

# Veritas™ Dynamic Multi-Pathing 6.0.4 Installation Guide - Linux

# Veritas™ Dynamic Multi-Pathing Installation Guide

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- Hardware information

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- Version and patch level
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- Problem description:
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- 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.

<https://sort.symantec.com/documents>

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:

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For information regarding the latest HOWTO articles, documentation updates, or to ask a question regarding product documentation, visit the Storage and Clustering Documentation forum on Symantec Connect.

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

## Support agreement resources

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Europe, Middle-East, and Africa	<a href="mailto:semea@symantec.com">semea@symantec.com</a>
North America and Latin America	<a href="mailto:supportsolutions@symantec.com">supportsolutions@symantec.com</a>

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# Installation overview and planning

- [Chapter 1. Introducing Veritas Dynamic Multi-Pathing](#)
- [Chapter 2. System requirements](#)
- [Chapter 3. Planning to install DMP](#)
- [Chapter 4. Licensing DMP](#)

# Introducing Veritas Dynamic Multi-Pathing

This chapter includes the following topics:

- [About Veritas Dynamic Multi-Pathing \(DMP\)](#)

## About Veritas Dynamic Multi-Pathing (DMP)

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.

DMP is also available as a stand-alone product, which extends DMP metadevices to support the OS native logical volume manager (LVM). You can create LVM volumes and volume groups on DMP metadevices.

Veritas Dynamic Multi-Pathing can be licensed separately from Storage Foundation products. Veritas Volume Manager and Veritas File System functionality is not provided with a DMP license.

DMP functionality is available with a Storage Foundation (SF) Enterprise license, a SF HA Enterprise license, and a Storage Foundation Standard license.

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.

# System requirements

This chapter includes the following topics:

- [Release notes](#)
- [Hardware compatibility list \(HCL\)](#)
- [Supported operating systems](#)
- [Disk space requirements](#)
- [Discovering product versions and various requirement information](#)

## 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:

<https://sort.symantec.com/documents>

## 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://www.symantec.com/docs/TECH170013>

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

## Supported operating systems

For information on supported operating systems, see the *Veritas Dynamic Multi-Pathing Release Notes*.

## Disk space requirements

Before installing your products, confirm that your system has enough free disk space.

Use the **Perform a Pre-installation Check (P)** menu for the Web-based installer to determine whether there is sufficient space.

Or, go to the installation directory and run the installer with the `-precheck` option.

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

See [“About the Veritas installer”](#) on page 17.

## Discovering product versions and various requirement information

Symantec provides several methods to check the Veritas product you have installed, plus various requirement information.

You can check the existing product versions using the `installer` command with the `-version` option before or after you install. After you have installed the current version of the product, you can use the `showversion` script in the `/opt/VRTS/install` directory to find version information.

The information that the `version` option or the `showversion` script discovers on systems includes the following:

- The installed version of all released Storage Foundation and High Availability Suite of products
- The required RPMs or patches (if applicable) that are missing
- The available updates (including patches or hotfixes) from Symantec Operations Readiness Tools (SORT) for the installed products

**To run the version checker**

- 1 Mount the media.
- 2 Start the installer with the `-version` option.

```
# ./installer -version system1 system2
```

# Planning to install DMP

This chapter includes the following topics:

- [About planning for DMP installation](#)
- [About installation and configuration methods for DMP](#)
- [About the Veritas installer](#)

## 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 Symantec Operations Readiness Tools (SORT) website.

<https://sort.symantec.com/documents>

Document version: 6.0.4 Rev 0.

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 Veritas Dynamic Multi-Pathing.

See the chapter, "Preparing to install Veritas Dynamic Multi-Pathing" for more information.

## About installation and configuration methods for DMP

You can install and configure DMP using Veritas installation programs or using 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. Installing with the installation script is also the same as 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.  
 See [“About the Web-based installer”](#) on page 33.
- 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 systems.  
 See [“About response files”](#) on page 66.

## About the Veritas installer

To install your Veritas product, use one of the following methods:

- The general product installer. The general product installer enables you to install and configure the product, verify preinstallation requirements, and view the product’s description. You perform the installation from a disc, and you are prompted to choose a product to install.  
 See [“Installing DMP”](#) on page 30.
- Product-specific installation scripts. 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 individual products. You can find these scripts at the root of the product media in the scripts directory. These scripts are also installed with the product.

[Table 3-1](#) lists all the SFHA Solutions product installation scripts. The list of product installation scripts that you find on your system depends on the product that you install on your system.

---

**Note:** The name of the script is different depending on whether you run the script from the install media or from a system on which the product software is installed.

---

**Table 3-1** Product installation scripts

Veritas product name	Product installation script (When running the script from the install media)	Product installation script (When running the script from a system on which the SFHA Solutions product is installed)
Veritas Cluster Server (VCS)	<code>installvcs</code>	<code>installvcs&lt;version&gt;</code>
Veritas Storage Foundation (SF)	<code>installsf</code>	<code>installsf&lt;version&gt;</code>
Veritas Storage Foundation and High Availability (SFHA)	<code>installsfha</code>	<code>installsfha&lt;version&gt;</code>
Veritas Storage Foundation Cluster File System High Availability (SFCFSHA)	<code>installsfcfsha</code>	<code>installsfcfsha&lt;version&gt;</code>
Veritas Storage Foundation for Oracle RAC (SF Oracle RAC)	<code>installsfrac</code>	<code>installsfrac&lt;version&gt;</code>
Veritas Dynamic Multi-Pathing	<code>installdmp</code>	<code>installdmp&lt;version&gt;</code>
Symantec VirtualStore	<code>installsvs</code>	<code>installsvs&lt;version&gt;</code>

The scripts that are installed on the system include the product version in the script name. For example, to install the DMP script from the install media, run the `installdmp` command. However, to run the script from the installed binaries, run the `installdmp<version>` command.

For example, for the 6.0.4 version:

```
# /opt/VRTS/install/installdmp604 -configure
```

---

**Note:** Do not include the release version if you use the general product installer 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.

See [“Command options for uninstall script”](#) on page 63.

# Licensing DMP

This chapter includes the following topics:

- [About Veritas product licensing](#)
- [Setting or changing the product level for keyless licensing](#)
- [Installing Veritas product license keys](#)

## 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/](http://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. If you do not comply with the above terms, continuing to use the Symantec 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 installer asks whether you want to upgrade the key to the new version. 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 21.  
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 23.  
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.

For more information to use keyless licensing 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 Change your current working directory:

```
# cd /opt/VRTSvlic/bin
```

- 2 View the current setting for the product level.

```
# ./vxkeyless -v display
```

- 3 View the possible settings for the product level.

```
# ./vxkeyless displayall
```

- 4 Set the desired product level.

```
# ./vxkeyless set prod_levels
```

where *prod\_levels* is a comma-separated list of keywords. The keywords are the product levels as shown by the output of step 3.

