



Sun Cluster Data Service for Apache Tomcat Guide for Solaris OS

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Preface

Sun Cluster Data Service for Apache Tomcat Guide for Solaris OS explains how to install and configure Sun™ Cluster HA for Apache Tomcat on both SPARC® and x86 based systems.

Note – In this document, the term “x86” refers to the Intel 32-bit family of microprocessor chips and compatible microprocessor chips made by AMD.

This document is intended for system administrators with extensive knowledge of Sun 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 document assume knowledge of the Solaris™ Operating System and expertise with the volume manager software that is used with Sun Cluster.

Note – Sun Cluster software runs on two platforms, SPARC and x86. The information in this document pertains to both platforms unless otherwise specified in a special chapter, section, note, bulleted item, figure, table, or example.

UNIX Commands

This document contains information about commands that are specific to installing and configuring Sun 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 Solaris Operating System
 - Solaris Operating System man pages
 - Other software documentation that you received with your system
-

Typographic Conventions

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

TABLE P-1 Typographic Conventions

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

Shell Prompts in Command Examples

The following table shows the default system prompt and superuser prompt for the C shell, Bourne shell, and Korn shell.

TABLE P-2 Shell Prompts

Shell	Prompt
C shell prompt	machine_name%
C shell superuser prompt	machine_name#
Bourne shell and Korn shell prompt	\$
Bourne shell and Korn shell superuser prompt	#

Related Documentation

Information about related Sun Cluster topics is available in the documentation that is listed in the following table. All Sun Cluster documentation is available at <http://docs.sun.com>.

Topic	Documentation
Data service administration	<i>Sun Cluster Data Services Planning and Administration Guide for Solaris OS</i> Individual data service guides
Concepts	<i>Sun Cluster Concepts Guide for Solaris OS</i>
Overview	<i>Sun Cluster Overview for Solaris OS</i>
Software installation	<i>Sun Cluster Software Installation Guide for Solaris OS</i>
System administration	<i>Sun Cluster System Administration Guide for Solaris OS</i>
Hardware administration	<i>Sun Cluster 3.0-3.1 Hardware Administration Manual for Solaris OS</i> Individual hardware administration guides
Data service development	<i>Sun Cluster Data Services Developer's Guide for Solaris OS</i>

Topic	Documentation
Error messages	<i>Sun Cluster Error Messages Guide for Solaris OS</i>
Command and function reference	<i>Sun Cluster Reference Manual for Solaris OS</i>

For a complete list of Sun Cluster documentation, see the release notes for your release of Sun Cluster at <http://docs.sun.com>.

Related Third-Party Web Site References

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

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

Documentation, Support, and Training

Sun Function	URL	Description
Documentation	http://www.sun.com/documentation/	Download PDF and HTML documents, and order printed documents
Support and Training	http://www.sun.com/supporttraining/	Obtain technical support, download patches, and learn about Sun courses

Help

If you have problems installing or using Sun 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 and serial numbers of your systems
- The release number of the Solaris Operating System (for example, Solaris 8)
- The release number of Sun Cluster (for example, Sun Cluster 3.0)

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

Command	Function
<code>prtconf -v</code>	Displays the size of the system memory and reports information about peripheral devices
<code>psrinfo -v</code>	Displays information about processors
<code>showrev -p</code>	Reports which patches are installed
<code>SPARCprtdiag -v</code>	Displays system diagnostic information
<code>scinstall -pv</code>	Displays Sun Cluster release and package version information

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

Installing and Configuring Sun Cluster HA for Apache Tomcat

This chapter explains how to install and configure Sun Cluster HA for Apache Tomcat.

This chapter contains the following sections.

- “Installing and Configuring Sun Cluster HA for Apache Tomcat” on page 11
- “Sun Cluster HA for Apache Tomcat” on page 12
- “Planning the Sun Cluster HA for Apache Tomcat Installation and Configuration” on page 13
- “Installing and Configuring Apache Tomcat” on page 19
- “Verifying the Installation and Configuration of Apache Tomcat” on page 22
- “Installing the Sun Cluster HA for Apache Tomcat Packages” on page 24
- “Registering and Configuring Sun Cluster HA for Apache Tomcat” on page 27
- “Verifying the Sun Cluster HA for Apache Tomcat Installation and Configuration” on page 37
- “Understanding the Sun Cluster Apache Tomcat HA Parameter File” on page 37
- “Understanding Sun Cluster HA for Apache Tomcat Fault Monitor” on page 40
- “How to debug Sun Cluster HA for Apache Tomcat” on page 41

Installing and Configuring Sun Cluster HA for Apache Tomcat

[Table 1](#) lists the tasks for installing and configuring Sun Cluster HA for Apache Tomcat. Perform these tasks in the order they are listed.

TABLE 1 Task Map: Installing and Configuring Sun Cluster HA for Apache Tomcat

Task	For Instructions, Go To
1 Plan the installation.	“Planning the Sun Cluster HA for Apache Tomcat Installation and Configuration” on page 13
2 Install and configure Apache Tomcat.	“How to Install and Configure Apache Tomcat” on page 19
3 Verify installation and configuration.	“How to Verify the Installation and Configuration of Apache Tomcat” on page 22
4 Install Sun Cluster HA for Apache Tomcat Packages.	“Installing the Sun Cluster HA for Apache Tomcat Packages” on page 24
5.1 Register and Configure Sun Cluster HA for Apache Tomcat as a failover data service.	“How to Register and Configure Sun Cluster HA for Apache Tomcat as a failover data service” on page 27
5.2 Register and Configure Sun Cluster HA for Apache Tomcat as a multiple masters data service.	“How to Register and Configure Sun Cluster HA for Apache Tomcat as a Multiple Masters Data Service” on page 30
5.3 Register and Configure Sun Cluster HA for Apache Tomcat as a scalable data service.	“How to Register and Configure Sun Cluster HA for Apache Tomcat as a Scalable Data Service” on page 33
6 Verify Sun Cluster HA for Apache Tomcat Installation and Configuration.	“How to Verify the Sun Cluster HA for Apache Tomcat Installation and Configuration” on page 37
7 Understanding the Sun Cluster Apache Tomcat HA parameter file.	“Understanding the Sun Cluster Apache Tomcat HA Parameter File” on page 37
8 Understanding the Sun Cluster HA for Apache Tomcat Fault Monitor.	“Understanding Sun Cluster HA for Apache Tomcat Fault Monitor” on page 40
9 How to debug Sun Cluster HA for Apache Tomcat.	“How to turn debug on for Sun Cluster HA for Apache Tomcat” on page 41

Sun Cluster HA for Apache Tomcat

Apache Tomcat acts as a servlet engine behind an Apache web server, or you can configure it as a standalone web server that includes the servlet engine.

