

Oracle® Solaris Cluster Data Service for Oracle VM Server for SPARC Guide

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Preface

Oracle Solaris Cluster Data Service for Oracle VM Server for SPARC Guide explains how to install and configure Oracle Solaris Cluster data services.

Note – This Oracle Solaris Cluster release supports systems that use the SPARC and x86 families of processor architectures: UltraSPARC, SPARC64, AMD64, and Intel 64. In this document, x86 refers to the larger family of 64-bit x86 compatible products. Information in this document pertains to all platforms unless otherwise specified.

This document is intended for system administrators with extensive knowledge of Oracle software and hardware. Do not use this document as a planning or presales guide. Before reading this document, you should have already determined your system requirements and purchased the appropriate equipment and software.

The instructions in this book assume knowledge of the Oracle Solaris Operating System and expertise with the volume-manager software that is used with Oracle Solaris Cluster software.

Using UNIX Commands

This document contains information about commands that are specific to installing and configuring Oracle Solaris Cluster data services. The document does *not* contain comprehensive information about basic UNIX commands and procedures, such as shutting down the system, booting the system, and configuring devices. Information about basic UNIX commands and procedures is available from the following sources:

- Online documentation for the Oracle Solaris Operating System
- Oracle Solaris Operating System man pages
- Other software documentation that you received with your system

Typographic Conventions

The following table describes the typographic conventions that are used in this book.

TABLE P-1 Typographic Conventions

Typeface	Meaning	Example
AaBbCc123	The names of commands, files, and directories, and onscreen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. <code>machine_name%</code> you have mail.
AaBbCc123	What you type, contrasted with onscreen computer output	<code>machine_name% su</code> Password:
<i>aabbcc123</i>	Placeholder: replace with a real name or value	The command to remove a file is <i>rm filename</i> .
<i>AaBbCc123</i>	Book titles, new terms, and terms to be emphasized	Read Chapter 6 in the <i>User's Guide</i> . <i>A cache</i> is a copy that is stored locally. Do <i>not</i> save the file. Note: Some emphasized items appear bold online.

Shell Prompts in Command Examples

The following table shows the default UNIX system prompt and superuser prompt for shells that are included in the Oracle Solaris OS. Note that the default system prompt that is displayed in command examples varies, depending on the Oracle Solaris release.

TABLE P-2 Shell Prompts

Shell	Prompt
Bash shell, Korn shell, and Bourne shell	\$
Bash shell, Korn shell, and Bourne shell for superuser	#
C shell	machine_name%
C shell for superuser	machine_name#

Related Documentation

Information about related Oracle Solaris Cluster topics is available in the documentation that is listed in the following table. All Oracle Solaris Cluster documentation is available at <http://www.oracle.com/technetwork/indexes/documentation/index.html>.

Topic	Documentation
Data service administration	<i>Oracle Solaris Cluster Data Services Planning and Administration Guide</i> Individual data service guides
Concepts	<i>Oracle Solaris Cluster Concepts Guide</i>
Software installation	<i>Oracle Solaris Cluster Software Installation Guide</i>
System administration	<i>Oracle Solaris Cluster System Administration Guide</i>
Hardware administration	<i>Oracle Solaris Cluster 3.3 Hardware Administration Manual</i> Individual hardware administration guides
Data service development	<i>Oracle Solaris Cluster Data Services Developer's Guide</i>
Error messages	<i>Oracle Solaris Cluster Error Messages Guide</i>
Command and function reference	<i>Oracle Solaris Cluster Reference Manual</i>

For a complete list of Oracle Solaris Cluster documentation, see the release notes for your release of Oracle Solaris Cluster at <http://www.oracle.com/technetwork/indexes/documentation/index.html>.

Related Third-Party Web Site References

Third-party URLs that are referenced in this document provide additional related information.

Note – Oracle is not responsible for the availability of third-party web sites mentioned in this document. Oracle does not endorse and is not responsible or liable for any content, advertising, products, or other materials that are available on or through such sites or resources. Oracle will not be responsible or liable for any actual or alleged damage or loss caused or alleged to be caused by or in connection with use of or reliance on any such content, goods, or services that are available on or through such sites or resources.

Documentation and Support

See the following web sites for additional resources:

- [Documentation \(http://www.oracle.com/technetwork/indexes/documentation/index.html\)](http://www.oracle.com/technetwork/indexes/documentation/index.html)
- [Support \(http://www.oracle.com/us/support/systems/index.html\)](http://www.oracle.com/us/support/systems/index.html)

Oracle Software Resources

[Oracle Technology Network \(http://www.oracle.com/technetwork/index.html\)](http://www.oracle.com/technetwork/index.html) offers a range of resources related to Oracle software:

- Discuss technical problems and solutions on the [Discussion Forums \(http://forums.oracle.com\)](http://forums.oracle.com).
- Get hands-on step-by-step tutorials with [Oracle By Example \(http://www.oracle.com/technetwork/tutorials/index.html\)](http://www.oracle.com/technetwork/tutorials/index.html).

