DMF Release and Installation Guide for IRIX® Systems

New Features

Major new features of release 2.7 are distributed commands and the Library Server.

Record of Revision

Version	Description
2.6.1	October 1997 Original printing to support the Data Migration Facility (DMF) release 2.6.1 running under SGI IRIX systems.
2.6.2	July 1998 Reprint with revision to support DMF release 2.6.2 running under SGI IRIX systems.
2.6.2.2	December 1998 Reprint with revision to support DMF update release 2.6.2.2 running under SGI IRIX systems.
004	May 2000 Reprint with revision to support DMF update release 2.6.3 running under SGI IRIX systems.
005	October 2000 Reprint to support the Data Migration Facility (DMF) update release 2.6.3.2 running under SGI IRIX systems.
006	May 2002 Reprint to support the Data Migration Facility (DMF) update release 2.7 running under SGI IRIX systems.

Contents

Figures

Tables

Procedures

About This Guide

This publication documents features and installation procedures for the Data Migration Facility (DMF), release 2.7, on SGI systems running the IRIX operating system releases 6.5 and later.

Related Publications

The following documents contain additional information that may be helpful:

- *DMF Administrator's Guide for IRIX Systems* describes how to configure and administer DMF.

- *DMF Recovery and Troubleshooting Guide for IRIX Systems* describes how to solve problems with DMF should you encounter them.

To order SGI documentation, go to the SGI Technical Publications Library at `http://techpubs.sgi.com`. Find the title that you want and choose `order` to get the ordering information page for that document.

Conventions

The following conventions are used throughout this document:

Convention	Meaning
`command`	This fixed-space font denotes literal items such as commands, files, routines, path names, signals, messages, and programming language structures.
`manpage` (*x*)	Man page section identifiers appear in parentheses after man page names.
variable	Italic typeface denotes variable entries and words or concepts being defined.
user input	This bold, fixed-space font denotes literal items that the user enters in interactive sessions. Output is shown in nonbold, fixed-space font.

[ ]	Brackets enclose optional portions of a command or directive line.
...	Ellipses indicate that a preceding element can be repeated.

Reader Comments

If you have comments about the technical accuracy, content, or organization of this document, please tell us. Be sure to include the title and document number of the manual with your comments. (Online, the document number is located in the front matter of the manual. In printed manuals, the document number is located at the bottom of each page.)

You can contact us in any of the following ways:

- Send e-mail to the following address:

  `techpubs@sgi.com`

- Use the Feedback option on the Technical Publications Library World Wide Web page:

  `http://techpubs.sgi.com`

- Contact your customer service representative and ask that an incident be filed in the SGI incident tracking system.

- Send mail to the following address:

  Technical Publications
  SGI
  1600 Amphitheatre Pkwy., M/S 535
  Mountain View, California 94043–1351

- Send a fax to the attention of "Technical Publications" at +1 650 932 0801.

We value your comments and will respond to them promptly.

Introduction

This publication documents the Data Migration Facility (DMF) for SGI computer systems running the IRIX operating system release 6.5.2 or later. Both 32-bit and 64-bit architectures are supported.

DMF for IRIX systems can manage only XFS file systems.

This publication includes the following information:

- Software overview (Chapter 2, "Software Overview", page 3)

- Release package information, including its contents, hardware/software requirements, ordering information, and documentation and training support (Chapter 3, "Release Package", page 7)

- Installation instructions (Chapter 4, "Installation Overview", page 11, through Chapter 8, "Before You Start DMF", page 27)

- Upgrade instructions (Chapter 9, "Upgrading DMF", page 29)

Note: For the most current and detailed information on changes in DMF functionality, including bugs fixed with specific releases, refer to the files accessed by the **Dependencies** and **News** buttons on the DMF installation interface (dmmaint(8)).

Software Overview

The Data Migration Facility (DMF) is a comprehensive data management tool that can be used to manage free space on your native XFS or CXFS file system. DMF can also be used to manage reliable, long-term storage of important data.

DMF accomplishes its work by moving user file data between primary storage and secondary storage. This process is called *file migration*. File migration can occur transparently to the end user (*automatic migration*), or it can be invoked manually by command request (*manual migration*). For a complete description of the capabilities of DMF, its commands, and the role of the IRIX system administrator, please refer to the *DMF Administrator's Guide for IRIX Systems*.

The following sections describe data storage and management capabilities provided with DMF, as well as the product's interface with the IRIX kernel.

Data Storage and Management

DMF is delivered with a complete set of utilities that can be used to manage the DMF databases and control automatic space management.

The DMF components that manage offline data storage are called *media-specific processes* (or *MSPs*) and *library servers* (or *LSs*).

The LS is a newer component than the MSP and can be used instead of one or more tape MSPs, providing improved error avoidance/recovery and tape volume scratch pools. The dmmsptols script converts an existing tape MSP database to an LS database. It also makes any necessary changes to the daemon database. A number of DMF commands have options to facilitate the handling of library servers.

