Veritas™ Dynamic Multi-Pathing Installation Guide

Linux

5.1 Service Pack 1

Symantec

Veritas Dynamic Multi-Pathing Installation Guide

The software described in this book is furnished under a license agreement and may be used only in accordance with the terms of the agreement.

Product version: 5.1 SP1

Document version: 5.1SP1.1

Legal Notice

Symantec Corporation
350 Ellis Street
Mountain View, CA 94043

http://www.symantec.com

Technical Support

Symantec Technical Support maintains support centers globally. Technical Support's primary role is to respond to specific queries about product features and functionality. The Technical Support group also creates content for our online Knowledge Base. The Technical Support group works collaboratively with the other functional areas within Symantec to answer your questions in a timely fashion. For example, the Technical Support group works with Product Engineering and Symantec Security Response to provide alerting services and virus definition updates.

Symantec's support offerings include the following:

- A range of support options that give you the flexibility to select the right amount of service for any size organization
- Telephone and/or Web-based support that provides rapid response and up-to-the-minute information
- Upgrade assurance that delivers software upgrades
- Global support purchased on a regional business hours or 24 hours a day, 7 days a week basis
- Premium service offerings that include Account Management Services

For information about Symantec's support offerings, you can visit our Web site at the following URL:

www.symantec.com/business/support/index.jsp

All support services will be delivered in accordance with your support agreement and the then-current enterprise technical support policy.

Contacting Technical Support

Customers with a current support agreement may access Technical Support information at the following URL:

www.symantec.com/business/support/contact_techsupp_static.jsp

Before contacting Technical Support, make sure you have satisfied the system requirements that are listed in your product documentation. Also, you should be at the computer on which the problem occurred, in case it is necessary to replicate the problem.

When you contact Technical Support, please have the following information available:

- Product release level

- Hardware information
- Available memory, disk space, and NIC information
- Operating system
- Version and patch level
- Network topology
- Router, gateway, and IP address information
- Problem description:
  - Error messages and log files
  - Troubleshooting that was performed before contacting Symantec
  - Recent software configuration changes and network changes

Licensing and registration

If your Symantec product requires registration or a license key, access our technical support Web page at the following URL:

www.symantec.com/business/support/

Customer service

Customer service information is available at the following URL:

www.symantec.com/business/support/

Customer Service is available to assist with non-technical questions, such as the following types of issues:

- Questions regarding product licensing or serialization
- Product registration updates, such as address or name changes
- General product information (features, language availability, local dealers)
- Latest information about product updates and upgrades
- Information about upgrade assurance and support contracts
- Information about the Symantec Buying Programs
- Advice about Symantec's technical support options
- Nontechnical presales questions
- Issues that are related to CD-ROMs or manuals

Documentation

Product guides are available on the media in PDF format. Make sure that you are using the current version of the documentation.The document version appears on page 2 of each guide. The latest product documentation is available on the Symantec website.

http://www.symantec.com/business/support/overview.jsp?pid=15107

Your feedback on product documentation is important to us. Send suggestions for improvements and reports on errors or omissions. Include the title and document version (located on the second page), and chapter and section titles of the text on which you are reporting. Send feedback to:

docs@symantec.com

About Symantec Connect

Symantec Connect is the peer-to-peer technical community site for Symantec's enterprise customers. Participants can connect and share information with other product users, including creating forum posts, articles, videos, downloads, blogs and suggesting ideas, as well as interact with Symantec product teams and Technical Support. Content is rated by the community, and members receive reward points for their contributions.

http://www.symantec.com/connect/storage-management

Support agreement resources

If you want to contact Symantec regarding an existing support agreement, please contact the support agreement administration team for your region as follows:

Asia-Pacific and Japan	customercare_apac@symantec.com
Europe, Middle-East, and Africa	semea@symantec.com
North America and Latin America	supportsolutions@symantec.com

Contents

Section 1

Installation overview and planning

Chapter 1

Introducing Veritas Dynamic Multi-Pathing

This chapter includes the following topics:

About Veritas Dynamic Multi-Pathing

Veritas Dynamic Multi-Pathing (DMP) provides multi-pathing functionality for the operating system native devices configured on the system. DMP creates DMP metadevices (also known as DMP nodes) to represent all the device paths to the same physical LUN.

In previous Veritas releases, DMP was only available as a feature of Veritas Volume Manager (VxVM). DMP supported VxVM volumes on DMP metadevices, and Veritas File System (VxFS) file systems on those volumes.

This release extends DMP metadevices to support OS native logical volume managers (LVM). You can create LVM volumes and volume groups on DMP metadevices.

In this release, Veritas Dynamic Multi-Pathing does not support Veritas File System (VxFS) on DMP devices.

Veritas Volume Manager (VxVM) volumes and disk groups can co-exist with LVM volumes and volume groups, but each device can only support one of the types. If a disk has a VxVM label, then the disk is not available to LVM. Similarly, if a disk is in use by LVM, then the disk is not available to VxVM.

Chapter 2

Planning to install Veritas Dynamic Multi-Pathing

This chapter includes the following topics:

About planning for DMP installation

Before you continue, make sure that you are using the current version of this guide. The latest documentation is available on the Symantec website.

http://www.symantec.com/business/support/overview.jsp?pid=15107

Document version: 5.1SP1.1.

This installation guide is designed for system administrators who already have a knowledge of basic UNIX system and network administration. Basic knowledge includes commands such as `tar`, `mkdir`, and simple shell scripting. Also required is basic familiarity with the specific platform and operating system where DMP will be installed.

Follow the preinstallation instructions if you are installing one of the Veritas Dynamic Multi-Pathing products by Symantec.

Several component products are bundled with each of these DMP products.

About installation and configuration methods

You can install and configure DMP with Veritas installation programs or with native operating system methods.

Use one of the following methods to install and configure DMP:

- The Veritas product installer
  The installer displays a menu that simplifies the selection of installation options.
- The product-specific installation scripts
  The installation scripts provide a command-line interface to install a specific product. The product-specific scripts enable you to specify some additional command-line options. Otherwise, installing with the installation script is identical to specifying DMP from the installer menu.
- The Web-based Veritas installer
  The installer provides an interface to manage the installation from a remote site using a standard Web browser.
  In this release, there are some limitations in the Web-based installer.
  See "About the Web-based installer" on page 37.
- Silent installation with response files
  You can use any of the above options to generate a response file. You can then customize the response file for another system. Run the product installation script with the response file to install silently on one or more other systems.
  See "About response files" on page 69.
- KickStart
  You can use the Veritas product installer or the product-specific installation script to generate a Kickstart script file. Use the generated script to install Veritas packages from your Kickstart server.

Chapter 3

System requirements

This chapter includes the following topics:

Release notes

The *Release Notes* for each Veritas product contains last minute news and important details for each product, including updates to system requirements and supported software. Review the Release Notes for the latest information before you start installing the product.

The product documentation is available on the Web at the following location:

http://www.symantec.com/business/support/overview.jsp?pid=15107

Hardware compatibility list (HCL)

The hardware compatibility list contains information about supported hardware and is updated regularly. Before installing or upgrading Storage Foundation and High Availability Solutions products, review the current compatibility list to confirm the compatibility of your hardware and software.

For the latest information on supported hardware, visit the following URL:

http://entsupport.symantec.com/docs/330441

For information on specific HA setup requirements, see the *Veritas Cluster Server Installation Guide*.

Supported Linux operating systems

This section lists the supported operating systems for this release of Veritas products.

The Veritas 5.1SP1 release supports the following operating systems and hardware:

- Red Hat Enterprise Linux 5 (RHEL 5) with Update 3 (2.6.18-128.el5 kernel) or later on AMD Opteron or Intel Xeon EM64T (x86_64)
- SUSE Linux Enterprise Server 10 (SLES 10) with SP2 (2.6.16.60-0.21 kernel) or SP3 on AMD Opteron or Intel Xeon EM64T (x86_64)
- SUSE Linux Enterprise Server 11 (SLES 11) (2.6.27.19-5-default kernel) or SUSE Linux Enterprise Server 11 (SLES 11) with SP1 on AMD Opteron or Intel Xeon EM64T (x86_64)
- Oracle Enterprise Linux 5 (OEL 5) with Update 3 or later (Red Hat compatible kernel mode only)

Note: 64-bit operating systems are only supported.

If your system is running an older version of either Red Hat Enterprise Linux, SUSE Linux Enterprise Server, or Oracle Enterprise Linux, you must upgrade it before attempting to install the Veritas software. Consult the Red Hat, SUSE, or Oracle documentation for more information on upgrading or reinstalling your system.