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:

<code>vxlicinst</code>	Installs a license key for a Symantec product
<code>vxlicrep</code>	Displays currently installed licenses
<code>vxlictest</code>	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 license key
```

To see a list of your vxkeyless keys, enter the following command:

```
# ./vxkeyless display
```

After you upgrade from a previous release, the output you see when you run the `vxkeyless display` command includes the previous release's vxkeyless keys. Each vxkeyless key name includes the suffix `_<previous_release_version>`. For example, `DMP_6.0`, or `SFENT_VR_5.1SP1`, or `VCS_GCO_5.1`. During the upgrade process, the CPI installer prompts you to update the vxkeyless keys to the current release level. If you update the vxkeyless keys during the upgrade process, you no longer see the `_<previous_release_number>` suffix after the keys are updated.

# Installation of DMP

- [Chapter 5. Preparing to install DMP](#)
- [Chapter 6. Installing DMP using the script-based installer](#)
- [Chapter 7. Installing DMP using the web-based installer](#)



# Preparing to install DMP

This chapter includes the following topics:

- [Installation preparation overview](#)
- [Setting environment variables](#)
- [About using ssh or rsh with the Veritas installer](#)
- [Mounting the product disc](#)
- [Assessing the system for installation readiness](#)

## 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 <a href="#">“About Veritas product licensing”</a> on page 20.
Download the software, or insert the product DVD.	See <a href="#">“Mounting the product disc”</a> on page 27.
Set environment variables.	See <a href="#">“Setting environment variables”</a> on page 26.
Configure the secure shell (ssh) or remote shell (rsh) on all nodes.	See <a href="#">“About using ssh or rsh with the Veritas installer”</a> on page 27. See <a href="#">“About configuring secure shell or remote shell communication modes before installing products”</a> on page 81.

**Table 5-1** Installation overview (*continued*)

Installation task	Section
Verify that hardware, software, and operating system requirements are met.	See <a href="#">“Release notes”</a> on page 13.
Check that sufficient disk space is available.	See <a href="#">“Disk space requirements”</a> on page 14.
Use the installer to install the products.	See <a href="#">“About the Veritas installer”</a> on page 17.

## 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.

## About using ssh or rsh with the Veritas installer

The installer uses 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 you perform installer sessions using a response file.

See [“About configuring secure shell or remote shell communication modes before installing products”](#) on page 81.

## 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 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:

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

4 Navigate to the location of the RPMs.

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

Where *dist* is *sles11*, and *arch* is *x86\_64* SLES.

## Assessing the system for installation readiness

Symantec provides the following tools for assessing your system, to ensure that the system meets the requirements for installing Veritas Dynamic Multi-Pathing 6.0.4.

Symantec Operations Readiness Tools

Symantec Operations Readiness Tools (SORT) is a Web-based application that is designed to support Symantec enterprise products.

See [“About Symantec Operations Readiness Tools”](#) on page 28.

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 6.0.4.

See [“Prechecking your systems using the Veritas installer”](#) on page 29.

## About Symantec Operations Readiness Tools

[Symantec Operations Readiness Tools \(SORT\)](#) is a Web site that automates and simplifies some of the most time-consuming administrative tasks. SORT helps you manage your datacenter more efficiently and get the most out of your Symantec products.

Among its broad set of features, SORT lets you do the following:

- Generate server-specific reports that describe how to prepare your servers for installation or upgrade of Symantec enterprise products.
- Access a single site with the latest production information, including patches, agents, and documentation.
- Create automatic email notifications for changes in patches, documentation, and array-specific modules.

To access SORT, go to:

<https://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.

See “[Installing DMP with the Web-based installer](#)” on page 36.

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.

# Installing DMP using the script-based installer

This chapter includes the following topics:

- [Installing DMP](#)
- [Performing a postcheck on a node](#)

## Installing DMP

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.

- 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 `Y` to install and press the Return key.

- 6 When the list of available products is displayed, to 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. Note that the information sent to Symantec is only to help improve the installer software.

```
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-****
```

Installer also generate a summary file of the whole procedure, you can view your summary file by answering **y**:

```
Would you like to view the summary file? [y,n,q] (n)
```

- 15 Reboot the systems if the installer prompts for a reboot, to enable DMP native support.

## Performing a postcheck on a node

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

### 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.



# Installing DMP using the web-based installer

This chapter includes the following topics:

- [About the Web-based installer](#)
- [Before using the Veritas Web-based installer](#)
- [Starting the Veritas Web-based installer](#)
- [Obtaining a security exception on Mozilla Firefox](#)
- [Performing a pre-installation check with the Veritas Web-based installer](#)
- [Installing DMP with the Web-based installer](#)

## About the Web-based installer

Use the Web-based installer 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 a Web browser such as 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 these files for auditing, debugging, and 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 34.

## 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 6.0.4.
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.
Administrative system	The system where you run the Web browser to perform the installation.	Must have a Web browser. Supported browsers: <ul style="list-style-type: none"><li>■ Internet Explorer 6, 7, and 8</li><li>■ Firefox 3.x and later</li></ul>

## 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 `xprt1wid`, on the installation server:

```
# ./webinstaller start
```

The webinstaller script displays a URL. Note this URL.

---

**Note:** If you do not see the URL, please check your firewall and iptables settings. If you have configured a firewall, ensure that the firewall settings allow access to the port 14172. You can alternatively use the `-port` option to use a free port instead.

---

- 2 On the administrative server, start the Web browser.
- 3 Navigate to the URL that the script displayed.
- 4 Certain browsers may display the following message:

```
Secure Connection Failed
```

Obtain a security exception for your browser.

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

- 5 Log in as superuser.

## Obtaining a security exception on Mozilla Firefox

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

The following instructions are general. They may change because of the rapid release cycle of Mozilla browsers.

### To obtain a security exception

- 1 Click **Or you can add an exception** link.
- 2 Click **I Understand the Risks**, or **You can add an exception**.
- 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.
- 2 On the Select a task and a product page, select **Perform a Pre-installation Check** from the **Task** drop-down list. Select **Veritas Storage Foundation and High Availability** from the **Product** drop-down list and click **Next**.
- 3 Select the Veritas Dynamic Multi-Pathing 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 **Next**.
- 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 36.
- 2 Start the Web-based installer.
- 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 **Next**.

- 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, the processes are started.  
For information about migrating your data volumes to DMP devices, refer to the *Veritas Dynamic Multi-Pathing Administrator's Guide*.
  - 12 If prompted, 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**. The installer asks if you would like to read the summary file. Select **Yes** to read the summary file. If you select **No**, the installer prompts you for another task.

# Post-installation tasks

- [Chapter 8. Verifying the DMP installation](#)

# Verifying the DMP installation

This chapter includes the following topics:

- [Verifying that the products were installed](#)
- [Installation log files](#)
- [Starting and stopping processes for the Veritas products](#)

## 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
```

You can verify the version of the installed product. Use the following command:

```
# /opt/VRTS/install/installdmp<version>
```

Where *<version>* is the specific release version.

