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<td>▼ How to Create and Enable Resources for the Zone Script Component</td>
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</tr>
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</table>
Preface

*Oracle Solaris Cluster Data Service for Oracle Solaris Zones 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>
<thead>
<tr>
<th>Typeface</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>AaBbCc123</td>
<td>The names of commands, files, and directories, and onscreen computer output</td>
<td>Edit your .login file. Use \ls -a to list all files. machine_name% you have mail.</td>
</tr>
<tr>
<td>AaBbCc123</td>
<td>What you type, contrasted with onscreen computer output</td>
<td>machine_name% su Password:</td>
</tr>
<tr>
<td>aabbcc123</td>
<td>Placeholder: replace with a real name or value</td>
<td>The command to remove a file is rm filename.</td>
</tr>
<tr>
<td>AaBbCc123</td>
<td>Book titles, new terms, and terms to be emphasized</td>
<td>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.</td>
</tr>
</tbody>
</table>

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>
<thead>
<tr>
<th>Shell</th>
<th>Prompt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bash shell, Korn shell, and Bourne shell</td>
<td>$</td>
</tr>
<tr>
<td>Bash shell, Korn shell, and Bourne shell for superuser</td>
<td>#</td>
</tr>
<tr>
<td>C shell</td>
<td>machine_name%</td>
</tr>
<tr>
<td>C shell for superuser</td>
<td>machine_name#</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware installation and administration</td>
<td>Oracle Solaris Cluster Hardware Administration Manual</td>
</tr>
<tr>
<td></td>
<td>Individual hardware administration guides</td>
</tr>
<tr>
<td>Concepts</td>
<td>Oracle Solaris Cluster Concepts Guide</td>
</tr>
<tr>
<td>Software installation</td>
<td>Oracle Solaris Cluster Software Installation Guide</td>
</tr>
<tr>
<td>Data service installation and administration</td>
<td>Oracle Solaris Cluster Data Services Planning and Administration Guide</td>
</tr>
<tr>
<td></td>
<td>and individual data service guides</td>
</tr>
<tr>
<td>Data service development</td>
<td>Oracle Solaris Cluster Data Services Developer's Guide</td>
</tr>
<tr>
<td>System administration</td>
<td>Oracle Solaris Cluster System Administration Guide</td>
</tr>
<tr>
<td></td>
<td>Oracle Solaris Cluster Quick Reference</td>
</tr>
<tr>
<td>Software upgrade</td>
<td>Oracle Solaris Cluster Upgrade Guide</td>
</tr>
<tr>
<td>Error messages</td>
<td>Oracle Solaris Cluster Error Messages Guide</td>
</tr>
<tr>
<td>Command and function references</td>
<td>Oracle Solaris Cluster Reference Manual</td>
</tr>
<tr>
<td></td>
<td>Oracle Solaris Cluster Data Services Reference Manual</td>
</tr>
<tr>
<td></td>
<td>Oracle Solaris Cluster Quorum Server Reference Manual</td>
</tr>
</tbody>
</table>

Access to Oracle Support

Oracle customers have access to electronic support through My Oracle Support. For information, visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info or visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.
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 4.1)

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

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

Also have available the contents of the /var/adm/messages file.
This chapter explains how to install and configure Oracle Solaris Cluster HA for Solaris Zones (HA for Solaris Zones) for solaris and solaris10 brand zones.

This chapter contains the following sections.

- “HA for Solaris Zones Overview” on page 9
- “Overview of Installing and Configuring HA for Solaris Zones” on page 11
- “Planning the HA for Solaris Zones Installation and Configuration” on page 11
- “Installing and Configuring Zones” on page 15
- “Verifying the Installation and Configuration of a Zone” on page 21
- “Installing the HA for Solaris Zones Package” on page 22
- “Registering and Configuring HA for Solaris Zones” on page 22
- “Verifying the HA for Solaris Zones and Configuration” on page 39
- “Upgrading Non-Global Zones Managed by HA for Oracle Solaris Zones” on page 39
- “Tuning the HA for Solaris Zones Fault Monitors” on page 40
- “Tuning the HA for Solaris Zones Stop_timeout property” on page 42
- “Denying Cluster Services for a Non-Global Zone” on page 43
- “Debugging HA for Solaris Zones” on page 43

HA for Solaris Zones Overview

The solaris and solaris10 brands of non-global zones are supported for configuration with the HA for Solaris Zones data service. A solaris brand zone is a complete runtime environment for applications that run on the Oracle Solaris 11 Operating System. Solaris 10 Resource Manager and Solaris Zones software partitioning technology are both parts of the solaris brand zone. These components address different qualities the zone can deliver and work together to create a complete zone. The zones portion provides a virtual mapping from the application to the platform resources. Zones allow application components to be isolated from one application even though the zones share a single instance of the Solaris Operating System. Resource management features permit you to allocate the quantity of resources that a workload receives.
The Solaris Zones facility in the Solaris Operating System provides an isolated and secure environment in which to run applications on your system. When you create a zone, you produce an application execution environment in which processes are isolated from the rest of the system.

This isolation prevents processes that are running in one zone from monitoring or affecting processes that are running in other zones. Even a process that is running with superuser credentials cannot view or affect activity in other zones. A zone also provides an abstract layer that separates applications from the physical attributes of the machine on which they are deployed. Examples of these attributes include physical device paths.

Every Solaris system contains a global zone. The global zone is both the default zone for the system and the zone that is used for system-wide administrative control. Non-global zones are referred to as zones and are created by the administrator of the global zone.

HA for Solaris Zones enables Oracle Solaris Cluster to manage Solaris Zones by providing components to perform the following operations:

- The orderly booting, shutdown and fault monitoring of a zone through the `sczb` component.
- The orderly startup, shutdown and fault monitoring of an application within the zone, using scripts or commands through the `sczsh` component.
- The orderly startup, shutdown and fault monitoring of a Solaris Service Management Facility (SMF) service within the zone through the `sczs` component.

You can configure HA for Solaris Zones as a failover service or a multiple-masters service. You cannot configure HA for Solaris Zones as a scalable service.

When a Solaris Zone is managed by the HA for Solaris Zones data service, the Solaris Zone becomes a Solaris HA zone or a multiple-masters Solaris Zone across the Oracle Solaris Cluster nodes. The failover in case of a Solaris HA zone is managed by the HA for Solaris Zones data service, which runs only within the global zone.

You can also choose to set up non-global zones that do not participate in the cluster. A root user logged into one of these zones is not able to discover or disrupt operation of the cluster. See "Denying Cluster Services for a Non-Global Zone" on page 43 for more information.

For conceptual information about failover data services, multiple-masters data services, and scalable data services, see Oracle Solaris Cluster Concepts Guide.
Overview of Installing and Configuring HA for Solaris Zones

The following table summarizes the tasks for installing and configuring HA for Solaris Zones 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>
<thead>
<tr>
<th>Task</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan the installation</td>
<td>“Planning the HA for Solaris Zones Installation and Configuration” on page 11</td>
</tr>
<tr>
<td>Install and configure the Solaris Zones</td>
<td>“Installing and Configuring Zones” on page 15</td>
</tr>
<tr>
<td>Verify installation and configuration</td>
<td>“How to Verify the Installation and Configuration of a Zone” on page 21</td>
</tr>
<tr>
<td>Install HA for Solaris Zones Packages</td>
<td>“Installing the HA for Solaris Zones Package” on page 22</td>
</tr>
<tr>
<td>Register and configure HA for Solaris Zones components</td>
<td>“Registering and Configuring HA for Solaris Zones” on page 22</td>
</tr>
<tr>
<td>Verify HA for Solaris Zones installation and configuration</td>
<td>“Verifying the HA for Solaris Zones and Configuration” on page 39</td>
</tr>
<tr>
<td>Upgrading the non-global zones managed by HA for Solaris Zones</td>
<td>“Upgrading Non-Global Zones Managed by HA for Oracle Solaris Zones” on page 39</td>
</tr>
<tr>
<td>Tune the HA for Solaris Zones fault monitors</td>
<td>“Tuning the HA for Solaris Zones Fault Monitors” on page 40</td>
</tr>
<tr>
<td>Tune the HA for Solaris Zones Stop_timeout property</td>
<td>“Tuning the HA for Solaris Zones Stop_timeout property” on page 42</td>
</tr>
<tr>
<td>Debug HA for Solaris Zones</td>
<td>“How to Activate Debugging for HA for Solaris Zones” on page 43</td>
</tr>
</tbody>
</table>

Planning the HA for Solaris Zones Installation and Configuration

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

Configuration Restrictions

The configuration restrictions in the subsections that follow apply only to HA for Solaris Zones.
Caution – Your data service configuration might not be supported if you do not observe these restrictions.

**Restrictions for Zone Network Addresses**

The configuration of a zone’s network addresses depends on the level of high availability (HA) you require for it and the configured `ip-type` option. You can choose between no HA, HA through the use of only IPMP, or HA through the use of IPMP and SUNW.LogicalHostName (`ip-type=shared only`).