Symantec supports only Oracle, Red Hat, and SUSE distributed kernel binaries.

Symantec products operate on subsequent kernel and patch releases provided the operating systems maintain kernel ABI (application binary interface) compatibility.

Information about the latest supported Red Hat errata and updates and SUSE service packs is available in the following TechNote. Read this TechNote before you install Symantec products.

http://entsupport.symantec.com/docs/335001

Disk space requirements

Before installing any of the Veritas Storage Foundation products, confirm that your system has enough free disk space.

Use the "Perform a Preinstallation Check" (P) menu or the `-precheck` option of the product installer to determine whether there is sufficient space.

```
# ./installer -precheck
```

Chapter 4

Licensing Veritas products

This chapter includes the following topics:

About Veritas product licensing

You have the option to install Veritas products without a license key. Installation without a license does not eliminate the need to obtain a license. A software license is a legal instrument governing the usage or redistribution of copyright protected software. The administrator and company representatives must ensure that a server or cluster is entitled to the license level for the products installed. Symantec reserves the right to ensure entitlement and compliance through auditing.

If you encounter problems while licensing this product, visit the Symantec licensing support website.

www.symantec.com/techsupp/

The Veritas product installer prompts you to select one of the following licensing methods:

- Install a license key for the product and features that you want to install.
  When you purchase a Symantec product, you receive a License Key certificate. The certificate specifies the product keys and the number of product licenses purchased.
- Continue to install without a license key.
  The installer prompts for the product modes and options that you want to install, and then sets the required product level.

Within 60 days of choosing this option, you must install a valid license key corresponding to the license level entitled or continue with keyless licensing by managing the server or cluster with a management server. If you do not comply with the above terms, continuing to use the Veritas product is a violation of your end user license agreement, and results in warning messages.
For more information about keyless licensing, see the following URL:
http://go.symantec.com/sfhakeyless

If you upgrade to this release from a prior release of the Veritas software, the product installer does not change the license keys that are already installed. The existing license keys may not activate new features in this release.

If you upgrade with the product installer, or if you install or upgrade with a method other than the product installer, you must do one of the following to license the products:

- Run the `vxkeyless` command to set the product level for the products you have purchased. This option also requires that you manage the server or cluster with a management server.
  See "Setting or changing the product level for keyless licensing" on page 22.
  See the `vxkeyless(1m)` manual page.
- Use the `vxlicinst` command to install a valid product license key for the products you have purchased.
  See "Installing Veritas product license keys" on page 24.
  See the `vxlicinst(1m)` manual page.

You can also use the above options to change the product levels to another level that you are authorized to use. For example, you can add the replication option to the installed product. You must ensure that you have the appropriate license for the product level and options in use.

Note: In order to change from one product group to another, you may need to perform additional steps.

Setting or changing the product level for keyless licensing

The keyless licensing method uses product levels to determine the Veritas products and functionality that are licensed. In order to use keyless licensing, you must set up a Management Server to manage your systems.

For more information and to download the management server, see the following URL:

http://go.symantec.com/vom

When you set the product license level for the first time, you enable keyless licensing for that system. If you install with the product installer and select the keyless option, you are prompted to select the product and feature level that you want to license.

After you install, you can change product license levels at any time to reflect the products and functionality that you want to license. When you set a product level, you agree that you have the license for that functionality.

To set or change the product level

1 View the current setting for the product level.

```
# vxkeyless -v display
```

2 View the possible settings for the product level.

```
# vxkeyless displayall
```

3 Set the desired product level.

```
# vxkeyless -q set prod_levels
```

where *prod_levels* is a comma-separated list of keywords, as shown in step 2

If you want to remove keyless licensing and enter a key, you must clear the keyless licenses. Use the NONE keyword to clear all keys from the system.

Warning: Clearing the keys disables the Veritas products until you install a new key or set a new product level.

To clear the product license level

1 View the current setting for the product license level.

```
# vxkeyless [-v] display
```

2 If there are keyless licenses installed, remove all keyless licenses:

```
# vxkeyless [-q] set NONE
```

For more details on using the `vxkeyless` utility, see the `vxkeyless(1m)` manual page.

Installing Veritas product license keys

The VRTSvlic RPM enables product licensing. After the VRTSvlic is installed, the following commands and their manual pages are available on the system:

vxlicinst	Installs a license key for a Symantec product
vxlicrep	Displays currently installed licenses
vxlictest	Retrieves features and their descriptions encoded in a license key

Even though other products are included on the enclosed software discs, you can only use the Symantec software products for which you have purchased a license

To install a new license

- Run the following commands. In a cluster environment, run the commands on each node in the cluster:

```
# cd /opt/VRTS/bin

# ./vxlicinst -k xxxx-xxxx-xxxx-xxxx-xxxx-xxx
```

Section 2

Installation of Veritas Dynamic Multi-Pathing

Chapter 5

Preparing to install Veritas Dynamic Multi-Pathing

This chapter includes the following topics:

Installation preparation overview

Table 5-1 provides an overview of an installation using the product installer.

Table 5-1 Installation overview

Installation task	Section
Obtain product licenses.	See "About Veritas product licensing" on page 21.
Download the software, or insert the product DVD.	See "Mounting the product disc" on page 29.
Set environment variables.	See "Setting environment variables" on page 28.
Configure the secure shell (ssh) on all nodes.	See "About configuring secure shell or remote shell communication modes before installing products" on page 75.

Table 5-1 Installation overview *(continued)*

Installation task	Section
Verify that hardware, software, and operating system requirements are met.	See "Supported Linux operating systems" on page 18. See "Release notes" on page 17.
Check that sufficient disk space is available.	See "Disk space requirements" on page 18.
Use the installer to install the products.	See "About the Veritas installer" on page 33.

About configuring ssh or rsh using the Veritas installer

The installer can configure passwordless secure shell (ssh) or remote shell (rsh) communications among systems. The installer uses the ssh or rsh daemon that comes bundled with the operating system. During an installation, you choose the communication method that you want to use. You then provide the installer with the superuser passwords for the systems where you plan to install. The ssh or rsh communication among the systems is removed when the installation process completes, unless the installation abruptly terminates. If installation terminated abruptly, use the installation script's `-comcleanup` option to remove the ssh or rsh configuration from the systems.

In most installation, configuration, upgrade (where necessary), and uninstallation scenarios, the installer can configure ssh or rsh on the target systems. In the following scenarios, you need to set up ssh or rsh manually:

- When the root broker is outside of the cluster that you plan to configure.
- When you add new nodes to an existing cluster.
- When the nodes are in a sub-cluster during a phased upgrade.
- When you perform installer sessions using a response file.

See "About configuring secure shell or remote shell communication modes before installing products" on page 75.

Setting environment variables

Most of the commands used in the installation are in the `/sbin` or `/usr/sbin` directory. Add these directories to your `PATH` environment variable as necessary.

After installation, DMP commands are in `/opt/VRTS/bin`. DMP manual pages are stored in `/opt/VRTS/man`.

Specify `/opt/VRTS/bin` in your PATH after the path to the standard Linux commands.

To invoke the VxFS-specific `df`, `fsdb`, `ncheck`, or `umount` commands, type the full path name: `/opt/VRTS/bin/`*command*.

To set your MANPATH environment variable to include `/opt/VRTS/man` do the following:

- If you are using a shell such as sh or bash, enter the following:

  ```
  $ MANPATH=$MANPATH:/opt/VRTS/man; export MANPATH
  ```

- If you are using a shell such as csh or tcsh, enter the following:

  ```
  % setenv MANPATH $(MANPATH):/opt/VRTS/man
  ```

On a Red Hat system, also include the 1m manual page section in the list defined by your `MANSECT` environment variable.

- If you are using a shell such as sh or bash, enter the following:

  ```
  $ MANSECT=$MANSECT:1m; export MANSECT
  ```

- If you are using a shell such as csh or tcsh, enter the following:

  ```
  % setenv MANSECT $(MANSECT):1m
  ```

  If you use the `man`(1) command to access manual pages, set `LC_ALL=C` in your shell to ensure that they display correctly.

Mounting the product disc

You must have superuser (root) privileges to load the DMP software.

To mount the product disc

1. Log in as superuser on a system where you want to install DMP.

   The system from which you install DMP need not be part of the cluster. The systems must be in the same subnet.

2. Insert the product disc with the DMP software into a drive that is connected to the system.

   The disc is automatically mounted.

3. If the disc does not automatically mount, then enter:

   ```
   # mount -o ro /dev/cdrom /mnt/cdrom
   ```

4. Navigate to the location of the RPMs.

   ```
   # cd /mnt/cdrom/dist_arch/rpms
   ```

   Where *dist* is rhel5, sles10, or sles11, and *arch* is x86_64 for RHEL and SLES.