See [“About the Veritas installer”](#) on page 17.

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 <code>responsefile</code> 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
```

or

```
# /opt/VRTS/install/installdmp<version> -stop
```

Where `<version>` is the specific release version.



### 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
```

or

```
# /opt/VRTS/install/installdmp<version> -start
```

Where `<version>` is the specific release version.

# Upgrade of DMP

- [Chapter 9. Planning to upgrade DMP](#)
- [Chapter 10. Upgrading DMP](#)
- [Chapter 11. Performing post-upgrade tasks](#)

# Planning to upgrade DMP

This chapter includes the following topics:

- [Upgrade methods for DMP](#)
- [Supported upgrade paths for DMP](#)
- [Preparing to upgrade DMP](#)

## Upgrade methods for DMP

Symantec offers you several different ways to upgrade. You need to decide which upgrade method best suits your environment, your expertise, and the downtime required.

**Table 9-1** Review this table to determine how you want to perform the upgrade

Upgrade types and considerations	Methods available for upgrade
Typical upgrades—use a Veritas provided tool or you can perform the upgrade manually. Requires some server downtime.	Script-based—you can use this to upgrade for the supported upgrade paths Web-based—you can use this to upgrade for the supported upgrade paths Manual—you can use this to upgrade from the previous release Response file—you can use this to upgrade from the supported upgrade paths
Native operating system upgrade—use the upgrade software that comes with the operating system. Note that not all operating systems support native upgrades.	Operating system specific methods Operating system upgrades

## Supported upgrade paths for DMP

The following tables describe upgrading to 6.0.4.

**Table 9-2** SLES 11 x64 upgrades using the script- or Web-based installer

Veritas software versions	SLES 10	SLES 11
5.1 SP1 5.1 SP1 RPx	N/A	Upgrade to SLES11 SP1 or SP2. Use the installer to upgrade to 6.0.4.
6.0 6.0 RP1 6.0.1 6.0.2 6.0.3	N/A	No upgrade path exists. Uninstall product. Upgrade to SLES11 SP1 or SP2. Upgrade directly to 6.0.4 using the installer script.

## Preparing to upgrade DMP

Before you upgrade, you need to prepare the systems and storage. Review the following procedures and perform the appropriate tasks.

### Getting ready for the upgrade

Complete the following tasks before you perform the upgrade:

- Review the Symantec Technical Support website for additional information:  
<http://www.symantec.com/techsupp/>
- Make sure that the administrator who performs the upgrade has root access and a good knowledge of the operating system's administration.
- Make sure that all users are logged off and that all major user applications are properly shut down.
- Make sure that you have created a valid backup.  
 See "Creating backups" on page 45.
- Ensure that you have enough file system space to upgrade. Identify where you want to copy the RPMs, for example `/packages/Veritas` when the root file system has enough space or `/var/tmp/packages` if the `/var` file system has enough space.

Do not put the files under `/tmp`, which is erased during a system reboot. Do not put the files on a file system that is inaccessible prior to running the upgrade script.

You can use a Veritas-supplied disc for the upgrade as long as modifications to the upgrade script are not required. If `/usr/local` was originally created as a slice, modifications are required.

- For any startup scripts in `/sbin/rcS.d`, comment out any application commands or processes that are known to hang if their file systems are not present.
- Make sure that the current operating system supports version 6.0.4 of the product. If the operating system does not support it, plan for a staged upgrade.
- Schedule sufficient outage time and downtime for the upgrade and any applications that use the Veritas products. Depending on the configuration, the outage can take several hours.
- Any swap partitions not in `rootdg` must be commented out of `/etc/fstab`. If possible, swap partitions other than those on the root disk should be commented out of `/etc/fstab` and not mounted during the upgrade. Active swap partitions that are not in `rootdg` cause `upgrade_start` to fail.
- Make sure the file systems are clean before upgrading.
- Upgrade arrays (if required).  
See [“Upgrading the array support”](#) on page 46.
- To reliably save information on a mirrored disk, shut down the system and physically remove the mirrored disk. Removing the disk in this manner offers a failback point.

## Creating backups

Save relevant system information before the upgrade.

### To create backups

- 1 Log in as superuser.
- 2 Before the upgrade, ensure that you have made backups of all data that you want to preserve.
- 3 Back up information in files such as `/boot/grub/menu.lst`, `/etc/grub.conf` or `/etc/lilo.conf`, and `/etc/fstab`.

- 4 Installer verifies that recent backups of configuration files in VxVM private region have been saved in `/etc/vx/cbr/bk`.  
If not, a warning message is displayed.

---

**Warning:** Backup `/etc/vx/cbr/bk` directory.

---

- 5 Run the `vxlicrep`, `vxdisk list`, and `vxprint -ht` commands and record the output. Use this information to reconfigure your system after the upgrade.

## Upgrading the array support

The Storage Foundation 6.0.4 release includes all array support in a single RPM, `VRTSaslapm`. The array support RPM includes the array support previously included in the `VRTSvxvm` RPM. The array support RPM also includes support previously packaged as external array support libraries (ASLs) and array policy modules (APMs).

See the 6.0.4 Hardware Compatibility List for information about supported arrays.

See [“Hardware compatibility list \(HCL\)”](#) on page 13.

When you upgrade Storage Foundation products with the product installer, the installer automatically upgrades the array support. If you upgrade Storage Foundation products with manual steps, you should remove any external ASLs or APMs that were installed previously on your system. Installing the `VRTSvxvm` RPM exits with an error if external ASLs or APMs are detected.

See [“Removing external ASL or APM RPMs before upgrading Storage Foundation with manual steps”](#) on page 46.

After you have installed Storage Foundation 6.0.4, Symantec provides support for new disk arrays through updates to the `VRTSaslapm` RPM.

For more information about array support, see the *Veritas Storage Foundation Administrator's Guide*.

### Removing external ASL or APM RPMs before upgrading Storage Foundation with manual steps

If you are upgrading with manual steps, remove all external ASLs or APMs before upgrading Storage Foundation. This procedure is not required if you upgrade with the product installer.

**To remove external ASL or APM RPMs for a manual installation**

- 1 Before you remove any RPMs, make sure you are not running anything in VxVM volumes, make sure that no volumes are mounted etc.

These steps ensure that VxVM does not access the data in any disks that were claimed by these ASLs or APMs after the RPMs are removed. Attempting to access the data could lead to data corruption if the disks are not claimed correctly.

- 2 Remove any external ASLs.

```
# rpm -e VRTSIBM-DS4xxx-2.0-1.0
```

- 3 Determine which external APM RPMs are installed:

```
# rpm -qf /etc/vx/apmkey.d | grep -v "^VRTSvxvm-platform"
```

This command lists the RPMs which installed any APM keys.

Any RPM other than `VRTSvxvm` is an external APM RPM.

