



# Sun GlassFish Enterprise Server 2.1 Quick Start Guide



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# Preface

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This Quick Start Guide provides basic procedures to start the server, deploy an application, and set up load balancing and failover.

This preface contains information about and conventions for the entire Sun GlassFish™ Enterprise Server documentation set.

## Sun GlassFish Enterprise Server Documentation Set

TABLE P-1 Books in the Enterprise Server Documentation Set

Book Title	Description
<i>Documentation Center</i>	Enterprise Server documentation topics organized by task and subject.
<i>Release Notes</i>	Late-breaking information about the software and the documentation. Includes a comprehensive, table-based summary of the supported hardware, operating system, Java™ Development Kit (JDK™), and database drivers.
<i>Quick Start Guide</i>	How to get started with the Enterprise Server product.
<i>Installation Guide</i>	Installing the software and its components.
<i>Application Deployment Guide</i>	Deployment of applications and application components to the Enterprise Server. Includes information about deployment descriptors.
<i>Developer's Guide</i>	Creating and implementing Java Platform, Enterprise Edition (Java EE platform) applications intended to run on the Enterprise Server that follow the open Java standards model for Java EE components and APIs. Includes information about developer tools, security, debugging, and creating lifecycle modules.
<i>Java EE 5 Tutorial</i>	Using Java EE 5 platform technologies and APIs to develop Java EE applications.
<i>Java WSIT Tutorial</i>	Developing web applications using the Web Service Interoperability Technologies (WSIT). Describes how, when, and why to use the WSIT technologies and the features and options that each technology supports.
<i>Administration Guide</i>	System administration for the Enterprise Server, including configuration, monitoring, security, resource management, and web services management.

TABLE P-1 Books in the Enterprise Server Documentation Set (Continued)

Book Title	Description
<i>High Availability Administration Guide</i>	Setting up clusters, working with node agents, and using load balancers.
<i>Administration Reference</i>	Editing the Enterprise Server configuration file, <code>domain.xml</code> .
<i>Performance Tuning Guide</i>	Tuning the Enterprise Server to improve performance.
<i>Reference Manual</i>	Utility commands available with the Enterprise Server; written in man page style. Includes the <code>asadmin</code> command line interface.

## Default Paths and File Names

The following table describes the default paths and file names that are used in this book.

TABLE P-2 Default Paths and File Names

Placeholder	Description	Default Value
<i>as-install</i>	Represents the base installation directory for Enterprise Server.	Solaris™ and Linux installations, non-root user: <i>user's-home-directory/SUNWappserver</i>  Solaris and Linux installations, root user: <i>/opt/SUNWappserver</i>  Windows, all installations: <i>SystemDrive:\Sun\AppServer</i>
<i>domain-root-dir</i>	Represents the directory containing all domains.	All installations: <i>as-install/domains/</i>
<i>domain-dir</i>	Represents the directory for a domain.  In configuration files, you might see <i>domain-dir</i> represented as follows:  <code>\${com.sun.aas.instanceRoot}</code>	<i>domain-root-dir/domain-dir</i>
<i>instance-dir</i>	Represents the directory for a server instance.	<i>domain-dir/instance-dir</i>
<i>samples-dir</i>	Represents the directory containing sample applications.	<i>as-install/samples</i>
<i>docs-dir</i>	Represents the directory containing documentation.	<i>as-install/docs</i>

## Typographic Conventions

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

TABLE P-3 Typographic Conventions

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

## Symbol Conventions

The following table explains symbols that might be used in this book.

TABLE P-4 Symbol Conventions

Symbol	Description	Example	Meaning
[ ]	Contains optional arguments and command options.	<code>ls [-l]</code>	The <code>-l</code> option is not required.
{   }	Contains a set of choices for a required command option.	<code>-d {y n}</code>	The <code>-d</code> option requires that you use either the <code>y</code> argument or the <code>n</code> argument.
`\${ }`	Indicates a variable reference.	<code>\${com.sun.javaRoot}</code>	References the value of the <code>com.sun.javaRoot</code> variable.
-	Joins simultaneous multiple keystrokes.	Control-A	Press the Control key while you press the A key.
+	Joins consecutive multiple keystrokes.	Ctrl+A+N	Press the Control key, release it, and then press the subsequent keys.

TABLE P-4 Symbol Conventions (Continued)

Symbol	Description	Example	Meaning
→	Indicates menu item selection in a graphical user interface.	File → New → Templates	From the File menu, choose New. From the New submenu, choose Templates.

## Documentation, Support, and Training

The Sun web site provides information about the following additional resources:

- Documentation (<http://www.sun.com/documentation/>)
- Support (<http://www.sun.com/support/>)
- Training (<http://www.sun.com/training/>)

## Third-Party Web Site References

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

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# Quick Start for Basic Features

---

Welcome to the *Quick Start Guide*. This guide provides a set of sample procedures that you can use to get started with the Enterprise Server.

Before using the procedures in this document you must have already installed the GlassFish Communications Server software.

This section contains the following topics:

- “Getting Started” on page 9
- “Administration Tools” on page 16
- “Where to Go Next” on page 18

## Getting Started

This topic provides instructions for the following basic tasks: starting the Domain Administration Server (DAS), logging into the Admin Console, examining the log files, and starting the node agent. The steps are presented in the order that you should complete them.

- “To Start the Domain on Solaris and Linux” on page 10
- “To Start the Domain on Windows” on page 10
- “To Log On to the Admin Console” on page 11
- “To View the Domain Administration Server Log File” on page 13
- “To Start the Node Agent” on page 14
- “To Add Cluster Support to a Domain” on page 15
- “To Start the Bundled Java DB Server” on page 15

## ▼ To Start the Domain on Solaris and Linux

To start the Domain Administration Server, start the default domain, domain1.