Assessing system preparedness

Symantec provides the following tools for assessing your system, to ensure that the system meets the requirements for installing Veritas Dynamic Multi-Pathing 5.1SP1.

Symantec Operations Readiness Tools	Symantec Operations Readiness Tools (SORT) is a Web-based application that is designed to support Symantec enterprise products. See "Symantec Operations Readiness Tools" on page 31.
Prechecking your systems using the installer	Performs a pre-installation check on the specified systems. The Veritas product installer reports whether the specified systems meet the minimum requirements for installing Veritas Dynamic Multi-Pathing 5.1SP1. See "Prechecking your systems using the Veritas installer" on page 31.

Symantec Operations Readiness Tools

Symantec™ Operations Readiness Tools (SORT) is a set of Web-based tools that supports Symantec enterprise products. SORT increases operational efficiency and helps improve application availability.

Among its broad set of features, SORT provides patches, patch notifications, and documentation for Symantec enterprise products.

To access SORT, go to:

http://sort.symantec.com

Prechecking your systems using the Veritas installer

The script-based and Web-based installer's precheck option checks for the following:

- Recommended swap space for installation
- Recommended memory sizes on target systems for Veritas programs for best performance
- Required operating system versions

To use the precheck option

1. Start the script-based or Web-based installer.
2. Select the precheck option:
   - From the Web-based installer, select the **Perform a Pre-Installation Check** from the Task pull-down menu.
   - In the script-based installer, from root on the system where you want to perform the check, start the installer.

     ```
     # ./installer
     ```

     In the Task Menu, press the p key to start the precheck.
3. Review the output and make the changes that the installer recommends.

Chapter 6

Installing Veritas Dynamic Multi-Pathing using the script-based installer

This chapter includes the following topics:

About the Veritas installer

The installer also enables you to configure the product, verify preinstallation requirements, and view the product's description.

If you obtained a standalone Veritas product from an electronic download site, the single-product download files do not contain the general product installer. Use the product installation script to install the product.

At most points during the installation you can type the following characters for different actions:

- Use `b` (back) to return to a previous section of the installation procedure. The back feature of the installation scripts is context-sensitive, so it returns to the beginning of a grouped section of questions.
- Use `Control-c` to stop and exit the program if an installation procedure hangs. After a short delay, the script exits.
- Use `q` to quit the installer.

- Use ? to display help information.
- Use the Enter button to accept a default response.

Additional options are available for the installer.

Installing Veritas Dynamic Multi-Pathing

Use the installer program to install Veritas Dynamic Multi-Pathing (DMP) on your system.

The following sample procedure installs DMP on a single system.

To install DMP

1. To install on multiple systems, set up the systems so that commands between systems execute without prompting for passwords or confirmations.

   See "About configuring secure shell or remote shell communication modes before installing products" on page 75.

2. Load and mount the software disc.

3. Move to the top-level directory on the disc.

   ```
   # cd /mnt/cdrom
   ```

4. From this directory, type the following command to install on the local system. Also use this command to install on remote systems provided that the secure shell (SSH) or remote shell (rsh) utilities are configured:

   ```
   # ./installer
   ```

5. Enter I to install and press the Return key.
6. When the list of available products is displayed, select **Veritas Dynamic Multi-Pathing**, enter the corresponding number, and press the Return key.
7. At the prompt, specify whether you accept the terms of the End User License Agreement (EULA). Press the return key to proceed.
8. Select one of the following installation options:

   - A minimal installation installs RPMs for minimal functionality for the selected product.
   - A recommended installation installs the recommended DMP RPMs that provide complete functionality of the product.
     Note that this option is the default.

- The display selection displays all RPMs and provides information about them. Note that the recommended installation installs the minimum and the recommended RPMs.

9 When the installer prompts you, indicate the systems where you want to install DMP. Enter one or more system names, separated by spaces.

10 The installer program verifies the system for installation. If the installer does not verify a system, fix the issue and return to the installer.

After the system checks complete, the installer displays a list of the RPMs to be installed. Press Return to continue with the installation.

11 The installer can configure remote shell or secure shell communications for you among systems, however each system needs to have rsh or SSH servers installed. You also need to provide the superuser passwords for the systems. Note that for security reasons, the installation program neither stores nor caches these passwords.

12 The installer program prompts you to choose a licensing method.

If you have a valid license key, select 1 and enter the license key at the prompt.

To install through keyless licensing, select 2.

Note: With the keyless license option, you must manage the systems with a management server.

For more information, go to the following Web site:

http://go.symantec.com/sfhakeyless

---

13 The installer installs the product packages. Next, at the prompt, specify whether you want to send your installation information to Symantec.

```
Would you like to send the information about
this installation to Symantec to help improve installation
in the future? [y,n,q,?] (y) y
```

14 The installer program completes the installation and starts the DMP processes.

If required, check the log files to confirm the installation.

```
Installation log files, summary file, and response file
are saved at:

        /opt/VRTS/install/logs/installer-****
```

Performing a postcheck on a node

The installer's `postcheck` command can help you to determine installation-related problems.

Note: This command option requires downtime for the system.

To run the postcheck command on a node

- Run the installer with the `-postcheck` option.

  ```
  # ./installer -postcheck system_name
  ```

  The installer reports some errors or warnings if any processes or drivers do not start.

Chapter 7

Installing Veritas Dynamic Multi-Pathing using the web-based installer

This chapter includes the following topics:

About the Web-based installer

Use the Web-based installer's interface to install Veritas products. The Web-based installer can perform most of the tasks that the script-based installer performs.

You use the `webinstaller` script to start and stop the Veritas XPortal Server `xprtlwid` process. The `webinstaller` script can also be used to check the status of the XPortal Server.

When the `webinstaller` script starts the `xprtlwid` process, the script displays a URL. Use this URL to access the Web-based installer from Internet Explorer or FireFox.

The Web installer creates log files whenever the Web installer is operating. While the installation processes are operating, the log files are located in a session-based directory under the `/var/tmp` directory. After the install process completes, the log files are located in the `/opt/VRTS/install/logs` directory. It is recommended that you keep the files for auditing, debugging, and for future use.

The location of the Veritas XPortal Server configuration file is `/var/opt/webinstaller/xprtlwid.conf`.

See "Before using the Veritas Web-based installer" on page 38.

See "Starting the Veritas Web-based installer" on page 39.

Features not supported with Web-based installer

In this release, the following features that can be performed using the script installer are not available in the Web-based installer:

- Configuring server-based I/O fencing
- Configuring non-SCSI3 I/O fencing in virtual environments where SCSI3 is not supported

Before using the Veritas Web-based installer

The Veritas Web-based installer requires the following configuration.

Table 7-1 Web-based installer requirements

System	Function	Requirements
Target system	The systems where you plan to install the Veritas products.	Must be a supported platform for Veritas Dynamic Multi-Pathing 5.1SP1.
Installation server	The server where you start the installation. The installation media is accessible from the installation server.	Must use the same operating system as the target systems and must be at one of the supported operating system update levels.

Table 7-1 Web-based installer requirements *(continued)*

System	Function	Requirements
Administrative system	The system where you run the Web browser to perform the installation.	Must have a Web browser. Supported browsers: ■ Internet Explorer 6, 7, and 8 ■ Firefox 3.x

Starting the Veritas Web-based installer

This section describes starting the Veritas Web-based installer.

To start the Web-based installer

1 Start the Veritas XPortal Server process `xprtlwid`, on the installation server:

```
# ./webinstaller start
```

The webinstaller script displays a URL. Note this URL.

Note: If you do not see the URL, run the command again.

2 On the administrative server, start the Web browser.

3 Navigate to the URL that the script displayed.

4 The browser may display the following message:

```
Secure Connection Failed
```

Obtain a security exception for your browser.

5 When prompted, enter `root` and root's password of the installation server.

Obtaining a security exception on Mozilla Firefox

You may need to get a security exception on Mozilla Firefox.

To obtain a security exception

1 Click **Or you can add an exception** link.

2 Click **Add Exception** button.

3 Click **Get Certificate** button.

4 Uncheck **Permanently Store this exception checkbox (recommended)**.

5 Click **Confirm Security Exception** button.

6 Enter root in User Name field and root password of the web server in the Password field.

Performing a pre-installation check with the Veritas Web-based installer

This section describes performing a pre-installation check with the Veritas Web-based installer.

To perform a pre-installation check

1 Start the Web-based installer.

See "Starting the Veritas Web-based installer" on page 39.