DMF is delivered with the following MSP/LS functionality:

- A tape MSP or LS that allows the administrator to designate a pool of tapes for use as a repository for stored data.

- An FTP MSP that allows the administrator to move migrated data to or from any destination machine accessible via the file transfer protocol (FTP).

- A disk MSP that migrates data into a directory accessed on the current system.

For the tape MSP/LS to manage stored data, it must mount and dismount tapes on tape transports connected to the platform on which DMF is running. Most often, tape mounting is accomplished by a robotic autoloader. These robotic autoloaders can be managed by OpenVault or by the Tape Management Facility (TMF). DMF supports all of the robotic autoloaders the mounting service supports. For a list of supported devices and libraries, refer to the `Readme` file by clicking on the **Dependencies** button on the DMF installation interface, (dmmaint(8)).

For a detailed description of the MSP and LS components, refer to the *DMF Administrator's Guide for IRIX Systems*.

Several DMF utilities are designed to ensure the integrity of DMF databases and of the media used by the tape MSP or LS. For example, you can use `dmatsnf` and `dmatread` to scan tape media looking for hard errors and to recover data from failed media. Additionally, you can examine the integrity of DMF databases by using `dmdbcheck`(8) to validate the internal structure of any DMF database and `dmaudit`(8) to ensure that the DMF database is consistent with the XFS/CXFS file systems being managed by DMF. For a detailed description of the use of `dmaudit`, refer to the *DMF Recovery and Troubleshooting Guide for IRIX Systems*.

You can automate the running of the `dmdbcheck`(8) and `dmaudit`(8) commands through the DMF configuration file, as described in *DMF Administrator's Guide for IRIX Systems*.

Data Management Application Interface (DMAPI)

DMF interacts with the IRIX kernel to migrate user data. This interaction is accomplished through an interface called the *Data Management Application Programming Interface* or *DMAPI*. This interface is recognized by the X/Open Group, which calls it the XDSM standard. DMF is also supported in minor ways by the Network File System (NFS) and Bulk Data Services (BDS). You must install the DMAPI software component on any machine that will be a DMF server. It also might be necessary to install specific patches. To obtain information about specific patches, use the **Dependencies** button on the DMF installation interface, (dmmaint(8)).

Distributed Commands

The distributed command (DC) feature is an installation subset of the full DMF product that you can install on hosts that have DMF-managed filesystems exported to them, but never execute as the DMF server host. The DC feature allows DMF user

commands (dmput, dmget, dmfind, dmls, dmcopy, and dmattr) to be executed on the client host.

The DMF User Library, libdmfusr.so, allows users to write their own custom DMF user commands that use the same DC Application Program Interface (API) as the DMF user commands listed previously.

Licensing is installed and enforced on the DMF server machine only. No licensing is required on the client host.

Differences between IRIX and UNICOS/UNICOS/mk DMF

If you are upgrading from a UNICOS or UNICOS/mk operating system to an IRIX operating system, you will need to be aware of the differences between IRIX DMF functionality and UNICOS/UNICOS/mk DMF functionality. The basic structure of DMF is the same for IRIX environments as for UNICOS and UNICOS/mk environments. However, the differences occur in areas affected by operating system dependencies. The DMF administrator interface differs in the areas of product installation, database administration utilities, and automatic space management. There are also differences in basic terminology. Table 2-1, page 5 provides a summary of key differences between the two operating systems as thet relate to DMF.

Table 2-1 IRIX and UNICOS/UNICOS/mk DMF Differences

Functionality	UNICOS/UNICOS/mk	IRIX
Kernel interface that supports file state transitions	dmofrq(2) command.	DMAPI 2.3 (see "Data Management Application Interface (DMAPI)", page 4).
Use of HOME_DIR, SPOOL_DIR, JOURNAL_DIR directories		Configuration files
Protected files feature	Supported as a part of the user database feature (UDB).	Not supported.
dmmode(2) command	Supported.	Not supported. Offline files are always processed when accessed.
Client/server configuration option	Supported.	Not supported.

Functionality	UNICOS/UNICOS/mk	IRIX
Reporting	dmhit(blank) command.	dmscanfs(8) command.
DMF database administration	dmdalter and dndbase commands.	dmdadm(8) command, which has an administrator interface similar to that of the dmcatadm(8) and dmvoladm(8) commands.
File migration and conversion to dual state	dmmigall(8) command.	dmmigrate(8) command.
Information reporting on DMF managed files	ls(1) and find(1) commands	dmls(1) and dmfind(1) commands (based on the IRIX commands, ls and find).
Structure of directory written by the dmsnap(8) command		
File handle terminology	File handle.	bit-file identifier (bfid).
File handle terminology.	dev/inode.	fhandle.