Apache Tomcat is freely available under Apache Software License and can be downloaded from <http://jakarta.apache.org>.

The Sun Cluster HA for Apache Tomcat data service provides a mechanism for orderly startup and shutdown, fault monitoring, and automatic failover of the Apache Tomcat service.

The following table describes the relation between the application components and the related Sun Cluster data service.

TABLE 2 Protection of Components

Component	Protected by
Apache Tomcat	Sun Cluster HA for Apache Tomcat

Planning the Sun Cluster HA for Apache Tomcat Installation and Configuration

This section contains the information you need to plan your Sun Cluster HA for Apache Tomcat installation and configuration.

About Horizontal Scalability

Sun Cluster includes a concept of horizontal scalability for data services called scalable service. Ip based load-balancing algorithms are integrated in this concept. Because of this reason you can scale horizontally without using hardware loadbalancers. For a more detailed discussion of this scalable service see *Sun Cluster Concepts Guide for Solaris OS*.

Before using the Sun Cluster HA for Apache Tomcat in a scalable configuration, it is necessary to have a closer look at the infrastructure of the cluster and the clients.

If your clients access your application using proxies, determine whether the used proxy stays the same during a session context. This is true for an intranet.

If the proxy changes during a session context it means, from the load-balancing point of view, that the source ip address is changing. This will spoil every ip based load-balancing, whether it is hardware or software.

Especially when your client accesses the server over the Internet, it is *not* guaranteed, that the source ip address remains the same during a session context.

Sun Cluster HA for Apache Tomcat can be configured two ways to get horizontal scalability.

1. Using Sun Cluster HA for Apache Tomcat in a purely scalable configuration.

2. Using Sun Cluster HA for Apache Tomcat in a multiple masters configuration.

The difference between the two configuration is in the way of accessing the nodes.

- A client accesses the scalable configuration by its shared address. In this case, Sun Cluster does the load-balancing.
- A client accesses a multiple masters configuration using each node's physical address. Load-balancing must be done outside of the cluster.

For more information about scalable data services, see *Sun Cluster Concepts Guide for Solaris OS*.

Both configuration options are discussed in the sections "[Sun Cluster HA for Apache Tomcat as a scalable configuration](#)" on page 14 and "[Sun Cluster HA for Apache Tomcat as a multiple master configuration](#)" on page 15.

Sun Cluster HA for Apache Tomcat as a scalable configuration

You can use Sun Cluster HA for Apache Tomcat in a scalable configuration if it is guaranteed, that the source ip address remains the same during a session context. This guarantee is achieved in example in an intranet.

If the source ip address might change during a session context and a scalable configuration is required, Apache Tomcat needs to be configured with session replication. This can be done by the application using a global file system or a database.



Caution – You will get a performance penalty from this approach.

You will get better performance using Tomcats inbound memory session replication for a scalable configuration with changing source ip addresses.

- You can achieve the session replication for Apache Tomcat 4.x by following the instructions at <http://www.theserverside.com/resources/article.jsp?l=Tomcat>.
- For Apache Tomcat 5.x, inbound memory session replication as a built-in feature, is on the feature list.
- For Apache Tomcat 3.x the inbound memory session replication is not configurable.

Sun Cluster HA for Apache Tomcat as a multiple master configuration

You can use Sun Cluster HA for Apache Tomcat in a multiple master configuration in the other scenarios. External load-balancing is required. A typical configuration uses the scalable Apache web server as a load balancer and configures one physical host name of an Apache Tomcat instance behind each instance of the Apache web server. Another option is to use a hardware load balancer, which handles the session context.

The difference between scalable and multiple masters configuration is only in the way, the clients access the cluster nodes. In a scalable configuration, they access the shared address. Otherwise the clients access the physical hostnames.

Configuration Restrictions

This section provides a list of software and hardware configuration restrictions that apply to Sun Cluster HA for Apache Tomcat only.

For restrictions that apply to all data services, see *Sun Cluster Data Services Planning and Administration Guide for Solaris OS*.

- **Deploy a scalable Sun Cluster HA for Apache Tomcat configuration** only if either session replication, or reliable source ip addresses are achieved. Otherwise the behavior of the application becomes unpredictable.
- **Setting the resource parameter `Load_balancing_policy` to `LB_STICKY` is strictly required**, if Sun Cluster HA for Apache Tomcat is deployed in a scalable configuration with reliable source ip addresses when no session replication is configured. Otherwise, the behavior of the application becomes unpredictable. In every other scalable configuration the Sticky `Load_balancing_policy` helps to get the more cache hits out of your caches.



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

Configuration Requirements

These requirements apply to Sun Cluster HA for Apache Tomcat only. You must meet these requirements before you proceed with your Sun Cluster HA for Apache Tomcat installation and configuration.



Caution – Your data service configuration might not be supported if you do not adhere to these requirements.

Location of the Tomcat Home Directory for Scalable or Multiple Masters Configurations

If you intend to install Apache Tomcat in a scalable resource group, create the Tomcat Home directory and its dynamic data on local storage.

This required because Apache Tomcat uses the directory structure to store its configuration, logs, deployed applications and so on.

If your local storage is not big enough, you can use a Global File System on the shared storage.



Caution – In this scenario, the deployment of Tomcat applications needs to occur on every node where Apache Tomcat is hosted.

Load Balancing for Multiple Master Configurations

If you intend to install Apache Tomcat in a multiple master configuration, an external load balancer is required.

Location of the Tomcat Home Directory for Failover Configurations

If you intend to install Apache Tomcat in a failover resource group, create the Tomcat Home directory on the shared storage. The location for the Tomcat Home directory can reside on a Global File System (GFS) or it can reside on a Failover File System (FFS) with an HAStoragePlus resource. It is best practice to store it on a FFS.

This is required because Apache Tomcat uses the directory structure to store its configuration, logs, deployed applications, and so on. It is not recommended to store the binaries local and the dynamic parts of the data on the shared storage.

Note – It is best practice to mount Global File Systems with the `/global` prefix and to mount Failover File Systems with the `/local` prefix.

Apache Tomcat Component Dependencies

You can configure the Sun Cluster HA for Apache Tomcat data service to protect one or more Apache Tomcat instances. Each instance needs to be covered by one Apache Tomcat resource. The dependencies between the Apache Tomcat resource and other needed resources are described in [Table 3](#), in [Table 4](#), or in [Table 5](#).