2 On the Select a task and a product page, select **Perform a Pre-installation Check** from the **Task** drop-down list.

3 Select the product from the **Product** drop-down list, and click **Next**.

4 Indicate the systems on which to perform the precheck. Enter one or more system names, separated by spaces. Click **Validate**.

5 The installer performs the precheck and displays the results.

6 Click **Finish**. The installer prompts you for another task.

Installing DMP with the Web-based installer

This section describes installing DMP with the Veritas Web-based installer.

To install DMP using the Web-based installer

1 Perform preliminary steps. See "Performing a pre-installation check with the Veritas Web-based installer" on page 40.

2 Start the Web-based installer.

See "Starting the Veritas Web-based installer" on page 39.

3 Select **Install a Product** from the **Task** drop-down list.

4 Select **Veritas Dynamic Multi-Pathing** from the Product drop-down list, and click Next.

5 On the License agreement page, read the End User License Agreement (EULA). To continue, select **Yes, I agree** and click **Next**.

6 Choose minimal or recommended RPMs. Click **Next**.

7 Indicate the systems where you want to install. Separate multiple system names with spaces. Click **Validate**.

8 If you have not yet configured a communication mode among systems, you have the option to let the installer configure ssh or rsh. If you choose to allow this configuration, select the communication mode and provide the superuser passwords for the systems.

9 After the validation completes successfully, click **Next** to install DMP on the selected system.

10 After the installation completes, you must choose your licensing method.

On the license page, select one of the following tabs:

- Keyless licensing

  Note: The keyless license option enables you to install without entering a key. However, in order to ensure compliance you must manage the systems with a management server.

  For more information, go to the following website:

  http://go.symantec.com/sfhakeyless

  Click **Register**.

- Enter license key
  If you have a valid license key, select this tab. Enter the license key for each system. Click **Register**.

11 After the product is registered, reboot the systems if prompted.

For information about migrating your data volumes to DMP devices, refer to the *Veritas Dynamic Multi-Pathing Administrator's Guide*.

12 Select the checkbox to specify whether you want to send your installation information to Symantec.

```
Would you like to send the information about this installation
to Symantec to help improve installation in the future?
```

Click **Finish**.

Chapter 8

Installing Veritas Dynamic Multi-Pathing using other methods

This chapter includes the following topics:

Installing DMP using Kickstart

You can install DMP using Kickstart. Kickstart is supported only for Red Hat Enterprise Linux (RHEL5).

To install DMP using Kickstart

1. Create a directory for the Kickstart configuration files.

   ```
   # mkdir /kickstart_files/
   ```

2. Generate the Kickstart configuration files and the `installproduct` and `uninstallproduct` scripts. The configuration files have the extension `.ks`. Do one of the following:

   - To generate scripts and configuration files for all products, including Veritas Storage Foundation™ (SF), Storage Foundation Cluster File System (SFCFS), Storage Foundation for Oracle® RAC (SFRAC), and Storage Foundation Cluster File System for Oracle® RAC (SFCFSRAC), enter the following command:

     ```
     # ./installer -kickstart /kickstart_files/
     ```

The system lists the scripts and files as they are generated.

- To only generate scripts and configuration files for DMP, enter the following command:

```
# ./installdmp -kickstart /tmp
```

The command output includes the following:

```
The kickstart script for DMP51 is generated at
/tmp/kickstart_dmp51.ks
The installer script to configure DMP is generated at
/tmp/installdmp
The installer script to uninstall DMP is generated at
/tmp/uninstalldmp
```

3 Setup an NFS exported location which the Kickstart client can access. For example, if `/nfs_mount_kickstart` is the directory which has been NFS exported, the NFS exported location may look similar to the following:

```
# cat /etc/exports
/nfs_mount_kickstart  * (rw,sync,no_root_squash)
```

4 Copy the entire directory of RPMs and scripts from the CD/DVD to the NFS location.

5 Copy the required DMP `install`*`product`* and `uninstall`*`product`* scripts you generated in step 2 to the following NFS directory.

```
# cp kickstart_files/installdmp /nfs_mount_kickstart
# cp kickstart_files/uninstalldmp /nfs_mount_kickstart
```

6 Verify the contents of the directory. They should look similar to the following:

```
# ls /nfs_mount_kickstart/

rpms     scripts          installdmp  uninstalldmp
```

7 In the DMP Kickstart configuration file, modify the `BUILDSRC` variable to point to the actual NFS location. The variable has the following format:

```
BUILDSRC="hostname_or_ip:/nfs_mount_kickstart"
```

8 Append the entire modified contents of the Kickstart configuration file to the operating system `ks.cfg` file.

9 Launch the Kickstart installation for the RHEL5 operating system.

10 After the operating system installation is complete, check the file `/var/tmp/kickstart.log` for any errors related to the installation of Veritas RPMs and Veritas product installer scripts.

11 Verify that all the product RPMs have been installed. Enter the following command:

```
# rpm -qa | grep -i vrts
```

If you do not find any installation issues or errors, configure the product stack. Enter the following command:

```
# /opt/VRTS/install/installdmp -configure node1 node2
```

Sample Kickstart configuration file

The following is a sample Kickstart configuration file.

```
%post --nochroot
# Add necessary scripts or commands here to your need
# This generated kickstart file is only for the automated installation of products
# in the DVD

PATH=$PATH:/sbin:/usr/sbin:/bin:/usr/bin
export PATH

#
# Notice:
# * Modify the BUILDSRC below according to your real environment
# * The location specified with BUILDSRC should be NFS accessible
#   to the Kickstart Server
# * Copy the whole directories of rpms and scripts from
#   installation media to the BUILDSRC
# * Put generated install<product> scripts into the BUILDSRC
#

BUILDSRC="<hostname_or_ip>:/path/to/rpms_and_scripts"

#
# Notice:
# * You do not have to change the following scripts.
#
```

```
# define path variables
ROOT=/mnt/sysimage
BUILDDIR="${ROOT}/build"
RPMDIR="${BUILDDIR}/rpms"
SCRIPTDIR="${BUILDDIR}/scripts"
CPIDIR="${ROOT}/opt/VRTS/install"
CPIMODDIR="${ROOT}/opt/VRTSperl/lib/site_perl/UXRT51"

# define log path
KSLOG="${ROOT}/var/tmp/kickstart.log"

echo "==== Executing kickstart post section: ====" >> ${KSLOG}

mkdir -p ${BUILDDIR}
mount -t nfs -o vers=3 ${BUILDSRC} ${BUILDDIR} >> ${KSLOG} 2>&1

# install rpms one by one
  for RPM in VRTSvlic VRTSperl VRTSspt VRTSvxvm VRTSaslapm VRTSsfmh

do
    echo "Installing package  -- $RPM" >> ${KSLOG}
    rpm -U -v --root ${ROOT} ${RPMDIR}/${RPM}-* >> ${KSLOG} 2>&1
done

# copy cpi perl modules
mkdir -p ${CPIMODDIR}
for MODULE in EDR CPIC CPIP
do
    if [ -d "${SCRIPTDIR}/${MODULE}" ]
    then
        cp -rp ${SCRIPTDIR}/${MODULE} ${CPIMODDIR}
        echo "Perl modules from ${SCRIPTDIR}/${MODULE} are copied to ${CPIMODDIR}" \
             >> ${KSLOG}
    else
        echo "Required perl modules ${SCRIPTDIR}/${MODULE} not found" >> ${KSLOG}
    fi
done

# copy cpi message catalogs
if [ -d "${SCRIPTDIR}/messages" ]
then
    cp -rp "${SCRIPTDIR}/messages" ${CPIMODDIR}
    echo "Messages from ${SCRIPTDIR}/messages are copied to ${CPIMODDIR}" \
```

```
          >> ${KSLOG}
fi
if [ -d "${SCRIPTDIR}/bin" ]
then
    cp -rp "${SCRIPTDIR}/bin" ${CPIMODDIR}
    echo "Commands from ${SCRIPTDIR}/bin are copied to ${CPIMODDIR}" >> ${KSLOG}
fi

# copy cpi installer scripts
mkdir -p ${CPIDIR}
touch "${CPIDIR}/.cpi5"
for FILE in $(find ${BUILDDIR} -maxdepth 1 -name '*install*')
do
    cp -p ${FILE} ${CPIDIR}
    echo "Copy ${FILE} to ${CPIDIR}" >> ${KSLOG}
done

umount ${BUILDDIR}

echo "==== Completed kickstart file ====" >> ${KSLOG}

exit 0
```

Section 3

Verification of the installation

Chapter 9

Verifying the Veritas Dynamic Multi-Pathing installation

This chapter includes the following topics:

Verifying that the products were installed

Verify that the DMP products are installed.