Release Package

This chapter provides information on the DMF release package and the software and hardware platforms that DMF supports.

Release Package Contents

The DMF release package includes the following:

- A CD-ROM that contains the installable binary packages for the current DMF release

- *DMF Release and Installation Guide for IRIX Systems* (this publication)

- *DMF Administrator's Guide for IRIX Systems*

- *DMF Recovery and Troubleshooting Guide for IRIX Systems*

- A DMF entitlement number for licensing (see Chapter 7, "FLEXlm License Requirements", page 25)

Hardware and Software Requirements

DMF runs on SGI computer systems running the IRIX operating system 6.5 or later.

Licensing Information

DMF is released independently of operating system releases and is distributed by order only to licensed sites. Software keys are used to enforce licensing. DMF licenses apply to a single specific system. DMF license fees vary depending on the type of hardware.

DMF contains an embedded proprietary software package known as the Raima Data Manager (RDM) from Raima Corporation. RDM is not available from SGI; if you want to obtain it, contact Raima Corporation. SGI reserves the right to make changes to the embedded package, which will cause it to be different from that which you obtain from Raima Corporation.

Ordering a DMF Release Package

You can order a DMF release in the following ways:

- Customers can contact the order desk at the SGI Distribution Center in Minnesota by telephone (+1 651 683 5907 or 1 800 284 2729 extension 35907), through electronic mail (`orderdsk@sgi.com`), or by fax (+1 651 452 0141).

- Customers outside of the United States and Canada can contact their local service or sales organization for ordering information.

Software will be shipped by ground service or 5-day international service unless otherwise requested.

To order any additional publications, contact the order desk at the SGI Distribution Center in Minnesota, or contact your local service or sales organization for ordering information. DMF documentation is also available as part of the DMF Download Evaluation Software in InSight format as described in "Documentation Support".

Documentation Support

DMF documentation is available as part of the SGI technical publications library at the following URL:

`http://techpubs.sgi.com`

If you click **Library Search** and type `DMF` in the search box, you will find the publications that support DMF.

The release package also contains the documentation in InSight format. All of the DMF publications are included on the DMF media.

DMF documentation includes the following:

- *DMF Release and Installation Guide for IRIX Systems* (this publication).

- *DMF Administrator's Guide for IRIX Systems*, which contains information about configuring and administering DMF.

- *DMF Recovery and Troubleshooting Guide for IRIX Systems*, which describes how to detect and repair discrepancies between your file system and the DMF daemon database.

- Man pages. Man pages are preformatted files containing information about commands and other aspects of operating systems or compatible products. Man pages are listed in Table 3-1:

Table 3-1 DMF Man Pages

Type	Man pages available
User commands	`dmattr(1) dmcopy(1) dmfind(1) dmget(1) dmls(1) dmput(1)`
Administrator commands	`dmatread(8) dmatsnf(8) dmatvfy(8) dmaudit(8)` `dmcatadm(8) dmcheck(8) dmclripc(8) dmconfig(8)` `dmdadm(8) dmdaemon(8) dmdate(8) dmdbcheck(8)` `dmdbrecover(8) dmdidle(8) dmdstat(8) dmdstop(8)` `dmdump(8) dmdumpj(8) dmfill(8) dmfsfree(8) dmfsmon(8)` `dmhdelete(8) dmlockmgr(8) dmmaint(8) dmmigrate(8)` `dmmove(8) dmmsptols(8) dmov_keyfile(8)` `dmov_loadtapes(8) dmov_makecarts(8) dmscanfs(8)` `dmselect(8) dmsnap(8) dmsort(8) dmversion(8)` `dmvoladm(8) dmxfsrestore(8)`
File formats	`dmf_config(5) trxj(5)`

Training Support

You can obtain information about SGI training services and facilities for DMF at the following URL:

`http://servinfo.csd.sgi.com`

Select **Training Center > Description, Schedules, Registration & Maps**.

Installation Overview

Installation is the second of four steps necessary to the successful implementation of DMF at a site:

- Planning

- Installation

- Configuration

- Initialization

The planning, configuration, and initialization steps, as well as daily operation, are described in the *DMF Administrator's Guide for IRIX Systems*.

The procedures described in this document are used for the installation of major releases, revisions, and product upgrades delivered on the release media.

All installation steps are initiated through the SGI `inst` utility and the `dmmaint` utility.

Preparing for Installation

Beginning with DMF release 2.7, the installable DMF package includes a server software subsystem and a client software subsystem. The server software subsystem provides the full set of DMF functionality, including the DMF daemon, MSPs, LSs, DMF user and administrator commands, DMF online manuals, and all DMF man pages. The client software subsystem provides the executable files, libraries, and the subset of man pages that allow a machine to be a DMF client. This subsystem allows users on the client to use the DMF distributed commands. Only one of these subsystems can be installed on a machine.