- 4 Remove these APMs before upgrading Storage Foundation:

```
# rpm -e VRTSIBM-DS4xxx-2.0-1.0
```

# Upgrading DMP

This chapter includes the following topics:

- [Upgrading Veritas Dynamic Multi-Pathing using the script-based installer](#)
- [Upgrading Veritas Dynamic Multi-Pathing using the Veritas Web-based installer](#)

## Upgrading Veritas Dynamic Multi-Pathing using the script-based installer

Perform the following procedure to upgrade Veritas Dynamic Multi-Pathing. The operating system must be at a supported level for this upgrade.

### To upgrade DMP

- 1 Prepare for the installation.  
See “[Preparing to upgrade DMP](#)” on page 44.
- 2 Install DMP 6.0.4 using the installer script.  

```
# ./installer
```
- 3 Enter **G** to upgrade and press the **Return** key.
- 4 Enter the names of the systems that you want to upgrade and press the **Return** key.

Various messages and prompts appear. Answer the prompts appropriately.



- 5 Review the End User License Agreement, and enter **y** if you agree with it. Press the **Return** key.

```
Do you agree with the terms of the End User License Agreement
as specified in the dynamic_multipathing/EULA/lang/
EULA_DMP_Ux_version.pdf file present on media?
[y,n,q,?] y
```

- 6 The installer lists the packages that it will install or update. Confirm that you are ready to stop DMP processes.

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

If you select **y**, the installer stops the product processes and makes some configuration updates.

- 7 The installer uninstalls and reinstalls the listed packages and starts the DMP processes.

## Upgrading Veritas Dynamic Multi-Pathing using the Veritas Web-based installer

This section describes upgrading DMP with the Veritas Web-based installer. The installer detects and upgrades the product that is currently installed on the specified system or systems.

### To upgrade DMP

- 1 Perform the required steps to save any data that you wish to preserve. For example, make configuration file backups.
- 2 Start the Web-based installer.
- 3 On the Select a task and a product page, select **Upgrade a Product** from the Task drop-down menu.  
  
The installer detects the product that is installed on the specified system. Click **Next**.
- 4 Indicate the systems on which to upgrade. Enter one or more system names, separated by spaces. Click **Next**.

- 5 Click **Next** to complete the upgrade.

After the upgrade completes, the installer displays the location of the log and summary files. If required, view the files to confirm the installation status.

- 6 If you are prompted to reboot the systems, enter the following reboot command:

```
# /usr/sbin/shutdown -r now
```

# Performing post-upgrade tasks

This chapter includes the following topics:

- [Updating variables](#)
- [Verifying the Veritas Dynamic Multi-Pathing upgrade](#)

## Updating variables

In `/etc/profile`, update the `PATH` and `MANPATH` variables as needed.

`MANPATH` could include `/opt/VRTS/man` and `PATH /opt/VRTS/bin`.

## Verifying the Veritas Dynamic Multi-Pathing upgrade

Refer to the section about verifying the installation to verify the upgrade.

See [“Verifying that the products were installed”](#) on page 39.

# Uninstallation of DMP

- [Chapter 12. Uninstalling DMP](#)

# Uninstalling DMP

This chapter includes the following topics:

- [Uninstalling DMP](#)
- [Uninstalling DMP with the Veritas Web-based installer](#)
- [Removing license files \(Optional\)](#)

## Uninstalling DMP

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.
- 2 On the system where you plan to remove DMP, move to the `/opt/VRTS/install` directory.
- 3 Run the `uninstalldmp` command.

```
# ./uninstalldmp<version>
```

Where `<version>` is the specific release version.

- 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.
- 7 Reboot all the nodes.

## Uninstalling DMP with the Veritas Web-based installer

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

---

**Note:** After you uninstall the product, you cannot access any file systems you created using the default disk layout Version in DMP 6.0.4 with a previous version of DMP.

---

### 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.
- 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 **Next**.
- 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**.

Most RPMs have kernel components. In order to ensure their complete removal, a system reboot is recommended after all the RPMs have been removed.

## 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.

## Installation reference

- [Appendix A. Installation scripts](#)
- [Appendix B. Automated installation using response files](#)
- [Appendix C. Tunable files for installation](#)
- [Appendix D. Configuring the secure shell or the remote shell for communications](#)
- [Appendix E. DMP components](#)
- [Appendix F. Troubleshooting installation issues](#)
- [Appendix G. Compatibility issues when installing DMP with other products](#)



# Installation scripts

This appendix includes the following topics:

- [Command options for the installation script](#)
- [Command options for uninstall script](#)

## Command options for the installation script

The `installdmp` command usage takes the following form:

```
installdmp [ system1 system2... ]  
[ -configure | -license | -precheck | -requirements  
  | -start | -stop | -upgrade | -postcheck ]  
[ -logpath log_path ]  
[ -responsefile response_file ]  
[ -tmppath tmp_path ]  
[ -tunablesfile tunables_file ]  
[ -timeout timeout_value ]  
[ -hostfile hostfile_path ]  
  
[ -keyfile ssh_key_file ]  
  
[ -pkgpath pkg_path ]  
  
[ -rsh | -redirect | -installminpkgs | -installrecpkgs  
  | -installallpkgs | -minpkgs | -recpkgs | -allpkgs  
  | -pkgset | -pkginfo | -serial | -comcleanup | -makeresponsefile  
  | -pkgtable | -version | -nolic | -settunables | -tunables ]
```

[Table A-1](#) lists the `installdmp` command options.

**Table A-1**      `installdmp` options

Option and Syntax	Description
<code>-allpkgs</code>	<p>View a list of all DMP RPMs and patches. The <code>installdmp</code> lists the RPMs and patches in the correct installation order.</p> <p>You can use the output to create scripts for command-line installation, or for installations over a network.</p> <p>See the <code>-minpkgs</code> and the <code>-recpkgs</code> options.</p>
<code>-comcleanup</code>	<p>The <code>-comcleanup</code> option removes the <code>ssh</code> or <code>rsh</code> configuration added by installer on the systems. The option is only required when installation routines that performed auto-configuration of <code>ssh</code> or <code>rsh</code> are abruptly terminated.</p>
<code>-configure</code>	<p>Configure DMP after using <code>-install</code> option to install DMP.</p>
<code>-hostfile</code> <i>full_path_to_file</i>	<p>Specifies the location of a file that contains the system names for the installer.</p>
<code>-installallpkgs</code>	<p>Selects all the RPMs for installation.</p> <p>See the <code>-allpkgs</code> option.</p>
<code>-installminpkgs</code>	<p>Selects the minimum RPMs for installation.</p> <p>See the <code>-minpkgs</code> option.</p>
<code>-installrecpkgs</code>	<p>Selects the recommended RPMs for installation.</p> <p>See the <code>-recpkgs</code> option.</p>
<code>-keyfile</code> <i>ssh_key_file</i>	<p>Specifies a key file for SSH. The option passes <code>-i ssh_key_file</code> with each SSH invocation.</p>
<code>-license</code>	<p>Register or update product licenses on the specified systems. This option is useful to replace a demo license.</p>