Your choice of a zone’s network addresses configuration affects some configuration parameters for the zone boot resource. For more information, see “Registering and Configuring HA for Solaris Zones” on page 22.

The following restrictions apply if `ip-type` is set to shared:

- If HA for the zone’s addresses is not required, then configure the zone’s addresses by using the `zonecfg` utility.
- If only HA through IPMP protection in the global zone is required, then configure the zone’s addresses by using the `zonecfg` utility and place the zone’s addresses on an adapter within an IPMP group.
- If HA through IPMP protection in the global zone and protection against the failure of all physical interfaces by triggering a failover is required, choose one option from the following list:
  - If you require the SUNW.LogicalHostName resource type to manage one or a subset of the zone’s addresses, configure a SUNW.LogicalHostName resource for those zone’s addresses and not by using the `zonecfg` utility. Use the `zonecfg` utility only to configure the zone’s addresses that are not required to be under the control of the SUNW.LogicalHostName resource.
  - If you require the SUNW.LogicalHostName resource type to manage all the zone’s addresses, configure a SUNW.LogicalHostName resource with a list of the zone’s addresses and do not configure them by using the `zonecfg` utility.
  - Otherwise, configure the zone’s addresses by using the `zonecfg` utility and configure a separate redundant IP address in the same subnet for use by a SUNW.LogicalHostName resource, which must not be configured using the `zonecfg` utility.

The following restrictions apply if `ip-type` is set to exclusive:

- The `SC_NETWORK` variable in the `sczbt_config` file must be set to `false` to successfully register the `sczbt` resource.
- Do not configure a resource dependency on a SUNW.LogicalHostName resource from the `sczbt` resource.
A linkname is required for anet resources within zonecfg. Set the linkname value explicitly instead of using the auto option.

**Restrictions for an HA Zone**

The zone path of a zone in an HA zone configuration must reside on a highly available local file system. The zone must be configured on each cluster node where the zone can reside.

The zone is active on only one node at a time, and the zone's address is plumbed on only one node at a time. Application clients can then reach the zone through the zone's address, wherever that zone resides within the cluster.

Ensure that the zone's autoboot property is set to false. Setting a zone's autoboot property to false prevents the zone from being booted when the global zone is booted. The HA for Solaris Zones data service can manage a zone only if the zone is booted under the control of the data service.

Ensure that the zone configuration defines a generic attribute with name osc-ha-zone of type boolean and value true. This attribute is used by the svc:/system/cluster/osc-ha-zone-state-cleanup SMF service on each node to identify a zone controlled by the sczbt component. The svc:/system/cluster/osc-ha-zone-state-cleanup SMF service must be enabled.

For a solaris brand zone, ensure that the universally unique ID (UUID) of each node's boot-environment (BE) root dataset is the same value.

**Restrictions for a Multiple-Masters Zone**

The zone path of a zone in a multiple-masters configuration must reside on the local disks of each node. The zone must be configured with the same name on each node that can master the zone.

Each zone that is configured to run within a multiple-masters configuration must also have a zone-specific address. Load balancing for applications in these configurations is typically provided by an external load balancer. You must configure this load balancer for the address of each zone. Application clients can then reach the zone through the load balancer's address.

Ensure that the zone's autoboot property is set to false. Setting a zone's autoboot property to false prevents the zone from being booted when the global zone is booted. The HA for Solaris Zones data service can manage a zone only if the zone is booted under the control of the data service.

**Restrictions for the Zone Path of a Zone**

The zone path of a zone that HA for Solaris Zones manages cannot reside on a global file system. If the zone is in a failover configuration, the zone path must reside on a highly available local file system.
If the zone is in a multiple-masters configuration, the zone path must reside on the local disks of each node.

**Restrictions on Major Device Numbers in /etc/name_to_major**

For shared devices, Oracle Solaris Cluster requires that the major and minor device numbers are identical on all nodes in the cluster. If the device is required for a zone, ensure that the major device number is the same in /etc/name_to_major on all nodes in the cluster that will host the zone.

**Configuration Requirements**

The configuration requirements in this section apply only to HA for Solaris Zones.

**Caution** – If your data service configuration does not conform to these requirements, the data service configuration might not be supported.

**Dependencies Between HA for Solaris Zones Components**

The dependencies between the HA for Solaris Zones components are described in the following table:

<table>
<thead>
<tr>
<th>Component</th>
<th>Dependency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone boot resource (sczbt)</td>
<td>SUNW.HAStoragePlus - In a failover configuration, the zone’s zone path must be on a highly available file system managed by a SUNW.HAStoragePlus resource</td>
</tr>
<tr>
<td></td>
<td>SUNW.LogicalHostName - This dependency is required only if the zone’s address is managed by a SUNW.LogicalHostName resource and the ip-type is set to shared</td>
</tr>
<tr>
<td>Zone script resource (sczsh)</td>
<td>Zone boot resource</td>
</tr>
<tr>
<td>Zone SMF resource (sczsrmf)</td>
<td>Zone boot resource</td>
</tr>
</tbody>
</table>

These dependencies are set when you register and configure HA for Solaris Zones. For more information, see “Registering and Configuring HA for Solaris Zones” on page 22.

The zone script resource and SMF resource are optional. If used, multiple instances of the zone script resource and SMF resource can be deployed within the same resource group as the zone boot resource. Furthermore, if more elaborate dependencies are required then refer to the r_properties(5) and rg_properties(5) man pages for further dependencies and affinities settings.
Parameter File Directory for HA for Solaris Zones

The boot component and script component of HA for Solaris Zones require a parameter file to pass configuration information to the data service. You must create a directory for these files. The directory location must be available on the node that is to host the zone and must not be in the zone’s zone path. The directory must be accessible only from the global zone. The parameter file for each component is created automatically when the resource for the component is registered.

Note – If a multiple-masters zone configuration is being deployed, you must ensure that the parameter directory exists on all nodes that will host the zone. You can either place separate copies of the parameter directory on local storage on each node or place the parameter directory on a cluster file system. The advantage of using a cluster file system ensures that only one copy of the parameter directory exists, whereas if you have separate copies of the parameter directory on local storage you must ensure the contents are kept up to date after registering an sczbt or sczsh resource and before you enable the resource.

Installing and Configuring Zones

Installing and configuring Solaris Zones involves the following tasks:

1. Enabling a zone to run in your chosen data service configuration, as explained in the following sections:
   - “How to Enable a Zone to Run in a Failover Configuration” on page 15
   - “How to Enable a Zone to Run in a Multiple-Masters Configuration” on page 16

2. Installing and configuring a zone, as explained in:
   - “How to Install a Zone and Perform the Initial Internal Zone Configuration” on page 16

Perform this task for each zone that you are installing and configuring. This section explains only the special requirements for installing Solaris Zones for use with HA for Solaris Zones. For complete information about installing and configuring Solaris Zones, see Oracle Solaris Administration: Oracle Solaris Zones, Oracle Solaris 10 Zones, and Resource Management.

How to Enable a Zone to Run in a Failover Configuration

1. Register the SUNW.HAStoragePlus resource type.
   # clresourcetype register SUNW.HAStoragePlus

2. Create a failover resource group.
   # clresourcegroup create solaris-zone-resource-group
3 Create a resource for the zone’s disk storage.
   This HAStoragePlus resource is for the zonepath. The file system must be a failover file system.
   
   # clresource create \\
   -g solaris-zone-resource-group \\
   -t SUNW.HAStoragePlus \\
   -p zpools=solaris-zone-instance-zpool \\
   solaris-zone-has-resource-name

4 (Optional) Create a resource for the zone’s logical hostname.
   
   # clreslogicalhostname create \\
   -g solaris-zone-resource-group \\
   -h solaris-zone-logical-hostname \\
   solaris-zone-logical-hostname-resource-name

5 Enable the failover resource group.
   
   # clresourcegroup online -M solaris-zone-resource-group

▼ How to Enable a Zone to Run in a Multiple-Masters Configuration

1 Create a scalable resource group.
   
   # clresourcegroup create \\
   -p Maximum_primaries=max-number \\
   -p Desired_primaries=desired-number \\
   solaris-zone-resource-group

2 Enable the scalable resource group.
   
   # clresourcegroup online -M solaris-zone-resource-group

▼ How to Install a Zone and Perform the Initial Internal Zone Configuration

Perform this task on each node that is to host the zone.

Note – For complete information about installing a zone, see Oracle Solaris Administration: Oracle Solaris Zones, Oracle Solaris 10 Zones, and Resource Management.

Before You Begin Consult “Configuration Restrictions” on page 11 and then determine the following requirements for the deployment of the zone with Oracle Solaris Cluster:

- The number of Solaris Zone instances that are to be deployed.
- The zpool containing the file system that is to be used by each Solaris Zone instance.
Ensure that the zone is configured.

If the zone that you are installing is to run in a failover configuration, configure the zone’s zone path to specify a file system on a zpool. The zpool must be managed by the SUNW.HAStoragePlus resource that you created in "How to Enable a Zone to Run in a Failover Configuration" on page 15.