Before beginning the installation of DMF, ensure that you meet the following requirements:

- You must be `root`

- The Data Management API (DMAPI) is the mechanism within IRIX and the XFS/CXFS file system for passing file management requests between the kernel and DMF. Ensure that you have installed DMAPI and the appropriate patches on

the DMF server, as listed in the files displayed by the **Dependencies** and **News** buttons on the dmmaint(8) display.

> ⚠ **Caution:** For file systems to be managed by DMF, they must be mounted on the DMF server to enable the DMAPI interface. You can do this by using the mount -o dmi command or by declaring parameter 4 in the fstab entry to be dmi. (refer to the man pages for mount or fstab). Failure to enable dmi for DMF-managed file systems will result in a configuration error.

- DMF state information is kept within a file system structure called an *extended attribute*. Extended attributes can be either inside the inode or in attribute blocks associated with the inode. DMF runs much faster when the extended attribute is inside the inode, because this minimizes the number of disk references that are required to determine DMF information. In certain circumstances, there can be a large performance difference between inode-resident extended attribute and non-resident extended attribute.

  You should configure your file systems to ensure that the extended attribute is always inode-resident. This is done with the mkfs_xfs command. Declare the inode size to be 512 bytes using the -i size=512 option. File systems that already exist will have to be dumped, recreated, and restored. This change is not mandatory.

- Ensure that, in the operating system configuration file, the following IPC kernel configuration parameters are set equal to or greater than the default: MSGMAX, MSGMNI, MSGSEG, and MSGSSZ. The parameters are described in Appendix A of *IRIX Admin: System Configuration and Operation*, SGI publication 007-2859.

When you have completed the installation, you must configure DMF on the server prior to using it. See the *DMF Administrator's Guide for IRIX Systems* for information on configuring DMF.

DMF Directory Structure

The following diagram shows the DMF directory structure on server machines. The dmmaint command creates links in other directories that are not shown in this diagram. It also copies files into other directories that are not shown in this diagram.
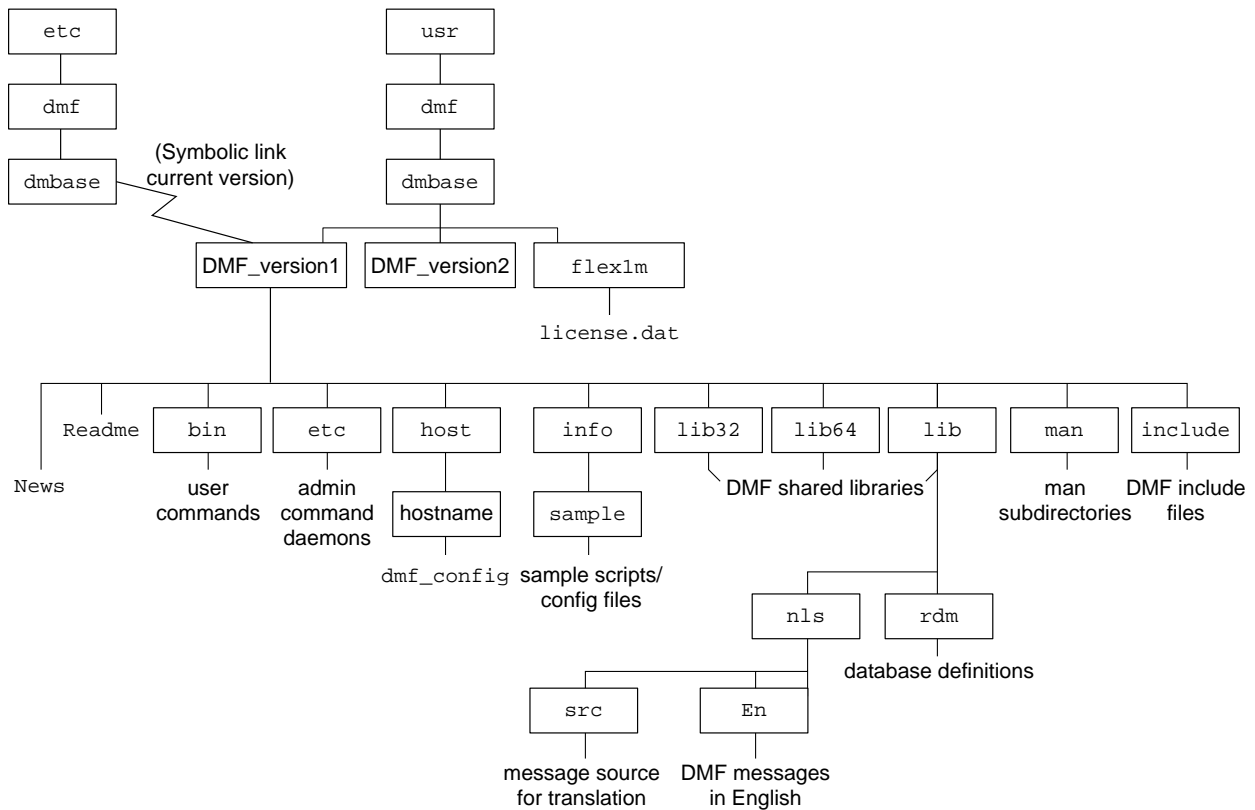
Figure 4-1 DMF Directory Structure

There is more than one *version* directory if you upgrade DMF from a previous release. When you use the dmmaint(8) utility, you can activate the most recent version and configure it. You can also use dmmaint to activate any version you wish.