TABLE 3 Dependencies Failover

Component	Description
Storage Resource	This resource can be a <code>SUNW.HAStoragePlus</code> or a <code>SUNW.HAStorage</code> resource type.
Apache Tomcat (Mandatory)	→ <code>SUNW.HAStoragePlus</code> resource or <code>SUNW.HAStorage</code> resource The Storage resource manages the Apache Tomcat File System Mount points and ensures that Apache Tomcat is not started until they are mounted.
Logical Host (Mandatory)	The Apache Tomcat has an implicit dependency on the logical hosts of the resource group, because it is based on the generic data service. On behalf of this reason a logical Host needs to exist, but no explicit dependency is necessary.

Because of the special requirements of a scalable configuration, you need no dependencies to storage or addresses, as long as every Apache Tomcat and its parameter file `pfile` is stored on the root file system. Otherwise follow [Table 4](#).

TABLE 4 Dependencies Scalable

Component	Description
Storage Resource	This resource can be a <code>SUNW.HAStorage</code> or a <code>SUNW.HAStoragePlus</code> resource type.
Apache Tomcat (Mandatory)	→ Storage resource The Storage resource manages the Apache Tomcat File System Mount points and ensures that Apache Tomcat is not started until they are mounted.
Shared address (Mandatory)	The shared address resource resides in a separate resource group on which the scalable resource group depends.

A multiple master configuration is running on more than one nodes like a scalable configuration, but without a shared address. Because of the special requirements of a multiple masters configuration, you need no dependencies to storage or addresses, as long as every Apache Tomcat and its parameter file `pfile` is stored on the root file system. Otherwise follow [Table 5](#).

TABLE 5 Dependencies Multiple Masters

Component	Description
Storage Resource	This resource can be a <code>SUNW.HASStorage</code> or a <code>SUNW.HASStoragePlus</code> resource type.
Apache Tomcat (Mandatory)	→ Storage resource The Storage resource manages the Apache Tomcat File System Mount points and ensures that Apache Tomcat is not started until they are mounted.
Shared address (Mandatory)	The shared address resource resides in a separate resource group on which the scalable resource group depends.

Note – For more detailed information about Apache Tomcat, refer to the <http://jakarta.apache.org> web page.

Apache Tomcat Configuration and Registration Files

Apache Tomcat component has configuration and registration files in the directory `/opt/SUNWsctomcat/util`. These files let you register the Apache Tomcat component with Sun Cluster.

Within these files, the appropriate dependencies have been applied.

```
# cd /opt/SUNWsctomcat
#
# ls -l util
total 4
-rwx--x---  1 root    other      709 Apr 29 11:57 sctomcat_config
-rwx--x---  1 root    other      561 Apr 29 11:58 sctomcat_register
# more util/*g
:::::::::::::
util/sctomcat_config
:::::::::::::
#
# Copyright 2003 Sun Microsystems, Inc.  All rights reserved.
# Use is subject to license terms.
#
# This file will be sourced in by sctomcat_register and the parameters
```

```
# listed below will be used.
#
# These parameters can be customized in (key=value) form
#
#     RS - name of the resource for the application
#     RG - name of the resource group containing RS
#     PORT - name of the port number
#     LH - name of the LogicalHostname SC resource
#     SCALABLE - true or false for a scalable or failover resource
#     NETWORK - false or true, false for multiple master configurations without
#               shared address, in this case SCALABLE will be ignored
#
#     PFILE - absolute pathname to the parameter file for the Tomcat resource
#     HAS_RS - name of the HAStoragePlus SC resource
#              (it can be a , separated list for the dependencies)
#
RS=
RG=
PORT=8080
LH=
SCALABLE=false
NETWORK=true
PFILE=
HAS_RS=
```

Installing and Configuring Apache Tomcat

This section contains the procedures you need to install and configure Apache Tomcat.

Note – For more information about Apache Tomcat, refer to the <http://jakarta.apache.org> web page.

▼ How to Install and Configure Apache Tomcat

Steps 1. Determine how Apache Tomcat will be deployed in Sun Cluster

- Determine whether you will use Apache Tomcat as a failover a multiple master, or a scalable data service.

For conceptual information on scalable and failover data services, see *Sun Cluster Concepts Guide for Solaris OS*.

- Determine which user name will run Apache Tomcat.
- Determine how many Apache Tomcat versions and instances will be deployed.
- If more than one instance of a version will be deployed, determine whether they share the binaries.
- Determine which Cluster File System will be used by each Apache Tomcat instance.

2. Mount Apache Tomcat Cluster File Systems



Caution – In this scenario, the deployment of Tomcat applications needs to occur on every node where Apache Tomcat is hosted.

3. Create user and group if required.

If Apache Tomcat is to run under a non root user, you have to create the appropriate user, and the appropriate group. For these tasks use the following commands.

a. Create the group by running the following command:

```
# groupadd -g 1000 tomcat
```

b. Create the user by running the following command:

```
# useradd -u 1000 -g 1000 -d /global/tomcat -s /bin/ksh tomcat
```

4. If you are not logged in as root, switch to the appropriate user name.

```
# su - user-name
```

5. Install Apache Tomcat.

If you deploy Apache Tomcat as a failover data service, install Apache Tomcat onto a shared file system within Sun Cluster.

It is recommended that you install Apache Tomcat onto shared disks. For a discussion of the advantages and disadvantages of installing the software on a local versus a cluster file system, see “Determining the Location of the Application Binaries” in *Sun Cluster Data Services Planning and Administration Guide for Solaris OS*.

If you will deploy Apache Tomcat as a failover data service install the Apache Tomcat binaries on the shared storage on **one** node. If Apache Tomcat will be deployed as a scalable or a multiple master data service, install the Apache Tomcat binaries on the local storage on **every** node that will host the Apache Tomcat data service.

Note – Refer to <http://jakarta.apache.org/tomcat/index.html> for instructions about installing Apache Tomcat.

If you deploy Apache Tomcat as a scalable data service for a scalable or a multiple masters configuration, repeat the following step at every node that will host Apache Tomcat.

6. Create the environment script.

Create an Korn shell or a Cshell script (dependent on the login-shell of your Apache Tomcat user name) to set the environment variables for Apache Tomcat. You must set the environment variables in a shell script and not in the users profile.

With this mechanism you can install and run multiple Apache Tomcat versions and instances under one user name.



Caution – These shell scripts must be available on every node that can host the Apache Tomcat data service. For a failover configuration, store them on the shared storage. For a scalable or a multiple masters configuration, store them on the local file system of every node or on the shared storage. These scripts must not be different on the various nodes.