For detailed information about configuring a zone before installation of the zone, see the following documentation:
- Chapter 16, “Non-Global Zone Configuration (Overview),” in Oracle Solaris Administration: Oracle Solaris Zones, Oracle Solaris 10 Zones, and Resource Management
- Chapter 17, “Planning and Configuring Non-Global Zones (Tasks),” in Oracle Solaris Administration: Oracle Solaris Zones, Oracle Solaris 10 Zones, and Resource Management

Note – This procedure assumes you are performing it on a two-node cluster. If you perform this procedure on a cluster with more than two nodes, perform on all nodes any steps that say to perform them on both nodes.

1 Become superuser on one node of the cluster.
Alternatively, if your user account is assigned the System Administrator profile, issue commands as non-root through a profile shell, or prefix the command with the pfexec command.

2 If you will use a solaris10 brand zone, set up the system image.

3 Create an HAStoragePlus resource.
Specify the ZFS storage pool and the resource group that you created.
```
phys-schost-1# clresource create -t SUNW.HAStoragePlus \
    -g resourcegroup -p Zpools=pool hasp-resource
```

4 Bring the resource group online.
```
phys-schost-1# clresourcegroup online -eM resourcegroup
```

5 Create a ZFS file-system dataset on the ZFS storage pool that you created.
You will use this file system as the zone root path for the solaris brand zone that you create later in this procedure.
```
phys-schost-1# zfs create pool/filesystem
```
For a solaris brand zone, ensure that the universally unique ID (UUID) of each node's boot-environment (BE) root dataset is the same value.

a. **Determine the UUID of the node where you initially created the zone.**

   Output is similar to the following.
   
   ```bash
   phys-schost-1# beadm list -H
   ...
   b101b-SC;8fe53702-16c3-eb21-ed85-d19af92c6bbd;NR;/;756...
   ```
   
   In this example output, the UUID is 8fe53702-16c3-eb21-ed85-d19af92c6bbd and the BE is b101b-SC.

b. **Set the same UUID on the second node.**

   ```bash
   phys-schost-2# zfs set org.opensolaris.libbe:uuid=uuid rpool/ROOT/BE
   ```

   **Note** – If you use a multimaster configuration, you do not need to set the UUID as described in this step.

On both nodes, configure the solaris or solaris10 brand non-global zone.

Set the zone root path to the file system that you created on the ZFS storage pool.

a. **Configure the zone.**

   **Note** – You must define the osc-ha-zone attribute in the zone configuration, setting type to boolean and value to true.

   ```bash
   phys-schost# zonecfg -z zonename \n   'create ; add attr; set name=osc-ha-zone; set type=boolean; set value=true; end; set zonopath=/pool/filesystem/zonename ; set autoboot=false'
   ```

   ```bash
   phys-schost# zonecfg -z zonename \n   'create ; set brand=solaris10; set zonopath=/pool/filesystem/zonename ; add attr; set name=osc-ha-zone; set type=boolean; set value=true; end; set autoboot=false'
   ```

b. **Verify the zone configuration.**

   ```bash
   phys-schost# zoneadm list -cv
   ID  NAME   STATUS    PATH            BRAND   IP
   0  global running /                  solaris  shared
   -  zonename configured /pool/filesystem/zonename  brand  shared
   ```

8 **From the node that masters the HAStoragePlus resource, install the solaris or solaris10 brand non-global zone.**
Note – For a multi-master configuration, you do not need an HAStoragePlus resource as described in Step a and you do not need to perform the switchover described in Step 9.

Output is similar to the following:

a. Determine which node masters the HAStoragePlus resource.

```
phys-schost# cresource status
=== Cluster Resources ===
Resource Name Node Name Status Message
-------------- ---------- ------- -------
hasp-resource phys-schost-1 Online Online
phys-schost-2 Offline Offline
```

Perform the remaining tasks in this step from the node that masters the HAStoragePlus resource.

b. Install the zone on the node that masters the HAStoragePlus resource for the ZFS storage pool.

- For a solaris brand zone, use the following command.

```
phys-schost-1# zoneadm -z zonename install
```

- For a solaris10 brand zone, use the following command.

```
phys-schost-2# zoneadm -z zonename install -a flarimage -u
```

c. Verify that the zone is installed.

```
phys-schost-1# zoneadm list -cv
ID NAME STATUS PATH BRAND IP
0 global running / solaris shared
- zonename installed /pool/filesystem/zonename brand shared
```

d. Boot the zone that you created and verify that the zone is running.

```
phys-schost-1# zoneadm -z zonename boot
phys-schost-1# zoneadm list -cv
ID NAME STATUS PATH BRAND IP
0 global running / solaris shared
- zonename running /pool/filesystem/zonename brand shared
```

e. Open a new terminal window and log in to the zone console.
Follow the interactive steps to finish the zone configuration.

f. Halt the zone.

The zone’s status should return to installed.

```
phys-schost-1# zoneadm -z zonename halt
```
g. Forcibly detach the zone.
   
   \texttt{phys-schost-1\# zoneadm -z zonename detach -F}
   
The zone state changes from installed to configured.

9 Switch the resource group to the other node and forcibly attach the zone.

a. Switch over the resource group.
   
   Input is similar to the following, where \texttt{phys-schost-1} is the node that currently masters
   the resource group and \texttt{phys-schost-2} is the node to which you switch the resource group.
   
   \texttt{phys-schost-1\# cresourcegroup switch -n phys-schost-2 resourcegroup}
   
   Perform the remaining tasks in this step from the node to which you switch the resource
   group.

b. Forcibly attach the zone to the node to which you switched the resource group.

   \texttt{phys-schost-2\# zoneadm -z zonename attach -F}

   Perform the remaining tasks in this step from the node to which you switch the resource
   group.

c. Verify that the zone is installed on the node.

   Output is similar to the following:
   
   \texttt{phys-schost-2\# zoneadm list -cv}
   
   \begin{tabular}{|c|c|c|c|}
   \hline
   ID & NAME & STATUS & PATH & BRAND & IP \\
   \hline
   0 & global & running & / & solaris & shared \\
   - & zonename & installed & /pool/filesystem/zonename & brand & shared \\
   \hline
   \end{tabular}

   d. Boot the zone.

   \texttt{phys-schost-2\# zoneadm -z zonename boot}

   e. Open a new terminal window and log in to the zone.

   Perform this step to verify that the zone is functional.

   \texttt{phys-schost-2\# zlogin -C zonename}

f. Halt the zone.

   \texttt{phys-schost-2\# zoneadm -z zonename halt}

g. Forcibly detach the zone.

   \texttt{phys-schost-1\# zoneadm -z zonename detach -F}
   
The zone state changes from installed to configured.
Verifying the Installation and Configuration of a Zone

Before you install the HA for Solaris Zones packages, verify that the zones that you created are correctly configured to run in a cluster. This verification does not verify that the zones are highly available because the HA for Solaris Zones data service is not yet installed.

How to Verify the Installation and Configuration of a Zone

Perform this procedure for each zone that you created in “Installing and Configuring Zones” on page 15.

1. Start the zone.
   
   ```
   # zoneadm -z zone boot
   ```

2. Log in to the zone.
   
   ```
   # zlogin zone
   ```

3. Perform the required task depending upon the brand type of the zone.

   ■ For a solaris and solaris10 brand type zone, confirm that the zone has reached the `svc:/milestone/multi-user-server:default` milestone.

   ```
   # svcs -a | grep milestone
   online Apr_10 svc:/milestone/network:default
   online Apr_10 svc:/milestone/devices:default
   online Apr_10 svc:/milestone/single-user:default
   online Apr_10 svc:/milestone/sysconfig:default
   online Apr_10 svc:/milestone/name-services:default
   online Apr_10 svc:/milestone/multi-user:default
   online Apr_10 svc:/milestone/multi-user-server:default
   ```

4. Stop the zone.
   
   ```
   # zoneadm -z zone halt
   ```

Next Steps

Go to “Registering and Configuring HA for Solaris Zones” on page 22.
Installing the HA for Solaris Zones Package

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

▼ How to Install the HA for Solaris Zones Package

Perform this procedure on each cluster node where you want the HA for Solaris Zones 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.