The News and Readme files are displayed by the **News** and **Dependencies** buttons on the dmmaint(8) display.

Using the `inst` Utility

This chapter describes how to use the IRIX inst(1m) utility to install DMF.

Note: To install DMF, you are required to have `root` permission.

To install DMF, complete the steps in Procedure 5-1, page 15.

Procedure 5-1 Installing the Software from CD-ROM

1. Place the CD-ROM into the drive.

2. Using the left mouse button, select `System->Software Manager` on the pulldown menu.

3. On the `Available Software` list, select `/CDROM/dist`.

4. TO INSTALL THE DMF SERVER: Click on **Customize Installation**. You will receive more information about the size of the DMF software and the directories and files in it. Click on the `Install` button and select the folder icon next to `Product` to view the contents of the software.

   TO INSTALL THE DMF CLIENT: Click on **Customize Installation**. Select the DMF client software subsystem and the DMF client man pages. Deselect the DMF server subsystem.

5. Click on the `Start` button. The **Status** `Log` section of the window will display the following message when the DMF installation is complete:

   ```
   Installations and removals were successful.
   ```

6. Select **File > Exit**.

7. Eject the CD-ROM.

8. FOR THE DMF SERVER: Use the DMF version maintenance utility (`dmmaint`) to make the current version of DMF the active version. For information about how to use dmmaint(blank), see Chapter 6, "DMF Version Maintenance Utility", page 17.

   FOR THE DMF CLIENT: It is not necessary to use `dmmaint` on DMF client machines.

DMF Version Maintenance Utility

Note: The information in this chapter is for DMF server installation only.

After you have installed a DMF server release, set the current DMF release to be the active version of DMF by using the DMF version maintenance utility (dmmaint(8)). This utility handles the setup of all symbolic links that DMF requires to operate normally.

You can use the dmmaint utility to view DMF release–specific news and to view information related to dependencies of which you should be aware before you start the current version of DMF.

You can use the dmmaint utility to switch between versions of DMF and to install your temporary or permanent licenses.

⚠ **Caution:** Ensure that you have installed your FLEXlm license file for this release. The FLEXlm license included with your DMF release is temporary; when you obtain your permanent DMF license, you must restart DMF.

For information about FLEXlm licensing requirements, see Chapter 7, "FLEXlm License Requirements", page 25.

In the /usr/dmf/dmbase/*version*/etc directory, use the dmmaint utility to select the active version. (*version* is the version you selected when you downloaded the software). In order to use the dmmaint utility, ensure that your DISPLAY environment variable is set up, and then enter the following command:

/usr/dmf/dmbase/*version*/etc/dmmaint &

If DISPLAY is not defined, dmmaint reverts to line mode, which has menu selections that are equivalent to the fields and buttons on the graphic user interface. Line mode is provided for remote log in, and is not recommended for general use.

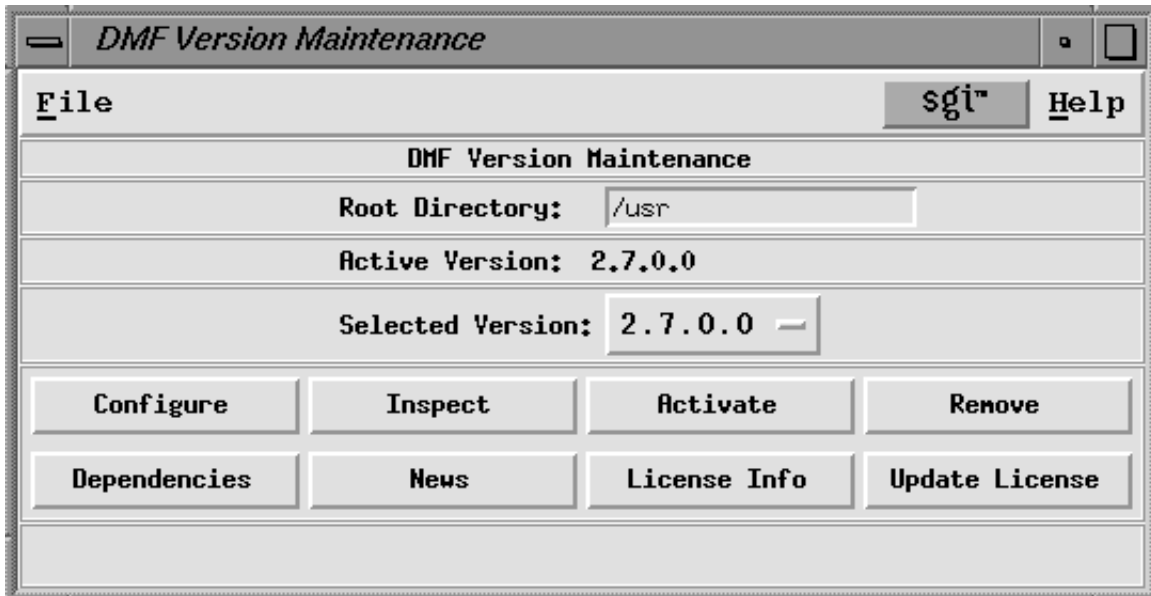The screen shown in Figure 6-1, page 18 is then displayed:

Figure 6-1 DMF Version Maintenance Display

The fields and buttons of the `DMF Version Maintenance` display are described as follows:

Field/Button	Description
Root Directory	Lets you set the root directory to be scanned for installed versions of DMF. The default value is /usr. Do **not** change this directory on IRIX systems.
Active Version	Displays the current active installed version of DMF. If there is no active DMF configured, None is displayed.
Selected Version	Lets you select a specifically installed version of DMF with which to work. You must select a version of DMF to work with before using the **Configure**, **Inspect**, **Activate**, **Remove**, **Dependencies**, **News**, **License Info**,

or **Update License** buttons. Simply release your mouse button over the version you want to make active.

Configure   Lets you customize the DMF configuration file for the selected version of DMF.

If this is the first time you have configured this version of DMF, a window appears telling you that there is no configuration file. You are asked which file you would like to use as a basis for the new configuration. You may choose an existing configuration file or one of several sample files that are pre-configured for different types of media-specific processes (MSP)/library servers (LS).

If you are modifying an existing configuration, a window appears that asks if you would like to modify the existing configuration file or use an alternate file. If you choose an alternate file, you see the same window that you would see if this were a new configuration.

After you choose a file to use as a basis, an editing session is started (in a new window) that displays a copy of that configuration file. You can make changes as desired.

After exiting from the editor, you are prompted for confirmation before the original configuration file is replaced with the edited copy.

For more information on the parameters you can use in your DMF configuration file, see the `dmf_config`(5) man page (available from the **Help** button). The *DMF Administrator's Guide for IRIX Systems* also provides information on DMF configuration.

Inspect   Runs the `dmcheck`(8) program to report errors.

After you have created a configuration file for the selected version of DMF, you can click the **Inspect** button, which runs `dmcheck` to report any errors in that configuration. If there are errors, you can click the **Configure** button, make changes, and continue to

alternate between **Configure** and **Inspect** until you are satisfied that the configuration is correct.

Activate   Lets you make the selected version of DMF the active version. When you click this button, `dmmaint` runs `dmcheck`. If the selected version's DMF configuration file contains errors, click **Examine errors** to determine what is wrong with the configuration. If another version of DMF is already running, you are prompted for confirmation to continue.

When it makes the selected version active, `dmmaint` first stops DMF if it is already running. It creates the following symbolic links:

- `/etc/dmf/dmbase` - Points to the selected version's base directory

- `/etc/init.d/dmf`, `/etc/rc0.d/K79dmf`, and `/etc/rc2.d/S25dmf` - Point to the selected version's DMF startup script

- `/usr/include/bapi` - Points to the BAPI include files of the selected version

- `/usr/lib[32,64]/libbapi.so` and `/usr/lib[32,64]/bapi` - Point to the BAPI libraries of the selected version

- `/usr/include/dmf` - Points to the distributed command API include files of the selected version

- `/usr/lib[32,64]/libdmfusr.so` - Points to the `libdmfusr.so` user command library of the selected version

- `/usr/bin/dmattr`, `/usr/bin/dmcopy`, `/usr/bin/dmfind`, `/usr/bin/dmget`, `/usr/bin/dmls`, `/usr/bin/dmput`, `/usr/etc/dmversion`, `/usr/etc/dmdate` - Point to the commands of the selected version

- In the `/usr/share/catman/u_man/cat1` directory: `dmattr.z`, `dmcopy.z`, `dmfind.z`, `dmget.z`, `dmls.z`, and `dmput.z`

In the `/usr/share/catman/u_man/cat8` directory: `dmversion.z` and `dmdate.z` - Point to man pages of the selected versions

- `/usr/lib/locale/C/LC_MESSAGES/sgr_dmf.cat`and `/usr/lib/locale/C/LC_MESSAGES/sgr_dmf.cat.m` - Point to the message catalogs of the selected version

`chkconfig` is used to create a DMF configuration variable and set its value to `on`. Finally, you are asked if the newly activated version of DMF should be started.