Example 1 Korn shell script to set the environment variables for Apache Tomcat 3.x/3.3

```
# more env.ksh
#!/usr/bin/ksh
#
# Environment for Tomcat
#
JAVA_HOME=/usr/j2se
export JAVA_HOME
JAKARTA_HOME=/global/mnt1/jakarta-3.3
export JAKARTA_HOME
TOMCAT_HOME=$JAKARTA_HOME
export TOMCAT_HOME
```

Example 2 Cshell script to set the environment variables for Apache Tomcat 3.3/3.3

```
# more env.csh
#!/usr/bin/csh
#
# Environment for Tomcat
#
```

```
setenv JAVA_HOME /usr/j2se
setenv JAKARTA_HOME /global/mnt1/jakarta-3.3
setenv TOMCAT_HOME $JAKARTA_HOME
```

Example 3 Korn shell script to set the environment variables for Apache Tomcat 4.1.x

```
# more env.ksh
#!/usr/bin/ksh
#
# Environment for Tomcat
#
JAVA_HOME=/usr/j2se
export JAVA_HOME
CATALINA_HOME=/global/mnt1/jakarta-tomcat-4.1.18
export CATALINA_HOME
```

Example 4 Cshell script to set the environment variables for Apache Tomcat 4.1.x

```
# more env.csh
#!/usr/bin/csh
#
# Environment for Tomcat
#
setenv JAVA_HOME /usr/j2se
setenv CATALINA_HOME /global/mnt1/jakarta-tomcat-4.1.18
```

The environment variables are version and configuration dependent.

Verifying the Installation and Configuration of Apache Tomcat

This section contains the procedure you need to verify the installation and configuration of Apache Tomcat.

▼ How to Verify the Installation and Configuration of Apache Tomcat

This procedure does not verify that your application is highly available because you have not installed your data service yet.

Steps 1. Start the Apache Tomcat.

Switch to the Tomcat user name (in the following example, it is root) and change to the directory where the environment script is located. In the following example the Tomcat version is 4.1.24.

Note – The output messages of the start and shutdown commands are highly version dependent.

```
# ./env.ksh
# cd $CATALINA_HOME/bin
# ./startup.sh
Using CATALINA_BASE:   /tomcat/jakarta-tomcat-4.1.24
Using CATALINA_HOME:   /tomcat/jakarta-tomcat-4.1.24
Using CATALINA_TMPDIR: /tomcat/jakarta-tomcat-4.1.24/temp
Using JAVA_HOME:       /usr/j2se
```

2. Check the Installation

Start a web browser and connect to the cluster node with `http://nodename:8080`. If you see the default Tomcat homepage everything is working correctly.

3. Stop the Apache Tomcat.

```
# ./shutdown.sh
Using CATALINA_BASE:   /tomcat/jakarta-tomcat-4.1.24
Using CATALINA_HOME:   /tomcat/jakarta-tomcat-4.1.24
Using CATALINA_TMPDIR: /tomcat/jakarta-tomcat-4.1.24/temp
Using JAVA_HOME:       /usr/j2se
```

▼ How to Deploy the Apache Tomcat Application

If you configure Apache Tomcat as a failover resource, execute the following steps on one node. If you deploy Apache Tomcat as a scalable configuration, repeat the following steps on every node.



Caution – It is vital for a scalable configuration that the Apache Tomcat configuration does not differ on the Tomcat hosts.

Steps 1. Modify the configuration files `server.xml` and the Tomcat user configuration to the desired content.

For further information refer to <http://jakarta.apache.org/tomcat/index.html>.

2. Start Apache Tomcat as described in “How to Verify the Installation and Configuration of Apache Tomcat” on page 22.

3. Deploy your Application.

For further information refer to
<http://jakarta.apache.org/tomcat/index.html>.

4. Test your application with appropriate methods.

For example, connect with a web browser to the Host with the appropriate port and select the start page of your application.

5. Stop Apache Tomcat as described in “How to Verify the Installation and Configuration of Apache Tomcat” on page 22.

The port on which Apache Tomcat is serving is required for the configuration of the Sun Cluster Apache Tomcat resource.

It is best practice to use the start page of the deployed application for the Fault Monitoring. In this case the TestCmd is described in “Understanding the Sun Cluster Apache Tomcat HA Parameter File” on page 37 can be `get /start_page`. With this procedure, you monitor Apache Tomcat and the application it is serving.

Installing the Sun Cluster HA for Apache Tomcat Packages

If you did not install the Sun Cluster HA for Apache Tomcat packages during your initial Sun Cluster installation, perform this procedure to install the packages. Perform this procedure on each cluster node where you are installing the Sun Cluster HA for Apache Tomcat packages. To complete this procedure, you need the Sun Java Enterprise System Accessory CD Volume 3.

If you are installing more than one data service simultaneously, perform the procedure in “Installing the Software” in *Sun Cluster Software Installation Guide for Solaris OS*.

Install the Sun Cluster HA for Apache Tomcat packages by using one of the following installation tools:

- The Web Start program
- The `scinstall` utility

Note – The Web Start program is *not* available in releases earlier than Sun Cluster 3.1 Data Services 10/03.

If you are using Solaris 10, install these packages *only* in the global zone. To ensure that these packages are not propagated to any local zones that are created after you install the packages, use the `scinstall` utility to install these packages. Do *not* use the Web Start program.

▼ How to Install the Sun Cluster HA for Apache Tomcat Packages Using the Web Start Program

You can run the Web Start program with a command-line interface (CLI) or with a graphical user interface (GUI). The content and sequence of instructions in the CLI and the GUI are similar. For more information about the Web Start program, see the `installer(1M)` man page.

- Steps**
1. **Become superuser on the cluster node where you are installing the Sun Cluster HA for Apache Tomcat packages.**
 2. **(Optional) If you intend to run the Web Start program with a GUI, ensure that your `DISPLAY` environment variable is set.**
 3. **Load the Sun Java Enterprise System Accessory CD Volume 3 into the CD-ROM drive.**

If the Volume Management daemon `vold(1M)` is running and configured to manage CD-ROM devices, it automatically mounts the CD-ROM on the `/cdrom/cdrom0` directory.
 4. **Change to the Sun Cluster HA for Apache Tomcat component directory of the CD-ROM.**

The Web Start program for the Sun Cluster HA for Apache Tomcat data service resides in this directory.

```
# cd /cdrom/cdrom0/components/SunCluster_HA_APACHE_TC_3.1
```
 5. **Start the Web Start program.**

```
# ./installer
```
 6. **When you are prompted, select the type of installation.**
 - To install only the C locale, select Typical.
 - To install other locales, select Custom.
 7. **Follow instructions on the screen to install the Sun Cluster HA for Apache Tomcat packages on the node.**

After the installation is finished, the Web Start program provides an installation summary. This summary enables you to view logs that the Web Start program created during the installation. These logs are located in the `/var/sadm/install/logs` directory.

