Oracle® Solaris Cluster Data Service for DNS Guide

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Preface

Oracle Solaris Cluster Data Service for DNS 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. In this document, "x86" refers to the larger family of 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.

Bash is the default shell for Oracle Solaris 11. Machine names shown with the Bash shell prompt are displayed for clarity.

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	Description	Example
`AaBbCc123`	The names of commands, files, and directories, and onscreen computer output	Edit your `.login` file. Use `ls -a` to list all files. `machine_name% you have mail.`
`AaBbCc123`	What you type, contrasted with onscreen computer output	`machine_name%` **`su`** `Password:`
aabbcc123	Placeholder: replace with a real name or value	The command to remove a file is `rm` *filename*.
AaBbCc123	Book titles, new terms, and terms to be emphasized	Read Chapter 6 in the *User's Guide*. A *cache* is a copy that is stored locally. Do *not* 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
Hardware installation and administration	*Oracle Solaris Cluster 4.0 Hardware Administration Manual* Individual hardware administration guides
Concepts	*Oracle Solaris Cluster Concepts Guide*
Software installation	*Oracle Solaris Cluster Software Installation Guide*
Data service installation and administration	*Oracle Solaris Cluster Data Services Planning and Administration Guide* and individual data service guides
Data service development	*Oracle Solaris Cluster Data Services Developer's Guide*
System administration	*Oracle Solaris Cluster System Administration Guide* *Oracle Solaris Cluster Quick Reference*
Software upgrade	*Oracle Solaris Cluster Upgrade Guide*
Error messages	*Oracle Solaris Cluster Error Messages Guide*
Command and function references	*Oracle Solaris Cluster Reference Manual* *Oracle Solaris Cluster Data Services Reference Manual* *Oracle Solaris Cluster Geographic Edition Reference Manual* *Oracle Solaris Cluster Quorum Server Reference Manual*

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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 operating environment (for example, Oracle Solaris 11)
- The release number of Oracle Solaris Cluster (for example, Oracle Solaris Cluster 4.0)

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

Command	Function
`prtconf -v`	Displays the size of the system memory and reports information about peripheral devices
`psrinfo -v`	Displays information about processors
`pkg list`	Reports which packages are installed
`prtdiag -v`	Displays system diagnostic information
`/usr/cluster/bin/clnode show-rev`	Displays Oracle Solaris Cluster release and package version information for each node

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

◆ ◆ ◆ CHAPTER 1

Installing and Configuring Oracle Solaris Cluster HA for DNS

This chapter describes the steps to install and configure the HA for Domain Name Service (DNS) data service on your Oracle Solaris Cluster servers.

This chapter contains the following sections.

- "Overview of the Installation and Configuration Process for Oracle Solaris Cluster HA for DNS" on page 9
- "Installing DNS" on page 10
- "Installing the Oracle Solaris Cluster HA for DNS Package" on page 12
- "Registering and Configuring Oracle Solaris Cluster HA for DNS" on page 13
- "Verifying Data Service Installation and Configuration" on page 18
- "Tuning the Oracle Solaris Cluster HA for DNS Fault Monitor" on page 18

You must configure Oracle Solaris Cluster HA for DNS as a failover data service. See Chapter 1, "Planning for Oracle Solaris Cluster Data Services," in *Oracle Solaris Cluster Data Services Planning and Administration Guide* and the *Oracle Solaris Cluster Concepts Guide* for general information about data services, resource groups, resources, and other related topics.

Overview of the Installation and Configuration Process for Oracle Solaris Cluster HA for DNS

The following table lists the sections that describe the installation and configuration tasks.

TABLE 1–1 Task Map: Installing and Configuring Oracle Solaris Cluster HA for DNS

Task	Instructions
Install DNS	"Installing DNS" on page 10
Install Oracle Solaris Cluster HA for DNS packages	"How to Install the Oracle Solaris Cluster HA for DNS Package" on page 13

TABLE 1–1 Task Map: Installing and Configuring Oracle Solaris Cluster HA for DNS *(Continued)*

Task	Instructions
Configure and start Oracle Solaris Cluster HA for DNS	"Registering and Configuring Oracle Solaris Cluster HA for DNS" on page 13
Verify the data service installation and configuration	"Verifying Data Service Installation and Configuration" on page 18
Tune the Oracle Solaris Cluster HA for DNS fault monitor	"Tuning the Oracle Solaris Cluster HA for DNS Fault Monitor" on page 18

Installing DNS

This section describes the steps to install DNS and to enable DNS to run as Oracle Solaris Cluster HA for DNS.