Getting Help

If you have problems installing or using Oracle Solaris Cluster, contact your service provider and provide the following information:

- Your name and email address (if available)
- Your company name, address, and phone number
- The model number and serial number of your systems
- The release number of the Oracle Solaris Operating System (for example, Oracle Solaris 10)
- The release number of Oracle Solaris Cluster (for example, Oracle Solaris Cluster 3.3)

Use the following commands to gather information about each node on your system for your service provider.

Command	Function
<code>prtconf -v</code>	Displays the size of the system memory and reports information about peripheral devices
<code>psrinfo -v</code>	Displays information about processors
<code>showrev -p</code>	Reports which patches are installed
<code>prtdiag -v</code>	Displays system diagnostic information
<code>/usr/cluster/bin/clnode show-rev</code>	Displays Oracle Solaris Cluster release and package version information

Also have available the contents of the `/var/adm/messages` file.

Installing and Configuring HA for Logical Domains

This chapter explains how to install and configure Oracle Solaris Cluster HA for Oracle VM Server for SPARC (HA for Logical Domains) and contains the following sections:

- [“Installing and Configuring HA for Logical Domains” on page 11](#)
- [“HA for Logical Domains Overview” on page 12](#)
- [“Planning the HA for Logical Domains Installation and Configuration” on page 12](#)
- [“Installing and Configuring Logical Domains” on page 14](#)
- [“Verifying the Installation and Configuration of Logical Domains” on page 15](#)
- [“Installing the HA for Logical Domains Packages” on page 16](#)
- [“Registering and Configuring HA for Logical Domains” on page 17](#)
- [“Verifying the Installation and Configuration of Logical Domains” on page 19](#)
- [“Tuning the HA for Logical Domains Fault Monitor” on page 19](#)
- [“Debugging HA for Logical Domains” on page 21](#)

Installing and Configuring HA for Logical Domains

The following table summarizes the tasks for installing and configuring HA for Logical Domains and provides cross-references to detailed instructions for performing these tasks. Perform the tasks in the order that they are listed in the table.

TABLE 1 Tasks for Installing and Configuring HA for Logical Domains

Task	Instructions
Plan the installation	“Planning the HA for Logical Domains Installation and Configuration” on page 12
Install and configure the Logical Domains software	“Installing and Configuring Logical Domains” on page 14
Install HA for Logical Domains packages	“Installing the HA for Logical Domains Packages” on page 16

TABLE 1 Tasks for Installing and Configuring HA for Logical Domains (Continued)	
Task	Instructions
Register and configure HA for Logical Domains resources	“Registering and Configuring HA for Logical Domains” on page 17
Verify the HA for Logical Domains installation and configuration	“Verifying the Installation and Configuration of Logical Domains” on page 19
Tune the HA for Logical Domains fault monitor	“Tuning the HA for Logical Domains Fault Monitor” on page 19
Debug HA for Logical Domains	“Debugging HA for Logical Domains” on page 21

HA for Logical Domains Overview

Oracle VM Server for SPARC (Logical Domains) provides the ability to split a single physical system into multiple, independent virtual systems. This is achieved by an additional software application in the firmware layer, interposed between the operating system and the hardware platform called the hypervisor. It abstracts the hardware and can expose or hide various resources, allowing for the creation of resource partitions that can operate as discrete systems, complete with virtual CPU, memory, and I/O devices.

The HA for Logical Domains data service provides a mechanism for orderly startup and shutdown, fault monitoring, and automatic failover of the Logical Domains guest domain service. The Logical Domains component is protected by the HA for Logical Domains data service.

Planning the HA for Logical Domains Installation and Configuration

This section contains the information you need to plan your HA for Logical Domains installation and configuration.

Configuration Restrictions

The configuration restrictions in the subsections that follow apply only to HA for Logical Domains.

For restrictions that apply to all data services, see the [Oracle Solaris Cluster 3.3 Release Notes](#).



Caution – Your data service configuration might not be supported if you do not observe these restrictions.

