &DEV.TWO. Some requests only require a single device.

4

Reflects the node from which the command originated. In this example, the command originated from node GDLVM7.

5

Reflects the user that originated the command. In this example, the user MNTDASD1 entered the command.

6

Is the sequence number given in the original command.

7

Is the original command. All parameters are presented as provided from the user.

8

Is the system affinity associated with the command invocation.

9

Is the target user ID, which will be altered by the command.

10

Is the language associated with this command.

11

Is the command level in which the command was entered.

12

Is the setting of the prefix ASUSER when the command was entered.

13

Is the request number associated with this command.

14

Is the original extent information or N/A. This field is only set if the command being processed is a CMDISK.

15

Is the number of times the work unit has been retried or &RETRY in an unassigned work unit.

16

Is the SSI member name associated with the command invocation. An '*' indicates that the disk being processed may be handled by a DATAMOVE server on any member of the SSI. Any other value indicates the member on which the associated DATAMOVE machine should be running. This is the value of the ATnode prefix in the associated DIRM command. If the ATnode prefix was '*' and the FORuser is a SUBCONFIG entry, then this is the SSI member associated with the SUBCONFIG on the BUILD statement in the associated IDENTITY entry.

17

Is a token representing the start of the commands area and the end of the prefix area.

Command Area

The command area defines the subcommands required to accomplish the task. There are usually several subcommands within each WUCF. The exact sequence of commands depends on the command that generated the WUCF. Regardless of the command, each subcommand consists of three basic parts:

18

Part 1

Status

Identifies the status of this specific command. The first part may have the following values:

NTRIED

The command has not been tried.

DONEnnnncccc

The command has returned from DATAMOVE or returned from a subcommand handler with the specified status. The field is zero padded.

Where:

nnnn

Specifies the DATAMOVE return code.

For more information for specific meanings, see *z/VM: Directory Maintenance Facility Messages*. If this status is reflecting the return code from a subcommand handler, this field will always be zeros.

cccc

Specifies the CMS return code of a failing condition (if we have a failing condition) or zeros if all worked well.

ACTIVE

The command has been sent to DATAMOVE to process. No status has returned from the DATAMOVE machine.

RETRY

The command has been sent to DATAMOVE to process. A recoverable error was returned and this step should be retried.

19

Part 2

Command Name

Denotes the subcommand name.

20

Part 3

Command Parameters

Denotes the specific parameters associated with the command. This list will be different for each command.

Subsystem Control

The DASD subsystem control structure consist of these files that exist on the DirMaint servers 1DF disk:

DATAMOVE Control File

The DATAMOVE control file is the primary control structure for managing interaction with the DATAMOVE machine. There is only a single occurrence of this file on the 1DF disk, its name is DATAMOVE CONTROL. A single entry for each defined DATAMOVE machine is contained within. This file provides the serialization required when dealing with DATAMOVE machines. Its format is as follows:

```
userid nodeid sysaffin activity fdevtab pending autologs unitid
```

- Userid is the userid of the DATAMOVE machine
- Nodeid is the node ID of the DATAMOVE machine
- Sysaffin is the system affinity associated with this DM
- Activity is the current activity of this DATAMOVE machine
 - ACTIVE
 - Indicates that a transaction was sent to the DATAMOVE machine and no response has yet been received.
 - INACTIVE
 - Indicates that the DATAMOVE machine is available for additional work.
 - QUIESCED
 - Indicates that the DATAMOVE machine is not available for additional work and should not be dispatched.
- Fdevtab is the filename of the free device table
- Pending is the number of pending requests
 - Due to DATAMOVE retry situations
 - Copy delayed while waiting for a link to device to drop
 - Copy delayed while waiting for directory to be placed online.
 - It is also used to load level the assignment of work
- AutoLogs is the number of times the DATAMOVE machine has been autologged. DirMaint will autolog a DATAMOVE machine if the machine is logged off when DirMaint needs to assign a work unit to it.

- `Unitid` is the current Work Unit Control File (WUCF)
 - Only valid if ACTIVE

This file is only rebuilt during initialization if no active Work Unit Control Files exist. As this file contains status information regarding the activity of work units, it's information must not be lost by rebuilding this file. If no active work units exist the file is rebuilt by DVHINITI during system initialization.

xxxxFDEV DVHTABLE File

Essentially is a bit map describing what devices are currently in use in the associated DATAMOVE machine. The 'xxxx' is an ordinal between 0000 and 9999 that is assigned to a specific DATAMOVE machine. One xxxxFDEV DVHTABLE exists for each DATAMOVE machine. The DATAMOVE CONTROL file associates a specific DATAMOVE machine with this file. The table is referenced during a device assignment being made to a DATAMOVE machine. The mapped range is '0100'x to '05FF'x on the DATAMOVE virtual machine.

Unassigned Queue

The unassigned queue is used as a repository for unassigned WUCFs. If a DATAMOVE machine can not be assigned once the work unit is created it is placed into this file. The maximum size of this file is governed by the `MAXIMUM_UNASSIGNED_WORKUNITS=` configuration file entry. The date and time the WUCF was created is also placed into this file. This file only exists if WUCFs are unassigned. It exists on the DirMaint servers 1DF disk and is named

- UNASSIGN DVHQUEUE

Processing Retry or Stalled Work Units

Work units processed by the DATAMOVE machine may sometimes not be able to complete. There are a number of possible reasons for this, but in most cases, a disk which needs to be formatted or copied to is linked by another user. The DirMaint server will attempt to retry work units based on the `MAXIMUM_WORKUNIT_RETRIES` configuration statement value. The default is to retry the work unit indefinitely. Eventually, the disk may become detached and the DATAMOVE machine will be able to successfully complete the work unit.

If the DirMaint server is waiting indefinitely for the disk to be detached and you decide that the work unit processing is no longer desired, you may choose to use manual intervention. The disk may have been detached and you may want to retry the work unit immediately, or you may wish to cancel the work unit and roll back any processing which has already occurred.

In other cases, because the DirMaint DASD management subsystem is so complex, it's possible that DirMaint will sometimes lose track of everything it's supposed to be tracking. If a work unit is stalled or if the DATAMOVE machine has stopped, manual intervention may be necessary to get the DATAMOVE machine working again. The commands in the following two sections can be used to diagnose and process retry or stalled work units.

See [*z/VM: Directory Maintenance Facility Commands Reference*](#) for more information on any of these commands.

Commands For Diagnosing Work Units

Use the following command to diagnose work units:

- **DIRMaint Query**

The DIRMaint Query command may be used to request current system information from the DIRMAINT server. The current status of DATAMOVE machines may be requested, as well as the current number of pending work elements for a DATAMOVE machine, or the status of the current unassigned work unit queue. Detailed information for specific work units may also be queried.

- **DIRMaint STATUS**

The DIRMaint STATUS command may be used to request the current status of DATAMOVE virtual machines, as well as list all work units being processed by DirMaint. Detailed information on specific work units may also be requested.

All of this information may be used to determine if a work unit is in a retry or stalled state, or if a DATAMOVE machine has become quiesced or has stopped. If the status of the DATAMOVE is QUIESCED, the DATAMOVE machine is disabled and will not process any more work units without manual intervention. If the number of pending work units for a DATAMOVE machine or the number of work units on the unassigned queue is growing and the DATAMOVE machine status is ACTIVE or INACTIVE, then the DATAMOVE machine may be in a stopped condition. Individual work units may be queried to determine what step or process is stalled for the work unit. Once it is determined that a work unit or the entire DATAMOVE machine is stalled, the commands in the following section may be helpful in addressing your specific situation.

Commands For Processing Work Units

Use the following command to process work units:

- **DIRMaint WORKUNIT**

The DIRMaint WORKUNIT command may be used to cancel or retry specific work units. If the DATAMOVE machine is not quiesced or hung, this command may be used to initiate retry or cancel operations.

- **DIRMaint CLEANUP**

The DIRMaint CLEANUP command may be used to unhang a DATAMOVE machine by cleaning up internal files and retrying or canceling all work units associated with that DATAMOVE machine. If the DATAMOVE machine is in a QUIESCED state or in a hung condition, this command may be used to perform an automatic cleanup.

Error Recovery

When a failure occurs although a work unit is being processed, automatic rollback processing is attempted before deallocating the work unit. If rollback is possible, a batch file is created with the required commands to rollback the work unit. The batch file is submitted automatically. In either case, the Work Unit Control File is copied to a file for administrative review. The format is:

```
nnnnnnnn WUCFFAIL
```

To understand the specific rollback processing done by DirMaint requires some background information on the method used by DirMaint to handle DASD requests.

As many events that require the DATAMOVE server are handled asynchronously, DirMaint DASD operations are subject to asynchronous failures. The DASD subsystem has been designed to meet three types of asynchronous failures:

Soft Failures

Soft failures generally occur when the assigned DATAMOVE machine is unable to obtain a link to the required device. This can occur when the object directory has not been placed online or when a virtual machine still has a link to the required device. These errors are handled by DirMaint as retry events. The DATAMOVE virtual machine will periodically attempt the operation and, if links are obtained, complete the required operation. This failure will leave no residual files indicating that it ever occurred.

Hard Failure – Recoverable

If possible, the DirMaint machine will rollback the transaction and return the system to a state that existed before the command was entered. In either case, a residual file is produced to help the administrator determine the cause of the failure.

Automated Rollback

Automatic rollback processing involves:

- Transferring resources from the DATAMOVE machine back to the user
- Releasing any obtained, but unused, extents.
- Removing locks on devices

There are three scenarios where this can be performed by DirMaint:

- Failure of AMDISK subcommand. Several commands create a WUCF where one of the first operations involves the subcommand AMDISK. If this command should fail, DirMaint is able to release any device locks obtained by this transaction.
- Failure of DATAMOVE COPY request. The WUCF created for a CMDISK request involves using an AMDISK subcommand to create a new extent, transferring the original extent to a DATAMOVE machine, and requesting that the DataMove machine COPY the information from the old extent to the new extent. The new extent is then returned to the user and the old extent is released. Should the COPY request fail, DirMaint is able to:
 - Transfer the old extent back to the user
 - Release the new extent
 - Release any device locks obtained by this transaction
- Failure of DATAMOVE format. The WUCF created for an AMDISK that requires formatting involves the allocation of a new extent on a DATAMOVE machine, formatting it and finally transferring it to the user. If the format should fail, DIRMAINT is able to:
 - Release the obtained extent
 - Release any locks obtained by this transaction
- Failure of old minidisk CLEANUP. The WUCF created for an AMDISK, CMDISK, or DMDISK that requires clean-up of an old minidisk being released. If the clean-up should fail, DIRMAINT is able to:
 - Transfer a new minidisk to user
 - Release the old extent
 - Release any locks obtained by this transaction.

Hard Failure – Nonrecoverable

If a WUCF failure does not meet the criteria for automatic rollback, the WUCF may require administrative intervention to clean up after the failure. The original WUCF, now renamed to *nnnnnnnn* WUCFFAIL, remains as a history of what commands were performed and which commands failed.

Note: The device locks and extents all remain exactly as they were when the WUCF failed.

Manual Rollback

The manual steps required to rollback a WUCF will vary with the command that created the WUCF. This can be determined from the ORIGCMD: tag in the prefix area. The specific actions will depend on where the WUCF failed. As explained in [“Work Unit Control File”](#) on page 88, the command status field will indicate the failing command.

For more information on the specific steps generated in the WUCF files, see [“Error Recovery Scenarios”](#) on page 94.

Error Recovery Scenarios

These scenarios discuss the types of work units that may be found and the steps performed during their execution. Use these scenarios as an aid to problem solving. For information on the error messages and return codes to determine the cause of the failure, see the [z/VM: Directory Maintenance Facility Messages](#).

AMDISK With No DATAMOVE Interaction

These devices may have been locked on behalf of this transaction. If the failure has occurred before the UNLOCK step (and it was not a candidate for automatic rollback), the device may still be locked.

```

DMM: &DMM.NAME &DMM.NODE
DEV.ONE: &DEV.ONE
DEV.TWO: &DEV.TWO
ORIGNODE: GDLVM7
ORIGUSER: MNTDASD1
ORIGSEQ#: 12
ORIGCMD: AMDISK 0306 3390 AUTOG 500 GDLVM7 MR
SYSAFFIN: *
TARGETID: DSSERV
LANG: AMENG
CMDLEVEL: 140A
ASUSER: MNTDASD1
REQUEST: 12
ORIGEXTENT: N/A
WURETRIES: &RETRY
SSINODE: *
BEGINCMDS:
1 NTRIED WORKUNIT ENABLE
2 NTRIED AMDISK FOR DSSERV 0306 3390 AUTOG 500 GDLVM7 MR
3 NTRIED UNLOCK 0306 DSSERV NOMSG
4 NTRIED WORKUNIT RESET
5 NTRIED DIRECT

```

Figure 17. AMDISK With No DATAMOVE Interaction

The following steps are provided to help you with your [“AMDISK With No DATAMOVE Interaction”](#) on page 95 error recovery.

- 1** WORKUNIT ENABLE causes object directory updates to be suspended. Failure of this step may indicate a problem using GLOBALV.
- 2** AMDISK adds an extent to the DATAMOVE machine. Failure on this step probably resulted from an authorization failure. It should have been handled by automatic rollback processing. If the failure occurs after this step, DirMaint has allocated an extent on the DATAMOVE machine that may need to be deallocated.
- 3** UNLOCK releases the locks on the user's device. Note that you may still have a device lock pending for this user if the failure occurs here.
- 4** WORKUNIT RESET causes object directory updates to be enabled. Failure of this step may indicate a problem using GLOBALV.
- 5** DIRECT causes object directory to be placed online if current settings allow. Failure on this command may indicate problem with your source directory.

AMDISK With DATAMOVE Interaction

These devices may have been locked on behalf of this transaction. If the failure has occurred before the UNLOCK step (and it was not a candidate for automatic rollback), the device may still be locked.

```

DMM: DATAMOVE GDLVMK1
DEV.ONE: 100
DEV.TWO:
ORIGNODE: GDLVMK1
ORIGUSER: DIRMAINT
ORIGSEQ#: 92
ORIGCMD: AMDISK 6543 3380 2001 1 K1CP04 LABEL MJH191
SYSAFFIN: *
TARGETID: HOWLAND9
LANG: AMENG
CMDLEVEL: 150A
ASUSER: DIRMAINT
REQUEST: 92
ORIGEXTENT: N/A
WURETRIES: &RETRY
SSINODE: *
BEGINCMDS:
1 NTRIED WORKUNIT ENABLE
2 NTRIED AMDISK FOR DATAMOVE 100 3380 2002 1 K1CP04
3 NTRIED WORKUNIT RESET
4 NTRIED DIRECT
5 NTRIED DMVCTL DATAMOVE GDLVM7 DMVCTL FORMAT DIRMAINT GDLVMK1 32027026 1 HOWLAND9 6543 * 100 =
MJH191
6 NTRIED WORKUNIT ENABLE
7 NTRIED TMDISK FOR DATAMOVE 100 HOWLAND9 6543
8 NTRIED WORKUNIT RESET
9 NTRIED DIRECT
10 NTRIED UNLOCK 6543 HOWLAND9 NOMSG

```

Figure 18. AMDISK With DATAMOVE Interaction

The following steps are provided help you with your [“AMDISK With DATAMOVE Interaction”](#) on page 95 error recovery.

- 1** WORKUNIT ENABLE causes object directory updates to be suspended. Failure of this step may indicate a problem using GLOBALV.
- 2** AMDISK adds an extent to the DATAMOVE machine. Failure on this step probably resulted from an authorization failure. It should have been handled by automatic rollback processing. If the failure occurs after this step, DirMaint has allocated an extent on the DATAMOVE machine that may need to be deallocated.
- 3** WORKUNIT RESET causes object directory updates to be enabled. Failure of this step may indicate a problem using GLOBALV.
- 4** DIRECT causes object directory to be placed online if current settings allow. Failure on this command may indicate problem with your source directory.
- 5** DMVCTL FORMAT requests that the new extent on DATAMOVE be formatted.
- 6** WORKUNIT ENABLE causes object directory updates to be suspended. Failure of this step may indicate a problem using GLOBALV.
- 7** TMDISK transfers the extent from DATAMOVE to the user. The new extent has been allocated on DATAMOVE and is now formatted. You may choose to release the locks on the users device and issue a separate TMDISK (from DATAMOVE to the user) to give the user their new extent.
- 8** WORKUNIT RESET causes object directory updates to be enabled. Failure of this step may indicate a problem using GLOBALV.
- 9** DIRECT causes object directory to be placed online if current settings allow. Failure on this command may indicate problem with your source directory.

10

UNLOCK releases the locks on the user's device. Note that you may still have a device lock pending for this user if the failure occurs here.

CMDISK

The CMDISK always requires DATAMOVE interaction. These devices may have been locked on behalf of this transaction. If the failure has occurred before the UNLOCK step (and it was not a candidate for automatic rollback), the device may still be locked.

```
DMM: DATAMOVE GDLVMK1
DEV.ONE: 100
DEV.TWO: 101
ORIGINODE: GDLVMK1
ORIGUSER: DIRMAINT
ORIGSEQ#: 128
ORIGCMD: CMDISK 0191 XXXX AUTOR 5 REGION1
SYSAFFIN: *
TARGETID: HOWLAND9
LANG: AMENG
CMDLEVEL: 150A
ASUSER: DIRMAINT
REQUEST: 128
ORIGEXTENT: MDISK 0191 3380 2181 1 K1CP04 MR SAM DOC HARRY
WURETRIES: &RETRY
SSINODE: *
BEGINCMDS:
1 NTRIED WORKUNIT ENABLE
2 NTRIED AMDISK FOR DATAMOVE 100 XXXX AUTOR 5 MIKEPLAY MR SAM DOC HARRY
3 NTRIED TMDISK FOR HOWLAND9 0191 DATAMOVE 101
4 NTRIED WORKUNIT RESET
5 NTRIED DIRECT
6 NTRIED DMVCTL DATAMOVE GDLVMK1 DMVCTL COPY DIRMAINT GDLVMK1 04003811 1 HOWLAND9 0191 * 101 100
7 NTRIED WORKUNIT ENABLE
8 NTRIED TMDISK FOR DATAMOVE 100 HOWLAND9 0191
9 NTRIED UNLOCK 0191 HOWLAND9 NOMSG
10 NTRIED DMDISK FOR DATAMOVE 101 NOCLEAN KEEPLINKS
11 NTRIED WORKUNIT RESET
12 NTRIED DIRECT
```

Figure 19. CMDISK

The following steps are provided help you with your “CMDISK” on page 97 error recovery.

1

WORKUNIT ENABLE causes object directory updates to be suspended. Failure of this step may indicate a problem using GLOBALV.

2

AMDISK adds an extent to the DATAMOVE machine. Failure on this step probably resulted from an authorization failure. It should have been handled by automatic rollback processing. If the failure occurs after this step, DirMaint has allocated an extent on the DATAMOVE machine that may need to be deallocated.

3

TMDISK transfers the extent from the user to DATAMOVE in preparation of the COPY step.

4

WORKUNIT RESET causes object directory updates to be enabled. Failure of this step may indicate a problem using GLOBALV.

5

DIRECT causes object directory to be placed online if current settings allow. Failure on this command may indicate problem with your source directory.

6

DMVCTL COPY copies the old extent (the extent transferred from the user) to the new extent (the extent allocated on DATAMOVE). Failure on this step are usually the result of an attempt to copy a non-CMS disk. Failures that occurred here are candidates for automatic rollback processing and should have been handled by DirMaint.

7

WORKUNIT ENABLE causes object directory updates to be suspended. Failure of this step may indicate a problem using GLOBALV.

8

TMDISK transfers the new extent from DATAMOVE to the user. Note that at this time both the old and new extents should still exist on the DATAMOVE machine. The data from the old extent should also exist on the new extent and could be transferred directly to the user after releasing any pending device locks.

9

UNLOCK releases the locks on the user's device. Note that you may still have a device lock pending for this user if the failure occurs here.

10

DMDISK deallocates the old extent from the DATAMOVE machine. This is the original user extent. Failure at this point may mean that the original user extent is still associated with the DATAMOVE machine. Although this will not cause problems with the DATAMOVE machine, you may choose to take steps to eliminate the extent.

11

WORKUNIT RESET causes object directory updates to be enabled. Failure of this step may indicate a problem using GLOBALV.

12

DIRECT causes object directory to be placed online if current settings allow. Failure on this command may indicate problem with your source directory.

DMDISK With No DATAMOVE Interaction (NOCLEAN)

These devices may have been locked on behalf of this transaction. If the failure has occurred before the UNLOCK step (and it was not a candidate for automatic rollback), the device may still be locked.

```
DMM: DATAMOVA GDLVMK1
DEV.ONE:
DEV.TWO:
ORIGNODE: GDLVMK1
ORIGUSER: DIRMAINT
ORIGSEQ#: 35
ORIGCMD: DMDISK 0194 NOCLEAN
SYSAFFIN: *
TARGETID: HOWLAND9
LANG: AMENG
CMDLEVEL: 150A
ASUSER: DIRMAINT
REQUEST: 35
ORIGEXTENT: N/A
WURETRIES: &RETRY
SSINODE: *
BEGINCMDS:
1 NTRIED DMDISK FOR HOWLAND9 0194 NOCLEAN
2 NTRIED UNLOCK 0194 HOWLAND9 NOMSG
3 NTRIED DIRECT
```

Figure 20. DMDISK With No DATAMOVE Interaction (NOCLEAN)

The following steps are provided help you with your [“DMDISK With No DATAMOVE Interaction \(NOCLEAN\)”](#) on page 98 error recovery.

1

DMDISK deallocates the extent from the user directory. Note that you may still have an extent associated with the user.

2

UNLOCK releases the locks on the user's device. Note that you may still have a device lock pending for this user if the failure occurs here.

3

DIRECT causes object directory to be placed online if current settings allow. Failure on this command may indicate problem with your source directory.

DMDISK With DATAMOVE Interaction (CLEAN)

The DMDISK requests with the CLEAN option generate an auxiliary WUCF to perform the actual deallocation and cleaning. This auxiliary WUCF is handled separately from the initial DMDISK WUCF. Because of the asynchronous nature of the DirMaint DASD sub system, the target of the DMDISK may remain attached to the user. During this time device locks prevent activity on it. After the auxiliary WUCF is dispatched and completes, the device will be gone from the user's directory.

```
DMM: DATAMOVA GDLVMK1
DEV.ONE:
DEV.TWO:
ORIGNODE: GDLVMK1
ORIGUSER: DIRMAINT
ORIGSEQ#: 38
ORIGCMD: DMDISK 0194 CLEAN
SYSAFFIN: *
TARGETID: HOWLAND9
LANG: AMENG
CMDLEVEL: 150A
ASUSER: DIRMAINT
REQUEST: 38
ORIGEXTENT: N/A
WURETRIES: &RETRY
SSINODE: *
BEGINCMDS:
1 NTRIED DMDISK FOR HOWLAND9 0194 CLEAN
```

Figure 21. DMDISK With No DATAMOVE Interaction (CLEAN)

The following steps are provided help you with your [“DMDISK With DATAMOVE Interaction \(CLEAN\)”](#) on page 99 error recovery.

1

DMDISK generates an auxiliary WUCF that will transfer the extent to DATAMOVE, clean it and then deallocate the extent. Failure during this step may indicate that there were problems associated with the creation of another WUCF. Note, depending on the point of failure, there may still be an extent associated with the user at this point.

ZAPMDISK (Auxiliary DMDISK)

ZAPMDISK requests are generated on behalf of a DMDISK CLEAN request. The ZAPMDISK handles the cleaning and deallocation of the extent.

```

DMM: DATAMOVA GDLVMK1
DEV.ONE: 100
DEV.TWO:
ORIGNODE: GDLVMK1
ORIGUSER: DIRMAINT
ORIGSEQ#: 38.2
ORIGCMD: ZAPMDISK HOWLAND9 0194
SYSAFFIN: *
TARGETID: HOWLAND9
LANG: AMENG
CMDLEVEL: 150A
ASUSER: DIRMAINT
REQUEST: 38.2
ORIGEXTENT: N/A
WURETRIES: &RETRY
SSINODE: *
BEGINCMDS:
1 NTRIED WORKUNIT ENABLE
2 NTRIED TMDISK FOR HOWLAND9 0194 DATAMOVA 100
3 NTRIED WORKUNIT RESET
4 NTRIED DIRECT
5 NTRIED UNLOCK 0194 HOWLAND9 NOMSG
6 NTRIED DMVCTL DATAMOVA GDLVMK1 DMVCTL CLEAN DIRMAINT GDLVMK1 37537049 1 HOWLAND9 0194 * 100
7 NTRIED WORKUNIT ENABLE
8 NTRIED DMDISK FOR DATAMOVA 100 NOCLEAN KEEPLINKS HOWLAND9
9 NTRIED WORKUNIT RESET
10 NTRIED DIRECT

```

Figure 22. ZAPMDISK (Auxiliary DMDISK)

The following steps are provided help you with your [“ZAPMDISK \(Auxiliary DMDISK\)” on page 99](#) error recovery.

- 1** WORKUNIT ENABLE causes object directory updates to be suspended. Failure of this step may indicate a problem using GLOBALV.
- 2** TMDISK transfers the users extent to a DATAMOVE machine in preparation for cleaning. Note that the extent may still be associated with the original user.
- 3** WORKUNIT RESET causes object directory updates to be enabled. Failure of this step may indicate a problem using GLOBALV.
- 4** DIRECT causes object directory to be placed online if current settings allow. Failure on this command may indicate problem with your source directory.
- 5** UNLOCK releases the locks on the user's device. Note that you may still have a device lock pending for this user if the failure occurs here.
- 6** DMVCTL CLEAN cleans the extent on the DATAMOVE machine. Note that the extent may remain uncleaned and attached to the DATAMOVE machine.
- 7** WORKUNIT ENABLE causes object directory updates to be suspended. Failure of this step may indicate a problem using GLOBALV.
- 8** DMDISK deallocates the extent from the DATAMOVE machine. This DMDISK command explicitly uses the NOCLEAN option to force a simple deallocation of the associated extents. Note that the newly cleaned extent may remain attached to the DATAMOVE machine.
- 9** WORKUNIT RESET causes object directory updates to be enabled. Failure of this step may indicate a problem using GLOBALV.

10

DIRECT causes object directory to be placed online if current settings allow. Failure on this command may indicate problem with your source directory.

TMDISK

These devices may have been locked on behalf of this transaction; one device represents the source user's device and the other device represents the target user's device. If the failure has occurred before the UNLOCK steps, one or both devices may still be locked.

```

DMM: &DMM.NAME &DMM.NODE
DEV.ONE: &DEV.ONE
DEV.TWO: &DEV.TWO
ORIGNODE: GDLVMK1
ORIGUSER: DIRMAINT
ORIGSEQ#: 8
ORIGCMD: TMDISK 9999 TO HOWLAND9 0191
SYSAFFIN: *
TARGETID: HOWLAND2
LANG: AMENG
CMDLEVEL: 150A
ASUSER: DIRMAINT
REQUEST: 8
ORIGEXTENT: N/A
WURETRIES: &RETRY
SSINODE: *
BEGINCMDS:
1 NTRIED WORKUNIT ENABLE
2 NTRIED TMDISK FOR HOWLAND2 9999 HOWLAND9 0191
3 NTRIED WORKUNIT RESET
4 NTRIED DIRECT
5 NTRIED UNLOCK 0191 HOWLAND9 NOMSG
6 NTRIED UNLOCK 9999 HOWLAND2 NOMSG

```

Figure 23. TMDISK

The following steps are provided help you with your [“ZAPMDISK \(Auxiliary DMDISK\)”](#) on page 99 error recovery.

1

WORKUNIT ENABLE causes object directory updates to be suspended. Failure of this step may indicate a problem using GLOBALV.

2

TMDISK transfers the source device to the target user and device.

3

WORKUNIT RESET causes object directory updates to be enabled. Failure of this step may indicate a problem using GLOBALV.

4

DIRECT causes object directory to be placed online if current settings allow. Failure on this command may indicate problem with your source directory.

5

UNLOCK target unlocks the target user's device address. Note that you may still have a device lock pending for this user if the failure occurs here.

6

UNLOCK source unlocks the source user's device address. Consult the error message and return codes to determine the exact cause of the failure. Note that you may still have a device lock pending for this user if the failure occurs here.

Chapter 7. User Tailoring

This chapter tells you how you to tailor exit routines and data files with commands. Your system administrator has already applied the IBM defaults during installation of DirMaint therefore, no user tailoring is required. However, a user can customize their workstation to their needs. You should read this chapter at your terminal, reviewing the examples as you read the text.

The ACCESS DATADVH File

The ACCESS DATADVH file is a required file intended for local tailoring, but will default to the DIRMAINT 11F disk. This allows you to modify how commands and data files are routed.

The DIRMAINT EXEC obtains access to the interface files by using the *nodeid* entries found in the SYSTEM NETID and ACCESS DATADVH files. The production level of these two files generally resides on the 19E disk of the MAINT machine, although the test level of these files generally resides on the 29E disk of the 7VMDIR40 machine.

A common error that occurs is having multiple copies of the ACCESS DATADVH file in the search order, with the wrong one accessed ahead of the other. This can be detected by use of the DIRM CHECK command. For more information on the DIRM CHECK command, see [z/VM: Directory Maintenance Facility Commands Reference](#).

When accessing the ACCESS DATADVH file, you should choose one of these formats. Enter:

```
ON= nodeid USE= server:owner.subdirectory
ON= nodeid USE= owner vaddr <rpas>
```

Or you can choose to use the IBM-supplied default format. Enter:

```
ON= * USE= 7VMDIR40 11F ALL
```

Where:

ON=

Specifies *nodeid*, this keyword must be followed by at least one blank column.

nodeid

Identifies the node of the user entering the allocation request.

Specifies a default entry for use if no other entry matches the user's *nodeid*.

USE=

Specifies the interface or the qualified path name of a shared file directory; this keyword must be followed by at least one blank column.

server:owner.subdirectory

Identifies the *userid* that owns the interface or the qualified path name of a shared file directory.

or

owner vaddr

Specifies the virtual machine *userid* and the minidisk address containing the user interface files or blanks if you are using a shared file directory.

Note: The DVHPROFX EXEC file must be updated if a disk address other than 11F or an SFS directory is used.

rpas

Specifies the read-share password needed to obtain a link for the interface disk, or blanks if you are using a shared file directory.

Note:

1. If you are using the password of *ALL*, then *ALL* should be specified in the ACCESS DATADVH entry.
2. If an ESM is installed, the password may or may not be required, or may be required but ignored.
3. If you are using RACF as your ESM with DISKP=ALLOW on the SYSSEC macro, a password is not required in the ACCESS DATADVH entry and is ignored if specified. If you are using RACF with DISKP=DEFER, then the ACCESS DATADVH entry must supply the correct link password.

For more information, see your ESM documentation. If you are using IBM RACF, refer to [z/VM: RACF Security Server Macros and Interfaces](#).

The CONFIG* DATADVH File

The CONFIG* DATADVH file is created with the entry keywords as shown in [Table 12 on page 104](#). DirMaint allows entries in multiple CONFIG* DATADVH files, therefore, it is not necessary to duplicate the entire file to supplement or override a single line.

CONFIG* DATADVH File Example

An example of a CONFIG* DATADVH file is shown in [Figure 24 on page 104](#). Because of the size of the CONFIG* DATADVH file, the entries are abbreviated in this example.

```

1 REQUIRED_USER_FILE= DVHCMD EXEC
2 LOADABLE_USER_FILE= DIRMAINT EXEC      Recommended.
3 DEFAULT_CMDSET.140A= G
4 SAMPL_USER_MSGS_1x0A=
5 KANJI_USER_MSGS_140A= LCLAUSER MSGKDVH
6 KANJI_BATCH_HEADER_140A= DVHBHEAD DATAKDVH
7 KANJI_HELP_140A= DIRM HELPDIRM
8 KANJI_MENU_DEFS_150= DVHMENUS DATAKDVH
9 PARSER_140A= DVHADZ EXEC
10 COMMANDS_140A= 140CMDS DATADVH
11 PASSWORD_RANDOM_GENERATOR_USER_EXIT= DVHPXR EXEC (Required)
12 FROM= DVHTEST1 DEST= DVHTEST2 S= DIRMAINT T= DVHTEST2
13 PW_MIN_LENGTH= 3
14 PW_REUSE_HASHING_EXIT=
15 PW_REUSE_INTERVAL=
16 SAMPL_LINESIZE_140A= 222
17 SAMPL_LINESIZE_150A= 222
18 DVHSAPI_END_MSG.DVHSCU3541I= DVHREQ2289I DVHSHN3430I
19 DVHSAPI_ENTER_KEY_ACTION= END

```

Figure 24. CONFIG* DATADVH File

Table 12. Summary of CONFIG* DATADVH File Entries

Entry Keyword	Function
1 REQUIRED_USER_FILE=	Defines the files needed in the user's virtual machine to enter any DIRMAINT commands.
2 LOADABLE_USER_FILE=	Defines the user file to be made resident or nonresident by using the EXECLOAD and EXECDROP commands.
3 DEFAULT_CMDSET.1x0A=	Identifies the general user command set for each command level if a local user has not been explicitly authorized for use of any privileged command sets.

Table 12. Summary of CONFIG* DATADVH File Entries (continued)

Entry Keyword	Function
4 SAMPL_USER_MSGS_1x0A=	The SAMPL entry provides an example of creating a custom language for a special application. The SAMPUSER message repository may reassign message numbers and severities, may rephrase the message text or suppress the message entirely, and may change the return code passed back when the message is issued.
National Language Support	Defines a set of online directions, Help files, menus, and messages by using these files: <ul style="list-style-type: none"> • 5lang_USER_MSGS_1x0A= • 6lang_BATCH_HEADER_1x0A= • 7lang_HELP_1x0A= • 8lang_MENU_DEFS_1x0A=
9 PARSER_1x0A=	Defines the command entered by the user, verifies it is syntactically correct, expands keyword abbreviations to their full length, extracts selected information from and about the command, and makes it available to other parts of the product.
10 COMMANDS_1x0A=	Defines the file name of the handler routine. This will determine what machine will process the command.
11 Various _USER_EXIT=	Defines alternative processing options to be performed.
12 FROM= DEST=	Defines the necessary route for a command or file from the system or to route messages or files from the DIRMAINT service machine back to the user.
13 PW_MIN_LENGTH=	Defines a security check of the user's password.
14 PW_REUSE_HASHING_EXIT	Defines a routine to hash the user's password for storage in the password history file. The file type may be either EXEC or MODULE. The default is DVHHASH MODULE. If not specified, the passwords will be stored in the history file as hexadecimal digits.
15 PW_REUSE_INTERVAL	Identifies how long an entry is kept in the password history file. This can be either a time period with a DAYS suffix, or a count with no suffix. The default is 365 DAYS. Note: If the IBM supplied default of 365 DAYS is changed, you need to enable a PASSWORD CHANGE NOTIFICATION EXIT = DVHXPXN EXEC statement in the CONFIG* DATADVH file.
16 SAMPL_LINESIZE_140A= 222 17 SAMPL_LINESIZE_150A= 222	By default, DirMaint will dynamically select a message output length of either 52 or 73 characters. User's may select a "language" whose messages are formatted for a line length other than the default. Note: The maximum linesize is equal to 222; because the maximum length of the CP command buffer is 240, minus 9 for the user ID and intervening blank, minus 10 for the CP MSGNOH command and another blank. The minimum value is 40.
18 DVHSAPI_END_MSG.message=	Identifies user tailorable choices for when the DVHSAPI routine exits and returns control back to the calling application. The default, if no entries are specified, is to end when message DVHREQ2289I is received.

Table 12. Summary of CONFIG* DATADVH File Entries (continued)

Entry Keyword	Function
19 DVHSAPI_ENTER_KEY_ACTION= END IGNORE	Specifies whether pressing the ENTER key either terminates DVHSAPI or is ignored. The default (for compatibility) is END.

Notes:

- Blank lines and comments (lines starting with a slash (/)) are allowed to enhance readability.
The IBM convention is to use the delimiter */** before and **/* after prologues, directions, and other readable information.
- An inactive machine readable entry will have a / in the prefix area.
- A common error that occurs is to have multiple copies of this file in the search order with the wrong one accessed ahead of the other. This can be detected with the DIRM CHECK command.

Example—Fragments from the CONFIG and CONFIGAA DATADVH Files:

```

:
1 LOADABLE_USER_FILE= DVHCMD EXEC
1 LOADABLE_USER_FILE= DVHMSG EXEC
1 LOADABLE_USER_FILE= DVHXMIT EXEC
2 PASSWORD_RANDOM_GENERATOR_USER_EXIT= DVHPXR EXEC
:
```

Figure 25. CONFIG DATADVH File

```

:
1 LOADABLE_USER_FILE= DVHFILE EXEC
1 LOADABLE_USER_FILE= DVHADZ EXEC
2 USER_EXIT= MYPXR EXEC
:
```

Figure 26. CONFIGAA DATADVH File

The following notes are to help you with your [Figure 25 on page 106](#) and [Figure 26 on page 106](#).

- 1**
Some entries in the CONFIG* DATADVH files appear multiple times and are cumulative. If there are three LOADABLE_USER_FILE= entries in the base CONFIG DATADVH file and two more in a CONFIGAA DATADVH file, all five files are loadable.
- 2**
Other entries are alternatives. If specified more than once in a single CONFIG DATADVH file or in multiple CONFIG* DATADVH files, only the first entry encountered is used. If there is a PASSWORD_RANDOM_GENERATOR_USER_EXIT= entry in both a CONFIG DATADVH file and in a CONFIGAA DATADVH file, only the entry in the CONFIGAA DATADVH file will be used. This makes the order that the files are searched important. The files are searched in REVERSE alphanumeric order: CONFIG99 before CONFIG0, CONFIG0 before CONFIGZZ, CONFIGZZ before CONFIGA, and CONFIGA before CONFIG. If two files have the same file name, only the file on the disk or directory with the lowest file mode letter is searched.

The REQUIRED_USER_FILE= Entries

The REQUIRED_USER_FILE= entries are the files that must be present for the user's virtual machine to correctly issue any DIRMAINT commands.


```

// REQUIRED_USER_FILE= ACCESS    DATADVH Already checked.
// REQUIRED_USER_FILE= CONFIG*  DATADVH Already checked.
REQUIRED_USER_FILE= WHERE TO  DATADVH
REQUIRED_USER_FILE= 140CMDS    DATADVH
REQUIRED_USER_FILE= 150CMDS    DATADVH
REQUIRED_USER_FILE= DVHULVL    DATADVH
// REQUIRED_USER_FILE= DIRMAINT  EXEC    Already checked.
REQUIRED_USER_FILE= DVHADZ     EXEC
REQUIRED_USER_FILE= DVHAEZ     EXEC
REQUIRED_USER_FILE= DVHCMD     EXEC
REQUIRED_USER_FILE= DVHCEXIT   EXEC
// REQUIRED_USER_FILE= DVHCXB    EXEC
// REQUIRED_USER_FILE= DVHCXA    EXEC
REQUIRED_USER_FILE= DVHFILE    EXEC
REQUIRED_USER_FILE= DVHFNDCS   EXEC
REQUIRED_USER_FILE= DVHGLBLV   EXEC
REQUIRED_USER_FILE= DVHHELP    EXEC
REQUIRED_USER_FILE= DVHMSG     EXEC
REQUIRED_USER_FILE= DVHPWC     EXEC
REQUIRED_USER_FILE= DVHPXR     EXEC
REQUIRED_USER_FILE= DVHPXV     EXEC
// REQUIRED_USER_FILE= DVHPXA    EXEC
REQUIRED_USER_FILE= DVHUCHK    EXEC
REQUIRED_USER_FILE= DVHXMITE   EXEC
// REQUIRED_USER_FILE= COMPARE   MODULE
// REQUIRED_USER_FILE= EXECDROP  MODULE
// REQUIRED_USER_FILE= NUCXDRP   MODULE
REQUIRED_USER_FILE= PIPE       MODULE Do we have a supported CMS level?
// REQUIRED_USER_FILE= VMFCLEAR  MODULE
// REQUIRED_USER_FILE= 140AUSER  MSGADVH
REQUIRED_USER_FILE= 150AUSER  MSGADVH

```

Figure 27. `REQUIRED_USER_FILE=` Entries

The following notes are to help you with [“The `REQUIRED_USER_FILE=` Entries”](#) on page 106.

Note:

1. The `REQUIRED_USER_FILE=` statements must be followed by both a file name and a file type.
2. The `DIRMAINT EXEC` ensures that all listed files are present before continuing with command processing. If one or more files are not found, the `DIRMAINT EXEC` will use the information in the `ACCESS DATADVH` file to link and access the minidisk with the user interface files, or to access the shared file directory with those files. If one or more required files are still not found, the `DIRMAINT EXEC` issues an error message and exits with a nonzero return code.
3. The IBM-supplied required files listing includes all files supplied by IBM that are expected to reside on the user interface disk or directory. Any local user exit routines or new user machine command handling routines should be added to this listing. Performance can be improved by reducing the number of entries on the listing.
4. This listing of `REQUIRED_USER_FILE=` entries, may not be appropriate for everyone. You can create a separate `CONFIG* DATADVH` file, perhaps with the name `CONFIGRU DATADVH`, to contain all of the `REQUIRED_USER_FILE=` entries and remove them from the IBM-supplied `CONFIG DATADVH` file. Each virtual machine can then customize its own private copy of the `CONFIGRU DATADVH` file without needing to duplicate the entire base `CONFIG DATADVH` file.

The `LOADABLE_USER_FILE=` Entries

The `LOADABLE_USER_FILE=` entries are the user files that are made resident or nonresident by the `DIRM EXECLOAD` and `DIRM EXECDROP` commands.

```

LOADABLE_USER_FILE= DIRMAINT EXEC Recommended.
LOADABLE_USER_FILE= DVHMSG EXEC Recommended.
LOADABLE_USER_FILE= DVHADZ EXEC Recommended.
LOADABLE_USER_FILE= DVHAEZ EXEC Recommended.
LOADABLE_USER_FILE= DVHCMD EXEC Recommended.
LOADABLE_USER_FILE= DVHFNDCS EXEC Recommended.
LOADABLE_USER_FILE= DVHCEXIT EXEC Recommended.
/ LOADABLE_USER_FILE= DVHCXB EXEC Recommended.
LOADABLE_USER_FILE= DVHCXA EXEC Recommended.
LOADABLE_USER_FILE= DVHXMIT EXEC Recommended.
LOADABLE_USER_FILE= DVHFILE EXEC Recommended.
/ LOADABLE_USER_FILE= DVHPWC EXEC Recommend individual tailoring.
/ LOADABLE_USER_FILE= DVHPXR EXEC Recommend individual tailoring.
/ LOADABLE_USER_FILE= DVHPXV EXEC Recommend individual tailoring.
/ LOADABLE_USER_FILE= DVHPXA EXEC Recommend individual tailoring.
// LOADABLE_USER_FILE= DVHEXLD EXEC Probably not worthwhile.
// LOADABLE_USER_FILE= DVHGLBLV EXEC Probably not worthwhile.
// LOADABLE_USER_FILE= DVHHELP EXEC Probably not worthwhile.
// LOADABLE_USER_FILE= DVHVCHK EXEC Probably not worthwhile.

```

Figure 28. `LOADABLE_USER_FILE=` Entries

The following notes are to help you with [“The `LOADABLE_USER_FILE=` Entries” on page 107](#).

Note:

1. The `LOADABLE_USER_FILE=` statements must be followed by both a file name and file type. The file type must be either EXEC, MODULE, REXX, or XEDIT.
2. The DIRMAINT EXEC will usually release the shared file directory or release and detach the minidisk containing the user interface files on completion of a DIRM command if it did the link and access before processing the next command. However, it will leave the disk or directory accessed if all required files were found without doing the link and access before processing the command. The DIRM EXECLOAD and DIRM EXECDROP commands are exceptions to this general rule. The disk or directory will always remain accessed following a DIRM EXECLOAD command, and will always be released and detached after a DIRM EXECDROP command.
3. The virtual machines that spend a substantial amount of their time running DirMaint commands may benefit by making parts of the DirMaint program resident, thus saving on file I/O time for each command entered. This is a trade off, as making DirMaint files resident uses storage, which may impact other programs that run in the same virtual machine either concurrently or consecutively. Files are made resident by entering a DIRM EXECLOAD command; and can be made nonresident by entering a DIRM EXECDROP command.
4. The IBM-supplied loadable files listing includes all performance critical files supplied by IBM that reside on the user interface disk or directory. These files are generally used by system administrators. Any local user exit routines or new user machine command handling routines should be added to this listing. Performance can be improved by listing all frequently used files.
5. This listing of `LOADABLE_USER_FILE=` entries may not be appropriate for everyone. You can create a separate CONFIG* DATADVH file, perhaps with the name CONFIGLU DATADVH, to contain all of the `LOADABLE_USER_FILE=` entries and remove them from the IBM supplied CONFIG DATADVH file. Each virtual machine can then customize its own private copy of the CONFIGLU DATADVH file without needing to duplicate the entire base CONFIG DATADVH file.

The `DEFAULT_CMDLEVEL=` Entry

The `DEFAULT_CMDLEVEL` value determines which messages and command parsing files should be used when the user has not entered a DIRM DEFAULTS CMDLEVEL command to select their own default CMDLEVEL.

DirMaint supports two command levels:

- The 150A level provides all of the function supported in DirMaint using the preferred command syntax. IBM encourages users sitting in front of a terminal to use the full function 150A command level.
- The 140A level provides all of the function supported in DirMaint Release 4 that remains in the DirMaint feature, using the Release 4 compatibility command syntax. Command level 140A is intended for use

by programs that have not been changed to use the 150A command syntax, allowing the service virtual machines DFSMS, DSO, NVAS, RACF, and so forth to run without changes, even if the administrator and the general user population exploit the full capabilities of DirMaint.

Each virtual machine can select its own command level by issuing a DIRM DEFAULTS CMDLEVEL 1x0A command.

If multiple occurrences of this keyword are encountered in the CONFIG* DATADVH files, the first occurrence will be used.

For those virtual machines that have not issued a DIRM DEFAULTS CMDLEVEL command, the default command level is determined by a DEFAULT_CMDLEVEL= entry in the CONFIG* DATADVH file. The IBM-supplied default is:

```
DEFAULT_CMDLEVEL= 150A
```

If possible, IBM recommends that all virtual machines running programs that issue DirMaint commands using the DirMaint Release 4 syntax issue a DIRM DEFAULTS CMDLEVEL 140A command. Otherwise, the DEFAULT_CMDLEVEL must be changed to 140A.

National Language Support

The national language support files identify the language dependent files needed for the user's active language.

```
AMENG_BATCH_HEADER_140A= DVHBHEAD DATAADVH
AMENG_BATCH_HEADER_150A= DVHBHEAD DATAADVH
AMENG_COPYRIGHT_NOTICE= DVHCOPYR DATAADVH
AMENG_HELP_140A= DIRM HELPDIRM
AMENG_HELP_150A= DVHAMENG HELPADVH
AMENG_MENU_DEFS_150A= DVHMENUS DATAADVH
AMENG_USER_MSGS_140A= LCLAUSER MSGADVH
AMENG_USER_MSGS_140A= 150AUSER MSGADVH
AMENG_USER_MSGS_150A= LCLAUSER MSGADVH
AMENG_USER_MSGS_150A= 150AUSER MSGADVH
UCENG_BATCH_HEADER_140A= DVHBHEAD DATAUDVH
UCENG_BATCH_HEADER_150A= DVHBHEAD DATAUDVH
UCENG_COPYRIGHT_NOTICE= DVHCOPYR DATAUDVH
UCENG_HELP_140A= DIRM HELPDIRM
UCENG_HELP_150A= DVHUCENG HELPUADVH
UCENG_MENU_DEFS_150A= DVHMENUS DATAADVH
UCENG_USER_MSGS_140A= LCLAUSER MSGUDVH
UCENG_USER_MSGS_140A= 140AUSER MSGUDVH
UCENG_USER_MSGS_140A= 150AUSER MSGUDVH
UCENG_USER_MSGS_150A= LCLAUSER MSGUDVH
UCENG_USER_MSGS_150A= 150AUSER MSGUDVH
KANJI_BATCH_HEADER_140A= DVHBHEAD DATAKDVH
KANJI_BATCH_HEADER_150A= DVHBHEAD DATAKDVH
KANJI_COPYRIGHT_NOTICE= DVHCOPYR DATAKDVH
KANJI_HELP_140A= DIRM HELPDIRM
KANJI_HELP_150A= DVHUCENG HELPKDVH
KANJI_MENU_DEFS_150A= DVHMENUS DATAUDVH
KANJI_USER_MSGS_140A= LCLAUSER MSGKDVH
KANJI_USER_MSGS_140A= 140AUSER MSGKDVH
KANJI_USER_MSGS_140A= 150AUSER MSGKDVH
KANJI_USER_MSGS_150A= LCLAUSER MSGKDVH
KANJI_USER_MSGS_150A= 150AUSER MSGKDVH
1SAPI_BATCH_HEADER_140A= DVHBHEAD DATAADVH
1SAPI_BATCH_HEADER_150A= DVHBHEAD DATAADVH
1SAPI_COPYRIGHT_NOTICE= DVHCOPYR DATAADVH
1SAPI_HELP_140A= DIRM HELPDIRM
1SAPI_HELP_150A= DVHAMENG HELPADVH
1SAPI_MENU_DEFS_150A= DVHMENUS DATAADVH
1SAPI_USER_MSGS_140A= LCLAUSER MSG1DVH
1SAPI_USER_MSGS_140A= 140AUSER MSG1DVH
1SAPI_USER_MSGS_140A= 150AUSER MSG1DVH
1SAPI_USER_MSGS_150A= LCLAUSER MSG1DVH
1SAPI_USER_MSGS_150A= 150AUSER MSG1DVH
```

Figure 29. National Language Support

The following notes are to help you with [“National Language Support”](#) on page 109.

Note:

1. Each command level has its own set of online directions, Help files, menus, and messages. DirMaint supports translation of each of these varieties of information into any left-to-right language whose character set is supported by z/VM. IBM provides all of these files in mixed case American English (AMENG), with instructions for conversion to upper case English (UCENG), and supplies messages in Japanese (KANJI).
2. The virtual machine can select its own language by issuing a DIRM GLOBALV LANG xxxxx command. This may be, but need not be, the same language chosen for CMS using the SET LANG command. If a DIRM DEFAULT LANG command has not been issued, DirMaint will use a QUERY LANG command to determine the language.
3. To avoid repeating entries in the CONFIG* DATADVH file for each language, a series of five dots,, identifies a default that applies to any language that does not have its own entry.

Example—Identify a Default Entry in the CONFIG* DATADVH File:

```

....._BATCH_HEADER_140A= DVHBHEAD DATAADVH
....._BATCH_HEADER_150A= DVHBHEAD DATAADVH
....._HELP_140A=         DIRM      HELPDIRM
....._HELP_150A=         DVHAMENG HELPADVH
....._MENU_DEFS_150A=    DVHMENUS DATAADVH
....._USER_MSGS_140A=    LCLAUSER MSGADVH
....._USER_MSGS_140A=    150AUSER MSGADVH
....._USER_MSGS_150A=    LCLAUSER MSGADVH
....._USER_MSGS_150A=    150AUSER MSGADVH

```

This listing of national language choices may not be appropriate for everyone. You can create a separate CONFIG* DATADVH file, perhaps with the name CONFIGNL DATADVH, to contain all of the language related entries and remove them from the IBM-supplied CONFIG DATADVH file. Each virtual machine can then customize its own private copy of the CONFIGNL DATADVH file without needing to duplicate the entire base CONFIG DATADVH file.

The lang_BATCH_HEADER_1x0A= Entries

When editing a batch file, a set of directions will be shown. These directions describe how to submit the batch commands and how to cancel the commands if you decide not to submit them. A different set of directions may be used for each command level. Only the first entry is used for each language and command level. The IBM-supplied defaults are:

```

KANJI_BATCH_HEADER_140A= DVHBHEAD DATAKDVH
KANJI_BATCH_HEADER_150A= DVHBHEAD DATAKDVH
UCENG_BATCH_HEADER_140A= DVHBHEAD DATAUDVH
UCENG_BATCH_HEADER_150A= DVHBHEAD DATAUDVH
....._BATCH_HEADER_140A= DVHBHEAD DATAADVH
....._BATCH_HEADER_150A= DVHBHEAD DATAADVH

```

Each entry identifies the file name and file type of the file containing the directions for that combination of language and command level.

If multiple occurrences of this keyword are encountered in the CONFIG* DATADVH file, the first occurrence will be used.

The lang_HELP_1x0A= Entries

The lang_HELP_1x0A= identify supply the Online Help information available. The IBM-supplied Help files are in mixed case American English, with instructions available on conversion to Upper Case English. Each supported language identifies which files to use. If multiple entries are specified for the same language and command level, the first entry encountered is used. The IBM-supplied defaults are:

```

KANJI_HELP_140A= DIRM HELPDIRM
KANJI_HELP_150A= DVHAMENG HELPADVH
UCENG_HELP_140A= DIRM HELPDIRM
UCENG_HELP_150A= DVHUCENG HELPUADVH

```

```
....._HELP_140A= DIRM HELPDIRM
....._HELP_150A= DVHAMENG HELPADVH
```

Each entry specifies a file name and file type, although not for the same file. The file name is the name of the HELPMENU file used when a DIRM HELP command is entered without specifying a topic name. The file type is the file type of the online HELP file used when a DIRM HELP topic_name command is entered.

If multiple occurrences of this keyword are encountered in the CONFIG* DATADVH file, the first occurrence will be used.

The lang_MENU__DEFS_1x0A= Entries

Most DirMaint commands can be submitted by filling in a menu panel. The menu panel definitions are contained in a file for which the file name and file type must be specified. The IBM-supplied defaults are:

```
KANJI_MENU_DEFS_150A= DVHMENUS DATAADVH
UCENG_MENU_DEFS_150A= DVHMENUS DATAUDVH
....._MENU_DEFS_150A= DVHMENUS DATAADVH
```

Each entry specifies a file name and file type of the menu definition file. If multiple occurrences of this keyword are encountered in the CONFIG* DATADVH file, the first occurrence will be used.