- 1 **Add the *as-install/bin/* directory to the PATH environment variable.**
- 2 **Start the server by entering this command:**

```
asadmin start-domain domain1
```

When you are prompted for the user, admin password, and the master password, enter your user name and the passwords that you provided during installation. The default admin user name is admin and the password is adminadmin. The default master password is changeit.

When the start up process is complete, the following message appears:

```
Domain domain1 started
```

Each domain has a corresponding profile: enterprise, cluster or developer. domain1 is created with the default profile, which is defined in the AS\_ADMIN\_PROFILE variable defined in the asadminenv.conf file. For more information on profiles see the “Usage Profiles” in *Sun GlassFish Enterprise Server 2.1 Administration Guide*. If domain1 was created with developer profile, when you log in to the Admin Console, you cannot use features such as clustering and node agents. To use clusters and server instances, use the create-domain command to create a domain with cluster profile. For information on creating domains, type asadmin create-domain --help or see [create-domain\(1\)](#).

## ▼ To Start the Domain on Windows

To start the Domain Administration Server, start the default domain, domain1.

- 1 **From the Explorer window or desktop, right click My Computer.**
- 2 **Choose Properties to display the System Properties dialog.**
- 3 **Click the Advanced tab.**
- 4 **Click Environment Variables.**
- 5 **In the User variables section:**
  - **If a PATH variable exists, verify that *as-install\bin* exists in the path: *as-install\bin*; *other\_entries*. If *as-install\bin* does not exist in the PATH variable, add it.**
  - **If a PATH variable is not present, click New. In Variable Name, type PATH. In Variable Value, type the path to the server's bin directory: *as-install\bin*. Click OK to commit the change.**

- 6 Add a new environment variable `AS_ADMIN_USER` and set it to the Administrative User Name that you assigned during installation.
- 7 Click OK to commit the change and close the remaining open windows.
- 8 Start the Enterprise Server by clicking the Start Admin Server option within the Programs menu.
- 9 When a command prompt window opens to prompt you for the admin password and the master password, enter the passwords that you provided during installation.

When you are prompted for the user, admin password, and the master password, enter your user name and the passwords that you provided during installation. The default admin user name is `admin` and the password is `adminadmin`. The default master password is `changeit`.

---

**Note** – If you do not find the Start Admin Server option in your menu, open the Windows Command Prompt and type the following command: `asadmin start-domain domain1`

---

When the startup process has completed, you see an additional message:

```
Domain domain1 started.
Press any key to continue ...
```

Each domain has a corresponding profile: `enterprise`, `cluster`, or `developer`. `domain1` is created with the default profile, which is defined in the `AS_ADMIN_PROFILE` variable defined in the `asadminenv.conf` file. For more information on profiles see the “Usage Profiles” in *Sun GlassFish Enterprise Server 2.1 Administration Guide*. If `domain1` was created with developer profile, when you log in to the Admin Console, you cannot use features such as clustering and node agents. To use clusters and server instances, use the `create-domain` command to create a domain with cluster profile. For information on creating domains, type `asadmin create-domain --help` or see `create-domain(1)`.

- 10 Press a key to close the message window.

## ▼ To Log On to the Admin Console

The Admin Console is a browser interface that simplifies a variety of administration and configuration tasks. It is commonly used to:

- Deploy and undeploy applications
- Enable, disable, and manage applications
- Configure resources and other server settings
- Select and view log files

For further information about using the Admin Console, consult the online help or the *Sun GlassFish Enterprise Server 2.1 Administration Guide*.

**1 Open a browser, and type this URL in your browser:**

http://*hostname*:4848

If the browser is on a different system than the server, replace the *hostname* variable with the hostname or IP address of the system that the Domain Administration Server is running on.

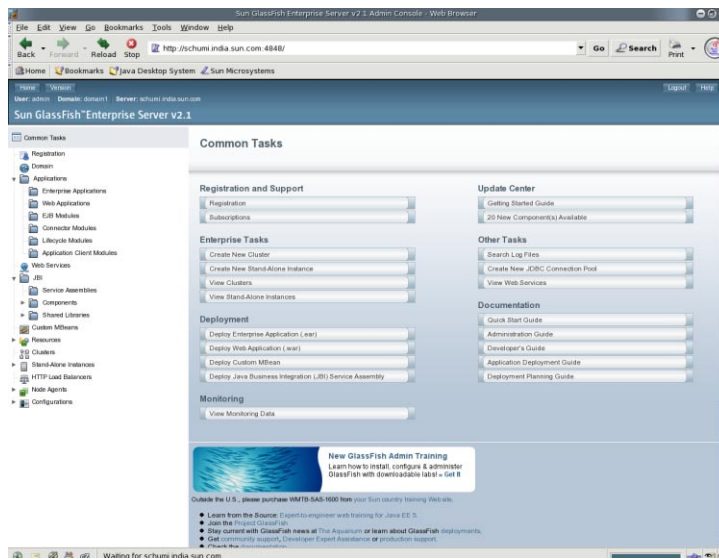
4848 is the Admin Console's default port number. If you changed the port number during the installation or if you have created a domain with another port number, use that number instead.

---

**Note** – If a popup window appears with a message such as Website Certified by an Unknown Authority, click OK.

This message appears because your browser does not recognize the self-signed certificate that the Domain Administration Server uses to service the Admin Console over the secure transmission protocol.