   ```bash
   # 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 HA for Solaris Zones software package.

   ```bash
   # pkg install ha-cluster/data-service/ha-zones
   ``

4. Verify that the package installed successfully.

   ```bash
   $ pkg info ha-cluster/data-service/ha-zones
   ``

   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 HA for Solaris Zones

Before you perform this procedure, ensure that the HA for Solaris Zones data service packages are installed.

Use the configuration and registration files in the following directories to register the HA for Solaris Zones resources:

- `/opt/SUNWsczone/sczbt/util`
- `/opt/SUNWsczone/sczsh/util`
- `/opt/SUNWsczone/sczsmf/util`
The files define the dependencies that are required between the HA for Solaris Zones components. For information about these dependencies, see “Dependencies Between HA for Solaris Zones Components” on page 14.

Registering and configuring HA for Solaris Zones involves the tasks that are explained in the following sections:

1. “Specifying Configuration Parameters for the Zone Boot Resource” on page 23
2. “Writing Scripts for the Zone Script Resource” on page 28
3. “Specifying Configuration Parameters for the Zone Script Resource” on page 29
4. “Writing a Service Probe for the Zone SMF Resource” on page 30
5. “Specifying Configuration Parameters for the Zone SMF Resource” on page 31
6. “How to Create and Enable Resources for the Zone Boot Component” on page 33
7. “How to Create and Enable Resources for the Zone Script Component” on page 38
8. “How to Create and Enable Resources for the Zone SMF Component” on page 38

Specifying Configuration Parameters for the Zone Boot Resource

HA for Solaris Zones provides the script `sczbt_register`, which automates the process of configuring the zone boot resource. By default this script obtains configuration parameters from the `sczbt_config` file in the `/opt/SUNWsczone/sczbt/util` directory. To specify configuration parameters for the zone boot resource, copy the `sczbt_config` file to a different filename and amend it as described below. It is recommended to keep this file as a future reference. The register script provides option `-f` to specify the fully qualified filename to the copied configuration file.

The directory you specify for the `PARAMETERDIR` can exist on the local file system of all nodes, the global file system, or the failover file system.

Each configuration parameter in the `sczbt_config` file is defined as a keyword-value pair. The `sczbt_config` file already contains the required keywords and equals signs. For more information, see “Listing of `sczbt_config`” on page 45. When you edit the `sczbt_config` file, add the required value to each keyword.

For more information, see “How to Create and Enable Resources for the Zone Boot Component” on page 33.

The keyword-value pairs in the `sczbt_config` file are as follows:

- RS=`sczbt-rs`
- RG=`sczbt-rg`
- PARAMETERDIR=`sczbt-parameter-directory`
- SC_NETWORK=`true|false`
- SC_LH=`sczbt-lh-rs`
- FAILOVER=`true|false`
HAS_RS=soczbt-has-rs
Zonename=zone-name
Zonebrand=zone-brand-type
Zonebootopt=zone-boot-options
Milestone=zone-boot-milestone
LXrunlevel=linux-runlevel
SLrunlevel=solaris-legacy-runlevel
Mounts=list-of-mountpoints

The meaning and permitted values of the keywords in the sczbt_config file are as follows:

RS=soczbt-rs
   Specifies the name that you are assigning to the zone boot resource. You must specify a value for this keyword.

RG=soczbt-rg
   Specifies the name of the resource group the zone boot resource will reside in. You must specify a value for this keyword.

PARAMETERDIR=soczbt parameter directory
   Specifies the directory name that you are assigning to the parameter directory where some variables and their values will be stored. You must specify a value for this keyword. This directory can exist on the local file system of all nodes, the global file system, or on a failover file system.

SC_NETWORK=true|false
   Specifies whether the zone boot resource is network aware with a SUNW.LogicalHostName resource. You must specify a value for this keyword.
   - If HA for the zone’s addresses is not required, then configure the zone’s addresses by using the zonecfg utility.
     SC_NETWORK=false
     SC_LH=
   - If only HA through IPMP protection is required, then configure the zone’s addresses by using the zonecfg utility and then place the zone’s addresses on an adapter within an IPMP group.
     SC_NETWORK=false
     SC_LH=
   - If HA through IPMP protection and protection against the failure of all physical interfaces by triggering a failover is required, choose one option from the following list:
     - If you require the SUNW.LogicalHostName resource type to manage one or a subset of the zone’s addresses, configure a SUNW.LogicalHostName resource for those zone’s addresses and not by using the zonecfg utility. Use the zonecfg utility to configure only the zone’s addresses that are not to be under the control of the SUNW.LogicalHostName resource.
       SC_NETWORK=true
       SC_LH=Name of the SUNW.LogicalHostName resource
If you require the SUNW.LogicalHostName resource type to manage all the zone's addresses, configure a SUNW.LogicalHostName resource with a list of the zone's addresses and do not configure them by using the zonecfg utility.

\[
\text{SC NETWORK=true} \\
\text{SC LH= Name of the SUNW.LogicalHostName resources}
\]

Otherwise, configure the zone's addresses by using the zonecfg utility and configure a separate redundant IP address for use by a SUNW.LogicalHostName resource, which must not be configured using the zonecfg utility.

\[
\text{SC NETWORK=false} \\
\text{SC LH= Name of the SUNW.LogicalHostName resource}
\]

SC_LH=sczbt-lh-rs

Specifies the name of the SUNW.LogicalHostName resource for the zone boot resource. Refer to "Restrictions for Zone Network Addresses" on page 12 for a description of when to set this variable. This name must be the SUNW.LogicalHostName resource name you assigned when you created the resource in Step 4.

FAILOVER=true|false

Specifies whether the zone's zone path is on a highly available file system.

HAS_RS=sczbt-has-rs

Specifies the name of the SUNW.HAStoragePlus resource for the zone boot resource. This name must be the SUNW.HAStoragePlus resource name you assigned when you created the resource in “How to Enable a Zone to Run in a Failover Configuration” on page 15. You must specify a value for this keyword if FAILOVER=true is set. This will cause the scbzt_register script to define a Resource_dependencies_offline_restart resource dependency from the zone boot resource to the specified SUNW.HAStoragePlus resource.

For a multi-master configuration, the HAS_RS= parameter must be empty because there is no SUNW.HAStoragePlus resource. All the zone paths are local to each node in that configuration.

Zonename=zone-name

Specifies the zone name. You must specify a value for this keyword.

Zonebrand=zone-brand-type

Specifies the brand type of the zone. The options that are currently supported are solaris or solaris10. You must specify a value for this keyword.

Zonebootopt=zone-boot-options

Specifies the zone boot option to use. Only -s is supported. Leaving this variable blank will cause the zone to boot to the multi-user-server milestone.

Milestone=zone-boot-milestone

Specifies the milestone the zone must reach to be considered successfully booted. This option is used for the solaris or solaris10 brand type. You must specify a value for this keyword if you set the Zonebrand option to solaris or solaris10.
LXrunlevel=linux-runlevel
This option was used on Oracle Solaris 10 and is now deprecated. Any value for this keyword is ignored.

SLrunlevel=solaris-legacy-runlevel
This option was used on Oracle Solaris 10 and is now deprecated. Any value for this keyword is ignored.

Mounts=list-of-mountpoints
Specifies a space separated list of directories with their mount options, which will automatically get lofs mounted from the global zone into the booted zone. The mount point used in the global zone can be different to the mount point in the booted zone. Specifying a value for this keyword is optional.

The Mounts keyword format is as follows:
Mounts="/global-zone-dir:/local-zone-dir:mount-options <next entry>"

While mount-options can be a comma separated list of file system mount options.

The only required entry when setting this keyword is the /global-zone-dir part of the colon separated variable. The /local-zone-dir and mount-options part can be omitted.

Omitting the /local-zone-dir part will make the zone's mount point the same as the global zone directory.

Omitting the mount-options part will not provide any mount options except the default options from the mount command.

**Note** – If you are omitting the /local-zone-dir or the mount-options, you must also omit the “:” as delimiter.

**Note** – You must manually create any mount point directories within the booted zone that will be used within the Mounts keyword, before registering this resource within Oracle Solaris Cluster.

**Note** – If the file system of the source mount point in the global zone is mounted by a SUNW.HAStoragePlus resource, you must specify a strong resource dependency from the sczbt resource to this SUNW.HAStoragePlus resource.
**EXAMPLE 1-1  Sample sczb_t_config File**

This example shows an `sczb_t_config` file in which configuration parameters are set as follows:

- The name of the zone boot resource is `zone1-rs`.
- The name of the resource group for the zone boot resource is `zone1-rg`.
- The name of the parameter file directory for the zone boot resource is `/global/zones/pfiles`.
- Indicates that the zone's address is managed by a `SUNW.LogicalHostName` resource and is true.
- The name of the `SUNW.LogicalHostName` resource name for the zone boot resource is `zone1-lh`.
- Indicates that the zone boot resource's zone path is managed by a `SUNW.LogicalHostName` resource and is true.
- The name of the `SUNW.HAStoragePlus` resource name for the zone boot resource is `zone1-has`.
- The name of the zone is `zone1`.
- The brand type of the zone is `solaris`.
- Indicates that the zone boot resource's boot option is null.
- Indicates that the zone boot resource's milestone is `multi-user-server`.
- Defines that `/global/app/bin` from the global zone gets mounted read-only within zone `zone1` under mount point `/app/bin`.
- Defines that `/app/data` from the global zone gets mounted read-write within zone `zone1` under mount point `/app/data`.
- Defines that `/logs` from the global zone gets mounted with default mount options within zone `zone1` under mount point `/logs`.