Note: IBM has chosen not to supply menus for command level 140A. Command level 140A is intended for use by programs that have not been changed to use the 150A command syntax. IBM encourages users sitting in front of a terminal to use the full function 150A command level.

The lang_USER_MSGS_1x0A= Entries

DirMaint will search multiple message repositories when looking for the text of a message. The IBM-supplied defaults are:

```
KANJI_USER_MSGS_140A= 140AUSER MSGKDVH
KANJI_USER_MSGS_140A= 150AUSER MSGKDVH
UCENG_USER_MSGS_140A= 140AUSER MSGUDVH
UCENG_USER_MSGS_140A= 150AUSER MSGUDVH
....._USER_MSGS_140A= 140AUSER MSGADVH
....._USER_MSGS_140A= 150AUSER MSGADVH
KANJI_USER_MSGS_150A= 150AUSER MSGKDVH
UCENG_USER_MSGS_150A= 150AUSER MSGUDVH
....._USER_MSGS_150A= 150AUSER MSGADVH
```

The following notes are to help you with [“The lang_USER_MSGS_1x0A= Entries”](#) on page 111.

Note:

1. Each file name and file type of the repositories to be searched must all be listed in the CONFIG* DATADVH file. A different set of repositories may be used for each command level.
2. The entry identifies the file name and file type of the message repository file for that combination of language and command level.

The entries for command level 140A use both the 140AUSER and 150AUSER repositories, although the entries for command level 150A use only the 150AUSER repositories. The 140AUSER repositories contain overrides for the 150AUSER repositories.

If your site needs to create overrides, enter:

```
....._USER_MSGS_140A= LCLAUSER MSGADVH
....._USER_MSGS_150A= LCLAUSER MSGADVH
```

and include them in a separate CONFIG* DATADVH file with a name (CONFIGZZ perhaps) that will be searched before the IBM-supplied file.

For more information, see [“Overriding and Supplementing DirMaint Messages”](#) on page 62.

Messages and Return Codes

Messages consist of a message identifier and message text. The identifier distinguishes messages from each other. The text is a phrase or sentence that either describes a condition that has occurred or requests a response from a user. The Synchronous Application Programming Interface Language (SAPI) may be used by programs that need to interpret DirMaint's messages.

Example—Message Formats: The format of most message identifiers is:

```
DVHABC1234S MSG= 1234 FMT= 01 SEV= S RTN= DVHABC SUBS= s1 s2 s3 ...
```

If you, Enter:

```
DIRM review
```

An AMENG message response might be:

```
DVHREQ2289I Command REVIEW complete; RC = 0.
```

The corresponding 1SAPI message response would be:

```
DVHREQ2289I MSG= 2289 FMT= 01 SEV= I RTN= DVHREQ SUBS= 0 REVIEW
```

Where:

DVH

Prefix identifier

ABC

An abbreviation of the routine name of the routine for which the error occurred.

1234

The numeric message number consists of three or four digits that are associated with the condition that caused the message to be generated.

S

A letter that shows a severe error message. The severity code values are:

A

User action is required.

E

Error message

I

Information message

R

User response is required.

W

Warning message

T

Terminating error message.

MSG= 1234

Identifies the message number

FMT= 01

Identifies the message format

SEV= S

Identifies the message severity code

RTN= DVHABC

Identifies the message routine name

SUBS= s1 s2 s3 ...

Identifies the message variable information elements for substitution into the message text.

The PARSER_1x0A= Entries

All DirMaint commands must be *parsed*. The parser ensures that the command entered by the user has the correct syntax expands keyword abbreviations to their full length, and extracts selected information from and about the command and makes it available to other parts of the product. Each command level has its own parser. These are identified by entries in the CONFIG* DATADVH file. The IBM-supplied defaults are:

```
PARSER_140A= DVHADZ EXEC
PARSER_150A= DVHAEZ EXEC
```

Each PARSER_1x0A= entry must be followed by both a file name and file type. The file type must be EXEC or MODULE.

If multiple occurrences of this keyword are encountered in the CONFIG* DATADVH file, the first occurrence will be used.

The COMMANDS_1x0A= Entries

After the syntax of the command has been validated, the command must be *handled*. A data file determines the file name of the *handler* routine. This occurs whether the command is sent to the DIRMAINT service machine or is completely processed in the issuing user's virtual machine. If sent to the DIRMAINT service machine, a data file determines the file name of the *handler* routine whether password validation is required and whether the command is available in the general user command set or whether authorization for a privileged command set is required for use of the particular command. Each command level has a separate data file containing this information. The IBM-supplied defaults are:

```
COMMANDS_140A= LCLCMDS DATADVH
COMMANDS_140A= 140CMDS DATADVH
COMMANDS_150A= LCLCMDS DATADVH
COMMANDS_150A= 150CMDS DATADVH
```

Each COMMANDS_1x0A= entry must be followed by both a file name and file type.

If multiple occurrences of this keyword are encountered in the CONFIG* DATADVH file, they will be searched in the order specified until the command definition is found or the list is exhausted. Thus, if your site changes the command set required for use of a particular command, you can include that one command in a separate file (LCLCMDS DATADVH for example) rather than modify the IBM-supplied file. You can then list that file in a separate CONFIG* DATADVH file (CONFIGZZ DATADVH for example) that is searched before the CONFIG DATADVH file.

You should never change the CONFIG DATADVH file. Changes you want to make to the configuration files should be accomplished using override files. For more information, see [“The CONFIG* DATADVH File”](#) on page 104.

The Various USER_EXIT= Entries

The Various _USER_EXIT= entries are used at several points during processing of a command. There are alternative implementations that may be chosen or special site specific functions that may need to be performed. These are handled by various exit routines. The IBM-supplied defaults are:

```
COMMAND_BEFORE_PARSING_USER_EXIT= DVHCXC EXEC
COMMAND_BEFORE_PROCESSING_USER_EXIT= DVHCXB EXEC
COMMAND_AFTER_PROCESSING_USER_EXIT= DVHCXA EXEC (sample)
PASSWORD_RANDOM_GENERATOR_USER_EXIT= DVHPXR EXEC (required)
PASSWORD_SYNTAX_CHECKING_USER_EXIT= DVHPXV EXEC (sample)
PASSWORD_NOTIFICATION_USER_EXIT= DVHPXA EXEC (sample)
```


Each USER_EXIT= entry must be followed by both a file name and file type. The file type must be either EXEC or MODULE.

If multiple occurrences of this keyword are encountered in the CONFIG* DATADVH file, only the first occurrence will be used.

Note: For more information on the various exit points, see the [Chapter 9, “Exit Routines,”](#) on page 121.

The PW_MIN_LENGTH= Entry

The PW or TESTPW command eventually gets routed into the PASSWORD_SYNTAX_CHECKING_USER_EXIT routine. Your site may have rules prohibiting use of *trivial* passwords. These rules are enforced by this exit routine. One of the most common rules is to prohibit short passwords. The IBM-supplied sample exit routine looks in the CONFIG* DATADVH file to determine what your site considers to be a *short* versus a *long* password. The IBM-supplied default is:

```
PW_MIN_LENGTH= 3
```

The PW_MIN_LENGTH= entry must be followed by an integer value between 1 and 8 inclusive.

If multiple occurrences of this keyword are encountered in the CONFIG* DATADVH file, only the first occurrence will be used.

Note: This entry is also used by the PASSWORD_SYNTAX_CHECKING_EXIT routine running in the DirMaint service machine. Frequently, these two exit descriptors will point to the same physical routine.

The FROM= DEST= Entries

The FROM= DEST= entries aid in a multiple system cluster environment when it is necessary to route a command or file from the system where it is entered by the user to the system where the DIRMAINT service machine is running, or to route messages or files from the DIRMAINT service machine back to the user. In an SSI cluster, the systems use the built-in cross-system spool support to communicate with each other. In other cases, systems in a multiple system cluster might communicate with each other through a private *spool file bridge* network. And in other cases, systems in a multiple system cluster might communicate with each other only through the enterprise-wide RSCS network. Entries in the CONFIG* DATADVH file identify how to accomplish this routing in each situation. The IBM-supplied default is:

```
FROM= *   DEST= *   S= *   T= *
```

This uses the RSCS networking between systems.

In an SSI cluster, you should change the S= * to S= DIRMAINT, or whatever the user ID of your DIRMAINT service machine happens to be.

If you are using a dedicated *spool file bridge* network, you will need to identify your network configuration to DirMaint. You may need to completely specify each entry, which may need up to 256 entries if there are no similarities between them. For example,

```
FROM= DVHTEST1  DEST= DVHTEST2  S= DVHTEST2  T= DVHTEST1
FROM= DVHTEST1  DEST= DVHTEST3  S= DVHTEST3  T= DVHTEST1
FROM= DVHTEST2  DEST= DVHTEST1  S= DVHTEST1  T= DVHTEST2
FROM= DVHTEST2  DEST= DVHTEST3  S= DVHTEST3  T= DVHTEST2
FROM= DVHTEST3  DEST= DVHTEST1  S= DVHTEST1  T= DVHTEST3
FROM= DVHTEST3  DEST= DVHTEST2  S= DVHTEST2  T= DVHTEST3
```

Although this technique still works between our current z/VM systems, a little rational restructuring of the network makes the entries in the CONFIG* DATADVH file a lot easier:

```
FROM= *          DEST= DVHTEST1  S= SFBRIDGE  T= *
FROM= *          DEST= DVHTEST2  S= SFBRIDGE  T= *
FROM= *          DEST= DVHTEST3  S= SFBRIDGE  T= *
```

For a maximum of 16 entries or for a single entry:


```
FROM= *      DEST= *      S= SFBRIDGE  T= *
```

DirMaint supports enterprise-wide networking. This allows an administrator on the corporate headquarters system in California, USA, to make directory changes to a system in Europe without having to log on to the system in Europe. (Of course, such remote administration must have been previously authorized by the administrators of the European system.) This requires using the RSCS network between the systems. And it requires entries in the CONFIG* DATADVH file to describe how this routing is done. The IBM-supplied default is:

```
FROM= *  DEST= *  S= *  T= *  U= DIRMAINT
```

This presumes the user ID of the network service machine is found using the system IDENTIFY command, and the tag node is the same as the destination name, which in turn is the same as the TOSYS value specified on the DIRM command. If you use a *nickname* for the TOSYS value, the nickname must be defined on a DEST= tag for the system from which the command is coming, and the correct network node ID must be specified on the corresponding T= tag. If the user ID of the DIRMAINT service machine on the destination system is not DIRMAINT, the correct user ID must be specified on the U= tag.

Example—Using the IDENTIFY Command:

```
FROM= *  DEST= HQ  S= *  T= CORPHQ  U= DIRMR5
```

The order that multiple occurrences of these entries are encountered in the CONFIG* DATADVH file is very significant, and somewhat different from the ordering processing of the National Language entries. When looking for a language related entry, the first occurrence of the language specific entry is used regardless of its position relative to the entry. The first entry is used only if no relevant entry is found for the specific language in question. When looking for a cluster or network routing entry, all entries are considered in the order that they occur. Thus, the command may be processed using a * entry, even though there is a specific entry for the FROM= and DEST= nodes in the file, if the * entry appears first.

Chapter 8. Delegating Administrative Authority

This chapter provides guidance for delegating administrative authority and altering command sets on your system. This is necessary if you want to allow users to enter commands other than privilege class G or General user commands.

Command Classes

DirMaint employs a command set structure similar to the CP command privilege structure. A specific command can be placed in one or more command sets and a specific user can be authorized to enter one or more command sets.

DirMaint has several layers of authorization to go through when a command is entered. Some of the logic takes place on the users machine before sending the transaction to the DirMaint server. The remainder of the logic takes place on the DirMaint server.

When a command is entered, DIRMAINT determines if the user:

- Entering the command is authorized for the command set required to enter the command.
- Is authorized to enter that level command against the target user.

Command sets are represented by alphanumeric characters.

With DirMaint you can have up to 36 tailorable DirMaint command sets. A user ID cannot enter commands in a command set unless authorization is given. However, user IDs can be authorized to act on behalf of other user IDs, and may be authorized to use the command sets of the user ID they are acting on behalf of. This allows for delegation of administrative authority.

Example—Administrative Authority: Administrative authority could be delegated to class instructors over student user IDs, or to department supervisors over user IDs within their department.

By default, DirMaint provides the following nine command sets at installation:

Table 13. Privilege Classes

Class	User and Function
A	Administration, non-DASD related
D	DASD Management
G	General users
H	Helpdesk
M	Password Monitor
O	System Operator
P	DASD management automated Programs, such as DFSMS/VM®
S	Support programmer
Z	Internal communication

Note: Additional command classes can be defined if specific command subsets are required.

Command Sets on the DIRMAINT Server

When the transaction is received on the DirMaint server, the command set of the command and the issuing user is checked against the AUTHFOR CONTROL file to ensure they have authority to issue the command. In addition to using the class of the command to authorize the issuing user, the target of the

operation is also consulted to ensure they have authorized the user issuing the command to use the specified command set against their user directory entry.

Defining a New Command Set

The shipped command sets may be inappropriate for your local installation. DirMaint allows administrators to define a custom set of commands and assign them to locally defined command sets. This command set is then treated as a shipped command set by the DirMaint installation.

Custom command sets are particularly useful for allowing users to use a few commands from a potentially dangerous set of commands. You may want to permit a POSIX administrator to have authority to assign specific UID values on your system. The DIRMAINT POSIXINFO command is required to perform this. The POSIXINFO command is shipped with a command set A, but several other administrative commands also share the command set A.

One alternative is to allow your POSIX administrator to use command set A and to trust that they will only use the POSIXINFO command. A better solution is to define a new command set and place the POSIXINFO command in this new set. Then authorize the POSIX administrator to use the new set.

Command sets are established in the 150CMDS DATADVH and 140CMDS DATADVH files. Each file corresponds to the command level being used.

Note: POSIXINFO only exists in the 150A command set. The specific format of the file is described in the prologue section of the file.

Example—150CMDS DATADVH File:

```

:
1 POOL          DVHXMIT   DVHPOOL   Y  2 A.....
  POSIXFSROOT  DVHXMIT   DVHPOSIX  Y  ..G.....
  POSIXGLIST   DVHXMIT   DVHGLIST  Y  A.....
  POSIXGROUP   DVHXMIT   DVHGBGRP  Y  A.....
  POSIXINFO    DVHXMIT   DVHPOSIX  Y  A.....
  POSIXIUPGM   DVHXMIT   DVHPOSIX  Y  ..G.....
  POSIXIWDIR   DVHXMIT   DVHPOSIX  Y  ..G.....
  POSIXOPT     DVHXMIT   DVHPOPT   Y  A.....
  PRIORITY     DVHXMIT   DVHPRI    Y  A.....
  PRIOSSET     DVHXMIT   DVHPRI    Y  A.....
:

```

1

Specifies the command name,

2

Specifies the command sets associated with the command. As you can see, POSIXINFO is considered a command set A command. To define a new set simply place an alphanumeric character adjacent to the existing command sets. You should choose a set that is not being used as an IBM default.

You should also note that the command set field must be contiguous, with no imbedded blanks. The position you place the new set is unimportant but placing it on the end is recommended.

As all IBM-supplied defaults are alphabetic, the following example will use command set 5 to ensure that no conflicts arise. After altering the file, the results are:

```

:
POOL          DVHXMIT   DVHPOOL   Y  A.....
  POSIXFSROOT  DVHXMIT   DVHPOSIX  Y  ..G.....
  POSIXGLIST   DVHXMIT   DVHGLIST  Y  A.....
  POSIXGROUP   DVHXMIT   DVHGBGRP  Y  A.....
  POSIXINFO    DVHXMIT   DVHPOSIX  Y  3 A.....5
  POSIXIUPGM   DVHXMIT   DVHPOSIX  Y  ..G.....
  POSIXIWDIR   DVHXMIT   DVHPOSIX  Y  ..G.....
  POSIXOPT     DVHXMIT   DVHPOPT   Y  A.....
  PRIORITY     DVHXMIT   DVHPRI    Y  A.....
  PRIOSSET     DVHXMIT   DVHPRI    Y  A.....
:

```

3

Indicates you can now authorize your administrator to use command set 5 and they will only have authority to issue the POSIXINFO command.

DirMaint Server Authorization Procedures

The DIRMAINT server uses the AUTHFOR CONTROL file as a repository of authorization information. This file contains a listing of user IDs who are authorized to act for other user IDs and the privilege classes that have been delegated to them.

AUTHFOR CONTROL File

The AUTHFOR CONTROL file resides on the DirMaint 1DF disk. The format is:

```
tUid iUid iNode CmdLevel CmdSets
```

Where:

tUid

Identifies the *userid* or *profileid* granting permission for a set of command classes to be used against them. A keyword of *ALL* may be used here to indicate that the following user has authority to use the specified privileges against all users.

iUid

Identifies the *userid* that is authorized to use the command sets.

iNode

Identifies the network *nodeid* that the issuing user is on. This allows *userids* on different nodes to be granted different command classes.

CmdLevel

Specifies the command level that authority is granted for. Valid values are 140A and 150A.

CmdSets

Specifies a list of command classes being authorized. The list cannot have any spaces imbedded between the classes.

Note: The AUTHFOR CONTROL file can be maintained in one of two ways

- Directly through the DIRM AUTHFOR command.
- Manually by using DIRM SEND to retrieve the file. Using XEDIT to alter the file and returning the file through the DIRM FILE command.

If the AUTHFOR CONTROL file is included in the loadable files list in the CONFIG DATADVH file, then a DIRM RLDCODE command is needed after the DIRM FILE command to make the change known to DIRMAINT. Otherwise, the change will not be noticed until the next time the DIRMAINT machine is re-IPled.

Example—Granting a User Class A Authority:

In this example, we will be granting user ID HOWLANDM at GDLVM7 authority to issue class A for all user IDs in the source directory. This authority will only be granted for command level 150A. The following step should be done:

- Issue the following command from the DirMaint console:

```
FOR ALL AUTHFOR HOWLANDM FROM GDLVM7 CMDLEVEL 150A CMDSET A
```

or, add the following line to the AUTHFOR CONTROL file using XEDIT:

```
ALL      HOWLANDM GDLVM7    150A A
```

Example—Revoking a User Class Authority:

To revoke the authority you just gave user ID HOWLANDM at GDLVM7, the following steps should be done:

- Issue the following command from the DirMaint console:

```
FOR ALL DROPFOR HOWLANDM FROM GDLVM7 CMDLEVEL 150A CMDSET A
```

or, delete the following line from the AUTHFOR CONTROL file using XEDIT:

```
ALL      HOWLANDM GDLVM7      150A A
```

Note: If user ID HOWLANDM had additional classes (besides class A) you may choose to alter the line instead of deleting it. To let the user retain the *other* classes simply remove the *A* from the command set list and let the other classes remain.

Chapter 9. Exit Routines

This chapter describes each of the exits available with DirMaint. An exit is a point in a program that is designed to allow an exit routine to gain control of certain processes. Some exit routines are required, but most are optional. IBM supplies samples of all of the required DirMaint exit routines, as well as samples for some of the optional exits. Where appropriate, the supplied DirMaint exit routines are enabled for interfacing between DirMaint and other programs, such as RACF, or products that facilitate distributed processing.

Most DirMaint exit routines are written in the REXX programming language, and can be customized or replaced by an installation-written exit, or be called by an installation-written command.

It is recommended that you place customized exit routines on the xVMDIRxx 491 disk.

Command and Exit Routine Interactions

When a DirMaint command is entered, it may interact with multiple exit routines within the various virtual machines it executes in. The number of exit routines a command interacts with is dependent upon the command being entered and any installation tailoring that was done.

User Virtual Machine

When a command is entered, the command may cause an interaction with all, or a subset of, the following exit routines:

- DVHCXC
- DVHCXB
- DVHPXR
- DVHPXV
- DVHPXA
- DVHCXA

The exit routine interactions occur in the order of the above list.

DATAMOVE Service Machine

When a command is entered, the command may cause an interaction with all, or a subset of, the following exit routines:

- DVHXRC
- DVHXRБ
- One of the following, according to the command:
 - DVHDXF for AMDISK FORMAT processing
 - DVHDXD for CLONEDISK processing
 - DVHDXP for CMDISK processing
 - DVHDXC for CMDISK processing of a CMS formatted disk
 - DVHDXN for CMDISK processing of a non-CMS formatted disk
 - DVHDXE for DMDISK CLEAN processing.
- DVHXRA

The exit routine interactions occur in the order of the above list.

DIRMSAT Service Machine

When a command is entered, the command may cause an interaction with all, or a subset of, the following exit routines:

- DVHXRC
- DVHXRБ
- DVHXRA

The exit routine interactions occur in the order of the above list.

DIRMAINT Service Machine

When a command is entered, the command may cause an interaction with multiple exit routines being called within the DIRMAINT service machine. Authorization checking exits will be called before notification exits. The following exits will be called for each command:

All

DVHXRC, DVHXRБ, those listed below for each command, DVHXRA

ACCOUNT

DVHXAV, DVHXAN

ADD

DVHPXV, DVHXAV, DVHXDA - for each disk, DVHXMP - for each disk, DVHXLА - for each link, DVHXUN, DVHXPN, DVHXAN, DVHXDN - for each disk, DVHXMN - for each disk, and DVHXLN - for each link, DVHXNN – for each NICDEF statement with the LAN option

AMDISK

DVHXDA, DVHXMP, DVHXDN, DVHXMN

BACKUP

DVHXTF

CHNGID

DVHPXV, DVHXAV, DVHXMP - for each disk DVHXUN - new, DVHXPN - new, DVHXAN - new, DVHXDN - for each new disk, DVHXMN - for each new disk, DVHXLN - for each new link, DVHXMN -for each old disk, DVHXDN -for each old disk, DVHXLN - for each old link, DVHXAN - old, DVHXPN - old, DVHXUN - old, DVHXNN for each new NICDEF statement with the LAN option and DVHXNN for each old NICDEF statement with the LAN option

CHVADDR

DVHXMP, DVHXMN - old, DVHXDN - twice, DVHXMN - new. Or, for a changed LINK: DVHXLN - twice.

CMDISK

DVHXDA, DVHXDN

DLINK

DVHXLN for each NICDEF statement with the LAN option

DMDISK

DVHXMN, DVHXDN

LOGONBY

DVHXLБ

MDISK

DVHXMP, DVHXMN

NICDEF

DVHXNN for NICDEF command with the LAN option.

POSIXFSROOT

DVHXPESM

POSIXGLIST

DVHXPESM

POSIXGROUP

DVHXPESM

POSIXINFO

DVHXPESM

POSIXIUPGM

DVHXPESM

POSIXIWDIR

DVHXPESM

PURGE

DVHXMN - for each disk, DVHSDN - for each disk, DVHSLN - for each old link, DVHSDN, DVHSDN,
DVHSDN. DVHSDN - for each NICDEF statement with the LAN option

PW

DVHPXV, DVHSDN

PWGEN

DVHPXR, DVHPXV

PWMON

DVHSCP, DVHSDP

REPLACE

DVHPXV, DVHSDV, DVHSDN, DVHSDN, DVHSDN - for each deleted disk, DVHSDN - for each deleted
disk, DVHSLN - for each deleted link, DVHSDN - for each added disk, DVHSDN - for each remaining
disk, DVHSLN - for each new link. DVHSDN for each deleted NICDEF statement with the LAN option
and DVHSDN for each NICDEF statement with the LAN option

RMDISK

DVHSDA, DVHSDN

SETACNT

DVHSDV, DVHSDN

SETPW

DVHPXV, DVHSDN

SETSTAG

DVHSDA

STAG

DVHSDA

SUBSCRIBE

DVHSDN

TESTPW

DVHPXV

TMDISK

DVHSDA - new, DVHSDP - new, DVHSDN - new, DVHSDN - new, DVHSDN - old, DVHSDN - old

Exit Routines Summary

Table 14 on page 124 summarizes the DirMaint 150A exit routines. You can find more information about each exit routine by referring to the referenced page.

Table 14. Exit Routines Summary

Exit Routine	Function	Machine Environment	IBM Supplied Sample	Topic
DVHCXA	Command exit, after processing	User	Yes	“Command After Processing (DVHCXA)” on page 129
DVHCXB	Command exit, after parsing, before processing	User	No	“Command Before Processing (DVHCXB)” on page 130
DVHCXC	Command exit, before parsing	User	Yes	“Command Before Parsing (DVHCXC)” on page 131
DVHDXC	DATAMOVE COPY CMS exit	DATAMOVE	No	“DATAMOVE CMS Copying (DVHDXC)” on page 132
DVHDXD	DATAMOVE DDR exit	DATAMOVE	Yes	“DATAMOVE DDR Processing (DVHDXD)” on page 134
DVHDXE	DATAMOVE ERASE exit	DATAMOVE	Yes	“DATAMOVE ERASE Processing (DVHDXE)” on page 136
DVHDXF	DATAMOVE FORMAT exit	DATAMOVE	No	“DATAMOVE FORMAT Processing (DVHDXF)” on page 137
DVHDXN	DATAMOVE COPY NONCMS exit	DATAMOVE	No	“DATAMOVE non-CMS Copying (DVHDXN)” on page 138
DVHDXP	DATAMOVE non-CMS disk copying exit	DATAMOVE	No	“DATAMOVE non-CMS Copying (DVHDXP)” on page 140
DVHESMLR	External Security Manager log recording exit	User DIRMAINT DATAMOVE DIRMSAT	Yes	“ESM Log Recording (DVHESMLR)” on page 142

Table 14. Exit Routines Summary (continued)

Exit Routine	Function	Machine Environment	IBM Supplied Sample	Topic
DVHPXA	User's logon password exit, after transmission to DIRMAINT	User	Yes	“Password After Processing (DVHPXA)” on page 144
DVHPXR	Random password generation exit for logon	User DIRMAINT	Yes	“Password Random Generator (DVHPXR)” on page 145 “Random Password Generator (DVHPXR)” on page 148
DVHPXV	User's logon password exit, syntax verification	User DIRMAINT	Yes	“Password Syntax Checking (DVHPXV)” on page 146
DVHXAN	Account number notification exit	DIRMAINT	No	“ACCOUNT Number Notification (DVHXAN)” on page 149
DVHXAV	Account number verification exit	DIRMAINT	Yes	“ACCOUNT Number Verification (DVHXAV)” on page 150
DVHXCP	Check user privilege exit	DIRMAINT	No	“Check User Privilege (DVHXCP)” on page 151
DVHXDA	DASD authorization checking exit	DIRMAINT	No	“DASD Authorization Checking (DVHXDA)” on page 152
DVHXDN	DASD notification exit	DIRMAINT	Yes	“DASD Ownership Notification (DVHXDN)” on page 154
DVHXFA	FOR authorization checking exit	DIRMAINT DATAMOVE DIRMSAT	No	“FOR Authorization Checking (DVHXFA)” on page 155

Table 14. Exit Routines Summary (continued)

Exit Routine	Function	Machine Environment	IBM Supplied Sample	Topic
DVHXL A	Link authorization checking exit	DIRMAINT	No	“Link Authorization (DVHXL A)” on page 156
DVHXL B	LOGONBY change notification exit	DIRMAINT	Yes	“LOGONBY Change Notification (DVHXL B)” on page 157
DVHXL F	Log record filtering exit	DIRMAINT DATAMOVE DIRMSAT	Yes	“Message Logging Filter (DVHXL F)” on page 158
DVHXL N	Link notification exit	DIRMAINT	No	“Link Notification (DVHXL N)” on page 160
DVHXL V L	Pre-startup exit for switching service levels	DIRMAINT DATAMOVE DIRMSAT	Yes	“Pre-startup Exit for Switching Service Levels (DVHXL V L)” on page 161
DVHXL MN	Minidisk password change notification exit	DIRMAINT	Yes	“Minidisk Password Notification (DVHXL MN)” on page 162
DVHXL MP	Minidisk password syntax verification exit	DIRMAINT	No	“Minidisk Password Checking (DVHXL MP)” on page 163
DVHXL MU	MULTIUSER authorization checking exit	DIRMAINT DATAMOVE DIRMSAT	Yes	“Multiple User Prefix Authorization (DVHXL MU)” on page 164
DVHXL NE	Asynchronous update notification exit	DIRMAINT	Yes	“Asynchronous Update Notification (DVHXL NE)” on page 165
DVHXL NN	NICDEF notification exit	DIRMAINT	No	“NICDEF Notification Exit (DVHXL NN)” on page 167

Table 14. Exit Routines Summary (continued)

Exit Routine	Function	Machine Environment	IBM Supplied Sample	Topic
DVHXP	External security manager password authentication exit	DIRMAINT	Yes	“ESM Password Authentication (DVHXP EXEC)” on page 168
DVHXPESM	POSIX change notification exit	DIRMAINT	Yes	“POSIX Change Notification (DVHXPESM)” on page 169
DVHXPN	Password change notification exit	DIRMAINT	Yes	“Password Change Notification (DVHXPN)” on page 170
DVHXPROF	Post-profile exit for the DirMaint service machines. The exit name, DVHXPROF, must not be renamed.	DIRMAINT	Yes, see “Optimizing the DirMaint Service Machines” on page 215	“Optimizing the DirMaint Service Machines” on page 215
DVHXPP	Password notice print exit	DIRMAINT	Yes	“Password Notice Printing (DVHXPP)” on page 172
DVHXRA	Request after processing exit	DIRMAINT DATAMOVE DIRMSAT	No	“Request After Processing (DVHXRA)” on page 173
DVHXRB	Request after parsing, before processing exit	DIRMAINT DATAMOVE DIRMSAT	No	“Request Before Processing (DVHXRB)” on page 174
DVHXRC	Request before parsing exit	DIRMAINT DATAMOVE DIRMSAT	No	“Request Before Parsing (DVHXRC)” on page 176
DVHXTA	Local STAG authorization exit	DIRMAINT	No	“Local STAG Authorization (DVHXTA)” on page 177
DVHXTP	Backup tape mount exit	DIRMAINT	Yes	“Backup Tape Mount (DVHXTP)” on page 178
DVHXUN	User ID change notification exit	DIRMAINT	Yes	“User Change Notification (DVHXUN)” on page 180

DirMaint Exit Routine Descriptions

This section provides specific information about each IBM-supplied exit routine. The exit routine descriptions are catalogued in alphabetical order. Each exit routine description is presented in the following format:

- *Environment*: Indicates where the exit routine is called.
- *Description*: Explains what the exit routine does.
- *Invocation*: Displays the entry to be placed in the CONFIG* DATADVH file.
- *Interface Parameter*: Identifies the parameters that are to be provided when the exit routine is called.
- *Return Codes*: The return codes that the exit routine can return (if any), and their meaning.

Command After Processing (DVHCXA)

Environment

User virtual machine

Description

Command exit, after processing.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file:

```
COMMAND_AFTER_PROCESSING_USER_EXIT= DVHCXA EXEC
```

For more information, see [“The CONFIG* DATADVH File” on page 104.](#)

Interface Parameter

This exit is called with these two parameters:

- Return code from processing the command
- Command name

In addition, the following two interface variables are available:

CMD_STRING

The command string as verified and returned by the parser. Command and parameter abbreviations HAVE been resolved. All prefix variables (TOSYS, ASUSER, BYUSER, FORUSER, and ATNODE) have been stripped off and stored in their own separate global variables. They will each have a value, if not specified on the user's command then defaults will be supplied.

LOG_STRING

The command string as verified and returned by the parser, with passwords and other sensitive information *masked* for security. The prefix operands are included as entered by the user, defaults are NOT filled in for omitted parameters.

These two interface variables are obtainable using: 'PIPE VAR variable_name 2 | ...'. This exit is called indirectly through the DVHCEXIT EXEC. An *invocation* or *generation* number of 2 is necessary to get the value from DVHCEXIT's caller, DVHCMD.

Return Codes

Ignored upon exit.

Command Before Processing (DVHCXB)

Environment

User virtual machine

Description

Command exit, after parsing, before processing.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
COMMAND_BEFORE_PROCESSING_USER_EXIT= DVHCXB EXEC
```

For more information, see [“The CONFIG* DATADVH File” on page 104.](#)

Interface Parameter

This exit is called with no parameters, but with two interface variables set:

CMD_STRING

The command string as verified and returned by the parser. Command and parameter abbreviations HAVE been resolved. All prefix variables (TOSYS, ASUSER, BYUSER, FORUSER, and ATNODE) have been stripped off and stored in their own separate global variables. They will each have a value, if not specified on the user's command then defaults will be supplied.

LOG_STRING

The command string as verified and returned by the parser, with passwords and other sensitive information *masked* for security. The prefix operands are included as entered by the user, defaults are NOT filled in for omitted parameters.

These two interface variables are obtainable using: 'PIPE VAR variable_name 2 | ...'. This exit is called indirectly through the DVHCEXIT EXEC. An *invocation* or *generation* number of 2 is necessary to get the value from DVHCEXIT's caller, DVHCMD.

Return Codes

This routine must exit with one of the following:

Table 15. COMMAND_BEFORE_PROCESSING_USER_EXIT

Return Code	Meaning
30 - Nop	Regular DirMaint processing continues.
31	A replacement command string has been set into variable CMD_STRING using 'PIPE ... VAR CMD_STRING 2'. This exit is called indirectly through the DVHCEXIT EXEC. An <i>invocation</i> or <i>generation</i> number of 2 is necessary to pass the value back to DVHCEXITs caller, DVHCMD. If the CMD_STRING is changed and contains passwords or other sensitive information, the LOG_STRING should also be changed to the equivalent string with the sensitive information changed to a string of XXXs.
Other	The command has been completely processed. DirMaint exits, passing back whatever return code it was given.

Command Before Parsing (DVHCXC)

Environment

User virtual machine

Description

Command exit, before parsing.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
COMMAND_BEFORE_PARSING_USER_EXIT= DVHCXC EXEC
```

For more information, see [“The CONFIG* DATADVH File” on page 104.](#)

Interface Parameter

This exit is called with the following parameter:

- The command string, as entered by the user; command and parameter abbreviations have NOT been resolved.

Return Codes

This routine must exit with one of the following:

Table 16. COMMAND_BEFORE_PARSING_USER_EXIT

Return Code	Meaning
30 - Nop	Regular DirMaint processing continues.
31	A replacement command string has been set into variable CMD_STRING using 'PIPE ... VAR CMD_STRING 2'. This exit is called indirectly through the DVHCEXIT EXEC. An <i>invocation</i> or <i>generation</i> number of 2 is necessary to pass the value back to DVHCEXITs caller, DVHCMD.
Other	The command has been completely processed. DirMaint exits, passing back whatever return code it was given.

DATAMOVE CMS Copying (DVHDXC)

Environment

DATAMOVE service machine

Description

DATAMOVE CMS disk copying exit.

Invocation

The following entry should be entered in the text file in upper case as required in the CONFIG* DATADVH file.:

```
DATAMOVE_COPY_CMS_EXIT= DVHDXC EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The source virtual address of the DATAMOVE machine
- The destination virtual address of the DATAMOVE machine
- The target ID
- The target address
- The target system affinity, usually *
- The block size with which the destination disk should be formatted: 512, 1024, 2048, 4096, or an '=' sign to use the same block size as the source disk. If both the block size and the label are omitted, an '=' sign is presumed.
- The label with which the destination disk should be formatted; or an '=' sign to use the same label as the source disk. If omitted, an '=' sign is presumed.

Return Codes

This routine must exit with one of these:

Table 17. DATAMOVE_COPY_CMS_EXIT Return Codes

Return Code	Meaning
0	Processing complete. DATAMOVE skips the remainder of its normal processing for this function and reports the successful completion back to DIRMAINT.
30 - Nop	DATAMOVE processing continues as if the exit routine were not even present. If DFSMS is installed and the destination disk is at least as large as the source disk, DATAMOVE will use DFSMS COPY to format the disk and copy the data. Otherwise, DATAMOVE will use a FORMAT command to format the disk and then a COPYFILE command to copy the data.

Table 17. DATAMOVE_COPY_CMS_EXIT Return Codes (continued)

Return Code	Meaning
Other nonzero	An error has occurred. The exit routine has already issued the appropriate error messages. DATAMOVE will report the failure back to DIRMAINT.

DATAMOVE DDR Processing (DVHDXD)

Environment

DATAMOVE service machine

Description

DATAMOVE DDR processing exit.

Invocation

The following entry should be entered in the text file in upper case as required in the CONFIG* DATADVH file.:

```
DATAMOVE_DDR_EXIT= DVHDXD EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The source virtual address of the DATAMOVE machine
- A left parenthesis
- Device characteristics for the source disk, consisting of the volume label, device type, starting cylinder or block number (or the keyword 'START'), and the size of the disk in cylinders or blocks (or the keyword 'END')
- A right parenthesis
- The destination virtual address of the DATAMOVE machine
- A left parenthesis
- Device characteristics for the destination disk, consisting of the volume label, device type, starting cylinder or block number (or the keyword 'START'), and the size of the disk in cylinders or blocks (or the keyword 'END')
- A right parenthesis

Return Codes

This routine must exit with one of these:

Table 18. DATAMOVE_DDR_EXIT Return Codes

Return Code	Meaning
0	Processing complete. DATAMOVE skips the remainder of its normal processing for this function and reports the successful completion back to DIRMAINT.
30 - Nop	DATAMOVE processing continues as if the exit routine were not even present. DATAMOVE will use DDR to perform the copy.

Table 18. DATAMOVE_DDR_EXIT Return Codes (continued)

Return Code	Meaning
95	A COMMAND RESULTS LOST response was received for the issued CP FLASHCOPY command. DATAMOVE skips the remainder of its normal processing for this function and reports the successful completion back to DirMaint.
96	The target disk specified in the DIRMaint CLONEDisk command is a space-efficient volume. CLONEDISK to a space-efficient target disk is not available because DirMaint does not implement IBM FlashCopy/SE support, and DDR copy to all extents of the space-efficient target would defeat the purpose of space-efficient DASD (which is to copy as little data as possible).
296-297	The source or target disk specified in the DIRMaint CLONEDisk command is being used in an existing FLASHCOPY operation. DATAMOVE adds the associated workunit to the DATAMOVE retry queue. The workunit is retried based on the DMVCTL WAKEUP schedule configured in the DATAMOVE DATADVH configuration file.
Other nonzero	An error has occurred. The exit routine has already issued the appropriate error messages. DATAMOVE will report the failure back to DIRMAINT.

DATAMOVE ERASE Processing (DVHDXE)

Environment

DATAMOVE service machine

Description

DATAMOVE ERASE processing exit.

Invocation

The following entry should be entered in the text file in upper case as required in the CONFIG* DATADVH file.:

```
DATAMOVE_ERASE_EXIT= DVHDXE EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The virtual address of the DATAMOVE machine
- The former owner's userid
- The former owner's virtual address
- The target system affinity, usually *

Return Codes

This routine must exit with one of these:

Table 19. DATAMOVE_ERASE_EXIT Return Codes

Return Code	Meaning
0	Processing complete. DATAMOVE skips the remainder of its normal processing for this function and reports the successful completion back to DIRMAINT.
30 - Nop	DATAMOVE processing continues as if the exit routine were not even present. DATAMOVE will use a CPFMTXA command to overwrite the disk space with binary zeros.
Other nonzero	An error has occurred. The exit routine has already issued the appropriate error messages. DATAMOVE will report the failure back to DIRMAINT.

DATAMOVE FORMAT Processing (DVHDXF)

Environment

DATAMOVE service machine

Description

DATAMOVE FORMAT processing exit.

Invocation

The following entry should be entered in the text file in upper case as required in the CONFIG* DATADVH file.:

```
DATAMOVE_FORMAT_EXIT= DVHDXF EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The virtual address of the DATAMOVE machine
- The target ID
- The target address
- The target system affinity, usually *
- The block size with which the destination disk should be formatted: 512, 1024, 2048, 4096, or an '=' sign to use the system default. If both the block size and the label are omitted, an '=' sign is presumed.
- The label with which the destination disk should be formatted – or omitted to use a default consisting of the leftmost characters of the userid followed by the target address.

Return Codes

This routine must exit with one of these:

Table 20. DATAMOVE_FORMAT_EXIT Return Codes

Return Code	Meaning
0	Processing complete. DATAMOVE skips the remainder of its normal processing for this function and reports the successful completion back to DIRMAINT.
30 - Nop	DATAMOVE processing continues as if the exit routine were not even present. DATAMOVE will use a FORMAT command to format the disk use with the CMS file system.
Other nonzero	An error has occurred. The exit routine has already issued the appropriate error messages. DATAMOVE will report the failure back to DIRMAINT.

DATAMOVE non-CMS Copying (DVHDXN)

Environment

DATAMOVE service machine

Description

DATAMOVE CMS non-CMS disk copying exit.

Note: DVHDXP (the DATAMOVE_NONCMS_COPYING_EXIT) is retained for compatibility with earlier function levels of DirMaint, and may be removed in a future release. It is recommended that you use this exit (DVHDXN, the DATAMOVE_COPY_NONCMS_EXIT) instead.

Invocation

The following entry should be entered in the text file in upper case as required in the CONFIG* DATADVH file.:

```
DATAMOVE_COPY_NONCMS_EXIT= DVHDXN EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The source virtual address of the DATAMOVE machine
- The destination virtual address of the DATAMOVE machine
- The target ID
- The target address
- The target system affinity, usually *
- The block size with which the destination disk should be formatted: 512, 1024, 2048, 4096, or an '=' sign to use the same block size as the source disk. If both the block size and the label are omitted, an '=' sign is presumed.
- The label with which the destination disk should be formatted; or an '=' sign to use the same label as the source disk. If omitted, an '=' sign is presumed.

Return Codes

This routine must exit with one of these:

Table 21. DATAMOVE_COPY_NONCMS_EXIT Return Codes

Return Code	Meaning
0	Processing complete. DATAMOVE skips the remainder of its normal processing for this function and reports the successful completion back to DIRMAINT.
30 - Nop	DATAMOVE processing continues as if the exit routine were not even present. DATAMOVE will treat this as a failure.

Table 21. DATAMOVE_COPY_NONCMS_EXIT Return Codes (continued)

Return Code	Meaning
Other nonzero	An error has occurred. The exit routine has already issued the appropriate error messages. DATAMOVE will report the failure back to DIRMAINT.

DATAMOVE non-CMS Copying (DVHDXP)

Environment

DATAMOVE service machine

Description

DATAMOVE non-CMS disk copying exit.

Note: This exit is retained for compatibility with earlier function levels of DirMaint FL 4.1.0, and may be removed in a future release. It is recommended that you use DVHDXN (the DATAMOVE_COPY_NONCMS_EXIT) instead.

Invocation

The following entry should be entered in the text file in upper case as required in the CONFIG* DATADVH file.:

```
DATAMOVE_NONCMS_COPYING_EXIT= DVHDXP EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The source virtual address of the DATAMOVE machine
- The destination virtual address of the DATAMOVE machine
- The target ID
- The target system affinity, usually *.

Return Codes

This routine must exit with one of these:

Table 22. DATAMOVE_NONCMS_COPYING_EXIT Return Codes

Return Code	Meaning
30 - Nop	The minidisk appears to be a standard CMS minidisk. DATAMOVE continues by making the same checks as if the exit were not present. DATAMOVE will link to both disks SW if possible, otherwise just W. If present, the DFSMS MODULE will be used to perform the copy; otherwise, FORMAT and COPYFILE will be used.
0xx	The minidisk copy has been completed. No further processing is done to complete the copy. Cleanup processing, if active, will be done separately. A different return code may be used for each type of nonstandard CMS or non-CMS disk encountered and supported.

Table 22. DATAMOVE_NONCMS_COPYING_EXIT Return Codes (continued)

Return Code	Meaning
1xx	The minidisk copy has not been completed because the CP LINK command failed with RC=1xx. The copy will be retried later.
2xx	The minidisk copy has not been completed because the CP LINK command failed with RC=2xx. The copy will be retried later.
Other nonzero	The minidisk copy has not been completed. Most likely the minidisk format is not supported by the exit routine. The exit routine has already issued the appropriate messages. The return code should be the same as the message number. The copy will not be retried.

ESM Log Recording (DVHESMLR)

Environment

DIRMAINT service machine

DATAMOVE service machine

DIRMSAT service machines

Description

External security manager log recording exit. By default, all command and message activity is recording in the service machine's console file only. Optionally, this information (subject to filtering) may be communicated to an ESM, such as RACF for recording in a secure audit file by this exit routine.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
ESM_LOG_RECORDING_EXIT= DVHESMLR EXEC
```

Note: The DirMaint server may abend, hang, or shutdown if the ESM is not installed, the DirMaint server has not been granted the authority to use the log recording service, or if the ESM is temporarily inactive. For the DirMaint server to operate under these conditions, the name of the exit routine must be removed from the ESM LOG RECORDING EXIT statement in the CONFIG* DATADVH file(s), and issue a RLDDATA command to reset the server's global variables. Then you need to restore use of the exit routine when the ESM has been reactivated.

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- A date stamp (*yyyymmdd*) and time stamp (*hh:mm:ss*).
- The node ID and user ID for whom the message is being recorded. For a message to a distribution list, the node ID will be recorded as and the user ID will be the nickname for the list.
- The message identifier is DVHrrrrnnnS

Where:

rrr

Specifies the routine issuing the message.

nnnn

Specifies the message number.

S

Specifies the message severity.

- The message text to be logged.

Return Codes

A non-zero return code will cause the DirMaint service machine to issue message DVH2101T and then shut down.

Usage Notes

1. If the DVHESMLR EXEC provided by IBM is enabled, all DirMaint service machines must be authorized and enabled to use RACROUTE, as described in [“Enabling Auditing Using RACROUTE” on page 196](#).

Password After Processing (DVHPXA)

Environment

User virtual machine

Description

User's logon password exit, after transmission to DIRMAINT.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
PASSWORD_NOTIFICATION_USER_EXIT= DVHPXA EXEC
```

Interface Parameter

This exit is called with the following parameters:

- The keyword USER (if invoked in the user's virtual machine) or DIRMAINT (if invoked by the DIRMAINT virtual machine).
- The command causing this notification: PW or TESTPW.
- The target ID class (always USER).
- The target ID.
- The target system affinity (always *).
- The new password.

Return Codes

The return code is ignored upon exit.

Note: The password transaction has been successfully sent to the DIRMAINT service machine, but a change has not necessarily taken effect.

Password Random Generator (DVHPXR)

Environment

User virtual machine

DIRMAINT virtual machine

Description

Random password generation exit for logon.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

For the user's virtual machine:

```
PASSWORD_RANDOM_GENERATOR_USER_EXIT= DVHPXR EXEC
```

For more information, see [“The CONFIG* DATADVH File” on page 104](#).

For the DIRMAINT service machine:

```
PASSWORD_RANDOM_GENERATOR_EXIT= DVHPXR EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The keyword USER.
- The command name keyword (PW, TESTPW, or PWGEN).
- The target ID class (always USER).
- The target ID.
- The current password (or * if unknown).
- The target system affinity (always *).
- The keyword RANDOM.
- The algorithm to be used (ALPHA, NUM, ALPHANUM, and so forth), or null.
- Optional parameters determined by the specific algorithm; such as length, minimum and maximum lengths, and so forth.

Return Codes

This routine must exit with one of these:

Table 23. PASSWORD_RANDOM_GENERATOR_EXIT Return Codes

Return Code	Meaning
0	The password has been generated and pushed onto the stack.
nonzero	The password could not be generated and the stack is unchanged.

Password Syntax Checking (DVHPXV)

Environment

User virtual machine

DIRMAINT virtual machine

Description

User's logon password exit, syntax verification.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

For the user's virtual machine:

```
PASSWORD_SYNTAX_CHECKING_USER_EXIT= DVHPXV EXEC
```

For more information, see [“The CONFIG* DATADVH File” on page 104.](#)

For the DIRMAINT service machine:

```
PASSWORD_SYNTAX_CHECKING_EXIT= DVHPXV EXEC
```

For more information, see [“CONFIG DATADVH” on page 24.](#)

Interface Parameter

This exit is called with the following parameters:

- The keyword USER (if invoked in the user's virtual machine) or DIRMAINT (if invoked by the DIRMAINT virtual machine).
- The keyword PW or TESTPW (if invoked in the user's virtual machine); -or- ADD, CHNGID, PW, SETPW, or TESTPW (if invoked by DIRMAINT).
- The target ID class (USER or IDENTITY).
- The target ID.
- The target system affinity (always *).
- The current password (or * if unknown).
- The proposed new password.
- An optional NOMSG keyword.

Note: The tracing messages should be issued regardless of the NOMSG keyword, as may other messages of a serious nature. But messages reflecting the reason for rejecting a particular proposed password should not be issued if the NOMSG keyword is specified, although it should exit with a return code equal to the message number that would have been issued if the NOMSG keyword had been omitted.

Return Codes

This routine must exit with one of these:

Table 24. *PASSWORD_SYNTAX_CHECKING_USER_EXIT* Return Codes

Return Code	Meaning
0	The password is accepted. No further checking is done.
30 - Nop	The DVH3276E message will be displayed indicating that the exit routine was not located.
31	The password is rejected. DirMaint should issue a generic error message.
Other nonzero	The password is rejected and the exit routine has already issued the appropriate messages. The return code should be the same as the message number.

Random Password Generator (DVHPXR)

Environment

DIRMAINT service machine

User virtual machine

Description

Random password generation exit allows the installation to customize the format of passwords generated by PWGEN. The IBM-supplied default is ALPHANUMeric, with the length specified by the issuer of the PWMON command.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

For the DIRMAINT service machine:

```
PASSWORD_RANDOM_GENERATOR_EXIT= DVHPXR EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

For the user's virtual machine.

```
PASSWORD_RANDOM_GENERATOR_USER_EXIT= DVHPXR EXEC
```

For more information, see [“The CONFIG* DATADVH File” on page 104](#).

Interface Parameter

This exit is called with the following parameters:

- The keyword DIRMAINT.
- The command name keyword (PW, TESTPW, or PWGEN).
- The target ID class (always USER).
- The target ID.
- The target system affinity (always *).
- The current password (or * if unknown).
- The keyword RANDOM.
- The algorithm to be used (ALPHA, NUM, ALPHANUM, and so forth), or null.
- Optional parameters determined by the specific algorithm; such as length, minimum and maximum lengths, and so forth.

Return Codes

This routine must exit with one of these:

Table 25. PASSWORD_RANDOM_GENERATOR_EXIT Return Codes

Return Code	Meaning
0	The password has been generated and pushed on the stack.
nonzero	The password could not be generated and the stack is unchanged.

ACCOUNT Number Notification (DVHXAN)

Environment

DIRMAINT service machine

Description

Account number notification exit. This exit may be used to notify other service machines of changes to a user's account number. It will be called whenever an account number change is successful.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
ACCOUNT_NUMBER_NOTIFICATION_EXIT= DVHXAN EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The command causing this notification: ACCOUNT, ADD, ADD-ACCT, CHNGID-*NEW, CHNGID-*OLD, PURGE, REPLACE-NEW, REPLACE-*NEW or SETACNT.
- The target ID class (USER, IDENTITY, SUBCONFIG or PROFILE).
- The target ID.
- The target system affinity, usually *.
- The new or old account number.

Note: If null, the user ID will be substituted. All primary and secondary account numbers from the ACCOUNT statement are included on one call, and multiple tertiary account numbers from any *AC= records are included on one call.

Return Codes

Any return code is ignored upon exit.

ACCOUNT Number Verification (DVHXAV)

Environment

DIRMAINT service machine

Description

Replaces DVHACCT and DVHACCTM

Account number verification exit. The exit will not only be called for the ACCOUNT command; but also for ACNTADD, ADD, CHNGID, and SETACNT.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
ACCOUNT_NUMBER_VERIFICATION_EXIT= DVHXAV EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The command causing this check: ACCOUNT, ACNTADD, ADD, ADD-*AC, CHNGID, CHNGID-*AC, SETACNT-ADD, SETACNT-*ADD, SETACNT-DELETE, SETACNT-*DELETE, SETACNT-SET
- The target ID class (USER, IDENTITY, SUBCONFIG or PROFILE).
- The target ID.
- The target system affinity, usually *.
- The proposed account number. (If null, the user ID will be substituted.)

Return Codes

This routine must exit with one of the following:

Table 26. ACCOUNT_NUMBER_VERIFICATION_EXIT Return Codes

Return Code	Meaning
0	The account number is accepted. No further checking is done.
30 - Nop	The account number is neither accepted nor rejected. DirMaint continues by making the same checks as if the exit were not present.
31	The account number is rejected. DirMaint should issue a generic error message.
Other nonzero	The account number is rejected and the exit routine has already issued the appropriate messages. The return code should be the same as the message number.

Check User Privilege (DVHXCP)

Environment

DIRMAINT service machine

Description

Check user privilege exit. This exit may determine whether a given user ID is *privileged*. This determines which password change interval rule applies.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
CHECK_USER_PRIVILEGE_EXIT= DVHXCP EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The commands making this check: ADD, CHNGID, PW, PWMON, PW?, SETPW
- The target ID class (USER, IDENTITY or SUBCONFIG)
- The target ID
- The target system affinity, usually *.

Return Codes

This routine must exit with one of these:

Table 27. CHECK_USER_PRIVILEGE_EXIT Return Codes

Return Code	Meaning
0	The user is a GENERAL user. Use the PWINTERVALFORGEN rules.
1	The user is a PRIVILEGED user. Use the PWINTERVALFORPRIV rules.
30	Reserved for exit routine not found. Use the PWINTERVALFORGEN rules.
Other nonzero	An error has occurred and the exit routine has already issued the appropriate messages. The return code should be the same as the message number.