**Table A-1**      `installdmp` options (*continued*)

Option and Syntax	Description
<code>-logpath log_path</code>	Specifies that <code>log_path</code> , not <code>/opt/VRTS/install/logs</code> , is the location where install log files, summary files, and response files are saved.
<code>-makeresponsefile</code>	Create a response file. This option only generates a response file and does not install DMP.
<code>-minpkgs</code>	View a list of the minimal RPMs and the patches that are required for DMP. The <code>installdmp</code> 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 <code>-allpkgs</code> and the <code>-recpkgs</code> options.
<code>-nolic</code>	Allows installation of product packages without entering a license key. Licensed features cannot be configured, started, or used when this option is specified.
<code>-pkginfo</code>	Displays a list of packages in the order of installation in a user-friendly format.  Use this option with one of the following options: <ul style="list-style-type: none"> <li>■ <code>-allpkgs</code> If you do not specify an option, <code>-allpkgs</code> is used by default.</li> <li>■ <code>-minpkgs</code></li> <li>■ <code>-recpkgs</code></li> </ul>
<code>-pkgpath pkg_path</code>	Specifies that <code>pkg_path</code> contains all RPMs that the <code>installdmp</code> is about to install on all systems. The <code>pkg_path</code> is the complete path of a directory, usually NFS mounted.

**Table A-1**      `installdmp` options (*continued*)

Option and Syntax	Description
<code>-pkgset</code>	Discovers and lists the 6.0.4 RPMs installed on the systems that you specify.
<code>-pkgtable</code>	Displays the DMP 6.0.4 RPMs in the correct installation order.
<code>-postcheck</code>	Checks that the processes are running and other post-installation checks.
<code>-precheck</code>	Verify that systems meet the installation requirements before proceeding with DMP installation.  Symantec recommends doing a precheck before you install DMP.
<code>-recpkgs</code>	View a list of the recommended RPMs and the patches that are required for DMP. The <code>installdmp</code> 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 <code>-allpkgs</code> and the <code>-minpkgs</code> options.
<code>-redirect</code>	Specifies that the installer need not display the progress bar details during the installation.
<code>-requirements</code>	View a list of required operating system version, required patches, file system space, and other system requirements to install DMP.

**Table A-1**      `installdmp` options (*continued*)

Option and Syntax	Description
<code>-responsefile response_file</code>	<p>Perform automated DMP installation using the system and the configuration information that is stored in a specified file instead of prompting for information.</p> <p>The <i>response_file</i> 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.</p> <p>See <a href="#">“Installing DMP using response files”</a> on page 67.</p> <p>See <a href="#">“Upgrading DMP using response files”</a> on page 67.</p>
<code>-rsh</code>	<p>Specifies that <i>rsh</i> and <i>rscp</i> are to be used for communication between systems instead of <i>ssh</i> and <i>scp</i>. This option requires that systems be preconfigured such that <i>rsh</i> commands between systems execute without prompting for passwords or confirmations</p>
<code>-serial</code>	<p>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.</p>
<code>-settunables</code>	<p>Specify this option when you want to set tunable parameters after you install and configure a product. You may need to restart processes of the product for the tunable parameter values to take effect. You must use this option together with the <code>-tunablesfile</code> option.</p>

**Table A-1**      `installdmp` options (*continued*)

Option and Syntax	Description
<code>-start</code>	<p>Starts the daemons and processes for DMP.</p> <p>If the <code>installdmp</code> failed to start up all the DMP processes, you can use the <code>-stop</code> option to stop all the processes and then use the <code>-start</code> option to start the processes.</p> <p>See the <code>-stop</code> option.</p> <p>See <a href="#">“Starting and stopping processes for the Veritas products”</a> on page 40.</p>
<code>-stop</code>	<p>Stops the daemons and processes for DMP.</p> <p>If the <code>installdmp</code> failed to start up all the DMP processes, you can use the <code>-stop</code> option to stop all the processes and then use the <code>-start</code> option to start the processes.</p> <p>See the <code>-start</code> option.</p> <p>See <a href="#">“Starting and stopping processes for the Veritas products”</a> on page 40.</p>
<code>-timeout</code>	<p>The <code>-timeout</code> option is used to specify the number of seconds that the script must wait for each command to complete before timing out. Setting the <code>-timeout</code> option overrides the default value of 1200 seconds. Setting the <code>-timeout</code> option to 0 prevents the script from timing out. The <code>-timeout</code> option does not work with the <code>-serial</code> option.</p>
<code>-tmppath <i>tmp_path</i></code>	<p>Specifies that <code>tmp_path</code> is the working directory for <code>installdmp</code>. This path is different from the <code>/var/tmp</code> path. This destination is where the <code>installdmp</code> performs the initial logging and where the <code>installdmp</code> copies the RPMs on remote systems before installation.</p>

**Table A-1** installdmp options (*continued*)

Option and Syntax	Description
<code>-tunables</code>	Lists all supported tunables and create a tunables file template.
<code>-tunablesfile</code>	Specify this option when you specify a tunables file. The tunables file should include tunable parameters.
<code>-upgrade</code>	Upgrades the installed RPMs on the systems that you specify.
<code>-version</code>	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. Lists the installed patches, hotfixes, and available updates for the installed product if an Internet connection is available.

## Command options for uninstall script

The `uninstalldmp` command usage takes the following form:

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

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

[Table A-2](#) lists the `uninstalldmp` command options.

**Table A-2**          uninstalldmp options

Option and Syntax	Description
<code>-comcleanup</code>	The <code>-comcleanup</code> 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.
<code>-hostfile</code> <i>full_path_to_file</i>	Specifies the location of a file that contains the system names for the installer.
<code>-keyfile</code> <i>ssh_key_file</i>	Specifies a key file for SSH. The option passes <code>-i ssh_key_file</code> with each SSH invocation.
<code>-logpath</code> <i>log_path</i>	Specifies that <i>log_path</i> , not <code>/opt/VRTS/install/logs</code> , is the location where uninstalldmp log files, summary file, and response file are saved.
<code>-makeresponsefile</code>	Use this option to create a response file or to verify that your system configuration is ready for uninstalling DMP.
<code>-redirect</code>	Displays progress details without showing progress bar.
<code>-responsefile</code> <i>response_file</i>	<p>Perform automated DMP uninstallation using the system and the configuration information that is stored in a specified file instead of prompting for information.</p> <p>The <i>response_file</i> 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.</p> <p>See <a href="#">“Uninstalling DMP using response files”</a> on page 68.</p>
<code>-rsh</code>	Specifies that <i>rsh</i> and <i>rsh</i> are to be used for communication between systems instead of <i>ssh</i> and <i>scp</i> . This option requires that systems be preconfigured such that <i>rsh</i> commands between systems execute without prompting for passwords or confirmations
<code>-serial</code>	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.
<code>-tmppath</code> <i>tmp_path</i>	Specifies that <i>tmp_path</i> is the working directory for uninstalldmp. This path is different from the <code>/var/tmp</code> path. This destination is where the uninstalldmp performs the initial logging and where the installtmp copies the RPMs on remote systems before installation.