8. **Exit the Web Start program.**
9. **Unload the Sun Java Enterprise System Accessory CD Volume 3 from the CD-ROM drive.**
 - a. **To ensure that the CD-ROM is not being used, change to a directory that does *not* reside on the CD-ROM.**
 - b. **Eject the CD-ROM.**

```
# eject cdrom
```

▼ How to Install the Sun Cluster HA for Apache Tomcat Packages Using the `scinstall` Utility

You need the Sun Cluster Agents CD-ROM to perform this procedure. It is assumed that you did not install the data service during your initial Sun Cluster installation.

If you installed Sun Cluster HA for Apache Tomcat as part of your initial Sun Cluster installation, proceed to [“Registering and Configuring Sun Cluster HA for Apache Tomcat” on page 27](#).

Perform this procedure, on all nodes that can run Sun Cluster HA for Apache Tomcat.

- Steps**
1. **Load the Sun Cluster Agents CD-ROM into the CD-ROM drive.**
 2. **Run the `scinstall` utility with no options.**

The `scinstall` utility prompts you for additional information.
 3. **Chose the menu option, Add Support for New Data Service to this Cluster Node**

This step starts the `scinstall` utility in interactive mode.
 4. **Provide the pathname to the Sun Cluster Agents CD-ROM.**

The utility refers to the CD as “data services cd.”
 5. **Chose the menu option, q) done.**
 6. **Type yes for the question, Do you want to see more data services?**

The utility refers to the CD as “data services cd.”
 7. **Specify the data service to install.**

The `scinstall` utility lists the data service that you selected and asks you to confirm your choice.

8. Exit the `scinstall` utility.
9. Unload the CD from the CD-ROM drive.

Registering and Configuring Sun Cluster HA for Apache Tomcat

This section contains the procedures you need to configure Sun Cluster HA for Apache Tomcat.

▼ How to Register and Configure Sun Cluster HA for Apache Tomcat as a failover data service

This procedure assumes that you installed the data service packages.

If you did not install the Sun Cluster HA for Apache Tomcat packages, go to [“Installing the Sun Cluster HA for Apache Tomcat Packages”](#) on page 24.

It is assumed that the file system of Apache Tomcat will be mounted as a failover file system.

Steps 1. Become superuser on one of the nodes in the cluster that will host Apache Tomcat.

2. Register the `SUNW.gds` resource type.

```
# scrgadm -a -t SUNW.gds
```

3. Register the `SUNW.HAStoragePlus` resource type.

```
# scrgadm -a -t SUNW.HAStoragePlus
```

4. Create a failover resource group.

```
# scrgadm -a -g Apache-Tomcat-failover-resource-group
```

5. Create a resource for the Apache Tomcat Disk Storage.

```
# scrgadm -a -j Apache-Tomcat-has-resource \
> -g Apache-Tomcat-failover-resource-group \
> -t SUNW.HAStoragePlus \
> -x FilesystemMountPoints=Apache Tomcat- instance-mount-points
```

6. Create a resource for the Apache Tomcat Logical Host name.

```
# scrgadm -a -L -j Apache-Tomcat-lh-resource \
> -g Apache-Tomcat-failover-resource-group \
> -l Apache-Tomcat-logical-hostname
```

7. Enable the failover resource group, which now includes the Apache Tomcat Disk Storage and Logical Hostname resources.

```
# scswitch -Z -g Apache-Tomcat-failover-resource-group
```

8. Prepare the parameter file, which is required by the Sun Cluster HA for Apache Tomcat.

```
# cd /opt/SUNWscTomcat/bin
# cp pfile desired place
```

Edit the parameter file `pfile` and follow the comments within that file. For example:

```
#!/usr/bin/ksh
# Set the Apache Tomcat specific environment variables which the start,
# stop and check functions will use
#
# EnvScript      Script to set runtime environment for tomcat
# User           Apache Tomcat user name
# Basepath       Absolute pathname to Tomcat Home directory i.e. 4.x CATALINA_HOME
#                or TOMCAT_HOME for 3.x
# Host           Hostname to test Apache Tomcat
# Port           Port where Apache Tomcat is configured
# TestCmd        Apache Tomcat test command
# Startwait      Sleeping $Startwait seconds after completion of the
#                start command
EnvScript=
User=
Basepath=
Host=
Port=8080
TestCmd="get /index.jsp"
ReturnString="CATALINA"
Startwait=20
```

The following is an example for Apache Tomcat 4.1.24.

```
EnvScript=/global/mnt1/tomtest/env.ksh
User=tomtest
Basepath=/global/mnt1/tomtest/jakarta-tomcat-4.1.24
Host=tomcat-lh
Port=8080
TestCmd="get /index.jsp"
ReturnString="CATALINA"
Startwait=20
```

This example is from an Apache Tomcat 4.1.24 configured as standalone web server with the default start page `index.jsp`. The start page contains the string `CATALINA`.



Caution – The parameter files need to be available on every node that can host the Apache Tomcat data service. For a failover configuration store them on the shared storage. The parameter files cannot differ for an instance of Apache Tomcat on the various nodes.

Repeat [Step 8](#) for every Apache Tomcat instance you need.

9. Create and register each required Apache Tomcat component.

```
# cd /opt/SUNWsctomcat/util
# cp sctomcat_config desired place
# cp sctomcat_register desired place
```

Edit the `sctomcat_config` file and follow the comments within that file. For example:

```
# These parameters can be customized in (key=value) form
#
# Copyright 2003 Sun Microsystems, Inc. All rights reserved.
# Use is subject to license terms.
#
# This file will be sourced in by sctomcat_register and the parameters
# listed below will be used.
#
# These parameters can be customized in (key=value) form
#
# RS - name of the resource for the application
# RG - name of the resource group containing RS
# PORT - name of the port number
# LH - name of the LogicalHostname SC resource
# SCALABLE - true or false for a scalable or failover resource
# NETWORK - false or true, false for multiple master configurations without
#            shared address, in this case SCALABLE will be ignored
#
# PFILE - absolute pathname to the parameter file for the Tomcat resource
# HAS_RS - name of the HASToragePlus SC resource
#           (it can be a , separated list for the dependencies)
#
RS=
RG=
PORT=8080
LH=
SCALABLE=false
NETWORK=true
PFILE=
HAS_RS=
```

The following is an example for Apache Tomcat.

```
RS=tomcat-res
RG=tomcat-rg
PORT=8080
```

```
LH=tomcat-lh
SCALABLE=false
PFILE=/global/mnt1/pfile
NETWORK=true
HAS_RS=tomcat-hastplus-res
```

10. After editing `sctomcat_config` register the resource.

```
# ./sctomcat_register
```

Repeat Step 7,8, and 9 for each Apache Tomcat instance you need.