DASD Authorization Checking (DVHXDA)

Environment

DIRMAINT service machine

Description

The DASD authorization checking exit routine determines whether the originator is authorized to allocate space for the target user ID on the requested DASD volume. This supports distributed (departmental) administration and centralized (networking) administration. This exit will be called for all AMDISK, CMDISK, RMDISK, and ADD commands, because ADD generates AMDISK requests indirectly.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
DASD_AUTHORIZATION_CHECKING_EXIT= DVHXDA EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The user ID of the user making this allocation
- The node ID of the user making this allocation
- The command causing this check: ADD (Since ADD generates AMDISK requests indirectly), AMDISK, CMDISK, or RMDISK
- The target ID class (USER, IDENTITY or SUBCONFIG)
- The target ID
- The target system affinity, usually *.
- The affected minidisk address
- Minidisk extent information: device type
- Minidisk extent information: start of extent (Keyword DEVNO, T-DISK, V-DISK, or starting cylinder or block number)
- Minidisk extent information: size of extent (Keyword DEVNO for DEVNO minidisks)
- Minidisk extent information: volume ID (Real address for DEVNO. Null for T-DISK or V-DISK).

Return Codes

This routine must exit with one of these:

Table 28. DASD_AUTHORIZATION_CHECKING_EXIT Return Codes

Return Code	Meaning
0	The minidisk allocation is accepted. No further checking is done.
30 - Nop	The allocation is neither accepted nor rejected. DirMaint continues by making the same checks as if the exit were not present.
31	The allocation is rejected. DirMaint should issue a generic error message.

Table 28. DASD_AUTHORIZATION_CHECKING_EXIT Return Codes (continued)

Return Code	Meaning
Other nonzero	The allocation is rejected and the exit routine has already issued the appropriate messages. The return code should be the same as the message number.

Note: For this particular exit routine, return codes 0 and 30 are equivalent. This exit routine may need to be sensitive to an AMDISK command where the target ID is the DATAMOVE machine.

DASD Ownership Notification (DVHXDN)

Environment

DIRMAINT service machine

Description

The DASD ownership notification exit may be used to notify other service machines of new, deleted, or transferred minidisks. It will be called whenever the ADD, CHNGID, PURGE, AMDISK, DMDISK, CHVADDR, or TMDISK commands have added, deleted, or changed ownership of a minidisk.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
DASD_OWNERSHIP_NOTIFICATION_EXIT= DVHXDN EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The command causing this notification: ADD, AMDISK, CHNGID-NEW, CHNGID-OLD, CHVADDR-NEW, CHVADDR-OLD, CMDISK-OLD, CMDISK-NEW, DMDISK, PURGE, TMDISK-NEW, or TMDISK-OLD
- The target ID class (USER, IDENTITY or SUBCONFIG)
- The target ID
- The target system affinity, usually *
- The affected minidisk address
- The last parameter has the following possibilities:
 - No parameters following the affected minidisk address for ADD, AMDISK, DMDISK, and PURGE
 - The MOVELINKS or KEEPLINKS parameter associated with the command for CHNGID-NEW, CHNGID-OLD, CHVADDR-NEW, CHVADDR-OLD, DMDISK, PURGE, TMDISK-NEW, and TMDISK-OLD
 - DASD management work unit number for CMDISK-NEW and CMDISK-OLD.

Return Codes

Any return code is ignored upon exit.

Usage Notes®

1. This exit routine may need to be sensitive to the AMDISK, DMDISK, TMDISK-NEW or TMDISK-OLD commands, where the target ID is the DATAMOVE machine.
2. For the ADD, AMDISK, CHNGID-NEW, CHVADDR-NEW, CMDISK-NEW, and TMDISK-NEW commands, the RACF connector EXEC for DASD CHANGE (DVHRDN EXEC) will have been called prior to the DASD ownership notification exit. For the CHNGID-OLD, CHVADDR-OLD, CMDISK-OLD, DMDISK, PURGE and TMDISK-OLD commands, the RACF connector EXEC for DASD CHANGE (DVHRDN EXEC) is called after the DASD ownership notification exit even if the DASD ownership notification exit fails. Return codes from DVHRDN EXEC are ignored. See [“Step 5. Select RACF-Specific Characteristics” on page 34](#) for more information on the DirMaint RACF connector support.

FOR Authorization Checking (DVHXFA)

Environment

DIRMAINT service machine
 DATAMOVE service machine
 DIRMSAT service machines

Description

FOR authorization checking exit routine determines whether the originator is authorized to enter commands FOR the target user ID, and if so the command sets authorized. This supports distributed (departmental) administration,* centralized (networking) administration, NOTFOR privileged user IDs, and so forth.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file, Enter:

```
FOR_AUTHORIZATION_CHECKING_EXIT= DVHXFA EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- Issuer's effective user ID (Id specified with ASUSER, otherwise the origin user ID.)
- Issuer's effective node ID (Local system if ASUSER is specified, otherwise the origin node ID.)
- The target ID (user ID or profile)
- The target node ID (ATNODE if specified, otherwise an asterisk)
- The command level
- The command set(s) required to issue the command
- The command name and any other command parameters

Return Codes

This routine must exit with one of these:

Table 29. FOR_AUTHORIZATION_CHECKING_EXIT Return Codes

Return Code	Meaning
0	The command is authorized. No further authorization checking is performed by DirMaint.
30 - Nop	Regular DirMaint authorization checking is performed.
31	The command is not authorized. DirMaint will issue a generic error message and exit with the appropriate return code for that message.
Other	The command has been completely processed or rejected. DirMaint exits, passing back whatever return code it was given without issuing an error message.

Link Authorization (DVHXL A)

Environment

DIRMAINT service machine

Description

Link authorization checking exit. This exit may be used to perform alternative checking for LINK authorization. It will be called whenever a LINK command is issued, other than a LINK DELETE. It will also be called for ADD (ADD generates LINK requests indirectly), REPLACE, and CHNGID.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file, Enter:

```
LINK_AUTHORIZATION_EXIT= DVHXL A EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The command causing this check: LINK
- The target ID class (USER, IDENTITY or SUBCONFIG)
- The target ID
- The target system affinity, usually *.
- The minidisk owner's user ID
- The minidisk owner's virtual address
- The linker's proposed virtual address
- The requested link mode.

Return Codes

This routine must exit with one of the following:

Table 30. LINK_AUTHORIZATION_EXIT Return Codes

Return Code	Meaning
0	The LINK statement is accepted. No further checking is done.
30 - Nop	The LINK is neither accepted nor rejected. DirMaint continues by making the same checks as if the exit were not present.
31	The LINK is rejected. DirMaint should issue a generic error message.
Other nonzero	The LINK is rejected and the exit routine has already issued the appropriate messages. The return code should be the same as the message number.

LOGONBY Change Notification (DVHXLB)

Environment

DIRMAINT service machine

Description

The LOGONBY change notification exit may be used to notify other service machines of updates associated with the DIRM LOGONBY command.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
LOGONBY_CHANGE_NOTIFICATION_EXIT= DVHXLB EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The command causing this notification: LOGONBY
- The target ID class (PROFILE, USER, IDENTITY or SUBCONFIG)
- The target ID
- The target system affinity, usually *
- The ADD or DELETE parameter associated with the LOGONBY command
- The userid or list of userids as parameters for the LOGONBY command.

Return Codes

Values other than 0 or 30 will fail the associated request with error message DVH3288E. In case of error, the source directory updates associated with the LOGONBY command will not occur. See [z/VM: Directory Maintenance Facility Messages](#) for more information on message DVH3288E.

Usage Notes

1. The RACF connector EXEC for LOGONBY CHANGE (DVHRLB EXEC) will have been called prior to the LOGONBY change notification exit. A non-zero return code from DVHRLB EXEC will terminate processing of the LOGONBY command and the LOGONBY change notification exit will not be called. See [“Step 5. Select RACF-Specific Characteristics” on page 34](#) for more information on the DirMaint RACF connector support.

Message Logging Filter (DVHXLf)

Environment

DIRMAINT service machine

DATAMOVE service machine

DIRMSAT service machines

Description

Log record filtering exit; by default, all commands received by the DIRMAINT machine are auditable, and all messages sent by the DIRMAINT machine are auditable. This exit routine may selectively reduce the quantity of data logged.

Invocation

One of the following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
MESSAGE_LOGGING_FILTER_EXIT= DVHXLf EXEC
```

or

```
ESM_LOG_FILTER_EXIT= DVHXLf EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- A destination identifier: either an * for a message being sent to the service machine's own console, a ? for a message being sent back to the originator of the command (user ID available in global variable ORIGUSER, node ID available in global variable ORIGNODE), or a distribution list nickname: DVHCERT, DVHDIRM, DVHHELP, DVHOPER, DVHSUPT, or DVHALL.
- The message identifier is DVHrrrrnnnS

Where:

rrr

Specifies the routine issuing the message.

nnnn

Specifies the message number.

S

Specifies the message severity.

- The prospective string to be logged.

Return Codes

This routine must exit with one of these:

Table 31. MESSAGE_LOGGING_FILTER_EXIT Return Codes

Boolean Return Code	Meaning
0	Do not log this.

Table 31. MESSAGE_LOGGING_FILTER_EXIT Return Codes (continued)

Boolean Return Code	Meaning
1 or other nonzero	Log this.

Link Notification (DVHXLN)

Environment

DIRMAINT service machine

Description

Link notification exit may be used to notify other service machines of changes to directory LINKs. It will be called whenever a LINK command is issued, including a LINK DELETE. It will also be called for ADD (ADD generates LINK requests indirectly), REPLACE, CHNGID, and PURGE.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
LINK_NOTIFICATION_EXIT= DVHXLN EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The command causing this notification: CHNGID-NEW, CHNGID-OLD, CHVADDR-NEW, CHVADDR-OLD, LINK, PURGE, REPLACE-OLD, or REPLACE-NEW
- The target ID class (USER, IDENTITY or SUBCONFIG)
- The target ID
- The target system affinity, usually *.
- The minidisk owner's user ID
- The minidisk owner's virtual address
- The proposed virtual address of the linker
- The link mode, or DELETE.

Return Codes

Any return code is ignored upon exit.

Pre-startup Exit for Switching Service Levels (DVHXLVL)

Environment

DIRMAINT service machine

DATAMOVE service machine

DIRMSAT service machines

Description

This is a pre-startup exit routine to enable switching between a production service level and a test service level. As supplied by IBM, it provides options to set up DirMaint to use default, test, or production disks. This is useful for testing a specific service level before moving the level to production.

Invocation

The following entry should be entered in the PROFILE EXEC file before calling DVHPROF EXEC:

```
EXEC DVHXLVL
```

The routine can also be called from the command line.

Interface Parameter

This exit is called with the following parameter:

- The choice of disk set to link:

DFLT

To initialize using the directory defaults. This is the default if no parameter is specified.

PROD

To initialize using the PRODUCTION disks.

TEST

To initialize using the TEST disks.

Return Codes

This routine must exit with one of these:

Table 32. DVHXLVL Return Codes

Return Code	Meaning
0	Disk setup succeeded. Startup may continue.
Any nonzero	Error encountered. Initialization stops. If userid is disconnected, the routine logs it off.

Minidisk Password Notification (DVHXMN)

Environment

DIRMAINT service machine

Description

Minidisk password change notification exit may be used to notify other service machines of changes to a user's minidisk password. It will be called whenever a password change is successful.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
MINIDISK_PASSWORD_NOTIFICATION_EXIT= DVHXMN EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- Command causing this notification (one of the following):

- ADD
- AMDISK
- CHNGID-NEW
- CHNGID-OLD
- CHVADDR-NEW
- CHVADDR-OLD
- DMDISK
- MDISK
- PURGE
- REPLACE-NEW
- REPLACE-OLD
- TMDISK-OLD
- TMDISK-NEW

- Target ID class (USER, IDENTITY or SUBCONFIG)
- Target ID
- Target system affinity, usually *.
- Affected minidisk address
- Three minidisk passwords (if provided).

Return Codes

Any return code is ignored upon exit.

Minidisk Password Checking (DVHXMP)

Environment

DIRMAINT service machine

Description

Minidisk password syntax verification exit. This exit will be called for the ADD (since ADD requests generate AMDISK requests), AMDISK, CHNGID, CHVADDR, and TMDISK commands, as well as for the MDISK command.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
MINIDISK_PASSWORD_CHECKING_EXIT= DVHXMP EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- Command causing this check: AMDISK, CHNGID, CHVADDR, MDISK, or TMDISK
- Target ID class (PROFILE, USER, IDENTITY or SUBCONFIG)
- Target ID
- Target system affinity, usually *.
- Affected minidisk address
- Three proposed passwords (if provided).

Return Codes

This routine must exit with one of the following:

Table 33. MINIDISK_PASSWORD_CHECKING_EXIT Return Codes

Return Code	Meaning
0	The minidisk passwords are accepted. No further checking is done.
30 - Nop	The passwords are neither accepted nor rejected. DirMaint continues by making the same checks as if the exit were not present.
31	The passwords are rejected. DirMaint should issue a generic error message.
Other nonzero	The passwords are rejected and the exit routine has already issued the appropriate messages. The return code should be the same as the message number.

Multiple User Prefix Authorization (DVHXMU)

Environment

DIRMAINT service machine
 DATAMOVE service machine
 DIRMSAT service machines

Description

MULTIUSER authorization checking exit screens all attempts to use the MULTIUSER prefix operand. This exit must approve any use of this prefix operand.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
MULTIUSER_VERIFICATION_EXIT= DVHXMU EXEC
```

For more information, see “CONFIG DATADVH” on page 24.

Interface Parameter

This exit is called with the following parameters:

- The user and node making the request
- The pattern associated with the request
- The command keyword and parms being used.

Return Codes

This routine must exit with one of these:

Table 34. MULTIUSER_VERIFICATION_EXIT Return Codes

Return Code	Meaning
0	The use of the MULTIUSER prefix is authorized.
30	The use of the MULTIUSER prefix is rejected with a message from DirMaint. This exit must explicitly authorize its use.
31	The use of the MULTIUSER prefix is rejected with a generic message from DirMaint. This exit must explicitly authorize its use.
Other nonzero	The use of the MULTIUSER prefix is rejected. It is assumed that the exit has issued an error message.

Asynchronous Update Notification (DVHXNE)

Environment

DIRMAINT service machine

Description

Exit to notify another server when directory updates have been made.

Invocation

The following entry should be made in your local CONFIG* DATADVH supplement/override file(s):

```
ASYNCHRONOUS_UPDATE_NOTIFICATION_EXIT.xxxx= DVHXNE EXEC
```

where xxxx matches one of the supported protocols: RDR, SMSG, TCP, or UDP. If the protocol is TCP or UDP, the DIRMAINT server needs access to the TCPIP DATA file on the TCPMAINT 592 disk. The DIRMAINT server is shipped with a link to this disk in its directory entry, but the disk is not accessed by default. In order to access the disk, you must uncomment the following line in the DVHPROFA DIRMAINT file on the DIRMAINT 191 disk (by removing the initial '/' character):

```
/PURPOSE= TCP FM= W ACC= 592 TCP/IP client code ...
```

and then re-IPL the DIRMAINT server.

Interface Parameter

This exit is called with the following parameters:

- The encoding (ASCII or EBCDIC)
- The protocol (RDR, SMSG, TCP, or UDP)
- The destination parameter 1 (userid for RDR or SMSG, IP address for TCP or UDP)
- The destination parameter 2 (nodeid or * for RDR or SMSG, port number for TCP or UDP)
- The updated userid
- The subscriber data string (an optional character or hexadecimal string supplied by the subscriber).

Return Codes

This routine must exit with one of these:

Table 35. ASYNCHRONOUS_UPDATE_NOTIFICATION_EXIT Return Codes

Return Code	Meaning
0	The notification has been sent.
8	Error – recipient not reachable.
30	NOP – notification not sent.

Usage Notes

The notification – encoded in the format (EBCDIC or ASCII) provided in the subscription created by the DIRM SUBSCRIBE command – consists of the following:

- For RDR and SMSG: the following three fields each separated by a blank character:

Exit Routines

1. Directory entry name – the identification of the PROFILE, USER, IDENTITY, or SUBCONFIG entry changed by the associated DIRM command. If a PROFILE or SUBCONFIG is changed, notifications will also be sent for all associated user IDs.
 2. Associated DIRM command (for example, ADD, AMDISK, LOGONBY, etc.).
 3. Subscription Data provided on the DIRM SUBSCRIBE command when the subscription was created.
- For TCP and UDP: the same as for RDR and SMSG, except that there are no blanks between fields, and each field is preceded by a 4-digit length in character format.

NICDEF Notification Exit (DVHXNN)

Environment

DIRMAINT service machine

Description

The NICDEF notification exit can be used to notify other service machines of changes based on NICDEF processing in the user directory. It will be called whenever the NICDEF command is issued and the LAN option is specified. It will also be called when the NICDEF statement with the LAN option is found when processing ADD, CHNGID, PURGE, and REPLACE.

Invocation

The following entry should be entered in the text file in upper case as required in the CONFIG* DATADVH file.

```
NICDEF_NOTIFICATION_EXIT= DVHXNN EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The command causing this notification: ADD, CHNGID-NEW, CHNGID-OLD, NICDEF, PURGE, REPLACE-NEW, REPLACE-OLD
- The target ID class (PROFILE,USER, IDENTITY, or SUBCONFIG)
- The target ID
- The target system affinity, usually *
- The VSWITCH or guest LAN owner's user ID
- The VSWITCH or guest LAN name
- The list of VLAN IDs in a REXX stem variable
- 'PROMISCUOUS' or 'NOPROMISCUOUS' (If neither specified, the default, NOPROMISCUOUS is passed)

Return Codes

Any return code is ignored upon exit

ESM Password Authentication (DVHXPX EXEC)

Environment

DIRMAINT service machine

Description

External security manager password authentication exit; with an ESM installed, the administrator has the choice of using the user's logon password owned by the ESM for command authentication instead of using the password from the user's z/VM directory entry. This exit calls the ESM to provide this service.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
ESM_PASSWORD_AUTHENTICATION_EXIT= DVHXPX EXEC
```

Note: The DIRMAINT machine may abend, hang, or reject transactions if the ESM is not installed, DIRMAINT has not been granted the authority to use the authentication service, or if the ESM is temporarily inactive. For the IBM supplied default (DVHXPX EXEC), the DIRMAINT machine must have OPTION DIAG88 in its directory entry to enable the DIRMAINT service machine to use DIAGNOSE X'88' for ESM password authentication. For DIRMAINT to revert to verification using the directory passwords, the name of the exit routine must be removed from the ESM PASSWORD AUTHENTICATION EXIT statement in the CONFIG* DATADVH file(s), and issue a RLDDATA command to reset DirMaint's global variables. Then you need to restore use of the exit routine when the ESM has been reactivated.

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The user ID whose password is to be authenticated
- The password to be authenticated.

Return Codes

This routine must exit with one of these:

Table 36. ESM_PASSWORD_AUTHENTICATION_EXIT Return Codes

Return Code	Meaning
0	The password was successfully authenticated for the provided userid.
28	The External Security Manager is not available.
30	Regular DirMaint password authentication should be done using the DMSPASS CSL routine.
Other nonzero	The password failed authentication for the provided userid.

POSIX Change Notification (DVHXPESM)

Environment

DIRMAINT service machine

Description

The POSIX change notification exit may be used to notify other service machines of POSIX changes related to the following commands: POSIXGROUP, POSIXGLIST, POSIXINFO, POSIXOPT, POSIXIWDIR, POSIXIUPGM, or POSIXFSROOT.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
POSIX_CHANGE_NOTIFICATION_EXIT= DVHXPESM EXEC
```

For more information, see “CONFIG DATADVH” on page 24.

Note that this exit uses the POSIX_UID_AUTO_RANGE entry (see “Step 3. Select Security and Auditing Characteristics” on page 29), which specifies a UID range for use during automatic assignment of POSIX UIDs to users during DIRM ADD and DIRM POSIXINFO operations.

Interface Parameter

This exit is called with the following parameters:

- The command causing this notification: POSIXGLIST, POSIXINFO, POSIXGROUP, POSIXIWDIR, POSIXIUPGM, or POSIXFSROOT
- The target ID class (PROFILE, USER, IDENTITY or SUBCONFIG)
- The target ID
- The target system affinity, usually *
- Parameters for the POSIX related command (POSIXGLIST, POSIXINFO, POSIXGROUP, POSIXIWDIR, POSIXIUPGM, or POSIXFSROOT).

Return Codes

Values other than 0 or 30 will fail the associated request with error message DVH3288E. In case of error, the source directory updates associated with the POSIX change will not occur except for when called during POSIXGROUP processing. In this case, the source directory updates will be completed. See [z/VM: Directory Maintenance Facility Messages](#) for more information on message DVH3288E.

Usage Notes

1. The RACF connector EXEC for POSIX CHANGE (DVHRPESM EXEC) will have been called prior to the POSIX change notification exit. A non-zero return code from DVHRPESM EXEC will terminate processing of the associated request and the POSIX change notification exit will not be called. See “Step 5. Select RACF-Specific Characteristics” on page 34 for more information on the DirMaint RACF connector support.

Password Change Notification (DVHXPEN)

Environment

DIRMAINT service machine

Description

The password change notification exit may be used to notify other service machines of changes to a user's logon password.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
PASSWORD_CHANGE_NOTIFICATION_EXIT= DVHXPEN EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The keyword DIRMAINT
- The command causing this notification: ADD, CHNGID-NEW, CHNGID-OLD, PURGE, PW, REPLACE, or SETPW
- The target ID class (USER or IDENTITY)
- The target ID
- The target system affinity, usually *.
- The last parameter has the following possibilities:
 - New password or passphrase for PW and SETPW commands
 - New password for ADD, CHNGID-NEW, and REPLACE commands
 - Old password for CHNGID-OLD and PURGE commands.

Return Codes

Values other than 0 or 30 will fail the associated request with error message DVH3288E or a later error (as described below). See [z/VM: Directory Maintenance Facility Messages](#) for more information on message DVH3288E or other errors that may occur. In case of error, the source directory updates associated with the password change will be handled as follows:

- If processing the PW or SETPW command and the RACF connector support for PASSWORD CHANGE (DVHRPN EXEC) is enabled, source directory updates will have completed successfully, but the associated command will fail with error DVH3288E.
- If processing the PW or SETPW command and the RACF connector support for PASSWORD CHANGE (DVHRPN EXEC) is disabled, no source directory updates will occur and the command will fail with error DVH3288E.
- If processing the ADD command, source directory updates will have completed successfully, but the associated command will fail with error DVH3288E.
- In all other cases, source directory updates will continue. If source directory updates complete, the associated command will fail with error DVH3288E. If a later error occurs, the associated command will fail with a later error message.

Usage Notes

1. The RACF connector EXEC for PASSWORD CHANGE (DVHRPN EXEC) will have been called prior to the password change notification exit. A non-zero return code from DVHRPN EXEC will terminate processing of the associated request and the password change notification exit will not be called. See [“Step 5. Select RACF-Specific Characteristics” on page 34](#) for more information on the DirMaint RACF connector support.
2. To support passphrases without enabling the IBM-supplied RACF connector PASSWORD change support (DVHRPN EXEC), you must configure the password change notification exit and provide the function to update the ESM passphrase within the exit.

Password Notice Printing (DVHXPP)

Environment

DIRMAINT service machine

Description

Password notice print exit may be used to forward printed password notices to a network printer for those systems that do not have a local printer.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
PW_NOTICE_PRT_EXIT= DVHXPP EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The user ID and node ID for whom the notice should be printed
- The file name, file type, and file mode of the file to be printed
- The desired spool file class
- Days since the password was changed
- Threshold days associated with this user.

Return Codes

This routine must exit with one of these:

Table 37. PW_NOTICE_PRT_EXIT Return Codes

Return Code	Meaning
0	The notice has been printed.
30	Reserved for exit routine not found; the print file will be sent to the local printer,___ unless PWNOTICEPRTCLASS= NONE is specified.
Other nonzero	An error has occurred and the exit routine has already issued the appropriate messages. The return code should be the same as the message number.

Request After Processing (DVHXRA)

Environment

DIRMAINT service machine
 DATAMOVE service machine
 DIRMSAT service machines

Description

Request after processing exit; the passed parameters are enhanced for networking support.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
REQUEST_AFTER_PROCESSING_EXIT= DVHXRA EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- Return code from processing the command
- Command name.

In addition, the following two interface variables are available:

CMD_STRING

The command string as verified and returned by the parser. Command and parameter abbreviations HAVE been resolved. All prefix variables (TOSYS, ASUSER, BYUSER, FORUSER, and ATNODE) have been stripped off and stored in their own separate global variables. They will each have a value, if not specified on the user's command then defaults will be supplied.

LOG_STRING

The command string as verified and returned by the parser, with passwords and other sensitive information *masked* for security. The prefix operands are included as entered by the user, defaults are NOT filled in for omitted parameters.

These two interface variables are obtainable using: 'PIPE VAR *variable_name* 2 | ...'. This exit is called indirectly through the DVHCEXIT EXEC. An *invocation* or *generation* number of 2 is necessary to get the value from DVHCEXIT's caller, DVHRQST.

Return Codes

Return codes are ignored upon exit.

Request Before Processing (DVHXR B)

Environment

DIRMAINT service machine
 DATAMOVE service machine
 DIRMSAT service machines

Description

Request after parsing, before processing exit.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
REQUEST_BEFORE_PROCESSING_EXIT= DVHXR B EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with no parameters, but with two interface variables set:

CMD_STRING

The command string as verified and returned by the parser; command and parameter abbreviations HAVE been resolved. All prefix variables (TOSYS, ASUSER, BYUSER, FORUSER, and ATNODE) have been stripped off and stored in their own separate global variables. They will each have a value, if not specified on the user's command then defaults will be supplied.

LOG_STRING

The command string as verified and returned by the parser, with passwords and other sensitive information *masked* for security; the prefix operands are included as entered by the user. Defaults are NOT filled in for omitted parameters.

These two interface variables are obtainable using: 'PIPE VAR *variable_name* 2 | ...'. This exit is called indirectly through the DVHCEXIT EXEC. An *invocation* or *generation* number of 2 is necessary to get the value from DVHCEXIT's caller, DVHRQST.

In addition, the following interface variable is available:

SPOOLFILE

A numeric value indicates that *spoolfile RDRFILE Z* is associated with this command. The value may be either 4 or 6 digits. A non-numeric value indicates there is no file associated with this command.

This variable is available using:

```
GLOBALV SELECT DVH15 GET SPOOLFILE
```

Return Codes

This routine must exit with one of the following:

Table 38. REQUEST_BEFORE_PROCESSING_EXIT Return Codes

Return Code	Meaning
30 - Nop	Regular DirMaint processing continues.

Table 38. REQUEST_BEFORE_PROCESSING_EXIT Return Codes (continued)

Return Code	Meaning
31	A replacement command string has been set into variable CMD_STRING using 'PIPE ... VAR CMD_STRING 2'. This exit is called indirectly through the DVHCEXIT EXEC. An <i>invocation</i> or <i>generation</i> number of 2 is necessary to pass the value back to DVHCEXITs caller, DVHRQST. If the CMD_STRING is changed and contains passwords or other sensitive information, the LOG_STRING should also be changed to the equivalent string with the sensitive information changed to a string of XXXs.
Other	The command has been completely processed. DirMaint exits, passing back whatever return code it was given.

Request Before Parsing (DVHXRC)

Environment

DIRMAINT service machine

DATAMOVE service machine

DIRMSAT service machines

Description

Request before parsing exit.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
REQUEST_BEFORE_PARSING_EXIT= DVHXRC EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the command string as entered by the user; command and parameter abbreviations have NOT been resolved.

In addition, the following interface variable is available:

SPOOLFILE

A numeric value indicates that *spoolfile RDRFILE Z* is associated with this command. The value may be either 4 or 6 digits. A non-numeric value indicates there is no file associated with this command.

This variable is available using:

```
GLOBALV SELECT DVH15 GET SPOOLFILE
```

Return Codes

This routine must exit with one of the following:

Table 39. REQUEST_BEFORE_PARSING_EXIT Return Codes

Return Code	Meaning
30 - Nop	Regular DirMaint processing continues.
31	A replacement command string has been set into variable CMD_STRING using 'PIPE ... VAR CMD_STRING 2'. This exit is called indirectly through the DVHCEXIT EXEC. An <i>invocation</i> or <i>generation</i> number of 2 is necessary to pass the value back to DVHCEXITs caller, DVHRQST.
Other	The command has been completely processed. DirMaint exits, passing back whatever return code it was given.

Local STAG Authorization (DVHXTA)

Environment

DIRMAINT service machine

Description

Local STAG authorization exit controls authorization allowing manipulation of locally defined *Star Tags*, or STAGs. A STAG is a comment in the directory in the form:

```
*tagname:
```

The *tagname* is 1 to 10 alphanumeric characters that is preceded* by an asterisk () and followed by a colon ().* The *tagname*: is made known to DirMaint by using the *DIRM DEFINESTAG* command. This exit may determine whether the general users are** allowed to change the value of a specific tag or tags.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
LOCAL_STAG_AUTHORIZATION_EXIT= DVHXTA EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The command causing this check: SETSTAG or STAG
- The target ID class (USER, PROFILE, IDENTITY or SUBCONFIG)
- The target ID
- The target system affinity, usually *
- The tag name (including the leading asterisk and trailing colon)
- The data the user wants set.

Return Codes

This routine must exit with one of these:

Table 40. LOCAL_STAG_AUTHORIZATION_EXIT Return Codes

Return Code	Meaning
0	The operation is accepted. No further checking is done.
30	Reserved for IBM use
31	The operation is rejected. DirMaint should issue a generic error message.
Other nonzero	The operation is rejected and the exit routine has already issued the appropriate messages. The return code should be the same as the message number.

Backup Tape Mount (DVHXTTP)

Environment

DIRMAINT service machine

Description

Backup tape mount exit may be used to mount backup tape using AMMR, VMTAPE, and other tape library management programs.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
BACKUP_TAPE_MOUNT_EXIT= DVHXTTP EXEC
For more information, see "CONFIG DATADVH" on page 24.
```

Interface Parameter

This exit is called with the following parameters:

- Request type one of these:

REQUEST

A new tape mount is being requested. The *protocol* and *tdev* variables will need to be changed to suit the needs of you installation.

REMINDER

This is a periodic reminder of a previously issued request.

REJECTED

The attached tape was not accepted because the tape has:

- A standard label, but an unlabeled tape is expected
- No label, but a standard labeled tape is expected
- A label, but it does not match the label expected.

REQUEST2

A replacement tape mount is being requested following a rejection.

CANCEL

The outstanding tape request is canceled without being satisfied.

ACCEPTED

The request has been satisfied and the tape is acceptable.

- The external tape identification (1-8 file name characters).
- The internal tape identification (1-6 file name characters).

Return Codes

This routine must exit with one of these:

Table 41. BACKUP_TAPE_MOUNT_EXIT Return Codes

Return Code	Meaning
0	The action has been completed.

Table 41. BACKUP_TAPE_MOUNT_EXIT Return Codes (continued)

Return Code	Meaning
30	Reserved for IBM use
Other nonzero	An error has occurred and the exit routine has already issued the appropriate messages. The return code should be the same as the message number.

Note: To avoid the DirMaint machine waiting for a tape mount, the exit routine must not wait for a result to be satisfied. It must send a message to the tape operator or make a request to a tape management program, and then return to the calling program. The DIRMAINT service machine will periodically check to see if the tape has been attached, and call the exit again as needed.

User Change Notification (DVHXUN)

Environment

DIRMAINT service machine

Description

The user change notification exit may be used to notify other service machines of new, deleted, or changed user IDs. It will be called whenever the ADD, CHNGID, or PURGE commands have added, changed, or deleted a user ID.

Invocation

The following entry should be entered in the text file in upper case, as required in the CONFIG* DATADVH file.

```
USER_CHANGE_NOTIFICATION_EXIT= DVHXUN EXEC
```

For more information, see [“CONFIG DATADVH” on page 24](#).

Interface Parameter

This exit is called with the following parameters:

- The command causing this notification: ADD, CHNGID-NEW, CHNGID-OLD, or PURGE
- The target ID class (PROFILE, USER, IDENTITY or SUBCONFIG)
- The target ID
- The target system affinity, usually *.
- The last parameter has the following possibilities:
 - New password for ADD command
 - No parameters following the target system affinity for CHNGID-OLD and PURGE commands
 - New password followed by all parameters following the password on the associated USER statement for the CHNGID-NEW command.

Return Codes

Values other than 0 or 30 will fail the associated request. In case of failure, source directory update processing will continue. If the updates complete successfully, the request will fail with error DVH3288E. Otherwise, the request will fail with a later error. See [z/VM: Directory Maintenance Facility Messages](#) for further information on message DVH3288E or other errors that may occur.

Usage Notes

1. For the ADD and CHNGID-NEW commands, the RACF connector EXEC for USER CHANGE (DVHRUN EXEC) will have been called prior to the user change notification exit. A non-zero return code from DVHRUN EXEC will not terminate the associated request and the user change notification exit will be called. For the CHNGID-OLD and PURGE commands, the RACF connector EXEC for USER CHANGE (DVHRUN EXEC) is called after the user change notification exit even if the user change notification exit fails. For all commands, if DVHRUN EXEC fails, the associated request will fail with the error from DVHRUN EXEC if no further errors occur. See [“Step 5. Select RACF-Specific Characteristics” on page 34](#) for more information on the DirMaint RACF connector support.

Guidelines for Creating or Modifying Exit Routines

If you choose to write or modify existing routines, follow these guidelines:

- Each exit routine should validate the INTERFACE level descriptor global variable. If unsupported, exit routines in the user machine should issue message DVH1901 and exit with return code 1901; while exit routines in the DIRMAINT, DATAMOVE, and DIRMSAT server machines should issue message 2901 and call DVHSHUT to logoff. Message DVH1901 indicates that the exec has encountered an unrecognized interface level descriptor on the users machine. Message DVH2901 indicates the same problem on the server.
- Each exit routine must support the TRACE global variable. This is a string of values of the form: DVHrtn=option,* or DVH=option. If the name of the routine is in the TRACE list, or except for* DVHXLf if DVH is in the trace list, exit routines in the user machine must issue message DVH1161 and set REXX tracing to the specified option on entry, and must issue message DVH1162 on exit, while exit routines in the server machines: DIRMAINT, DATAMOVE, and DIRMSATs must issue messages DVH2161 and DVH2162 respectively.
- In the event of an unexpected return code from any CP or CMS command, the exit routine should issue message DVH1119, user machine, or DVH2119, server machine respectively.
- Except for messages DVHx901, DVHx161, DVHx162, or DVHx119 just described above, the exit routines should generally not issue any messages. This is especially true for cases where the command originator is not authorized to enter that command or has made an error in the command. Instead, the exit routine should exit with an appropriate return code. For exceptional error conditions, indicative of incorrect installation or tailoring, the exit routine should issue appropriate error messages, and either exit with the return code passed back from the message routine, or if continued operation is inappropriate, call DVHSHUT to logoff the service machine.
- Each exit routine must be *fail safe* and *restartable*. If command processing fails for any reason after calling one or more of these exit routines, the command will usually be reprocessed and the exit routines will be called again. Be aware that human intervention may prevent the command from being reprocessed, and the exit routine documentation and site *run book* must describe what manual actions must be taken in each case if the command is not reprocessed.

Product Specific Program Interface

The INTERFACE variable and (for internal interface level 199501) the ASUSER, ATNODE, BYUSER, FORUSER, IMMED, LANG, TEST, TOSYS, TRACE, and CMDSET variables are considered to be part of the product specific program interface to the various exit routines (DVHCXB, DVHCXA, DVHPXR, DVHPXV, and DVHPXA) that run in the user's virtual machine. None of these variables are intended for use outside of the product or these exit routines.

A new internal interface level descriptor will be assigned in the event that any changes are made in the definition of the parameters passed to these exit routines, or to DVHMSG (because it is called by the preceding exit routines), or if any changes are made in the definition of the expected results from DVHCXB or DVHPXR.

A new internal interface level descriptor will also be assigned when any changes are made in the way information is exchanged between the user's virtual machine and the DIRMAINT service machine, including the addition of new commands or operands to the command set or changes in the user message repositories when any changes are made in the format of any data files that are intended for local tailoring.

General Program Interface

Neither DIRMAINT 1.4.0 nor DirMaint 1.5.0 provide a true General Programming Interface. Significant effort has been made to keep DirMaint 1.5.0 upwards compatible with DIRMAINT 1.4.0 in critical areas; and similar efforts will be made to keep follow-on releases upwards compatible with DirMaint 1.5.0. These critical areas include:

1. Command Syntax:

Most valid DIRMAINT 1.4 commands which were expected for use within application programs will be correctly processed by DirMaint 1.5.0 when running in 140A compatibility mode. The primary incompatibility is that menu support is not provided. Other differences are upwards compatible enhancements.

2. Messages:

Since this is a complete re-implementation of the product, it is strictly a coincidence if any messages are the same. The specific conditions which resulted in a particular 1.4 message may or may not arise in 1.5, and the required corrections may or may not be the same. However, DirMaint 1.5 has been specifically designed to enable the message handling routines to substitute: a specific return code, calling module identification, alternate message number and severity, alternate variable substitutions, and alternate message text; for any message which is issued. It not necessary to either copy entire primary message repositories or to modify the existing primary repositories to enable this capability. A tailored subset of the repositories may contain only the messages needing adjustments.

3. Return Codes:

Since this is a complete re-implementation of the product, it is strictly a coincidence if any return codes are the same. The specific conditions which resulted in a particular 1.4 return code may or may not arise in 1.5, and the required corrections may or may not be the same. DirMaint 1.5.0 has been specifically designed for improved automatic problem diagnosis and correction by an invoking application program, by generating a return code which corresponds to the error message issued. However, as stated above, the message handling routines may substitute an alternate return code from a tailored repository subset.

4. Data Files:

With the exception of the USER BACKUP file, programs should not attempt to process files as they reside directly on DIRMAINT's disks or directories. Programs which do so are "at risk". Unless otherwise stated, there is no assurance that data file formats will be compatible from release to release, or even from service level to service level within a release.

- The files obtained by issuing DIRMAINT BACKUP, DIRMAINT USER BACKUP, or DIRMAINT USER WITHPASS are suitable for input to the DIRECT or DIRECTXA commands. The MIXED (and NOMIXMSG) parameter(s) may be required.

Since they are suitable for input to DIRECT and/or DIRECTXA, they may also be used for input to a DirMaint INITLZ command. The file contains DirMaint control information pertaining to the user entry in addition to z/VM directory information. The issuing user is responsible for either ensuring that this control information is accurate or removing obsolete control information from the file. Application programs that are not designed to process DirMaint's control information should ignore any record beginning with "*DVH". Depending on the functions provided by the program, "ignore" may imply recognizing and deleting the control records, copying them to a new file without changes, or simply doing what needs to be done without "choking" on them.

- With the exception of the masking of passwords, the file obtained by issuing DIRMAINT USER NOPASS is also suitable for input to the DIRECT or DIRECTXA commands; possibly with the MIXED parameter. To prevent accidental destruction of the object directory with inappropriate data, the file generated by DIRMAINT USER NOPASS will include the following lines:

```
DVHWARN: THIS FILE WAS CREATED BY A "DIRMAINT USER NOPASS" COMMAND.  
DVHWARN: ALL PASSWORDS HAVE BEEN MASKED.  
DVHWARN: IT IS NOT SUITABLE FOR INPUT TO DIRECT, DIRECTXA, OR INITLZ.  
DVHWARN: ISSUE "DIRMAINT USER WITHPASS" TO OBTAIN A FILE  
DVHWARN: FOR THAT PURPOSE.
```

or one or more alternative lines beginning with "DVH".

Application programs that are not designed to process DirMaint's control information should ignore any record beginning with "*DVH", and possibly those beginning with "DVH". Depending on the functions provided by the program, "ignore" may imply recognizing and deleting the control records,

copying them to a new file without changes, or simply doing what needs to be done without "choking" on them.

- The files obtained by issuing DIRMAINT GET commands contain DirMaint control information pertaining to the user entry in addition to the z/VM directory information. When doing a DIRMAINT REPLACE, the issuing user is responsible for either ensuring that this control information is accurate or removing obsolete control information from the file. Application programs that are not designed to process DirMaint's control information should ignore any record beginning with "*DVH". Depending on the functions provided by the program, "ignore" may imply recognizing and deleting the control records, copying them to a new file without changes, or simply doing what needs to be done without "choking" on them.
- With the exception of the masking of passwords, the file obtained by issuing DIRMAINT REVIEW is also suitable for input to the DIRMAINT ADD or REPLACE. To prevent accidental damage to the directory with inappropriate data, the file generated by DIRMAINT REVIEW will include the following lines:

```
DVHWARN: THIS FILE WAS CREATED BY A "DIRMAINT REVIEW" COMMAND.
DVHWARN: ALL PASSWORDS HAVE BEEN MASKED.
DVHWARN: THE REFERENCED PROFILE(S) HAVE BEEN INCLUDED INLINE.
DVHWARN: IT IS NOT SUITABLE FOR INPUT TO DIRMAINT ADD OR REPLACE.
DVHWARN: ISSUE "DIRMAINT GET" TO OBTAIN A FILE FOR THAT PURPOSE.
```

or one or more alternative lines beginning with "DVH".

Application programs that are not designed to process DirMaint's control information should ignore any record beginning with "*DVH", and possibly those beginning with "DVH". Depending on the functions provided by the program, "ignore" may imply recognizing and deleting the control records, copying them to a new file without changes, or simply doing what needs to be done without "choking" on them.

- The files obtained by doing a DIRMAINT FREEEXT or DIRMAINT USEDEXT have not yet been defined for DirMaint 1.5.0. They may or may not be compatible with DIRMAINT 1.4.0.

These critical compatibility areas have been assigned an external compatibility level identification. The 1.4 compatibility set is designated as "140A". The full function set is designated as "150A". Any incompatible changes to these critical areas will result in a new identifier, beginning with 140B and/or 150B. Any simple additions which do not create incompatibilities with either: the command set, the message repositories, or the various tidbits of control information in the directory files; will keep the existing 140A or 150A designations, and only the internal interface level identifier will be changed as described under Product Specific Program Interface.

Users issuing DirMaint commands from the terminal are expected to be using the 150A command set; and may switch to the 140A command set prior to invoking an application program which requires this level of compatibility; and switch back to the 150A command set when the application is done. Refer to the DIRMAINT GLOBALV CMDLEVEL command. Existing application programs may be modified to include the necessary DIRMAINT GLOBALV CMDLEVEL commands; but new application programs should be written to the 150A level.

Communication with RACF and other non-DirMaint Servers

DirMaint uses SMSG to communicate between its client code and the DirMaint servers. For this reason, any communication by user exit code that runs within DirMaint servers (for example, issuing ESM commands) should not use SMSG.

The RACF RAC command should not be used in user exits intended to run within the DirMaint servers. DirMaint provides the DVHRACF EXEC to communicate with RACF using the RACF command instead of the RAC command. Any customer-written DirMaint exits that use the RAC command must be changed to use the DVHRACF EXEC. The syntax of the RACF commands remains unchanged. Simply replace "RAC" with "DVHRACF".

Message Numbers Available for Installation-Written Exits

In addition to the messages listed in [“Guidelines for Creating or Modifying Exit Routines”](#) on page 181, the following message numbers are reserved for installation-written exit routines:

109n

Reserved for hard coded, nontranslatable, messages not issued from the message repository through DVHMSG on the user machine side; no expected usage.

19nn

Other messages issued through DVHMSG on the user machine side; number DVH1901 is used as stated above.

209n

Hard coded, nontranslatable, messages not issued from the message repository through DVHMSG on the server machine side; potential callers are most likely to be either DVHXPROF or DVHXLF.

29nn

Other messages issued through DVHMSG from: DVHXPROF, DVHXLF, DVHXRC, DVHXRb, DVHXFA, or DVHXRA; number 2901 is used as stated above.

309n

Reserved for hard coded, nontranslatable, messages not issued from the message repository through DVHMSG on the service machine side from customer written command handlers; no expected usage

39nn

Other messages issued through DVHMSG from: DVHXAV, DVHXAN, DVHPXV, DVHXPn, DVHXMp, DVHXMN, DVHXLA, DVHXLN, DVHXDA, DVHXDN, DVHXUN, DVHDXP, DVHXNN, or from customer written command handlers.

Global Variables Available for the DVHCX* and DVHPX* Exits

These persistent LASTING GLOBALV variables are available to exit routines in the user's virtual machine. If not set, the default is the first value listed.

Table 42. LASTING GLOBALV Variables for the DVHCX and DVHPX* Exits*

Variable	Description
CMDLEVEL	Specifies whether the user is entering the command syntax from DirMaint 150A level or DirMaint 140A level. The valid values are 150A or 140A.
DASUSER	Specifies the default value for ASUSER. The valid values are an * or any valid file name that may be used as a user ID.
DATNODE	Specifies the default value for ATNODE. The valid values are an * or any valid file name.
DBYUSER	Specifies the default value for BYUSER. The valid values are an * or any valid file name that may be used as a user ID.
DFORUSER	Specifies the default value for FORUSER. The valid values are an * or any valid file name that may be used as a user ID.
DTOSYS	Specifies the default value for TOSYS. The valid values are an * or any valid file name.
LANG	Specifies the user's chosen language. The valid values are AMENG, UCENG, or 1SAPI. DirMaint is enabled for additional languages.
NEEDPASS	Specifies whether the user is required to supply their password for interaction with the DIRMAINT machine. The valid values are YES or NO.
REQUEST	Keeps track of how many requests have been sent to the DIRMAINT service machine for processing. The valid values are 1 through 999999.

Table 42. LASTING GLOBALV Variables for the DVHCX* and DVHPX* Exits (continued)

Variable	Description
TEST	Specifies whether the user is entering commands for production or for testing and problem diagnosis. The valid values are OFF, MSG, or SAY.
TRACE	Specifies which routines, if any, should be traced and the degree of tracing desired. The valid values are one or more occurrences of DVHname=trace_opt; where DVHname is the file name of any executable product part, the equal sign is a required delimiter, and the trace_opt is any valid REXX Trace option - A/C/E/F/I/L/N/O/R/S. The ? prefix is allowed.

The following temporary SESSION GLOBALV variables are available to exit routines in the user's virtual machine. Unless otherwise stated, there is no default.

Note: Of the following variables, only INTERFACE.DVHCXC is available to the COMMAND_BEFORE_PARSING_USER_EXIT (DVHCXC EXEC). The other variables are not available until after parsing has been completed.

Table 43. SESSION GLOBALV Variables for the DVHCX* and DVHPX* Exits

Variable	Description
ASUSER	Specifies the <i>userid</i> against which the password will be verified, and whose privileges will be used to perform the command. The default is an * for the <i>userid</i> of the user entering the command, unless overridden by DATUSER.
ATNODE	Specifies which node in a multiple system complex the command is intended to affect. The default is an * for all nodes, unless overridden by DATNODE.
BYUSER	Identifies the <i>userid</i> against which the password will be verified, but performing the command using the privileges of the command issuer. The default is an * for the user ID of the user entering the command, unless overridden by DBYUSER.
FORUSER	Identifies the <i>userid</i> for whom the command is issued. The default is an * for the <i>userid</i> of the user who entered the command, unless overridden by either DFORUSER or ASUSER or DASUSER.
INTERFACE	Specifies the transaction interface protocol being used by the user's virtual machine for exchange with the DIRMAINT machine. It is composed of the year and month of the most recent interface design change, for example 200201. There is a separate interface variable for each user exit routine: INTERFACE.DVHCXA, INTERFACE.DVHCXB, INTERFACE.DVHCXC, INTERFACE.DVHPXA, INTERFACE.DVHPXR, and INTERFACE.DVHPXV. Also, INTERFACE.DVHAPI is available for use by the caller of the DVHSAPI EXEC. For more information see the VALIDLVLS variable.
LOG_STRING	Specifies the command string being processed with any passwords or other sensitive data. This string should be changed to XXXs.
MULTIUSER	Specifies the nickname or pattern to be used in the operation on multiple directory entries.
PROMPT	Specifies that the user choose to be prompted for sensitive information (passwords) omitted from the command line.
TOSYS	Identifies the <i>nodeid</i> in a remote network on which the command is to be processed. The default is an * for the system or local system cluster where the command is issued, unless overridden by DTOSYS.
VALIDCMDS	Specifies the valid command levels from which the user may choose. The current value is 150A 140A.

Table 43. SESSION GLOBALV Variables for the DVHCX* and DVHPX* Exits (continued)

Variable	Description
VALIDLVLS	Specifies the valid interface design levels.

All IBM defined global variables are stored in the DVH15 variable pool. Customer defined global variables should be stored in either:

- DVH15LCL
- DVH15USR
- DVH15XIT

The INTERFACE variables and:

- ASUSER
- ATNODE
- BYUSER
- CMDSET
- FORUSER
- LANG
- TEST
- TOSYS
- TRACE

are considered to be part of the product specific program interface to the various exit routines that run in the user's virtual machine:

- DVHCXA - COMMAND_AFTER_PROCESSING
- DVHCXB - COMMAND_BEFORE_PROCESSING
- DVHCXC - COMMAND_BEFORE_PARSING
- DVHPXA - PASSWORD_AFTER_PROCESSING
- DVHPXR - PASSWORD_RANDOM_GENERATOR
- DVHPXV - PASSWORD_SYNTAX_VERIFICATION

None of these variables are intended for use outside of the product or these exit routines.

A new interface level descriptor will be assigned:

- In the event that any changes are made in the definition of the parameters passed to these exit routines, or to DVHMSG because it is called by the preceding exit routines, or if any changes are made in the definition of the expected results from DVHCXC, DVHCXB, DVHPXR, or DVHPXV.
- When any changes are made in the way information is exchanged between the user's virtual machine and the DIRMAINT service machine, including the addition of new commands or operands to the command set or changes in the user message repositories, or when any changes are made in the format of any data files that are intended for local tailoring.

Global Variables Available for the DVHX* Exits

The following persistent LASTING GLOBALV variables are available in the DIRMAINT, DATAMOVE, and DIRMSAT virtual machines.

Table 44. LASTING GLOBALV Variables for the DVHX* Exits

Variable	Description
TRACE	Specifies which routines, if any, should be traced and the degree of tracing desired. The valid values are one or more occurrences of DVHname=trace_opt; where DVHname is the file name of any executable product part, the equal sign is a required delimiter, and the trace_opt is any valid REXX Trace option - A/C/E/F/I/L/N/O/R/S. The ? prefix is allowed but not recommended.

The following temporary SESSION GLOBALV variables are available to exit routines in the DIRMAINT, DATAMOVE, and DIRMSAT virtual machines. Unless otherwise stated, there is no default.

Table 45. SESSION GLOBALV Variables for the DVHX* Exits

Variable	Description
ASUSER	Specifies the <i>userid</i> against which the password will be verified, and whose privileges will be used to perform the command. The default is the same as ORIGUSER.
ASNODE	Specifies the <i>nodeid</i> of the user whose privileges will be used to perform the command. If ASUSER is specified, ASNODE will be an asterisk (*) for a local cluster user. If ASUSER is not specified, ASNODE will be the same as ORIGNODE.
ATNODE	Specifies which node in a multiple system complex the command is intended to affect. The default is an * for all nodes within the SSI cluster.
BYUSER	Specifies the user ID against which the password will be verified, but issues the command using the privileges of the user entering the command. The default is an * for the user ID of the user entering the command.
CMDLEVEL	Specifies whether the user is entering the command syntax from DirMaint 150A level or DirMaint 140A level. The valid values are 150A or 140A.
FORUSER	Specifies the user for whom the command is issued. The default is an * for the user ID of the user who entered the command, unless overridden by ASUSER.
INTERFACE	Specifies the transaction interface protocol being used by the user's virtual machine for exchange with the DIRMAINT machine. It is composed of the year and month of the most recent interface design change, for example 200201. There is a separate interface variable for each system exit routine: INTERFACE.mmmmmm Where: mmmmmm Specifies the six character identifier used by the IBM-supplied sample exit routines for use in issuing messages.
LANG	Specifies the user's chosen language. The valid values are AMENG, UCENG, or 1SAPI.
ORIGNODE	Identifies the <i>nodeid</i> where the command originated. An asterisk (*) indicates any node within the local SSI cluster.
ORIGUSER	Identifies the <i>userid</i> where the command originated.
REQUEST	Keeps track of how many requests have been sent to the DIRMAINT service machine for processing. The valid values are 1 through 999999.

Table 45. SESSION GLOBALV Variables for the DVHX* Exits (continued)

Variable	Description
RESTART	Specifies whether the command handler or exit routine is being called during restart processing to recover after an interruption of some type. The valid values are NO or YES.
ROLE	Specifies whether the service machine is the DIRMAINT machine, the DATAMOVE machine, or a DIRMSAT machine.
TARGETID	Identifies the <i>userid</i> whose directory entry is to be affected. The value will be the first one of the following that applies: <ul style="list-style-type: none"> • The user ID specified within the privileged command, if present. (Applicable for command level 140A only.) • The FORUSER ID, if not an asterisk. • The ASUSER ID, if not an asterisk. • The ORIGUSER ID.
VALIDCMD5	Specifies the valid command levels from which the user may choose. The current values are 150A 140A.
VALIDDLVS	Specifies the valid interface design levels.

Notes:

1. Some of the following variables are not available until after parsing has been completed, and are therefore not available to the REQUEST_BEFORE_PARSING_EXIT (DVHXRC EXEC). Those that ARE available are: CMDLEVEL, INTERFACE.DVHXRC, ORIGNODE, ORIGUSER, and ROLE.
2. Some of the following variables are not available until after authorization checking has been completed, and therefore are not available to the REQUEST_BEFORE_PROCESSING_EXIT (DVHXR EXEC). Those that are NOT available are: ASUSER, ASNODE, and TARGETID.

All IBM defined global variables are stored in the DVH15 or DVH15NDX variable pool. Customer defined global variables should be stored in either DVH15LCL or DVH15XIT.

The INTERFACE variable and:

- ASNODE
- ATNODE
- ASUSER
- BYUSER
- FORUSER
- CMDLEVEL
- CMDSET
- ORIGNODE
- ORIGUSER
- RESTART
- ROLE
- TARGETID
- TRACE

are considered to be part of the product specific program interface to the various exit routines that run in the DIRMAINT, DATAMOVE, or DIRMSAT service machines. None of these variables are intended for use outside of the product or these exit routines.

A new interface level descriptor will be assigned:

- In the event that any changes are made in the definition of the parameters passed to these exit routines, or to DVHMSG because it is called by the preceding exit routines, or if any changes are made in the definition of the expected results from DVHXRFB.
- When any changes are made in the way information is exchanged between the user's virtual machine and the DIRMAINT service machine, including the addition of new commands or operands to the command set or changes in the user message repositories, or when any changes are made in the format of any data files that are intended for local tailoring.

Utility Routines

There are several house keeping utility routines that may be modified by the customer. These events are at pre-scheduled times of day or at periodic intervals. The IBM-supplied utilities are:

- DVHOURLY
- DVHDAILY
- DVHNDAY

These utilities may be either EXECs or MODULEs; the IBM supplied utilities are EXECs. These utilities run in all three service machines: DIRMAINT, DATAMOVE, and DIRMSATs.

Example:

Housekeeping utility invocations found in DIRMAINT DATADVH, DATAMOVE DATADVH, and DIRMSAT DATADVH are:

```
==/==/== 00:00:05 00/00/00 CMS EXEC DVHNDAY
==/==/== 00:01:00 00/00/00 CMS EXEC DVHDAILY
==/==/== +01:00:0 00/00/00 CMS EXEC DVHOURLY
```

The format of housekeeping utility invocations are:

Table 46. Format of Housekeeping Utility Fields

Columns	Function
1-8	Specifies the day or days when the event is to be scheduled
10-17	Specifies the time or times of day when the event is to be scheduled
19-26	Must have an initial value of 00/00/00, and are reserved for system use
28-240	Specifies the event.

Note:

1. The invocations for all of these house keeping utilities must be preceded by the CMS keyword.
2. If the utility is an EXEC, the CMS keyword must be followed by the EXEC keyword which in turn must be followed by the utility name and any optional parameters.
3. If the utility is a MODULE, the CMS keyword must be followed by the utility name and any optional parameters; there is no MODULE keyword.
4. For more information on the format of the date and time scheduling fields, see [Appendix E, "WAKEUP Command,"](#) on page 235.

Chapter 10. Planning for Diagnosis

To isolate and solve a problem, different people and different courses of action may be needed. DirMaint may be able to recover from, or circumvent, a problem automatically or with the help of an operator. However, if a problem recurs frequently, it should not be left unchecked.

This chapter describes a few considerations for diagnosing DirMaint problems. The following checklist describes some things to consider when planning for diagnosis.

Planning Checklist for Diagnosis and Recovery

- Ensure** that operators are trained to respond to problem situations — either to take action themselves or to call for help
- Ensure** that system backups (including the source directory) are maintained and that a plan is in place to recover from their loss.
- Identify** support personnel who will be on call when operators need help.
- Determine** procedures that users should follow if they run into problems.
- Identify** off-site contacts for problems that involve communication lines or other systems.

Diagnosing Problems Using DirMaint Facilities

DirMaint provides facilities to assist in diagnosing problems. These facilities include messages, commands, tracing facilities, and the installation verification procedure (IVP). DirMaint also provides facilities to automatically attempt to recover from some error situations.

DirMaint produces messages to document its actions. It also produces diagnostic messages if errors occur. These messages and their explanations often suggest follow-up actions to resolve or diagnose the problem. For more information about diagnostic messages, see the [z/VM: Directory Maintenance Facility Messages](#).

See [Appendix G, “Tests Run by the Automated IVP,”](#) on page 243 for more information on the IVP.

Displaying Service Level Information

When solving a DirMaint problem, you may sometimes need to provide IBM with service level information for several or all DirMaint executable modules. IBM supplies DVHSERVL EXEC to help you collect that information.

You can get a report using two different invocations of DVHSERVL EXEC.

- When DVHSERVL is invoked without operands, it reads the CONFIG* DATADVH files and uses the properties of the SERVICE_LEVEL_INFO= configuration statements to determine the information to display. This invocation is performed daily by the DVHNDAY (DirMaint New Day) EXEC.
- When DVHSERVL is invoked with operands, the operands are used instead of the SERVICE_LEVEL_INFO= configuration statements.

The DVHSERVL EXEC may be invoked from a userid authorized for the DIRM CMS command:

```
DIRM CMS DVHSERVL operands
```

Or it may be invoked from the DIRMAINT machine when DirMaint server code is not running:

```
DVHSERVL operands
```

Or it may be invoked from the command line when the server is running:

```
CMS DVHSERVL operands
```

Diagnosis Planning

Multiple SERVICE_LEVEL_INFO= configuration statements can be specified in the CONFIG* DATADVH files. The statements can be in any of the following formats:

```
SERVICE_LEVEL_INFO= ALL
SERVICE_LEVEL_INFO= CONTROL
SERVICE_LEVEL_INFO= fn ft
```

where:

ALL

indicates all files.

CONTROL

indicates files with a filetype of DATADVH.

fn

specifies the filename of the file. It can be specified as an asterisk (*) to be a wildcard.

ft

specifies the filetype of the file; must be one of the following:

EXEC
MODULE
REXX
XEDIT

Invoke the DVHSERVL EXEC with operands to override the SERVICE_LEVEL_INFO= configuration statements as input to DVHSERVL. ALL or CONTROL may not be specified with other operands. Multiple sets of *fn ft* operands may be specified on the invocation line.

DVHSERVL will return a report in the following format:

```
DVHSRV3505I Service Level Information for DirMaint Modules

File          Part          Status   PITS Status   APAR
-----
filename filetype fm partname parttype status @pitsstatus @VAnumber
```

where:

filename

is the file name.

filetype

is the file type.

fm

is the file mode.

partname

is the part name.

parttype

is the part type.

status

is the status of the part.

@pitsstatus

is the latest PITS or line item changes applied to the part identifier.

@VAnumbr

is the latest APAR changes applied to the part identifier.

Establishing Information-Collecting Procedures

Because operators may receive requests to collect diagnostic information, they should be instructed on what to do in various situations and when to get outside help. Some of this work can be simplified using execs, DirMaint commands or statements.

Chapter 11. Installation Verification Procedure (IVP)

The DirMaint installation verification procedure (IVP) provides automated tests that validate DirMaint servers (service machines), and their interactions with each other and the rest of z/VM.

(Note that [Appendix H, “Test the Installation/Service for DirMaint,”](#) on page 269 documents manual tests you can run to test the DirMaint installation and its service machines. It is recommended that you first use the automatic IVP to test the installation before using the manual methods.)

Automated testing can identify issues before you encounter them as a result of user-initiated commands that fail. By running the IVP daily and automatically, you can identify issues proactively. Allowing the same tests to be driven on demand (directed by IBM) and on individual DirMaint machines can aid in detecting and isolating problems.

How the IVP Works

You can run the IVP on any or all of these servers: DIRMAINT, DATAMOVE, and SATELLITE. The IVP can test each of the DirMaint server components and their interactions with other VM components, and the IVP is easily extendable. This allows IBM to add tests as it detects failure patterns in customer environments. In addition to testing for known problems, the IVP can include tests that identify conditions that do not represent a best practice configuration of DirMaint (such as placing configuration files on an inappropriate disk), and the IVP can inform you of these issues as part of an IVP run. In this way DirMaint can enforce the defined rules in a subsequent release, thereby allowing you to correct the issues before moving to the new release while avoiding any current problems.

You can configure the IVP to disable individual tests or all tests on specific servers. This flexibility allows you to control your environment and, when necessary, maintain an environment that might be out of the norm from what is generally expected and tested by automated tests.

Characteristics of the IVP

The IVP has the following characteristics:

- Can be started in the following ways:
 - Using the DIRM IVP START command from an authorized user or from the console of the DIRMAINT machine. For more information see the IVP START command description in [z/VM: Directory Maintenance Facility Commands Reference](#).
 - By including an entry in the DIRMAINT WAKEUP TIMES control file. For more information, see [“The WAKEUP Times File”](#) on page 235.
- Configuration file entries control the behavior of the IVP. For example, you can:
 - Run the IVP as a daily task (by default). You can change this behavior in the CONFIG DATADVH file on the DIRMAINT machine. For more information, see the description of the IVP_NEW_DAY_START parameter in [“CONFIG DATADVH”](#) on page 24.
 - Run the IVP in production or test mode. The appropriate tests are automatically deactivated or modified, based on the mode you choose. For more information, see the description of the IVP_RUNMODE parameter in [“Step 6. Select IVP Characteristics”](#) on page 46.
 - Enable and/or disable specific IVP tests (by test ID). For more information, see the description of the IVP_DISABLE_TEST parameter in [“Step 6. Select IVP Characteristics”](#) on page 46.
 - Specify servers (other than the DIRMAINT machine) that should not participate in an IVP run. For more information, see the description of the IVP_NO_TESTING parameter in [“Step 6. Select IVP Characteristics”](#) on page 46.

- Configure test parameters. For example, you can determine at what level a certain error gets flagged. For more information, see the description of the IVP_NOTIFY_FOR parameter in [“Step 6. Select IVP Characteristics”](#) on page 46.
- Configure a maximum duration for the IVP. For more information, see the description of the IVP_MAX_DURATION parameter in [“Step 6. Select IVP Characteristics”](#) on page 46.
- The results of an IVP run are returned based on how the run is started. If an IVP run is initiated from the console of a DIRMAINT, DATAMOVE, or SATELLITE server, the results are displayed on the console. If an automated task is initiated in the DIRMAINT WAKEUP TIMES file or if an authorized user issues the DIRM IVP START command, a spool file, called IVP RESULTS, is sent to the DIRMAINT user ID when the run completes. For more information see the DIRM IVP command description in [z/VM: Directory Maintenance Facility Commands Reference](#).
- You can use the DIRM IVP STATUS command to obtain results during or after an IVP run completes. The results are displayed on the DIRMAINT machine console if this command is issued from the DIRMAINT machine. Otherwise they are sent in the spool file called IVP STATUS to the user who issued the DIRM IVP STATUS command. For more information, see the DIRM IVP command description in [z/VM: Directory Maintenance Facility Commands Reference](#).

Note: The contents of an IVP RESULTS file are identical to the contents of an IVP STATUS file if you issue the DIRM IVP STATUS command after the IVP has completed. If you issue the DIRM IVP STATUS command before the IVP has completed, the IVP status file will contain information on the IVP run up to the point where the STATUS command was issued.

The DATAMOVE and SATELLITE servers do not update their status on the DIRMAINT server until the DATAMOVE or SATELLITE server has completed its IVP tests. Because of this, STATUS command output might be produced that includes a DATAMOVE or SATELLITE server that has not completed the IVP run, with the status containing an indication that the test was started but not containing additional test information for that server.

- To aid debugging of DATAMOVE and SATELLITE servers that are having communication problems, you can run the IVP related to those servers by initiating the individual command, on a specific server, from the console. When issued this way, the files are not sent back to the DIRMAINT machine but instead are transmitted by the user to the appropriate location.

Other IVP Files

During an IVP run, the IVP maintains two types of files on each DIRMAINT server (DIRMAINT, SATELLITE, and DATAMOVE) for which a test is run. The files are kept on the A-disk of the server. The file types are:

CONTROL

Contains key/value data used by the server to track the status of a run.

STATUS

Contains human-readable lines that are returned to identify the results of the individual tests that were run. For a detailed description of the contents of a STATUS file, see the IVP STATUS command description in [z/VM: Directory Maintenance Facility Commands Reference](#).

During an IVP, if a server fails to complete in the configured time frame, the DIRMAINT server will not contain a complete CONTROL and STATUS file for the server that did not complete. The server that failed to complete in time might contain these files on its A-disk (if it started the IVP). This is expected to be a rare situation. In cases where the server does not complete in time, you can obtain the status of the run on the specific server by issuing the IVP STATUS command directly to that server, either by using the SATELLITE IVP STATUS command or the DATAMOVE IVP STATUS command, or by directly logging on to the server and issuing the IVP STATUS command.

For examples of IVP tests, see [Appendix G, “Tests Run by the Automated IVP,”](#) on page 243.

Appendix A. External Security Manager Considerations

Tailoring your DirMaint system includes implementing security measures against unauthorized access to data, as well as inadvertent destruction of data. DirMaint itself provides a level of security through its command set authorizations. These can be tailored to suit the using installation's needs. However, for critical data files, additional security measures should be implemented. This can be done using an External Security Manager (ESM) such as RACF (Resources Access Control Facility). An ESM controls who can have access, and what kind of access they can have to specific data files and disks. If an ESM is implemented at your installation, DirMaint must be given the appropriate access to the disks and files you want it to manage.

This appendix describes how to enable the proper RACF authorizations for the operation of DirMaint:

- Guidance for defining the DirMaint service machines to your ESM
- Granting the necessary authority to the various DirMaint service machines.
- Facilities available for detecting and foiling attempts to break system security
- Considerations for maintaining system integrity.

These recommendations are optional and whether you follow them depends on the level of security that your installation requires.

If you add additional DATAMOVE or DIRMSAT machines to your system at a later time, remember to review this chapter and perform the necessary steps for the new service machines.

If you do not have an ESM installed on your system, you may skip this appendix.

Installing DirMaint With an External Security Manager Other Than RACF

DirMaint is intended to function on z/VM systems with external security manager programs other than RACF. The methods of defining the DirMaint product, data disks, and other controllable resources to the ESM, and granting access to the defined resources, all vary from one ESM to another.

For more information on administration, see the documentation provided with your ESM.

If you need assistance with your ESM, contact the vendor for your ESM product. If you need assistance translating the following RACF terminology into equivalent terminology for your ESM, contact the IBM marketing representative or the IBM branch office serving your area.

Installing DirMaint with RACF

RACF for z/VM can be used to enhance the security and integrity of your system by:

- Helping your installation implement its security policy
- Identifying and authenticating each user
- Controlling each user's access to sensitive data
- Logging and reporting events that are relevant to the system's security.

For information on the RACF administrator commands used in this appendix, see [*z/VM: RACF Security Server Security Administrator's Guide*](#).

For additional information on RACF for z/VM, see these publications:

- [*z/VM: RACF Security Server Auditor's Guide*](#)
- [*z/VM: RACF Security Server Command Language Reference*](#)

- [z/VM: RACF Security Server Diagnosis Guide](#)
- [z/VM: RACF Security Server General User's Guide](#)
- [z/VM: RACF Security Server Macros and Interfaces](#)
- [z/VM: RACF Security Server Messages and Codes](#)
- [z/VM: RACF Security Server System Programmer's Guide](#)
- [z/VM: Security Server RACROUTE Macro Reference](#)

RACF-Specific Characteristics in the CONFIG DATADVH File

If your system does have RACF installed as the ESM, note that there are several entries in the CONFIG DATADVH file that will set defaults for the DirMaint RACF connector support, which provides automatic communication with RACF. See [“Step 5. Select RACF-Specific Characteristics” on page 34](#) for more information.

Enabling DirMaint to Access the RACF Profile in the VMCMD Class

By default the RACF command is given universal read access. To list the RACF command authority, issue:

```
RAC RLIST VMCMD RACF AUTH
```

If the RACF profile is being controlled in the VMCMD class, allow DirMaint to use the command by giving it READ access. To do this, issue:

```
RAC PERMIT RACF CLASS(VMCMD) ID(DIRMAINT) ACCESS(READ)
```

And if the VMCMD class is RACLISTed issue:

```
RAC SETROPTS RACLIST(VMCMD) REFRESH
```

Enabling Auditing Using RACROUTE

You can enable any or all of the DirMaint service machines – DIRMAINT, DATAMOVEs, DIRMSATs – to record information in the RACF audit trail. If the ESM_LOG_RECORDING_EXIT supplied by IBM is configured, you must complete the following steps for each DirMaint service machine, or the service machine will shut down when it attempts to issue a message and is unable to log the message in the audit trail.

Step 1. Recording Activity using the RACROUTE Command

Enter the following commands. Note that the RAC PERMIT command must be entered for each service machine you want to enable:

```
RAC SETROPTS CLASSACT(FACILITY)
RAC SETROPTS RACLIST(FACILITY)
RAC RDEFINE FACILITY ICHCONN UACC(NONE)
RAC PERMIT ICHCONN CLASS(FACILITY) ID(xxxxxxx) ACCESS(UPDATE)
```

Where:

xxxxxxx

Specifies the user ID of the DirMaint service machine to be audited.

After the last RAC PERMIT command has been issued, enter the following command:

```
RAC SETROPTS RACLIST(FACILITY) REFRESH
```

Note: The above RACROUTE (RAC) commands can fail if they were previously issued.

Step 2. Linking to RACF 305

The DirMaint service machines must all be made aware of the user ID of the RACF service machine that is recording the audit log. This is contained in a file named RACF SERVMACH. To permit access, enter:

```
RAC PERMIT racfvmid.305 CLASS(VMMDISK) ID(xxxxxxxx) ACCESS(READ)
```

Where:

racfvmid

Specifies the name of the RACF service machine that you select to handle DirMaint audit requests

xxxxxxxx

Specifies the user ID of the DirMaint service machine.

Step 3. Accessing the RPIUCMS MODULE

The DirMaint service machines must all have access to the RPIUCMS MODULE. This file usually resides on the system 19E Y-disk, but may reside on any disk in the DirMaint service machine's search order. If necessary, you may add a LINK directory statement to the RACF service machine's directory entry for this disk, and update the DVHPROFA * files used by the DirMaint service machine to access the disk containing the RPIUCMS MODULE at an available filemode. Unless one of the following conditions is true:

- The RPIUCMS MODULE resides on a public disk, or
- The DirMaint service machines already have UACC (READ) access to that disk

then the service machines must be permitted for READ access to that disk. To do that, enter:

```
RAC PERMIT racfvmid.vaddr CLASS(VMMDISK) ID(xxxxxxxx) ACCESS(READ)
```

Where:

racfvmid.vaddr

Specifies the name of the virtual machine owning the disk and the virtual disk address containing the RPIUCMS MODULE file

xxxxxxxx

Specifies the user ID of the DirMaint service machine.

Step 4. The directory entry for the DirMaint service machines using this capability must all contain this statement:

```
IUCV ANY PRIORITY MSGLIMIT 100
```

Note: A MSGLIMIT value of 100 is initially suggested. It may be adjusted as your experience dictates.

Enabling DirMaint to Access DIAGNOSE X'88'

The DIRMAINT service machine uses the DMSPASS CSL routine to authenticate passwords provided by the DIRMAINT command. Use of the DMSPASS CSL routine requires that the DMSPASS issuer has the authority to issue DIAGNOSE X'88'. If CP is controlling access to the diagnose, you will need to use the OPTION DIAG88 statement in the DIRMAINT service machine's directory entry to provide access. If RACF is being used to control access to DIAGNOSE X'88', you can allow the DIRMAINT service machine to issue DIAGNOSE X'88' by completing the following steps:

Step 1. Enable RACF/VM profile protection for DIAGNOSE X'88':

1. Confirm that the VMXEVENT class is active.

- a. Issue the following command:

```
RAC SETROPTS LIST
```

- b. If VMXEVENT does not appear in the list of active classes, issue the following command to activate the VMXEVENT class.

```
RAC SETROPTS CLASSACT(VMXEVENT)
```

2. Confirm that the DIRMAINT server has the DIAG088 event controlled.

Note: The DIRMAINT server must be logged on in order for the active profile to exist in system memory.

- a. Issue the following command:

```
RAC SETEVENT LIST USERSEL.DIRMAINT
```

If the response contains DIAG088/CONTROL, then DIAGNOSE X'88' is controlled. Proceed to substep “3” on page 198.

If the response contains DIAG088/NOCTL, then DIAGNOSE X'88' is not controlled. Issue the following commands to remove DIAG088/NOCTL from the DIRMAINT server's active profile:

```
RAC RALTER VMXEVENT USERSEL.DIRMAINT  
      DELMEM(DIAG088/noctl)  
  
RAC SETEVENT REFRESH USERSEL.DIRMAINT
```

- b. If the response for the SETEVENT LIST command above is one of the following messages:

```
RPIS134E SETEVENT FAILED. USER VM EVENT PROFILE  
        DOES NOT EXIST FOR USERID DIRMAINT  
  
RPIS132E SETEVENT FAILED. NO USER VM EVENT  
        SETTINGS EXIST FOR USERID DIRMAINT.  
        SYSTEM SETTINGS ARE BEING USED.
```

then the system-wide DIAG088 setting is in effect for the DIRMAINT server. In this case, issue the following command to determine the system-wide setting:

```
RAC SETEVENT LIST
```

If the response contains DIAG088/CONTROL, then DIAGNOSE X'88' is controlled. Proceed to substep “3” on page 198.

If the system-wide setting for DIAG088 is NOCTL, you must determine why NOCTL was set for DIAG088. Since the default setting for DIAG088 is CONTROL, the NOCTL setting was intentionally set. For more information, see [z/VM: RACF Security Server Security Administrator's Guide](#).

3. Create a profile called DIAG088 in the VMCMD class with a default access of NONE:

```
RAC RDEFINE VMCMD DIAG088 UACC(NONE)
```

4. Ensure that the VMCMD class is active:

```
RAC SETROPTS CLASSACT(VMCMD)
```

Step 2. Give the DIRMAINT server permission to perform password validation using DMSPASS (which uses DIAGNOSE X'88' subcode 8):

```
PERMIT DIAG088 CLASS(VMCMD) ID(DIRMAINT) ACCESS(READ)
```

Enabling DirMaint to Access User's Minidisks and Readers

You must enable the DirMaint service machine for minidisk and reader access.

Minidisk Access

If RACF is being used to control minidisk access, enable minidisk access for DirMaint by completing the following steps:

Step 1. Access DirMaint primary interface files, enter:

```
RAC RALTER VMMDISK 7VMDIR40.11F UACC(READ)
```

Step 2. Access the secondary interface files and help files for testing, enter:

```
RAC RALTER VMMDISK 7VMDIR40.41F UACC(READ)
RAC RALTER VMMDISK 7VMDIR40.29E UACC(READ)
RAC RALTER VMMDISK 7VMDIR40.29D UACC(READ)
```

Step 3. Permit the DirMaint service machines to the necessary disks, enter:

```
RAC PERMIT 7VMDIR40.491 CLASS(VMMDISK) ID(DIRMAINT) ACCESS(CONTROL)
RAC PERMIT 7VMDIR40.492 CLASS(VMMDISK) ID(DIRMAINT) ACCESS(CONTROL)
RAC PERMIT 7VMDIR40.11F CLASS(VMMDISK) ID(DIRMAINT) ACCESS(CONTROL)
RAC PERMIT 7VMDIR40.41F CLASS(VMMDISK) ID(DIRMAINT) ACCESS(CONTROL)
RAC PERMIT 7VMDIR40.29E CLASS(VMMDISK) ID(DIRMAINT) ACCESS(CONTROL)
RAC PERMIT MAINT.123 CLASS(VMMDISK) ID(DIRMAINT) ACCESS(ALTER)
```

```
RAC PERMIT 7VMDIR40.491 CLASS(VMMDISK) ID(DATAMOVE) ACCESS(READ)
RAC PERMIT 7VMDIR40.492 CLASS(VMMDISK) ID(DATAMOVE) ACCESS(READ)
RAC PERMIT 7VMDIR40.11F CLASS(VMMDISK) ID(DATAMOVE) ACCESS(READ)
RAC PERMIT 7VMDIR40.41F CLASS(VMMDISK) ID(DATAMOVE) ACCESS(READ)
RAC PERMIT 7VMDIR40.29E CLASS(VMMDISK) ID(DATAMOVE) ACCESS(READ)
```

```
RAC PERMIT 7VMDIR40.491 CLASS(VMMDISK) ID(DIRMSAT) ACCESS(READ)
RAC PERMIT 7VMDIR40.492 CLASS(VMMDISK) ID(DIRMSAT) ACCESS(READ)
RAC PERMIT 7VMDIR40.11F CLASS(VMMDISK) ID(DIRMSAT) ACCESS(READ)
RAC PERMIT 7VMDIR40.41F CLASS(VMMDISK) ID(DIRMSAT) ACCESS(READ)
RAC PERMIT 7VMDIR40.29E CLASS(VMMDISK) ID(DIRMSAT) ACCESS(READ)
RAC PERMIT MAINT.123 CLASS(VMMDISK) ID(DIRMSAT) ACCESS(ALTER)
RAC PERMIT DIRMAINT.1DF CLASS(VMMDISK) ID(DIRMSAT) ACCESS(READ)
RAC PERMIT DIRMAINT.2DF CLASS(VMMDISK) ID(DIRMSAT) ACCESS(READ)
RAC PERMIT DIRMAINT.15D CLASS(VMMDISK) ID(DIRMSAT) ACCESS(READ)
```

Reader Access

If RACF is being used to control reader access, enable reader access for DirMaint by completing the following steps:

Step 1. Authorize all users to send files to the DIRMAINT machine's reader. If there is already a DIRMAINT VMRDR profile defined, alter it, by entering:

```
RAC RALTER VMRDR DIRMAINT UACC(UPDATE)
```

If this profile is not defined, enter:

```
RAC RDEF VMRDR DIRMAINT UACC(UPDATE)
```

Step 2. If DIRMAINT is not exempted from all reader access control, each user must authorize the DIRMAINT machine to send files back to the user's reader by entering:

```
RAC RDEFINE VMRDR <acigroup.>vmuserid UACC(NONE)
RAC PERMIT <acigroup.>vmuserid CLASS(VMRDR) xxxxxxxx ACCESS(UPDATE)
```

Where:

xxxxxxx

Identifies the user ID of the DirMaint service machine.

Note: This includes the DATAMOVE and DIRMSAT machines.

Step 3. If DATAMOVE and DIRMSAT machines are not exempted from all reader access control, the DirMaint support staff user IDs should authorize the DATAMOVE and DIRMSAT service machines by entering:

```
RAC PERMIT <acigroup.>vmuserid CLASS(VMRDR) ID(datamove) ACCESS(UPDATE)
RAC PERMIT <acigroup.>vmuserid CLASS(VMRDR) ID(dirmsat) ACCESS (UPDATE)
```

Where:

datamove

Identifies the user ID of the DATAMOVE service machine.

dirmsat

Identifies the user ID of the DIRMSAT service machine.

Enabling Satellite Servers to Act on Behalf of the DIRMAINT Server

In an SSI cluster, DirMaint satellite servers are used to relay DirMaint output to users on their associated satellite systems. When transferring output reader files to a local user on the satellite system, the satellite servers use CP DIAGNOSE X'D4' to indicate that the reader file is from the DIRMAINT server. Because of this use of CP DIAGNOSE X'D4', you must complete the following steps to enable all satellite servers in an SSI cluster to act on behalf of the DIRMAINT server and themselves if the VMBATCH resource class is active in RACF:

Step 1. Create a profile for DIRMAINT and each satellite server in the VMBATCH class with a default access of NONE:

```
RAC RDEFINE VMBATCH DIRMAINT UACC(NONE)
RAC RDEFINE VMBATCH DIRMSAT UACC(NONE)
RAC RDEFINE VMBATCH DIRMSAT2 UACC(NONE)
RAC RDEFINE VMBATCH DIRMSAT3 UACC(NONE)
RAC RDEFINE VMBATCH DIRMSAT4 UACC(NONE)
```

Step 2. Give each satellite server permission to act on behalf of the DIRMAINT server:

```
RAC PERMIT DIRMAINT CLASS(VMBATCH) ID(DIRMSAT) ACCESS(CONTROL)
RAC PERMIT DIRMSAT CLASS(VMBATCH) ID(DIRMSAT) ACCESS(CONTROL)

RAC PERMIT DIRMAINT CLASS(VMBATCH) ID(DIRMSAT2) ACCESS(CONTROL)
RAC PERMIT DIRMSAT2 CLASS(VMBATCH) ID(DIRMSAT2) ACCESS(CONTROL)

RAC PERMIT DIRMAINT CLASS(VMBATCH) ID(DIRMSAT3) ACCESS(CONTROL)
RAC PERMIT DIRMSAT3 CLASS(VMBATCH) ID(DIRMSAT3) ACCESS(CONTROL)

RAC PERMIT DIRMAINT CLASS(VMBATCH) ID(DIRMSAT4) ACCESS(CONTROL)
RAC PERMIT DIRMSAT4 CLASS(VMBATCH) ID(DIRMSAT4) ACCESS(CONTROL)
```

Improving Performance with RACF

When DIRMAINT is heavily used, you can improve performance by adding the 7VMDIR40 disks needed by general users to the global minidisk table in HCPRWA. Add:

```
GLBLDSK  USERID=7VMDIR40,VADDR=11F,SCOPE=GLOBAL
GLBLDSK  USERID=7VMDIR40,VADDR=29D,SCOPE=GLOBAL
GLBLDSK  USERID=7VMDIR40,VADDR=29E,SCOPE=GLOBAL
GLBLDSK  USERID=7VMDIR40,VADDR=41F,SCOPE=GLOBAL
```

Do *not* add any disk to the global access list if any of the these conditions are true:

1. The disk has a SECLABEL, unless that SECLABEL is SYSLOW.
2. The disk has UACC other than READ.
3. Any user is explicitly permitted to the disk for ACCESS(NONE).
4. The disk profile specifies either:
 - AUDIT(SUCCESS(READ))
 - AUDIT(FAILURE(READ))
 - AUDIT(ALL(READ))

For more information on adding this local modification, see "Defining Public Minidisks" in the *RACF Security Server for z/VM Program Directory*.

Enabling Mandatory Access Control for DirMaint Resources

Note: This section applies only if you are using security labels and mandatory access control (MAC).

Example—Defining the DirMaint Service Machines:

If you decide to enable access control of the DirMaint resources, you should define all DirMaint service machines (DIRMAINT, DATAMOVEs, and DIRMSATs) to RACF with a SECLABEL of SYSNONE in order to allow access to all users on the system by entering:

```
RAC PERMIT SYSNONE CLASS(SECLABEL) ID(xxxxxxx) ACCESS(READ)
RAC ALTUSER xxxxxxxx SECLABEL(SYSNONE)
```

Where:

xxxxxxx

Identifies the user ID of the service machine.

You can enable access control to DirMaint minidisks and readers.

Minidisk Access Control

If you decide to enable minidisk access control, perform the following steps:

Step 1. Define all of the minidisks owned by the DirMaint machines (7VMDIR40, DIRMAINT, DATAMOVEs, and DIRMSATs) with the appropriate SECLABEL. The disks needed by general users must be defined as SYSLOW. Enter:

```
RAC RALTER VMMDISK 7VMDIR40.11F SECLABEL(SYSLOW)
RAC RALTER VMMDISK 7VMDIR40.29D SECLABEL(SYSLOW)
RAC RALTER VMMDISK 7VMDIR40.29E SECLABEL(SYSLOW)
RAC RALTER VMMDISK 7VMDIR40.41F SECLABEL(SYSLOW)
```

The use of optional national language Help files also must be defined as SYSLOW disks. Enter:

```
RAC RALTER VMMDISK 7VMDIR40.xxx SECLABEL(SYSLOW)
RAC RALTER VMMDISK 7VMDIR40.xxx SECLABEL(SYSLOW)
```

The remaining product code disks may be assigned a SECLABEL of your choice. Enter:

```
RAC RALTER VMMDISK 7VMDIR40.491 SECLABEL(xxxxxxx)
RAC RALTER VMMDISK 7VMDIR40.492 SECLABEL(xxxxxxx)
```

Where:

xxxxxxx

Specifies the SECLABEL you have chosen.

Step 2. The DirMaint service machine data disks should all be given a SECLABEL of SYSHIGH. Enter:

```
RAC RALTER VMMDISK DIRMAINT.155 SECLABEL(SYSHIGH)
RAC RALTER VMMDISK DIRMAINT.1FA SECLABEL(SYSHIGH)
RAC RALTER VMMDISK DIRMAINT.1DF SECLABEL(SYSHIGH)
RAC RALTER VMMDISK DIRMAINT.2DF SECLABEL(SYSHIGH)
RAC RALTER VMMDISK DIRMAINT.1AA SECLABEL(SYSHIGH)
RAC RALTER VMMDISK DIRMAINT.2AA SECLABEL(SYSHIGH)
RAC RALTER VMMDISK DIRMAINT.1DB SECLABEL(SYSHIGH)
RAC RALTER VMMDISK DIRMAINT.1DE SECLABEL(SYSHIGH)
RAC RALTER VMMDISK DIRMAINT.15D SECLABEL(SYSHIGH)
RAC RALTER VMMDISK DIRMAINT.2DB SECLABEL(SYSHIGH)
RAC RALTER VMMDISK DATAMOVE.155 SECLABEL(SYSHIGH)
RAC RALTER VMMDISK DATAMOVE.1FA SECLABEL(SYSHIGH)
RAC RALTER VMMDISK DATAMOVE.1AA SECLABEL(SYSHIGH)
RAC RALTER VMMDISK DATAMOVE.2AA SECLABEL(SYSHIGH)
RAC RALTER VMMDISK DIRMSATx.155 SECLABEL(SYSHIGH)
RAC RALTER VMMDISK DIRMSATx.1FA SECLABEL(SYSHIGH)
RAC RALTER VMMDISK DIRMSATx.1AA SECLABEL(SYSHIGH)
RAC RALTER VMMDISK DIRMSATx.2AA SECLABEL(SYSHIGH)
```

Note: If you have multiple DATAMOVE or DIRMSAT service machines, you must assign a SECLABEL to all the data disks.

Reader Access Control

If you decide to enable reader access control, you must allow the DirMaint service machines (DIRMAINT, DATAMOVEs, and DIRMSATs) to send spool files to users with a SECLABEL other than SYSHIGH. The most commonly used SECLABEL is SYSLOW. Enter:

```
RAC PERMIT SYSLOW CLASS(SECLABEL) ID(xxxxxxx) ACCESS(READ)
RAC SETROPTS RACLIST(SECLABEL) REFRESH
```

Where:

xxxxxxx

Identifies the user ID of the service machine.

Appendix B. DirMaint Support for Systems Management APIs

This appendix includes crucial information for the client programmer or the server administrator using DirMaint as the directory manager for Systems Management APIs, as documented in *z/VM: Systems Management Application Programming*.

As a starting point, this appendix presumes that DirMaint is up and operational for native CMS users, as described in this book and in the DirMaint Program Directory.

This includes coordination between DirMaint and an ESM (External Security Manager) such as RACF, if necessary.

If full-function DirMaint is enabled after using the limited access directory manager function installed for use with the System Management Application Programming Interface (SMAPI), DirMaint must be manually configured as described in this appendix in order to continue to function successfully with SMAPI.

Check the DirMaint web site at [IBM Directory Maintenance for z/VM \(DirMaint\)](https://www.ibm.com/vm/related/dirmaint) (<https://www.ibm.com/vm/related/dirmaint>) for additional hints and tips.

Linking and Accessing the DirMaint Interface Disk

The owner of the VSM API worker servers must ensure that the DirMaint interface code is available to each worker server. In the default configuration, the worker servers would be the VSMWORK1, VSMWORK2 and VSMWORK3 user IDs. The most convenient way to do this is to include the following commands in each worker server machine's server profile exec:

```
'EXEC DIRMAINT EXECLOAD'  
'EXEC DIRMAINT DEFAULT MENUS DISABLED'  
'EXEC DIRMAINT DEFAULT PROMPTS DISABLED'
```

DIRMAINT should be using the PRODUCTION disks most of the time. However, when applying service, it is customary to put the service onto the TEST disks and to let DIRMAINT run with that level of service for a while (hours or days) before putting the new service onto the PRODUCTION disks. Either all worker servers should be switched to use the same interface disk that the DIRMAINT server is using, or else all worker servers should be shut down when DIRMAINT is using the TEST disks.

If the differences between the PRODUCTION and TEST disks are sufficiently minor, the VSM API worker servers and DIRMAINT servers may all continue working normally when the disks don't match, but this is not recommended. To switch disks, edit the ACCESS DATADVH file and change the USE= field for your system to point to the correct disk. Remember to revert to the production level of the ACCESS DATADVH file when DIRMAINT returns to use of the PRODUCTION disks.

Note: Changing the contents of the DirMaint interface disk while any of the VSM API worker servers are active, or changing the contents of any disk that is linked and accessed by any active server, may cause that server to encounter unpredictable results, including disk I/O errors and abends. To avoid such problems, the server(s) should be shut down or forced off while the disks are being changed, then restarted when the changes are complete.

Configuring Use of the ASUSER Prefix

Note: This section is applicable only when running the IBM-supplied VSM API server code.

When the ASUSER prefix is specified, a password is required unless the ALLOW_ASUSER_NOPASS_FROM configuration property has identified that the user does not require a password. This is accomplished by having a configuration file record for each worker server in the form of:

```
ALLOW_ASUSER_NOPASS_FROM= worker_server_x *|node_name
```

where *worker_server_x* is the name of the worker server.

This configuration file record should be placed in a supplemental configuration file. The first 6 characters of the file name are CONFIG, the 7th and 8th characters may be any valid file identification characters ("SM" is suggested and will be used as an example), and the file type must be DATADVH.

This supplemental CONFIGSM DATADVH file must reside on the DIRMAINT server's 11F disk, because the DIRM command user's virtual machine checks the ALLOW_ASUSER_NOPASS_FROM= statements.

Enabling the Asynchronous Update Notification Exit

In order to receive TCP and/or UDP asynchronous notifications for directory updates enabled by the Asynchronous_Notification_Enable_DM API, one or both of the following statements must be added to a DirMaint override configuration file:

```
ASYNCHRONOUS_UPDATE_NOTIFICATION_EXIT.TCP= DVHXNE EXEC
ASYNCHRONOUS_UPDATE_NOTIFICATION_EXIT.UDP= DVHXNE EXEC
```

For more information on the Asynchronous Update Notification exit and giving the DIRMAINT server access to the TCPMAINT 592 disk, see [“Asynchronous Update Notification \(DVHXNE\)” on page 165](#).

Coordination Between DirMaint and an External Security Manager

If your z/VM system is using an External Security Manager (ESM) such as RACF, some SMAPI functions require handshaking with the ESM. For example, after creating a new image with the Image_Create_DM function, the new image must be defined to the ESM before using an Image_Activate function. In order to use the Image_Disk_Create_DM or Image_Disk_Share_DM functions, the new disk must be defined to the ESM. DirMaint provides its RACF connector support to accomplish such coordination. This support provides automatic communication with RACF that can be totally enabled/disabled or enabled/disabled by specific RACF connector EXECs. For other ESMs, refer to the vendor-supplied documentation.

To configure DirMaint for use with RACF, see [“Step 5. Select RACF-Specific Characteristics” on page 34](#), as well as [Appendix A, “External Security Manager Considerations,” on page 195](#).

DirMaint Command Set Authorizations

The entries in the VSMWORK1 AUTHLIST file do not allow users to actually perform the Directory Manager functions; they simply allow the requests to be sent to the DIRMAINT server for further authorization checking.

DirMaint must be configured to allow Systems Management API users to use specific command sets. For more information, see [Chapter 8, “Delegating Administrative Authority,” on page 117](#).

Remember to authorize use of both command levels 140A and 150A, especially for any user authorized for command set D.

DirMaint must be configured to allow the VSMAPI short call worker server (VSMWORK1 by default) to use the command set containing the DIRMAINT NAMESAVE command (command set A by default). This is necessary because in order to grant access to all worker servers to the VSMAPI Server_DCSS, the short call worker server executes the Shared_Memory_Access_Add_DM API in its server profile exit – and as seen in [Table 47 on page 205](#), the Shared_Memory_Access_Add_DM API issues the DIRMAINT NAMESAVE command.

If you wish to allow a given authenticated userid to perform some directory management functions but not others, you need to know which Systems Management APIs invoke which DirMaint commands, and which DirMaint command sets(s) are used by those commands. The IBM-supplied defaults are as follows:

Table 47. IBM-Supplied Defaults for DirMaint Commands and Command Sets

API	Command(s)	CMDSETs
Asynchronous_Notification_Disable_DM	SUBSCRIBE	A,P
Asynchronous_Notification_Enable_DM	SUBSCRIBE	A,P
Asynchronous_Notification_Query_DM	SUBSCRIBE	A,P
Directory_Manager_Local_Tag_Define_DM	DEFINESTAG	P,S
Directory_Manager_Local_Tag_Delete_DM	DEFINESTAG	P,S
Directory_Manager_Local_Tag_Query_DM	SETSTAG	A
Directory_Manager_Local_Tag_Set_DM	SETSTAG	A
Directory_Manager_Search_DM	SCAN	H,S
Directory_Manager_Task_Cancel_DM	WORKUNIT	D
Image_CPU_Define_DM	SETCPU	A
Image_CPU_Delete_DM	SETCPU	A
Image_CPU_Query_DM	SETCPU	A
Image_CPU_Set_Maximum_DM	SETMACH	A
Image_Create_DM	ADD	A,D,G
Image_Definition_Create_DM	COMMAND GET REPLACE ADD AUTHSCIF DSECUSER CONSOLE SECUSER CPU SETMACH DEDICATE INCLUDE IPL LINK DMDISK AMDISK RMDISK MDISK NICDEF SETOPTN SETCLASS MAXSTORAGE STORAGE SHARE SETPW LOCK UNLOCK VMRELOCATE	A A S A G G G G G A P,S A G G D D D,P G A A A A G A A,M A A A

Table 47. IBM-Supplied Defaults for DirMaint Commands and Command Sets (continued)

API	Command(s)	CMDSETs
Image_Definition_Delete_DM	COMMAND GET AUTHSCIF DROPSCIF CONSOLE SECUSER SETCPU MACHINE DEDICATE INCLUDE IPL LINK DMDISK NICDEF SETOPTN PRIVCLASS MAXSTORAGE STORAGE SHARE SETPW LOCK REPLACE UNLOCK VMRELOCATE	A A G G G G A G P,S A G G D A A A A A G A A,M A S A A
Image_Definition_Query_DM	GET GLOBALOPTS	A P
Image_Definition_Update_DM	COMMAND GET REPLACE ADD AUTHSCIF DSECUSER CONSOLE SECUSER CPU SETMACH DEDICATE INCLUDE IPL LINK DMDISK AMDISK RMDISK MDISK NICDEF SETOPTN SETCLASS MAXSTORAGE STORAGE SHARE SETPW LOCK UNLOCK VMRELOCATE	A A S A G G G G G A P,S A G G D D D,P G A A A A A G A A,M A A A
Image_Delete_DM	PURGE	A,D
Image_Device_Dedicate_DM	DEDICATE	A
Image_Device_UnDedicate_DM	DEDICATE	A
Image_Disk_Copy_DM	CLONEDISK	D
Image_Disk_Create_DM	AMDISK	D
Image_Disk_Delete_DM	DMDISK	D

Table 47. IBM-Supplied Defaults for DirMaint Commands and Command Sets (continued)

API	Command(s)	CMDSETs
Image_Disk_Share_DM	LINK	G
Image_Disk_UnShare_DM	LINK	G
Image_IPL_Delete_DM	IPL	G
Image_IPL_Query_DM	IPL	G
Image_IPL_Set_DM	IPL	G
Image_Lock_DM	LOCK	A
Image_Name_Query_DM	USERMAP	A
Image_Password_Set_DM	PW	G
Image_Query_DM	GET	A
Image_Replace_DM	REPLACE	S
Image_SCSI_Characteristics_Query_DM	LOADDEV	G
Image_SCSI_Characteristics_Define_DM	LOADDEV	G
Image_Unlock_DM	UNLOCK	A
Image_Volume_Space_Define_DM	DASD	S
Image_Volume_Space_Define_Extended_DM	DASD	S
Image_Volume_Space_Query_DM	DASD	S
Image_Volume_Space_Query_Extended_DM	DASD	S
Image_Volume_Space_Remove_DM	DASD	S
Profile_Create_DM	ADD	A
Profile_Delete_DM	PURGE	A
Profile_Lock_DM	LOCK	A
Profile_Query_DM	GET	A
Profile_Replace_DM	REPLACE	S
Profile_Unlock_DM	UNLOCK	A
Prototype_Create_DM	CMS FILE	S S
Prototype_Delete_DM	CMS	S
Prototype_Name_Query_DM	CMS	S
Prototype_Query_DM	SEND	H,S
Prototype_Replace_DM	CMS FILE	S S
Query_All_DM	USER	S,H
Query_Asynchronous_Operation_DM	STATUS	S,H
Query_Directory_Manager_Level_DM	none	*
Shared_Memory_Access_Add_DM	NAMESAVE	A
Shared_Memory_Access_Query_DM	NAMESAVE	A
Shared_Memory_Access_Remove_DM	NAMESAVE	A
Shared_Memory_Create	NAMESAVE	A
Shared_Memory_Delete	NAMESAVE	A

Table 47. IBM-Supplied Defaults for DirMaint Commands and Command Sets (continued)

API	Command(s)	CMDSETs
Shared_Memory_Replace	NAMESAVE	A
Static_Image_Changes_Activate_DM	ONLINE	S
Static_Image_Changes_Deactivate_DM	OFFLINE	S
Static_Image_Changes_Immediate_DM	DIRECT	A,H
Virtual_Channel_Connection_Create_DM	SPECIAL	G
Virtual_Channel_Connection_Delete_DM	SPECIAL	G
Virtual_Network_Adapter_Create_DM	NICDEF	A
Virtual_Network_Adapter_Create_Extended_DM	NICDEF	A
Virtual_Network_Adapter_Delete_DM	NICDEF	A
Virtual_Network_Adapter_Connect_LAN_DM	NICDEF	A
Virtual_Network_Adapter_Connect_Vswitch_DM	NICDEF	A
Virtual_Network_Adapter_Disconnect_DM	NICDEF	A

These are only defaults, which may be customized. Remember to authorize command set D (DASD Management commands) for both command levels 140A and 150A. It is customary to authorize users for the same command sets in both command levels, but command set D is the critical one if the user will be making ADD (Image_Create_DM) requests.

DASD Management

In addition to the preceding command set authorizations, use of the DASD management space allocation requests (ADD or Image_Create_DM, AMDISK or Image_Disk_Create_DM, CLONEDISK or Image_Disk_Copy_DM, CMDISK, or RMDISK) require the requester to be authorized to allocate space of the specified type (group, region, or volume) in the area named. This is controlled by the AUTHDASD CONTROL file, located on DIRMAINT's 1DF disk. By default, all command set D users are authorized to allocate DASD space anywhere on the system. Note, however, that some installations may customize the AUTHDASD CONTROL file to restrict this.

Once authorized, DASD space may be allocated on named volumes, in named regions (which are subsets of volumes), or in named groups (which are collections of named regions). The EXTENT CONTROL file contains this information. For more information, see [Chapter 6, "DASD Management," on page 73](#) and the following commands in the *z/VM: Directory Maintenance Facility Commands Reference*: AMDISK, CLONEDISK, CMDISK, DMDISK, RMDISK, FREEEXT, USEEXT, and DIRMAP.

The REGIONS and GROUPS sections of the EXTENT CONTROL file may be maintained using the Image_Volume_Space_Define_DM, Image_Volume_Space_Remove_DM and Image_Volume_Space_Query_DM functions.

Image Disk Modes

The Image_Disk_Create_DM and Image_Disk_Copy_DM functions accept a limited range of input for the *image_disk_mode* parameters. Valid input to these parameters is limited to the following:

R	RR	W	WR	M	MR	MW
RE	RRE	WE	WRE	ME	MRE	MWE
RS	RRS	WS	WRS	MS	MRS	MWS
RD	RRD	WD	WRD	MD	MRD	MWD
RED	RRED	WED	WRED	MED	MRED	MWED
RSD	RRSD	WSD	WRSD	MSD	MRS	MWSD

RV	RRV	WV	WRV	MV	MRV	MWV
RVE	RRVE	WVE	WRVE	MVE	MRVE	MWVE
RVS	RRVS	WVS	WRVS	MVS	MRVS	MWVS
RVD	RRVD	WVD	WRVD	MVD	MRVD	MWVD
RVED	RRVED	WVED	WRVED	MVED	MRVED	MWVED
RVSD	RRVSD	WVSD	WRVSD	MVSD	MRVSD	MWVSD

Image_Create_DM: Adding A New Image

Once the requisites have been satisfied, adding a new virtual image is not particularly difficult. The trick is in satisfying all of the requisites:

1. The ADD or Image_Create_DM request must be made by a userid that is authorized to make requests in command sets A, D, and G in command level 150A for ALL users; AND (usually) for command set D in command level 140A for ALL users.
2. The Image_Create_DM request can either supply a buffer containing the virtual image directory entry or else supply the name of an existing PROTODIR file from which the new userid, virtual machine, or image is to be created. The PROTODIR file is created using a DIRM FILE command, or a Prototype_Create_DM API request.
3. If the PROTODIR file contains an INCLUDE statement for a PROFILE, the named PROFILE must already exist.
4. The name of the new image may be the same as the name of a PROTODIR file, but must not be the same as an existing PROFILE or USER name.
5. Unless a password is specified on the Image_Create_DM API function call, the password will be set to NOLOG, making the userid unusable until an Image_Password_Set_DM function has been performed for the userid.
6. Unless an account number is specified on the Image_Create_DM function call, the number specified on the ACCOUNT statement within the PROTODIR file will be used. If none is specified within the PROTODIR file, the ACCOUNT specified in the included PROFILE will be used. If there is no included PROFILE, or the included PROFILE does not specify an ACCOUNT statement, the virtual machine's userid will be used as the account number.
7. DirMaint requires account numbers specified on the DIRM ADD command to be verified before they are accepted. The default sample ACCOUNT_NUMBER_VERIFICATION_EXIT provided by DirMaint (DVHXAV EXEC) accepts all account numbers from the DIRM ADD command, as DIRM ADD is an administrator (privileged) command.

In order for account numbers to be accepted by the Image_Create_DM API (which uses the DIRM ADD command), you must have the following configuration file record in a supplemental configuration file:

```
ACCOUNT_NUMBER_VERIFICATION_EXIT= DVHXAV EXEC
```

The first six characters of the supplemental configuration file name must be 'CONFIG,' the seventh and eighth characters may be any valid file identification characters ('AV' is suggested and will be used here as an example), and the file type must be DATADVH. This supplemental CONFIGAV DATADVH file should reside on the DIRMAINT server's 1DF disk or on any other non-public disk in its search order.

You may tailor the sample exit to your needs if you require a more detailed account number verification function. If this exit is not configured and an account number is specified on the Image_Create_DM API, the API will fail with an account policy error (return code RCERR_POLICY_ACCT).

Prototype_Create_DM: Adding A New PROTODIR File

The PROTODIR file may contain almost any valid directory statement, as described in [z/VM: CP Planning and Administration](#).

1. Any DASD space allocation statements contained in the PROTODIR file should specify unformatted DASD space.
 - The statement name should be MDISK (rather than AMDISK).
 - If the AMDISK keyword is used, neither the BLKSIZE nor the LABEL keywords should be used.
 - Use of the BLKSIZE or LABEL keywords cause an asynchronous DirMaint process to be spawned for which neither completion nor results can be verified.

If CMS formatted DASD space is required, the PROTODIR file should omit the space allocation statement(s), and subsequent Image_Disk_Create_DM (AMDISK) or Image_Disk_Copy_DM (CLONEDISK) requests should be made to add and format the space once the Image_Create_DM (ADD) function has completed.

2. All DASD space allocation (MDISK) statements contained in the PROTODIR file must specify some form of automatic allocation, using an AUTOG, AUTOR, AUTOV, T-DISK, V-DISK, or the block size variants of GBLKnnnn, RBLKnnnn, VBLKnnnn, or VDBSnnnn. Use of an absolute starting cylinder number is not supported. If a disk must be allocated at a specific starting cylinder number for some reason, omit the definition of this disk from the PROTODIR file and use an Image_Disk_Create_DM (AMDISK) or Image_Disk_Copy_DM (CLONEDISK) request once the Image_Create_DM (ADD) function has completed.

A sample CMS PROTODIR file:

```
USER CMS NOLOG
INCLUDE CMSDFLT
MDISK 191 XXXX AUTOG 2 CMSGROUP MR
```

A sample LINUX PROTODIR file:

```
USER LINUX NOLOG
INCLUDE LINDFLT
MDISK 191 3390 AUTOG 0050 LINGROUP MR
MDISK 150 3390 AUTOG 3088 LINGROUP MR
MDISK 151 3390 AUTOG 0200 LINGROUP MR
```

Replacing an Image Definition

The Image_Replace_DM function can be used to replace the definition of a virtual image in the source directory, however, its use must be coordinated with other functions to ensure the integrity of the definition. Before invoking Image_Replace_DM, perform the following steps.

1. Call the Image_Lock_DM function to lock the image against changes by anyone else.

If the image is already locked, your Image_Lock_DM request will fail. Wait until whoever locked it has completed their update and unlocked it. You can use the DirMaint STATUS LOCKED request to find out who created the lock.
2. Call the Image_Query_DM function to obtain the current definition of the virtual image. This will include any changes made by anyone else since your most recent change.
3. Modify the results from your Image_Query_DM request to fit your current requirements for the image definition.



CAUTION: You should not make changes to disk space allocations (MDISK directory statements). There is no provision in the Image_Replace_DM function for allocating new disk space using automatic allocation, formatting new space using explicit allocation, protection against allocating space already in use, or for security erasure of deleted space. Disk space allocation additions or deletions should be made using one or more of the following functions: Image_Disk_Create_DM, Image_Disk_Copy_DM, Image_Disk_Delete_DM.

4. When ready, call the Image_Replace_DM function to have the Directory Manager update the source directory with your new definition. When the replacement definition has been accepted as the new directory source, the image is implicitly unlocked.

If someone else has replaced the definition between your Image_Lock_DM and Image_Replace_DM requests, or has unlocked the image in that interval, your Image_Replace_DM request will fail. To ensure integrity of the definition, re-lock and re-query the image, redo your modifications, and then repeat the Image_Replace_DM request.

5. If you change your mind and choose not to replace an image definition after locking it, you must explicitly unlock it with an Image_Unlock_DM function call before any other changes can be made to it.

Asynchronous DASD Management Operations

The results of certain DASD management operations may not always be immediately available to a caller of directory manager APIs. This is because certain DASD management operations complete asynchronously rather than synchronously.

These asynchronous DASD management APIs include Image_Disk_Create_DM, Image_Disk_Copy_DM, and Image_Disk_Delete_DM. When DirMaint initiates an asynchronous operation for one of these functions, the API will return an operation ID as an output parameter. Note that Image_Create_DM and Image_Delete_DM may have associated DASD management processes, which will also return an operation ID.

When a client application receives this operation ID, it should then pass the ID to the Query_Asynchronous_Operation_DM API to determine when the operation completes, and whether it completes successfully. A successful invocation of Query_Asynchronous_Operation_DM will return a value of RC_OK in the return code output parameter, and a value in the reason code output parameter which will indicate completion status (RS_ASYNC_OP_SUCCEEDED, RS_ASYNC_OP_FAILED, or RS_ASYNC_OP_IN_PROGRESS).

Note: If a nonexistent operation ID is specified, Query_Asynchronous_Operation_DM will return a value of RC_OK and a reason code value of RS_ASYNC_OP_SUCCEEDED.

If an asynchronous DASD management operation request does not complete in a timely manner, two courses of action are available to you. You can:

- Use native DirMaint commands to diagnose and repair the cause of the problem in an effort to allow the request to complete

or

- Cancel the asynchronous work unit using the Directory_Manager_Task_Cancel_DM API.

Other Asynchronous Operations

Various other DirMaint operations that are not related to DASD Management usually complete synchronously, but can sometimes complete in what appears to be an asynchronous manner. There are several reasons this can happen:

- Other DirMaint requests (of any kind) from other users may be queued ahead of the current request, so that the current request cannot start executing.
- DirMaint operation has been interrupted by human intervention at the DirMaint console.
- The operation is technically not a true asynchronous operation, but it did not complete within DirMaint's timeout limit. A common cause of this condition is that updating a directory through DIRECTXA can be time-consuming.

In these cases, the return code will be set to 592 (RCERR_ASYNC_DM) and the reason code will be set to a 1- to 4-digit DirMaint request identifier. The Query_Asynchronous_Operation_DM function should be used to check the status of these operations.

Asynchronous Notifications

When using DirMaint as the directory manager, DirMaint fills in the *user_word* field in the asynchronous subscription notification message (as described in the Usage Notes for

Asynchronous_Notification_Enable_DM in *z/VM: Systems Management Application Programming*) with either of the following:

- The directory statement name, if only one directory statement was updated (added, changed, or deleted)
- A DirMaint command operand (such as Replace) if multiple directory statements were updated.

Configure Request Log Processing

The DIRMAINT server keeps a log of the SMAPI requests and their associated return codes in the 1SAPI REQUESTS file on the DIRMAINT 155 disk. This log is used to respond to Query_Asynchronous_Operation_DM API calls. The number of previous days for which to keep request information can be configured using the 1SAPI_REQUESTS_BEHAVIOR= configuration statement in a DirMaint override configuration file. The size of the DIRMAINT 155 disk should be evaluated for the appropriate space needed to store the typical number of requests that are received within the configured time interval. Sometimes an unexpected number of requests can be received in this time period, which could cause the DIRMAINT 155 disk to fill up and then lead to the DIRMAINT machine shutting down. In order to prevent this, the DIRMAINT server will automatically prune the 1SAPI REQUESTS file if the amount of space left on the 155 disk becomes less than or equal to the amount of space needed to prune the file plus 5 percent of the disk space. The percentage of total requests to prune can also be configured on the 1SAPI_REQUESTS_BEHAVIOR= statement. For information on how to configure this statement, refer to the "Step 2. Select Restart and Recovery Characteristics" section in *"CONFIG DATADVH"* on page 24.

Refer to the *DirMaint Program Directory* for information on how to determine the size of the DIRMAINT 155 disk when DirMaint is used with the z/VM Systems Management APIs.

DirMaint Optimization: Static_Image_Changes_Activate_DM, _Deactivate_DM, and _Immediate_DM

Most changes to the source directory require DirMaint to use the DIRECTXA command to "compile" the source directory into the "object" directory. Depending on the size of your source directory, CPU speed, user load, and a variety of other factors, the DIRECTXA command may finish quickly (one second or less), may take several seconds, or may take longer.

- If DIRECTXA takes only a short time to run on your system, IBM recommends use of ONLINE= IMMED in the CONFIG* DATADVH file(s). This is fine for occasional isolated directory changes.
- If and when you, as sole system administrator, are going to make multiple updates to the directory in a short period of time, it may be advantageous to start with a Static_Image_Changes_Deactivate_DM call. This ensures that DirMaint does not make use of DIRECTXA until you are done with your changes. When your batch of changes is complete, make sure that you re-enable use of DIRECTXA with a Static_Image_Changes_Activate_DM call, followed by a Static_Image_Changes_Immediate_DM call.
- If there are multiple system administrators working concurrently, you will want to coordinate your use of Static_Image_Changes_Deactivate_DM and Static_Image_Changes_Activate_DM. The first administrator to begin should make the Deactivate call, and the last one finished should make the Activate call. As each administrator finishes his or her group of requests, a Static_Image_Changes_Immediate_DM call can be made to put all of the changes accumulated by all of the administrators to that point online with one invocation of DIRECTXA.
- If DIRECTXA takes significantly longer to run on your system, you may want to run with ONLINE= SCHED in the CONFIG* DATADVH file(s), and generally use a DIRECT CONDITIONAL request at scheduled intervals (perhaps every 15 minutes, hourly, or every 4 hours) in the DIRMAINT DATADVH wakeup times control file. Under these circumstances, it is not usually necessary or desirable to make Static_Image_Changes_Deactivate_DM or Static_Image_Changes_Activate_DM calls. If you make a change that needs to be put into effect before the next scheduled update, you may use a Static_Image_Changes_Immediate_DM call to do so at any time.

- If a directory manager function ends with $(rc,rs) = (0,8)$, this indicates that the source directory has been updated but the changes have *not* been put online in the object directory. If you wish to override DirMaint's configuration settings and bring this change online immediately, you may do so with a `Static_Images_Changes_Immediate_DM` call.

Appendix C. Tuning DirMaint Performance

There are three types of DirMaint performance tuning that can be done:

- Optimizing the user machine entries in the CONFIG* DATADVH file(s).
- Optimizing the service machine entries in the CONFIG* DATADVH file(s).
- Issuing CP privileged command options

Optimizing the User Machine

DirMaint functions performed in the user's virtual machine can be improved by following the suggestions described below.

- Split the CONFIG* DATADVH file into multiple files. Keep the user machine related entries in a CONFIG* DATADVH file on the user interface disk, 11F and 21F. Move the service machine related entries into a CONFIG* DATADVH file on the service machine program disks, 191 and 192. This action will benefit all DirMaint users.
- Minimize the number of entries in the REQUIRED_USER_FILE list. At least one entry is required; the DVHCMD EXEC is recommended. Having an entry for every part of the DirMaint product located on the interface disk, 11F and 21F may help with problem diagnosis by making error messages more specific when a problem occurs because of a missing file. However, this error checking process decreases DirMaint command performance slightly in a user's virtual machine. This action will benefit all DirMaint users.
- Maximize the number of entries in the LOADABLE_USER_FILE list. Reading frequently used files into storage takes time. General users, who may typically issue a DIRM PW command and a DIRM REVIEW command every month on the average, won't be affected by this. But users who have many DirMaint commands to issue will save time by making all parts resident, reading the files only once for the entire group of commands.
- Encourage general users who issue many DirMaint commands to submit them using DIRM BATCH. If the commands are not suited for batch processing, the general user should use the DIRM EXECLOAD command to make frequently used DirMaint user machine routines memory resident when they begin their DirMaint work. They should then issue a DIRM EXECDROP command at the end of the DirMaint work.
- Encourage your system administration personnel (especially those that issue many &DIRM commands daily) to put an EXEC DIRM MAINT EXECLOAD command into their PROFILE EXEC.
- If you have a large administration staff, you may want to consider installing the user machine routines into a shared segment. For more information see, [z/VM: CP Planning and Administration](#).
- Remove comments lines, beginning with a slash, from the CONFIG* DATADVH file(s).

Optimizing the DirMaint Service Machines

Functions performed in the DirMaint service machines can be improved by following the suggestions described below.

- Split the CONFIG DATADVH file into multiple files. Keep the user machine related entries in a CONFIG* DATADVH file on the user interface disk (11F, 21F). Move the service machine related entries into a CONFIG* DATADVH file on the service machine program disks (191, 192).
- Minimize the number of entries in the following lists:
 - REQUIRED_SERVER_FILE
 - REQUIRED_DIRMAINT_FILE

- REQUIRED_DATAMOVE_FILE
- REQUIRED_DIRMSAT_FILE

While this checking is only done once, at initialization time, these additional records must be scanned and skipped every time the CONFIG* DATADVH file(s) are read.

- Use existing system facilities for disaster recovery, rather than exploit DirMaint's redundancy capabilities. Don't use the:
 - 2AA disk if the 1AA disk is backed up nightly.
 - 2DF disk if the 1DF disk is backed up nightly.
 - MESSAGE_LOGGING_FILETYPE if you are running with an ESM and recording DirMaint activity in the ESM audit log. Use the MESSAGE_LOGGING_FILTER_EXIT and ESM_LOG_FILTER_EXIT entries to avoid recording unnecessary messages in the TRANSLOG file or in the ESM audit log.
- Exploit tailoring options that improve both performance and usability on your system. For example, use UPDATE_IN_PLACE= YES on your system.
- Avoid using options whose performance cost on your system outweighs the usability benefits for your system.
 - Avoid use of SORT_BY_DEVICE_ADDRESS= YES.
 - Use DASD_ALLOCATE= FIRST_FIT rather than EXACT_FF.
 - If privacy of residual data is not usually a concern on your system, use DISK_CLEANUP= NO to avoid the time to FORMAT deleted minidisks.

If privacy of residual data is a concern on your system, use DISK_CLEANUP= YES in the CONFIG* DATADVH file(s).

When DISK_CLEANUP= YES, request the administration staff to explicitly specify the CLEAN or NOCLEAN option on DMDISK or PURGE commands to avoid the time it takes to check for overlapping minidisks.

Note: The CMDISK command does not support the CLEAN or NOCLEAN option.

- Experiment with options that have trade-offs that could fall either way.
 - Try ONLINE= IMMED; the WRK_UNIT_ONLINE setting is irrelevant.
 - Try ONLINE= SCHED with WRK_UNIT_ONLINE= YES.
 - Try ONLINE= SCHED with WRK_UNIT_ONLINE= NO.

Adjust queue sizes to hold all work that typically arrives between directory updates.

- With ONLINE= IMMED or with WRK_UNIT_ONLINE= YES, try the IBM supplied default queue sizes:

```
DM_MAXIMUM_RETRIES= 10  
MAXIMUM_UNASSIGNED_WORKUNITS= 100
```

- With ONLINE= SCHED and WRK_UNIT_ONLINE= NO

```
==/==/== +01:00:0 DIRECT
```

specified in the DIRMAINT DATADVH file, and approximately 30 DASD management commands (AMDISK, CMDISK, DMDISK) arriving per hour, try increasing the queue sizes:

```
DM_MAXIMUM_RETRIES= 50  
MAXIMUM_UNASSIGNED_WORKUNITS= 500
```

- Customize the DVHXPREF EXEC, an IBM-supplied sample exit routine to define a VFB-512 virtual disk in storage and format it as filemode A, as shown in [Figure 30 on page 217](#).

```

1 PURPOSE= RWS FM= A ACC= 255 V-disk copy of 155.
2 PURPOSE= SRV FM= C ACC= 291 V-disk copy of 191.
3 PURPOSE= USR FM= D ACC= 31F V-disk copy of 11F.
4 PURPOSE= PDF FM= E ACC= 3DF V-disk copy of 1DF.
    PURPOSE= SSI FM= F ACC= 551
    PURPOSE= PDB FM= G ACC= 1DB
    PURPOSE= PTH FM= H ACC= 1AA
3 PURPOSE= SDF FM= J ACC= 1DF
  / PURPOSE= SDB FM= - ACC= --- not used. PDB covered by nightly backup
  / PURPOSE= STH FM= - ACC= --- not used. PTH covered by nightly backup
4 PURPOSE= abc FM= K ACC= 155
5 PURPOSE= def FM= L ACC= 191
6 PURPOSE= ghi FM= M ACC= 11F
    PURPOSE= SFA FM= Z ACC= 2FA V-disk.

```

Figure 30. Copying all files from the 155 disk to the new V-disk

These steps will help you customize the DVHXPREF EXEC.

Step 1.

Create the V-disks, as shown in **1** - **4**

Step 2.

Copy files to the V-disks from the 155, 191, 11F, and 1DF disks by using the DVHXPREF EXEC, with nothing being copied to the 2FA disk, as shown in **3** - **6**

Step 3.

Customize the DVHPROFA DIRMAINT, DVHPROFA DIRMSAT and DVHPROFM DATADVH files to access these disks.

For more information on the DVHPROFA DIRMAINT, see the [“DVHPROFA DIRMAINT”](#) on page 24.

Note: IBM recommends that the conventional minidisk files be backed up nightly, there is no protection of redundant conventional minidisks. However, there is a potential for loss of a few DirMaint transactions in the event of a system failure. Generally, this is accepted as a worthwhile risk to take in order to obtain the performance benefit of using V-disks.

- Remove comments lines, beginning with a slash, from the CONFIG* DATADVH file(s).
- Exploit the exit routines for performance. If you have a central administration staff and do not delegate use of the privileged commands, for example:

```
/* */ Exit 0
```

or

```
/* */
If WordPos(Userid(),'adminid1 adminid2 adminid3') <= 0
Then Exit 0
Else Exit 30
```

for some of the exit routines will bypass further authorization checking. Candidates for this include:

- ACCOUNT_NUMBER_VERIFICATION_EXIT
- DASD_AUTHORIZATION_CHECKING_EXIT
- LINK_AUTHORIZATION_EXIT
- LOCAL_STAG_AUTHORIZATION_EXIT

Setting CP Performance Options

For more information on these commands, see the [z/VM: CP Commands and Utilities Reference](#).

SET RESERVE Command

On systems with high paging load, DirMaint will very likely be paged out when an interrupt comes in. The SET RESERVE command, however, lets most DirMaint active pages remain in real storage.

SET QUICKDSP Command

The QUICKDSP designation is intended for selective use on virtual machines with critical response time requirements. The scheduler always moves a QUICKDSP user immediately into the dispatch list whenever it is ready to run, regardless of resource requirements and current system load. Indiscriminate use, therefore, increases response time overall and may severely affect maintenance of system storage.

QUICKDSP is generally provided for use by selected service virtual machines interacting with several other users, thus having stringent response time requirements. RSCS and IUCV applications are common examples.

Appendix D. DirMaint Configuration Data Files

This appendix provides a summary of each of the CONFIG* DATADVH entries provided by DirMaint. These data files provide information about the configuration of the DirMaint feature. If there are multiple files, they are searched in reverse alphabetical order so that entries in CONFIG99 will override entries in the IBM supplied CONFIG default. [Table 48 on page 219](#) describes many of the CONFIG* DATADVH entries supported by DirMaint.

Table 48. CONFIG* DATADVH Entries Summarized

Entry Name	Possible Operands	Comments	Topic
ADD_COMMAND_PROCESSING=	FULL or SHORT	This statement specifies whether LINK and MDISK directory statements in a directory entry being added are processed using full authorization checking, or if they are allowed to shortcut any of the LINK and AMDISK authorization checks.	“Step 3. Select Security and Auditing Characteristics” on page 29
ALLOW_ASUSER_NOPASS_FROM=	serverid * servernode	This statement gives the <i>userid</i> and <i>nodeid</i> of trusted service machines who can make requests including the ASUSER prefix keyword (which generally forces authentication) without supplying a password and thus without authentication. You must be EXTREMELY careful which servers are granted this capability, since this gives the listed servers the keys to your system (ASUSER DIRMANT or ASUSER MAINT for examples). A <i>nodeid</i> of * may be used to represent any system within the cluster where the DIRMANT server is running.	“Step 3. Select Security and Auditing Characteristics” on page 29
BACKUP_REBUILD= CLUSTER DVHLINK <VCONTROL> NONE	NONE	This statement controls the balance between the time taken to complete a BACKUP operation and the amount of cleanup needed.	“Step 1. Select Directory Update Options” on page 25
CLASS_LIMIT_ON_USER_STATEMENT=	8 0 ... 32 0 ... 8	Specifies how many CP privilege classes may be included on the USER statement.	“Step 1. Select Directory Update Options” on page 25
CLASS_STATEMENT_IN_PROFILE_CHECK=	NO or YES	Specifies whether DirMaint will do the additional checking to see if the included PROFILE contains a CLASS statement.	“Step 1. Select Directory Update Options” on page 25
COMMANDS_xxxx=	Handler routine file name	Defines the file name of the handler routine. This will determine what machine will process the command.	“CONFIG* DATADVH File Example” on page 104
CYLO_BLK0_CLEANUP=	NO or YES	This entry supports your OBJECT REUSE policy. Specify YES to have DirMaint format the cylinder 0 block 0 disk space from one user before allocating to another user to protect privacy.	“Step 3. Select Security and Auditing Characteristics” on page 29
DASD_ALLOCATE=	FIRST_FIT or EXACT_FF	Specifies which allocation algorithm to use for AUTOR, RBLK*, AUTOV, VBLK*, AUTOG, and GBLK* requests. FIRST_FIT is the faster choice, while EXACT_FF reduces fragmentation.	“Automatic Allocation Algorithms” on page 85
DATAMOVE_MACHINE=	<i>MachName MachNode SysAffin</i>	DirMaint DASD Management functions that require a CMS FORMAT, COPYFILE command, or both, may take a while to perform. So they are assigned to another service virtual machine for processing. Each machine must be identified on a DATAMOVE_MACHINE statement, along with the node ID within the complex where the DATAMOVE machine is running, and the system affinity that the DATAMOVE machine is authorized to process. The CONFIGSS DATADVH file is an appropriate container for the DATAMOVE_MACHINE statement because satellite definitions must be in CONFIGSS DATADVH. The CONFIGSS DATADVH file must be on the DirMaint server's 11F disk.	“Defining a DATAMOVE Machine to the DIRMANT Server” on page 73
DEFAULT_CMDLEVEL=	140A or 150A	This value determines which messages and command parsing files should be used when the user has not entered a DIRM GLOBALV CMDLEVEL command to select their own default CMDLEVEL. The preferred default for general users is 150A.	“The DEFAULT_CMDLEVEL= Entry” on page 108

Table 48. CONFIG* DATADVH Entries Summarized (continued)

Entry Name	Possible Operands	Comments	Topic
DEFAULT_CMDSET.xxxx=	The IBM-supplied default is G.	This value determines which privileges a user has if the user has not been explicitly authorized for specific privileges. A different default may be specified for each defined CMDLEVEL.	“CONFIG* DATADVH File Example” on page 104
DEFAULT_DELTA_OPTIONS=	Null, TRACE, CALL, RETURN, or USER <i>id</i> .	This value sets diagnostic options for delta processing.	N/A
DEFAULT_DIRECT_ACTION=	UNCONDITIONAL or CONDITIONAL	This value determines the default for the optional UNCONDITIONAL or CONDITIONAL parameters on the DIRMAINT DIRECT command. If specified as CONDITIONAL, the DIRECTXA command will not be issued unless there are pending changes to be processed. If specified as UNCONDITIONAL, the DIRECTXA command will be issued, regardless of any pending changes to be processed. (If omitted, the default is UNCONDITIONAL.)	N/A
DEFAULT_SERVER_LANG=	Language identifier	This value determines the language used for messages sent to the DIRMAINT/DATAMOVE/DIRMSAT machine's console and to the broadcast list for service messages. If not specified, the default is AMENG. Messages to an individual user are sent in the user's requested language.	N/A
DIRECTXA_OPTIONS=	MIXED or MIXED NOMIXMSG	<p>This value specifies the options used when the DIRECTXA command places the directory online. If you have a <i>clean</i> source directory for z/VM leave this blank. If your source directory has been migrated from the VM/ESA 370 feature (or its VM/SP or VM/SP HPO predecessors) and contains a few 370 flavor directory statements, you may chose to use MIXED to assist you in completing your migration.</p> <p>If your directory contains too many 370 flavor directory statements, you may use MIXED NOMIXMSG to suppress the messages.</p>	“Step 1. Select Directory Update Options” on page 25
DISK_CLEANUP=	NO or YES	This entry supports your OBJECT REUSE policy. Specify YES to have DirMaint format disk space from one user before allocating to another to protect privacy.	“Step 3. Select Security and Auditing Characteristics” on page 29
DISK_SPACE_THRESHOLD_addr	IBM supplied defaults are 75 and 90. However, you can use any number from 1 - 99, the first value must be less than the second value, the second value must be less than or equal to 1 - 99.	This value identifies the warning and shutdown limitation on DASD space usage. <i>addr</i> is the device address of the disk whose threshold is being changed.	“Step 2. Select Restart and Recovery Characteristics” on page 28
DM_MAXIMUM_RETRIES=	A numeric value in the range of 0 through 9999	<p>If a DATAMOVE machine is unable to link to a minidisk (most likely because a user is linked to a disk for which a CMDISK command has been entered, or because the directory change to transfer the minidisk to DATAMOVE has not been put online), then the FORMAT/COPY/CLEAN request will be put onto the DATAMOVE machine's retry queue. The DM_MAXIMUM_RETRIES value determines the maximum size of this retry queue. After DIRMAINT has been notified that this limit has been reached, DIRMAINT will not assign any more work to that particular DATAMOVE machine.</p> <p>The default for this value is 10. If a value is specified outside of the valid range of 0 through 9999, then the value will be set to 1.</p>	“Step 3. Define the DATAMOVE Retry and Autolog Limits” on page 67

Table 48. CONFIG* DATADVH Entries Summarized (continued)

Entry Name	Possible Operands	Comments	Topic
DVHDXD_FLASHCOPY_BEHAVIOR=	0, 1, or 2	<p>A value of 0 causes the exit to end with RC=30, which causes DATAMOVE to revert to use of DDR.</p> <p>A value of 1 causes the exit to issue the FLASHCOPY command. If FlashCopy Version 2 DASD is in use, the copy will be synchronous. If FlashCopy Version 1 DASD is in use, the copy will be asynchronous.</p> <p>A value of 2 causes the exit to issue the FLASHCOPY command with the SYNChronous option if FlashCopy Version 1 DASD is in use. If FlashCopy Version 2 DASD is in use, the copy will be synchronous. If the SYNChronous option is not supported and FlashCopy Version 1 DASD is in use, the CLONEDISK operation will complete when the COMMAND COMPLETE delayed response is received, unless polling FLASHCOPY commands are configured using the DVHDXD_FLASHCOPY_COMPLETION_WAIT configuration statement.</p> <p>Note that configuring DirMaint to poll the background copy associated with a CLONEdisk operation negates the performance benefits of FLASHCOPY. Performance in the polling method will be similar or worse to that of DDR.</p>	N/A
DVHDXD_FLASHCOPY_COMPLETION_WAIT=	Two numeric values, each ranging from 0 (no wait) to 3600 (one retry every hour)	<p>These values specify when, in number of seconds, to issue a subsequent FLASHCOPY command to check for the completion of the background copy process of a prior command. The first value is the wait between issuances of a CP FLASHCOPY 0 0 request, and the second is between issuances of a CP FLASHCOPY END END request.</p> <p>Note: DVHDXD_FLASHCOPY_COMPLETION_WAIT configures DirMaint to poll the background copy associated with a FLASHCOPY command. This polling method is used only when Enterprise Storage System FlashCopy Version 1 DASD is in use and the SYNChronous option is not supported on the CP FLASHCOPY command. Without this polling, the CLONEDISK operation will be considered complete when the COMMAND COMPLETE response is received from the FLASHCOPY command associated with the original CLONEDISK. At that time, the disks are considered useable by CP, but the disks may not be used in another FLASHCOPY operation until the background copy is complete. Configuring DirMaint to wait for the background copy to complete negates the performance benefits of FLASHCOPY. Performance in the polling method will be similar to or worse than that of DDR.</p>	N/A
DVHDXD_FLASHCOPY_DIAGNOSTICS=	0, 1, 2, 3, 4, or 5	<p>This value specifies the level of detail desired in DVHDXD diagnostics, as follows:</p> <p>0 No diagnostics</p> <p>1 Show entry time, date, and parameters plus exit RC</p> <p>2 Show as per above, plus diagnostic options</p> <p>3 Show as per above, plus device characteristics</p> <p>4 Show as per above, plus intermediate RCs</p> <p>5 Show as per above, plus details of each CP substep – if DVHDXD_FLASHCOPY_BEHAVIOR=2.</p>	N/A

Table 48. CONFIG* DATADVH Entries Summarized (continued)

Entry Name	Possible Operands	Comments	Topic
DVHDXD_FLASHCOPY_DIAGFILE_ERASE=	0 or 1	This value specifies whether (1) or not (0) the DVHDXD DIAGFILE is erased before beginning the next FLASHCOPY operation.	N/A
DVHDXD_FLASHCOPY_NOREPLY_WAIT=	Two numeric values, the first between 1 and 85400, the second between 1 and 61	<p>The first value specifies the number of seconds the IBM-supplied sample exit will wait after issuing a FLASHCOPY command before presuming that the response is lost. The maximum allowable value is 85400 seconds (24 hours). If omitted, the default is 3660 seconds (61 minutes).</p> <p>The second value specifies the number of seconds the IBM-supplied sample exit will wait after receiving one reply before presuming that there are no subsequent replies. The maximum value is 61 seconds. The default is 3 seconds.</p> <p>Note: This configuration value is ignored if either DVHDXD_FLASHCOPY_BEHAVIOR= 1 or FlashCopy Version 2 DASD is in use.</p>	N/A
DVHSAPI_END_MSG.message=	Any valid message numbers	Identifies user tailorable choices for when the DVHSAPI routine exits and returns control back to the calling application. The default, if no entries are specified, is to end when message DVHREQ2289I is received.	“CONFIG* DATADVH File Example” on page 104
DVHSAPI_ENTER_KEY_ACTION=	END IGNORE	Specifies whether pressing the ENTER key either terminates DVHSAPI or is ignored. The default (for compatibility) is END.	“CONFIG* DATADVH File Example” on page 104
DVHWAIT_BATCH_INTERVAL=	mm:ss or hh:mm:s	Specifies how long DVHWAIT should delay to wait for other input when a BATCH job file is active. If hours are specified, granularity is 10 second intervals. The default is 0 seconds (00:00).	N/A
DVHWAIT_CLUSTER_INTERVAL=	mm:ss or hh:mm:s	Specifies how long DVHWAIT should delay while waiting for a DIRECTXA request to complete on the satellite systems within an SSI cluster. If hours are specified, granularity is 10 second intervals. The default is 1 second (00:01).	N/A
DVHWAIT_IDLE_INTERVAL=	mm:ss or hh:mm:s	Specifies how often DVHWAIT must <i>wakeup</i> to prevent the DIRMAINT servers from being forced off the system due to lack of activity. If hours are specified, granularity is 10 second intervals. The default is 5 minutes (05:00).	N/A
ESM_LOG_FILTER_EXIT=	DVHXLF EXEC	This entry supports your AUDITING policy. As you review the entries in the ESM log, you may find many DirMaint messages that are of no interest to you. This entry suppresses future collection of these messages.	“Step 3. Select Security and Auditing Characteristics” on page 29
ESM_LOG_RECORDING_EXIT=	DVHESMLR EXEC	This entry supports your AUDITING policy. Use of an ESM with application audit logging capability allows AUDIT information to be located in a single repository.	“Step 3. Select Security and Auditing Characteristics” on page 29
ESM_PASSWORD_AUTHENTICATION_EXIT=	DVHXPA EXEC	This entry supports your AUTHENTICATION policy. A non-blank value is required to use an ESM for authentication.	“Step 3. Select Security and Auditing Characteristics” on page 29, “Step 5. Select RACF-Specific Characteristics” on page 34
FROM= DEST=		Defines the necessary route for a command or file from the system or to route messages or files from the DIRMAINT service machine back to the user.	“CONFIG* DATADVH File Example” on page 104
IVP_DISABLE_TEST=	IDs of IVP tests.	Specifies IVP tests that should not be run.	“Step 6. Select IVP Characteristics” on page 46
IVP_MAX_DURATION=	mm or hh:mm	Specifies the maximum time the IVP can run before it is considered to have failed.	“Step 6. Select IVP Characteristics” on page 46

Table 48. CONFIG* DATADVH Entries Summarized (continued)

Entry Name	Possible Operands	Comments	Topic
IVP_NEW_DAY_START=	YES or NO	Determines whether the IVP is started each day.	“Step 6. Select IVP Characteristics” on page 46
IVP_NOTIFY_FOR=	ALWAYS, WARNING or FATAL	Specifies when a notification should be sent to the system programmer or other personnel upon completion of a scheduled IVP run.	“Step 6. Select IVP Characteristics” on page 46
IVP_NOTIFY_TO=	<i>nickname or userid/node</i>	Specifies the user who receives notification the completion of a scheduled IVP run.	“Step 6. Select IVP Characteristics” on page 46
IVP_NO_TESTING=	<i>userid/node</i>	Specifies servers (other than the DIRMaint machine) that should not participate in the automated IVP run.	“Step 6. Select IVP Characteristics” on page 46
IVP_PARM=	GLOBAL or an IVP test ID, followed by the parameter to override and its new value.	Specifies a configuration parameter that will override a default.	“Step 6. Select IVP Characteristics” on page 46
IVP_RUNMODE=	OPERATIONAL or TESTING or ANY	Determines in which situations a scheduled IVP event runs.	“Step 6. Select IVP Characteristics” on page 46
LOADABLE_USER_FILE=	User file names	Defines the user file to be made resident or nonresident by using the EXECLOAD and EXECDROP commands.	“CONFIG* DATADVH File Example” on page 104
MAXIMUM_DATAMOVE_AUTOLOGS=	Numeric value in the range of 0 through 99	<p>Before assigning a workunit to a DATAMOVE machine, DirMaint will determine if the DATAMOVE machine is logged on. If the DATAMOVE machine is <i>not</i> logged on, then DirMaint will attempt to autolog it. The MAXIMUM_DATAMOVE_AUTOLOGS value specifies the number of times DirMaint will attempt to autolog a DATAMOVE machine which is not logged on to the system before quiescing the machine for manual intervention.</p> <p>Note that the autolog count is reset to zero during DAILY processing, so that if an autolog is successful and no further failures occur before DAILY processing, then MAXIMUM_DATAMOVE_AUTOLOGS will be attempted again.</p> <p>The default for this value is 10. If a value is specified outside of the valid range of 0 through 99, then the default will be used.</p>	“Usage Notes” on page 85
MAXIMUM_UNASSIGNED_WORKUNITS=	Numeric value	DirMaint DASD Management functions are queued for asynchronous processing by the DATAMOVE machine(s). The value specified for MAXIMUM_UNASSIGNED_WORKUNITS determines the maximum size of this queue. Too low a value results in DASD management commands being rejected because the queue is full while all DATAMOVE machines are busy. A value of 0 will completely disable all DASD management processing. Too high a value could result in problems not being noticed and reported to the support team for resolution in a timely manner.	“Usage Notes” on page 85
MAXIMUM_WORKUNIT_RETRIES=	Numeric value in the range of 0 through 999	<p>If a DATAMOVE machine is unable to link to a minidisk (most likely because a user is linked to a disk for which a CMDISK command has been issued, or because the directory change to transfer the minidisk to DATAMOVE hasn't been put online yet), then the FORMAT/COPY/CLEAN request will be put onto the DATAMOVE machine's retry queue. The MAXIMUM_WORKUNIT_RETRIES value specifies the number of times DirMaint will retry a workunit after the first attempt to process the work unit. Once the number of retries are attempted without success, the workunit will be cancelled and rolled back.</p> <p>There is no default setting. If a value outside of the valid range is specified or if MAXIMUM_WORKUNIT_RETRIES is not configured, then work units will be retried forever.</p>	“Usage Notes” on page 85

Table 48. CONFIG* DATADVH Entries Summarized (continued)

Entry Name	Possible Operands	Comments	Topic
MDPW_INTERVAL=	warn expire	<p>This determines how old a minidisk password may become before entering a WARNING period, and before entering the EXPIRED period. The first value must be less than the second value. The second value must be less than or equal to 373 (one year plus one week grace). Use of 0 0 disables checking.</p> <p>Note: Minidisk passwords of ALL never expire. DirMaint takes no action based on minidisk password expiration, but does flag them appropriately on the MDAUDIT report.</p>	“Step 4. Select Password Control Characteristics” on page 32
MESSAGE_LOG_RETENTION_PERIOD=	months	<p>This entry supports your AUDITING policy. A value of 3 months is suggested. This value may need to be adjusted up or down, depending on the amount of DirMaint activity on your system and the size of the minidisk you have allocated for the transaction history files.</p>	“Step 3. Select Security and Auditing Characteristics” on page 29
MESSAGE_LOGGING_FILETYPE= MESSAGE_LOGGING_FILTER_EXIT=	TRANSLLOG DVHXL EXEC	<p>These entries support your AUDITING policy. You may control what messages are LOGGED and where they are LOGGED.</p>	“Step 3. Select Security and Auditing Characteristics” on page 29
NEEDPASS_RESPECT=	NO or YES	<p>The NEEDPASS_RESPECT entry controls whether the DIRM NEEDPASS command setting (YES or NO) is used to determine whether the user is prompted to supply a password to execute DirMaint commands.</p> <p>If NEEDPASS_RESPECT is NO (the default):</p> <ul style="list-style-type: none"> All users are not prompted to supply a password to execute DirMaint commands. The DIRM NEEDPASS value (YES or NO) is ignored. User IDs listed in ALLOW_USER_NOPASS_FROM configuration statements can make requests without supplying a password. <p>If NEEDPASS_RESPECT is YES, the DIRM NEEDPASS setting is respected as follows:</p> <ul style="list-style-type: none"> If DIRM NEEDPASS is YES the user is prompted to enter a password to execute DirMaint commands. If DIRM NEEDPASS is NO the user is not prompted to enter a password to execute DirMaint commands. User IDs listed in ALLOW_USER_NOPASS_FROM configuration statements can make requests without supplying a password. 	“Step 3. Select Security and Auditing Characteristics” on page 29
ONLINE=	OFFLINE or SCHED or IMMED	<p>This value determines the initial value of the ONLINE CONTROL file. After DIRMaint has been initialized, the value be changed using the DIRM OFFLINE and DIRM ONLINE commands.</p>	“Step 1. Select Directory Update Options” on page 25
PARSER_xxxx=	Parser file name	<p>Defines the command entered by the user, verifies it is syntactically correct, expands keyword abbreviations to their full length, extracts selected information from and about the command, and makes it available to other parts of the product.</p>	“CONFIG* DATADVH File Example” on page 104
POSIX_UID_AUTO_RANGE=	low high	<p>This entry specifies a UID range for use during automatic assignment of POSIX UIDs to users during DIRM ADD and DIRM POSIXINFO operations. The input parms consist of two integer values, the first represents the lower bound, the second represents the upper bound. Note there is a space between <i>low</i> and <i>high</i>.</p>	“Step 3. Select Security and Auditing Characteristics” on page 29

Table 48. CONFIG* DATADVH Entries Summarized (continued)

Entry Name	Possible Operands	Comments	Topic
PURGE_COMMAND_PROCESSING=	FULL or SHORT	<p>This statement specifies whether LINK and MDISK directory statements in a directory entry being added are processed using full authorization checking, or if they are allowed to shortcut any of the LINK and AMDISK authorization checks.</p> <p>Note: This entry could also affect your OBJECT REUSE policy. Use of the PURGE_COMMAND_PROCESSING= SHORT will bypass the disk cleanup.</p>	“Step 3. Select Security and Auditing Characteristics” on page 29
PW_INTERVAL_FOR_GEN=	0 0	<p>This identifies how old a <i>general</i> user's logon password may become before entering a WARNING period, and before entering the EXPIRED period. The first value must be less than the second value. The second value must be less than or equal to 373 (one year plus one week grace). Use of 0 0 disables checking.</p>	“Step 4. Select Password Control Characteristics” on page 32
PW_INTERVAL_FOR_PRIV=	0 0	<p>This identifies how old a <i>privileged</i> user's logon password may become before entering a WARNING period and before entering the EXPIRED period. The first value must be less than the second value. The second value must be less than or equal to 373 (one year plus one week grace). Use of 0 0 disables checking. Blanks cause privileged users' passwords to be treated the same as general users.</p>	“Step 4. Select Password Control Characteristics” on page 32
PW_INTERVAL_FOR_SET=		<p>Unless otherwise specified, a password that is set using the ADD, CHNGID or SETPW commands will be valid for the full duration specified on the respective PW_INTERVAL_FOR_GEN or PW_INTERVAL_FOR_PRIV statements. The PW_INTERVAL_FOR_SET values specify a shorter expiration period when the password has been changed by one of these commands. The first value applies to <i>general</i> users. The second applies to <i>privileged</i> users. The values must be less than the respective expiration periods. The recommended minimum value is 1. The maximum suggested value is equal to the difference between the expiration period and the warning period.</p> <p>Note:</p> <ol style="list-style-type: none"> 1. All users are <i>general</i> users unless the system CHECK_USER_PRIVILEGE_EXIT is in use and identifies the users in question as <i>privileged</i>. 2. Logon passwords of AUTOONLY, LBYONLY, NOLOG, and NOPASS never expire. 	“Step 4. Select Password Control Characteristics” on page 32
PW_LOCK_MODE=	MANUAL or AUTOMATIC	<p>This determines whether DIRMAINT automatically generates and sends password expiration notices and changes expired passwords to NOLOG (if AUTOMATIC), or if this must be done by the administrator (if MANUAL).</p> <p>Note:</p> <ol style="list-style-type: none"> 1. PW_WARN_MODE is also AUTOMATIC. 2. The PW_INTERVAL_FOR_GEN and PW_INTERVAL_FOR_PRIV entries specify reasonable periods for your installation. 3. Disconnected service machines have a surrogate identified in the PWMON CONTROL file to receive their password notices. 4. Critical system user IDs, OPERATOR, DIRMAINT, MAINT, are listed in the PWMON CONTROL file as being exempt from lockout. 	“Step 4. Select Password Control Characteristics” on page 32
PW_MIN_LENGTH=	3	<p>This value is used by the IBM-supplied exits for PASSWORD_SYNTAX_CHECKING_USER_EXIT and PASSWORD_SYNTAX_CHECKING_EXIT. If your installation has modified these exits, or is not using them, then you may delete this value.</p> <p>For more information, see the z/VM: Directory Maintenance Facility Tailoring and Administration Guide.</p>	N/A

Table 48. CONFIG* DATADVH Entries Summarized (continued)

Entry Name	Possible Operands	Comments	Topic
PW_NOTICE_PRT_CLASS=	One letter from A to Z or NONE	This identifies the spool file print class to be used for printed password warning and expiration notices. A value of NONE indicates that password notices will not be printed.	“Step 4. Select Password Control Characteristics” on page 32
PW_NOTICE_RDR_CLASS=	One letter from A to Z or NONE	This identifies the spool file reader class to be used for password warning and expiration notices sent to a user's reader. A value of NONE indicates that password notices will not be sent.	“Step 4. Select Password Control Characteristics” on page 32
PW_REUSE_HASHING_EXIT	None	The routine hashes the user's password for storage in the password history file. The file type may be either EXEC or MODULE. The IBM supplied default is DVHHASH MODULE. If not specified, the passwords will be stored in the history file as hexadecimal digits.	“CONFIG* DATADVH File Example” on page 104
PW_REUSE_INTERVAL	None	This identifies how long an entry is kept in the password history file. It may be either a time period with a DAYS suffix, or a count with no suffix. The IBM supplied default is 365 DAYS. Note: If the IBM supplied default of 365 DAYS is changed, you need to enable a PASSWORD CHANGE NOTIFICATION EXIT = DVHXPXN EXEC statement in the CONFIG* DATADVH file.	“CONFIG* DATADVH File Example” on page 104
PW_WARN_MODE=	MANUAL or AUTOMATIC	This determines whether DIRMAINT automatically generates and sends password warning notices (if AUTOMATIC), or if this must be done by the administrator (if MANUAL).	“Step 4. Select Password Control Characteristics” on page 32
RACF_ADDUSER_DEFAULTS=	Any valid option on the RACF ADDUSER command	Specifies the defaults that will be used by DVHRUN when it issues a RACF ADDUSER command. (See the z/VM: RACF Security Server Command Language Reference for valid options.) The IBM-supplied default is UACC(NONE).	“Step 5. Select RACF-Specific Characteristics” on page 34
RACF_DISK_OWNER_ACCESS=	Any valid access option on the RACF PERMIT CLASS(VMMDISK) command.	Specifies the access authority that will be used by DVHRDN when it issues the RACF PERMIT command for the owner of a disk that is being added. (See the z/VM: RACF Security Server Command Language Reference for valid options.) The IBM-supplied default is ACC(ALTER).	“Step 5. Select RACF-Specific Characteristics” on page 34
RACF_RDEFINE_SURROGAT_DEFAULTS=	Any valid option on the RACF RDEFINE SURROGAT command	Specifies the defaults that will be used by DVHRLB or DVHRUN when it issues a RACF RDEFINE SURROGAT command. (See the z/VM: RACF Security Server Command Language Reference for valid options.) The IBM-supplied default is UACC(NONE) AUDIT(FAILURES(READ)).	“Step 5. Select RACF-Specific Characteristics” on page 34
RACF_RDEFINE_VMBATCH_DEFAULTS=	Any valid option on the RACF RDEFINE VMBATCH command	Specifies the defaults that will be used by DVHRUN when it issues a RACF RDEFINE VMBATCH command. (See the z/VM: RACF Security Server Command Language Reference for valid options.) The IBM-supplied default is UACC(NONE) AUDIT(FAILURES(READ)).	“Step 5. Select RACF-Specific Characteristics” on page 34
RACF_RDEFINE_VMMDISK_DEFAULTS=	Any valid option on the RACF RDEFINE VMMDISK command	Specifies the defaults that will be used by DVHRDN when it issues a RACF RDEFINE VMMDISK command. (See the z/VM: RACF Security Server Command Language Reference for valid options.) The IBM-supplied defaults are UACC(NONE) AUDIT(FAILURES(READ)).	“Step 5. Select RACF-Specific Characteristics” on page 34
RACF_RDEFINE_VMPOSIX_POSIXOPT.QUERYDB=	Any valid option on the RACF RDEFINE VMPOSIX POSIXOPT.QUERYDB command	Specifies the defaults that will be used by DVHRUN or DVHRPESM when it issues a RACF RDEFINE VMPOSIX POSIXOPT.QUERYDB command. (See the z/VM: RACF Security Server Command Language Reference for valid options.) The IBM-supplied default is UACC(READ).	“Step 5. Select RACF-Specific Characteristics” on page 34
RACF_RDEFINE_VMPOSIX_POSIXOPT.SETIDS=	Any valid option on the RACF RDEFINE VMPOSIX POSIXOPT.SETIDS command	Specifies the defaults that will be used by DVHRUN or DVHRPESM when it issues a RACF RDEFINE VMPOSIX POSIXOPT.SETIDS command. (See the z/VM: RACF Security Server Command Language Reference for valid options.) The IBM-supplied default is UACC(NONE).	“Step 5. Select RACF-Specific Characteristics” on page 34

Table 48. CONFIG* DATADVH Entries Summarized (continued)

Entry Name	Possible Operands	Comments	Topic
RACF_RDEFINE_VSWITCH_LAN=	YES or NO	This determines whether or not DIRMAINT automatically creates a RACF profile (using RDEFINE) for a z/VM Virtual Switch or guest LAN if one does not exist during an 'add' operation. (See the <i>z/VM: RACF Security Server Command Language Reference</i> .) The IBM-supplied default is YES.	“Step 5. Select RACF-Specific Characteristics” on page 34
RACF_RDEFINE_VMRDR_DEFAULTS=	Any valid option on the RACF RDEFINE VMRDR command	Specifies the defaults that will be used by DVHRUN when it issues a RACF RDEFINE VMRDR command. (See the <i>z/VM: RACF Security Server Command Language Reference</i> for valid options.) The IBM-supplied default is UACC(NONE) AUDIT(FAILURES(READ)).	“Step 5. Select RACF-Specific Characteristics” on page 34
RACF_VMBATCH_DEFAULT_MACHINES=	The names of any batch machines on the system	Identifies the batch machines for which DVHRUN will issue a RACF <i>target_id</i> PERMIT CLASS(VMBATCH) command. (See the <i>z/VM: RACF Security Server Command Language Reference</i> for valid options.) There is no IBM-supplied default.	“Step 5. Select RACF-Specific Characteristics” on page 34
REQUIRED_USER_FILE=	User file names	Defines the files needed in the user's virtual machine to enter any DIRMAINT commands.	“CONFIG* DATADVH File Example” on page 104
RUNMODE=	TESTING or OPERATIONAL	This value determines whether directory source changes are actually made (if OPERATIONAL) or discarded (if TESTING). For safety, the IBM-supplied default is TESTING.	“Step 1. Select Directory Update Options” on page 25
SAMPL_LINESIZE_xxxx=	40-222	By default, DirMaint will dynamically select a message output length of either 52 or 73 characters. User's may select a "language" whose messages are formatted for a line length other than the default. Note: The maximum linesize is equal to 222; because the maximum length of the CP command buffer is 240, minus 9 for the user ID and intervening blank, minus 10 for the CP MSGNOH command and another blank. The minimum value is 40.	“CONFIG* DATADVH File Example” on page 104
SAMPL_USER_MSGS_xxxx=		The SAMPL entry provides an example of creating a custom language for a special application. The SAMPUSER message repository may reassign message numbers and severities, may rephrase the message text or suppress the message entirely, and may change the return code passed back when the message is issued.	“CONFIG* DATADVH File Example” on page 104
SATELLITE_SERVER=	<i>userid nodeid cpuid</i>	The DIRMAINT service machine maintains a single object directory, usually on the system residence volume. For redundancy in case of hardware errors with that volume, a satellite machine can be used to maintain a second object directory on a different volume. In an SSI cluster, one or two separate object directories must be maintained on each system - also using satellite servers. Each satellite server must be defined on a SATELLITE_SERVER statement, along with the node ID within the complex where the satellite server is running, and the CPU ID to be used to associate that satellite server with the correct DIRECTORY statement and system affinity in the source directory file. If specified, the SATELLITE_SERVER entry must be in the CONFIGSS DATADVH file on the DirMaint server's 11F disk.	“Step 1. Define a Satellite Service Machine to DIRMAINT” on page 69
SERVICE_LEVEL_INFO=	ALL, <i>fn</i> EXEC, <i>fn</i> XEDIT, <i>fn</i> REXX, <i>fn</i> MODULE, or CONFIG	Used to specify a file set for DVHSERVL \$EXEC, which is used to display a service level information report. <i>fn</i> is a file name of the file to be included in the report. You can specify * for the file name to include all files of the type you specify. You can insert multiple SERVICE_LEVEL_INFO= statements. File identifiers that are compiled from multiple SERVICE_LEVEL_INFO= specifications will be combined into a single list.	“Displaying Service Level Information” on page 191

Table 48. CONFIG* DATADVH Entries Summarized (continued)

Entry Name	Possible Operands	Comments	Topic
SHUTDOWN_LOGOFF_THRESHOLD=	2, 3, or 4	This value specifies the number of error induced shutdown conditions that may be encountered before the service machine logs itself off, if running disconnected.	“Step 2. Select Restart and Recovery Characteristics” on page 28
SHUTDOWN_MESSAGE_FAILURE=	LOGOFF or REIPL	This value identifies the action to be taken if the failure causing the shutdown occurred in the message handler. If your system is intended to meet TCB criteria, the correct value is LOGOFF. Otherwise you may choose either LOGOFF or REIPL for this value. (Because of the TCB relevance, the SHUTDOWN_MESSAGE_FAILURE entry is located with the other security related configuration parameters.)	“Step 3. Select Security and Auditing Characteristics” on page 29
SHUTDOWN_REIPL_COMMAND=	CP IPL CMS PARM AUTO CR	This value specifies the CP command to be entered in order to accomplish the re-IPL. The AUTO CR keyword is required. Any other keywords that are valid on the IPL command may also be used if appropriate for your system environment. For example: CP IPL 190 PARM AUTO CR NOSPROF FILEPOOL SERVERX	“Step 2. Select Restart and Recovery Characteristics” on page 28
SHUTDOWN_RESET_THRESHOLD=	s_r_t	This value specifies the number of commands that must be successfully processed after an error induced shutdown before the logoff counter is reset. The s_r_t must be >= 1. A <i>successfully processed command</i> is one that does not result in a shutdown condition, but does not necessarily result in a zero return code. The minimum recommended value is 2; the maximum recommended value is 5. Note: 1. Shutdown events are handled in pairs. The first shutdown, or any odd numbered shutdown, causes a re-IPL, and the failing command is retried. The second shutdown, or any even numbered shutdown is probably the retry of the failing command. (The lower the value for the RESET threshold, the more likely this is true; a RESET value of 1 ensures this.) Even numbered shutdowns cause either a re-IPL or a LOGOFF after purging the command from the retry queue. 2. After the specified number of shutdown events have occurred, a CP LOGOFF command is entered if running disconnected. If running connected, the system will continue to re-IPL.	“Step 2. Select Restart and Recovery Characteristics” on page 28
SORT_BY_DEVICE_ADDRESS=	NO or YES	The SORT_BY_DEVICE_ADDRESS value specifies whether or not the device statements in each user directory are maintained in sorted order by device address. Specifying YES increases the time and storage requirements for all updates to directory entries (either PROFILE or USER) containing device statements.	“Step 1. Select Directory Update Options” on page 25
SORT_COMMENTS_WITH_STATEMENTS=	NO or YES	The SORT_COMMENTS_WITH_STATEMENTS value specifies whether comments in a directory with SYSAFFIN statements are kept with the statement they follow (YES) or whether they drop to the bottom of the directory entry (NO). For optimum performance and minimum directory size, specify NO. The default is YES, for minimum impact to customer supplied arrangement of data. This option has no affect on directory entries that do not contain a SYSAFFIN statement, where the action is always YES.	“Step 1. Select Directory Update Options” on page 25
SORT_DIRECTORY=	NO or YES	This value specifies whether the USER DIRECT file is to be maintained in sorted order. Specifying YES increases the time and storage requirements	“Step 1. Select Directory Update Options” on page 25

Table 48. CONFIG* DATADVH Entries Summarized (continued)

Entry Name	Possible Operands	Comments	Topic
SPOOL_CONSOLE=	Spool console command text	This value identifies the USER id to receive the console spool files from the various DirMaint service machines. The data following the = is usually the command syntax after the CP SPOOL CONSOLE command. Note: When the DIRM GETCONSOLE command is issued, a copy of the spool file is sent to the command issuer and a copy is sent to the user ID identified. If the user ID's are the same, only one copy is sent. The same action will occur if the DIRM GETCONSOLE command is to retrieve a spool file residing in the virtual printer.	“Step 3. Select Security and Auditing Characteristics” on page 29
SPOOL_FILE_SECLABEL=	SYSLOW	This entry supports your ACCESS CONTROL policy.	“Step 3. Select Security and Auditing Characteristics” on page 29
SRCUPDATE=	DISABLED or NOP	This value determines whether DIRMAINT disables itself from accepting directory update commands from users each time DIRMAINT is restarted. If DISABLED, a DISABLE CONTROL file is created; otherwise this statement is ignored (NOP). The DISABLE CONTROL file will be erased by a DIRM ENABLE command.	“Step 1. Select Directory Update Options” on page 25
TREAT_RAC_RC.4=	0 or 4	Tells DVHRDN, DVHRLB, DVHRPESM, and DVHRUN how to treat RC=4 (authorization decision deferred by RACF to z/VM) for RACF commands as if the return code was 0 (successful) or 4 (unsuccessful). The default, if not configured, is 4.	“DASD Ownership Notification (DVHXDN)” on page 154, “User Change Notification (DVHXUN)” on page 180, “Step 5. Select RACF-Specific Characteristics” on page 34
UPDATE_IN_PLACE=	YES or NO	This value controls whether DIRMAINT will attempt to use DIAGNOSE code X'84' to put directory changes online. It can be changed using the DIRM OFFLINE and DIRM ONLINE commands.	“Step 1. Select Directory Update Options” on page 25
USE_RACF=	YES NO ALL <i>file_name</i>	Specifies whether automatic communication with RACF is enabled or disabled for all or for certain RACF connector support. YES ALL indicates that all RACF connector support is enabled, except for those parts specified on a NO <i>file_name</i> statement. NO ALL indicates that all RACF connector support is disabled, except for those parts specified on a YES <i>file_name</i> statement. <i>file_name</i> indicates a DirMaint RACF connector part for which to enable or disable automatic RACF communication.	“Step 5. Select RACF-Specific Characteristics” on page 34
WRK_UNIT_CLEANUP=	ERASE or RENAME	This value controls whether the WORKUNIT files will be erased or renamed to WORKSAVE after the completion of the DASD management commands. In the event of a failure, they will be renamed to WUCFFAIL in either case.	“Step 1. Select Directory Update Options” on page 25
WRK_UNIT_ONLINE=	NO or YES	This value controls whether DIRMAINT will include DIRECTXA commands in the middle of a work unit. A work unit is a group of DIRMAINT commands created by DIRMAINT itself in response to a DASD management request that requires use of a DATAMOVE service machine to complete the request.	“Step 1. Select Directory Update Options” on page 25

Language Dependent Configuration Entries

The occurrence of *lang* must be replaced in the files listed in this section with one of the following language identifiers:

AMENG

American English

UCENG

Uppercase English

KANJI

Japanese

SAPI

Synchronous Application Programming Interface

The following identifies the language dependent files used for the user's active language:

```

lang_BATCH_HEADER_140A= DVHBHEAD DATAADVH    Batch header file
lang_BATCH_HEADER_150A= DVHBHEAD DATAADVH
lang_COPYRIGHT_NOTICE= DVHCOPYR DATAADVH      Copyright notice
lang_HELP_140A= DIRM  HELPDIRM                  Help files
lang_HELP_150A= DVHlang HELPADVH
lang_MENU_DEFS_150A= DVHMENUS DATAADVH        Menu data file
lang_USER_MSGS_140A= LCLAUSER MSGADVH          Message repositories
lang_USER_MSGS_140A= 140AUSER MSGADVH
lang_USER_MSGS_140A= 150AUSER MSGADVH
lang_USER_MSGS_150A= LCLAUSER MSGADVH
lang_USER_MSGS_150A= 150AUSER MSGADVH

```

The following entries define the files for those user languages not otherwise listed above. The indicates that these are the default. The defaults are set to mixed case American English.