- **Restriction for the HA for Logical Domains configuration**
Logical Domains can be configured only as a failover data service and not as a scalable data service.
- **Restriction for using warm migration with HA for Logical Domains data service**
Do not configure the HA for Logical Domains data service with Logical Domains version 1.2 or earlier if you want to use the Logical Domains warm migration feature.
- **Restriction for the location of HA for Logical Domains virtual disks**
Logical Domains disk image file should be placed only in the global file system. The file is exported as a raw disk by the virtual disk server and can be used as an installation disk by the Solaris OS installer on the guest domain.
The following example shows Logical Domains guest domains installed onto a global file system with two guest domain instances (ldg0 and ldg1).

```
# ls -l /global/ldoms/disks/
total 26926720
-rw-----T 1 root root 8589934592 Aug 23 03:31 ldg0.vdisk
-rw-----T 1 root root 8589934592 Aug 21 02:43 ldg1.vdisk
```

Note – In the example, the virtual disk for the Logical Domains guest domain instance ldg0 is /global/ldoms/disks/ldg0.vdisk, whereas the virtual disk for Logical Domains guest domain instance ldg1 is /global/ldoms/disks/ldg1.vdisk.

- **Restriction for Logical Domains Software Configurations**
None

▼ How to Configure Logical Domains to Reset for Control Domain Failures

- On each node that can master the Logical Domains guest domain resource, run the following commands.

```
# ldm set-domain failure-policy=reset primary

# ldm list -o domain primary
NAME          STATE      FLAGS    UTIL
primary       active    -n-cv-    0.6%

SOFTSTATE
Solaris running
```

```
HOSTID
    0x84d4a2ce

CONTROL
    failure-policy=reset

DEPENDENCY
    master=

# ldm set-domain master=primary ldg0

# ldm list -o domain ldg0
NAME          STATE      FLAGS    UTIL
ldg0          active    {}{}{}{}{}{}{}n--  0.1%

SOFTSTATE
Solaris running

HOSTID
    0x84f8a040

CONTROL
    failure-policy=ignore

DEPENDENCY
    master=

VARIABLES
    auto-boot?=false
    auto-boot?true=
    boot-device=vdisk1
    keyboard-layout=US-English
```

Installing and Configuring Logical Domains

This section contains the procedures you need to install and configure a Logical Domains guest domain.

▼ How to Install the Logical Domains Software

- 1 On a cluster member, become superuser or assume a role that provides `solaris.cluster.modify` RBAC authorization.
- 2 Go to <http://www.oracle.com/us/technologies/virtualization/oraclelvm/oracle-vm-server-for-sparc-068923.html>

▼ How to Enable the Logical Domains Instances to Run in a Cluster

- 1 Become superuser or assume a role that provides `solaris.cluster.verbose` RBAC authorization on one of the nodes in the cluster that will host the Logical Domains guest domain.
- 2 Register the `SUNW.HAStoragePlus` resource type.

```
# clresourcetype register SUNW.HAStoragePlus
```
- 3 Create a failover resource group.

```
# clresourcegroup create LDom-failover-rg
```
- 4 Create a resource for the Logical Domains guest domain Virtual Disk Storage.

```
# clresource create -g LDom-failover-rg \
-t SUNW.HAStoragePlus \
-p FilesystemMountPoints=LDom-mount-points \
LDom-has-resource
```
- 5 Enable the failover resource group that now includes the Logical Domains guest domain disk storage resources.

```
# clresourcegroup online -M -n current-node LDom-failover-rg
```

Verifying the Installation and Configuration of Logical Domains

▼ How to Verify the HA for Logical Domains Installation and Configuration

- 1 As superuser, log in to the node that currently hosts the resource group that contains the Logical Domains resource.
- 2 Switch the Logical Domains resource group to another cluster member.

```
# clresourcegroup switch -n node LDom-guest-domain
```
- 3 Start Logical Domains for this instance.

```
# ldm start LDom-guest-domain
```
- 4 Verify the status of the Logical Domains instance.

```
# ldm list-domain LDom-guest-domain
```

NAME	STATE	FLAGS	CONS	VCPU	MEMORY	UTIL	UPTIME
------	-------	-------	------	------	--------	------	--------

ldg active {}{}{}{}{}{}{}{}n--- 5000 4 2G 25% 2s

- 5 **Stop the Logical Domains instance.**
 # `ldm stop LDom-guest-domain`
- 6 **Repeat the preceding steps until you have tested all the potential nodes on which Logical Domains can run.**

Installing the HA for Logical Domains Packages

If you did not install the HA for Logical Domains packages during your initial Oracle Solaris Cluster installation, perform this procedure to install the packages.

▼ How to Install the HA for Logical Domains Packages

Perform this procedure on each cluster node where you are installing the HA for Logical Domains packages.