Oracle Solaris Cluster HA for DNS uses the Internet Domain Name Server (`named`) software that is bundled with the Oracle Solaris 11 operating system. See the `named(1M)` man page for information about how to set up DNS. The Oracle Solaris Cluster configuration involves the following differences.

- The DNS database is located on the cluster file system, not a local file system.
- A network resource (relocatable IP address), not the name of a physical host, identifies the name of a DNS server.

▼ How to Install DNS

This section describes how to install the DNS.

1. **On a cluster member, become superuser or assume a role that provides `solaris.cluster.admin` RBAC authorization.**

2. **Decide on the network resource that will provide the DNS service.**

   This name should be an IP address (logical hostname) that you set up when you install the Oracle Solaris Cluster software. See the *Oracle Solaris Cluster Concepts Guide* document for details about network resources.

3. **Ensure that the DNS executable (`named`) is in the directory `/usr/sbin`.**

   The DNS executable is bundled with the Oracle Solaris 11 operating system. Ensure that this executable is located in the `/usr/sbin` directory before you begin the installation.

4 **Create directory structure `/global/dns/named` on the cluster file system to hold the DNS configuration files (at level `/global/dns`) and database files (at level `/global/dns/named`).**

See the *Oracle Solaris Cluster Software Installation Guide* for information on how to set up cluster file systems.

```
# mkdir -p /global/dns/named
```

5 **Place the configuration file for DNS, `named.conf` or `named.boot`, under the `/global/dns` directory.**

If you have already installed DNS, you can copy the existing `named.conf` or `named.boot` file to the `/global/dns` directory. Otherwise, create a `named.conf` file in this directory. See the `named(1M)` man page for information on the types of entries to place in `named.conf` or `named.boot`. Either the `named.conf` file or the `named.boot` file must exist. Both files can exist.

6 **Place all of the DNS database files (listed in the `named.conf` file) under the `/global/dns/named` directory.**

7 **On all of the clients of Oracle Solaris Cluster HA for DNS, create an entry for the network resource of the DNS service in the `/etc/resolv.conf` file.**

On all of the nodes or zones, edit the `/etc/resolv.conf` file to contain the network resource. The following example shows the entries for a four-node configuration (`phys-schost-1`, `phys-schost-2`, `phys-schost-3`, and `phys-schost-4`) with the logical hostname `schost-1.eng.com`.

```
domain eng.com

; schost-1.eng.com

(Only entry to be added if the file is already present.)

nameserver 192.29.72.90

; phys-schost-2.eng
nameserver 129.146.1.151

; phys-schost-3.eng
nameserver 129.146.1.152

; phys-schost-4.eng
nameserver 129.144.134.19

; phys-schost-1.eng
nameserver 129.144.1.57
```

Make the network resource the first entry after the domain name. DNS attempts to use the addresses in the order that they are listed in the `resolv.conf` file to access the server.

Note – If the `/etc/resolv.conf` is already present on the nodes or zones, just add the first entry that shows the logical hostname in the preceding example. The order of the entries determines the order in which DNS tries to access the server.

8 On all of the cluster nodes or zones, edit the `/etc/inet/hosts` file to create an entry for the network resource of the DNS service.

In the following example, perform these steps.

- Replace the *IPaddress* variable with your actual IP address, such as `129.146.87.53`.
- Replace the *logical-hostname* variable with your actual network resource (logical hostname).

```
127.0.0.1                       localhost
IPaddress                       logical-hostname
```

9 On all of the cluster nodes or zones, edit the `/etc/nsswitch.conf` file to add the string `dns` after `cluster` and `files` to the `hosts` entry.

Example:

```
hosts:            cluster files dns
```

10 On all of the cluster nodes or zones, test DNS.

The following example shows how to test DNS.

```
# /usr/sbin/named -c /global/dns/named.conf
# nslookup phys-schost-1
```

11 On all of the cluster nodes or zones, stop DNS.

Be sure to stop the `named` executable before you proceed.

```
# pkill -x named
```

Next Steps If you installed the Oracle Solaris Cluster HA for DNS packages during your Oracle Solaris Cluster installation, go to "Registering and Configuring Oracle Solaris Cluster HA for DNS" on page 13. Otherwise, go to "Installing the Oracle Solaris Cluster HA for DNS Package" on page 12.