```
RS=zone1-rs
RG=zone1-rg
PARAMETERDIR=/global/zones/pfiles
SC_NETWORK=true
SC_LH=zone1-lh
FAILOVER=true
HAS_RS=zone1-has
Zonename=zone1
Zonebrand=solaris
Zonebootopt=
Milestone=multi-user-server
Mounts="/global/app/bin:/app/bin:ro /app/data:rw /logs"
```
Writing Scripts for the Zone Script Resource

The zone script resource provides the ability to run commands or scripts to start, stop and probe an application within a zone. The zone script resource depends on the zone boot resource. The command or script names are passed to the zone script resource when the resource is registered and must meet with the following requirements.

- The command or script must contain the fully qualified path within the zone.
- The command or script must be executable by root.
- The command or script must return one of the following return codes.

**TABLE 1-3** Return codes

<table>
<thead>
<tr>
<th>Return code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Successful completion</td>
</tr>
<tr>
<td>&gt;0</td>
<td>An error has occurred</td>
</tr>
<tr>
<td>201</td>
<td>(Probe only) – An error has occurred that requires an immediate failover of the resource group</td>
</tr>
<tr>
<td>&gt;0 &amp; !=201</td>
<td>(Probe only) – An error has occurred that requires a resource restart</td>
</tr>
</tbody>
</table>

**Note** – For an immediate failover of the zone script resource, you must configure the resource properties `Failover_mode` and `Failover_enabled` to meet the required behavior. Refer to the `r_properties(5)` man page when setting the `Failover_mode` property and the `SUNW.gds(5)` man page when setting the `Failover_enabled` property.

**EXAMPLE 1-2** Zone Probe Script for Apache2

This example shows a simple script to test that the Apache2 service is running, beyond the process tree existing. The script `/var/tmp/probe-apache2` must exist and being executable within the zone.

```bash
#!/usr/bin/ksh
if echo "GET; exit" | mconnect -p 80 > /dev/null 2>&1 then
  exit 0
else
  exit 100
fi
```

# <userinput>chmod 755 /var/tmp/probe-apache2</userinput>
Specifying Configuration Parameters for the Zone Script Resource

HA for Solaris Zones provides the script `sczsh_register`, which automates the process of configuring zone script resource. By default this script obtains configuration parameters from the `sczsh_config` file in the `/opt/SUNWsczone/sczsh/util` directory. To specify configuration parameters for the zone script resource, copy the `sczsh_config` file to a different filename and amend it as described below. It is recommended to keep this file as a future reference. The register script provides option `-f` to specify the fully qualified filename to the copied configuration file.

Each configuration parameter in the `sczsh_config` file is defined as a keyword-value pair. The `sczsh_config` file already contains the required keywords and equals signs. For more information, see “Listing of `sczsh_config`” on page 48. When you edit the `sczsh_config` file, add the required value to each keyword.

The keyword-value pairs in the `sczsh_config` file are as follows:

```
RS=sczsh-rs
RG=sczbt-rg
SCZBT_RS=sczbt-rs
PARAMETERDIR=sczsh-parameter-directory
Zonename=sczbt-zone-name
ServiceStartCommand=sczsh-start-command
ServiceStopCommand=sczsh-stop-command
ServiceProbeCommand=sczsh-probe-command
```

The meaning and permitted values of the keywords in the `sczsh_config` file are as follows:

- **RS=** `sczsh-rs`
  - Specifies the name that you are assigning to the zone script resource. You must specify a value for this keyword.

- **RG=** `sczbt-rg`
  - Specifies the name of the resource group the zone boot resource resides in. You must specify a value for this keyword.

- **SCZBT_RS=** `sczbt-rs`
  - Specifies the name of the zone boot resource. You must specify a value for this keyword.

- **PARAMETERDIR=** `sczsh parameter directory`
  - Specifies the directory name that you are assigning to the parameter directory where the following variables and their values will be stored. You must specify a value for this keyword.

- **Zonename=** `sczbt-zone-name`
  - Specifies the zone name. You must specify a value for this keyword.

- **ServiceStartCommand=** `sczsh-start-command`
  - Specifies the zone start command or script to run. You must specify a value for this keyword.
ServiceStopCommand=sczsh-stop-command
    Specifies the zone stop command or script to run. You must specify a value for this keyword

ServiceProbeCommand=sczsh-probe-command
    Specifies the zone probe command or script to run. You must specify a value for this keyword

EXAMPLE 1–3  Sample sczsh_config File

In this example the zone script resource uses the scripts that are available with the pkg:/web/server/apache-22 package on Oracle Solaris 11. Before this example can be used the Apache2 configuration file http.conf needs to be configured. For the purpose of this example, the delivered /etc/apache2/2.2/http.conf can be used. Amend the file so that you can successfully start and stop the Apache httpd server.

This example shows an sczsh_config file in which configuration parameters are set as follows:

- The name of the zone script resource is zone1-script-rs.
- The name of the resource group for the zone script resource is zone1-rg.
- The name of the zone boot resource is zone1-rs.
- The name of the parameter file directory for the zone script resource is /global/zones/pfiles.
- The name of the zone is zone1.
- The name of the zone script resource start command and its parameter is "/lib/svc/method/http-apache22 start".
- The name of the zone script resource stop command and its parameter is "/lib/svc/method/http-apache22 stop".
- The name of the zone script resource probe command is "/var/tmp/probe-apache22". This script is shown in Example 1–4 and must exist in zone1.

RS="zone1-script-rs"
RG="zone1-rg"
SCZBT_RS="zone1-rs"
PARAMETERDIR="/global/zones/pfiles"
Zonename="zone1"
ServiceStartCommand="/lib/svc/method/http-apache22 start"
ServiceStopCommand="/lib/svc/method/http-apache22 stop"
ServiceProbeCommand="/var/tmp/probe-apache22"

Writing a Service Probe for the Zone SMF Resource

The zone SMF resource provides the ability to enable, disable, and probe an SMF service within a zone that is of brand type solaris or solaris10. The zone SMF resource depends on the zone boot resource. Probing the SMF service is performed by running a command or script against
the SMF service. The SMF service and probe command or script names are passed to the zone SMF resource when the resource is registered. The probe command or script must meet the following requirements.

- The probe command or script must contain the fully qualified path within the zone.
- The probe command or script must be executable by root.
- The probe command or script must return one of the following return codes.

<table>
<thead>
<tr>
<th>TABLE 1–4</th>
<th>Return codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Successful completion</td>
</tr>
<tr>
<td>100</td>
<td>An error occurred that requires a resource restart</td>
</tr>
<tr>
<td>201</td>
<td>An error has occurred that requires an immediate failover of the resource group</td>
</tr>
</tbody>
</table>

**Note** – For an immediate failover of the zone SMF resource, you must configure the resource properties `Failover_mode` and `Failover_enabled` to meet the required behavior. Refer to the `r_properties(5)` man page when setting the `Failover_mode` property and the `SUNW.gds(5)` man page when setting the `Failover_enabled` property.

**EXAMPLE 1–4** Zone SMF Probe Script for Apache2

This example shows a simple script to test that the SMF Apache2 service is running, beyond the process tree existing. The script `/var/tmp/probe-apache2` must exist and being executable within the zone.

```
# <userinput>cat /var/tmp/probe-apache2</userinput>
#!/usr/bin/ksh
if echo "GET; exit" | mconnect -p 80 > /dev/null 2>&1
then
  exit 0
else
  exit 100
fi

# <userinput>chmod 755 /var/tmp/probe-apache2</userinput></screen>

**Specifying Configuration Parameters for the Zone SMF Resource**

HA for Solaris Zones provides the script `sczsmf_register`, which automates the process of configuring the zone SMF resource. By default this script obtains configuration parameters from the `sczsmf_config` file in the `/opt/SUNWsczone/sczsmf/util` directory. To specify configuration parameters for the zone SMF resource, copy the `sczsmf_config` file to a different
filename and amend it as described below. It is recommended to keep this file as a future reference. The register script provides option -f to specify the fully qualified filename to the copied configuration file.

Each configuration parameter in the `sczmf_config` file is defined as a keyword-value pair. The `sczmf_config` file already contains the required keywords and equals signs. For more information, see "Listing of `sczmf_config`" on page 48. When you edit the `sczmf_config` file, add the required value to each keyword.

The keyword-value pairs in the `sczmf_config` file are as follows:

- **RS**=`sczsmf-rs`
- **RG**=`sczbt-rg`
- **SCZBT_RS**=`sczbt-rs`
- **ZONE**=`sczbt-zone-name`
- **SERVICE**=`smf-service`
- **RECURSIVE**=`true|false`
- **STATE**=`true|false`
- **SERVICE_PROBE**=`sczsmf-service-probe`

The meaning and permitted values of the keywords in the `sczmf_config` file are as follows:

- **RS**=`sczsmf-rs`
  Specifying the name that you are assigning to the zone SMF resource. This must be defined.

- **RG**=`sczbt-rg`
  Specifies the name of the resource group the zone boot resource resides in. This must be defined.

- **SCZBT_RS**=`sczbt-rs`
  Specifies the name of the zone boot resource. You must specify a value for this keyword.

- **ZONE**=`sczbt-zone-name`
  Specifies the zone name. This must be defined.

- **SERVICE**=`smf-service`
  Specifies the SMF service to enable/disable. This must be defined.

- **RECURSIVE**=`true|false`
  Specifies `true` to enable the service recursively or `false` to just enable the service and no dependents. This must be defined.