`dmmaint` ensures that the `TCPMUX/SGI-DMUSRCMD` definition exists in the inetd configuration file, `/etc/inetd.conf` and copies `dmusrcmd` to `/usr/etc`.

Remove   Lets you remove the selected version of DMF. Positive confirmation is requested. If you click `OK`, all DMF files and directories for the selected version are removed. If the selected version was also the active version, DMF is stopped, the symbolic links are removed, and the active version becomes `None`.

Dependencies   Lets you view the dependencies file (`/usr/dmf/dmbase/`*version*`/Readme`) for the selected version. This file contains information on any dependencies that exist for a specific version of DMF, such as operating system levels supported, patch requirements, and so on.

News   Lets you view the news file (`/usr/dmf/dmbase/`*version*`/News`) for the selected version. This file contains information such as new DMF features, changes in the products, descriptions of fixed bugs, and future product plans.

License Info   Lets you view all FLEXlm license information for the selected version of DMF. The display shows the host name and FLEXlm host ID, which you need when you apply for a DMF permanent license. The name of the

license file is also displayed, as is a short description of
the state of any DMF license within the file.

Update License   Lets you make changes to the FLEXlm license file. An
                            editing session is started in a new window displaying a
                            copy of the contents of the license file. You can add or
                            delete licenses as desired. After you exit the editor,
                            positive confirmation is requested before the original
                            license file is replaced by the modified copy.

Help   Lets you view the dmmaint(8) or dmf_config(5) man
                            page.

Completing Initial Configuration

The following procedure uses dmmaint to complete the initial configuration of DMF:

Procedure 6-1 Running dmmaint

1. Select **Dependencies** to read about all the hardware and software requirements
   that must be fulfilled before running DMF.

2. Select **News** to read about what is new with this revision of DMF.

3. If you have not yet installed a FLEXlm license for DMF, select the **Update License**
   button and use your mouse to copy and paste your license into the file. Close the
   window. Select **License Info** and examine the output to verify that the license is
   installed correctly.

4. Select **Configure** to begin configuration of the current revision of DMF. The first
   time that you select this button, dmmaint will prompt you for the file you want
   to use as a basis for the configuration. Choose to use your existing configuration
   file or one of the sample files provided. If you choose to use your existing
   configuration, you will need to add new parameters to implement new features.
   dmmaint then opens an editing window containing the dmf_config file,
   allowing you to modify the configuration to suit your needs. When you exit the
   window, dmmaint will ask if you want to make your changes permanent. If so,
   click OK.

5. You may make additional editing changes to your configuration by reselecting
   Configure. If you are modifying an existing configuration, a window appears that
   asks if you would like to modify the existing configuration file or use an alternate

     file. If you choose an alternate file, you see the same window that you would see
if this were a new configuration.

6. Click the **Inspect** button, which runs `dmcheck` to report any errors in that
configuration. If there are errors, you can click the **Configure** button, make
changes, and continue to alternate between **Configure** and **Inspect** until you are
satisfied that the configuration is correct.

7. When you are satisfied that your configuration is correct, select **Activate** to make
this version of DMF the active one. `dmmaint` will run `dmcheck` to check for
configuration errors. If any are found, you will be notified and will be allowed to
examine those errors. You will then be asked whether you wish to continue to
make DMF active in spite of any errors. If so, `dmmaint` will establish all the
necessary symbolic links to make DMF active. It also establishes links to the DMF
startup script in `/etc/init.d`, `/etc/rc2.d`, and `/etc/rc0.d`. These links
ensure that that DMF will be automatically started whenever your machine is
booted and will be automatically stopped during a machine shutdown. If you do
not want DMF to be automatically started and stopped, enter the following
command after activating DMF (you must be running as `root`):

```
chkconfig dmf off
```

For information about how to start and stop DMF, see the `dmdaemon`(8) and
`dmdstop`(8) man pages.

FLEXlm License Requirements

Note: The information in this chapter is for the DMF server only.

The software licensing used by DMF is based on the FLEXlm product from GLOBEtrotter Software, Inc. A FLEXlm license is required to use DMF.

For more information on FLEXlm, you may order the *Flexible License Manager End User Manual* from GLOBEtrotter Software, Inc., or from the SGI Distribution Center in Minnesota.

The DMF license is issued to a specific host ID. You will be asked to provide the license manager host ID when you obtain your permanent license. To obtain the number, launch the dmmaint utility and select the **License Info** button. A window displays the host name and the FLEXlm host ID. When you are asked for the license manager host ID, provide this FLEXlm host ID.

You must have a separate license for each host machine on which DMF is installed.