---

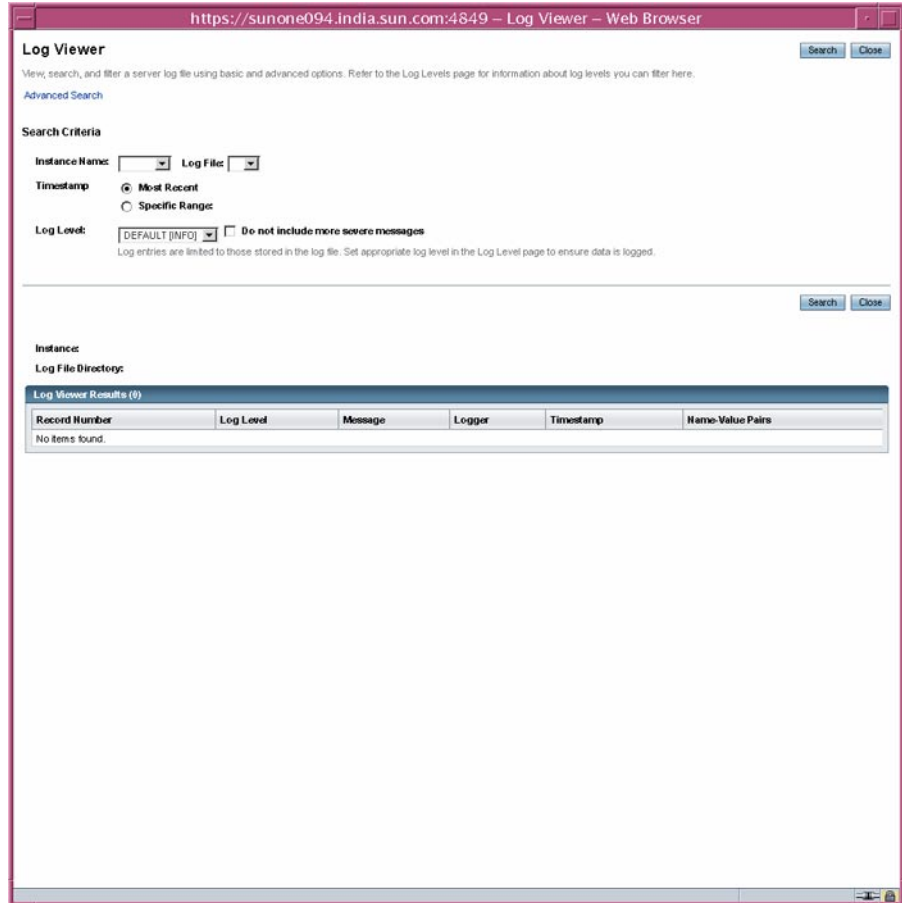
**2 When the Log in window appears, enter the admin user name and password.****3 Click Login.**

In the left pane, select what you want to manage from the tree provided. In the right pane, various administrative tasks are listed under the Common Tasks heading.

## ▼ To View the Domain Administration Server Log File

Enterprise Server instances and the Domain Administration Server produce annotated logs on the file system. By default, all errors, warnings or useful informative messages are logged.

- 1 From the Common Tasks list in the right pane, click Search Log Files to launch a new browser window for Log Viewer.



- 2 In the Log Viewer window, select “server” from the Instance Name drop-down list and click Search.

The Domain Administration Server’s recent log file entries are displayed.

- 3 **Scan the messages and look for any WARNING or SEVERE messages indicating that problems were encountered during server startup.**

You can close Log Viewer at any time. After you create clusters and deploy applications, examine log files if any of the operations failed. Use Log Viewer to view the log files of any running Enterprise Server instance in the domain.

## ▼ To Start the Node Agent

A *node agent* is a lightweight process running on each machine that participates in an administrative domain. The node agent is responsible for starting and stopping server instances on the host. It also communicates with the Domain Administration Server to create new instances.

---

**Note** – You can use node agents only on domains with the cluster profile or enterprise profile. If you are running only a developer domain, you need to create a domain with cluster profile before you can create and use node agents. For information on creating domains, type `asadmin create-domain --help` or see the [create-domain\(1\)](#) man page.

---

One node agent is needed on a machine for each administrative domain that the machine belongs to. A default node agent called *hostname* may be created during installation. If not, create a node agent, using the [create-node-agent\(1\)](#) command.

- 1 **In a terminal window, type this command:**

```
asadmin start-node-agent nodeagentname
```

Replace the variable *nodeagentname* with the name of the node agent you created. If your default domain on port 4848 (`domain1`) is not running on cluster profile or enterprise profile, use the `--port` option to specify the port of the cluster or enterprise domain.

- 2 **When you are prompted, provide the master password.**

The node agent starts and connects with the Domain Administration Server.

---

**Note** – Ensure that the Domain Administration Server is running before you start the node agent. Check the server.log file of a cluster instance to identify problems related to starting node agents or cluster instances.

If you have problems while starting a node agent or a cluster on Windows, see the [Sun GlassFish Enterprise Server 2.1 Release Notes](#) for possible solutions to the problem.

---

After the node agent has been started once, you can view it in the Admin Console.

**Next Steps** In this section you started the Domain Administration Server and confirmed that it is running. You also logged in to the Admin Console and used the Log Viewer. You started the node agent. You can stop the Quick Start trail here if you do not wish to continue, or you can go on to the next section.

## ▼ To Add Cluster Support to a Domain

You can use the Admin Console add cluster support to a developer domain.