- **STATE**=`true|false`
  Specifies `true` to wait until the service state is reached or `false` to not wait until the service state is reached. This must be defined.

- **SERVICE_PROBE**=`sczsmf-service-probe`
  Specify the script to check the SMF service. Specifying a value for this keyword is optional.
EXAMPLE 1–5  Sample sczsmf_config File

In this example the zone SMF resource uses the Apache2 SMF service that is available in Solaris 11. Before this example can be used the Apache2 configuration file http.conf needs to be configured. For the purpose of this example, the delivered /etc/apache2/2.2/http.conf can be used. Amend the http.conf file so that you can successfully start and stop the apache httpd server.

This example shows an sczsmf_config file in which configuration parameters are set as follows:

- The name of the zone SMF resource is zone1-smf-rs.
- The name of the resource group for the zone SMF resource is zone1-rg.
- The name of the zone boot resource is zone1-rs.
- The name of the zone name is zone1.
- The name of the zone SMF service is apache2.
- Indicates that the zone SMF service Recursive option is true.
- Indicates that the zone SMF service State option is true.
- Indicates that the zone SMF service probename is /var/tmp/probe-apache2. This script is shown in Example 1–2 and must exist in zone1.

```
RS=zone1-smf-rs
RG=zone1-rg
SCZBT_RS=zone1-rs
ZONE=zone1
SERVICE=apache2
RECURSIVE=true
STATE=true
SERVICE_PROBE=/var/tmp/probe-apache2
```

▼ How to Create and Enable Resources for the Zone Boot Component

Before You Begin

Ensure you have edited the sczbt_config file or a copy of it to specify configuration parameters for the HA for Solaris Zones zone boot component. For more information, see “Specifying Configuration Parameters for the Zone Boot Resource” on page 23.

1 Become superuser on one of the nodes in the cluster that will host the zone.

2 On both nodes, configure the zone-boot (sczbt) resource.

   a. Register the SUNW.gds resource type.

      ```
      phys-schost# cresource-type register SUNW.gds
      ```
b. Create a directory on the ZFS file system that you created.
You will specify this directory to store the parameter values that you set for the zone-boot resource.
```
phys-schost# mkdir /pool/filesystem/parameterdir
```

c. Install and configure the HA for Zones agent.
```
phys-schost# pkg install ha-cluster/data-service/ha-zones
phys-schost# cd /opt/SUNWsczone/sczbt/util
phys-schost# cp -p sczbt_config sczbt_config.zoneboot-resource
phys-schost# vi sczbt_config.zoneboot-resource
```
Add or modify the following entries in the file:
```
RS"zoneboot-resource"
RG"resourcegroup"
PARAMETERDIR="/pool/filesystem/parameterdir"
SC_NETWORK=false
SC_LH=
FAILOVER=true
HAS_RS="hasp-resource"
Zonename="zonename"
Zonebrand="brand"
Zonebootopt=""
Milestone="multi-user-server"
LXrunlevel=3
SLrunlevel=3
Mounts=""
```
Save and exit the file.

d. Configure the zone-boot resource.
The resource is configured with the parameters that you set in the zone-boot configuration file.
```
phys-schost# ./sczbt_register -f ./sczbt_config.zoneboot-resource
```

Note – If you are using a multi master configuration and a local parameter directory, copy the files from the node where you ran the register command to all other nodes in the resource group nodelist.

e. Verify that the zone-boot resource is enabled.
```
phys-schost# clresource enable zoneboot-resource
```

3 Verify that the resource group can switch to another node and the ZFS storage pool successfully starts there after the switchover.
a. Switch the resource group to another node.
```
phys-schost-2# clresourcegroup switch -n phys-schost-1 resourcegroup
```
b. Verify that the resource group is now online on the new node.

Output is similar to the following:

```
phys-schost-1# clresourcegroup status
=== Cluster Resource Groups ===

<table>
<thead>
<tr>
<th>Group Name</th>
<th>Node Name</th>
<th>Suspended</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>resourcegroup</td>
<td>phys-schost-1</td>
<td>No</td>
<td>Online</td>
</tr>
<tr>
<td></td>
<td>phys-schost-2</td>
<td>No</td>
<td>Offline</td>
</tr>
</tbody>
</table>
```

c. Verify that the zone is running on the new node.

```
phys-schost-1# zoneadm list -cv
ID  NAME     STATUS PATH                BRAND IP
0   global  running /                   solaris shared
1   zonename running /pool/filesystem/zonename brand shared
```

Example 1–6 Configuring the HA for Zones Zone Boot Component for solaris Brand Zones

This example creates the HAStoragePlus resource hasp-rs, which uses a mirrored ZFS storage pool hapool in the resource group zone-rg. The storage pool is mounted on the /hapool/solaris file system. The hasp-rs resource runs on the solaris brand non-global zone solariszone1, which is configured on both phys-schost-1 and phys-schost-2. The zone-boot resource solariszone1-rs is based on the SUNW.gds resource type.

Create a resource group.

```
phys-schost-1# clresourcegroup create zone-rg
```

Create a mirrored ZFS storage pool to be used for the HA zone root path.

```
phys-schost-1# zpool create -m /ha-zones hapool mirror /dev/rdsk/c4t6d0 \
/dev/rdsk/c5t6d0
phys-schost-1# zpool export hapool
```

Create an HAStoragePlus resource that uses the resource group and mirrored ZFS storage pool that you created.

```
phys-schost-1# clresourcecreate -t SUNW.HAStoragePlus -g zone-rg -p Zpools=hapool hasp-rs
```

Bring the resource group online.

```
phys-schost-1# clresourcegroup online -eM zone-rg
```

Create a ZFS file-system dataset on the ZFS storage pool that you created.

```
phys-schost-1# zfs create hapool/solaris
```

Ensure that the universally unique ID (UUID) of each node’s boot-environment (BE) root dataset is the same value on both nodes.

```
phys-schost-1# beadm list -H
...  
zfsbe:8fe53702-16c3-eb21-ed85-d19af92c6bbd;NR;/7565844992;static;1229439064
```
Configure the solaris brand non-global zone.

```
phys-schost-1# zonectfg -z solariszone1 'create -b \
set zonepath=/hapool/solaris/solariszone1 ; add attr; set name=osc-ha-zone; set type=boolean; 
set value=true; end; set autoboot=false; set ip-type=shared'
```

```
phys-schost-1# zoneadm list -cv
ID  NAME  STATUS  PATH       BRAND   IP
0   global running /         solaris  shared
    solariszone1 configured /hapool/solaris/solariszone1 solaris  shared
```

Identify the node that masters the HAStoragePlus resource, and from that node install solariszone1.

```
phys-schost-1# clresource status
```

```
=== Cluster Resources ===
Resource Name       Node Name  Status  Message
-------------- ---------- ------- -------
hasp-rs            phys-schost-1 Online Online
                    phys-schost-2 Offline Offline
```

```
phys-schost-1# zoneadm -z solariszone1 install
```

```
phys-schost-1# zoneadm list -cv
ID  NAME  STATUS  PATH       BRAND   IP
0   global running /         solaris  shared
    solariszone1 installed /hapool/solaris/solariszone1 solaris  shared
```

```
phys-schost-1# zoneadm -z solariszone1 boot
```

```
phys-schost-1# zoneadm list -cv
ID  NAME  STATUS  PATH       BRAND   IP
0   global running /         solaris  shared
    solariszone1 running /hapool/solaris/solariszone1 solaris  shared
```

Open a new terminal window and log in to solariszone1.

```
phys-schost-1# zoneadm -z solariszone1 halt
```

Forcibly detach the zone.

```
phys-schost-1# zoneadm -z solariszone1 detach -F
```

```
Switch zone-rg to phys-schost-2 and forcibly attach the zone.
```

```
phys-schost-1# clresourcegroup switch -n phys-schost-2 zone-rg
```

```
phys-schost-2# zoneadm -z solariszone1 attach -F
```

```
phys-schost-2# zoneadm list -cv
ID  NAME  STATUS  PATH       BRAND   IP
0   global running /         solaris  shared
    solariszone1 installed /hapool/solaris/solariszone1 solaris  shared
```

```
phys-schost-2# zoneadm -z solariszone1 boot
```
Open a new terminal window and log in to solariszone1.

phys-schost-2# zlogin -C solariszone1
phys-schost-2# zoneadm -z solariszone1 halt

Forcibly detach the zone.

phys-schost-1# zoneadm -z solariszone1 detach -F

On both nodes, configure the zone-boot (sczbt) resource.

phys-schost# cresource type register SUNW.gds
phys-schost# mkdir /hapool/solaris/params

On both nodes, install and configure the HA for Zones agent.

phys-schost# pkg install ha-cluster/data-service/ha-zones
phys-schost# cd /opt/SUNWsczone/sczbt/util
phys-schost# cp -p sczbt_config sczbt_config.solariszone1-rs
phys-schost# vi sczbt_config.solariszone1-rs

On both nodes, add or modify the following entries in the sczbt_config.solariszone1-rs file.