```

....._BATCH_HEADER_140A= DVHBHEAD DATAADVH
....._BATCH_HEADER_150A= DVHBHEAD DATAADVH
....._HELP_140A= DIRM  HELPDIRM
....._HELP_150A= DVHAMENG HELPADVH
....._MENU_DEFS_150A= DVHMENUS DATAADVH
....._USER_MSGS_140A= LCLAUSER MSGADVH
....._USER_MSGS_140A= 140AUSER MSGADVH
....._USER_MSGS_140A= 150AUSER MSGADVH
....._USER_MSGS_150A= LCLAUSER MSGADVH
....._USER_MSGS_150A= 150AUSER MSGADVH

```

The following identifies the language dependent files that are common to both the user's and the server's machines.

```

COMMANDS_140A= LCLCMDS DATADVH
COMMANDS_140A= 140CMDS DATADVH
COMMANDS_150A= LCLCMDS DATADVH
COMMANDS_150A= 150CMDS DATADVH
PARSER_140A= DVHADZ EXEC
PARSER_150A= DVHAEZ EXEC

```

The following identifies the language dependent files used for the server's active language:

```

lang_MDISK_AUDIT_NOTICES= AUTOMAIL DATAADVH    Mdisk audit notice file
lang_PW_NOTICE_LOCK_OTHERW= PWLOTHER DATAADVH Password notice files
lang_PW_NOTICE_LOCK_OTHERL= PWLOTHER DATAADVH
lang_PW_NOTICE_LOCK_NOLOCK= PWNOLCK DATAADVH
lang_PW_NOTICE_LOCK_LOCKED= PWLOCKED DATAADVH
lang_PW_NOTICE_WARN_OTHER= PWWOTHER DATAADVH
lang_PW_NOTICE_WARN_NOLOCK= PWWNOLCK DATAADVH
lang_PW_NOTICE_WARN_B4LOCK= PWWB4LCK DATAADVH
lang_SERV_MSGS_140A= LCLASERV MSGADVH          Message repositories
lang_SERV_MSGS_140A= 140ASERV MSGADVH
lang_SERV_MSGS_140A= 150ASERV MSGADVH
lang_SERV_MSGS_150A= LCLASERV MSGADVH
lang_SERV_MSGS_150A= 150ASERV MSGADVH

```

The following entries define the files for those user languages not otherwise listed above. The indicates that these are the default. The defaults are set to mixed case American English.

```

....._SERV_MSGS_140A= LCLASERV MSGADVH      Message repositories
....._SERV_MSGS_140A= 140ASERV MSGADVH
....._SERV_MSGS_140A= 150ASERV MSGADVH
....._SERV_MSGS_150A= LCLASERV MSGADVH
....._SERV_MSGS_150A= 150ASERV MSGADVH
....._PW_NOTICE_WARN_OTHER= PWWOTHER DATAADVH Password notice files
....._PW_NOTICE_WARN_NOLOCK= PWWNOLCK DATAADVH
....._PW_NOTICE_WARN_B4LOCK= PWWB4LCK DATAADVH
....._PW_NOTICE_LOCK_OTHERW= PWLOTHERR DATAADVH
....._PW_NOTICE_LOCK_OTHERL= PWLOTHERR DATAADVH
....._PW_NOTICE_LOCK_NOLOCK= PWNOLCK DATAADVH
....._PW_NOTICE_LOCK_LOCKED= PWLOCKED DATAADVH
....._MDISK_AUDIT_NOTICES= AUTOMAIL DATAADVH Mdisk audit notice file

```

Multiple-System Cluster Configuration Entries

In an SSI cluster, the default communication path between DIRMAINT and the DATAMOVE and DIRMSAT machines is automatically established using cross-system spool. To run with the default communication path, do not configure any routing statements.

If the default communication path is not sufficient, it might be necessary to identify the appropriate communication path with configuration statements.

The format of the configuration statement is:

```
FROM= fromspec DEST= destspec S= spoolid T= tagspec1 U= tagspec2
```

where:

fromspec

Identifies the network *nodeid* or service machine *userid* where the transaction originates.

destspec

Identifies the network *nodeid* or service machine *userid* where the transaction is being sent.

spoolid

Identifies the *userid* of the machine where punch output should be sent to reach the specified destination. In a non-SSI cluster, this is the *userid* of an RSCS network machine or spool file bridge.

tagspec1

Identifies the network *nodeid* or service machine *userid* of the spool file tag.

tagspec2

Identifies the *userid* of the spool file tag.

Note:

1. *fromspec*, *destspec*, and *tagspec1* are node IDs or user IDs, as determined by the IDENTITY command. *destspec* and *tagspec1* are usually the same.
2. FROM= * means from anywhere.
3. DEST= * means wherever the DIRMAINT server is running, as recorded in the WHERETO DATADVH file.
4. S= * means the network server, as determined by the IDENTITY command.
5. T= * means the same as the *destspec* value.

For performance reasons, you might choose to establish a dedicated network for a non-SSI cluster. In this case, the *spoolid* value must identify the special server for the cluster, and *tagspec1* must provide the correct tag data for that particular server. Here is an example of using a spool file bridge:

```

FROM= DVHTEST1 DEST= DVHTEST2 S= SFBRIDGE T= DVHTEST2
FROM= DVHTEST1 DEST= DVHTEST3 S= SFBRIDGE T= DVHTEST3
FROM= DVHTEST1 DEST= DVHTEST4 S= SFBRIDGE T= DVHTEST4
FROM= DVHTEST2 DEST= DVHTEST1 S= SFBRIDGE T= DVHTEST1
FROM= DVHTEST2 DEST= DVHTEST3 S= DIRMAINT T= DVHTEST3
FROM= DVHTEST2 DEST= DVHTEST4 S= DIRMAINT T= DVHTEST4

```

```
FROM= DVHTEST3 DEST= DVHTEST1 S= SFBRIDGE T= DVHTEST1
FROM= DVHTEST3 DEST= DVHTEST2 S= DIRMAINT T= DVHTEST2
FROM= DVHTEST3 DEST= DVHTEST4 S= DIRMAINT T= DVHTEST4
FROM= DVHTEST4 DEST= DVHTEST1 S= SFBRIDGE T= DVHTEST1
FROM= DVHTEST4 DEST= DVHTEST2 S= DIRMAINT T= DVHTEST2
FROM= DVHTEST4 DEST= DVHTEST3 S= DIRMAINT T= DVHTEST3
```

Each system in a non-SSI cluster must have a satellite server machine defined to update the object directory on that system. Optionally, a second server may be defined on each system to maintain a second object directory for backup. For example:

```
SATELLITE_SERVER= DIRMSAT1 DVHTEST2
SATELLITE_SERVER= DIRMSAT2 DVHTEST2
SATELLITE_SERVER= DIRMSAT3 DVHTEST3
SATELLITE_SERVER= DIRMSAT4 DVHTEST3
SATELLITE_SERVER= DIRMSAT5 DVHTEST4
SATELLITE_SERVER= DIRMSAT6 DVHTEST4
SATELLITE_SERVER= DIRMSAT7 DVHTEST1
SATELLITE_SERVER= DIRMSAT8 DVHTEST1
```

Network Configuration Entries

The following identifies how to route files to other remote systems beyond the local cluster.

Format:

```
FROM= * DEST= * S= * T= * U= DIRMAINT
```

Note: Network support is disabled by default.

FROM and T are node IDs as determined from an IDENTIFY command; DEST is your nickname for the T node. S is the user ID of the local network service machine, or an * if this is to be determined from the IDENTIFY command. FROM= * means from anywhere, DEST= * means wherever specified, S= * means the network server obtained using IDENTIFY, T= * means the same as DEST, and U= * means DIRMAINT. For example:

```
FROM= ABCVM DEST= XYZ1 S= * T= XYZVM1 U= DIRMXYZ1
FROM= ABCVM DEST= XYZ2 S= * T= XYZVM2 U= DIRMR5
```

System Performance

The following identifies the service machine files that are made resident at initialization time, and reloaded with RLDCODE; for more information, the location in this guide has been provided for your reference:

File

LOADABLE_SERV_FILE= *filename filetype*
LOADABLE_DATAMOVE_FILE= *filename filetype*
LOADABLE_DIRMSAT_FILE= *filename filetype*
LOADABLE_DIRMAINT_FILE= *filename filetype*

Topic

[“CONFIG DATADVH” on page 24](#)
[“DATAMOVE DATADVH” on page 68](#)
[“DIRMSAT DATADVH” on page 71](#)
[“DIRMAINT DATADVH” on page 48](#)

The following identifies the files that must be present for the service machine to run correctly.

```
REQUIRED_SERV_FILE= filename filetype  
REQUIRED_DATAMOVE_FILE= filename filetype  
REQUIRED_DIRMSAT_FILE= filename filetype  
REQUIRED_DIRMAINT_FILE= filename filetype
```

System Exit Routines Entries

The following identifies the service machine exit routines. For more information, see [Chapter 9, “Exit Routines,”](#) on page 121.

ACCOUNT_NUMBER_NOTIFICATION_EXIT=	DVHXAN	EXEC
ACCOUNT_NUMBER_VERIFICATION_EXIT=	DVHXAV	EXEC
BACKUP_TAPE_MOUNT_EXIT=	DVHXTAPE	EXEC
CHECK_USER_PRIVILEGE_EXIT=	DVHXCP	EXEC
DASD_AUTHORIZATION_CHECKING_EXIT=	DVHXDA	EXEC
DASD_OWNERSHIP_NOTIFICATION_EXIT=	DVHXDN	EXEC
DATAMOVE_COPY_CMS_EXIT=	DVHDXC	EXEC
DATAMOVE_COPY_NONCMS_EXIT=	DVHDXN	EXEC
DATAMOVE_DDR_EXIT=	DVHDXD	EXEC
DATAMOVE_ERASE_EXIT=	DVHDXE	EXEC
DATAMOVE_FORMAT_EXIT=	DVHDXF	EXEC
DATAMOVE_NONCMS_COPYING_EXIT=	DVHDXP	EXEC
FOR_AUTHORIZATION_CHECKING_EXIT=	DVHXFA	EXEC
LINK_AUTHORIZATION_EXIT=	DVHXLA	EXEC
LINK_NOTIFICATION_EXIT=	DVHXLN	EXEC
LOCAL_STAG_AUTHORIZATION_EXIT=	DVHXTA	EXEC
LOGONBY_CHANGE_NOTIFICATION_EXIT=	DVHXLB	EXEC
MINIDISK_PASSWORD_CHECKING_EXIT=	DVHXMP	EXEC
MINIDISK_PASSWORD_NOTIFICATION_EXIT=	DVHXMN	EXEC
MULTIUSER_VERIFICATION_EXIT=	DVHXMU	EXEC
NICDEF_NOTIFICATION_EXIT=	DVHXNN	EXEC
PASSWORD_CHANGE_NOTIFICATION_EXIT=	DVHXPN	EXEC
PASSWORD_RANDOM_GENERATOR_EXIT=	DVHPXR	EXEC
PASSWORD_SYNTAX_CHECKING_EXIT=	DVHPXV	EXEC
POSIX_CHANGE_NOTIFICATION_EXIT=	DVHXPESM	EXEC
PW_NOTICE_PRT_EXIT_EXIT=	DVHXPP	EXEC
REQUEST_AFTER_PROCESSING_EXIT=	DVHXRA	EXEC
REQUEST_BEFORE_PARSING_EXIT=	DVHXRC	EXEC
REQUEST_BEFORE_PROCESSING_EXIT=	DVHXRB	EXEC
USER_CHANGE_NOTIFICATION_EXIT=	DVHXUN	EXEC

Note: A *required* exit routine must be defined, and must exist; although it may be given any valid unique file name and may be tailored.

User Performance Entries

The following identifies the user files that are made resident or non-resident by the EXECLOAD and EXECDROP commands.

```
LOADABLE_USER_FILE= filename filetype
```

The following identifies the files that must be present for the user's virtual machine to correctly enter any DIRMAINT command.

```
REQUIRED_USER_FILE= filename filetype
```

User Exit Entries

The following identifies the user exit routines. For more information, see [Chapter 9, “Exit Routines,”](#) on page 121.

COMMAND_BEFORE_PARSING_USER_EXIT=	DVHCXC	EXEC	
COMMAND_BEFORE_PROCESSING_USER_EXIT=	DVHCXB	EXEC	
COMMAND_AFTER_PROCESSING_USER_EXIT=	DVHCXA	EXEC	
PASSWORD_RANDOM_GENERATOR_USER_EXIT=	DVHPXR	EXEC	(Required)
PASSWORD_SYNTAX_CHECKING_USER_EXIT=	DVHPXV	EXEC	
PASSWORD_NOTIFICATION_USER_EXIT=	DVHPXA	EXEC	

Note: A *required* exit routine must be defined, and must exist; although it may be given any valid unique file name and may be tailored. The COMMAND_BEFORE_PROCESSING exit is *required* for compatibility with 1.4 (SYS processing on ADD or AMDISK commands, and for compatibility with 1.4 BATCH processing without a file identification being supplied). The PASSWORD_RANDOM_GENERATOR exit is required if random passwords are to be generated automatically.

Appendix E. WAKEUP Command

The WAKEUP command controls the startup of an event-driven machine (typically a disconnected service virtual machine) by ending its wait state condition whenever a specified event occurs. WAKEUP events can be specified using optional WAKEUP parameters. WAKEUP events that may end a wait state include:

- The passing of a time of day (including a date or day of the week)
- The presence or arrival of reader files
- The arrival of a Virtual Machine Communication Facility message
- The arrival of a Special Message Facility message (from CP SMSG)

The WAKEUP Times File

Entries in a WAKEUP Times file are coded as follows:

Columns				
1–8	10–17	19–26	28–255	Stacked
ALL	HH:MM:SS	datestamp	user-text	once a day
MM/DD/YY	HH:MM:SS	datestamp	user-text	once
==/DD/YY	HH:MM:SS	datestamp	user-text	once a month
==/==/==	HH:MM:SS	datestamp	user-text	once a day
==/01/==	HH:MM:SS	datestamp	user-text	on the 1st
dayofweek	HH:MM:SS	datestamp	user-text	once a week
WEEKEND	HH:MM:SS	datestamp	user-text	on weekends
S-S	HH:MM:SS	datestamp	user-text	same as above
WEEKDAY	HH:MM:SS	datestamp	user-text	on weekdays
M-F	HH:MM:SS	datestamp	user-text	same as above
==/==/==	+05	timestamp	user-text	every 5 minutes
WEEKEND	+10:30	timestamp	user-text	every 10 minutes 30 seconds on weekends
WEEKDAY	+20	timestamp	user-text	every 20 minutes on weekdays
dayofweek	+5	timestamp	user-text	every 5 minutes on the specified day of the week
M-F	+02:30:0	timestamp	user-text	every 150 minutes on weekdays

WAKEUP Times File Format

The WAKEUP Times file format is:

```
date time stamp rest-of-record
```

The WAKEUP Times file only looks at the *date*, *time stamp* and *stamp fields*. These fields determine:

- If it should run the record today
- The time it should run the record
- When it last ran the record.

Note: If the date and time fields indicate a time before the current time, the virtual machine will wake up immediately.

The Date Field (Columns 1–8)

The date field is eight characters long and begins in column 1. It tells WAKEUP the date or day of the week when the record should be considered.

The date field format is:

mm/dd/yy

Specifies the exact date. You can also use an equal sign (=) for any of the numbers to specify general dates.

Example:

If you Enter:

```
==/10/==
```

This tells the WAKEUP file to process something on the tenth of every month.

Example—If the date and time fields are exact:

If you Enter:

```
03/15/87 03:45:30
```

The WAKEUP file changes the first slash to a period. ***Example:***

If you Enter:

```
03.15/87
```

When the WAKEUP file processes the record, the first slash changes to a period. This makes it easy to write an EXEC to delete records that will never be ran again.

ALL

Specifies every day.

Example:

If you Enter:

```
==/==/==
```

The WAKEUP file shows every day.

Day Name

Specifies a day of the week.

Example:

If you Enter:

```
MONDAY  
TUESDAY  
WEDNESDA (You have to leave off the Y.)  
THURSDAY  
FRIDAY  
SATURDAY
```

or

SUNDAY

Note: You can abbreviate any name to three letters.

WEEKEND or S-S

Specifies Saturday and Sunday.

WEEKDAY or M-F

Specifies every weekday.

MONTHLY

Specifies once a month.

Example:

If your system is always up on the first of the month, you can Enter:

```
==/01/==
```

instead of Entering:

```
MONTHLY
```

MONTHLY is designed to ensure that the record will be processed once a month, even if your system happens to be down on the first of the month. **Example:**

You must Enter:

```
HH:MM:SS
```

in the time field with *MONTHLY*.

Note: You cannot use relative time intervals.

YEARLY

Specifies once a year.

Example:

If your system is always up on New Year's Day you can, Enter:

```
01/01/==
```

instead of Entering:

```
YEARLY
```

Example:

You must Enter:

```
HH:MM:SS
```

in the time field with *YEARLY*.

Note: You cannot use relative time intervals.

Specifies that this record is a comment. Comment records, those beginning with an asterisk can be anywhere in a WAKEUP Times file.

The Time Field (Columns 10–17)

The time field is also eight characters long and begins in column 10. It tells the WAKEUP file the time you want the record stacked.

The date field format is:

HH:MM:SS

Specifies the exact time.

+MM

Specifies every *MM* minutes.

For example, if you Enter:

```
+05
```

This tells the WAKEUP file to do this every 5 minutes.

+HH:MM:S

Specifies every *HH* hours, *MM* minutes, and *S0* seconds.

Note: The seconds can only be specified in multiples of 10.

Date/Time Stamp Field (Columns 19–26)

The date or time stamp fields are eight characters long and begin in column 19. The WAKEUP File records the last WAKEUP date or time here. **Example:**

If the time field contains an exact time:

```
23:55:00
```

The WAKEUP file records a *date stamp*. **Example:**

If the time field contains a relative time:

```
+15
```

The WAKEUP file records a *time stamp*

Note: This field should not be altered by the user to set the WAKEUP events. This should be done by coding the appropriate date field and time field entries.

The Rest of the Record (Columns 28–255)

The rest of the records field information or commands describing the event can start in column 28 and can extend to column 255.

Your application can put its own data here.

Note:

The WAKEUP Times file must always have:

```
ALL 23:59:00 datestamp CP SLEEP 2 MIN
```

as its last entry; or some other event that will begin just prior to Midnight and will not end until after Midnight. Otherwise, WAKEUP will not run the WAKEUP Times file events on the next scheduled *WAKEUP* day.

Items Stacked by WAKEUP

The seven WAKEUP options that cause data to be stacked are: EXT, FILE, IO, IUCVMSG, SMSG, TIME, and VMCF. WAKEUP stacks the data in the following order regardless of the order the options are specified when you invoke WAKEUP:

1. Current date and time
2. Line from the WAKEUP Times file, or an asterisk (*) if no line is found
3. An IUCV, SMSG or VMCF message, or EXT or IO interrupt data.

Note: In general, the last line stacked by WAKEUP is the one you really want to use, not the first line.

For more information on the WAKEUP Times file, see [z/VM: CMS Commands and Utilities Reference](#).

Appendix F. Making Multiple Updates to a Directory

Once a directory has been initialized, it should not be edited directly. Direct editing invariably introduces checksum errors, possibly for every entry if default serialization is allowed to take place. An editor may only be used as part of the cycle of transactions (DIRM FOR *userid* GET, RECEIVE, XEDIT *userid* DIRECT A, DIRM FOR *userid* REPLACE), when applied to a single directory entry at a time.

To make multiple updates to the entire directory (updates that may affect multiple users) the following procedure is recommended:

1. Disable updates to the source directory (DIRM DISABLE)
2. Ensure you have the latest copy of the directory (DIRM USER BACKUP)
3. Receive the monolithic backup (DIRM SEND USER BACKUP G)

Note: You can optionally combine these three commands into a batch job file (called BULKUPDT PART1 A for this example), containing the following commands:

```
DISABLE
USER BACKUP
SEND USER BACKUP G
```

and then submit this batch job file to the DIRMAINT server using a DIRM BATCH BULKUPDT PART1 command.

4. Receive the file to your A-minidisk and use your editor to make the changes.
5. Replace the user input file (DIRM FILE USER BACKUP A USER INPUT E) on the DIRMAINT server.
6. Create a batch job file (called BULKUPDT PART2 A for this example), containing the following commands:

```
CMS ERASE USER DIRECT E
RLDDATA
ENABLE
```

and submit this batch job file to the DIRMAINT server using a DIRM BATCH BULKUPDT PART2 command.

Note: This is required. Otherwise, authentication of the DIRM RLDDATA command will fail once the USER DIRECT E file has been erased. (If you've inadvertently done this, you can correct it by logging on to the DIRMAINT server and issuing the RLDDATA and ENABLE commands from the console, then CP DISC.) If you wish, the DIRM ENABLE command can be issued separately.

7. Issue the following command to bring the updated directory online:

```
DIRM DIRECT
```

Appendix G. Tests Run by the Automated IVP

This appendix provides examples of the tests that the DirMaint installation verification program (IVP) runs to validate the DirMaint servers.

A test is identified by its test ID, which consists of a two-character prefix followed by a four-digit numeric ID. The format is *ssnnnn*, where:

ss

is the prefix indicating the server where the test is run:

DA

DATAMOVE server

DM

DIRMAINT server

DS

SATELLITE server

nnnn

is the numeric ID.

Suppose a test name is Test 0010. This test can be run on multiple server types and, if this is the case, it would have multiple IDs. For example, if Test 0010 is run on all three of the above servers it would be identified as DA0010, DM0010, and DS0010, respectively.

Each test includes the following sections:

Environment

The server(s) on which the test is running.

Summary

Indicates what is being tested.

Warning

Warning messages associated with the test.

Resolution

Indicates the reason for the warning and how to resolve the problem or obtain more information to resolve it.

Result

Indicates whether the warning will cause the test to fail; some warnings indicate an issue that is not considered serious enough for the test to fail. Also warns of future problems.

Test Parameters

IVP parameters (specified on the IVP_PARM configuration statement) that modify the test.

Test 0010 - DA0010, DM0010, and DS0010

Environment

DATAMOVE, DIRMAINT, SATELLITE

Summary

Verifies that the server role matches the roles indicated in various configuration files.

Warning

The server role does not match some configuration values.

Resolution

Inconsistent specification of the server role can affect functionality. The identified issues should be corrected.

Result

The test fails.

Test Parameters

None.

Test 0020 - DA0020, DM0020, and DS0020

Environment

DATAMOVE, DIRMAINT, SATELLITE

Summary

Identifies the disks currently accessed by the server, and verifies that required disks are accessed and that read/write disks do not exceed the limits specified by the DISK_SPACE_THRESHOLD_*addr* configuration properties. (For more information on this property, see [“Step 2. Select Restart and Recovery Characteristics”](#) on page 28.)

The disks are identified by their associated character ID that identifies the purpose of the disk. This is used in the DVHPROFM DATADVH and DVHPROFA *filetype* data files (where *filetype* is the user ID of the DIRMAINT machine or a SATELLITE machine). The possible character IDs (purpose codes) are:

EDT

Delta object directory work edit disk

LCL

Local exit routines

PDF

primary directory files

PDB

Primary backup files

PTH

Primary transaction history files

RWS

Read/write workspace

SFA

Spool file arrival queue

SID

System interface disk

SFD

Secondary director files

SDB

Secondary backup files

SSI

System release level utilities

STH

Secondary transaction history files

SRV

Server related product files not used by users

USR

Product files used by users

Warning

Some read/write disks are at the shutdown limit specified by the DISK_SPACE_THRESHOLD_XXXX configuration properties.

Resolution

DirMaint monitors disk space usage for read/write disks on an hourly basis and will shutdown servers that have monitored disks that have reached the shutdown threshold. The disks which are at the limit are identified in the table of this test with the string ** shutdown at followed by the configured limit. You should list files on the indicated disks to see if there are files that

can be pruned (for example, the NETLOG file on the RWS disk) or have files that can be removed (for example, the WUCFFAIL or WUCFSAVE files on the PDF disk). Otherwise, the size of the disk should be increased and the servers should be restarted to use the new increased size disk.

Result

The test fails.

Warning

The ONLINE_VIA_DELTA configuration property is set to ON but the required EDT disk is not accessed.

Resolution

DirMaint will not use DIRECTXA with the DELTA option to make changes to the object directory. The performance of DirMaint will be greatly improved if DIRECTXA with the DELTA option is used. For more information on the ONLINE_VIA_DELTA configuration property, see Item **16** in the section [“DIRMAINT DASD Directory Statements”](#) on page 11.

Result

The test fails.

Warning

The ONLINE_VIA_DELTA configuration property is set to OFF but the required EDT disk is accessed.

Resolution

DirMaint will not use DIRECTXA with the DELTA option to make changes to the object directory. The performance of DirMaint will be greatly improved if DIRECTXA with the DELTA option is used. Change the ONLINE_VIA_DELTA configuration property setting to ON after you have verified that the EDT disk is formatted correctly.

Result

The test fails.

Warning

The ONLINE_VIA_DELTA configuration property is set to OFF but the required EDT disk is not accessed.

Resolution

DirMaint will not use DIRECTXA with the DELTA option to make changes to the object directory. The performance of DirMaint will be greatly improved if DIRECTXA with the DELTA option is used. Define, format and configure DirMaint to use the disk and change the ONLINE_VIA_DELTA configuration property setting to ON. For more information on the ONLINE_VIA_DELTA configuration property, see Item **16** in the section [“DIRMAINT DASD Directory Statements”](#) on page 11.

Result

The test passes.

Warning

The required disks are not accessed.

Resolution

Missing required disks will affect the functionality of DirMaint. For example, the EDT missing disables DIRECTXA with the DELTA option.

Result

The test fails.

Test Parameters

The following test parameters affect the test:

IGNORE

Specifies missing disks that should not cause a warning message. The disks are specified using their three-character purpose code with multiple values specified on the same IVP_PARM line separated by blanks. For example, specify "EDT SRV USR" to ignore checking the delta object directory work edit disk, the server related product disk, and the user related product disk. Specifying the EDT disk disables all warnings related to that disk being missing and also disables warnings related to the ONLINE_VIA_DELTA configuration property.

Test 0030 - DM0030

Environment

DIRMAINT

Summary

Verifies that the DirMaint and satellite servers are configured for UPDATE_IN_PLACE.

Warning

Update in place is not configured to allow the servers to use diagnose x'84' to update the object directory.

Resolution

Update in place allows faster updating of the object directory and thus improves the overall performance of DirMaint. Specify UPDATE_IN_PLACE= YES in your installation's CONFIG* DATADVH file. Do not modify the CONFIG DATADVH file because that is used to provide IBM configured defaults. Issue the DirMaint RLDDATA command after updating the configuration file.

Result

The test fails.

Test Parameters

None.

Test 0100 - DA0100, DM0100, and DS0100

Environment

DATAMOVE, DIRMAINT, SATELLITE

Summary

Check for configuration files (CONFIG* DATADVH files) that are not on the appropriate disk. The recommended location for these files is the USR disk (address 11F, file mode D) on the DIRMAINT server. The D disk is accessible to the DirMaint servers (the DIRMAINT, SATELLITE, and DATAMOVE machines) and to DirMaint code that runs in the user environment.

The configuration files can also be placed on the following disks on the DirMaint server. However, the configuration properties on these disks are not available to the DirMaint code running in the user environment.

- SRV disk, address 191, filemode C
- LCL disk, address 192, filemode B

Warning

Configuration files were found that are not on the USR, SRV or LCL disk.

Resolution

All servers should use the same configuration files. The files should be moved to the USR, SRV or LCL disk.

Result

The test fails.

Test Parameters

None.

Test 0110 - DA0110, DM0110, and DS0110

Environment

DATAMOVE, DIRMAINT, SATELLITE

Summary

Check for files with a file type of PROTODIR that are not on the PDF disk. These files should be maintained on the PDF disk.

Warning

Files with the file type of PROTODIR were found on a disk other than the PDF disk.

Resolution

Previous releases of DirMaint allowed files these to put on any of the DirMaint disks. This is no longer recommended. Placing the files on the PDF disk ensures that the files are backed up along with other source directory files. It also ensures that the files are viewed by only authorized users.

Result

The test passes. In a future release, the recommendation will be enforced and the test will fail.

Test Parameters

None.

Test 0140 - DM0140

Environment

DIRMAINT

Summary

Verifies that the server is not running in test mode.

Warning

The server is not running in operational mode (that is, it is running in test mode).

Resolution

The DIRMAINT server running in test mode is unable to make changes to the directory. This mode is not intended for normal operation.

To change the mode to operational, you need to edit your CONFIG* DATADVH override file and either change or add the RUNMODE= setting to operational:

```
RUNMODE= OPERATIONAL
```

Once you have edited and then saved the file back on the DIRMAINT server, you must issue the following command to enable the change:

```
DIRM RLDDATA
```

Result

The test fails.

Test Parameters

None.

Test 0150 - DM0150

Environment

DIRMAINT

Summary

Check the AUTHFOR CONTROL file (used in the full DirMaint product) or the SMPAUTH CONTROL file (shipped with DirMaint) to verify the control file has been configured to allow authorized users to issue commands to DirMaint and to act on behalf of other users.

Warning

The AUTHFOR CONTROL file does not exist.

Resolution

This file is necessary to allow management of DirMaint outside of the DIRMAINT server console. Use the AUTHFOR command from the DIRMAINT console to define authorized users. See “AUTHFOR CONTROL” on page 56 for more information on the control file, and see [z/VM: Directory Maintenance Facility Commands Reference](#) for more information on the AUTHFOR command.

Result

The test fails.

Warning

The AUTHFOR CONTROL file or the SMPAUTH CONTROL file cannot be read.

Resolution

From the DIRMAINT server console erase the file and recreate it with the AUTHFOR command. See “AUTHFOR CONTROL” on page 56 for more information on the control file, and see [z/VM: Directory Maintenance Facility Commands Reference](#) for more information on the AUTHFOR command.

Result

The test fails.

Warning

The AUTHFOR CONTROL file does not contain any authorization lines.

Resolution

From the DIRMAINT server console erase the file and recreate it with the AUTHFOR command. See “AUTHFOR CONTROL” on page 56 for more information on the control file, and see [z/VM: Directory Maintenance Facility Commands Reference](#) for more information on the AUTHFOR command.

Result

The test fails.

Test Parameters

None.

Test 0200 - DM0200

Environment

DIRMAINT

Summary

Validate the z/VM system on which the DirMaint server is running has available SPOOL space.

Warning

System spool file usage is at or above the warning limit.

Resolution

DirMaint uses spool space to transfer the files and communicate with other DirMaint servers. Free up system spool space.

Result

The test fails.

Warning

QUERY ALLOC SPOOL failed.

Resolution

This warning can occur when the DirMaint server is not authorized for the CP QUERY ALLOC SPOOL command. The DirMaint server issues this command as part of the IVP and as part of minidisk management.

Result

The test fails.

Test Parameters

The following test parameters affect the test:

WARNPERCENT

Specifies a decimal percentage as a whole number at which the test should generate a warning. The default is 90 percent.

Test 0210 - DA0210, DM0210, and DS0210

Environment

DATAMOVE, DIRMAINT, SATELLITE

Summary

Verifies that non-informational messages have not been generated by the server within the last 24 hours.

Warning

Non-information messages issued by the DirMaint servers have been detected within the last 24 hours.

Resolution

DirMaint monitors non-information messages issued by the DirMaint servers over a 24-hour period. Some messages are expected in an environment where automated provisioning is performed (for example, messages 6209E and 2289E) and are ignored by default. Other non-informational messages can indicate configuration failures and usage errors. The messages are shown in a table indicating the time issued within a quarter-hour time period, the full message ID, and the number of times issued.

To determine the reason for the message, consult [z/VM: Directory Maintenance Facility Messages](#). Errors attributable to simple user errors can be ignored, while other unexpected or severe messages should be investigated further.

The GETCONSOLE, DATAMOVE GETCONSOLE, or SATELLITE GETCONSOLE commands can be issued to list the available console logs and obtain the desired console log from the server. For more information about these commands, see [z/VM: Directory Maintenance Facility Commands Reference](#). The time period listed in the IVP messages table for this test indicates the time the message was issued and can be used to identify the console log that should be obtained.

Result

The test fails if a terminating message (severity T) was detected. Otherwise, the test passes with a warning.

Test Parameters

The following test parameters affect the test:

EXCLUDE

Specifies message IDs that should be ignored and not cause a warning if they occurred during the 24 hour time period that is monitored by the IVP. Multiple IDs are separated by blanks. The IDs may be specified in the following formats:

- An asterisk (*), indicating all messages.
- Full message ID in the form DVHppppnnns; for example, DVHREQ2289E
- Message number and severity in the form nnnns; for example, 2289E
- Severity only; for example, E
- A message range in one of these forms:
 - mmmm-nnnns; for example, 2201-2219E to exclude all severity "E" messages with the range of 2201 to 2219
 - mmmm-nnnn; for example, 2201-2219 to exclude all messages within the range of 2201 to 2219, regardless of the severity

Note: Invalid IDs (for example, format errors such as 1.1E) are ignored and no message is produced.

The IVP has a default set of messages that it excludes. These messages are excluded because they are either action messages, which denote an interaction with a user, or simple user messages. These are the messages that are currently excluded: Action messages (that is, severity "A" messages), 2102E, 2201-2237E, 2251-2252E, 2266-2267, 2270E, 2275-2288, 2295-2297E, 2922-2929E, 3210E, 3213E, 3217E, 3228E, 3902-3903W, 6200E, 6209E, DVHGET3212E.

Additional messages will be added as they are created or identified.

Multiple sets of message identifiers can be specified on the same IVP_PARM configuration line. The identifiers are separated by a comma. Multiple IVP_PARM configuration lines can be specified for this property.

INCLUDE

Specifies message IDs that should not be ignored and causes a warning if they occurred during the 24-hour time period that is monitored by the IVP. The IDs may be specified in the same format as specified with the EXCLUDE parameter. The INCLUDE parameter overrides the values specified on the EXCLUDE parameter, either as an IVP default or specified using the IVP_PARM configuration property. This allows the installation to modify IVP defaults that might have excluded a message ID.

Multiple sets of message identifiers can be specified on the same IVP_PARM configuration line. The identifiers are separated by a comma. Multiple IVP_PARM configuration lines can be specified for this property.

Test 0220 - DA0220, DM0220, and DS0220

Environment

DATAMOVE, DIRMAINT, SATELLITE

Summary

Verifies that the server termination messages (DVHxxx2194T or DVHxxx3895t) have not been generated by the server within the last 24 hours.

Warning

The server shut down abnormally within the last 24 hours.

Resolution

DirMaint servers that shut down abnormally attempt to restart and recover from the termination. Any abnormal terminations of the server are identified in the table that is shown. The table indicates the time of the termination (within 15 minutes), how often the server shut down abnormally during that 15-minute time period, and the ID of the terminating message.

Obtain the server console log that covers the time of the termination. The entries in the console log prior to the termination message will show the actions performed by the server prior to the termination. This will assist in identifying the cause.

- The DirMaint GETCONSOLE command can be used to obtain the console log from the DIRMAINT server and list the available console logs.
- The DirMaint SATELLITE GETCONSOLE command can be used to obtain the console log from a satellite server.
- The DirMaint DATAMOVE GETCONSOLE command can be used to obtain the console log from a DATAMOVE server.

Result

The test fails.

Test Parameters

None.

Test 0300 - DM0300

Environment

DIRMAINT

Summary

Validate the integrity of the directory files on the directory source disk using the DirMaint CHKSUM command.

Warning

The CHKSUM command failed for the indicated directory entries.

Resolution

The CHKSUM command places a CHECKSUM value in each directory entry (for example, in USER, IDENTITY, etc.). The command recalculated the CHECKSUM value for the indicated directory entries and detected that the value does not match the value saved in the entry. This normally

means that someone changed the entry by editing the entry on the source directory within the DIRMAINT server. However, it can also indicate that disk corruption has occurred. Access the directory entry to determine whether it has been corrupted. If it was not corrupted, obtain the directory entry with the GET command and place it back on the source directory with the REPLACE command.

Result

The test fails.

Test Parameters

None.

Test 0310 - DM0310

Environment

DIRMAINT

Summary

Verify that DirMaint is configured to accept incoming source update transactions.

Warning

The DirMaint server is not enabled to receive directory update requests.

Resolution

The directory server is currently disabled from accepting source directory update requests. This situation can occur as the result of an error within the DIRMAINT server, or because an authorized user has sent the DISABLE command. The ENABLE command allows the server to accept requests. If a DIRMAINT server error is suspected, obtain and review the DIRMAINT console logs for the period that covers the time from when the IVP was last run to the time of the current IVP run.

Result

The test fails.

Test Parameters

None.

Test 0320 - DM0320

Environment

DIRMAINT

Summary

Verify that DirMaint is enabled to update the object directory.

Warning

The DIRMAINT server is disabled from updating the object directory.

Resolution

The DIRMAINT server will not update the object directory. This situation can occur as the result of an error occurring within the DIRMAINT server or because an authorized user has sent the OFFLINE command. The ONLINE command enables the server to update the object directory. If a DIRMAINT server error is suspected, obtain and review the DIRMAINT console logs for the period that covers the time from when the IVP was last run to the time of the current IVP run.

Result

The test fails.

Test Parameters

None.

Test 0330 - DM0330

Environment

DIRMAINT

Summary

Verify that entry and device locks are not held for long.

Warning

A lock was held for more days than desired. This warning occurs when the number of days a lock exists is at or above the configured warning limit. The default is one day.

Resolution

The DIRMAINT server uses locks to prevent changes to entries in the directory. The lock can prevent changes to an entire entry or to a specific minidisk. Locks can be created by the DIRMAINT server as part of operations to manage an entry (for example, while removing a minidisk) or by an authorized user via the LOCK command. Locks created by the DIRMAINT server normally exist for a few minutes but can last longer if work units for which the lock was created are failing and being retried.

The warning includes a table containing:

- entry name
- the virtual device address, if it is a device lock
- the user who created the lock
- number of days a lock has existed.

For each lock identified that you want to remove, first determine whether there are any active work units related to the lock. Issue:

```
DIRM STATUS WORKUNIT ALL
```

For any active work units, issue:

```
DIRM STATUS WORKUNIT work_unit_number
```

The output of the STATUS command indicates the user ID and disk address related to the work unit. It also indicates the status of the work unit. If an active work unit is found that relates to the lock, you can attempt to restart or cancel the work unit with the DIRM WORKUNIT command. After performing a recovery action, you can use the LOCK command to determine whether the lock has been removed. Issue the following command:

```
DIRM FOR entry_name LOCK ?
```

Once there are no active work units related to the lock, the lock can be removed with the UNLOCK command. The format of the command depends on whether an entry lock is held or a device lock is held.

To remove a device lock, issue:

```
DIRM FOR entry_name UNLOCK device_address
```

To remove an entry lock, issue:

```
DIRM FOR entry_name UNLOCK
```

Result

The test fails.

Test Parameters

The following test parameters affect the test:

IGNORE

Specifies locks that should be ignored if an error is detected. The lock values can be specified as either:

- A USER, IDENTITY, PROFILE, or SUBCONFIG entry name. This indicates that any user lock or device lock should be ignored for the specified value.

- *entry/vaddr* indicates a device lock for the specified minidisk within an entry (for example: *maint/0190*). The *vaddr* should be specified as a four-digit address that includes leading zeroes.

Multiple lock values may be specified on the same IVP_PARM configuration line by separating them with a blank character. Multiple IVP_PARM configuration lines can be specified for this property.

WARNDDAYS

Specifies the number of days a lock can exist before a warning is generated. The value is a whole number. Zero days indicates that any locks held when this test is run will generate a warning. A value of zero is not recommended because it is normal for the DIRMAINT server to create locks on an entry as it is managing the entry. The default is one day.

Test 0420 - DA0420, DM0420, and DS0420

Environment

DATAMOVE, DIRMAINT, SATELLITE

Summary

Verify that the server is authorized to issue the necessary CP commands, subcommands, and diagnose instructions.

Warning

An unauthorized command, subcommand, or diagnose instruction was detected.

Resolution

The server is not authorized for the indicated command, subcommand, or diagnose instruction. This causes various operations to fail when DirMaint attempts to use the command, subcommand, or diagnose. The DIRMAINT servers are configured for specific IBM command classes when the product is delivered. If you are using the CP User Class Restructure function to limit command access, ensure that the server has the necessary command class that includes the given function.

Result

The test fails.

Test Parameters

The following test parameters affect the test:

IGNORE

Specifies commands, subcommands, and diagnose instructions that to be ignored and that will not cause a warning to be generated, if they are authorized. Commands are specified with the command name appended to the class with an underscore as the separator; for example: LINK_G. Subcommands are specified with the command name appended to the subcommand name and the class with an underscore separating them; for example: QUERY_BYUSER_B.

Diagnose instructions are specified by appending the hexadecimal diagnose code number to the "DIAG" string; for example: DIAG27C. A single digit diagnose should be specified with a leading 0 digit; for example: DIAG08.

Multiple commands, subcommands, and diagnose instructions can be specified on the same IVP_PARM configuration line. Multiple IVP_PARM configuration lines can be specified for this property. For example:

```
IVP_PARM= DM0420 IGNORE LINK_G
IVP_PARM= DM0420 IGNORE QUERY_BYUSER_B DIAG08 DIAG27C
```

Test 0430 - DM0430

Environment

DIRMAINT

Summary

The DIRMAINT server attempts to run a portion of the IVP on each satellite server. This is accomplished by sending a command and a data file to each server.

Warning

The IVP failed to start on the server because a set up command (such as DSATCTL IVP START) failed to be sent to the server.

Resolution

This can occur if the information related to the server is incorrectly configured on the DIRMAINT server. Review the configuration files for the SATELLITE_SERVER configuration property to verify that it contains the correct information for the SATELLITE server.

Result

The test fails.

Warning

IVP testing for the specified SATELLITE server is disabled because the server is logged off.

Resolution

The IVP will not log on a server that is logged off. This is because the installation might have a reason for logging it off. If the server was not intentionally logged off, restart it and verify that it is operable by doing the following:

1. XAUTOLOG the server
2. Issue this command to verify that the server is operational:

```
DIRM FOR serverName AT serverNode SATELLITE CMS IDENTIFY
```

where *serverName* is the user ID of the server and *serverNode* is the node where the server is running.

Result

The test fails if the IVP was not started on any SATELLITE server.

Warning

IVP testing for the specified SATELLITE server is disabled because the server is in a configuration file but the file was not loaded with RLDDATA

Resolution

Correct the configuration by issuing RLDDATA to reload the configuration properties.

Result

The test fails if the IVP was not started on any SATELLITE server.

Test Parameters

None.

Test 0440 - DM0440

Environment

DIRMAINT

Summary

The DIRMAINT server attempts to run a portion of the IVP on each DATAMOVE server. This is accomplished by sending a command and a data file to each server.

Warning

The IVP failed to start on the server because a set up command (such as DSATCTL IVP START) failed to be sent to the server.

Resolution

This warning can occur if the information related to the server is incorrectly configured on the DIRMAINT server. Review the configuration files for the DATAMOVE_MACHINE configuration property to verify that it contains the correct information for the DATAMOVE server.

Result

The test fails.

Warning

IVP testing for the specified DATAMOVE server is disabled because the server is logged off

Resolution

The IVP will not log on a server that is logged off. This is because the installation might have a reason for logging it off. If the server was not intentionally logged off, restart it and verify that it is operable by doing the following:

1. XAUTOLOG the server
2. Issue this command to verify that the server is operational:

```
DIRM FOR serverName AT serverNode SATELLITE CMS IDENTIFY
```

where *serverName* is the user ID of the server and *serverNode* is the node where the server is running.

Result

The test fails if the IVP was not started on any SATELLITE server.

Warning

IVP testing for the specified SATELLITE server is disabled because the server is in a configuration file but the file was not loaded with RLDDATA

Resolution

Correct the configuration by issuing RLDDATA to reload the configuration properties.

Result

The test fails if the IVP was not started on any SATELLITE server.

Warning

IVP testing was not started on any DATAMOVE server.

Resolution

Previous warning messages were issued to indicate the servers on which the IVP could not be started. Correct the problems indicated in the messages.

Result

The test fails.

Test Parameters

None.

Test 0500 - DM0500 and DS0500

Environment

DIRMAINT, SATELLITE

Summary

Verify that the DIRMAINT and SATELLITE servers are not running on the same z/VM host at the same time.

Warning

The DIRMAINT server is logged on the same system as a satellite server.

Resolution

The SATELLITE server is responsible for manipulating the object directory on systems other than the system on which the primary DIRMAINT server runs. A SATELLITE server is defined on the same system as the DIRMAINT server but is only intended to be run when DIRMAINT is running on another member of the cluster. The SATELLITE server should be shutdown as soon as possible and should not be logged on automatically by z/VM. A SATELLITE server can also manipulate the object directory on the same system as DirMaint to maintain duplicate copies of the object directory. The SATELLITE server should not have write access to these DIRMAINT server disks:

- DIRMAINT server's 191 disk (server product files)
- DIRMAINT server's 11f disk (user product files)
- DIRMAINT server's 1DF disk (primary directory files).

If the SATELLITE server is configured to run on the same system as the DirMaint server for duplicate object directories, the running of this test should be disabled using the IVP_DISABLE_TEST configuration file property; for example: IVP_DISABLE_TEST= DM0500.

Result

The test fails.

Test Parameters

None.

Test 0700 - DM0700

Environment

DIRMAINT

Summary

Verify that the EXTENT CONTROL file is configured. The EXTENT CONTROL file defines any volume that is being used for minidisk allocation and provides a template, or layout, of how the space should be used. The contents of the EXTENT CONTROL file are used to create the volume control files. In addition, it also contains system and device default values used during allocation operations. If your installation does not use DirMaint to allocate minidisks for virtual machines, this test should be deactivated with the IVP_DISABLE_TEST configuration parameter.

Warning

The EXTENT CONTROL file does not exist. During installation the DIR2PROD EXEC places the EXTENT CONTROL file on the 1DF disk. The system programmer modifies this file when adding new volumes for DirMaint to use for minidisk allocation.

Resolution

The absence of the EXTENT CONTROL file impacts minidisk allocation. The EXTENT CONTROL file should be recreated and placed on the 1DF disk. An example of the EXTENT CONTROL file is provided in [Figure 14 on page 75](#) and should be used as a guide to supply the necessary section tags. Once the file is created, the RLDEXTN command can be issued to reload the volume control files.

Result

The test fails.

Warning

The EXTENT CONTROL file cannot be read.

Resolution

The EXTENT CONTROL might be corrupted. The EXTENT CONTROL file should be recreated and placed on the 1DF disk. An example of the EXTENT CONTROL file is provided in [Figure 14 on page 75](#) and should be used as a guide to supply the necessary section tags. Once the file is created, the RLDEXTN command can be issued to reload the volume control files.

Result

The test fails.

Warning

The :REGIONS section of EXTENT CONTROL file does not contain any data.

Resolution

The most likely cause of this issue is that the EXTENT CONTROL file has not been tailored. The regions that DirMaint uses to allocate minidisks must be defined in this file. The :REGIONS section should be tailored and the RLDEXTN command should then be issued to reload the volume control files.

Result

The test fails.

Test Parameters

None.

Test 0710 - DM0710

Environment

DIRMAINT

Summary

Verify the layout of the disks defined by the EXTENT CONTROL file.

Warning

DASD were detected which overlap another extent. DirMaint uses this information when allocating minidisks and checking for potential overlaps. The information used for the overlap checking is gathered from minidisk statements in the directory, the EXTENT CONTROL file, and the results of the CP QUERY ALLOC for each volume.

Resolution

There are instances where an installation might want to overlap the extents of specific disks, such as by sub-dividing disks to allow access to the whole disk and the minidisks contained within it. Most often, however, this warning indicates a problem with a volume. To determine whether this is the case, issue the USEDEXT command from an authorized user ID specifying the volume ID of the volume that has the overlap. For example:

```
DIRM USEDEXT V=validA
```

The DIAGNOSE USEDEXT report file returned by the command lists the minidisks that have been allocated from the volume, the owning user ID of each minidisk, and the starting and stopping cylinder/block address. Allocated system extents are identified in the **OwnerUid** column with periods surrounding the type (for example, .DRCT., .PAGE., .SPOOL., .TDISK.), and the **VDev** column contains the real device address of the volume.

Determine whether the overlap is intentional. If it is not intentional, correct the overlap by removing the minidisk that is overlapping. If the overlap is intentional, the IGNORE_DASD or IGNORE_VOLID test parameters can be specified to prevent the test from reporting an error for that minidisk or volume.

A common issue occurs for the \$DIRECT\$, \$PAGE\$, \$SPOOL\$ and \$TDISK\$ userids. Often the installation fails to define the minidisk extents within those userids so that they exactly match the information returned by the CP QUERY ALLOC command for the volume or have incorrectly defined the size of the volume in the EXTENT CONTROL file. If the volume is attached and DirMaint is able to query the device, it will use the actual size. In an SSI environment, the queries are issued on each SSI member, and the maximum size of the volume responses is used. If the volume is not attached, the DirMaint defaults to the size of the earliest version of the device. For example, DirMaint defaults the size for a 3390 to 1113, which is the size of a 3390 model 1. Specifying the volume in the EXTENT CONTROL file with a model type that has the actual size and reloading the EXTENT CONTROL file with the DIRMAINT RLDEXTN command may correct the issue.

Result

The test fails.

Warning

The FREEXT command returned an unexpected return code.

Resolution

Retry the FREEXT command to see if the failure is unique to the IVP run. Report your findings to IBM.

Result

The test fails.

Warning

The USEDEXT command returned an unexpected return code.

Resolution

Retry the USEDEXT command to see if the failure is unique to the IVP run. Report your findings to IBM.

Result

The test fails.

Warning

The DIAGNOSE FREEXT file or DIAGNOSE USEDEXT file could not be read.

Resolution

This error can occur when there is not enough space on the A-disk of the DirMaint virtual machine. Issue CMS QUERY DISK on the DirMaint virtual machine to check the size of the disk. If the disk is out of space or nearly out of space, check the files that are consuming the space. One possible issue is the size of the NETLOG file (for example, DIRMAINT NETLOG) on the A-disk. If the size of this file is the issue, prune entries in the file to reduce its size and rerun the IVP.

Result

The test fails.

Warning

Identical definitions occur for the same extent on the same system.

Resolution

DirMaint maintains volume control files that contain allocation data for each volume defined in the EXTENT CONTROL file. A control file contains multiple allocations for the same allocated extent (the same user ID, virtual address, and start and ending location). This indicates an error in the virtual control file. Gather supporting documentation in addition to the output of the IVP. The USEDEXT reports for the volume ID in error should be saved to assist in debugging the problem. Issue the USEDEXT command from an authorized user ID, specifying the volume ID of the volume that has the error. For example:

```
DIRM USEDEXT validA
```

After the information has been collected and stored off of the DirMaint server, rebuild the volume control files with the RLDEXTN command. Rerun the IVP to determine whether the problem has cleared up. Report the error to IBM and be prepared to provide the documentation that was collected.

Result

The test fails.

Test Parameters

The following test parameters affect the test:

IGNORE_DASD

Specifies the user ID and virtual address of the DASD that should be ignored if an error is detected. The DASD is specified with a slash (/) separating the user ID and virtual address. The address is specified as a four-digit address with 0 as the fill character; for example:

```
STEVEG/0152
```

Multiple DASDs can be specified on the same IVP_PARM configuration line. Multiple IVP_PARM configuration lines can be specified for this property.

IGNORE_VOLID

Specifies the volume ID of the DASD that should be ignored if an error is detected. Multiple volume IDs can be specified on the same IVP_PARM configuration line. Multiple IVP_PARM configuration lines can be specified for this property.

Test 0810 - DM0810

Environment

DIRMAINT

Summary

Verify there are not large numbers of unassigned DATAMOVE related work units. If there are any unassigned work units, their work unit ID and creation time are shown in a table.

Warning

The UNASSIGN DVHQUEUE value is greater or equal to the warning limit. The MAXIMUM_UNASSIGNED_WORKUNITS configuration property specifies a value at which new work for DATAMOVE servers is rejected.

Resolution

The UNASSIGN DVHQUEUE file maintains a list of work units that have not been assigned to DATAMOVE servers because the DATAMOVE servers are actively busy with other work. Large unassigned work units are symptomatic of the need to define additional DATAMOVE servers so that work is not rejected during peak periods of DATAMOVE related requests.

Result

The test fails.

Warning

The MAXIMUM_UNASSIGNED_WORKUNITS configuration property was exceeded in the past 24 hour period.

Resolution

When the MAXIMUM_UNASSIGNED_WORKUNITS value is reached, work unit requests are rejected. DirMaint monitors the last 24 hours and the IVP lists the time period (in quarters of an hour) when the value has been exceeded and how often it was exceeded during that time period. If this issue occurs more than desired, you might be able to make operational scheduling changes to reduce the number of concurrent requests during the specified time period. Or, you can define additional DATAMOVE servers.

Result

The test fails.

Warning

Unassigned work units were found that are older than one day. This should not occur in a system running normally. A warning string next to the work unit in the table shows the number of days that the work unit has existed.

Resolution

Work units should be assigned almost immediately or, if there are not enough DATAMOVE servers for the current workload, within a few minutes. A work unit would not typically remain pending for over one day. Issue STATUS WORKUNIT to display information about the work unit. For example:

```
DIRM STATUS WORKUNIT 12345678
```

Record the information and contact your IBM Support Center personnel.

Result

The test fails.

Test Parameters

The following test parameters affect the test:

SHOWSIZE

Specifies the number of unassigned work units to show in the table, specified as a whole number. The default is 1.

WARNPERCENT

Specifies a decimal percentage as a whole number at which the test should begin warning of large unassigned work units. This is a percentage of the MAXIMUM_UNASSIGNED_WORKUNITS configuration property. The default is 75% of the specified value of the MAXIMUM_UNASSIGNED_WORKUNITS property. If both WARNSPERCENT and MAXIMUM_UNASSIGNED_WORKUNITS are not specified, the WARNPERCENT property is ignored.

WARNSIZE

Specifies a whole number that indicates the number of unassigned work units that will trigger a warning. This property is used when the MAXIMUM_UNASSIGNED_WORKUNITS configuration property is not specified. If both WARNSIZE and MAXIMUM_UNASSIGNED_WORKUNITS are not specified, WARNSIZE defaults to 4.

Test 0820 - DM0820

Environment

DIRMAINT

Summary

Check for failed work units. DASD work units that permanently fail are saved on the primary directory files (PDF) disk (filemode E) for later analysis. They should be periodically reviewed and removed from the disk.

Warning

Failed work units were found.

Resolution

A DASD work unit failed with a permanent error. One or more files with a file type of WUCFFAIL were found on the PDF disk. The WUCFFAIL files should be reviewed and removed from the disk. For more information see [“Work Unit Control File” on page 88](#).

Note:

WUCFFAIL files are referenced when resolving DM0880 issues. Resolve any DM0880 warnings prior to removing the WUCFFAIL files.

Result

The test fails.

Test Parameters

None.

Test 0830 - DM0830

Environment

DIRMAINT

Summary

Check for DATAMOVE related work units with large retry counts.

The MAXIMUM_WORKUNIT_RETRIES configuration property specifies the number of times after the first attempt that DirMaint will retry an unsuccessful DATAMOVE related work unit. Once the limit is reached, the work unit is canceled and rolled back. If not specified, unsuccessful work units are retried forever. Retrying a work unit consumes processing time of the DATAMOVE servers. In normal operations, a work unit should not require a retry. Work units can fail when links to a disk are not released by other virtual machines before returning a minidisk, or a volume on which the minidisk resides is offline. The test lists work units with retry counts at or above the show limit are listed. (See the SHOWSIZE test parameter.) Work units above the warning levels are highlighted with ** warning ** at the end of the row in the table. (See the WARNPERCENT and WARNSIZE test parameters)

Warning

Some DASD work units have retry counts at or above the limit.

Resolution

Work units should complete on the first attempt. Work units with large retry counts should be investigated to determine whether the cause is related to volumes being unavailable, which indicates environmental problems in the z/VM system, or to links being held to the disks that are being released, which indicates procedural problems in the installation of not ensuring all use of the disks is complete before they are released.

Result

The test fails.

Test Parameters

The following test parameters affect the test:

SHOWSIZE

Specifies the number of retries for a work unit, specified as a whole number, at which the retries should be shown in the output of the test. This parameter is useful for identifying trends in work units that are not violating the MAXIMUM_WORKUNIT_RETRIES limit. The default is 2.

WARNPERCENT

Specifies a decimal percentage as a whole number at which the test should begin warning of work units that have been retried to often. This is a percentage of the MAXIMUM_WORKUNIT_RETRIES configuration property. The default is 75% of the value of the MAXIMUM_WORKUNIT_RETRIES configuration property. If MAXIMUM_WORKUNIT_RETRIES is not specified then the WARNPERCENT property is ignored.

WARNSIZE

Specifies a whole number that indicates the number of work unit retries that will trigger a warning. This property is used when the MAXIMUM_WORKUNIT_RETRIES configuration property is not specified. If both WARNSIZE and MAXIMUM_WORKUNIT_RETRIES are not specified, WARNSIZE defaults to 18.

Test 0840 - DM0840

Environment

DIRMAINT

Summary

Check for DATAMOVE related work units that have been significantly delayed in starting.

Warning

There are pending work units for DATAMOVE servers that have reached the warning time.

Resolution

Active work units are waiting too long for an available DATAMOVE. The work units are listed. Consider adding more DATAMOVE servers to handle the current workload.

Result

The test fails.

Warning

Over the previous 24 hours work units have exceeded the warning time prior to being sent to a DATAMOVE server.

Resolution

Work units are waiting too long for an available DATAMOVE server. The table shows the last 24 hours, broken into 15 minute time periods, and the delays. You might not have enough DATAMOVE servers for the current workload, or you might want to modify your operating procedures to spread out the jobs that are generating requests so that you do not overload the DATAMOVE servers.

Result

The test fails.

Test Parameters

The following test parameters affect the test:

WARNTIME

Specifies the number of seconds that a work unit has been waiting to be initially assigned to a DATAMOVE server, which will trigger a warning. The value is specified as a whole number. The default is 300.

Test 0850 - DM0850

Environment

DIRMAINT

Summary

Check for DATAMOVE servers with large numbers of pending work units. Too many pending work units will cause DirMaint to stop sending work to the DATAMOVE server.

If a DATAMOVE server is unable to link to a minidisk (most likely because a user is linked to a disk for which a CMDISK command has been issued; or because the directory change to transfer the minidisk to the DATAMOVE server hasn't been put online yet) the FORMAT/COPY/CLEAN request will be put onto the DATAMOVE server's retry queue. The DM_MAXIMUM_RETRIES configuration property determines the maximum size of this retry queue. (It has no effect on the number of times one request will be retried.) After the DirMaint server has been notified that this limit has been reached, DirMaint will not assign any more work to that DATAMOVE server.

Warning

Some DATAMOVE servers have pending work (retry queues) that are at the configured warning limit or larger.

Resolution

Issue the STATUS command to determine the current work on the identified DATAMOVE server:

```
STATUS DATAMOVE ALL
```

The PENDING value lists the number of work units in the retry queue for each DATAMOVE server.

Issue the STATUS command to determine the active/pending work units:

```
STATUS WORKUNIT ALL
```

The output shows the work unit numbers. Issue the STATUS command for each work unit listed to show the contents of each WORKUNIT file and to locate the work units that are being handled by the DATAMOVE server which has the large pending queue. A line near the beginning of the file indicates which DATAMOVE server is handling the work unit. If you are unable to determine the cause of the retry failure, contact IBM and provide the appropriate documentation.

Result

The test fails.

Test Parameters

The following test parameters affect the test:

SHOWSIZE

Specifies the number of pending work units, specified as a whole number, at which they will be shown in the output of the test. This is useful in identifying trends in work units that are not violating the DM_MAXIMUM_RETRIES limit. The default is 1.

WARNPERCENT

Specifies a decimal percentage as a whole number at which the test should begin warning of work units that have been retried too often. This is a percentage of the DM_MAXIMUM_RETRIES configuration property. The default is 75% of the specified DM_MAXIMUM_RETRIES configuration property. If the configuration property is not specified, the WARNPERCENT property is ignored.

WARNSIZE

Specifies a whole number that indicates the number of work unit retries that will trigger a warning. This property is used when the DM_MAXIMUM_RETRIES configuration property is not specified. If neither property is specified, WARNSIZE defaults to 4.

Test 0860 - DM0860

Environment

DIRMAINT

Summary

Check for DATAMOVE servers that have been quiesced. DATAMOVE servers are quiesced when problems occur on the server.

Warning

Some DATAMOVE servers are quiesced.

Resolution

A quiesced DATAMOVE server is not available for work. The server enters this state for any of the following reasons:

- The CLEANUP command is attempting to unhang the server. the server will remain in this state if the command fails to resolve the issue.
- The DM_MAXIMUM_RETRIES limit was exceeded for the DATAMOVE server.
- The MAXIMUM_DATAMOVE_AUTOLOGS limit for the server was reached. Attempt to resolve the problem using the CLEANUP command. See the Usage Note section under the description of the CLEANUP command in *z/VM: Directory Maintenance Facility Commands Reference* for information on cleaning up the server.

Result

The test fails.

Test Parameters

None.

Test 0870 - DM0870

Environment

DIRMAINT

Summary

Check for DATAMOVE servers with a large number of AUTOLOG attempts. This test uses the AUTOLOG value that is maintained in the DATAMOVE CONTROL file and reset daily when DVHDAILY is run. The test shows a table of DATAMOVE servers that have been autologged at the limit or more than the limit specified by the SHOWSIZE test parameter.

Warning

One or more DATAMOVE servers were found that have been autologged at the limit or more than the value specified by the test parameters.

Resolution

DATAMOVE servers should not need to be autologged often. If a server is autologged too often during the day, its console logs should be reviewed to determine what is causing this. One possible cause is that the server is running out of space on one of its read/write disks.

Result

The test fails.

Test Parameters

The following parameters modify when a warning is generated and which work units are shown in the output of the test:

- WARNPERCENT and WARNSIZE determine when a warning is generated.
- SHOWSIZE modifies the test to display work units below the warning limit.

The test parameters are described in more detail here:

SHOWSIZE

Modifies the test to include work units that do not generate a warning but have AUTOLOG counts at or larger than the specified size. This parameter is useful in identifying trends in work units that are not violating the MAXIMUM_DATAMOVE_AUTOLOGS limit. The default is 1

WARNPERCENT

Specifies a decimal percentage as a whole number at which the test should begin warning of DATAMOVE servers that have been autologged too often. This is a percentage of the

MAXIMUM_DATAMOVE_AUTOLOGS configuration property. The default is 75% of the specified MAXIMUM_DATAMOVE_AUTOLOGS configuration property. If the configuration property is not specified then the WARNPERCENT property is ignored.

WARNSIZE

Specifies the warning limit as a specific number of AUTOLOG attempts. This property is used when the MAXIMUM_DATAMOVE_AUTOLOGS configuration property is not specified. If neither property is specified, WARNSIZE defaults to 3.

Test 0880 - DM0880

Environment

DIRMAINT

Summary

Verifies that the DATAMOVE machines do not own disks that are related to previously failed or canceled work units.

Warning

Minidisks are owned by the DATAMOVE machines that are not related to active work units being handled by the DATAMOVE machines or part of the DirMaint server environment. The minidisks are most likely related to failed or canceled work units whose disks could not be rolled back to the original owner. This can occur if a work unit fails that is related to a purge of a userid, identity or subconfig, or a manipulation of the disk which involves a DATAMOVE machine such as DMDISK, CLONEDISK, or CMDISK.

Resolution

Perform the following steps to resolve this issue:

1. Determine whether the disk is in use and should be returned to the owning id.

- a. Check for work unit failure files on the DirMaint server.

```
DIRM CMS LISTFILE * WUCFFAIL E
```

- b. Send the work unit failure files to your id for review.

```
DIRM SEND wuId WUCFFAIL E
```

Where:

wuId

is the 8-digit filename of the file.

- c. Review the files looking for failures related to the DATAMOVE server that has the orphan disk:

- The line that begins with the keyword “DMM:” identifies the DATAMOVE machine that was handling the work unit.
- The line that begins with “ORIGCMD:” indicates the command that caused the DATAMOVE to be involved.
- The lines that begin with “DEV.ONE:” or “DEV.TWO:” identify the virtual address used by the DATAMOVE machine to refer to each disk. “DEV.ONE:” refers to the first disk on the “ORIGCMD:” command that caused the DATAMOVE to be invoked. “DEV.TWO:” refers to the second address, if one was specified.
- See [“Work Unit Control File” on page 88](#) for more detailed information.

- d. For each disk, perform the following action to obtain the definition of the user that was the target of the work unit operation.

```
DIRM FOR owningUser REVIEW
```

Where: *owningUser* is the userid that owns the disk.

2. If there are no work unit failure files related to the DATAMOVE server and the orphan disks, review the source directory and look for a similar valid and extent range. This will identify the owning userid and disk address, if it exists. To obtain the source directory, issue this command:

```
DIRM USER NOPASS
```

3. Determine whether one of the following is true:

- The userid is being purged or has been purged. If so, return the disk to the disk pool by clearing the contents of the disk and deleting it with the NOCLEAN option. (See Step “4” on page 265.)
- The userid and the disk are still defined for the user and you want the userid to continue to own the disk. If so, you only need to delete the disk from the DATAMOVE with the NOCLEAN option. (See Step “5” on page 266.)
- The disk is no longer defined for the original user but it should own it. If so, give the disk back to the userid. (See Step “6” on page 266.)

4. For disks that should be deleted and returned to the disk pool, perform these steps:

- a. Log off the DATAMOVE machine.
- b. Transfer the disk from the DATAMOVE machine to an authorized userid.

```
DIRM FOR datamove AT node TMDISK oldVaddr TO authUser vaddr
```

Where:

datamove

is the userid of the DATAMOVE machine.

node

is the node id of the system where the DATAMOVE machine was running. If the DATAMOVE machine runs on the same node where the DIRMAINT server runs, omit “ AT *node*.”

oldVaddr

is the address of the minidisk on the DATAMOVE machine.

authUser

is the authorized userid.

vaddr

is the available address on the authorized userid that will be associated with the minidisk.

- c. Verify that no other userid is using the minidisk by issuing this command:

```
LINK * vaddr vaddr W
```

The link will fail if any other userids are using the minidisk; if so, they must detach the disk.

- d. Use CMS to format the minidisk to ensure that all residual data has been removed from the disk.

```
FORMAT vaddr freeFM
```

Where:

vaddr

is the virtual address of the minidisk.

freeFM

is an available filemode.

- e. Detach the disk from the authorized user:

```
RELEASE freeFM ( DETACH
```

- f. Delete the disk from the authorized user with the DirMaint DMDISK command and the NOCLEAN option. The formatting of the disk by CMS eliminates the need for a DATAMOVE machine to be involved with deleting the disk.

```
DIRM DMDISK vaddr NOCLEAN
```

5. If the disk should be deleted from the DATAMOVE without returning the disk to the disk pool, perform these steps:
 - a. Log off the DATAMOVE machine.
 - b. Delete the disk from the DATAMOVE machine with the DirMaint DMDISK command and the NOCLEAN option:

```
DIRM FOR datamove AT node DMDISK vaddr NOCLEAN
```

Where:

datamove

is the userid of the DATAMOVE machine.

node

is the node id of the system where the DATAMOVE machine was running. If the DATAMOVE machine runs on the same node where the DIRMAINT server runs, omit "AT *node*."

vaddr

is the address of the minidisk on the DATAMOVE machine.

6. If the disk should be returned to the owning user, perform these steps:
 - a. Log off the DATAMOVE machine.
 - b. Transfer the disk from the DATAMOVE machine to the owning userid:

```
DIRM FOR datamove AT node TMDISK oldVaddr TO owningUser vaddr
```

Where:

datamove

is the userid of the DATAMOVE machine.

node

is the node id of the system where the DATAMOVE machine was running. If the DATAMOVE machine runs on the same node where the DIRMAINT server runs, omit "AT *node*."

oldVaddr

is the address of the minidisk on the DATAMOVE machine.

owningUser

is the userid that should own the minidisk.

vaddr

is the address on the owning userid that will be associated with the minidisk.

Result

The test fails.

Warning

The DVHPROFM DATADVH file was not found on a disk accessed by the DIRMAINT server.

Resolution

The DVHPROFM DATADVH file controls which disks are accessed by the DATAMOVE machines and which filemodes are used. This file is required for DATAMOVE machines to operate. A sample file exists on the DirMaint VMSES installation userid's 2C2 disk as DVHPROFM SAMPDVH. Copy the sample file to the DIRMAINT server's 191 (access mode C) disk.

Result

The test fails.

Warning

The test could not create the internal directory file for a DATAMOVE server.

Resolution

The test attempted to access the directory entry for the indicated DATAMOVE machine. As part of this process the user-readable form of the directory entry is converted into an internal format usable by the DirMaint code. An error was encountered when the internal file was being created. This problem can occur for a number of reasons:

- The userid specified on the DATAMOVE_MACHINE= statement in the CONFIG* DATADVH file stored on the DIRMAINT server does not specify a userid defined in the user directory. A typo in the configuration file can cause this. When DirMaint is restarted it will encounter the error and not restart. Verify the name of the DATAMOVE machine. If it appears to be valid, issue this command to verify that the userid is defined:

```
DIRM FOR userid REVIEW
```

Where *userid* is the name of the DATAMOVE machine.

Correct the error by either removing the incorrect entry or defining the missing DATAMOVE machine in the user directory. You should do this before restarting the DIRMAINT server.

- The internal format file is built on the A disk of the DIRMAINT server. If the disk is out of space, an error can occur. Issue:

```
DIRM CMS QUERY DISK A
```

If the disk is full, remove some files that are consuming space on the disk and/or increase the size of the disk. For example, the DIRMAINT NETLOG file may be too large; to remove it, issue:

```
DIRM CMS ERASE DIRMAINT NETLOG A
```

- If none of these are the cause, report the error to IBM. Be prepared to provide the documentation related to the IVP run and the DIRMAINT console log from the time the IVP was run.

Result

The test fails.

Warning

The SYSTEMAFFINITY variable could not be set in GLOBALV by the test.

Resolution

This problem indicates an internal problem within the DIRMAINT server. Shutdown the DIRMAINT server and restart it. After restarting the server, run the automated IVP to determine whether the problem has cleared. If the problem continues, report the error to IBM. Be prepared to provide the documentation that was collected by the IVP and the DIRMAINT console log at the time of the problem.

Result

The test fails.

Test Parameters

None.

Appendix H. Test the Installation/Service for DirMaint

This appendix is used for testing the initial installation of DirMaint and its related server machines. It will also be used prior to placing new service into production. You should follow the steps to test each of the server machines that you are using.

Summary of the Installation Process

- This procedure will require the DirMaint server machines to be shutdown, therefore, you should only test when it will least disrupt your production environment.
- If the install ID is logged on you will get messages stating that the minidisks can not be accessed R/W. The install ID should be logged off during this procedure.
- **If testing after installing DirMaint**, then the RUNMODE= entry of the CONFIG DATADVH file (on the 7VMDIR40 41F minidisk) is set to *testing*. You should **never** change the CONFIG DATADVH file. To change the RUNMODE= entry, do so using override files as described in the [“CONFIG DATADVH”](#) on page 24.
- **If testing after applying service**, then be aware of what the RUNMODE= entry is set to. You should review whether or not you want the DIRMAINT server to have the ability to place the source directory online while testing and set the RUNMODE= entry accordingly in your override file.
- During these instructions, privileged commands are issued from another user ID. The AUTHFOR CONTROL file should have an entry for the user ID you will be issuing these commands from. For the purposes of these instructions, the test user ID will be called **DIRMUSER**. If you are testing from a different user ID, substitute that name for DIRMUSER.
Note: To test an SSI cluster, you will need a DIRMUSER user ID on a second and third system in the cluster. The DIRMUSER user ID must be a multiconfiguration virtual machine defined using IDENTITY and SUBCONFIG entries.
- For the purposes of these instructions, **DIRMAINT**, **DATAMOVE**, and **DIRMSAT** are assumed as the name of the server user ID's. If you are using a different user ID name, substitute that name for the particular server name where applicable in this appendix.
- The test instructions in this appendix are divided into four sections as follows:
 - [“Test the DIRMAINT Server Machine”](#) on page 269 for DIRMAINT,
 - [“Test the DIRMSAT Server Machine”](#) on page 275 for DIRMSAT,
 - [“Test the DATAMOVE Server Machine”](#) on page 280 for DATAMOVE, and
 - [“Quick Test After Installing Service”](#) on page 287 for testing after applying of service.

Following a new installation of DirMaint, complete all relevant test sections then proceed with [“Post Test Instructions”](#) on page 286. After installing RSU or corrective service, you may alternatively use the procedure in [“Quick Test After Installing Service”](#) on page 287.

Test the DIRMAINT Server Machine

This procedure will test the new DIRMAINT code to see that it functions properly. You will log on a test server machine and access the appropriate disks. The DIRMUSER user ID is required in order to verify the DIRMAINT function.

Note: Starting with step [“6”](#) on page 270, this procedure will have you make updates to the source directory and verify these changes took effect. To do this the RUNMODE= entry within an override file to the CONFIG DATADVH file (on the 7VMDIR40 41F minidisk) must be set to *operational*.

1. Log on to the **DIRMAINT** server.

2. If the DIRMAINT server is currently running, it must be shutdown.

shutdown

3. Link to the 7VMDIR40's test disks

profile test

You will not see a CMS Ready message. Instead, this condition has been replaced by a line with the DIRMAINT service machine's network node id, user id, the date, return code, and time of day.

4. Verify the appropriate disks have been accessed

The disk mode and addresses or directory names should match the configuration specified in the DVHPROFA DIRMAINT file. If not, make the necessary corrections and run the profile exec again.

q accessed

Mode	Stat	Files	Vdev	Label/Directory
A	R/W	1	155	DIR155
C	R/W	294	191	DRM492
D	R/W	57	11F	DRM41F
E	R/W	45	1DF	DIR1DF
F	R/O	25	551	PMT551
G	R/W	7	1DB	DIR1DB
H	R/W	10	1AA	DIR1AA
S	R/O	464	190	MNT190
Y/S	R/O	3	19E	MNT19E
Z	R/W	0	1FA	DIR1FA

DIRMAINT DVHTEST1 - 2024/04/11; T=0.01/0.01 17:28:35

5. Check for any extraneous files

This check verifies that the disks are accessed, that the message handler is functioning correctly, and that there are no back level executable files that have been misplaced in the search order. If you have a large number of duplicate files, or if you have any executable files, use the EXEC DVHUCHK CHECK FILELIST command to resolve the discrepancies before continuing.

exec dvhuchk check itemize

Depending on your environment, the messages issued may contain different information.

```
DVHUCH1371W Filemodes C and E both contain AUTHDASD DATADVH.
DVHUCH1371W Filemodes A and C both contain DIRMAINT DATADVH.
DVHUCH1371W Filemodes A and E both contain DIRMAINT DATADVH.
DVHUCH1371W Filemodes A and G both contain DIRMAINT DATADVH.
DVHUCH1372I There were 4 extraneous files found.
DVHUCH1190I Command CHECK complete; RC= 2.
DIRMAINT DVHTEST1 - 2024/04/11(00002); T=0.40/0.43 18:11:32
```

6. Update the RUNMODE=, ONLINE=, and DATAMOVE_MACHINE= entries.

cms xedit confignn datadvh d

Add a RUNMODE= OPERATIONAL entry and an ONLINE= IMMED entry to this override configuration file, where nn corresponds to the characters you choose for the override file.

Note: In an SSI cluster, the DATAMOVE servers are already defined for you.

Save this file on the D disk (41F).

====> file

7. Start the server machine using the new code and place the new CONFIG* DATADVH override file into use.

The DVHBEGIN EXEC will start the server. This will make a copy of the USER INPUT file (on the primary directory disk, 1DF) as USER BACKUP (on the directory backup disk, 1DB), and then convert the USER BACKUP file from *monolithic* to *clusterized* format. This also initializes all of the other control files DIRMAINT needs to begin updating the source directory. The operation of a substantial portion of the DirMaint product code will have been verified by this step.

Note: It is recommended that a copy of the USER BACKUP file be made prior to issuing the DVHBEGIN command.

dvhbegin

The DIRMAINT service machine should now be waiting for work.

```
DVHILZ3510I Starting DVHINITL with directory: USER INPUT E
DVHILZ3510I DVHINITL Parms: BLDMONO
DVHILZ3509I Monolithic backup now exists as: USER BACKUP G.
DVHILZ3509I Continuing with execution.
DVHILZ3510I Starting DVHINITL with directory: USER BACKUP G
DVHILZ3510I DVHINITL Parms: BLDCLUSTER BLDLINK BLDDASD
DIRMAINT DVHTEST1 - 2024/04/11; T=4.30/4.69 18:58:06
DVHWAI2140I Waiting for work on 2024/04/11 at 18:58:06.
```

8. Verify the operation of DirMaint's console interrupt handler, the command syntax parser, and part of the authorization checking.

cp query files

```
DVHWAI2146I Wakeup caused by console attention on 2024/04/11 at 19:20:00.
DVHREQ2290I Request is: CP query files
DVHREQ2288I Your CP request for DIRMAINT at * has been accepted.
FILES: NO RDR, 0001 PRT, NO PUN
DVHREQ2289I Your CP request for DIRMAINT at * has completed; with RC = 0.
DIRMAINT DVHTEST1 - 2024/04/11; T=0.56/0.61 19:20:05
DVHWAI2140I Waiting for work on 2024/04/11 at 19:20:05.
```

9. Test DirMaint's automatic restart and recovery.

- a. Create a CP disabled wait state.

If a restart is not successful, check the SHUTDOWN_REIPL_COMMAND= CP IPL CMS PARM AUTOOCR entry in the CONFIG* DATADVH file(s). You may need to correct the name of the CMS saved system, or change it to IPL by device address rather than by system name. It should match the IPL statement you included in the DIRMAINT machine's directory entry, or the IPL statement included in the profile used by the DIRMAINT machine's directory entry.

cp system clear

```
DVHWAI2146I Wakeup caused by console attention on 2024/05/16 at
21:51:50.
DVHREQ2290I Request is: CP system clear
DVHREQ2288I Your CP request for DIRMAINT at * has been accepted.
Storage cleared - system reset.
DMSWSP314W Automatic re-IPL by CP due to disabled wait; PSW 000A0000
00000000
z/VM 7.4.0      2024-05-01 10:40
PRT FILE 1019 SENT FROM DIRMAINT CON WAS 1019 RECS 0049 CPY  001 0
HOLD   NOKEEP
:
PRODUCT:
IBM Directory Maintenance Facility for z/VM (DirMaint)
5741-A05 (C) Copyright IBM Corporation 1979, 2024.
Function Level 740 Service Level nnnn.
DMSACC724I 155 replaces A (191)

DVHPR02008I ROLE = DIRMAINT

DVHPR02010I TESTING USE OF MSGNOH ...
DVHPR02002A Manual start is required for DIRMAINT.
DVHPR02002A Enter DVHBEGIN when ready to start.
DIRMAINT DVHTEST1 - 2024/05/16; T=0.38/0.46 21:54:49
```

b. Start the server machine again

If the DIRMAINT machine was running disconnected, the DVHPR02002A Manual start is required for DIRMAINT. DVHPR02002A Enter DVHBEGIN when ready to start. DIRMAINT DVHTEST1 - 2024/05/16; T=0.38/0.46 21:54:49

profile test dvhbegin

10. Verify the DIRMAINT machine will update the source directory.

Complete the test instructions from this point only when you are ready to allow DirMaint to update the source directory.

a. Determine your present distribution code

distrib ?

Write down the value returned from this command, it will be used in step “10.d” on [page 273](#) when restoring it.

```
DVHWAI2146I Wakeup caused by console attention on 2024/04/16 at 20:00:31.
DVHREQ2290I Request is: DISTRIB ?
DVHREQ2288I Your DISTRIB request for DIRMAINT at * has been accepted.
DVHDIS3248I The current distribution code for DIRMAINT is oldvalue
DVHREQ2289I Your DISTRIB request for DIRMAINT at * has completed; with RC = 0.
DIRMAINT DVHTEST1 - 2024/04/16; T=0.97/1.06 20:00:40
DVHWAI2140I Waiting for work on 2024/04/16 at 20:00:40.
```

b. Change your present distribution code

distrib value

value can be any value you wish, you will be changing it back shortly.

```
DVHWAI2146I Wakeup caused by console attention on 2024/04/16 at 20:05:57.
DVHREQ2290I Request is: DISTRIB value
DVHREQ2288I Your DISTRIB request for DIRMAINT at * has been accepted.
DVHBIU3423I The source for directory entry DIRMAINT has been updated.
DVHBIU3423I The next ONLINE will take place via Diagnose 84.
DVHBIU3428I Changes made to directory entry DIRMAINT have been placed online.
DVHREQ2289I Your DISTRIB request for DIRMAINT at * has completed; with RC = 0.
DIRMAINT DVHTEST1 - 2024/04/16; T=1.26/1.39 20:06:09
DVHWAI2140I Waiting for work on 2024/04/16 at 20:06:10.
```

c. Check if the distribution code has been changed

distrib ?

```
DVHWAI2146I Wakeup caused by console attention on 2024/04/16 at 20:06:12.
DVHREQ2290I Request is: DISTRIB ?
DVHREQ2288I Your DISTRIB request for DIRMAINT at * has been accepted.
DVHDI3248I The current distribution code for DIRMAINT is value
DVHREQ2289I Your DISTRIB request for DIRMAINT at * has completed; with RC = 0.
DIRMAINT DVHTEST1 - 2024/04/16; T=0.97/1.06 20:06:20
DVHWAI2140I Waiting for work on 2024/04/16 at 20:06:20.
```

d. Restore the original distribution code

distrib *oldvalue*

oldvalue is the original distribution code, determined in step [“10.a” on page 272](#).

```
distrib oldvalue
DVHWAI2146I Wakeup caused by console attention on 2024/04/16 at 20:05:57.
DVHREQ2290I Request is: DISTRIB oldvalue
DVHREQ2288I Your DISTRIB request for DIRMAINT at * has been accepted.
DVHBIU3423I The source for directory entry DIRMAINT has been updated.
DVHBIU3423I The next ONLINE will take place via Diagnose 84.
DVHBIU3428I Changes made to directory entry DIRMAINT have been placed online.
DVHREQ2289I Your DISTRIB request for DIRMAINT at * has completed; with RC = 0.
DIRMAINT DVHTEST1 - 2024/04/16; T=1.26/1.39 20:06:09
DVHWAI2140I Waiting for work on 2024/04/16 at 20:06:10.
```

11. Test a directory update that does not get placed online with diagnose X'84'

spool 00b 1403

spool 00b ?

spool 00b delete

```
DVHWAI2146I Wakeup caused by console attention on 2024/04/16 at 20:41:07.
DVHREQ2290I Request is: SPOOL 000B 1403
DVHREQ2288I Your SPOOL request for DIRMAINT at * has been accepted.
DVHBIU3424I The source for directory entry DIRMAINT has been updated.
DVHBIU3424I The next ONLINE will take place immediately.
DVHBIU3428I Changes made to directory entry DIRMAINT have been placed
DVHBIU3428I online.
DVHBIU3427I Changes made to directory entry
DVHBIU3427I DIRMAINT by DIRMAINT at DVHTEST1 have
DVHBIU3427I been placed online.
DVHREQ2289I Your SPOOL request for DIRMAINT at * has completed; with RC = 0.
DIRMAINT DVHTEST1 - 2024/04/16; T=1.20/1.32 20:41:18
DVHWAI2140I Waiting for work on 2024/04/16 at 20:41:18.
```

```
DVHWAI2146I Wakeup caused by console attention on 2024/04/16 at 20:43:36.
DVHREQ2290I Request is: SPOOL 000B ?
DVHREQ2288I Your SPOOL request for DIRMAINT at * has been accepted.
DVHSPL3320I The spool statement in DIRMAINT associated with virtual
DVHSPL3320I address 000B is:
DVHSPL3320I 1403
```

```
DVHREQ2289I Your SPOOL request for DIRMAINT at * has completed; with RC = 0.
DIRMAINT DVHTEST1 - 2024/04/16; T=1.00/1.10 20:43:45
DVHWAI2140I Waiting for work on 2024/04/16 at 20:43:45.
```

```
DVHWAI2146I Wakeup caused by console attention on 2024/04/16 at 20:49:50.
DVHREQ2290I Request is: SPOOL 000B DELETE
DVHREQ2288I Your SPOOL request for DIRMAINT at * has been accepted.
DVHBIU3424I The source for directory entry DIRMAINT has been updated.
DVHBIU3424I The next ONLINE will take place immediately.
DVHBIU3428I Changes made to directory entry DIRMAINT have been placed
DVHBIU3428I online.
DVHBIU3427I Changes made to directory entry
DVHBIU3427I DIRMAINT by DIRMAINT at DVHTEST1 have
DVHBIU3427I been placed online.
DVHREQ2289I Your SPOOL request for DIRMAINT at * has completed; with RC = 0.
DIRMAINT DVHTEST1 - 2024/04/16; T=1.35/1.49 20:50:04
DVHWAI2140I Waiting for work on 2024/04/16 at 20:50:04.
```

12. Verify the directory has not been corrupted by any changes made

chksum

```
chksum
DVHWAI2146I Wakeup caused by console attention on 2024/04/22 at 14:24:32.
DVHREQ2290I Request is: CHKSUM
DVHREQ2288I Your CHKSUM request for DIRMAINT at * has been accepted.
DVHILZ3510I Starting DVHINITL with directory: USER DIRECT E
DVHILZ3510I DVHINITLParms: BLDMONO
DVHREQ2289I Your CHKSUM request for DIRMAINT at * has completed; with RC = 0.
DIRMAINT DVHTEST1 - 2024/04/22; T=0.91/0.99 14:24:38
```

13. Make sure the DIRMUSER user ID is authorized to issue privileged commands, then disconnect the DIRMAINT server user ID.
 - a. Issue the AUTHFOR command to add the DIRMUSER user ID as a privileged user to the AUTHFOR CONTROL file.

Note: If you are testing from a different user ID, substitute that name for DIRMUSER.

for dirmuser authfor dirmuser cmdset adghopsm cmdl 140a

for dirmuser authfor dirmuser cmdset adghopsm cmdl 150a

- b. Disconnect the DIRMAINT server.

#cp disc

14. Log on to the DIRMUSER user ID. This user ID is required to be a DirMaint privileged user in order to issue privileged DirMaint commands to properly validate your installation of DirMaint.

- a. Link to the disk or SFS directory containing test code for the MAINT 19E minidisk

- i) If using minidisks:

link 7VMDIR40 29E vaddr rr
access vaddr b

Where *vaddr* is any free virtual address. This disk contains the DIRMAINT EXEC which will be used to verify that DirMaint code is satisfactory.

- ii) If using SFS:

| access VMPSFS:7VMDIR40.DIRM.MAINT19E b

This directory contains the DIRMAINT EXEC which will be used to verify that DirMaint code is satisfactory.

- b. Edit the ACCESS DATADVH file on the B disk and change the entry for the 11F disk to 21F and file on your A disk.

**| xedit access datadvh b
locate on= *
change /11F/21F/
====> file = a**

If the 21F minidisk (7VMDIR40's 41F minidisk) was defined with a password other than 'ALL', be sure to make the appropriate password correction here as well.

- c. Verify correct installation of the user machine code, issue:

dirmaint globalv ? interface

```
DVHGLB1341I The current setting for INTERFACE is 199701.150A  
DVHGLB1190I Command GLOBALV complete; RC= 0.
```

- d. Verify correct installation of the DIRMAINT service machine code and configuration of the DIRMAINT service virtual machine and issue:

**dirmaint globalv cmdlevel 150a
dirmaint query dvhlevel**

Where *yynn* will be the year and number of the latest RSU applied to DirMaint. If 0000, then there have not been any RSUs applied to DirMaint.

**| DVHGLB3844I IBM Directory Maintenance Facility for z/VM (DirMaint)
DVHGLB3844I 5741-A07 (C) Copyright IBM Corporation 1979, 2024.
DVHGLB3844I Function Level 740 Service Level *yynn*.
DVHREQ2289I Your QUERY request for DIRMUSER at * has completed; with RC = 0.**

- e. Repeat steps “14.a” on page 274 through “14.c” on page 275 from the DIRMUSER user ID on each system in the SSI cluster. This will allow the test user interface code to be available to the DIRMUSER user ID on each system in the cluster. Do *not* log off or disconnect from the DIRMUSER user ID yet, as it will be used to test the other DirMaint functions.

Test the DIRMSAT Server Machine

This procedure will test the new DIRMSAT code to see that it functions properly. You will log the server machine on and access the appropriate disks. The DIRMUSER user ID is required in order to verify the DIRMSAT function.

Note:

1. Log on the satellite server on a system in the SSI cluster where the DIRMAINT server is *not* running.

The satellite servers for the members of the SSI cluster are already defined for you. A satellite server named DIRMSAT is defined for the member system in slot 1, as identified by the CP QUERY SSI command. Satellite servers named DIRMSAT2, DIRMSAT3, and DIRMSAT4 are defined for the member system in slots 2, 3 and 4, respectively.

2. Starting with step “12” on page 278, this procedure will have you make updates to the source directory and verify these changes took effect. To do this the RUNMODE= entry within an **override file** to the CONFIG DATADVH file (on the 7VMDIR40 41F minidisk) must be set to *operational*.

- 1. Log on to the **DIRMSAT** server.
- 2. If the DIRMSAT server is currently running, it must be shutdown.

shutdown

- 3. Link to the 7VMDIR40's test disks

profile test

You will not see a CMS Ready message. Instead, this condition has been replaced by a line with the DIRMSAT service machine's network node id, user id, the date, return code, and time of day.

- 4. Verify the appropriate disks have been accessed

The disk mode and addresses or directory names should match the configuration specified in the DVHPROFA DIRMSAT file. If not, make the necessary corrections and run the profile exec again.

q accessed

Mode	Stat	Files	Vdev	Label/Directory
A	R/W	1	155	DST155
C	R/O	294	191	DRM492
D	R/O	57	11F	DRM41F
E	R/O	45	1DF	DIR1DF
F	R/O	25	551	PMT551
S	R/O	464	190	MNT190
Y/S	R/O	3	19E	MNT19E
Z	R/W	0	1FA	DST1FA
DIRMSAT DVHTEST1 - 2024/04/11; T=0.01/0.01 17:28:35				

- 5. Check for any extraneous files

This check verifies that the disks are accessed, that the message handler is functioning correctly, and that there are no back level executable files that have been misplaced in the search order. If you have a large number of duplicate files, or if you have any executable files, use the EXEC DVHUCHK CHECK FILELIST command to resolve the discrepancies before continuing.

exec dvhuchk check itemize

```
DVHUCH1371W Filemodes C and E both contain AUTHDASD DATADVH.
DVHUCH1371W Filemodes A and C both contain DIRMSAT DATADVH.
DVHUCH1372I There were 2 extraneous files found.
DVHUCH1190I Command CHECK complete; RC= 2.
DIRMSAT DVHTEST1 - 2024/04/11(00002); T=0.40/0.43 18:11:32
```

- 6. Start the server machine using the new code.

The DVHBEGIN EXEC will start the server.

dvhbegin

The DIRMSAT service machine should now be waiting for work.

```
dvhbegin
DIRMSAT DVHTEST1 - 2024/04/11; T=4.30/4.69 18:58:06
DVHWA12140I Waiting for work on 2024/04/11 at 18:58:06.
```

7. Verify the operation of DIRMSAT's console interrupt handler, the command syntax parser, and part of the authorization checking.

cp query files

```
DVHWAI2146I Wakeup caused by console attention on 2024/04/11 at 19:20:00.
DVHREQ2290I Request is: CP query files
DVHREQ2288I Your CP request for DIRMSAT at * has been accepted.
FILES: NO RDR, 0001 PRT, NO PUN
DVHREQ2289I Your CP request for DIRMSAT at * has completed; with RC = 0.
DIRMSAT DVHTEST1 - 2024/04/11; T=0.56/0.61 19:20:05
DVHWAI2140I Waiting for work on 2024/04/11 at 19:20:05.
```

8. Test DirMaint's automatic restart and recovery of the DIRMSAT server

- a. Create a CP disabled wait state.

If a restart is not successful, check the SHUTDOWN_REIPL_COMMAND= CP IPL CMS PARM AUTOCCR entry in the CONFIG* DATADVH file(s). You may need to correct the name of the CMS saved system, or change it to IPL by device address rather than by system name. It should match the IPL statement you included in the DIRMSAT machine's directory entry, or the IPL statement included in the profile used by the DIRMSAT machine's directory entry.

cp system clear

```
cp system clear
DVHWAI2146I Wakeup caused by console attention on 2024/04/16 at
21:51:50.
DVHREQ2290I Request is: CP system clear
DVHREQ2288I Your CP request for DIRMSAT at * has been accepted.
Storage cleared - system reset.
DMSWSP314W Automatic re-IPL by CP due to disabled wait; PSW 000A0000
00000000
z/VM 7.4.0      2024-05-23 10:40
PRT FILE 1019 SENT FROM DIRMSAT CON WAS 1019 RECS 0049 CPY 001 0
HOLD NOKEEP
:
PRODUCT:
IBM Directory Maintenance Facility for z/VM (DirMaint)
5741-A05 (C) Copyright IBM Corporation 1979, 2024.
Function Level 740 Service Level nnnn.
DMSACC724I 155 replaces A (191)

DVHPR02008I ROLE = DIRMSAT

DVHPR02010I TESTING USE OF MSGNOH ...
DVHPR02002A Manual start is required for DIRMSAT.
DVHPR02002A Enter DVHBEGIN when ready to start.
:
DIRMSAT DVHTEST1 - 2024/04/16; T=0.38/0.46 21:54:49
```

- b. Start the server machine again

If the DIRMSAT machine was running disconnected, the DVHPROF EXEC would have automatically issued an *EXEC DVHBEGIN* command; manual intervention would not have been required.

profile test dvhbegin

9. Disconnect the user ID

#cp disc

10. Repeat steps “1” on page 276 through “9” on page 277 for each satellite server defined for each system in the SSI cluster where the DIRMAINT machine is *not* running.
11. Verify that SSI cluster routing is properly working. Logon to a DIRMUSER user ID on a system in your cluster **other than the one where DIRMAINT is running**, and:
 - a. Send a command to the DIRMAINT server in the cluster and verify a response is received by issuing:

dirm distrib ?

- b. Send a file to the DIRMAINT server and verify the file is returned by issuing:

**dirm batch
input review noprof
file**

- c. Peek the reader file returned, and verify for accuracy by issuing:

**peek nnnn
discard
logoff**

Where *nnnn* is the spool ID of the reader file returned from DIRMAINT.

12. **Go back to the DIRMUSER user ID for the system in your cluster where DIRMAINT is running** (the user ID which you tested DIRMAINT functions). If you had previously logged off this user ID, make sure to complete the instructions in step “14.a” on page 274 to access test code for the MAINT 19E minidisk.

Complete the test instructions from this point only when you are ready to allow DirMaint to update the source directory.

There are two reasons for using a satellite server. If you are using a satellite server to update multiple object directories in an SSI cluster, you can verify that a directory change has taken place by logging on to the user ID on each system in turn and checking the necessary characteristic. If you are using a satellite server to maintain a duplicate object directory on a stand-alone system, it is more difficult to completely verify successful operation. You will need to do a CP SHUTDOWN of your entire system, IPL from the alternate system residence volume, logon to the DIRMUSER id and verify that the directory changes have in fact taken place, then SHUTDOWN your system again and re-IPL from your primary system residence volume. These instructions will not have you do the system SHUTDOWN/ IPL, do this at your discretion.

13. To verify that the DIRMSAT service machine correctly updates the object directory, do the following:
 - a. Determine your current DATEFORMAT setting:

#cp query dateformat

Write down the value returned from this command, it will be used in step “13.f” on page 279 when restoring it.

- b. Change your present DATEFORMAT setting:

dirmaint for dirmuser dateformat isodate

- c. Verify that the DATEFORMAT setting has been changed by logging off DIRMUSER, logging back on to DIRMUSER, and issuing:

#cp query dateformat

Verify that the date format returned matches the value specified in the previous DIRM command (issued in step “13.b” on page 278).

- d. Log on to the DIRMUSER user ID on each system where a DIRMSAT or DIRMSATn server is running and issue:

#cp query dateformat

Verify that the date format returned matches the value specified in the previous DIRM command (issued in step “13.b” on page 278).

Note: If you were already logged on to the DIRMUSER user ID on this system before the DIRM command in step “13.b” on page 278 was issued, you will have to log off and log back on for the change to take effect.

- e. Log off the DIRMUSER user ID on each system in the cluster, except the system where DIRMAINT is running:

#cp logoff

- f. Restore the original DATEFORMAT setting:

dirm for dirmuser dateformat *oldvalue*

Where *oldvalue* is the original date format, as determined in step “13.a” on page 278.

Or:

dirm for dirmuser dateformat delete

If you wish to use the system default.

14. If your system is running in an SSI cluster, continue with the following multiconfiguration virtual machine test verification steps:

- a. Log on to the MAINT user ID and determine the system IDs associated with each slot in the SSI cluster:

#cp query ssi

Write down the value returned for the SYSTEMID associated with each slot.

Note: Following this step, *sys1*, *sys2*, *sys3*, and *sys4* will now correspond to the member system associated with slots 1, 2, 3 and 4, respectively in the QUERY SSI output.

- b. Log on to the DIRMUSER user ID on the system associated with SLOT 1 in the QUERY SSI output. The DIRMUSER user ID should be a multiconfiguration machine defined with IDENTITY and SUBCONFIG entries.
- c. Query the current DATEFORMAT setting for the DIRMUSER user ID on each system in the SSI cluster:

#cp query dateformat

You must issue this command separately on each member of the cluster. Write down the DATEFORMAT setting returned on each system.

- d. Change the DATEFORMAT setting for the DIRMUSER user ID at the slot 2 member. Issue the following command from the DIRMUSER user ID on any member system in the cluster:

dirmaint for dirmuser at *sys2* dateformat isodate

- e. Log off and back on to the DIRMUSER user ID on *sys2*.

f. Verify that the DATEFORMAT setting changed on sys2:

#cp query dateformat

Verify that the DATEFORMAT setting matches that used in the DIRM command in step [“14.d” on page 279](#).

g. Log off and back on to the DIRMUSER user ID on sys1.

h. Verify that the DATEFORMAT setting did not change on sys1.

#cp query dateformat

Verify that the DATEFORMAT setting is the same as it was for sys1 in step [“14.c” on page 279](#).

i. Verify that the DATEFORMAT setting did not change on sys3 and sys4. Repeat steps [“14.g” on page 280](#) and [“14.h” on page 280](#) for the DIRMUSER user ID on sys3 and sys4.

j. Restore the original DATEFORMAT setting:

dirm for dirmuser at sys2 dateformat *oldvalue*

Where *oldvalue* is the original date format on sys2, as determined in step [“14.c” on page 279](#).

Or:

dirm for dirmuser at sys2 dateformat delete

If you wish to use the system default.

15. Do not log off or disconnect from the DIRMUSER user ID on the system where DIRMAINT is running, as it will be used to test the DATAMOVE server functions.

Test the DATAMOVE Server Machine

This procedure will test the new DATAMOVE code to see that it functions properly. You will log on a server machine and access the appropriate disks. The DIRMUSER user ID is required in order to verify the DATAMOVE function.

Note:

1. You will first need to log on to the appropriate DATAMOVE server.

In an SSI cluster, log on the DATAMOVE server at the member system associated with slot 1 in the QUERY SSI output. Refer to the DATAMOVE_MACHINE= statements in the CONFIGSS DATADVH file on the DIRMAINT 11F disk to determine which DATAMOVE server is defined for each system in the cluster.

2. To test an SSI cluster, you will need a DIRMUSER user ID on a second system in the cluster, and you should have already verified the DIRMSAT operation in [“Test the DIRMSAT Server Machine” on page 275](#).
3. Starting with step [“11” on page 283](#), this procedure will have you make updates to the source directory and verify these changes took effect. To do this the RUNMODE= entry within an override file to the CONFIG DATADVH file (on the 7VMDIR40 41F minidisk) must be set to *operational*.

1. Log on to appropriate the **DATAMOVE** server.
2. If the DATAMOVE server is currently running, it must be shutdown.

shutdown

3. Link to the 7VMDIR40's test disks

profile test

You will not see a CMS Ready message. Instead, this condition has been replaced by a line with the DATAMOVE service machine's network node id, user id, the date, return code, and time of day.

4. Verify the appropriate disks have been accessed

The disk mode and addresses or directory names should match the configuration specified in the DVHPROFM DATADVH file. If not, make the necessary corrections and run the profile exec again.

q accessed

```
q accessed
Mode Stat      Files Vdev  Label/Directory
A      R/W         1  155  DAT155
C      R/O        294 191  DRM492
D      R/O         57 11F  DRM41F
F      R/O         5  551  PMA551
S      R/O        464 190  MNT190
Y/S    R/O         3  19E  MNT19E
Z      R/W         0  1FA  DAT1FA
DATAMOVE DVHTEST1 - 2024/04/11; T=0.01/0.01 17:28:35
```

5. Check for any extraneous files

This check verifies that the disks are accessed, that the message handler is functioning correctly, and that there are no back level executable files that have been misplaced in the search order. If you have a large number of duplicate files, or if you have any executable files, use an *EXEC DVHUCHK CHECK FILELIST* command to resolve the discrepancies before continuing.

exec dvhuchk check itemize

```
exec dvhuchk check itemize
DVHUCH1371W Filemodes C and E both contain AUTHDASD DATADVH.
DVHUCH1371W Filemodes A and C both contain DATAMOVE DATADVH.
DVHUCH1372I There were 2 extraneous files found.
DVHUCH1190I Command CHECK complete; RC= 2.
DATAMOVE DVHTEST1 - 2024/04/11(00002); T=0.40/0.43 18:11:32
```

6. Start the server machine using the new code.

The DVHBEGIN EXEC will start the server.

dvhbegin

The DATAMOVE service machine should now be waiting for work.

```
dvhbegin
DATAMOVE DVHTEST1 - 2024/04/11; T=4.30/4.69 18:58:06
DVHWAI2140I Waiting for work on 2024/04/11 at 18:58:06.
```

7. Verify the operation of DATAMOVE's console interrupt handler, the command syntax parser, and part of the authorization checking.

cp query files

```
cp query files
DVHWAI2146I Wakeup caused by console attention on 2024/04/11 at 19:20:00.
DVHREQ2290I Request is: CP query files
DVHREQ2288I Your CP request for DATAMOVE at * has been accepted.
```

```
FILES: NO RDR, 0001 PRT, NO PUN
DVHREQ2289I Your CP request for DATAMOVE at * has completed; with RC = 0.
DATAMOVE DVHTEST1 - 2024/04/11; T=0.56/0.61 19:20:05
DVHWAI2140I Waiting for work on 2024/04/11 at 19:20:05.
```

8. Test DirMaint's automatic restart and recovery of the DATAMOVE server

a. Create a CP disabled wait state.

If a restart is not successful, check the SHUTDOWN_REIPL_COMMAND= CP IPL CMS PARM AUTOOCR entry in the CONFIG* DATADVH file(s). You may need to correct the name of the CMS saved system, or change it to IPL by device address rather than by system name. It should match the IPL statement you included in the DATAMOVE machine's directory entry, or the IPL statement included in the profile used by the DATAMOVE machine's directory entry.

cp system clear

```
cp system clear
DVHWAI2146I Wakeup caused by console attention on 2024/04/16 at
21:51:50.
DVHREQ2290I Request is: CP system clear
DVHREQ2288I Your CP request for DATAMOVE at * has been accepted.
Storage cleared - system reset.
DMSWSP314W Automatic re-IPL by CP due to disabled wait; PSW 000A0000
00000000
z/VM 7.4.0      2024-05-23 10:40
PRT FILE 1019 SENT FROM DATAMOVE CON WAS 1019 RECS 0049 CPY 001 0
HOLD NOKEEP
:

PRODUCT:
IBM Directory Maintenance Facility for z/VM (DirMaint)
5741-A05 (C) Copyright IBM Corporation 1979, 2024.
Function Level 740 Service Level nnnn.
DMSACC724I 155 replaces A (191)

DVHPR02008I ROLE = DATAMOVE

DVHPR02010I TESTING USE OF MSGNOH ...
DVHPR02002A Manual start is required for DATAMOVE.
DVHPR02002A Enter DVHBEGIN when ready to start.
:
DATAMOVE DVHTEST1 - 2024/04/16; T=0.38/0.46 21:54:49
```

b. Start the server machine again

If the DATAMOVE machine was running disconnected, the DVHPR0F EXEC would have automatically issued an *EXEC DVHBEGIN* command; manual intervention would not have been required.

profile test dvhbegin

9. Disconnect the user ID

#cp disc

- Repeat steps “1” on page 280 through “9” on page 282 for each DATAMOVE server defined for each system in the >SSI cluster. Refer to the DATAMOVE_MACHINE= statements configured in the associated override configuration file to determine which DATAMOVE servers are defined for which systems in the cluster.

11. Log on to the DIRMUSER user ID on any system in the SSI cluster. If you had previously logged off this user ID, make sure to complete the instructions in step [“14.a” on page 274](#) to access test code for the MAINT 19E minidisk.

Complete the test instructions from this point only when you are ready to allow DirMaint to update the source directory.

You will also want to make sure directory changes are placed online immediately for verification steps.

- a. To define available DASD extents for creating test disks to the DIRMAINT server, issue the following:

dirmaint dasd add region *regname* *valid* *devtype* *size* *start*

Add a region of free DASD space to be used to test DATAMOVE server functions to the DirMaint EXTENT CONTROL file – where *regname* is the name of the region, *valid* specifies the volume ID placed in the *volser* field of any volume with at least 1 cylinder (on any CKD device) or 64 blocks (on any FB-512 device) of available space, *devtype* specifies the DASD type associated with the volume, *size* specifies the number of blocks or cylinders associated with the free space, and *start* specifies the starting block or cylinder.

dirmaint rldext

Place the EXTENT CONTROL file changes into use.

- b. Verify that the DIRMAINT server will allocate DASD by issuing the following:

**dirmaint online immed
dirmaint for dirmuser amdisk *nnn* x autor 1 *regname***

Where *nnn* is the device address that does not already exist for the DIRMUSER user ID, and *regname* is the region name defined in step [“11.a” on page 283](#). If using FB-512 DASD, substitute 64 for 1.

- c. Wait for the messages to indicate that the minidisk has been added and transferred to the DIRMUSER user ID, then issue the following:

cp link * *nnn nnn* mr
access *nnn* z

Where *nnn* is the device address used in the previous AMDISK command for the DIRMUSER user ID. This will verify that the minidisk exists and has not been formatted.

d. Have DIRMAINT delete the requested DASD, issue the following:

dirmaint for dirmuser dmdisk *nnn* noclean

Where *nnn* is the device address used in the previous AMDISK command for the DIRMUSER user ID.

The expected result will be messages from DIRMAINT indicating that the specified device has been deleted and that the space is available for re-allocation.

e. Wait for the messages to indicate that the minidisk has been deleted, then issue:

cp detach *nnn*
cp link * *nnn nnn* mr

Where *nnn* is the device address used in the previous AMDISK command for the DIRMUSER user ID. The minidisk should not exist.

f. Verify that the DIRMAINT server will allocate and DATAMOVE server will format DASD by issuing:

dirmaint for dirmuser amdisk *nnn* x autor 1 *regname* label *label*

Where *nnn* is any legal device address that does not already exist for the DIRMUSER user ID, *regname* is the region name defined in step “11.a” on page 283, and *label* is the label to be assigned to the minidisk being allocated.

g. Wait for the messages to indicate that the minidisk has been added to DATAMOVE, the minidisk has been formatted, and transferred to the DIRMUSER user ID, then issue:

cp link * *nnn nnn* mr
access *nnn* z

Where *nnn* is the device address used in the previous AMDISK command for the DIRMUSER user ID. This will verify that the minidisk exists and has been formatted by DATAMOVE.

h. Have DATAMOVE format the requested DASD being deleted, issue:

cp detach *nnn*
dirmaint for dirmuser dmdisk *nnn* clean

Where *nnn* is the device address used in the previous AMDISK command for the DIRMUSER user ID.

The expected result will be a message from DIRMAINT indicating that the specified device has been transferred to the DATAMOVE machine for DATA security clean-up, followed by more messages from DIRMAINT indicating that the specified device has been deleted from the DATAMOVE machine and that the space is available for re-allocation.

- i. Wait for the messages to indicate that the minidisk has been deleted, then issue:

cp link * *nnn nnn mr*

Where *nnn* is the device address used in the previous AMDISK command for the DIRMUSER user ID. The minidisk should not exist.

12. If your system is running in an SSI cluster, continue with the following SSI cluster test verification steps. You can issue the following commands from the DIRMUSER user ID on any of the member systems in the cluster. This step will test the DATAMOVE server defined for the member systems associated with slots 2, 3, and 4 in the QUERY SSI output. This step should be repeated for all remaining slots in your SSI cluster.

- a. Verify on a specific system in the cluster that the DIRMAINT server will allocate and the DATAMOVE server will format DASD, by issuing:

dirmaint for *subconfig-n* at *sysn* amdisk *nnn* x autor 1 *regname label label*

Where *sysn* is the system ID of the member system in slot 2, 3, or 4 of the QUERY SSI output, *subconfig-n* is the name of the SUBCONFIG entry for the DIRMUSER user ID associated with system *sysn*, *nnn* is any legal device address that does not already exist for the DIRMUSER user ID, *regname* is the region name defined in step “11.a” on page 283, and *label* is the label to be assigned to the minidisk being allocated.

- b. Wait for the messages to indicate that the minidisk has been added to DATAMOVE, the minidisk has been formatted, and transferred to the DIRMUSER user ID on the *sysn* system in the cluster. Then issue the following from the DIRMUSER user ID on the *sysn* system in the cluster:

```
cp detach nnn  
cp link * nnn nnn mr  
access nnn z
```

Where *nnn* is the device address used in the previous AMDISK command for the DIRMUSER user ID on the *sysn* system. This will verify that the minidisk exists and has been formatted by DATAMOVE.

- c. Verify that the minidisk was *not* added to the other member systems in the cluster. Log on to the DIRMUSER user ID on each of the other systems in the cluster (besides *sysn*) and issue the following:

```
cp link * nnn nnn mr
```

This will verify that the minidisk does *not* exist.

- d. Have the DATAMOVE server on the *sysn* system in the cluster format the requested DASD being deleted, by issuing:

```
cp detach nnn  
dirmaint for subconfig-n at sysn dmdisk nnn clean
```

Where *subconfig-n*, *sysn* and *nnn* are the SUBCONFIG name, system ID and device address used in the previous AMDISK command for the DIRMUSER user ID in step “12.a” on page 285.

- e. Wait for the messages to indicate that the minidisk has been transferred to DATAMOVE, the minidisk has been formatted, and has been deleted from DATAMOVE on the *sysn* system in the cluster. Then issue the following from DIRMUSER on the *sysn* system in the cluster:

```
cp link * nnn nnn mr
```

Where *nnn* is the device address used in the previous AMDISK command for the DIRMUSER user ID in step “12.a” on page 285.

- f. Log off the DIRMUSER user ID on the *sysn* system in the cluster.