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

Option and Syntax	Description
<code>-timeout</code>	The <code>-timeout</code> option is used to specify the number of seconds that the script should wait for each command to complete before timing out. Setting the <code>-timeout</code> option overrides the default value of 1200 seconds. Setting the <code>-timeout</code> option to 0 will prevent the script from timing out. The <code>-timeout</code> option does not work with the <code>-serial</code> option.
<code>-version</code>	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.

# Automated installation using response files

This appendix includes the following topics:

- [About response files](#)
- [Installing DMP using response files](#)
- [Upgrading DMP using response files](#)
- [Uninstalling DMP using response files](#)
- [Syntax in the response file](#)
- [Response file variable definitions](#)

## About response files

The installer or product installation script generates a response file during any installation, configuration, upgrade (except rolling 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 a system to install DMP on other systems. 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 the system 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.

See [“About the Veritas installer”](#) on page 17.

## Upgrading DMP using response files

Typically, you can use the response file that the installer generates after you perform DMP upgrade on one system to upgrade DMP on other systems. You can also create a response file using the `makeresponsefile` option of the installer.

### To perform automated DMP upgrade

- 1 Make sure the systems where you want to upgrade DMP meet the upgrade requirements.
- 2 Make sure the pre-upgrade tasks are completed.
- 3 Copy the response file to one of the systems where you want to upgrade DMP.
- 4 Edit the values of the response file variables as necessary.

- 5 Mount the product disc and navigate to the folder that contains the installation program.
- 6 Start the upgrade 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 system to uninstall DMP on other systems.

### 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<version>  
-responsefile /tmp/response_file
```

Where `<version>` is the specific release version, and `/tmp/response_file` is the response file's full path name.

See [“About the Veritas installer”](#) on page 17.

## 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 <code>-configure</code> 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 or 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
CFG{prod}	Defines the product to be installed, uninstalled, or configured.  List or scalar: scalar  Optional or required: required  The value is DMP60 for DMP

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

Variable	Description
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 <i>rsh</i> must be used instead of <i>ssh</i> as the communication method between systems. List or scalar: scalar Optional or required: optional
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 <code>-install</code> 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

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

Variable	Description
CFG{opt}{uninstall}	Uninstalls DMP RPMs. List or scalar: scalar Optional or required: optional

# Tunable files for installation

This appendix includes the following topics:

- [About setting tunable parameters using the installer or a response file](#)
- [Setting tunables for an installation, configuration, or upgrade](#)
- [Setting tunables with no other installer-related operations](#)
- [Setting tunables with an un-integrated response file](#)
- [Preparing the tunables file](#)
- [Setting parameters for the tunables file](#)
- [Tunables value parameter definitions](#)

## About setting tunable parameters using the installer or a response file

You can set non-default product and system tunable parameters using a tunables file. With the file, you can set tunables such as the I/O policy or toggle native multi-pathing. The tunables file passes arguments to the installer script to set tunables. With the file, you can set the tunables for the following operations:

- When you install, configure, or upgrade systems.

```
# ./installer -tunablesfile tunables_file_name
```

See [“Setting tunables for an installation, configuration, or upgrade”](#) on page 73.

- When you apply the tunables file with no other installer-related operations.

```
# ./installer -tunablesfile tunables_file_name -setttunables [  
system1 system2 ...]
```



See [“Setting tunables with no other installer-related operations”](#) on page 74.

- When you apply the tunables file with an un-integrated response file.

```
# ./installer -responsefile response_file_name -tunablesfile  
tunables_file_name
```

See [“Setting tunables with an un-integrated response file”](#) on page 75.

See [“About response files”](#) on page 66.

You must select the tunables that you want to use from this guide.

See [“Tunables value parameter definitions”](#) on page 77.

## Setting tunables for an installation, configuration, or upgrade

You can use a tunables file for installation procedures to set non-default tunables. You invoke the installation script with the `tunablesfile` option. The tunables file passes arguments to the script to set the selected tunables. You must select the tunables that you want to use from this guide.

See [“Tunables value parameter definitions”](#) on page 77.

---

**Note:** Certain tunables only take effect after a system reboot.

---

### To set the non-default tunables for an installation, configuration, or upgrade

- 1 Prepare the tunables file.  
See [“Preparing the tunables file”](#) on page 76.
- 2 Make sure the systems where you want to install DMP meet the installation requirements.
- 3 Complete any preinstallation tasks.
- 4 Copy the tunables file to one of the systems where you want to install, configure, or upgrade the product.
- 5 Mount the product disc and navigate to the directory that contains the installation program.
- 6 Start the installer for the installation, configuration, or upgrade. For example:

```
# ./installer -tunablesfile /tmp/tunables_file
```

Where `/tmp/tunables_file` is the full path name for the tunables file.

- 7 Proceed with the operation. When prompted, accept the tunable parameters.  
Certain tunables are only activated after a reboot. Review the output carefully to determine if the system requires a reboot to set the tunable value.
- 8 The installer validates the tunables. If an error occurs, exit the installer and check the tunables file.

## Setting tunables with no other installer-related operations

You can use the installer to set tunable parameters without any other installer-related operations. You must use the parameters described in this guide. Note that many of the parameters are product-specific. You must select the tunables that you want to use from this guide.

See [“Tunables value parameter definitions”](#) on page 77.

---

**Note:** Certain tunables only take effect after a system reboot.

---

### To set tunables with no other installer-related operations

- 1 Prepare the tunables file.  
See [“Preparing the tunables file”](#) on page 76.
- 2 Make sure the systems where you want to install DMP meet the installation requirements.
- 3 Complete any preinstallation tasks.
- 4 Copy the tunables file to one of the systems that you want to tune.
- 5 Mount the product disc and navigate to the directory that contains the installation program.
- 6 Start the installer with the `-setttunables` option.

```
# ./installer -tunablesfile tunables_file_name -setttunables [ sys123 sys234 ...]
```

Where `/tmp/tunables_file` is the full path name for the tunables file.

- 7 Proceed with the operation. When prompted, accept the tunable parameters.  
Certain tunables are only activated after a reboot. Review the output carefully to determine if the system requires a reboot to set the tunable value.
- 8 The installer validates the tunables. If an error occurs, exit the installer and check the tunables file.

## Setting tunables with an un-integrated response file

You can use the installer to set tunable parameters with an un-integrated response file. You must use the parameters described in this guide. Note that many of the parameters are product-specific. You must select the tunables that you want to use from this guide.

See [“Tunables value parameter definitions”](#) on page 77.

---

**Note:** Certain tunables only take effect after a system reboot.

---

### To set tunables with an un-integrated response file

- 1 Make sure the systems where you want to install DMP meet the installation requirements.
- 2 Complete any preinstallation tasks.
- 3 Prepare the tunables file.  
See [“Preparing the tunables file”](#) on page 76.
- 4 Copy the tunables file to one of the systems that you want to tune.
- 5 Mount the product disc and navigate to the directory that contains the installation program.
- 6 Start the installer with the `-responsefile` and `-tunablesfile` options.