RS="solariszone1-rs"
RG="zone-rg"
PARAMETERDIR="/hapool/solaris/params"
SC_NETWORK="false"
SC_LH=""
FAILOVER="true"
HAS_RS="hasp-rs"

Zonename="solariszone1"
Zonebrand="solaris"
Zonebootopt=""
Milestone="multi-user-server"
LXrunlevel="3"
SLrunlevel="3"
Mounts=""

Save and exit the file.

On both nodes, configure the solariszone1-rs resource and verify that it is enabled.

phys-schost# ./sczbt_register -f ./sczbt_config.solariszone1-rs
phys-schost# cresource enable solariszone1-rs

Verify that zone-rg can switch to another node and that solariszone1 successfully starts there after the switchover.

phys-schost-2# cresource group switch -n phys-schost-1 zone-rg
phys-schost-1# cresource group status

<table>
<thead>
<tr>
<th>Group Name</th>
<th>Node Name</th>
<th>Suspended</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>zone-rg</td>
<td>phys-schost-1</td>
<td>No</td>
<td>Online</td>
</tr>
</tbody>
</table>
How to Create and Enable Resources for the Zone Script Component

Before You Begin
Ensure you have edited the `sczsh_config` file or a copy of it to specify configuration parameters for the HA for Solaris Zones zone script component. For more information, see "Specifying Configuration Parameters for the Zone Script Resource" on page 29.

1. Go to the directory that contains the script for creating the HA for Solaris Zones script resource.
   
   # cd /opt/SUNWsczone/sczsh/util

2. Run the script that creates the zone script resource.
   
   # ./sczsh_register -f /mypath/sczsh_config

3. Bring online the zone script resource.
   
   # clresource enable sczsh-rs

Next Steps
Go to “Verifying the HA for Solaris Zones and Configuration” on page 39.

How to Create and Enable Resources for the Zone SMF Component

Before You Begin
Ensure you have edited the `sczsmf_config` file or a copy of it to specify configuration parameters for the HA for Solaris Zones zone SMF component. For more information, see “Specifying Configuration Parameters for the Zone SMF Resource” on page 31.

1. Go to the directory that contains the script for creating the HA for Solaris Zones SMF resource.
   
   # cd /opt/SUNWsczone/sczsmf/util

2. Run the script that creates the zone SMF resource.
   
   # ./sczsmf_register -f /mypath/sczsmf_config

3. Bring online the zone SMF resource.
   
   # clresource enable sczsmf-rs

Next Steps
Go to “Verifying the HA for Solaris Zones and Configuration” on page 39.
Verifying the HA for Solaris Zones and Configuration

After you install, register, and configure HA for Solaris Zones, verify the HA for Solaris Zones installation and configuration. Verifying the HA for Solaris Zones installation and configuration determines if the HA for Solaris Zones data service makes your zones highly available.

▼ How to Verify the HA for Solaris Zones Installation and Configuration

1. Become superuser on a cluster node that is to host the Solaris Zones component.

2. Ensure all the Solaris Zone resources are online.
   For each resource, perform the following steps.
   a. Determine whether the resource is online.
      
      # cluster status -t rg,rs
   
   b. If the resource is not online, bring online the resource.
      
      # clresource enable solaris-zone-resource

3. For a failover service configuration, switch the zone resource group to another cluster node, such as node2.

   # clresourcegroup switch -n node2 solaris-zone-resource-group

4. Confirm that the resource is now online on node2.

   # cluster status -t rg,rs

Upgrading Non-Global Zones Managed by HA for Oracle Solaris Zones

You can upgrade Oracle Solaris non-global zones that are managed by the Oracle Solaris Cluster software. For instructions, see Chapter 2, “Upgrading Zones Managed by HA for Oracle Solaris Zones,” in Oracle Solaris Cluster Upgrade Guide.
Tuning the HA for Solaris Zones Fault Monitors

The HA for Solaris Zones fault monitors verify that the following components are running correctly:

- Zone boot resource
- Zone script resource
- Zone SMF resource

Each HA for Solaris Zones fault monitor is contained in the resource that represents Solaris Zones component. You create these resources when you register and configure HA for Solaris Zones. For more information, see “Registering and Configuring HA for Solaris Zones” on page 22.

System properties and extension properties of these resources 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 HA for Solaris Zones fault monitor only if you need to modify this preset behavior.

Tuning the HA for Solaris Zones fault monitors involves the following tasks:

- Setting the interval between fault monitor probes
- Setting the time-out for fault monitor probes
- Defining the criteria for persistent faults
- Specifying the failover behavior of a resource

For more information, see “Tuning Fault Monitors for Oracle Solaris Cluster Data Services” in Oracle Solaris Cluster Data Services Planning and Administration Guide.

Operation of the HA for Solaris Zones Parameter File

The HA for Solaris Zones zone boot and script resources uses a parameter file to pass parameters to the start, stop and probe commands. Changes to these parameters take effect at every restart or enabling, disabling of the resource.

Operation of the Fault Monitor for the Zone Boot Component

The fault monitor for the zone boot component ensures that the all requirements for the zone boot component to run are met:

- The corresponding zsched process for the zone is running.
If this process is not running, the fault monitor restarts the zone. If this fault persists, the fault monitor fails over the resource group that contains resource for the zone boot component.

- Every logical hostname that is managed by a SUNW.LogicalHostname resource is operational.
  If the logical hostname is not operational, the fault monitor fails over the resource group that contains resource for the zone boot component.

- The specified milestone for the solaris or solaris10 zone brand type is either online or degraded.
  If the milestone is not online or degraded, the fault monitor restarts the zone. If this fault persists, the fault monitor fails over the resource group that contains resource for the zone boot component.

  To verify the state of the milestone, the fault monitor connects to the zone. If the fault monitor cannot connect to the zone, the fault monitor retries every five seconds for approximately 60% of the probe time-out. If the attempt to connect still fails, then the fault monitor restarts the resource for the zone boot component.

**Caution** – The Probe_timeout defaults to 30 seconds. If you configure multiple Solaris HA zones on the same cluster or in combination with additional workloads, ensure that 60% of the Probe_timeout is enough (even under high system load) to successfully run the probe. Increase the Probe_timeout if the default is too sensitive in your actual deployment.

### Operation of the Fault Monitor for the Zone Script Component

The fault monitor for the zone script component runs the script that you specify for the component. The value that this script returns to the fault monitor determines the action that the fault monitor performs. For more information, see Table 1–3.

### Operation of the Fault Monitor for the Zone SMF Component

The fault monitor for the zone SMF component verifies that the SMF service is not disabled. If the service is disabled, the fault monitor restarts the SMF service. If this fault persists, the fault monitor fails over the resource group that contains the resource for the zone SMF component.

If the service is not disabled, the fault monitor runs the SMF service probe that you can specify for the component. The value that this probe returns to the fault monitor determines the action that the fault monitor performs. For more information, see Table 1–4.
Tuning the HA for Solaris Zones Stop_timeout property

The HA for Solaris Zones components consist all of the resource type SUNW.gds(5). As described in “Stop_command Property” in Oracle Solaris Cluster Data Services Developer’s Guide, the value for the Stop_timeout should be chosen so that the Stop_command can successfully return within 80% of its value.

Choosing the Stop_timeout value for the Zone Boot Component

The stop method for the zone boot component spends 60% of the value for the Stop_timeout performing a complete "zoneadm -z zonename shutdown" for the zone. If that failed, the next 20% of the value for the Stop_timeout will be spent halting the zone performing a "zoneadm –z zonename halt" and perform some additional cleanup steps in order to force the zone into the state installed. Therefore the Stop_timeout value for the zone boot component should be computed so that 60% is enough to successfully shutdown the zone.

Choosing the Stop_timeout value for the Zone Script Component

The stop method for the zone script component calls the command or script configured for the ServiceStopCommand keyword. Therefore the Stop_timeout value for the zone script component should be computed so that 80% is enough for the configured ServiceStopCommand to succeed.

Choosing the Stop_timeout value for the Zone SMF Component

The stop method for the zone SMF component spends 60% of the value for the Stop_timeout using svcadm to disable the configured SMF service in the zone. If that failed, the next 20% of the value for the Stop_timeout will be spent to first send SIGTERM then SIGKILL to the processes associated with this SMF service. Therefore the Stop_timeout value for the zone SMF component should be computed so that 60% is enough to successfully disable the configured SMF service in the zone.
Denying Cluster Services for a Non-Global Zone

You can choose to set up non-global zones that do not participate in the cluster. A root user logged into one of these zones will not able to discover or disrupt operation of the cluster.

To implement this feature, create the file /etc/cluster/cluster.zone.deny in the global zone of each node and add the names of the non-global zones on that node that should not be part of the cluster. If the zone name appears in the file, all cluster commands and daemons are disabled in that zone. Ensure that the zone is not running when you add or remove a zone name from this file.

Debugging HA for Solaris Zones

The config file in the /opt/SUNWsczone/zone component/etc directory enables you to activate debugging for Solaris Zone resources. Where zone component represents sczbt for the boot component, sczsh for the script component and sczsmf for the SMF component.