```
logoff
```

Logoff should only be issued if you are finished testing the DATAMOVE function for each system in the cluster.

Post Test Instructions

Verification of DirMaint is now complete. You will need to do some final clean up.

1. Erase the ACCESS DATADVH file created on DIRMUSER's A disk. This should be done on each system in the cluster.

```
erase access datadvh a
```

2. You can log off the DIRMUSER user ID

3. At this point, it is advisable to log off all DirMaint server machines.
4. Once DirMaint is in production, the supplied sample files can be modified and placed in production without bringing down the DirMaint server's. This way, the system files can be maintained on the test disk and immediately placed into production without the need for shutting the servers down.

From the 7VMDIR40 user ID, issue:

- a. Make the desired changes to tailorable system files on the 492 or 41F test minidisk.
- b. Send the updated system file to the DIRMAINT server and have it replace the file on the appropriate production minidisk.

dirm file *fn ft fm*

Where *fn ft fm* is the file identification and location of the system file you wish to replace on the appropriate production minidisk.

- c. Have the DIRMAINT server place the new system files into use

dirm rldata

What's Next?

Proceed with:

To place the new DirMaint code into production after testing during initial installation, see "Section 6.4, Place DirMaint Tailored Files Into Production" of the *DirMaint Program Directory*.

OR

To replace DirMaint code running in production with the new code after testing while servicing your system, see "Section 7.5, Place Serviced DirMaint Into Production" of the *DirMaint Program Directory*.

Quick Test After Installing Service

The steps in [“Test the DIRMAINT Server Machine”](#) on page 269, [“Test the DIRMSAT Server Machine”](#) on page 275, and [“Test the DATAMOVE Server Machine”](#) on page 280 are specifically designed to systematically test the functions of the DirMaint product in a sequence such that the point of failure, if any, isolates the cause and identifies the necessary corrective action. After a period of production, there is small likelihood that this procedure will encounter any problem, and is unnecessarily involved for routine regression testing.

This procedure provides an easier alternative. If the test is successful, testing is complete. If the test fails, there is no indication of the cause; return to [“Test the DIRMAINT Server Machine”](#) on page 269 and follow the more detailed steps to isolate the cause and identify the solution.

1. Switch the DirMaint service machines from using the production code to use the code to be tested.

Create a PROD2TST DVHBATCH file, for example, containing the following commands:

OFFLINE
DATAMOVE SHUTDOWN
SATELLITE SHUTDOWN
FOR DATAMOVE LINK 7VMDIR40 491 191 DELETE
FOR DATAMOVE LINK 7VMDIR40 11F 11F DELETE
FOR DATAMOVE LINK 7VMDIR40 492 192 DELETE
FOR DATAMOVE LINK 7VMDIR40 41F 21F DELETE
FOR DIRMSAT LINK 7VMDIR40 491 191 DELETE
FOR DIRMSAT LINK 7VMDIR40 11F 11F DELETE
FOR DIRMSAT LINK 7VMDIR40 492 192 DELETE
FOR DIRMSAT LINK 7VMDIR40 41F 21F DELETE
FOR DIRMAINT LINK 7VMDIR40 491 191 DELETE
FOR DIRMAINT LINK 7VMDIR40 11F 11F DELETE
FOR DIRMAINT LINK 7VMDIR40 492 192 DELETE
FOR DIRMAINT LINK 7VMDIR40 41F 21F DELETE
FOR DATAMOVE LINK 7VMDIR40 492 191 RR
FOR DATAMOVE LINK 7VMDIR40 41F 11F RR
FOR DATAMOVE LINK 7VMDIR40 491 192 RR
FOR DATAMOVE LINK 7VMDIR40 11F 21F RR
FOR DIRMSAT LINK 7VMDIR40 492 191 RR
FOR DIRMSAT LINK 7VMDIR40 41F 11F RR
FOR DIRMSAT LINK 7VMDIR40 491 192 RR
FOR DIRMSAT LINK 7VMDIR40 11F 21F RR
FOR DIRMAINT LINK 7VMDIR40 492 191 MR
FOR DIRMAINT LINK 7VMDIR40 41F 11F MR
FOR DIRMAINT LINK 7VMDIR40 491 192 MR
FOR DIRMAINT LINK 7VMDIR40 11F 21F MR
FOR DATAMOVE REVIEW NOPROF
FOR DIRMSAT REVIEW NOPROF
FOR DIRMAINT REVIEW NOPROF
CP MSG <your_id> PROD2TST is done!

Note: The FOR DATAMOVE commands in this batch file must be duplicated for each DATAMOVE server, and the FOR DIRMSAT commands must be duplicated for each defined satellite server.

2. Submit this batch job to the DIRMAINT server using these commands:

DIRM BATCH PROD2TST DVHBATCH

3. When the job has completed successfully, and you have reviewed the returned reader files verifying the LINK statements are correct, issue:

DIRM DIRECT **DIRM SHUTDOWN**

4. Restart the DIRMAINT and DIRMSAT servers. Note that the DATAMOVE machines will be autologged by DirMaint when they are used.
 - a. Issue the following commands:

CP XAUTOLOG DIRMAINT **CP SLEEP 1 MIN**

- b. Then issue the following command for each DIRMSAT server configured on each system where DIRMAINT is not running.

CP AT *sysn* CMD XAUTOLOG *dirmsat_id*

Where *dirmsat_id* is the user ID of a DIRMSAT server where DIRMAINT is not running and *sysn* is the system associated with the DIRMSAT server on the SATELLITE_SERVER= statement in your override configuration file.

5. Run a test that exploits most of DirMaint's critical code paths.

Issue these commands:

DIRM ONLINE

DIRM FOR <any_id> AMDISK <555> <3390> AUTOG <1> <groupname> M

You may substitute other values for the virtual address, device type, size, or groupname; as appropriate for your installation. This tests the communication paths between the originating user and the DIRMAINT server, the parser, message handler, and the path between DIRMAINT and the DIRMSAT servers, if any.

6. Reverse the previous step by issuing these command:

DIRM FOR <any_id> DMDISK <555> CLEAN

This retests the same paths as the previous step, and adds the communication paths between DIRMAINT and the DATAMOVE server, and from DATAMOVE back to DIRMAINT.

7. Switch the DirMaint service machines from using the test code back to use the production code to be tested.

Create a TST2PROD DVHBATCH file, for example, containing these commands:

```

OFFLINE
DATAMOVE SHUTDOWN
SATELLITE SHUTDOWN
| FOR DATAMOVE LINK 7VMDIR40 492 191 DELETE
| FOR DATAMOVE LINK 7VMDIR40 41F 11F DELETE
| FOR DATAMOVE LINK 7VMDIR40 491 192 DELETE
| FOR DATAMOVE LINK 7VMDIR40 11F 21F DELETE
| FOR DIRMSAT LINK 7VMDIR40 492 191 DELETE
| FOR DIRMSAT LINK 7VMDIR40 41F 11F DELETE
| FOR DIRMSAT LINK 7VMDIR40 491 192 DELETE
| FOR DIRMSAT LINK 7VMDIR40 11F 21F DELETE
| FOR DIRMAINT LINK 7VMDIR40 492 191 DELETE
| FOR DIRMAINT LINK 7VMDIR40 41F 11F DELETE
| FOR DIRMAINT LINK 7VMDIR40 491 192 DELETE
| FOR DIRMAINT LINK 7VMDIR40 11F 21F DELETE
| FOR DATAMOVE LINK 7VMDIR40 491 191 RR
| FOR DATAMOVE LINK 7VMDIR40 11F 11F RR
| FOR DATAMOVE LINK 7VMDIR40 492 192 RR
| FOR DATAMOVE LINK 7VMDIR40> 41F 21F RR
| FOR DIRMSAT LINK 7VMDIR40 491 191 RR
| FOR DIRMSAT LINK 7VMDIR40 11F 11F RR
| FOR DIRMSAT LINK 7VMDIR40 492 192 RR
| FOR DIRMSAT LINK 7VMDIR40 41F 21F RR
| FOR DIRMAINT LINK 7VMDIR40 491 191 MR
| FOR DIRMAINT LINK 7VMDIR40 11F 11F MR
| FOR DIRMAINT LINK 7VMDIR40 492 192 MR
| FOR DIRMAINT LINK 7VMDIR40 41F 21F MR
FOR DATAMOVE REVIEW NOPROF
FOR DIRMSAT REVIEW NOPROF
FOR DIRMAINT REVIEW NOPROF
CP MSG <your_id> TST2PROD is done!

```

Note: The FOR DATAMOVE commands in this batch file must be duplicated for each DATAMOVE server, and the FOR DIRMSAT commands must be duplicated for each defined satellite server.

8. Submit this batch job to the DIRMAINT server by issuing these command:

DIRM BATCH TST2PROD DVHBATCH

9. When the job has completed successfully, and you have reviewed the returned reader files verifying the LINK statements are correct, issue these commands:

```

DIRM DIRECT
DIRM ONLINE
DIRM SHUTDOWN

```

What's Next?

To replace DirMaint code running in production with the new code after testing while servicing your system, see "Section 7.5, Place Serviced DirMaint Into Production" of the *DirMaint Program Directory*.

Appendix I. DirMaint Tailorable and Non-Tailorable System Files

This table lists the DirMaint files that may be tailored during the installation procedure.

Table 50. DirMaint Tailorable System Files		
File Name	Description	Topic
ACCESS DATADVH	Identifies where the DirMaint common user code resides.	For more information, see “The ACCESS DATADVH File” on page 103.
AUTHDASD DATADVH	Determines who can allocate space in what DASD groups, regions, or volumes.	For more information, see “The AUTHDASD DATADVH Control File” on page 83.
AUTHFOR CONTROL	Identifies what user ID's have delegated authority for another user ID to act for them, and what command sets are included in that authority. Maintained by using the DIRM AUTHFOR and DIRM DROPFOR commands.	For more information, see “AUTHFOR CONTROL File” on page 119. For more information on the AUTHFOR and DROPFOR commands, see the z/VM: Directory Maintenance Facility Commands Reference .
AUTHLINK CONTROL	Identifies what user ID's are allowed to issue DIRM LINK commands without having to know the minidisk password for the disk being linked. Maintained by using the DIRM AUTHLINK command.	For more information on the AUTHLINK command, see the z/VM: Directory Maintenance Facility Commands Reference .
AUTHSCIF CONTROL	Contains a list of user ID's which are allowed to issue the DIRM SECUSER command. This file is maintained by the DIRM AUTHSCIF command.	For more information on the AUTHSCIF and SECUSER commands, see the z/VM: Directory Maintenance Facility Commands Reference .
AUTOMAIL DATAADVH	Contains the minidisk audit notice file. The Uppercase English version of this file has a filetype of DATAUDVH.	For more information, see “Language Dependent Configuration Entries” on page 229. For more information, see the AUTOMAIL \$DATADVH source file.
CONFIG DATADVH	Is the configuration file for the DirMaint servers. Multiple configuration files are allowed, providing the ability to override the supplied sample configuration file without actually altering it. Configuration file records are read starting with filenames CONFIG99-CONFIG0, CONFIGZZ-CONFIGA, then CONFIG DATADVH.	For more information, see “CONFIG DATADVH” on page 24.

Table 50. DirMaint Tailorable System Files (continued)

File Name	Description	Topic
DATAMOVE DATADVH	Contains a schedule of events for the DATAMOVE server.	For more information, see “DATAMOVE DATADVH” on page 68.
DIRECTXA DATADVH	Contains a list of all z/VM directory statements.	For more information, see the DIRECTXA \$DATADVH source file.
DIRMAINT DATADVH	Contains a schedule of events for the DIRMAINT server.	For more information, see “DIRMAINT DATADVH” on page 48.
DIRMAINT NEWMAIL	Is a mail file which may contain system information about new or changed function or installation policy or any other general DirMaint information an installation would like distributed to users. Maintained by using the DIRM MAIL command.	For more information on the MAIL command, see the z/VM: Directory Maintenance Facility Commands Reference .
DIRMSAT DATADVH	Contains a schedule of events for the DIRMSAT server.	For more information, see “DIRMSAT DATADVH” on page 71.
DVHBHEAD DATAADVH	Contains the batch header file. The Uppercase English version of this file has a filetype of DATAUDVH. The Kanji version of this file has a filetype of DATAKDVH.	For more information, see “Language Dependent Configuration Entries” on page 229. For more information, see the DVHBHEAD \$DATADVH source file.
DVHLINK EXCLUDE	Contains a list of minidisk addresses, and their owners, that are excluded from the DVHLINK FILE (contains a list of user ID's who have a link to a minidisk). Maintained by using the DIRM USEROPTN command.	For more information, see “DVHLINK EXCLUDE” on page 52. For more information on the USEROPTN command, see the z/VM: Directory Maintenance Facility Commands Reference .
DVHMENUS DATAADVH	Contains the DirMaint menu source. The Uppercase English version of this file has a filetype of DATAUDVH.	For more information, see “National Language Support” on page 109.
DVHNAMES DATADVH	Identifies user ID's which are to be notified when any significant event occurs in any of the DirMaint servers.	For more information, see “DVHNAMES DATADVH” on page 51.
DVHPROFA *	Determines which minidisks (or SFS Directories) are accessed by the DIRMAINT, DATAMOVE, and DIRMSAT servers and at what filemode during initialization. The filetype must be the same as the user ID name the server is running on.	For more information, see “DVHPROFA DIRMAINT” on page 24.

Table 50. DirMaint Tailorable System Files (continued)

File Name	Description	Topic
DVHPROFM DATADVH	Determines which minidisks (or SFS Directories) are accessed by the DATAMOVE server and at what filemode during initialization. This file is used if there is no DVHPROFA file with a filetype matching the user ID name the DATAMOVE server is running on.	For more information, see “DVHPROFA DIRMAINT” on page 24.
EXTENT CONTROL	Provides information required for DirMaint DASD management functions.	For more information, see “The Extent Control File” on page 74.
PROFILE EXEC	Contains the PROFILE EXEC for the DirMaint servers.	For more information, see the PROFILE \$EXEC source file.
PROFILE XEDIT	Determines characteristics of your edit sessions.	For more information, see “PROFILE XEDIT” on page 23.
PWMON CONTROL	Contains a list of user ID's whose passwords do not expire, or do not receive password expiration notices, or have their password expiration notices sent to an alternate user ID. Maintained by using the DIRM PWMON command.	For more information, see “PWMON CONTROL” on page 54. For more information on the PWMON command, see the <i>z/VM: Directory Maintenance Facility Commands Reference</i> .
PWLNOLCK DATAADVH	Contains the password expired (without lockout) notice file. The Uppercase English version of this file has a filetype of DATAUDVH.	For more information, see “Language Dependent Configuration Entries” on page 229 and the PWLNOLCK \$DATAADV source file.
PWLOCKED DATAADVH	Contains the password expired (with lockout) notice file, sent to the affected user ID. The Uppercase English version of this file has a filetype of DATAUDVH.	For more information, see “Language Dependent Configuration Entries” on page 229 and the PWLOCKED \$DATAADV source file.
PWLOTHER DATAADVH	Contains the password expired (with lockout) notice file, sent to the surrogate user ID listed in the PWMON CONTROL file. The Uppercase English version of this file has a filetype of DATAUDVH.	For more information, see “Language Dependent Configuration Entries” on page 229 and the PWLOTHER \$DATAADV source file.
PWWB4LCK DATAADVH	Contains the password will expire (with lockout) notice file, sent to the affected user ID. The Uppercase English version of this file has a filetype of DATAUDVH.	For more information, “Language Dependent Configuration Entries” on page 229 and the PWWB4LCK \$DATAADV source file.
PWWNOLCK DATAADVH	Contains the password will expire (without lockout) notice file, sent to the affected user ID. The Uppercase English version of this file has a filetype of DATAUDVH.	For more information, see “Language Dependent Configuration Entries” on page 229 and the PWWNOLCK \$DATAADV source file.

<i>Table 50. DirMaint Tailorable System Files (continued)</i>		
File Name	Description	Topic
PWWOTHER DATAADVH	Contains the password will expire (without lockout) notice file, sent to the surrogate user ID listed in the PWMON CONTROL file. The Uppercase English version of this file has a filetype of DATAUDVH.	For more information, see “Language Dependent Configuration Entries” on page 229 and the PWWOTHER \$DATAADV source file.
RPWLIST DATA	Contains a list of prohibited passwords.	For more information, see “RPWLIST DATA” on page 54 and see <i>z/VM: CP Commands and Utilities Reference</i> .
SUBSCRIB DATADVH	Contains a list of subscribers to be notified when any userid, or particular userids, are changed. Maintained by the SUBSCRIBE command.	For more information, see “SUBSCRIB DATADVH” on page 55, and for more information on the SUBSCRIBE command, see the <i>z/VM: Directory Maintenance Facility Commands Reference</i> .
USER INPUT	Is the existing source directory file.	For more information, see “USER INPUT” on page 58 and see <i>z/VM: CP Planning and Administration</i> .
150ASERV MSGADVH	Contains the American English message repository for the DirMaint servers.	For more information, see “Language Dependent Configuration Entries” on page 229 and “Overriding and Supplementing DirMaint Messages” on page 62.
150AUSER MSGADVH	Contains the American English message repository for the user interface code.	For more information, see “Language Dependent Configuration Entries” on page 229 and “Overriding and Supplementing DirMaint Messages” on page 62.
150ASERV MSGKDVH	Contains the Kanji message repository for the DirMaint servers.	For more information, see “Language Dependent Configuration Entries” on page 229.
150AUSER MSGKDVH	Contains the Kanji message repository for the user interface code.	For more information, see “Language Dependent Configuration Entries” on page 229.
140CMDS DATADVH	Describes the 1.4 compatibility command set.	For more information, see the 140CMDS \$SAMPDVH source file.
150CMDS DATADVH	Describes the 1.5 compatibility command set.	For more information, see the 150CMDS \$SAMPDVH source file.

This table lists the DirMaint files which are created and maintained by the DirMaint servers. These files **should not** be directly modified.

Table 51. DirMaint Non-Tailorable System Files		
File Name	Description	Page
ACTIVE DATADVH	Contains a list of all directory statements from the DIRECTXA DATADVH file plus any additional added by the DIRM DEFINESTAG command.	For more information, see the DIRECTXA \$DATADVH source file. For more information on the DEFINESTAG command, see the <i>z/VM: Directory Maintenance Facility Commands Reference</i> .
AUTOBLK CONTROL	Generated from the :AUTOBLOCK. section of the EXTENT CONTROL file.	For more information, see “The Extent Control File” on page 74.
CLST* CLUSTER	Contains clusters of user ID's from the monolithic source directory. This file is built using the load list format of the directory. The last 4-characters of the filename will be the cluster number starting at offset 1.	N/A
CMDSTATE FILE	Used for maintaining the state of command processing.	N/A
DATAMOVE CONTROL	Contains the primary control structure for managing interaction with the DATAMOVE machine. Built from entries contained in the CONFIG* DATADVH files.	For more information, see “DATAMOVE Control File” on page 91.
DEFAULT CONTROL	Generated from the :DEFAULTS. section of the EXTENT CONTROL file.	For more information, see “The Extent Control File” on page 74.
DEFAULTS DATADVH	Defines the default maximum size for various DASD devices.	For more information, see “The Extent Control File” on page 74.
DIRMAINT TRANSLOG	Contains the DirMaint servers transaction message logs for the latest month.	For more information, see the CONFIG \$SAMPDVH source file.
DIRMAINT TLOG _{yy} _{mm}	Contains the DirMaint servers transaction message logs for previous months.	For more information, see the CONFIG \$SAMPDVH source file.
DIRMSAT CONTROL	Contains the primary control structure for managing interaction with the DIRMSAT Server. Built from entries contained in the CONFIG* DATADVH files.	For more information, see the CONFIG \$SAMPDVH source file.
DISABLE CONTROL	Contains the date and time when the DIRM DISABLE command was issued. This file is erased when the DIRM ENABLE command is issued.	For more information on the ENABLE and DISABLE commands, see the <i>z/VM: Directory Maintenance Facility Commands Reference</i> .
DVHBATCH CONTROL	Used for maintaining the state of batch processing.	N/A

Table 51. DirMaint Non-Tailorable System Files (continued)

File Name	Description	Page
DVHBATCH QUEUE	Contains the batch requests which have not yet been processed. This file is appended to when a reader file is received after a DIRM BATCH command is issued.	For more information on the BATCH command, see the z/VM: Directory Maintenance Facility Commands Reference .
DVHCEXIT CALLINFO	Contains a timestamped record of exits called by a DirMaint server, or user interface code, and the return code passed back from the exit.	N/A
DVHLINK ATTEMPT	Contains a list of minidisk link attempts which were rejected. This file is appended to when a DIRM LINK command fails. The DIRM ELINK command can be used to provide maintenance on this file.	For more information on the ELINK and LINK commands, see the z/VM: Directory Maintenance Facility Commands Reference .
DVHLINK FILE	Contains a list of of user ID's who have a LINK to a minidisk. Maintained by using the DIRM DLINK and DIRM LINK commands.	For more information on the DLINK and LINK commands, see the z/VM: Directory Maintenance Facility Commands Reference .
DVHLOCK DATADVH	Contains a list of device addresses or user ID's which are locked. Maintained by the DIRM LOCK and DIRM UNLOCK commands.	For more information on the LOCK and UNLOCK commands, see the z/VM: Directory Maintenance Facility Commands Reference .
DVHPWUSE DATADVH	Contains a history of user ID passwords for the timeframe specified by the PW_REUSE_INTERVAL= configuration file entry. Passwords for all user ID's on the system are contained in this file. This file is maintained by the supplied (DVHPXV) local password screening exit, and by the supplied (DVHXPV) local logon password notification exit.	For more information, see the CONFIG \$SAMPDVH source file.
DVHRETRY QUEUE	Contains a list of work in progress when DirMaint previously shutdown due to an error encountered.	For more information, see “Restart or Shutdown Processing After Encountering an Error” on page 63.
DVHSCAN OUTPUT	Created during DIRM SCAN command processing to hold the requested output of that command.	For more information on the SCAN command, see the z/VM: Directory Maintenance Facility Commands Reference .
DVHSHUTX CONTROL	Contains two counters and an action indicator used during shutdown/restart processing when errors are encountered.	For more information, see “Restart or Shutdown Processing After Encountering an Error” on page 63.
DVHSLVL DATADVH	Contains the current RSU service level for the DirMaint server's.	Maintained on the RSU only.

<i>Table 51. DirMaint Non-Tailorable System Files (continued)</i>		
File Name	Description	Page
DVHULVL DATADVH	Contains the current RSU service level for the user interface code.	Maintained on the RSU only.
EXCLUDE CONTROL	Generated from the :EXCLUDE. section of the EXTENT CONTROL file.	For more information, see “The Extent Control File” on page 74.
GROUP CONTROL	Generated from the :GROUPS. section of the EXTENT CONTROL file.	For more information, see “The Extent Control File” on page 74.
IVP* CONTROL	Controls information related to IVP processing for a server. The IVP creates a file for each DIRMAINT, SATELLITE, and DATAMOVE server. The file name consists of the string “IVP” and one or more decimal digits. The file resides on the A-disk of the server .	For more information, see “Other IVP Files” on page 194.
IVP* STATUS	Human readable status information related to IVP processing for a server. The IVP creates a file for each DIRMAINT, SATELLITE, and DATAMOVE server. The file name consists of the string “IVP” and one or more decimal digits. The file resides on the A-disk of the server.	For more information, see “Other IVP Files” on page 194.
LOCAL DATADVH	Contains a list of all directory statements added by the DIRM DEFINESTAG command.	For more information on the DEFINESTAG command, see the z/VM: Directory Maintenance Facility Commands Reference.
OFFLINE CONTROL	Contains the date and time when the DIRM OFFLINE command was issued. This file is erased when the DIRM ONLINE command is issued.	For more information on the OFFLINE and ONLINE commands, see the z/VM: Directory Maintenance Facility Commands Reference.
OPTIONS DATADVH	Defines the keywords on the OPTION directory statement. Is used during DIRM OPTION command processing.	For more information on the OPTION command, see the z/VM: Directory Maintenance Facility Commands Reference. For more information, see the AUTOMAIL \$DATADVH source file.
PASSCHNG DATADVH	Contains a list of minidisk password change requests. This file is maintained by the supplied (DVHXMN) minidisk password notification exit.	N/A

Table 51. DirMaint Non-Tailorable System Files (continued)		
File Name	Description	Page
PASSWORD CHANGE	Created when the DIRM PWGEN command is issued. This file contains a list of randomly generated passwords to alter the existing user ID passwords.	For more information on the PWGEN command, see the z/VM: Directory Maintenance Facility Commands Reference .
PENDING MESSAGES	Contains a list of messages to be issued when the next directory online takes place.	N/A
PENDING FREEDEV	Contains a list of devices to be freed from a device table (*FDEV DEVTABLE).	For more information, see “xxxxFDEV DVHTABLE File” on page 92.
PURGES PENDING	Contains a list of user ID purge requests which have not yet been processed. This file is appended to when a DIRM PURGE command is received.	For more information on the PURGE command, see the z/VM: Directory Maintenance Facility Commands Reference .
PWMINFO LOCKLIST	Contains the distribution list of user ID's to be sent a password expired notice and have their passwords changed to NOLOG. This list of users will be sent the password expired notice and be NOLOGed if the CONFIG DATADVH entry PW_LOCK_MODE=AUTOMATIC.	For more information, see “ Step 4. Select Password Control Characteristics ” on page 32.
PWMINFO WARNLIST	Contains the distribution list of user ID's to be sent a password warning notice. This list of users will be sent the password warning notice if the CONFIG DATADVH entry PW_WARN_MODE=AUTOMATIC.	For more information, see “ Step 4. Select Password Control Characteristics ” on page 32.
PWMON LOCKLIST	Contains a list of user ID's to be locked out of the system. This list is sent to, intended to be edited by, the system administrator. The DIRM PWMON command is used to send this file back to DirMaint for processing.	For more information, see “ Step 4. Select Password Control Characteristics ” on page 32. For more information on the PWMON command, see the z/VM: Directory Maintenance Facility Commands Reference .
REGION CONTROL	Generated from the :REGIONS. section of the EXTENT CONTROL file.	For more information, see “ The Extent Control File ” on page 74.
SSIVOL CONTROL	Generated from the :SSI_VOLUMES. section of the EXTENT CONTROL file.	For more information, see “ The Extent Control File ” on page 74.
UNASSIGN DVHQUEUE	Contains a list of unassigned Work Unit Control Files (WUCF).	For more information, see “ Unassigned Queue ” on page 92.

<i>Table 51. DirMaint Non-Tailorable System Files (continued)</i>		
File Name	Description	Page
USER BACKOLD	Is the previous backup of the monolithic version of the source directory file.	For more information on the BACKUP command, see the z/VM: Directory Maintenance Facility Commands Reference .
USER BACKUP	Is the backup of the monolithic version of the source directory file.	For more information on the BACKUP command, see the z/VM: Directory Maintenance Facility Commands Reference .
USER DIRECT	Manages the cluster files, containing pointers to the cluster files for each user ID in the directory.	N/A
WHERE TO DATADVH	Identifies the node in a multi-system cluster on which the DIRMAINT server is currently running.	N/A
\$DIRGRP\$ DIRMPART	Contains the GLOBALDEFS statement which denotes the start of the global definition section of the source directory. The GLOBALDEFS Directory Control Statement contains the GLOBALOPTS and POSIXGROUP Directory Control Statements. Maintained by using the DIRM GLOBALOPTS and DIRM POSIXGROUP commands.	For more information on the GLOBALOPTS and POSIXGROUP commands, see the z/VM: Directory Maintenance Facility Commands Reference .
* DIRMPART	Contains additions or changes to a user directory. The filename will be the user ID of the directory entry. All DIRMPART files are merged into the CLUSTER files during nightly back up processing.	N/A
* DVHPWUSE	Contains a history of user ID passwords, one file for each user ID in the system, for the timeframe specified by the PW_REUSE_INTERVAL= configuration file entry. These files are maintained by the supplied (DVHPXV) local password screening exit, and by the supplied (DVHXPV) local logon password notification exit.	N/A

Table 51. DirMaint Non-Tailorable System Files (continued)

File Name	Description	Page
* NAMES	Contains the distribution list to be notified when a DirMaint server starts up or shuts down. Generated from the DVHNAMES DATADVH file. The filename will be DIRMAINT, DIRMSAT, and DATAMOVE for the three different servers.	For more information, see “DVHNAMES DATADVH” on page 51.
* RDRFILE	Contains the data file associated with a reader file request. The filename will be the spool file ID of the reader file request.	N/A
* VCONTROL	Contains information that pertains to a particular DASD volume. One of these files exists for each known DASD volume on the system. The filename will be the DASD volume ID.	For more information, see “Work Unit Control File” on page 88.
* WORKSAVE	Contains the WORKUNIT file after completion of processing if saving was specified in the CONFIG* DATADVH files.	For more information, see “Work Unit Control File” on page 88.
* WORKUNIT	Contains the basic unit of work managed on the DASD subsystem, also known as the Work Unit Control File (WUCF). The filename will be an eight digit number uniquely identifying the work unit.	For more information, see “Work Unit Control File” on page 88.
* WUCFFAIL	Contains a history of what commands were performed and which commands failed for a basic unit of work managed on the DASD subsystem. The filename will be an eight digit number uniquely identifying the work unit.	For more information, see “Work Unit Control File” on page 88.
*FDEV DVHTABLE	Contains a bit map describing what devices are currently in use in the associated DATAMOVE machine. The first 4-characters of the filename will be a number which is assigned to a specific DATAMOVE machine.	For more information, see “xxxxFDEV DVHTABLE File” on page 92.

Notices

This information was developed for products and services offered in the US. This material might be available from IBM in other languages. However, you may be required to own a copy of the product or product version in that language in order to access it.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not grant you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive, MD-NC119
Armonk, NY 10504-1785
US

For license inquiries regarding double-byte character set (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

Intellectual Property Licensing
Legal and Intellectual Property Law
IBM Japan Ltd.
19-21, Nihonbashi-Hakozakicho, Chuo-ku
Tokyo 103-8510, Japan

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM websites are provided for convenience only and do not in any manner serve as an endorsement of those websites. The materials at those websites are not part of the materials for this IBM product and use of those websites is at your own risk.

IBM may use or distribute any of the information you provide in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

IBM Director of Licensing
IBM Corporation
North Castle Drive, MD-NC119
Armonk, NY 10504-1785
US

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this document and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement or any equivalent agreement between us.

The performance data and client examples cited are presented for illustrative purposes only. Actual performance results may vary depending on specific configurations and operating conditions.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

Statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

This information may contain examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to actual people or business enterprises is entirely coincidental.

COPYRIGHT LICENSE:

This information may contain sample application programs in source language, which illustrate programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs. The sample programs are provided "AS IS", without warranty of any kind. IBM shall not be liable for any damages arising out of your use of the sample programs.

Programming Interface Information

This guide is intended to help DirMaint administrators tailor DirMaint to meet the needs of their particular VM system. This book documents Diagnosis, Modification, or Tuning Information provided by DirMaint.

Trademarks

IBM, the IBM logo, and [ibm.com](https://www.ibm.com/legal/copytrade)[®] are trademarks or registered trademarks of International Business Machines Corp., in the United States and/or other countries. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on [IBM Copyright and trademark information](https://www.ibm.com/legal/copytrade) (<https://www.ibm.com/legal/copytrade>).

The registered trademark Linux[®] is used pursuant to a sublicense from the Linux Foundation, the exclusive licensee of Linus Torvalds, owner of the mark on a worldwide basis.

Terms and Conditions for Product Documentation

Permissions for the use of these publications are granted subject to the following terms and conditions.

Applicability

These terms and conditions are in addition to any terms of use for the IBM website.

Personal Use

You may reproduce these publications for your personal, noncommercial use provided that all proprietary notices are preserved. You may not distribute, display or make derivative work of these publications, or any portion thereof, without the express consent of IBM.

Commercial Use

You may reproduce, distribute and display these publications solely within your enterprise provided that all proprietary notices are preserved. You may not make derivative works of these publications, or reproduce, distribute or display these publications or any portion thereof outside your enterprise, without the express consent of IBM.

Rights

Except as expressly granted in this permission, no other permissions, licenses or rights are granted, either express or implied, to the publications or any information, data, software or other intellectual property contained therein.

IBM reserves the right to withdraw the permissions granted herein whenever, in its discretion, the use of the publications is detrimental to its interest or, as determined by IBM, the above instructions are not being properly followed.

You may not download, export or re-export this information except in full compliance with all applicable laws and regulations, including all United States export laws and regulations.

IBM MAKES NO GUARANTEE ABOUT THE CONTENT OF THESE PUBLICATIONS. THE PUBLICATIONS ARE PROVIDED "AS-IS" AND WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT, AND FITNESS FOR A PARTICULAR PURPOSE.

IBM Online Privacy Statement

IBM Software products, including software as a service solutions, ("Software Offerings") may use cookies or other technologies to collect product usage information, to help improve the end user experience, to tailor interactions with the end user, or for other purposes. In many cases no personally identifiable information is collected by the Software Offerings. Some of our Software Offerings can help enable you to collect personally identifiable information. If this Software Offering uses cookies to collect personally identifiable information, specific information about this offering's use of cookies is set forth below.

This Software Offering does not use cookies or other technologies to collect personally identifiable information.

If the configurations deployed for this Software Offering provide you as customer the ability to collect personally identifiable information from end users via cookies and other technologies, you should seek your own legal advice about any laws applicable to such data collection, including any requirements for notice and consent.

For more information about the use of various technologies, including cookies, for these purposes, see:

- The section entitled **IBM Websites** at [IBM Privacy Statement](https://www.ibm.com/privacy) (<https://www.ibm.com/privacy>)
- [Cookies and Similar Technologies](https://www.ibm.com/privacy#Cookies_and_Similar_Technologies) (https://www.ibm.com/privacy#Cookies_and_Similar_Technologies)

Bibliography

This topic lists the publications in the z/VM library. For abstracts of the z/VM publications, see [z/VM: General Information](#).

Where to Get z/VM Information

The current z/VM product documentation is available in [IBM Documentation - z/VM \(https://www.ibm.com/docs/en/zvm\)](https://www.ibm.com/docs/en/zvm).

z/VM Base Library

Overview

- [z/VM: License Information](#), GI13-4377
- [z/VM: General Information](#), GC24-6286

Installation, Migration, and Service

- [z/VM: Installation Guide](#), GC24-6292
- [z/VM: Migration Guide](#), GC24-6294
- [z/VM: Service Guide](#), GC24-6325
- [z/VM: VMSES/E Introduction and Reference](#), GC24-6336

Planning and Administration

- [z/VM: CMS File Pool Planning, Administration, and Operation](#), SC24-6261
- [z/VM: CMS Planning and Administration](#), SC24-6264
- [z/VM: Connectivity](#), SC24-6267
- [z/VM: CP Planning and Administration](#), SC24-6271
- [z/VM: Getting Started with Linux on IBM Z](#), SC24-6287
- [z/VM: Group Control System](#), SC24-6289
- [z/VM: I/O Configuration](#), SC24-6291
- [z/VM: Running Guest Operating Systems](#), SC24-6321
- [z/VM: Saved Segments Planning and Administration](#), SC24-6322
- [z/VM: Secure Configuration Guide](#), SC24-6323

Customization and Tuning

- [z/VM: CP Exit Customization](#), SC24-6269
- [z/VM: Performance](#), SC24-6301

Operation and Use

- [z/VM: CMS Commands and Utilities Reference](#), SC24-6260
- [z/VM: CMS Primer](#), SC24-6265
- [z/VM: CMS User's Guide](#), SC24-6266
- [z/VM: CP Commands and Utilities Reference](#), SC24-6268

- [z/VM: System Operation](#), SC24-6326
- [z/VM: Virtual Machine Operation](#), SC24-6334
- [z/VM: XEDIT Commands and Macros Reference](#), SC24-6337
- [z/VM: XEDIT User's Guide](#), SC24-6338

Application Programming

- [z/VM: CMS Application Development Guide](#), SC24-6256
- [z/VM: CMS Application Development Guide for Assembler](#), SC24-6257
- [z/VM: CMS Application Multitasking](#), SC24-6258
- [z/VM: CMS Callable Services Reference](#), SC24-6259
- [z/VM: CMS Macros and Functions Reference](#), SC24-6262
- [z/VM: CMS Pipelines User's Guide and Reference](#), SC24-6252
- [z/VM: CP Programming Services](#), SC24-6272
- [z/VM: CPI Communications User's Guide](#), SC24-6273
- [z/VM: ESA/XC Principles of Operation](#), SC24-6285
- [z/VM: Language Environment User's Guide](#), SC24-6293
- [z/VM: OpenExtensions Advanced Application Programming Tools](#), SC24-6295
- [z/VM: OpenExtensions Callable Services Reference](#), SC24-6296
- [z/VM: OpenExtensions Commands Reference](#), SC24-6297
- [z/VM: OpenExtensions POSIX Conformance Document](#), GC24-6298
- [z/VM: OpenExtensions User's Guide](#), SC24-6299
- [z/VM: Program Management Binder for CMS](#), SC24-6304
- [z/VM: Reusable Server Kernel Programmer's Guide and Reference](#), SC24-6313
- [z/VM: REXX/VM Reference](#), SC24-6314
- [z/VM: REXX/VM User's Guide](#), SC24-6315
- [z/VM: Systems Management Application Programming](#), SC24-6327
- [z/VM: z/Architecture Extended Configuration \(z/XC\) Principles of Operation](#), SC27-4940

Diagnosis

- [z/VM: CMS and REXX/VM Messages and Codes](#), GC24-6255
- [z/VM: CP Messages and Codes](#), GC24-6270
- [z/VM: Diagnosis Guide](#), GC24-6280
- [z/VM: Dump Viewing Facility](#), GC24-6284
- [z/VM: Other Components Messages and Codes](#), GC24-6300
- [z/VM: VM Dump Tool](#), GC24-6335

z/VM Facilities and Features

Data Facility Storage Management Subsystem for z/VM

- [z/VM: DFSMS/VM Customization](#), SC24-6274
- [z/VM: DFSMS/VM Diagnosis Guide](#), GC24-6275
- [z/VM: DFSMS/VM Messages and Codes](#), GC24-6276
- [z/VM: DFSMS/VM Planning Guide](#), SC24-6277

- *z/VM: DFSMS/VM Removable Media Services*, SC24-6278
- *z/VM: DFSMS/VM Storage Administration*, SC24-6279

Directory Maintenance Facility for z/VM

- *z/VM: Directory Maintenance Facility Commands Reference*, SC24-6281
- *z/VM: Directory Maintenance Facility Messages*, GC24-6282
- *z/VM: Directory Maintenance Facility Tailoring and Administration Guide*, SC24-6283

Open Systems Adapter

- Open Systems Adapter/Support Facility on the Hardware Management Console (https://www.ibm.com/docs/en/SSLTBW_2.3.0/pdf/SC14-7580-02.pdf), SC14-7580
- Open Systems Adapter-Express ICC 3215 Support (<https://www.ibm.com/docs/en/zos/2.3.0?topic=osa-icc-3215-support>), SA23-2247
- Open Systems Adapter Integrated Console Controller User's Guide (https://www.ibm.com/docs/en/SSLTBW_2.3.0/pdf/SC27-9003-02.pdf), SC27-9003
- Open Systems Adapter-Express Customer's Guide and Reference (https://www.ibm.com/docs/en/SSLTBW_2.3.0/pdf/iaa2z1f0.pdf), SA22-7935

Performance Toolkit for z/VM

- *z/VM: Performance Toolkit Guide*, SC24-6302
- *z/VM: Performance Toolkit Reference*, SC24-6303

The following publications contain sections that provide information about z/VM Performance Data Pump, which is licensed with Performance Toolkit for z/VM.

- *z/VM: Performance*, SC24-6301. See *z/VM Performance Data Pump*.
- *z/VM: Other Components Messages and Codes*, GC24-6300. See *Data Pump Messages*.

RACF Security Server for z/VM

- *z/VM: RACF Security Server Auditor's Guide*, SC24-6305
- *z/VM: RACF Security Server Command Language Reference*, SC24-6306
- *z/VM: RACF Security Server Diagnosis Guide*, GC24-6307
- *z/VM: RACF Security Server General User's Guide*, SC24-6308
- *z/VM: RACF Security Server Macros and Interfaces*, SC24-6309
- *z/VM: RACF Security Server Messages and Codes*, GC24-6310
- *z/VM: RACF Security Server Security Administrator's Guide*, SC24-6311
- *z/VM: RACF Security Server System Programmer's Guide*, SC24-6312
- *z/VM: Security Server RACROUTE Macro Reference*, SC24-6324

Remote Spooling Communications Subsystem Networking for z/VM

- *z/VM: RSCS Networking Diagnosis*, GC24-6316
- *z/VM: RSCS Networking Exit Customization*, SC24-6317
- *z/VM: RSCS Networking Messages and Codes*, GC24-6318
- *z/VM: RSCS Networking Operation and Use*, SC24-6319
- *z/VM: RSCS Networking Planning and Configuration*, SC24-6320

TCP/IP for z/VM

- [z/VM: TCP/IP Diagnosis Guide](#), GC24-6328
- [z/VM: TCP/IP LDAP Administration Guide](#), SC24-6329
- [z/VM: TCP/IP Messages and Codes](#), GC24-6330
- [z/VM: TCP/IP Planning and Customization](#), SC24-6331
- [z/VM: TCP/IP Programmer's Reference](#), SC24-6332
- [z/VM: TCP/IP User's Guide](#), SC24-6333

Prerequisite Products

Device Support Facilities

- Device Support Facilities (ICKDSF): User's Guide and Reference (https://www.ibm.com/docs/en/SSLTBW_2.5.0/pdf/ickug00_v2r5.pdf), GC35-0033

Related Products

XL C++ for z/VM

- [XL C/C++ for z/VM: Runtime Library Reference](#), SC09-7624
- [XL C/C++ for z/VM: User's Guide](#), SC09-7625

z/OS

IBM Documentation - z/OS (<https://www.ibm.com/docs/en/zos>)

Index

Special Characters

:AUTOBLOCK., extent control file [81](#)
:DEFAULTS., extent control file [82](#)
:EXCLUDE., extent control file [80](#)
:GROUPS. extent control file [78](#)
:REGIONS., extent control file [76](#)
:SSI_VOLUMES. extent control file [79](#)

A

ACCESS DATADVH file [103](#)
administrative and support users [7](#)
administrative authority, delegating [117](#)
AUTHDASD DATADVH control file [83](#)
AUTHFOR CONTROL [56](#)
automatic allocation algorithms [85](#)

C

cluster satellite synchronization [7](#)
common PROFILE [7](#)
CONFIG DATADVH [24](#)
CONFIG* DATADVH file [104](#)
CONFIGRC DATADVH file [34](#)
CONFIGRC SAMPDVH file [34](#)

D

DASD management
 AUTHDASD file [83](#)
 defining a DATAMOVE machine to the DIRMAINT Server [73](#)
 description [73](#)
 DirMaint [208](#)
 extent control file [74](#)
 moving minidisks [63](#)
 operation [87](#)
 preparing your DirMaint machine [73](#)
 protecting system areas [86](#)
 scenarios, error recovery [94](#)
 updating minidisks [63](#)
 volume control file [86](#)
 work unit control file [88](#)
data files [21](#)
DATAMOVE service machine
 DATADVH file [68](#)
 defining and tailoring [65](#)
 defining to the DIRMAINT Server [73](#)
DATAMOVE service machines [6](#)
date field columns [236](#)
date/time stamp field columns [238](#)
diagnosis planning [191](#)
directory
 entry
 RSCS virtual machine [20](#)

DirMaint

configuration [203](#)
DASD management [208](#)
installation verification [46](#), [193](#), [194](#), [243](#)
IVP

 characteristics [46](#), [193](#)
 description [193](#)
 files [194](#)
 overview [193](#)
 tests [243](#)
 warnings [243](#)

DIRMAINT DATADVH [48](#)

DirMaint server machines

 administrative and support users [7](#)
 administrative authority, delegating [117](#)
 cluster satellite synchronization [7](#)
 Common PROFILE [7](#)
 configuration data files, entries summarized [219](#)
 diagnosis planning [191](#)
 directory statements for virtual machines [8](#)
 exit routines [121](#)
 general users [7](#)
 install and service an user ID [5](#)
 introduction [1](#)
 MAINT user ID [5](#)
 performance planning [215](#)
 security manager considerations, external [195](#)
 sever, what is a [5](#)
 user tailoring [103](#)
 using DirMaint commands [2](#)
 using online HELP facility [2](#)
 VM, preparing for DirMaint [5](#)

DIRMAINT service machine

 AUTHFOR CONTROL [56](#)
 CONFIG DATADVH [24](#)
 data files [21](#)
 define a DATAMOVE service machine [65](#)
 define a DIRMSAT service machine [69](#)
 diagnosing problems using DirMaint facilities [191](#)
 DIRMAINT DATADVH [48](#)
 DIRMMAIL SAMPDVH [52](#)
 DVHLINK EXCLUDE [52](#)
 DVHNames DATADVH [51](#)
 DVHPROFA DIRMAINT [24](#)
 PROFILE XEDIT [23](#)
 PWMON CONTROL [54](#)
 RPWLIST DATA [54](#)
 SUBSCRIB DATADVH [55](#)
 USER INPUT [58](#)

DIRMMAIL SAMPDVH [52](#)

DIRMSAT service machine

 DATADVH file [71](#)
 defining and tailoring [69](#)
 DVHLINK EXCLUDE [52](#)
 DVHNames DATADVH [51](#)
 DVHPROFA DIRMAINT [24](#)

E

error

messages [191](#)

recovery [93](#)

scenarios

AMDISK with DATAMOVE interaction [95](#)

AMDISK with no DATAMOVE interaction [95](#)

CMDISK [97](#)

DMDISK with DATAMOVE interaction (CLEAN) [99](#)

DMDISK with No DATAMOVE interaction (NOCLEAN) [98](#)

TMDISK [101](#)

ZAPMDISK (Auxiliary DMDISK) [99](#)

exit routines

descriptions [128](#)

DVHCXA (command after processing) [129](#)

DVHCXB (command before processing) [130](#)

DVHCXC (command before parsing) [131](#)

DVHDA0 MODULE (ESM password authentication) [168](#)

DVHDXC (DATAMOVE CMS Copying) [132](#)

DVHDXD (DATAMOVE DDR Processing) [134](#)

DVHDXE (DATAMOVE ERASE Processing) [136](#)

DVHDXF (DATAMOVE FORMAT Processing) [137](#)

DVHDXN (DATAMOVE non-CMS Copying) [138](#)

DVHDXP (DATAMOVE non-CMS Copying) [140](#)

DVHESMLR (ESM log recording) [142](#)

DVHPXA (password after processing) [144](#)

DVHPXR (password random generator) [145](#)

DVHPXR (random password generator) [148](#)

DVHPXV (password syntax checking) [146](#)

DVHXAN (ACCOUNT number notification) [149](#)

DVHXAV (ACCOUNT number verification) [150](#)

DVHXCP (check user privilege) [151](#)

DVHXDA (DASD authorization checking) [152](#)

DVHXDN (DASD ownership notification) [154](#)

DVHXFA (FOR authorization checking) [155](#)

DVHXLA (link authorization) [156](#)

DVHXLB (LOGONBY change notification) [157](#)

DVHXLF (message logging filter) [158](#)

DVHXLN (link notification) [160](#)

DVHXLVL (pre-startup exit for switching service levels) [161](#)

DVHXMN (minidisk password notification) [162](#)

DVHXMP (minidisk password checking) [163](#)

DVHXMU (multiple user prefix authorization) [164](#)

DVHXNE (asynchronous update notification) [165](#)

DVHXNN (NICDEF notification exit) [167](#)

DVHXPESM (POSIX change notification) [169](#)

DVHXPN (password change notification) [170](#)

DVHXPP (password notice printing) [172](#)

DVHXRA (request after processing) [173](#)

DVHXRB (request before processing) [174](#)

DVHXRC (request before parsing) [176](#)

DVHXTA (local stag authorization) [177](#)

DVHXTP (backup tape mount) [178](#)

DVHXUN (user change notification) [180](#)

guidelines for creating or modifying [181](#)

interactions, commands and routines [121](#)

summarization table [123](#)

utility [189](#)

extent control file

description [74](#)

sections

extent control file (*continued*)

sections (*continued*)

:SSI_VOLUMES. [79](#)

.:AUTOBLOCK. [81](#)

.:DEFAULTS. [82](#)

.:EXCLUDE. [80](#)

.:GROUPS. [78](#)

.:REGIONS. [76](#)

external security manager [195](#)

H

HELP, online [2](#)

I

information collecting procedures [192](#)

installation verification program (IVP)

characteristics [46](#), [193](#)

description [193](#)

files [194](#)

overview [193](#)

test [243](#)

M

minidisk

access [198](#)

access control [201](#)

O

online HELP facility, using [2](#)

operation, DASD management [87](#)

P

performance planning and administration [215](#)

performance with RACF, improving [200](#)

problem diagnosis using DirMaint facilities [191](#)

procedures, information collecting [192](#)

PROFILE XEDIT [23](#)

PWMON CONTROL [54](#)

R

RACF and non-DirMaint servers [183](#)

RACF profile [196](#)

RACF with DirMaint [195](#), [200](#)

RACF, selecting characteristics [34](#)

RACROUTE [196](#)

reader

access [199](#)

access control [202](#)

record columns [238](#)

RPWLIST DATA [54](#)

S

satellite servers [200](#)

security

manager considerations, external [195](#)

SUBSCRIB DATADVH [55](#)

T

tasks

Replacing an Image Definition
steps for [210](#)

time field columns [237](#)

transaction file, work control file [89](#)

U

USER INPUT [58](#)

user tailoring [103](#)

utility routines [189](#)

V

volume control file

description [86](#)

example [87](#)

W

WAKEUP TIMES File

DATAMOVE service machine [68](#)

date field columns [236](#)

date/time stamp field columns [238](#)

DIRMAINT service machine [48](#)

DIRMSAT service machine [71](#)

formats [235](#)

record columns [238](#)

time field columns [237](#)

work unit control file

description [88](#)

transaction file example [89](#)



Product Number: 5741-A09

Printed in USA

SC24-6283-74