Use the command to check which rpms have been installed.

```
# rpm -qa | grep VRTS
```

See "Veritas Dynamic Multi-Pathing installation RPMs" on page 83.

Use the following sections to further verify the product installation.

Installation log files

The Veritas product installer or product installation script installdmp creates log files for auditing and debugging. After every product installation, configuration, or uninstall, the installer displays the name and location of the files. The files are located in the `/opt/VRTS/install/logs` directory. Symantec recommends that you keep the files for auditing, debugging, and future use.

The log files include the following types of text files:

Installation log file	The installation log file contains all commands executed during the procedure, their output, and errors generated by the commands. This file is for debugging installation problems and can be used for analysis by Veritas Support.
Response file	The response file contains the configuration information that you entered during the procedure. You can use the response file for future installation procedures by invoking an installation script with the `responsefile` option. The response file passes arguments to the script to automate the installation of that product. You can edit the file to automate installation and configuration of additional systems.
Summary file	The summary file contains the results of the installation by the common product installer or product installation scripts. The summary includes the list of the RPMs, and the status (success or failure) of each RPM. The summary also indicates which processes were stopped or restarted during the installation. After installation, refer to the summary file to determine whether any processes need to be started.

Starting and stopping processes for the Veritas products

After the installation and configuration is complete, the Veritas product installer starts the processes that are used by the installed products. You can use the product installer to stop or start the processes, if required.

To stop the processes

- Use the `-stop` option to stop the product installation script.

  For example, to stop the product's processes, enter the following command:

  ```
  # ./installer -stop
  ```

To start the processes

- Use the `-start` option to start the product installation script.

  For example, to start the product's processes, enter the following command:

  ```
  # ./installer -start
  ```

Section 4

Uninstallation of Veritas Dynamic Multi-Pathing

Chapter 10

Uninstalling Veritas Dynamic Multi-Pathing

This chapter includes the following topics:

Uninstalling DMP with the Veritas Web-based installer

This section describes how to uninstall with the Veritas Web-based installer.

To uninstall DMP

1. Perform the required steps to save any data that you wish to preserve. For example, take back-ups of configuration files.
2. Start the Web-based installer.

   See "Starting the Veritas Web-based installer" on page 39.
3. On the Select a task and a product page, select **Uninstall a Product** from the Task drop-down list.
4. Select **Veritas Dynamic Multi-Pathing** from the Product drop-down list, and click **Next**.
5. Indicate the systems on which to uninstall. Enter one or more system names, separated by spaces. Click **Validate**.
6. After the validation completes successfully, click **Next** to uninstall DMP on the selected system.

7 If there are any processes running on the target system, the installer stops the processes. Click **Next**.

8 After the installer stops the processes, the installer removes the products from the specified system.

Click **Next**.

9 After the uninstall completes, the installer displays the location of the summary, response, and log files. If required, view the files to confirm the status of the removal.

10 Click **Finish**.

The Web-based installer prompts you for another task.

Uninstalling Veritas Dynamic Multi-Pathing

Use the following procedure to remove Veritas Dynamic Multi-Pathing (DMP).

To uninstall DMP

1 To uninstall from multiple systems, set up the systems so that commands between systems execute without prompting for passwords or confirmations.

See "About configuring secure shell or remote shell communication modes before installing products" on page 75.

2 On the system where you plan to remove DMP, move to the /opt/VRTS/install directory.

3 Run the `uninstalldmp` command.

```
# ./uninstalldmp
```

4 When the installer prompts you, enter the names of each system where you want to uninstall DMP. Separate system names with spaces.

5 The installer program checks the systems. It then asks you if you want to stop DMP processes.

```
Do you want to stop DMP processes now? [y,n,q,?] (y)
```

If you respond yes, the processes are stopped and the RPMs are uninstalled.

6 After the uninstall completes, the installer displays the location of the summary, response, and log files. If required, view the files to confirm the status of the removal.

Removing license files (Optional)

Optionally, you can remove the license files.

To remove the VERITAS license files

1. To see what license key files you have installed on a system, enter:

   ```
   # /sbin/vxlicrep
   ```

   The output lists the license keys and information about their respective products.

2. Go to the directory containing the license key files and list them:

   ```
   # cd /etc/vx/licenses/lic
   # ls -a
   ```

3. Using the output from step 1, identify and delete unwanted key files listed in step 2. Unwanted keys may be deleted by removing the license key file.

Section 5

Installation reference

Appendix A

Installation scripts

This appendix includes the following topics:

Command options for the installation script

The `installdmp` command usage takes the following form:

```
installdmp [ system1 system2... ]
 [ -configure | -install | -license | -precheck
         | -requirements | -start   | -stop | -uninstall
         | -upgrade | -postcheck ]
 [ -logpath log_path ]
 [ -responsefile response_file ]
 [ -tmppath tmp_path ]
 [ -hostfile hostfile_path ]

 [ -keyfile ssh_key_file ]

 [ -kickstart kickstart_path ]

[ -patchpath patch_path ]
 [ -pkgpath pkg_path ]

[ -rsh | -redirect | -installminpkgs | -installrecpkgs
        | -installallpkgs   | -minpkgs | -recpkgs | -allpkgs
        | -listpatches | -pkgset |  -copyinstallscripts
        | -pkginfo | -serial | -comcleanup | -makeresponsefile
        | -pkgtable | -ignorepatchreqs | -version | -nolic ]
```

Table A-1 lists the `installdmp` command options.

Table A-1 installdmp options

Option and Syntax	Description
`-allpkgs`	View a list of all DMP RPMs and patches. The installdmp lists the RPMs and patches in the correct installation order. You can use the output to create scripts for command-line installation, or for installations over a network. See the -minpkgs and the -recpkgs options.
`-comcleanup`	The `-comcleanup` option removes the ssh or rsh configuration added by installer on the systems. The option is only required when installation routines that performed auto-configuration of ssh or rsh are abruptly terminated.
`-configure`	Configure DMP after using `-install` option to install DMP.
`-copyinstallscripts`	Use this option when you manually install products and want to use the intallation scripts that are stored on the system to perform product configuration, uninstallation, and licensing tasks without the product media. Use this option to copy the installation scripts to an alternate rootpath when you use it with the `-rootpath` option. The following examples demonstrate the usage for this option: ■ `./installer -copyinstallscripts` Copies the installation and uninstallation scripts for all products in the release to /opt/VRTS/install. It also copies the installation Perl libraries to /opt/VRTSperl/lib/site_perl/*release_name* . ■ `./install`*`product_name`* `-copyinstallscripts` Copies the installation and uninstallation scripts for the specified product and any subset products for the product to /opt/VRTS/install. It also copies the installation Perl libraries to /opt/VRTSperl/lib/site_perl/*release_name* . ■ `./installer -rootpath` *`alt_root_path`* `-copyinstallscripts` The path *alt_root_path* can be a directory like /rdisk2. In that case, this command copies installation and uninstallation scripts for all the products in the release to /rdisk2/opt/VRTS/install. CPI perl libraries are copied at /rdisk2/opt/VRTSperl/lib/site_perl/release_name. For example, for the 5.1 SP1 the *release_name* is UXRT51SP1.

Table A-1 installdmp options *(continued)*

Option and Syntax	Description
`-hostfile`	Specifies the location of a file that contains the system names for the installer.
`-ignorepatchreqs`	The `-ignorepatchreqs` option is used to allow installation or upgrading even if the prerequisite packages or patches are missed on the system.
`-install`	Install product RPMs on systems without configuring DMP.
`-installallpkgs`	Selects all the RPMs for installation. See the `-allpkgs` option.
`-installminpkgs`	Selects the minimum RPMs for installation. See the `-minpkgs` option.
`-installrecpkgs`	Selects the recommended RPMs for installation. See the `-recpkgs` option.
`-kickstart` *`dir_path`*	Creates a kickstart configuration file to install DMP using the Kickstart utility for RHEL. The file contains the list of DMP RPMs in the correct installation order. The file contains the RPMs in the format that the Kickstart utility can use for installation. The *dir_path* indicates the path to an existing directory where the installer must create the file.
`-keyfile` *`ssh_key_file`*	Specifies a key file for SSH. The option passes `-i` *`ssh_key_file`* with each SSH invocation.
`-license`	Register or update product licenses on the specified systems. This option is useful to replace a demo license.
`-listpatches`	The `-listpatches` option displays product patches in correct installation order.
`-logpath` *`log_path`*	Specifies that log_path, not /opt/VRTS/install/logs, is the location where install log files, summary files, and response files are saved.
`-makeresponsefile`	Create a response file. This option only generates a response file and does not install DMP.