Each component of HA for Solaris Zones has a config that enables you to activate debugging for Solaris Zone resources. The location of this file for each component is as follows:

- For the zone boot component, this file is contained in the /opt/SUNWsczone/sczbt/etc directory.
- For the zone script component, this file is contained in the /opt/SUNWsczone/sczsh/etc directory.
- For the zone SMF component, this file is contained in the /opt/SUNWsczone/sczsmf/etc directory.

▼ How to Activate Debugging for HA for Solaris Zones

1 Determine whether debugging for HA for Solaris Zones is active.
If debugging is inactive, daemon.notice is set in the file /etc/syslog.conf.

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

2 If debugging is inactive, edit the /etc/syslog.conf file to change daemon.notice to daemon.debug.

3 Confirm that debugging for HA for Solaris Zones is active.
If debugging is active, daemon.debug is set in the file /etc/syslog.conf.

```
# grep daemon /etc/syslog.conf
*.err; kern.debug; daemon.debug; mail.crit /var/adm/messages
```
4  **Restart the syslogd daemon.**
   
   # svcadm restart system-log

5  **Edit the `/opt/SUNWsczone/sczbt/etc/config` file to change `DEBUG=` to `DEBUG=ALL` or `DEBUG=sczbt-rs`.**

   # cat /opt/SUNWsczone/sczbt/etc/config
   #
   # Copyright 2012 Oracle Corporation. All rights reserved.
   # Use is subject to license terms.
   #
   # ident "@(#)config 1.1 06/02/12"
   #
   # Usage:
   #   DEBUG=<RESOURCE_NAME> or ALL
   #   DEBUG=ALL
   #

   **Note** – To deactivate debugging, reverse the preceding steps.
Files for Configuring HA for Solaris Zones Resources

The /opt/SUNWsczone/zone component/util directory contains files that automate the process of configuring HA for Solaris Zones resources. Listings of these files are provided in the following sections:

- “Listing of sczb_t_config” on page 45
- “Listing of sczsh_config” on page 48
- “Listing of sczsmf_config” on page 48

Listing of sczb_t_config

# # Copyright 2012 Oracle Corporation. All rights reserved.
# Use is subject to license terms.
# # ident "@(#)sczb_t_config 1.5 08/04/17"
# # This file will be sourced in by sczb_t_register and the parameters
# # listed below will be used.
# # These parameters can be customized in (key=value) form
# #
# #   RS - Name of the resource
# #   RG - Name of the resource group containing RS
# #   PARAMETERDIR - Name of the parameter file directory
# #   SC_NETWORK - Identifies if SUNW.LogicalHostname will be used
# #     true = zone will use SUNW.LogicalHostname
# #     false = zone will use it's own configuration
# #
# # NOTE: If the ip-type keyword for the non-global zone is set
to "exclusive", only "false" is allowed for SC_NETWORK
# # The configuration of a zone's network addresses depends on
# whether you require IPMP protection or protection against
# the failure of all physical interfaces.
# # If you require only IPMP protection, configure the zone's
addresses by using the zonecfg utility and then place the zone’s address in an IPMP group.

To configure this option set

```
SC_NETWORK=false
SC_LH=Name of the SC Logical Hostname resource
```

If IPMP protection is not required, just configure the zone’s addresses by using the zonecfg utility.

To configure this option set

```
SC_NETWORK=false
SC_LH=Name of the SC Logical Hostname resource
```

If you require protection against the failure of all physical interfaces, choose one option from the following list.

- If you want the SUNW.LogicalHostName resource type to manage the zone’s addresses, configure a SUNW.LogicalHostName resource with at least one of the zone’s addresses.

To configure this option set

```
SC_NETWORK=true
SC_LH=Name of the SC Logical Hostname resource
```

- Otherwise, configure the zone’s addresses by using the zonecfg utility and configure a redundant IP address for use by a SUNW.LogicalHostName resource.

To configure this option set

```
SC_NETWORK=false
SC_LH=Name of the SC Logical Hostname resource
```

Whichever option is chosen, multiple zone addresses can be used either in the zone’s configuration or using several SUNW.LogicalHostName resources.

```
e.g.  SC_NETWORK=true
      SC_LH=zone1-lh1,zone1-lh2
```

`SC_LH` - Name of the SC Logical Hostname resource

`FAILOVER` - Identifies if the zone’s zone path is on a highly available local file system

```
e.g.  FAILOVER=true - highly available local file system
      FAILOVER=false - local file system
```

`HAS_RS` - Name of the HAStoragePlus SC resource
# The following variable will be placed in the parameter file
#
# Parameters for sczbt (Zone Boot)
#
# Zonename     Name of the zone
# Zonebrand    Brand of the zone. Current supported options are
#               "solaris" (default) or "solaris10"
# Zonebootopt  Zone boot options ("-s" requires that Milestone=single-user)
# Milestone    SMF Milestone which needs to be online before the zone is
#               considered booted. This option is only used for the
#               "solaris" Zonebrand.
# LXrunlevel   Runlevel which needs to get reached before the zone is
#               considered booted. This option is only used for the "lx"
#               Zonebrand.
# SLrunlevel   Solaris legacy runlevel which needs to get reached before the
#               zone is considered booted. This option is only used for the
#               "solaris8" or "solaris9" Zonebrand.
# Mounts       Mounts is a list of directories and their mount options,
#               which are loopback mounted from the global zone into the
#               newly booted zone. The mountpoint in the local zone can
#               be different to the mountpoint from the global zone.
#               The Mounts parameter format is as follows,
#               Mounts="/globalzonedirectory:/localzonedirectory:mountoptions"
# The following are valid examples for the "Mounts" variable
# Mounts="/globalzone-dir1:/localzone-dir1:rw"
# Mounts="/globalzone-dir1:/localzone-dir1:rw /globalzone-dir2:rw"
# The only required entry is the /global zone directory, the
# /local zone directory and mount options can be omitted.
# Omitting /local zone directory will make the local zone
# mountpoint the same as the global zone directory.
# Omitting mount options will not provide any mount options
# except the default options from the mount command.
# Note: You must manually create any local zone mountpoint
# directories that will be used within the Mounts variable,
# before registering this resource within Solaris Cluster.

Zonename=""
Zonebrand="solaris"
Zonebootopt=""
Milestone="multi-user-server"
LXrunlevel="3"
SLrunlevel="3"
Mounts=""
Listing of sczsh_config

# Copyright 2012 Oracle Corporation. All rights reserved.
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#
# ident "@(#)sczsh_config 1.1 06/02/12"
#
# This file will be sourced by sczsh_register and the parameters
# listed below will be used.
#
# These parameters can be customized in (key=value) form
#
# RS - Name of the resource
# RG - Name of the resource group containing RS
# SCZBT RS - Name of the SC Zone boot resource
# PARAMETERDIR - Name of the parameter file directory
# Zonename - Name of the zone
# ServiceStartCommand - Command including all options to start
# the service in the configured zone
# ServiceStopCommand - Command including all options to stop
# the service in the configured zone
# ServiceProbeCommand - Command including all options to probe
# the service in the configured zone
#
RS=""
RG=""
SCZBT_RS=""
PARAMETERDIR=""
Zonename=""
ServiceStartCommand=""
ServiceStopCommand=""
ServiceProbeCommand=""

Listing of sczsmf_config

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#
# ident "@(#)sczsmf_config 1.1 06/02/12"
#
# This file will be sourced by sczsmf_register and the parameters
# listed below will be used.
#
# These parameters can be customized in (key=value) form
#
# RS - Name of the resource
# RG - Name of the resource group containing RS
# SCZBT RS - Name of the SC Zone boot resource
# ZONE - Name of the Zone
#
#
# For SERVICE, RECURSIVE and STATE, refer to the svcadm(1M)
# man page
#
# SERVICE - {FMRI | pattern}
#   FMRI - Fault management resource identifier
#   pattern - Pattern matching a service
#
# RECURSIVE - {false | true}  Default: true
#   False - Just enable the service and no dependents
#   True - Enable the service and recursively enable
#          its dependents
#
# RECURSIVE=true equates to svcadm enable "-r"
#
# STATE - {false | true}  Default: true
#   False - Do not wait until service state is reached
#   True - Wait until service state is reached
#
# STATE=true equates to svcadm enable/disable "-s"
#
# SERVICE_PROBE - Script to check the SMF service
#
# The optional parameter, SERVICE_PROBE, provides the
# ability to check that the SMF service is working.
# This must be a script within the zone and must
# adhere to these return codes,
#
#  0  - The SMF service is working
# 100 - The SMF service should be restarted
# 201 - The SMF service should initiate a failover of
#      the Resource Group
#
# Note: That return code 201, requires that this resource
# has an appropriate extension property value for
# FAILOVER_MODE and FAILOVER_ENABLED=TRUE
#
# For FAILOVER_MODE refer to the r_properties(5) man page.
#
RS=
RG=
SCZBT_RS=
ZONE=
SERVICE=
RECURSIVE=true
STATE=true
SERVICE_PROBE=""
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