11. Enable each Apache Tomcat resource.

Repeat this step for each Apache Tomcat resource created in the step 10.

```
# scstat
```

```
# scswitch -e -j Apache-Tomcat-resource
```

▼ How to Register and Configure Sun Cluster HA for Apache Tomcat as a Multiple Masters Data Service

This procedure assumes that you installed the data service packages during your initial Sun Cluster installation.

If you did not install the Sun Cluster HA for Apache Tomcat packages as part of your initial Sun Cluster installation, go to [“Installing the Sun Cluster HA for Apache Tomcat Packages” on page 24](#).

Steps 1. Become superuser on one of the nodes in the cluster that will host Apache Tomcat.

2. Register the `SUNW.gds` resource type.

```
# scrgadm -a -t SUNW.gds
```

3. Prepare the parameter file, which is required by the Sun Cluster HA for Apache Tomcat.

```
# cd /opt/SUNWsctomcat/bin
cp pfile desired place
```

Edit the parameter file `pfile` and follow the comments within that file. For example:

```
#!/usr/bin/ksh
# Set the Apache Tomcat specific environment variables which the start,
# stop and check functions will use
#
# EnvScript      Script to set runtime environment for tomcat
# User           Apache Tomcat user name
```

```
# Basepath      Absolute pathname to Tomcat Home directory i.e. 4.x CATALINA_HOME
#              or TOMCAT_HOME for 3.x
# Host          Hostname to test Apache Tomcat
# Port          Port where Apache Tomcat is configured
# TestCmd       Apache Tomcat test command
# Startwait     Sleeping $Startwait seconds after completion of the
#              start command
EnvScript=
User=
Basepath=
Host=
Port=8080
TestCmd="get /index.jsp"
ReturnString="CATALINA"
Startwait=20
```

The following is an example for Apache Tomcat 4.1.24.

```
EnvScript=/tomcat/env.ksh
User=tomcat
Basepath=/tomcat/jakarta-tomca-4.1.24
Host=localhost
Port=8080
TestCmd="get /index.jsp"
ReturnString="CATALINA"
Startwait=20
```

This example is from an Apache Tomcat 4.1.24 configured as standalone web server with the default start page `index.jsp`. The start page contains the string `CATALINA`.

The `Host` parameter depends on the location of the `pfile`.

- If the `pfile` is stored on the shared storage, you need to use `localhost`.
- If the `pfile` is stored on the local storage, it can be either `localhost` or the nodes host name.



Caution – The parameter files need to be available on every node that can host the Apache Tomcat data service. For a scalable or a multiple masters configuration, store them on the local file system of every node or on the shared storage. The parameter files must not differ for an instance of Apache Tomcat on the various nodes.

Repeat this Step for every Apache Tomcat instance and every node you need.

4. Create the resource group for the multiple masters data service.

```
# scrgadm -a -g Apache-Tomcat-Scalable-resource-group \
> -y Maximum primaries=2 \
> -y Desired primaries=2 \
```

If you need more nodes, adjust `Maximum primaries` and `Desired primaries` to the appropriate value.

5. Create a resource for the Apache Tomcat Disk Storage if it is not in the root file system.

Otherwise, proceed to [Step 7](#).

```
# scrgadm -a -j Apache-Tomcat-has-resource \
> -g Apache-Tomcat-failover-resource-group \
> -t SUNW.HAStoragePlus \
> -x FilesystemMountPoints=Apache Tomcat- instance-mount-points
```

6. Enable the Apache-Tomcat-has-resource.

```
# scstat

# scswitch -e -j Apache- Tomcat-has-resource
```

7. Create and register each required Apache Tomcat component.

```
# cd /opt/SUNWscTomcat/util
# cp sctomcat_config desired place
# cp sctomcat_register desired place
```

Edit the sctomcat_config file and follow the comments within that file, for example:

```
# These parameters can be customized in (key=value) form
#
# Copyright 2003 Sun Microsystems, Inc. All rights reserved.
# Use is subject to license terms.
#
# This file will be sourced in by sctomcat_register and the parameters
# listed below will be used.
#
# These parameters can be customized in (key=value) form
#
# RS - name of the resource for the application
# RG - name of the resource group containing RS
# PORT - name of the port number
# LH - name of the LogicalHostname SC resource
# SCALABLE - true or false for a scalable or failover resource
# NETWORK - false or true, false for multiple master configurations without
#           shared address, in this case SCALABLE will be ignored
#
# PFILE - absolute pathname to the parameter file for the Tomcat resource
# HAS_RS - name of the HAStoragePlus SC resource
#           (it can be a , separated list for the dependencies)
#

RS=
RG=
PORT=8080
LH=
SCALABLE=false
NETWORK=false
PFILE=
HAS_RS=
```


The following is an example for Apache Tomcat.

```
RS=tomcat-res
RG=tomcat-rg
PORT=8080
LH=tomcat-lh
SCALABLE=false
SNETWORK=falsePFILE=/local/pfile
HAS_RS=Apache-Tomcat-has-resource
```

Omit the LH parameter here, it will not be used. Set the parameter HAS_RS only when another file system (GFS or local file system) is used and the appropriate Apache-Tomcat-has-resource is created.

8. After editing `sctomcat_config` register the resource.

```
# ./sctomcat_register
```

Repeat Steps 6, 7, and 8 for every Apache Tomcat instance you need.

9. Enable each Apache Tomcat resource.

Repeat this step for each Apache Tomcat resource created in the previous step.

```
# scstat
```

```
# scswitch -e -j Apache-Tomcat-resource
```

▼ How to Register and Configure Sun Cluster HA for Apache Tomcat as a Scalable Data Service

This procedure assumes that you installed the data service packages during your initial Sun Cluster installation.

If you did not install the Sun Cluster HA for Apache Tomcat packages as part of your initial Sun Cluster installation, go to [“Installing the Sun Cluster HA for Apache Tomcat Packages” on page 24](#).

Steps 1. Become superuser on one of the nodes in the cluster that will host Apache Tomcat.