Table A-1 installdmp options *(continued)*

Option and Syntax	Description
`-minpkgs`	View a list of the minimal RPMs and the patches that are required for DMP. The installdmp lists the RPMs and patches in the correct installation order. The list does not include the optional RPMs. You can use the output to create scripts for command-line installation, or for installations over a network. See the -allpkgs and the -recpkgs options.
`-nolic`	Allows installation of product packages without entering a license key. Licensed features cannot be configured, started, or used when this option is specified.
`-pkginfo`	Displays a list of packages in the order of installation in a user-friendly format. Use this option with one of the following options: ■ -allpkgs If you do not specify an option, -allpkgs is used by default. ■ -minpkgs ■ -recpkgs
`-pkgpath` *`pkg_path`*	Specifies that *pkg_path* contains all RPMs that the installdmp is about to install on all systems. The *pkg_path* is the complete path of a directory, usually NFS mounted.
`-pkgset`	Discovers and lists the 5.1SP1 RPMs installed on the systems that you specify.
`-pkgtable`	Displays the DMP 5.1SP1 RPMs in the correct installation order.
`-postcheck`	Checks that the processes are running and other post-installation checks.
`-precheck`	Verify that systems meet the installation requirements before proceeding with DMP installation. Symantec recommends doing a precheck before you install DMP.

Table A-1 installdmp options *(continued)*

Option and Syntax	Description
`-recpkgs`	View a list of the recommended RPMs and the patches that are required for DMP. The installdmp lists the RPMs and patches in the correct installation order. The list does not include the optional RPMs. You can use the output to create scripts for command-line installation, or for installations over a network. See the -allpkgs and the -minpkgs options.
`-redirect`	Specifies that the installer need not display the progress bar details during the installation.
`-requirements`	View a list of required operating system version, required patches, file system space, and other system requirements to install DMP.
`-responsefile` *response_file*	Perform automated DMP installation using the system and the configuration information that is stored in a specified file instead of prompting for information. The *response_file* must be a full path name. You must edit the response file to use it for subsequent installations. Variable field definitions are defined within the file. See "Installing DMP using response files" on page 69.
`-rsh`	Specifies that *rsh* and `rcp` are to be used for communication between systems instead of ssh and `scp`. This option requires that systems be preconfigured such that *rsh* commands between systems execute without prompting for passwords or confirmations
`-serial`	Performs the installation, uninstallation, start, and stop operations on the systems in a serial fashion. By default, the installer performs these operations simultaneously on all the systems.
`-start`	Starts the daemons and processes for DMP. If the installdmp failed to start up all the DMP processes, you can use the -stop option to stop all the processes and then use the -start option to start the processes. See the -stop option. See "Starting and stopping processes for the Veritas products" on page 52.

Table A-1 installdmp options *(continued)*

Option and Syntax	Description
`-stop`	Stops the daemons and processes for DMP. If the installdmp failed to start up all the DMP processes, you can use the -stop option to stop all the processes and then use the -start option to start the processes. See the -start option. See "Starting and stopping processes for the Veritas products " on page 52.
`-tmppath tmp_path`	Specifies that *tmp_path* is the working directory for installdmp. This path is different from the /var/tmp path. This destination is where the installdmp performs the initial logging and where the installdmp copies the RPMs on remote systems before installation.
`-upgrade`	Upgrades the installed RPMs on the systems that you specify.
`-uninstall`	Uninstalls DMP from the systems that you specify.
`-version`	Checks and reports the installed products and their versions. Identifies the installed and missing RPMs and patches where applicable for the product. Provides a summary that includes the count of the installed and any missing RPMs and patches where applicable.

Command options for uninstall script

The `uninstalldmp program` command usage takes the following form:

```
uninstalldmp [ <system1> <system2>... ]
        [ -logpath <log_path> ]
        [ -responsefile <response_file> ]
        [ -tmppath <tmp_path> ]
        [ -hostfile <hostfile_path> ]
        [ -keyfile <ssh_key_file> ]

  [ -rsh | -redirect | -copyinstallscripts
            | -serial | -comcleanup
            | -makeresponsefile | -version | -nolic ]
```

Table A-2 lists the `uninstalldmp program` command options.

Table A-2 uninstalldmp program options

Option and Syntax	Description
`-comcleanup`	The `-comcleanup` option removes the ssh or rsh configuration added by installer on the systems. The option is only required when installation routines that performed auto-configuration of ssh or rsh are abruptly terminated.
`-copyinstallscripts`	Use this option when you manually install products and want to use the intallation scripts that are stored on the system to perform product configuration, uninstallation, and licensing tasks without the product media. Use this option to copy the installation scripts to an alternate rootpath when you use it with the `-rootpath` option. The following examples demonstrate the usage for this option: ■ `./installer -copyinstallscripts` Copies the installation and uninstallation scripts for all products in the release to /opt/VRTS/install. It also copies the installation Perl libraries to /opt/VRTSperl/lib/site_perl/*release_name* . ■ `./install`*`product_name`* `-copyinstallscripts` Copies the installation and uninstallation scripts for the specified product and any subset products for the product to /opt/VRTS/install. It also copies the installation Perl libraries to /opt/VRTSperl/lib/site_perl/*release_name* . ■ `./installer -rootpath` *`alt_root_path`* `-copyinstallscripts` The path *alt_root_path* can be a directory like /rdisk2. In that case, this command copies installation and uninstallation scripts for all the products in the release to /rdisk2/opt/VRTS/install. CPI perl libraries are copied at /rdisk2/opt/VRTSperl/lib/site_perl/release_name. For example, for the 5.1 SP1 the *release_name* is UXRT51SP1.
`-hostfile`	Specifies the location of a file that contains the system names for the installer.
`-keyfile` *`ssh_key_file`*	Specifies a key file for SSH. The option passes `-i` *`ssh_key_file`* with each SSH invocation.
`-logpath` *`log_path`*	Specifies that log_path, not /opt/VRTS/install/logs, is the location where uninstalldmp program log files, summary file, and response file are saved.

Table A-2 uninstalldmp program options *(continued)*

Option and Syntax	Description
`-makeresponsefile`	Use this option to create a response file or to verify that your system configuration is ready for uninstalling DMP.
`-nolic`	Allows installation of product packages without entering a license key. Licensed features cannot be configured, started, or used when this option is specified.
`-redirect`	Displays progress details without showing progress bar.
`-responsefile` *`response_file`*	Perform automated DMP uninstallation using the system and the configuration information that is stored in a specified file instead of prompting for information. The *response_file* must be a full path name. You must edit the response file to use it for subsequent installations. Variable field definitions are defined within the file. See "Uninstalling DMP using response files" on page 70.
`-rsh`	Specifies that *rsh* and `rcp` are to be used for communication between systems instead of ssh and `scp`. This option requires that systems be preconfigured such that *rsh* commands between systems execute without prompting for passwords or confirmations
`-serial`	Performs the installation, uninstallation, start, and stop operations on the systems in a serial fashion. By default, the installer performs these operations simultaneously on all the systems.
`-tmppath` *`tmp_path`*	Specifies that *tmp_path* is the working directory for uninstalldmp program. This path is different from the /var/tmp path. This destination is where the uninstalldmp program performs the initial logging and where the installdmp copies the RPMs on remote systems before installation.
`-version`	Checks and reports the installed products and their versions. Identifies the installed and missing RPMs and patches where applicable for the product. Provides a summary that includes the count of the installed and any missing RPMs and patches where applicable.

Appendix B

Response files

This appendix includes the following topics:

About response files

The installer or product installation script generates a response file during any installation, configuration, upgrade, or uninstall procedure. The response file contains the configuration information that you entered during the procedure. When the procedure completes, the installation script displays the location of the response files.

You can use the response file for future installation procedures by invoking an installation script with the `responsefile` option. The response file passes arguments to the script to automate the installation of that product. You can edit the file to automate installation and configuration of additional systems.

You can generate a response file using the `makeresponsefile` option.

Installing DMP using response files

Typically, you can use the response file that the installer generates after you perform DMP installation on one cluster to install DMP on other clusters. You can also create a response file using the `-makeresponsefile` option of the installer.

To install DMP using response files

1. Make sure the systems where you want to install DMP meet the installation requirements.
2. Make sure the preinstallation tasks are completed.
3. Copy the response file to one of the cluster systems where you want to install DMP.
4. Edit the values of the response file variables as necessary.
5. Mount the product disc and navigate to the directory that contains the installation program.
6. Start the installation from the system to which you copied the response file. For example:

   ```
   # ./installer -responsefile /tmp/response_file

   # ./installdmp -responsefile /tmp/response_file
   ```

   Where /tmp/*response_file* is the response file's full path name.