Installing the Oracle Solaris Cluster HA for DNS Package

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

▼ How to Install the Oracle Solaris Cluster HA for DNS Package

Perform this procedure on each cluster node where you want the Oracle Solaris Cluster HA for DNS software to run.

1 **On the cluster node where you are installing the data service package, become superuser.**

2 **Ensure that the `solaris` and `ha-cluster` publishers are valid.**

```
# pkg publisher
PUBLISHER                             TYPE     STATUS   URI
solaris                               origin   online   solaris-repository
ha-cluster                            origin   online   ha-cluster-repository
```

For information about setting the `solaris` publisher, see "Set the Publisher Origin To the File Repository URI" in *Copying and Creating Oracle Solaris 11 Package Repositories*.

3 **Install the Oracle Solaris Cluster HA for DNS software package.**

```
# pkg install ha-cluster/data-service/dns
```

4 **Verify that the package installed successfully.**

```
$ pkg info ha-cluster/data-service/dns
```

Installation is successful if output shows that `State` is `Installed`.

5 **Perform any necessary updates to the Oracle Solaris Cluster software.**

For instructions on updating single or multiple packages, see Chapter 11, "Updating Your Software," in *Oracle Solaris Cluster System Administration Guide*.

Registering and Configuring Oracle Solaris Cluster HA for DNS

This procedure describes how to use the `clresource` command to register and configure Oracle Solaris Cluster HA for DNS.

Note – Other options also enable you to register and configure the data service. See "Tools for Data Service Resource Administration" in *Oracle Solaris Cluster Data Services Planning and Administration Guide* for details about these options.

Setting Oracle Solaris Cluster HA for DNS Extension Properties

The sections that follow contain instructions for registering and configuring Oracle Solaris Cluster HA for DNS resources. For information about the extension properties, see Appendix A, "Oracle Solaris Cluster HA for DNS Extension Properties." The Tunable entry indicates when you can update a property.

See "Standard Properties" in *Oracle Solaris Cluster Data Services Planning and Administration Guide* for details about all the Oracle Solaris Cluster properties.

To set an extension property of a resource, include the following option in the `clresource` command that creates or modifies the resource:

`-p` *property*=*value*

`-p` *property*
: Identifies the extension property that you are setting.

value
: Specifies the value to which you are setting the extension property.

You can also use the procedures in Chapter 2, "Administering Data Service Resources," in *Oracle Solaris Cluster Data Services Planning and Administration Guide* to configure resources after the resources are created.

▼ How to Register and Configure Oracle Solaris Cluster HA for DNS

This section describes how to register and configure Oracle Solaris Cluster HA for DNS.

To perform this procedure, you need the following information about your configuration.

- The name of the resource type for Oracle Solaris Cluster HA for DNS. This name is `SUNW.dns`.
- The names of the cluster nodes that master the data service.
- The network resource that clients use to access the data service. You normally set up this IP address when you install the cluster. See the *Oracle Solaris Cluster Concepts Guide* for details about network resources.
- The path to the DNS configuration files, which you must install on a cluster file system. This path maps to the `Config_dir` resource property that is configured in this procedure.

Note – Perform this procedure on any cluster member.

1 On a cluster member, become superuser or assume a role that provides `solaris.cluster.admin` RBAC authorization.

2 Disable the SMF service `/network/dns/server:default`.

Perform this step before starting any Oracle Solaris Cluster HA for DNS resource.

In the event of any failure in the initial primary node or zone, failover is possible only if the Service Management Facility (SMF) service `/network/dns/server:default` is disabled. On all potential primary nodes, disable this service by running the following command.

```
# svcadm disable /network/dns/server:default
```

For more information on SMF, see "Introduction to SMF" in *Oracle Solaris Administration: Common Tasks*.

3 Register the resource type for the data service.

```
# clresourcetype register SUNW.dns
```

`SUNW.dns`
Specifies the predefined resource type name for your data service.