When you download or order DMF, you will receive a temporary license and an entitlement number from the SGI Distribution Center in Minnesota; you must get a permanent DMF license and restart DMF once you have that license.

Install the DMF software. Steps to take for the temporary license are described in Procedure 6-1, page 22.

Along with your entitlement number, you will receive a URL to a key generation page. To obtain your permanent license, follow the instructions on the key generation page. After you have provided the required information, a key will be sent to you through electronic mail.

If for some reason you cannot use the World Wide Web key generation page, you can telephone or email the SGI Distribution Center in Minnesota and a key will be sent to you.

Customers can contact the order desk at the SGI Distribution Center in Minnesota by telephone (+1 651 683 5907 or 1 800 284 2729 extension 35907), through electronic mail (orderdsk@sgi.com), or by fax (+1 651 452 0141).

Warning: You **must** use `dmmaint` to install your permanent license. DMF keys cannot be installed with the SGI license manager.

Before You Start DMF

To use DMF commands and DMF man pages, set your PATH and MANPATH environment variables. The DMF administrator commands and executable files are installed in /etc/dmf/dmbase/etc. On DMF server machines, the user commands are installed in /etc/dmf/dmbase/bin. Man pages are installed in /etc/dmf/dmbase/man. Beginning with DMF release 2.7, on client machines, the user commands are installed in /usr/bin and their man pages are installed in /usr/share/catman/u_man/cat1 . Also, beginning with DMF release 2.7, on server machines, the dmmaint utility creates links to the user commands in /usr/bin.

Note: If you are not familiar with setting the MANPATH environment variable, you should know that some paths are checked even though they are not listed by default. In other words, even though the command echo $MANPATH in ksh returns no message or in csh returns the message MANPATH - Undefined variable, certain paths are still searched for man pages. Setting the MANPATH environment variable as described in the following examples will overwrite these paths.

If MANPATH has not been set, you should read the man(1) man page to determine the paths that are checked and then include those paths in the commands below.

The following example uses sh syntax to set and display the DMF PATH environment variables:

```
# PATH=$PATH:/etc/dmf/dmbase/etc:/etc/dmf/dmbase/bin; export PATH
# MANPATH=$MANPATH:/etc/dmf/dmbase/man; export MANPATH
# env | grep PATH
MANPATH=/usr/man:/usr/share/catman:/usr/catman:/usr/local/man:/etc/dmf/dmbase/man
PATH=/usr/sbin:/usr/bsd:/sbin:/usr/bin:/bin:/etc:/usr/etc:/usr/bin/X11:/etc/dmf/dmbase/etc:
/etc/dmf/dmbase/bin
```

The following example uses csh syntax to set and display the DMF PATH environment variables:

```
% setenv PATH ${PATH}:/etc/dmf/dmbase/etc:/etc/dmf/dmbase/bin
% setenv MANPATH ${MANPATH}:/etc/dmf/dmbase/man
% env |grep PATH
MANPATH=/usr/man:/usr/share/catman:/usr/catman:/usr/local/man:/etc/dmf/dmbase/man
PATH=/usr/sbin:/usr/bsd:/sbin:/usr/bin:/bin:/etc:/usr/etc:/usr/bin/X11:/etc/dmf/dmbase/etc:
/etc/dmf/dmbase/bin
```

You can set the user command and man path names in the file /etc/profile for all ksh users and /etc/cshrc for all csh users, or provide a module for users.

Upgrading DMF

Upgrading the DMF software is essentially the same procedure as the one described in Procedure 5-1, page 15.

You need to be aware of the following differences from an initial installation:

- When you start to edit the configuration file for the new version of DMF, you are prompted as to whether you want to use the existing configuration file or one of several sample files.

- When you select **Activate** to make the new revision of DMF active, you may receive a warning that the current version of DMF is running and will have to be stopped. You must click **OK** if you want the activation to continue.

- After installing and testing a new revision of DMF, you most likely will want to remove the previous revision of DMF. Select the previous revision using the **Selected Version:** list box, then select **Remove**. You will be prompted for confirmation before the revision is actually removed. If the revision being removed is the active revision, then DMF will be stopped and all symbolic links will be removed.

Support Issues

Before upgrading to a new release, please read the following information and be sure that your site is able to accommodate the process. Failure to do so can cause major problems when the DMF is initialized.

DMF supports both OpenVault and the Tape Management Facility (TMF). You must acquire these facilities before you can upgrade. Support for the tape MSP Autoloader API has been dropped.

TMF is available to all DMF licensed customers for no charge. If you want TMF, order product SC4-TMF-XL. This will grant TMF, free of charge, to any existing DMF-licensed customers.

DMF is licensed for several different architectures based on the number of CPUs, and DMF does enforce a node locked license. However, it does not enforce licenses based upon the size of the machine.

Index