Uninstalling DMP using response files

Typically, you can use the response file that the installer generates after you perform DMP uninstallation on one cluster to uninstall DMP on other clusters.

To perform an automated uninstallation

1. Make sure that you meet the prerequisites to uninstall DMP.
2. Copy the response file to one of the cluster systems where you want to uninstall DMP.
3. Edit the values of the response file variables as necessary.
4. Start the uninstallation from the system to which you copied the response file. For example:

   ```
   # /opt/VRTS/install/uninstalldmp -responsefile /tmp/response_file
   ```

   Where /tmp/*response_file* is the response file's full path name.

Syntax in the response file

The syntax of the Perl statements that are included in the response file variables varies. It can depend on whether the variables require scalar or list values.

For example, in the case of a string value:

```
$CFG{Scalar_variable}="value";
```

or, in the case of an integer value:

```
$CFG{Scalar_variable}=123;
```

or, in the case of a list:

```
$CFG{List_variable}=["value", "value", "value"];
```

Response file variable definitions

Table B-1 lists the variables that are used in the response file and their definitions.

Table B-1 Response file variables

Variable	Description
CFG{opt}{install}	Installs DMP RPMs. Configuration can be performed at a later time using the `-configure` option. List or scalar: scalar Optional or required: optional
CFG{accepteula}	Specifies whether you agree with the EULA.pdf file on the media. List or scalar: scalar Optional or required: required
$CFG{opt}{vxkeyless}	Installs the product with keyless license. List of scalar: scalar Optional or required: optional
CFG{systems}	List of systems on which the product is to be installed, uninstalled, or configured. List or scalar: list Optional or required: required

Table B-1 Response file variables *(continued)*

Variable	Description
CFG{prod}	Defines the product to be installed, uninstalled, or configured. List or scalar: scalar Optional or required: required
CFG{opt}{keyfile}	Defines the location of an ssh keyfile that is used to communicate with all remote systems. List or scalar: scalar Optional or required: optional
CFG{opt}{pkgpath}	Defines a location, typically an NFS mount, from which all remote systems can install product RPMs. The location must be accessible from all target systems. List or scalar: scalar Optional or required: optional
CFG{opt}{tmppath}	Defines the location where a working directory is created to store temporary files and the RPMs that are needed during the install. The default location is /var/tmp. List or scalar: scalar Optional or required: optional
CFG{opt}{rsh}	Defines that *rsh* must be used instead of ssh as the communication method between systems. List or scalar: scalar Optional or required: optional
CFG{donotinstall} {RPM}	Instructs the installation to not install the optional RPMs in the list. List or scalar: list Optional or required: optional
CFG{donotremove} {RPM}	Instructs the uninstallation to not remove the optional RPMs in the list. List or scalar: list Optional or required: optional

Table B-1 Response file variables *(continued)*

Variable	Description
CFG{opt}{logpath}	Mentions the location where the log files are to be copied. The default location is /opt/VRTS/install/logs. List or scalar: scalar Optional or required: optional
CFG{opt}{configure}	Performs the configuration after the RPMs are installed using the `-install` option. List or scalar: scalar Optional or required: optional
CFG{opt}{upgrade}	Upgrades all RPMs installed, without configuration. List or scalar: list Optional or required: optional
CFG{opt}{uninstall}	Uninstalls DMP RPMs. List or scalar: scalar Optional or required: optional

Appendix C

Configuring the secure shell or the remote shell for communications

This appendix includes the following topics:

About configuring secure shell or remote shell communication modes before installing products

Establishing communication between nodes is required to install Veritas software from a remote system, or to install and configure a cluster. The node from which the installer is run must have permissions to run `rsh` (remote shell) or `ssh` (secure shell) utilities. You need to run the installer with superuser privileges on the systems where you plan to install Veritas software.

You can install products to remote systems using either secure shell (ssh) or remote shell (rsh). Symantec recommends that you use ssh as it is more secure than rsh.

This section contains an example of how to set up ssh password free communication. The example sets up ssh between a source system (system1) that

contains the installation directories, and a target system (system2). This procedure also applies to multiple target systems.

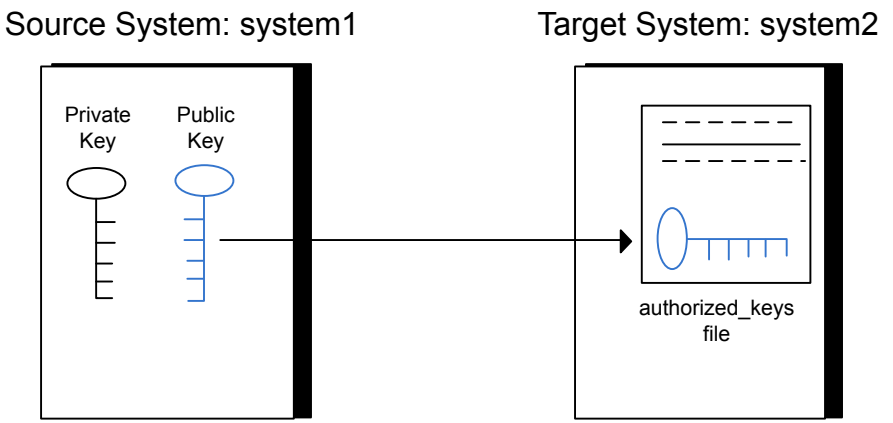
Configuring and enabling ssh

The ssh program enables you to log into and execute commands on a remote system. ssh enables encrypted communications and an authentication process between two untrusted hosts over an insecure network.

In this procedure, you first create a DSA key pair. From the key pair, you append the public key from the source system to the authorized_keys file on the target systems.

Figure C-1 illustrates this procedure.

Figure C-1 Creating the DSA key pair and appending it to target systems



Read the ssh documentation and online manual pages before enabling ssh. Contact your operating system support provider for issues regarding ssh configuration.

Visit the OpenSSH website that is located at: http://openssh.org to access online manuals and other resources.

To create the DSA key pair

1 On the source system (system1), log in as root, and navigate to the root directory.

```
system1 # cd /root
```

2 To generate a DSA key pair on the source system, type the following command:

```
system1 # ssh-keygen -t dsa
```

System output similar to the following is displayed:

```
Generating public/private dsa key pair.
Enter file in which to save the key (/root/.ssh/id_dsa):
```

3 Press Enter to accept the default location of `/root/.ssh/id_dsa`.

4 When the program asks you to enter the passphrase, press the Enter key twice.

```
Enter passphrase (empty for no passphrase):
```

Do not enter a passphrase. Press Enter.

```
Enter same passphrase again:
```

Press Enter again.

5 Output similar to the following lines appears.

```
Your identification has been saved in /root/.ssh/id_dsa.
Your public key has been saved in /root/.ssh/id_dsa.pub.
The key fingerprint is:
1f:00:e0:c2:9b:4e:29:b4:0b:6e:08:f8:50:de:48:d2 root@system1
```

To append the public key from the source system to the authorized_keys file on the target system, using secure file transfer

1. From the source system (system1), move the public key to a temporary file on the target system (system2).

   Use the secure file transfer program.

   In this example, the file name `id_dsa.pub` in the root directory is the name for the temporary file for the public key.

   Use the following command for secure file transfer:

   ```
   system1 # sftp system2
   ```

   If the secure file transfer is set up for the first time on this system, output similar to the following lines is displayed:

   ```
   Connecting to system2 ...
   The authenticity of host 'system2 (10.182.00.00)'
   can't be established. DSA key fingerprint is
   fb:6f:9f:61:91:9d:44:6b:87:86:ef:68:a6:fd:88:7d.
   Are you sure you want to continue connecting (yes/no)?
   ```

2. Enter `yes`.

   Output similar to the following is displayed:

   ```
   Warning: Permanently added 'system2,10.182.00.00'
   (DSA) to the list of known hosts.
   root@system2 password:
   ```

3. Enter the root password of system2.
4. At the `sftp` prompt, type the following command:

   ```
   sftp> put /root/.ssh/id_dsa.pub
   ```

   The following output is displayed:

   ```
   Uploading /root/.ssh/id_dsa.pub to /root/id_dsa.pub
   ```

5. To quit the SFTP session, type the following command:

   ```
   sftp> quit
   ```

6 Add the `id_dsa.pub` keys to the `authorized_keys` file on the target system. To begin the `ssh` session on the target system (system2 in this example), type the following command on system1:

```
system1 # ssh system2
```

Enter the root password of system2 at the prompt:

```
password:
```

Type the following commands on system2:

```
system2 # cat /root/id_dsa.pub >> /root/.ssh/authorized_keys
system2 # rm  /root/id_dsa.pub
```

7 When you install from a source system that is also an installation target, also add the local system `id_dsa.pub` key to the local `authorized_keys` file. The installation can fail if the installation source system is not authenticated.