4 Create a resource group for network and DNS resources to use.

You can use the `-n` option to optionally select the set of nodes or zones on which the data service can run.

```
# clresourcegroup create [-n node-zone-list] resource-group
```

[`-n` *node-zone-list*]
Specifies a comma-separated, ordered list of zones that can master this resource group. The format of each entry in the list is *node*. In this format, *node* specifies the node name and *zone* specifies the name of a non-global Oracle Solaris zone. To specify the global zone, or to specify a node without non-global zones, specify only *node*.

This list is optional. If you omit this list, the global zone of each cluster node can master the resource group.

resource-group
Specifies the name of the resource group. This name can be your choice but must be unique for the resource groups within the cluster.

5 Add network resources to the resource group.

For example, run the following command to add a logical hostname to a resource group.

```
# clreslogicalhostname create -g resource-group -h logical-hostname [logical-hostname] \
[-N netiflist] logical-hostname
```

`-h` *logical-hostname*
Specifies a comma-separated list of network resources (logical hostname). If you require a fully qualified hostname, you must specify the fully qualified name with the `-h` option and you cannot use the fully qualified form in the resource name.

`-N` *netiflist*
Specifies an optional, comma-separated list that identifies the IPMP groups that are on each node or zone. The format of each entry in the list is *netif*`@`*node*. The replaceable items in this format are as follows:

netif Specifies an IPMP group name, such as `sc_ipmp0`, or a public network interface card (NIC). If you specify a public NIC, Oracle Solaris Cluster attempts to create the required IPMP groups.

node Specifies the name or ID of a node. To specify the global zone, or to specify a node without non-global zones, specify only *node*.

Note – Oracle Solaris Cluster does not currently support the use of the adapter name for `netif`.

---

6 Add a DNS application resource to the resource group.

```
# clresource create -g resource-group \
-t SUNW.dns -p Resource_Dependencies=network-resource,... \
-p Port_list=port-number/protocol -p DNS_mode=config-file \
-p Confdir_list=config-directory  resource
```

The resource is created in the enabled state.

`-t SUNW.dns`
Specifies the name of the resource type to which this resource belongs. This entry is required.

`-p Resource_Dependencies=`*network-resource*, …
Specifies a comma-separated list of network resources (logical hostnames) that DNS will use. If you do not specify this property, the value defaults to all the network resources that are contained in the resource group.

`-p Port_list=`*port-number/protocol*
Specifies a port number and the protocol to be used. If you do not specify this property, the value defaults to `53/udp`.

`-p DNS_mode=`*config-file*
Specifies the configuration file to use, either `conf` (which specifies the file `named.conf`) or `boot` (which specifies the file `named.boot`). If you do not specify this property, the value defaults to `conf`.

`-p Confdir_list=`*config-directory*
Specifies the DNS configuration directory, which must be on the cluster file system. Oracle Solaris Cluster HA for DNS requires this extension property. The ‘directory' directive in the global portion (options) of the `named.conf` should match this value.

resource
Specifies the DNS application resource name.

7 Run the `clresourcegroup` command to complete the following tasks.

- Enable the resource and fault monitoring.
- Move the resource group into a managed state.
- Bring the resource group online.

```
# clresourcegroup online -M resource-group
```

`-M`
Moves all resources within the resource group to the `MANAGED` state.

resource-group
Specifies the name of the resource group.

Example 1–1 Registering Failover Oracle Solaris Cluster HA for DNS

The following example shows how to register Oracle Solaris Cluster HA for DNS on a two-node cluster. Note that at the end, the `clresourcegroup` command starts Oracle Solaris Cluster HA for DNS.

```
Cluster Information
Node names: phys-schost-1, phys-schost-2
Logical hostname: schost-1
Resource group: resource-group-1 (for all the resources)
Resources: schost-1 (logical hostname), dns-1 (DNS application resource)

(Disable the SMF service /network/dns/server:default.)
# svcadm disable /network/dns/server:default

(Register the DNS resource type.)
# clresourcetype register SUNW.dns

(Add the resource group to contain all the resources.)
# clresourcegroup create resource-group-1

(Add the logical hostname resource to the resource group.)
# clreslogicalhostname create -g resource-group-1 -h schost-1 schost-1

(Add DNS application resources to the resource group.)
# clresource create -g resource-group-1 -t SUNW.dns \
-p Resource_Dependencies=schost-1 -p Port_list=53/udp \
-p DNS_mode=conf -p Confdir_list=/global/dns dns-1

(Bring the failover resource group online.)
# clresourcegroup online -M resource-group-1
```

Verifying Data Service Installation and Configuration

To verify that you have correctly installed and configured Oracle Solaris Cluster HA for DNS, run the following command after you complete the procedure "How to Register and Configure Oracle Solaris Cluster HA for DNS" on page 14.

```
# nslookup logical-hostname logical-hostname
```

In this example, *logical-hostname* is the name of the network resource that you have configured to service DNS requests. For example, `schost-1` is shown in the previous registration example. The output should indicate that the network resource that you specified answered (served) the query.