- 1 **Log on to the Admin Console.** For instructions, see [“To Log On to the Admin Console” on page 11](#).
- 2 **From the left pane, click Application Server.**
- 3 **Click the Add Cluster Support button in the General tab.**
- 4 **The Add Cluster Support page appears. Review the information on this page and click OK.**
- 5 **In the Restart Required Page, click the Stop Instance button to stop the domain.**
- 6 **Log in to the machine where the domain is installed and run the following command:**  
*as-install/bin/asadmin list-domains*. **Verify that the domain was stopped.**
- 7 **Run the following command:** *as-install/bin/asadmin start-domain <domain-name>*  
The restarted domain supports clustering.

### More Information Troubleshooting

If the restarted domain does not show clustering capabilities, stop the domain, reboot the machine on which the domain is installed, and restart the domain as shown in step 7.

## ▼ To Start the Bundled Java DB Server

The Enterprise Server includes a bundled Java DB server. To start it, use the following procedure:

- 1 **Make sure that you are logged in as the user that installed the database.**
- 2 **Run `asadmin start-database`.**  
For more information on the `start-database` command, see the [start-database\(1\)](#) man page.

## Administration Tools

To enable administrators to manage server instances and clusters running on multiple hosts, Enterprise Server provides these tools:

- The Admin Console, a browser-based graphical user interface (GUI). You can launch the Admin console by opening `http://hostname:4848` in your browser.
- Command-line tools, such as the `asadmin` utility. See [Table 1–1](#) for the complete list of command-line tools. The `asadmin` utility is at `as-install/bin`.
- Programmatic Java Management Extensions (JMX™) APIs

These tools connect to a server called the *Domain Administration Server*, a specially designated instance that intermediates in all administrative tasks. The Domain Administration Server (DAS) provides a single secure interface for validating and executing administrative commands regardless of which interface is used.

A *domain* is a collection of configuration data, deployed applications, and machines with a designated administrator. The domain definition describes and can control the operation of several applications, stand-alone instances, and clusters, potentially spread over multiple machines. When the DAS is installed, a default domain called *domain1* is always installed. You work with the default domain in this guide.

Enterprise Server offers a variety of command-line tools for performing administrative functions, in addition to the Admin Console. To launch a tool, type the name of the tool in a command window. [Table 1–1](#) lists tools by name in the first column and describes them in the second column.

TABLE 1–1 Command-Line Tools

Name of Tool	Description
<code>appclient</code>	Launches the Application Client Container and invokes the client application packaged in the application Java archive (JAR) file.
<code>asadmin</code>	Launches the Enterprise Server administration tool that provides a set of subcommands for configuring the Enterprise Server software.
<code>asant</code>	Launches the Jakarta Ant tool, so that you can automate repetitive development and deployment tasks.
<code>asapt</code>	Compiles Java sources with Java EE annotations. The tool automatically invokes the <code>wsimport</code> command.
<code>asupgrade</code>	Enterprise Server administration tool for upgrading the Enterprise Server software.
<code>capture-schema</code>	Extracts schema information from a database and produces a schema file that the server can use for Container Managed Persistence (CMP).



TABLE 1-1 Command-Line Tools (Continued)

Name of Tool	Description
<code>jspc</code>	Compiles JSP pages.
<code>package-appclient</code>	Packages the application client container libraries and JAR files.
<code>schemagen</code>	Creates a schema file for each namespace referenced in your Java classes.
<code>verifier</code>	Validates the Java EE deployment descriptors with the DTDs.  This tool also provides a graphical user interface. To see the GUI, specify the <code>-u</code> option.  Some Windows systems launch a driver verifier utility with the same name. To launch the Enterprise Server verifier, you must be in the <code>as-install/bin</code> directory.
<code>wscmpile</code>	Takes the service definition interface and generates the client stubs or server-side skeletons for JAX-RPC; or generates a Web Services Description Language (WSDL) description for the provided interface.
<code>wsdeploy</code>	Generates an implementation-specific, ready-to-deploy WAR file for web services applications that use JAX-RPC.
<code>wsgen</code>	Reads a web service endpoint class and generates all the required artifacts for web service deployment and invocation.
<code>wsimport</code>	Generates JAX-WS portable artifacts, such as service endpoint interfaces (SEIs), services, exception classes mapped from the <code>wsdl: fault</code> and <code>soap: header fault</code> tags, asynchronous response beans derived from the <code>wsdl: message</code> tag, and JAXB generated value types.
<code>xjc</code>	Transforms, or binds, a source XML schema to a set of JAXB content classes in the Java programming language.

**Note –**

- To run these command-line tools on Windows, ensure that you have an environment variable called `PATH` that points to the `as-install/bin/` directory.
- You can run the `asadmin` subcommands by prefixing `asadmin` with every sub command or by entering the `asadmin` prompt (type `asadmin` and hit Return) in the `as-install/bin/` directory.

## Where to Go Next

The next steps of the *Quick Start Guide* are available in the following chapters.

- [Chapter 2, “Setting Up a Cluster”](#)

Steps for creating a sample cluster. Skip to the next chapter if you are running a domain with developer profile.

- [Chapter 3, “Deploying an Application”](#)

Steps for deploying a sample web application. If you are using a domain with cluster capabilities, you can perform the steps for deploying an enterprise application to a cluster.

Other resources for learning and using Enterprise Server are available. They include:

- Product details at [as-install/docs/about.html](#).
- Sample applications at [as-install/samples](#)
- [Sun GlassFish Enterprise Server 2.1 Release Notes](#)
- [Sun GlassFish Enterprise Server 2.1 Reference Manual](#) (man pages)
- [Sun GlassFish Enterprise Server 2.1 Application Deployment Guide](#)
- [The Java EE 5 Tutorial](#)
- [Java BluePrints \(http://java.sun.com/blueprints\)](http://java.sun.com/blueprints) guidelines for the Enterprise

## Setting Up a Cluster

---

This chapter describes how to create and set up clusters. A *cluster* is a group of server instances (typically on multiple hosts) that share the same configurations, resources, and applications. A cluster facilitates load balancing across server instances and high availability through failover. You can create clusters spanning multiple machines and manage them with the help of the node agent process on each machine.