You can run the `installer` program with a command-line interface (CLI) or with a graphical user interface (GUI). The content and sequence of instructions in the CLI and the GUI are similar.

Before You Begin Ensure that you have the Oracle Solaris Cluster installation media.

If you intend to run the `installer` program with a GUI, ensure that your `DISPLAY` environment variable is set.

- 1 **On the cluster node where you are installing the data service packages, become superuser.**
- 2 **Load the installation media into the DVD-ROM drive.**
 If the Volume Management daemon `vold(1M)` is running and configured to manage DVD-ROM devices, the daemon automatically mounts the DVD-ROM on the `/cdrom` directory.
- 3 **Change to the `installer` directory of the DVD-ROM.**
 - **For the SPARC platform, type the following command:**
 # `cd /cdrom/cdrom0/Solaris_sparc`
 - **For the x86 platform, type the following command:**
 # `cd /cdrom/cdrom0/Solaris_x86`

4 Start the installer utility.

```
# ./installer
```

5 When you are prompted, accept the license agreement.**6 From the list of Oracle Solaris Cluster agents under Availability Services, select the data service for Oracle RAC.****7 If you require support for languages other than English, select the option to install multilingual packages.**

English language support is always installed.

8 When prompted whether to configure the data service now or later, choose Configure Later.

Configure Later performs the configuration after the installation.

9 Follow the instructions on the screen to install the data service packages on the node.

The installer utility displays the status of the installation. When the installation is complete, the wizard displays an installation summary and the installation logs.

10 (GUI only) If you do not want to register the product and receive product updates, deselect the Product Registration option.

The Product Registration option is not available with the CLI.

11 Exit the installer utility.**12 Unload the installation media from the DVD-ROM drive.**

a. To ensure that the DVD-ROM is not being used, change to a directory that does *not* reside on the DVD-ROM.

b. Eject the DVD-ROM.

```
# eject cdrom
```

Next Steps See “Registering and Configuring HA for Logical Domains” on page 17

Registering and Configuring HA for Logical Domains

▼ How to Configure HA for Logical Domains

Before You Begin Install the data service packages during your initial Oracle Solaris Cluster installation.

If you did not install the HA for Logical Domains packages as part of your initial Oracle Solaris Cluster installation, go to [“Installing the HA for Logical Domains Packages”](#) on page 16.

- 1 **Become superuser or assume a role that provides `solaris.cluster.modify` and `solaris.cluster.admin` RBAC authorization on the node in the cluster that host Logical Domains guest domain.**

- 2 **Register the `SUNW.ldom` resource type.**

```
# clresourcetype register SUNW.ldom
```

- 3 **Create a Logical Domains guest domain resource in the failover resource group.**

If you plan to use warm migration (see [Step 4](#)), a `password_type` property is required. For warm migration, specify the complete path to the file that contains the target host password required for guest domain migration.

```
# clresource create -g LDom-failover-rg -t SUNW.ldom \  
-p Domain_name=LDom-guest-domain-instance LDom-guest-domain-resource  
-p password_file=path-to-file-with-target-host-password
```

- 4 **For Logical Domains, enable warm migration to be performed on a Solaris Logical Domains guest domain during Logical Domains resource failovers.**

Warm migration requires that you change the value for the `migration_type` property from `NORMAL` to `MIGRATE`. For a value of `MIGRATE`, the `password_file` is required (see [Step 3](#)).

```
# clresource set -p Migration_type=MIGRATE LDom-guest-domain-resource
```

- 5 **Enable each Logical Domains guest domain resource.**

Repeat this step for each Logical Domains guest domain instance, if multiple instances were created.

```
# clresource status  
# clresource enable LDom-guest-domain-resource
```

▼ How to Remove a HA for Logical Domains Resource From a Failover Resource Group

- 1 **Become superuser or assume a role that provides `solaris.cluster.modify` and `solaris.cluster.admin` RBAC authorizations.**
- 2 **Disable and remove the resource that is used by the HA for Logical Domains data service.**

```
# clresource disable resource  
# clresource delete resource
```

Verifying the Installation and Configuration of Logical Domains

▼ How to Verify the HA for Logical Domains Installation and Configuration

- 1 As a superuser, log in to the node that currently hosts the resource group that contains the Logical Domains guest domain resource.