Tuning the Oracle Solaris Cluster HA for DNS Fault Monitor

The Oracle Solaris Cluster HA for DNS fault monitor is contained in the resource that represents DNS. You create this resource when you register and configure Oracle Solaris Cluster HA for DNS. For more information, see "Registering and Configuring Oracle Solaris Cluster HA for DNS" on page 13.

System properties and extension properties of this resource control the behavior of the fault monitor. The default values of these properties determine the preset behavior of the fault monitor. The preset behavior should be suitable for most Oracle Solaris Cluster installations. Therefore, you should tune the Oracle Solaris Cluster HA for DNS fault monitor *only* if you need to modify this preset behavior.

For more information, see the following sections.

- "Tuning Fault Monitors for Oracle Solaris Cluster Data Services" in *Oracle Solaris Cluster Data Services Planning and Administration Guide*
- "Changing Resource Type, Resource Group, and Resource Properties" in *Oracle Solaris Cluster Data Services Planning and Administration Guide*
- "Standard Properties" in *Oracle Solaris Cluster Data Services Planning and Administration Guide*

Operations by the Fault Monitor During a Probe

The fault monitor probe uses the `nslookup` command to query the health of DNS. Before the probe actually queries the DNS server, a check is made to confirm that network resources are configured in the same resource group as the DNS data service. If no network resources are configured, an error message is logged, and the probe exits with failure.

The result of the `nslookup` command can be either failure or success. If DNS successfully replied to the `nslookup` query, the probe returns to its infinite loop, waiting for the next probe time.

If the `nslookup` fails, the probe considers this scenario a failure of the DNS data service and records the failure in its history. The DNS probe considers every failure a complete failure.

Based on the success or failure history, a failure can cause a local restart or a data service failover. "Tuning Fault Monitors for Oracle Solaris Cluster Data Services" in *Oracle Solaris Cluster Data Services Planning and Administration Guide* further describes this action.

◆ ◆ ◆ APPENDIX A

Oracle Solaris Cluster HA for DNS Extension Properties

This section describes the extension properties for the resource type `SUNW.dns`. This resource type represents the DNS application in an Oracle Solaris Cluster configuration.

For details about system-defined properties, see the `r_properties(5)` man page and the `rg_properties(5)` man page.

The extension properties of the `SUNW.dns` resource type are as follows:

`Confdir_list`
The DNS configuration directory, which contains the configuration file for a DNS instance.

Data type String

Default No default defined

Range Not applicable

Tunable At creation

`DNS_mode`
The DNS configuration file to use, either `conf` (which specifies the file `named.conf`) or `boot` (which specifies the file `named.boot`).

Data type String

Default `conf`

Range Not applicable

Tunable At creation

`Monitor_retry_count`
The number of times that the process monitor facility (PMF) restarts the fault monitor during the time window that the `Monitor_retry_interval` property specifies. This property refers to restarts of the fault monitor itself rather than to the resource. The system-defined properties `Retry_interval` and `Retry_count` control resource restarts.

Data type Integer

Default 4

Range 0 - 2,147,483,641

–1 indicates an infinite number of retry attempts.

Tunable At any time

`Monitor_retry_interval`
The time (in minutes) over which failures of the fault monitor are counted. If the number of times that the fault monitor fails exceeds the value that is specified in the extension property `Monitor_retry_count` within this period, the PMF does not restart the fault monitor.

Data type Integer

Default 2

Range 0 – 2,147,483,641

–1 indicates an infinite retry interval.

Tunable At any time

`Probe_timeout`
The timeout value (in seconds) that the fault monitor uses to probe a DNS instance.

Data type Integer

Default 120

Range 0 – 2,147,483,641

Tunable At any time

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