To add the local system `id_dsa.pub` key to the local `authorized_keys` file, enter the following command:

```
system1 # cat /root/.ssh/id_dsa.pub >> /root/.ssh/authorized_keys
```

8 Run the following commands on the source installation system. If your ssh session has expired or terminated, you can also run these commands to renew the session. These commands bring the private key into the shell environment and make the key globally available to the user `root`:

```
system1 # exec /usr/bin/ssh-agent $SHELL
system1 # ssh-add

  Identity added: /root/.ssh/id_dsa
```

This shell-specific step is valid only while the shell is active. You must execute the procedure again if you close the shell during the session.

To verify that you can connect to a target system

1 On the source system (system1), enter the following command:

```
system1 # ssh -l root system2 uname -a
```

where system2 is the name of the target system.

2 The command should execute from the source system (system1) to the target system (system2) without the system requesting a passphrase or password.

3 Repeat this procedure for each target system.

Restarting the ssh session

After you complete this procedure, ssh can be restarted in any of the following scenarios:

- After a terminal session is closed
- After a new terminal session is opened
- After a system is restarted
- After too much time has elapsed, to refresh ssh

To restart ssh

1. On the source installation system (system1), bring the private key into the shell environment.

   ```
   system1 # exec /usr/bin/ssh-agent $SHELL
   ```

2. Make the key globally available for the user `root`

   ```
   system1 # ssh-add
   ```

Enabling rsh for Linux

The following section describes how to enable remote shell.

Veritas recommends configuring a secure shell environment for Veritas product installations.

See “Configuring and enabling ssh” on page 76.

See the operating system documentation for more information on configuring remote shell.

To enable rsh

1. To ensure that the `rsh` and `rsh-server` packages are installed, type the following command:

   ```
   # rpm -qa | grep -i rsh
   ```

   If it is not already in the file, type the following command to append the line "`rsh`" to the `/etc/securetty` file:

   ```
   # echo "rsh" >> /etc/securetty
   ```

2. Modify /etc/init.d/rsh disable=no.

3 In the /etc/pam.d/rsh file, change the "auth" type from "required" to "sufficient":

```
auth      sufficient
```

4 Add the "promiscuous" flag into /etc/pam.d/rsh and /etc/pam.d/rlogin after item “pam_rhosts_auth.so”.

5 To enable the rsh server, type the following command:

```
# chkconfig rsh on
```

6 Modify the .rhosts file. Each line of the .rhosts file contains a fully qualified domain name or IP address for each remote system. This file also contains the name of a user having access to the local system. For example, if the root user must remotely access system1 from system2, add an entry for system2.*companyname*.com to the .rhosts file on system1 by typing the following command:

```
# echo "system2.companyname.com" >> $HOME/.rhosts
```

7 Install the Veritas product.

To disable rsh

1 Remove the "rsh" entry in the /etc/securetty file.

2 Disable the rsh server by typing the following command:

```
# chkconfig rsh off
```

3 After you complete an installation procedure, delete the .rhosts file from each user’s $HOME directory to ensure security:

```
# rm -f $HOME/.rhosts
```

Appendix D

Veritas Dynamic Multi-Pathing components

This appendix includes the following topics:

Veritas Dynamic Multi-Pathing installation RPMs

Table D-1 shows the RPM name and contents for each English language RPM for Veritas Dynamic Multi-Pathing. The table also gives you guidelines for which RPMs to install based whether you want the minimum, recommended, or advanced configuration.

Table D-1 Veritas Dynamic Multi-Pathing RPMs

RPMs	Contents	Configuration
VRTSaslapm	Veritas Array Support Library (ASL) and Array Policy Module(APM) binaries Required for the support and compatibility of various storage arrays.	Minimum
VRTSperl	Perl 5.10.0 for Veritas	Minimum
VRTSvlic	Veritas License Utilities Installs the license key layout files required to decode the Storage Foundation license keys. Provides the standard license key utilities vxlicrep, vxlicinst, and vxlictest.	Minimum
VRTSvxvm	Veritas Volume Manager binaries	Minimum

Table D-1 Veritas Dynamic Multi-Pathing RPMs *(continued)*

RPMs	Contents	Configuration
VRTSsfmh	Veritas Storage Foundation Managed Host Discovers configuration information on a Storage Foundation managed host. This information is stored on a central database, which is not part of this release. You must download the database separately at: http://www.symantec.com/business/storage-foundation-manager	Recommended
VRTSspt	Veritas Software Support Tools	Recommended

Appendix E

Troubleshooting installation issues

This appendix includes the following topics:

Enable DMP root support manually when installing DMP 5.1SP1

Installing or upgrading to DMP 5.1SP1 with keyless or Veritas Dynamic Multi-pathing license requires the administrator to manually run the command to enable DMP root support. To do this, run the command `vxdmpadm settune dmp_native_support=on` after package installation.

Restarting the installer after a failed connection

If an installation is killed because of a failed connection, you can restart the installer to resume the installation. The installer detects the existing installation. The installer prompts you whether you want to resume the installation. If you

resume the installation, the installation proceeds from the point where the installation failed.

What to do if you see a licensing reminder

In this release, you can install without a license key. In order to comply with the End User License Agreement, you must either install a license key or make the host managed by a Management Server. If you do not comply with these terms within 60 days, the following warning messages result:

```
WARNING V-365-1-1 This host is not entitled to run Veritas Storage
Foundation/Veritas Cluster Server.As set forth in the End User
License Agreement (EULA) you must complete one of the two options
set forth below. To comply with this condition of the EULA and
stop logging of this message, you have <nn> days to either:
- make this host managed by a Management Server (see
  http://go.symantec.com/sfhakeyless for details and free download),
  or
- add a valid license key matching the functionality in use on this host
  using the command 'vxlicinst'
```

To comply with the terms of the EULA, and remove these messages, you must do one of the following within 60 days:

- Install a valid license key corresponding to the functionality in use on the host. After you install the license key, you must validate the license key using the following command:

  ```
  # vxkeyless display
  ```

- Continue with keyless licensing by managing the server or cluster with a management server.
  For more information about keyless licensing, see the following URL: http://go.symantec.com/sfhakeyless

Troubleshooting information

The VRTSspt package provides a group of tools for troubleshooting a system and collecting information on its configuration. The tools can gather Veritas File System and Veritas Volume Manager metadata information and establish various benchmarks to measure file system and volume manager performance. Although the tools are not required for the operation of any Veritas product, Symantec recommends installing them should a support case be needed to be opened with

Symantec Support. If you are unfamiliar with their use and purpose, use caution when using them or use them in concert with Symantec Support.

Incorrect permissions for root on remote system

The permissions are inappropriate. Make sure you have remote root access permission on each system to which you are installing.

```
Failed to setup rsh communication on 10.198.89.241:
'rsh 10.198.89.241 <command>' failed
Trying to setup ssh communication on 10.198.89.241.
Failed to setup ssh communication on 10.198.89.241:
Login denied

Failed to login to remote system(s) 10.198.89.241.
Please make sure the password(s) are correct and superuser(root)
can login to the remote system(s) with the password(s).
If you want to setup rsh on remote system(s), please make sure
rsh with command argument ('rsh <host> <command>') is not
denied by remote system(s).

Either ssh or rsh is needed to be setup between the local node
and 10.198.89.241 for communication

Would you like the installer to setup ssh/rsh communication
automatically between the nodes?
Superuser passwords for the systems will be asked. [y,n,q] (y) n

System verification did not complete successfully

The following errors were discovered on the systems:

The ssh permission denied on 10.198.89.241
rsh exited 1 on 10.198.89.241
either ssh or rsh is needed to be setup between the local node
and 10.198.89.241 for communication
```

Suggested solution: You need to set up the systems to allow remote access using `ssh` or `rsh`.

See "About configuring secure shell or remote shell communication modes before installing products" on page 75.

Note: Remove remote shell permissions after completing the DMP installation and configuration.

Inaccessible system

The system you specified is not accessible. This could be for a variety of reasons such as, the system name was entered incorrectly or the system is not available over the network.

```
 Verifying systems: 12% .....................................
 Estimated time remaining: 0:10 1 of 8
 Checking system communication ............................. Done
System verification did not complete successfully
The following errors were discovered on the systems:
cannot resolve hostname host1
Enter the  system names separated by spaces: q,? (host1)
```

Suggested solution: Verify that you entered the system name correctly; use the `ping`(1M) command to verify the accessibility of the host.

Index