This chapter assumes that you are running a domain with cluster profile or enterprise profile. This chapter has the following sections:

- [“Creating a Cluster” on page 19](#)
- [“Creating a Cluster that Spans Multiple Machines” on page 21](#)
- [“Viewing Ports for Clustered Server Instances” on page 22](#)

### Creating a Cluster

This section explains how to create a cluster that contains two Enterprise Server instances, both residing on a single machine.

#### ▼ To Set Up a Cluster

This procedure creates the sample cluster on the same host on which the DAS is running.

**Before You Begin** It is assumed that you have already started the node agent. When you specify instances during cluster creation, associate the instance with a running node agent for the machine on which you want the instance to run. If the node agent is not running, the instance will not start. Node agent and instance names must be unique across clusters that are created in a domain.

- 1 **Log in to the Administration Console at `http://hostname:portnumber` if you have not already done so.**

Replace the *hostname* variable with the name of the system that the Domain Administration Server is running on. Replace *portnumber* with the port number of the cluster domain, `domain1`.

- 2 **On the left pane, click the Clusters tab.**
- 3 **To create a cluster, do one of the following:**

- **On the right-hand pane, click new and type `cluster1` as the name. Click OK.**
- **Use the following command:** `asadmin create-cluster --user admin --passwordfile adminpassword.txt --host hostname -port 4848 cluster1`

- 4 **Click `cluster1`. The General Information for this cluster appears.**

---

**Note** – In the General tab on the right hand pane, ensure that the Heartbeat Enabled checkbox is selected. You need GMS service to be running to be able to use the converged load balancer.

---

- 5 **On the right pane, click the Instances tab. Click the New button to create two entries to specify two instances for the cluster.**
- 6 **Type `instance1`. In the Node Agent field, `nodeagent1` is selected by default.**
- 7 **Type `instance2`. In the Node Agent field, `nodeagent1` is selected by default. Click Save.**

Instead of steps 4,5, and 6 you can use the following `asadmin` commands:

- `asadmin create-instance --user admin --passwordfile adminpassword.txt --host hostname -port 4848 --cluster cluster1 --nodeagent nodeagent1 --systemproperties "JMX_SYSTEM_CONNECTOR_PORT=8687:IIOP_LISTENER_PORT=3330:IIOP_SSL_LISTENER_PORT=4440:IIOP_MUTUALAUTH_PORT=5550:HTTP_LISTENER_PORT=1110:HTTP_SSL_LISTENER_PORT=2220" instance1`
- `asadmin create-instance --user admin --passwordfile adminpassword.txt --host hostname -port 4848 --cluster cluster1 --nodeagent nodeagent1 --systemproperties "JMX_SYSTEM_CONNECTOR_PORT=8688:IIOP_LISTENER_PORT=3331:IIOP_SSL_LISTENER_PORT=4441:IIOP_MUTUALAUTH_PORT=5551:HTTP_LISTENER_PORT=1111:HTTP_SSL_LISTENER_PORT=2221" instance2`

- 8 **To start the cluster,**
  - **Click the General tab and click the Start Cluster button.**

- **Start the cluster and its instances by running the following command:**

```
asadmin start-cluster --user admin --passwordfile adminpassword.txt --host
hostname --port 4848 cluster1
```

The two instances are started by default when you start the cluster.

## Creating a Cluster that Spans Multiple Machines

### ▼ To Create a Cluster With Instances On Different Machines

The following procedure demonstrates how to create a cluster that has two instances, instance3 and instance4, each running on different machines. The two machines are called schumi and sr115. schumi is the machine that is denoted as the administrative node and is called the Domain Administration Server (DAS).

**Before You Begin** You must have already installed Enterprise Server on both machines.

#### 1 Create and start a node agent (nodeagent2) on the DAS machine.

Use the following command: `asadmin create-node-agent --user admin --host schumi nodeagent2`

#### 2 Start the node agent on the DAS machine.

Use the following command: `asadmin start-node-agent --user admin --host schumi nodeagent2`. For more information, see [start-node-agent\(1\)](#) command.

#### 3 Create a start a node agent on another machine.

This example uses a second machine called sr115. On the second machine, at the invoke the `asadmin` utility and use the following command: `asadmin create-node-agent --user admin --host schumi nodeagent3`

---

**Note** – You need to provide the DAS machine name in the `--host` option.

---

#### 4 Start the node agent on the second machine.

Use the following command: `asadmin start-node-agent --user admin --host schumi nodeagent3`. For more information, see [start-node-agent\(1\)](#) command.

#### 5 Log in to the Admin Console of the DAS machine at `http://das-machine-name:portnumber`.

You can see that the two node agents are running if you click Node Agents on the left-hand tree on the Admin Console.

- 6 On the left pane, click the Clusters tab and click New.**
- 7 Specify a name for the cluster.**

This example creates a cluster with the name, `mycluster`.
- 8 In the Server Instances to be Created section, click New.**
- 9 Type the instance name as `instance3` and choose **node agent**, `nodeagent3`.**

`nodeagent3` was created on the machine called `sr115` in step 2 of this procedure.
- 10 Type the instance name as `instance4` and choose **node agent**, `nodeagent2`.**

`nodeagent2` was created on the DAS machine called `schumi` in step 1 of this procedure.
- 11 Click OK.**

The cluster gets created.
- 12 In the left pane, click Clusters.**
- 13 In the right pane, select the checkbox next to `mycluster` and click the Start Cluster button,**

The cluster and the two instances start.