```
# ./installer -responsefile response_file_name -tunablesfile  
tunables_file_name
```

Where *response\_file\_name* is the full path name for the response file and *tunables\_file\_name* is the full path name for the tunables file.

- 7 Certain tunables are only activated after a reboot. Review the output carefully to determine if the system requires a reboot to set the tunable value.
- 8 The installer validates the tunables. If an error occurs, exit the installer and check the tunables file.

## Preparing the tunables file

A tunables file is a Perl module and consists of an opening and closing statement, with the tunables defined between. Use the hash symbol at the beginning of the line to comment out the line. The tunables file opens with the line "our %TUN;" and ends with the return true "1;" line. The final return true line only needs to appear once at the end of the file. Define each tunable parameter on its own line.

You can use the installer to create a tunables file template, or manually format tunables files you create.

### To create a tunables file template

- ◆ Start the installer with the `-tunables` option. Enter the following:

```
# ./installer -tunables
```

You see a list of all supported tunables, and the location of the tunables file template.

### To manually format tunables files

- ◆ Format the tunable parameter as follows:

```
$TUN{"tunable_name"}{"system_name"|"*"}=value_of_tunable;
```

For the *system\_name*, use the name of the system, its IP address, or a wildcard symbol. The *value\_of\_tunable* depends on the type of tunable you are setting. End the line with a semicolon.

The following is an example of a tunables file.

```
#  
# Tunable Parameter Values:  
#  
our %TUN;  
  
$TUN{"tunable1"}{"*"}=1024;  
$TUN{"tunable3"}{"sys123"}="SHA256";  
  
1;
```

## Setting parameters for the tunables file

Each tunables file defines different tunable parameters. The values that you can use are listed in the description of each parameter. Select the tunables that you want to add to the tunables file and then configure each parameter.

See [“Tunables value parameter definitions”](#) on page 77.

Each line for the parameter value starts with \$TUN. The name of the tunable is in curly brackets and double-quotes. The system name is enclosed in curly brackets and double-quotes. Finally define the value and end the line with a semicolon, for example:

```
$TUN{"dmp_daemon_count"}{"node123"}=16;
```

In this example, you are changing the dmp\_daemon\_count value from its default of 10 to 16. You can use the wildcard symbol "\*" for all systems. For example:

```
$TUN{"dmp_daemon_count"}{"*"}=16;
```

## Tunables value parameter definitions

When you create a tunables file for the installer you can only use the parameters in the following list.

Prior to making any updates to the tunables, refer to the *Veritas Storage Foundation and High Availability Solutions Tuning Guide* for detailed information on product tunable ranges and recommendations .

[Table C-1](#) describes the supported tunable parameters that can be specified in a tunables file.

**Table C-1** Supported tunable parameters

Tunable	Description
dmp_cache_open	(Veritas Dynamic Multi-Pathing) Whether the first open on a device performed by an array support library (ASL) is cached. This tunable must be set after Veritas Dynamic Multi-Pathing is started.
dmp_daemon_count	(Veritas Dynamic Multi-Pathing) The number of kernel threads for DMP administrative tasks. This tunable must be set after Veritas Dynamic Multi-Pathing is started.
dmp_delayq_interval	(Veritas Dynamic Multi-Pathing) The time interval for which DMP delays the error processing if the device is busy. This tunable must be set after Veritas Dynamic Multi-Pathing is started.
dmp_fast_recovery	(Veritas Dynamic Multi-Pathing) Whether DMP should attempt to obtain SCSI error information directly from the HBA interface. This tunable must be set after Veritas Dynamic Multi-Pathing is started.

**Table C-1** Supported tunable parameters (*continued*)

Tunable	Description
dmp_health_time	(Veritas Dynamic Multi-Pathing) The time in seconds for which a path must stay healthy. This tunable must be set after Veritas Dynamic Multi-Pathing is started.
dmp_log_level	(Veritas Dynamic Multi-Pathing) The level of detail to which DMP console messages are displayed. This tunable must be set after Veritas Dynamic Multi-Pathing is started.
dmp_low_impact_probe	(Veritas Dynamic Multi-Pathing) Whether the low impact path probing feature is enabled. This tunable must be set after Veritas Dynamic Multi-Pathing is started.
dmp_lun_retry_timeout	(Veritas Dynamic Multi-Pathing) The retry period for handling transient errors. This tunable must be set after Veritas Dynamic Multi-Pathing is started.
dmp_monitor_fabric	(Veritas Dynamic Multi-Pathing) Whether the Event Source daemon (vxesd) uses the Storage Networking Industry Association (SNIA) HBA API. This tunable must be set after Veritas Dynamic Multi-Pathing is started.
dmp_monitor_osevent	(Veritas Dynamic Multi-Pathing) Whether the Event Source daemon (vxesd) monitors operating system events. This tunable must be set after Veritas Dynamic Multi-Pathing is started.
dmp_monitor_ownership	(Veritas Dynamic Multi-Pathing) Whether the dynamic change in LUN ownership is monitored. This tunable must be set after Veritas Dynamic Multi-Pathing is started.
dmp_native_support	(Veritas Dynamic Multi-Pathing) Whether DMP does multi-pathing for native devices. This tunable must be set after Veritas Dynamic Multi-Pathing is started.
dmp_path_age	(Veritas Dynamic Multi-Pathing) The time for which an intermittently failing path needs to be monitored before DMP marks it as healthy. This tunable must be set after Veritas Dynamic Multi-Pathing is started.

**Table C-1** Supported tunable parameters (*continued*)

Tunable	Description
dmp_pathswitch_blks_shift	(Veritas Dynamic Multi-Pathing) The default number of contiguous I/O blocks sent along a DMP path to an array before switching to the next available path. This tunable must be set after Veritas Dynamic Multi-Pathing is started.
dmp_probe_idle_lun	(Veritas Dynamic Multi-Pathing) Whether the path restoration kernel thread probes idle LUNs. This tunable must be set after Veritas Dynamic Multi-Pathing is started.
dmp_probe_threshold	(Veritas Dynamic Multi-Pathing) The number of paths will be probed by the restore daemon. This tunable must be set after Veritas Dynamic Multi-Pathing is started.
dmp_restore_cycles	(Veritas Dynamic Multi-Pathing) The number of cycles between running the check_all policy when the restore policy is check_periodic. This tunable must be set after Veritas Dynamic Multi-Pathing is started.
dmp_restore_interval	(Veritas Dynamic Multi-Pathing) The time interval in seconds the restore daemon analyzes the condition of paths. This tunable must be set after Veritas Dynamic Multi-Pathing is started.
dmp_restore_policy	(Veritas Dynamic Multi-Pathing) The policy used by DMP path restoration thread. This tunable must be set after Veritas Dynamic Multi-Pathing is started.
dmp_restore_state	(Veritas Dynamic Multi-Pathing) Whether kernel thread for DMP path restoration is started. This tunable must be set after Veritas Dynamic Multi-Pathing is started.
dmp_retry_count	(Veritas Dynamic Multi-Pathing) The number of times a path reports a path busy error consecutively before DMP marks the path as failed. This tunable must be set after Veritas Dynamic Multi-Pathing is started.
dmp_scsi_timeout	(Veritas Dynamic Multi-Pathing) The timeout value for any SCSI command sent via DMP. This tunable must be set after Veritas Dynamic Multi-Pathing is started.
dmp_sfg_threshold	(Veritas Dynamic Multi-Pathing) The status of the subpaths failover group (SFG) feature. This tunable must be set after Veritas Dynamic Multi-Pathing is started.

**Table C-1** Supported tunable parameters (*continued*)

Tunable	Description
dmp_stat_interval	(Veritas Dynamic Multi-Pathing) The time interval between gathering DMP statistics. This tunable must be set after Veritas Dynamic Multi-Pathing is started.



# 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](#)
- [Manually configuring and passwordless ssh](#)
- [Restarting the ssh session](#)
- [Enabling rsh for Linux](#)

## 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 system. The system 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.

---

**Note:** The script- and Web-based installers support establishing passwordless communication for you.

---

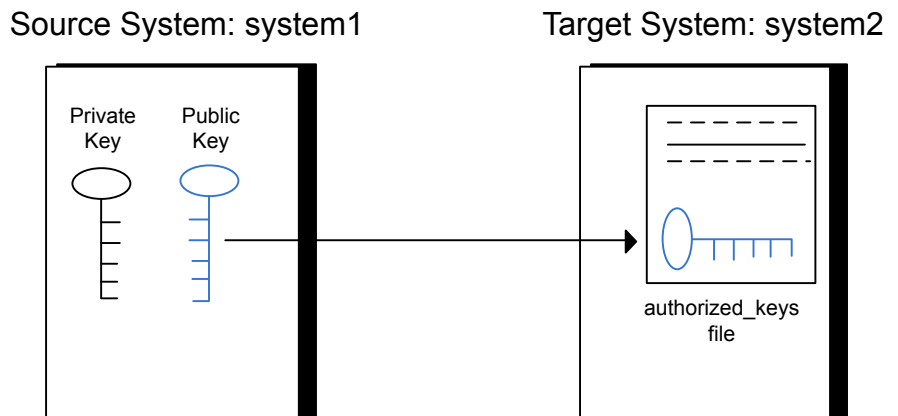
## Manually configuring and passwordless ssh

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 D-1 illustrates this procedure.

**Figure D-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 [“Manually configuring and passwordless ssh”](#) on page 82.

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

### To enable rsh

- 1 To ensure that the `rsh` and `rsh-server` RPMs 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 the line `disable = no` in the `/etc/xinetd.d/rsh` file.

- 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
```