2. Register the `SUNW.gds` resource type.

```
# scrgadm -a -t SUNW.gds
```

3. Create a failover resource group for the SharedAddress resource.

```
# scrgadm -a -g Apache-Tomcat-SharedAddress-resource-group
```

4. Create the SharedAddress resource.

```
# scrgadm -a -S -j Apache-Tomcat-SharedAddress-resource \
> -g Apache-Tomcat-SharedAddress-resource-group \
> -l Apache-Tomcat-SharedAddress-hostname
```

5. Enable the SharedAddress resource group.

```
# scswitch -Z -g Apache-Tomcat-SharedAddress-resource-group
```

6. Prepare the parameter file, which is required by the Sun Cluster HA for Apache Tomcat.

```
# cd /opt/SUNWsctomcat/bin
cp pfile desired place
```

Edit the parameter file `pfile` and follow the comments within that file. For example:

```
#!/usr/bin/ksh
# Set the Apache Tomcat specific environment variables which the start,
# stop and check functions will use
#
# EnvScript      Script to set runtime environment for tomcat
# User           Apache Tomcat user name
# Basepath       Absolute pathname to Tomcat Home directory i.e. 4.x CATALINA_HOME
#                or TOMCAT_HOME for 3.x
# Host           Hostname to test Apache Tomcat
# Port           Port where Apache Tomcat is configured
# TestCmd        Apache Tomcat test command
# Startwait      Sleeping $Startwait seconds after completion of the
#                start command
EnvScript=
User=
Basepath=
Host=
Port=8080
TestCmd="get /index.jsp"
ReturnString="CATALINA"
Startwait=20
```

The following is an example for Apache Tomcat 4.1.24.

```
EnvScript=/tomcat/env.ksh
User=tomcat
Basepath=/tomcat/jakarta-tomca-4.1.24
Host=localhost
Port=8080
TestCmd="get /index.jsp"
ReturnString="CATALINA"
Startwait=20
```

This example is from an Apache Tomcat 4.1.24 configured as standalone web server with the default start page `index.jsp`. The start page contains the string `CATALINA`.

The Host parameter depends on the location of the `pfile`.

- If the `pfile` is stored on the shared storage, you need to use `localhost`.
- If the `pfile` is stored on the local storage, it can be either `localhost` or the nodes host name.

Do not use the SharedAddress here.



Caution – The parameter files need to be available on every node that can host the Apache Tomcat data service. For a scalable or a multiple masters configuration, store them on the local file system of every node or on the shared storage. The parameter files must not differ for an instance of Apache Tomcat on the various nodes.

Repeat this Step for every Apache Tomcat instance and every node you need.

7. Create the resource group for the scalable service.

```
# scrgadm -a -g Apache-Tomcat-Scalable-resource-group \  
> -y Maximum primaries=2 \  
> -y Desired primaries=2 \  
> -y RG_dependencies=Apache-Tomcat-SharedAddress-resource-group
```

If you need more nodes, adjust Maximum_primaries and Desired_primaries to the appropriate value.

8. Create a resource for the Apache Tomcat Disk Storage if it is not in the root file system.

Otherwise, proceed to [Step 10](#).

```
# scrgadm -a -j Apache-Tomcat-has-resource \  
> -g Apache-Tomcat-failover-resource-group \  
> -t SUNW.HAStoragePlus \  
> -x FilesystemMountPoints=Apache Tomcat- instance-mount-points
```

9. Enable the Apache-Tomcat-has-resource.

```
# scstat  
  
# scswitch -e -j Apache- Tomcat-has-resource
```

10. Create and register each required Apache Tomcat component.

```
# cd /opt/SUNWsctomcat/util  
# cp sctomcat_config desired place  
# cp sctomcat_register desired place
```

Edit the sctomcat_config file and follow the comments within that file, for example:

```
# These parameters can be customized in (key=value) form  
#  
# Copyright 2003 Sun Microsystems, Inc. All rights reserved.  
# Use is subject to license terms.  
#  
# This file will be sourced in by sctomcat_register and the parameters  
# listed below will be used.  
#  
# These parameters can be customized in (key=value) form  
#  
# RS - name of the resource for the application
```

```

#      RG - name of the resource group containing RS
#      PORT - name of the port number
#      LH - name of the LogicalHostname SC resource
#  SCALABLE - true or false for a scalable or failover resource
#  NETWORK - false or true, false for multiple master configurations without
#             shared address, in this case SCALABLE will be ignored
#
#      PFILE - absolute pathname to the parameter file for the Tomcat resource
#      HAS_RS - name of the HAStoragePlus SC resource
#               (it can be a , separated list for the dependencies)
#

```

```

RS=
RG=
PORT=8080
LH=
SCALABLE=false
NETWORK=true
PFILE=
HAS_RS=

```

The following is an example for Apache Tomcat.

```

RS=tomcat-res
RG=tomcat-rg
PORT=8080
LH=tomcat-lh
SCALABLE=true
NETWORK=true
PFILE=/tomcat/pfile
HAS_RS=Apache-Tomcat-has-resource

```

Configure the parameter LH need to be configured as the name of the shared address. Set the parameter HAS_RS only when another file system (GFS or local file system) is used and the appropriate Apache-Tomcat-has-resource is created.

11. After editing `sctomcat_config` register the resource.

```
# ./sctomcat_register
```

Repeat Steps 8, 9, an 10 for every Apache Tomcat instance you need.

12. Enable each Apache Tomcat resource.

Repeat this step for each Apache Tomcat resource created in the previous step.

```
# scstat
```

```
# scswitch -e -j Apache-Tomcat-resource
```

Verifying the Sun Cluster HA for Apache Tomcat Installation and Configuration

This section contains the procedure you need to verify that you installed and configured your data service correctly.

▼ How to Verify the Sun Cluster HA for Apache Tomcat Installation and Configuration

Steps 1. Become superuser on one of the nodes in the cluster which will host Apache Tomcat.

2. Ensure all the Apache Tomcat resources are online with `scstat`.

```
# scstat
```

For each Apache Tomcat resource which is not online, use the `scswitch` command as follows.

```
# scswitch -e -j Apache Tomcat- resource
```

3. If you deployed a failover data service run the `scswitch` command to switch the Apache Tomcat resource group to another cluster node, such as `node2` with the command described below.

```
# scswitch -z -g Apache-Tomcat-failover-resource-group -h node2
```

Understanding the Sun Cluster Apache Tomcat HA Parameter File

Use the information to understand the contents of the Sun Cluster Apache Tomcat HA parameter file. This section describes the structure and the content of the Sun Cluster Apache Tomcat HA parameter file, as well as the strategy to chose some of its variables.

Structure of the Apache Tomcat HA parameter file

Apache Tomcat HA uses a parameter file to pass parameters to the start, stop and probe command. This parameter file needs to be a valid Korn shell script which sets several variables. The structure of this file appears in [Table 6](#). For examples of the parameter file refer to “[Registering and Configuring Sun Cluster HA for Apache Tomcat](#)” on page 27.