The two instances in `mycluster` are running on different machines and are controlled by different node agents. You can view the two node agents and see each instance associated with it.

If you deploy an application on `mycluster`, the application is accessible from two machines.

## Viewing Ports for Clustered Server Instances

### ▼ To View Ports for Clustered Server Instances

You can view the ports numbers and override the default values for the clustered server instance you created in the previous section, “[Creating a Cluster](#)” on page 19. By default, the HTTP ports are 38081 for `instance1` and 38080 for `instance2`. If these ports were busy on your machine when you created these clusters, or if you had already assigned these ports to other instances and clusters, different port numbers were assigned.

To view the port numbers and optionally override the default values, follow these steps:

- 1 In the left pane, expand Clusters and click `cluster1` to display the General Information page for clusters.**

**2 Click the Instances tab to display `instance1` and `instance2`, the instances that you created.**

**a. Click `instance1` to examine this instance.**

The HTTP and HTTPS ports assigned to the instance are displayed in the HTTP Ports field.  
The SIP and SIPS Ports are displayed in the SIPS field.

**Next Steps** In this section you have created a simple cluster on a single machine. You can also create clusters spanning multiple machines using the same basic steps (as long as you have the software installed and a node agent running on each machine).





## Deploying an Application

---

This chapter explains how to deploy an application. If you are running a domain with developer profile, see “[Deploying a Sample Web Application](#)” on page 25. If you are running a domain with cluster profile, see “[Deploying the Sample Enterprise Application to a Cluster](#)” on page 27.

This chapter presents the following sections:

- “[Deploying a Sample Web Application](#)” on page 25
- “[Deploying the Sample Enterprise Application to a Cluster](#)” on page 27
- “[To Verify Application Deployment](#)” on page 28

### Deploying a Sample Web Application

These procedures assume that you are running a domain with developer profile.

#### ▼ To Deploy the Hello Application Using Autodeploy

The Hello application is contained in a Web ARchive (WAR) file in the `samples/quickstart` directory. Packaged applications can also be in the form of a Java ARchive (JAR) or Enterprise ARchive (EAR) file.

Alternatively, you can download this application from <https://glasfish.dev.java.net/downloads/quickstart/hello.war>.

Copying to a domain’s autodeploy directory lets you put a pre-packaged application into use immediately, with minimal effort.

- 1 **Find** `as-install/samples/quickstart/hello.war` **or download from** <https://glasfish.dev.java.net/downloads/quickstart/hello.war>.
- 2 **Copy** `hello.war` **to the** `as-install/domains/domain1/autodeploy/` **directory.**

---

**Tip** – On Windows, you can create a shortcut to the autodeploy directory on your desktop, and then drag and drop the `hello.war` file onto the shortcut.

---

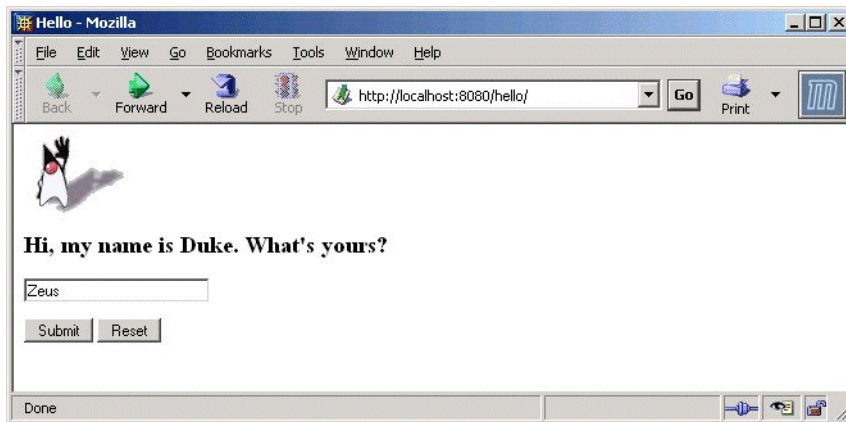
When the server has finished deploying the application, it creates a file named `hello.war_deployed` in the autodeploy directory. Depending on the speed of your system, the process can take a few seconds. Until that file appears, a 404-File Not Found error occurs when you try to visit the application page.

- 3 Access this URL to visit the application page:** `http://hostname:HTTPport/hello`.

You see the application's first page, which prompts you to fill in your name:

- 4 Type your name and click Submit.**

The application displays a customized response, giving you a personal Hello.



## ▼ To Deploy the Hello Application Using Admin Console

- 1 Open the Admin Console in a web browser if you have not done so already.**
- 2 In the left pane, click the Applications node to expand it.**
- 3 Click Web Applications.**

You can see the list of deployed web applications, if any.
- 4 Click Deploy.**

- 5 You can use the Hello application bundled with the Enterprise Server or you upload the sample you have downloaded from <https://glassfish.dev.java.net/downloads/quickstart/hello.war>. Do one of the following:
  - Select the option called Local packaged file or directory that is accessible to Application Server and click Browse Files. Navigate to the `as-install/samples/quickstart` directory and select `hello.war`.
- 6 If you have downloaded the Hello application, click Browse in the Packaged File to Upload text box. Navigate to the directory to which you have downloaded the application.
- 7 Click OK.  
The application appears in the Web Applications list.
- 8 To verify that it was deployed properly, in the Web Applications page, select the Hello application and click Launch.

#### More Information **Deploying Applications Using CLI Commands**

You can deploy applications using the `asadmin deploy` command. You can also use the `asant` commands for deployment. For detailed information on deploying applications see the Sun GlassFish Communications Server Application Deployment guide.