# DMP components

This appendix includes the following topics:

- [Veritas Dynamic Multi-Pathing installation RPMs](#)

## Veritas Dynamic Multi-Pathing installation RPMs

[Table E-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 E-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 5.14.2 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 E-1** Veritas Dynamic Multi-Pathing RPMs *(continued)*

RPMs	Contents	Configuration
VRTSsfcp604	<p>Veritas Storage Foundation Common Product Installer</p> <p>The Storage Foundation Common Product installer RPM contains the scripts that perform the following:</p> <ul style="list-style-type: none"> <li>■ installation</li> <li>■ configuration</li> <li>■ upgrade</li> <li>■ uninstallation</li> <li>■ adding nodes</li> <li>■ removing nodes</li> <li>■ etc.</li> </ul> <p>You can use this script to simplify the native operating system installations, configurations, and upgrades.</p>	Minimum
VRTSsfmh	<p>Veritas Storage Foundation Managed Host</p> <p>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:</p> <p><a href="http://www.symantec.com/business/storage-foundation-manager">http://www.symantec.com/business/storage-foundation-manager</a></p>	Recommended
VRTSspt	Veritas Software Support Tools	Recommended

# Troubleshooting installation issues

This appendix includes the following topics:

- [Enable DMP root support manually when installing DMP 6.0.4](#)
- [Restarting the installer after a failed connection](#)
- [What to do if you see a licensing reminder](#)
- [About the VRTSspt RPM troubleshooting tools](#)
- [Incorrect permissions for root on remote system](#)
- [Inaccessible system](#)

## Enable DMP root support manually when installing DMP 6.0.4

Installing or upgrading to DMP 6.0.4 with keyless or Veritas Dynamic Multi-pathing license requires the administrator to manually run the command to enable DMP root support, if it is not enabled automatically.

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:

```
# /opt/VRTS/bin/vxlicrep
```

- 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>

## About the VRTSspt RPM troubleshooting tools

The VRTSspt RPM provides a group of tools for troubleshooting a system and collecting information on its configuration. If you install and use the VRTSspt RPM, it will be easier for Symantec Support to diagnose any issues you may have.

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. Use caution when you use the VRTSspt RPM, and always use it 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.

---

**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.

# Compatibility issues when installing DMP with other products

This appendix includes the following topics:

- [Installing, uninstalling, or upgrading Storage Foundation products when other Veritas products are present](#)
- [Installing, uninstalling, or upgrading Storage Foundation products when VOM is already present](#)
- [Installing, uninstalling, or upgrading Storage Foundation products when NetBackup is already present](#)

## Installing, uninstalling, or upgrading Storage Foundation products when other Veritas products are present

Installing Storage Foundation when other Veritas products are installed can create compatibility issues. For example, installing Storage Foundation products when VOM, ApplicationHA, and NetBackup are present on the systems.

## Installing, uninstalling, or upgrading Storage Foundation products when VOM is already present

If you plan to install or upgrade Storage Foundation products on systems where VOM has already been installed, be aware of the following compatibility issues:

- When you install or upgrade Storage Foundation products where SFM or VOM Central Server is present, the installer skips the VRTSsfmh upgrade and leaves the SFM Central Server and Managed Host RPMs as is.
- When uninstalling Storage Foundation products where SFM or VOM Central Server is present, the installer does not uninstall VRTSsfmh.
- When you install or upgrade Storage Foundation products where SFM or VOM Managed Host is present, the installer gives warning messages that it will upgrade VRTSsfmh.

## Installing, uninstalling, or upgrading Storage Foundation products when NetBackup is already present

If you plan to install or upgrade Storage Foundation on systems where NetBackup has already been installed, be aware of the following compatibility issues:

- When you install or upgrade Storage Foundation products where NetBackup is present, the installer does not uninstall VRTSspbx and VRTSicsco. It does not upgrade VRTSat.
- When you uninstall Storage Foundation products where NetBackup is present, the installer does not uninstall VRTSspbx, VRTSicsco, and VRTSat.

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