- 2 Switch the Logical Domains guest domain resource group to another cluster member.

```
# clresourcegroup switch -n node LDom-guest-domain
```

- 3 Start the Logical Domains guest domain for this instance.

```
# ldm start LDom-guest-domain
```

- 4** Verify the status of the Logical Domains guest domain instance.

```
# ldm list-domain LDom-guest-domain
```

NAME	STATE	FLAGS	CONS	VCPU	MEMORY	UTIL	UPTIME	
ldg	active	{ } { } { } { } { } { } { } { } { } { }	n---	5000	4	2G	25%	2s

- 5 Stop the Logical Domains guest domain instance.

```
# ldm stop LDom-guest-domain
```

- 6 Repeat the preceding steps until you have tested all the potential nodes on which the Logical Domains guest domain can run.

Tuning the HA for Logical Domains Fault Monitor

This section describes the HA for Logical Domains fault monitor's probing algorithm or functionality, and states the conditions, messages, and recovery actions associated with unsuccessful probing.

For conceptual information about fault monitors, see the *Oracle Solaris Cluster Concepts Guide*.

Resource Properties

The HA for Logical Domains guest domain fault monitor uses the resource properties specified in the resource type `SUNW.ldom`. Refer to the `SUNW.ldom(5)` man page for a complete list of resource properties used.

Probing Algorithm and Functionality

HA for Logical Domains is controlled by the extension properties that control the probing frequency. The default values of these properties determine the preset behavior of the fault monitor and are suitable for most Oracle Solaris Cluster installations. You can modify this preset behavior by performing the following actions:

- Setting the interval between fault monitor probes (`Thorough_probe_interval`)
- Setting the timeout for fault monitor probes (`Probe_timeout`)
- Setting the number of times the fault monitor attempts to restart the resource (`Retry_count`)

The HA for Logical Domains fault monitor checks the domain status within an infinite loop. During each cycle, the fault monitor checks the domain state and reports either a failure or success.

If the fault monitor is successful, it returns to its infinite loop and continues the next cycle of probing and sleeping.

If the fault monitor reports a failure, a request is made to the cluster to restart the resource. If the fault monitor reports another failure, another request is made to the cluster to restart the resource. This behavior continues whenever the fault monitor reports a failure. If successive restarts exceed the `Retry_count` within the `Thorough_probe_interval`, a request is made to fail over the resource group onto a different node.

Operations of the Logical Domains Probe

- The probe checks the domain state every 60 seconds by using the `ldm list-domain` command.
- The `ldm list-domain` command produces a status line for the domain and is accurate at the instant that the command executes.
- The status modes that are considered to be normal operational modes are as follows: active, suspending, resuming, suspended, and starting. Whenever the `ldm` command reports these status modes, the probe considers that the domain is operating in an acceptable mode.
- The status modes that are considered to be restartable modes are as follows: inactive and stopping. These modes are not considered acceptable and if one of these modes is encountered, the probe requests a restart of the resource.
- The probe also requests a resource to restart if any unknown status modes are reported by the `ldm` command.
- If the guest domain configuration has changed, the probe will update this information to CCR.
- The probe runs the user-supplied script or binary provided for `plugin_probe`. If this process fails, then the probe will restart the Logical Domains guest domain resource.

- If the Logical Domains guest domain resource is repeatedly restarted and subsequently exhausts the `Retry_count` within the `Retry_interval`, then a failover is initiated for the resource group onto another node if `Failover_enabled` is set to `TRUE`.

Debugging HA for Logical Domains

HA for Logical Domains has a extension property named `debug_level` that enables you to activate debugging for Logical Domains guest domain resources.

▼ How to Activate Debugging for HA for Logical Domains

- 1 Determine whether debugging for HA for Logical Domains is active.

```
# grep daemon /etc/syslog.conf
*.err;kern.debug;daemon.notice;mail.crit      /var/adm/messages
*.alert;kern.err;daemon.err                    operator
#
```

If debugging is active, `daemon.debug` is set in the file `/etc/syslog.conf`.

If debugging is inactive, `daemon.notice` is set in the file `/etc/syslog.conf` of the appropriate node.

- 2 If debugging is inactive, edit the `/etc/syslog.conf` file in the appropriate node to change `daemon.notice` to `daemon.debug`.

- 3 Confirm that debugging for HA for Logical Domains is active.

```
# grep daemon /etc/syslog.conf
*.err;kern.debug;daemon.debug;mail.crit      /var/adm/messages
*.alert;kern.err;daemon.err                    operator
#
```

- 4 Restart the `syslogd` daemon in the global zone.

```
# svcadm refresh svc:/system/system-log:default
```

- 5 Set the property `debug_level` to level 2.

```
# clresource set -p debug_level=2 LDom-guest-domain-resource
```

Note – To deactivate debugging, repeat these steps, changing `daemon.debug` to `daemon.notice` and changing the `debug_level` property to 0.

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