## Deploying the Sample Enterprise Application to a Cluster

These procedures assume that you are running a domain with cluster profile. The procedures in this chapter assume that you have already created a cluster called `default-cluster`, as described in [Chapter 2, “Setting Up a Cluster.”](#) This section uses the `clusterjsp` sample application to demonstrate HTTP load balancing capabilities.

### ▼ **To Deploy the Sample Enterprise Application Using Admin Console**

- 1 Open the Admin Console in a web browser if you have not done so already.
- 2 Click Common Tasks on the left pane to go to the Common Tasks page, if you are not there already.
- 3 On the right pane, under Common Tasks, click Deploy Enterprise Application (.ear).

- 4 Select the radio button to the left of the Local packaged file or directory that is accessible from the Application Server option and then click the Choose File... button. Navigate to `as-install/samples/quickstart/clusterjsp/clusterjsp.ear`.**

If you are accessing Enterprise Server remotely, and if the sample application is accessible from your client machine choose the Packaged file to be uploaded to the server option and click Browse.

- 5 Click the Availability enabled check box to make your application highly available.**

It is recommended that you set the heap size to a larger value, if you have available memory in your system. For example, `<jvm-options>-Xmx1000m</jvm-options>`

- 6 In the Targets section of the page, select `mycluster` from the Available list, and click Add to move it to the Selected list.**

- 7 Click OK.**

The `clusterjsp` application is now deployed to `default-cluster`. Before you launch this application, you need to start the instances in the cluster.

---

**Note** – Ensure that you have enabled cookies in your browser before you deploy this application. `clusterjsp` is a sample application. Please use with caution in a production environment.

---

## More Information Deploying Applications Using CLI Commands

You can deploy applications using the `asadmin deploy` command. See the `deploy man` page in the Reference Manual. You can also use the `asant` commands for deployment. For detailed information on deploying applications see `Deploying Modules and Applications in the Application Deployment Guide`.

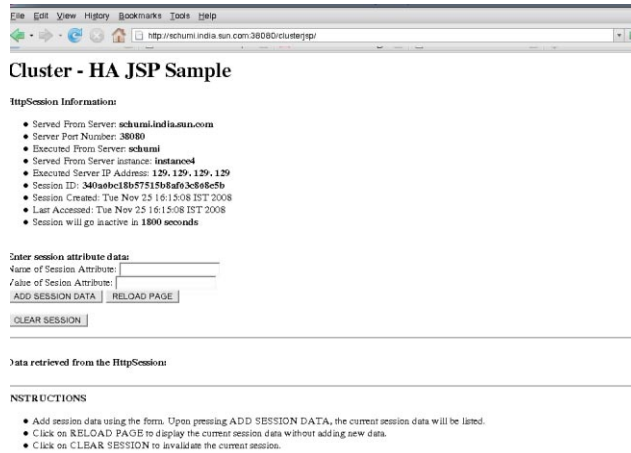
## ▼ To Verify Application Deployment

- 1 Type the following URL in your browser:**

`http://hostname:HTTPport/clusterjsp`

Replace the `hostname` variable with the name of the system that the Domain Admin Server is running on.

Replace the `HTTPport` variable with the value of `HTTP-LISTENER-PORT` for `instance4`. This example uses `http://hostname:38081/clusterjsp`.



- 2 Add some session attribute data.
- 3 Examine the Session and Host information displayed. For example:
  - Executed From Server: *localhost*
  - Server Port Number: 38081
  - Executed Server IP Address: 198.19.255.255
  - Session Created: Tue Aug 23 15:26:07 PDT 2005
- 4 Add some session data and click the Add to Session button.
- 5 Repeat this procedure for instance `instance3` by typing this URL in your browser:  
`http://hostname :38081/clusterjsp`



## Working with Load Balancers

---

This section provides instructions on how to set up the Web Server software to act as a load balancer to the cluster of Application Servers. In addition, it provides steps for configuring a load balancer and exporting it to the Web Server. The load balancer feature is available to you only if you are running a domain with enterprise profile or cluster profile.

A load balancer is deployed with a cluster. A load balancer provides the following features:

- Allows an application or service to be scaled horizontally across multiple physical (or logical) hosts yet still presents the user with a single URL
- Insulates the user from host failures or server crashes, when it is used with session persistence.
- Enhances security by hiding the internal network from the user

Enterprise Server includes load balancing plug-ins for popular web servers such as Sun Java™ System Web Server, Apache, and Microsoft Windows IIS.

To complete this section, you must have sufficient memory to run a Web Server on your system in addition to the Domain Administration Server and the two instances you have created so far in this guide. A system with 512 Mbytes to 1024 Mbytes of memory is recommended.

This topic presents the following steps:

- [“Setting up Load Balancing” on page 32](#)
- [“Starting Load Balancing” on page 33](#)
- [“Verifying Load Balancing” on page 33](#)
- [“High Availability and Failover Using the In-memory Replication Feature” on page 34](#)

# Setting up Load Balancing

Before you set up load balancing, you need to install the load balancer plug-in. These procedures assume you are running a domain with cluster or enterprise profile.