TABLE 6 Structure of the Apache Tomcat HA parameter file

Variable	Explanation
EnvScript	This is a ksh script or a csh script depending on the login-shell of the user name, which owns Apache Tomcat. The purpose of this script is to set the Apache Tomcat specific environment variables, which are needed to start and stop the Apache Tomcat instance.
User	The owner of the Apache Tomcat instance.
Basepath	Basepath is the absolute pathname to the directory where the Tomcat bin directory resides. Typically, it is the TOMCAT_HOME (3.x) or the CATALINA_HOME (4.x).
Host	The Host variable is the Host to test the functionality of the Apache Tomcat server process. The Test is done via a connection to Host:Port.
Port	A Port where Apache Tomcat is serving. This Port is used together with the Host to test the functionality of the Apache Tomcat server process.
TestCmd	This variable represents the command which is passed to the Apache Tomcat server process to test it's sanity.
ReturnString	The variable ReturnString represents the string which must be present in the answer to the TestCmd. It can not be Connection refused because this string is in the answer when the Apache Tomcat server process is not running.
Startwait	This variable stands for the number of seconds to wait after the Apache Tomcat start command is completed. It lasts until the Apache Tomcat server process is fully operational. The absolute number of seconds depends on the speed and the load of the Hardware. A good strategy is to start with 10 — 20 seconds.

The parameters in [Table 6](#) can be changed at any time. The only difference is when changes take effect.

The following parameters of the Apache Tomcat HA parameter file are used for starting and stopping Apache Tomcat. Changes to these parameters take effect at every restart or disabling and enabling of a Apache Tomcat resource.

- EnvScript
- User
- Basepath
- Startwait

The following parameters of the Apache Tomcat HA parameter file are used within the fault monitor. Changes to these parameters take effect at every `Thorough_probe_interval`.

- Host
- Port
- TestCmd
- ReturnString

Strategy to Chose the TestCmd and the ReturnString Variable

Alternatives are available to chose the ReturnString:

- Take the start page of your application and set the TestCmd to get `/start_page`. Set the ReturnString to a string contained in the startpage. With this strategy, you are monitoring that Apache Tomcat is serving your application.
- Take the Apache Tomcat default startpage and set the TestCmd to get `/default-startpage`. In this case, set the ReturnString to a string contained in the startpage. This string depends on the deployed Apache Tomcat version, for 3.x it is Tomcat home and for 4.x it is CATALINA. With this strategy, you are monitoring that Apache Tomcat is serving its default application.
- Deploy a test application (which is not provided with the Sun Cluster Apache Tomcat agent) to Apache Tomcat. Set the TestCmd to get `/startpage-of-the-application`. In this case, set the ReturnString to a string contained in the startpage. With this strategy, you are monitoring that Apache Tomcat is serving your test application.
- If none of above is appropriate, set the TestCmd to get `/a-page-which-does-not-exists`. In this case, set the ReturnString to a string contained in the Error Page. With this strategy, you are monitoring that Apache Tomcat is operational, because it registers that it must deliver a page that does not exist.

You can evaluate the different pages by connecting using a browser with `hostname:port` and specifying the different pages.

Understanding Sun Cluster HA for Apache Tomcat Fault Monitor

This section describes the Sun Cluster HA for Apache Tomcat fault monitor's probing algorithm and functionality, states the conditions, messages, and recovery actions associated with unsuccessful probing, and states the conditions and messages associated with unsuccessful probing.

For conceptual information on fault monitors, see *Sun Cluster Concepts Guide for Solaris OS*.

Resource Properties

The Sun Cluster HA for Apache Tomcat fault monitor uses the same resource properties as the resource type `SUNW.gds`. Refer to the `SUNW.gds(5)` man page for a complete list of resource properties used.

Probing Algorithm and Functionality

The following steps are executed to monitor the sanity of Apache Tomcat.

1. Sleeps for `Thorough_probe_interval`.
2. Pings the `Host`, which is configured in the Apache Tomcat HA parameter file.
3. Connects to the Apache Tomcat via `Host` and `Port`. If the connection is successful it sends the `TestCmd` and tests whether the `ReturnString` comes back. If it fails, it is rescheduled after 5 seconds. If this fails again, then the probe will restart the Apache Tomcat.



Caution – The `ReturnString` cannot be **Connection refused** because this string will be returned if no connection is possible.

4. If the Apache Tomcat process has died, pmf will interrupt the probe to immediately restart the Apache Tomcat.
5. If the Apache Tomcat is repeatedly restarted and subsequently exhausts the `Retry_count` within the `Retry_interval`, then a failover is initiated for the resource group onto another node. This is done if the resource property `Failover_enabled` is set to `TRUE`.

How to debug Sun Cluster HA for Apache Tomcat

Sun Cluster HA for Apache Tomcat can be used by multiple Apache Tomcat instances. However, it is possible to turn debug on for all Apache Tomcat instances or a particular Apache Tomcat instance.

The Apache Tomcat component has a `DEBUG` file under `/opt/SUNWsctomcat/etc`.

This file allows you to switch debug on for all Apache Tomcat instances, or for a specific Apache Tomcat instance on a particular node in a Sun Cluster. If you require debug to be switched on for Sun Cluster HA for Apache Tomcat across the whole Sun Cluster, you will need to repeat this step on all nodes within Sun Cluster.

▼ How to turn debug on for Sun Cluster HA for Apache Tomcat

Perform this step for the Apache Tomcat that requires debug output, on each node of Sun Cluster as required.

Steps 1. Edit `/etc/syslog.conf` and change `daemon.notice` to `daemon.debug`.

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

Change the `daemon.notice` to `daemon.debug` and restart `syslogd`. Note that the output below, from the command `grep daemon /etc/syslog.conf`, shows that `daemon.debug` has now been set.

```
# grep daemon /etc/syslog.conf
*.err;kern.debug;daemon.debug;mail.crit      /var/adm/messages
*.alert;kern.err;daemon.err                    operator
#
# pkill -1 syslogd
```

2. Edit `/opt/SUNWsctomcat/etc/config` and change `DEBUG=` to `DEBUG=ALL` or `DEBUG=resource`

```
# cat /opt/SUNWsctomcat/etc/config
#
# Copyright 2003 Sun Microsystems, Inc. All rights reserved.
# Use is subject to license terms.
#
# Usage:
```

```
#          DEBUG=<RESOURCE_NAME> or ALL
#
FDEBUG=ALL
#
```

Note – To turn off debug, reverse the steps above.

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