## ▼ To Set Up Load Balancing

- 1 **Create a load balancer using the Admin Console. Alternatively, you can use the `asadmin create-http-lb(1)` command.**
  - a. Click the HTTP Load Balancers node in the Admin Console.
  - b. Click New.
  - c. Type `lb1` as the name of the load balancer, the host on which Web Server is installed, and the Web Server instance port. In this sample scenarios Web Server host is `localhost` and the port is `38000`.
  - d. Select the **Apply Changes Automatically** check box. If you choose this option, you do not have to export the load balancer configuration. All changes you make to the load balancer configuration are propagated automatically.
  - e. Select `cluster1` as target.  
“[Creating a Cluster](#)” on page 19 explains how to create a sample cluster (`cluster1`)
  - f. Click Save.
- 2 **Enable `cluster1` for load balancing:**  
`asadmin enable-http-lb-server cluster1`
- 3 **Enable the `clusterjsp` application for load balancing:**  
`asadmin enable-http-lb-application clusterjsp.`

**See Also** For information on advanced topics, such as changing the load balancer configuration or creating health checkers, see the [Chapter 4, “Configuring HTTP Load Balancing,”](#) in *Sun GlassFish Enterprise Server 2.1 High Availability Administration Guide*.



## Starting Load Balancing

Start load balancing by starting or restarting the Web Server.

- If the Web Server instance serving as load balancer is not already running, start the Web Server.  
If you are using Web Server 7.0, use the `wadm start -instance` command.  
For Web Server 6.1, run the `start` script in the `<websvr-instance-dir>` directory.
- If the Web Server instance serving as load balancer is already running, stop the Web Server and restart.  
For Web Server 6.1, use the `stop` program in `web_server_install_dir/https-hostname` and restart the server by running the `start` program.  
For Web Server 7.0, use the `wadm stop -instance` followed by the `wadm start -instance` command.

## Verifying Load Balancing

Once the application is deployed and the load balancer is running, verify that the load balancing is working.

### ▼ To Verify Load Balancing

- 1 **To display the first page of the `clusterjsp` application, type this URL in your browser:**

```
http://localhost:web_server_port/clusterjsp
```

Replace the `localhost` variable with the name of the system that the Web Server is running on.

Replace the `web_server_port` variable with the value of the port attribute of the LS element in `web_server_install_dir/https-hostname/config/server.xml`. For this example, port 38000 is used.

A page similar to what you saw in [“To Verify Application Deployment”](#) on page 28. appears.

- 2 **Examine the Session and Host information displayed. For example:**

- Executed From Server: `localhost`
- Server Port Number: `38000`
- Executed Server IP Address: `192.18.145.133`
- Session Created: `Day Mon 05 14:55:34 PDT 2005`

- 3 **The Server Port Number is 38000, the Web Server’s port. The load balancer has forwarded the request on the two instances in the cluster.**

**4 Using different browser software, or a browser on a different machine, create a new session. Requests from the same browser are “sticky” and go to the same instance.**

These sessions should be distributed to the two instances in the cluster. You can verify this by looking at the server access log files located here:

■ Solaris Java Enterprise System installation:

```
/var/opt/SUNWappserver/nodeagents/nodeagent_name/instance1/logs  
/access/server_access_log
```

```
/var/opt/SUNWappserver/nodeagents/nodeagent_name/instance2/logs  
/access/server_access_log
```

■ Linux Java Enterprise System installation:

```
/var/opt/sun/appserver/nodeagents/nodeagent_name/instance1/logs  
/access/server_access_log
```

```
/var/opt/sun/appserver/nodeagents/nodeagent_name/instance2/logs  
/access/server_access_log
```

■ Windows Java Enterprise System installation:

```
as-install\nodeagents\nodeagent_name\instance1\logs\access\server_access_log
```

```
as-install\nodeagents\nodeagent_name\instance1\logs\access\server_access_log
```

■ Stand-alone Enterprise Server installations:

```
as-install/nodeagents/nodeagent_name/instance1/logs/access/server_access_log
```

```
as-install/nodeagents/nodeagent_name/instance2/logs/access/server_access_log
```

**5 Add a name and value pair (Name=Name Value=Duke) for storing in HttpSession.**

**6 Click the Add to Session Data button.**

**7 Verify that the session data was added**

## High Availability and Failover Using the In-memory Replication Feature

GlassFish v2 does not offer HADB. For high availability and failover, GlassFish offers the in-memory replication feature. The following procedure illustrates this feature:

1. Restart the web server that has the load balancer plugin installed before deploying an application. This ensures that requests are served by instances in the order set in the `loadbalancer.xml` file. If you use the `loadbalancer.xml` file provided in this chapter, `instance1` serves the first request.

2. You have already deployed the `clusterjsp` web application, which stores session data. You should be able to see that successive requests are served by the same instance that served the first request and the session data is maintained across the requests.
3. Send few requests and note down the instance that served those requests and shutdown that particular instance. Use this command to stop the instance: `asadmin stop-instance --user adminuser --password adminpassword instance1`
4. Send in the next request and verify that the new data is stored and that the previously added data is still there in the session. If one of the server serving requests is not available, another server in the same cluster takes over the request with all earlier session data and completes the request.



## Setting Up High Availability Failover

---

With the configuration used in the previous chapter, if a server instance goes down, users lose session state. This section, the second of two advanced topics, provides the steps for installing the high-availability database (HADB), creating a highly available cluster, and testing HTTP session persistence.

Enterprise Server supports both HTTP session persistence and persistence for Stateful Session Beans. The procedures in this chapter cover high availability using in-memory replication or HADB.

These steps assume you have already performed the steps in the previous sections of this Quick Start. The steps are presented in the order that you should complete them. To use the HADB feature, you need to be running a domain with enterprise profile.

---

**Note** – Completing the procedures in this section may require additional hardware resources.

---

This topic contains the following sections:

- “High-availability Clusters and HADB” on page 38
- “HADB Preinstallation Steps” on page 38
- “Installing HADB” on page 40
- “Starting HADB” on page 41
- “Configuring a Cluster and Application for High Availability” on page 42
- “Restarting the Cluster” on page 42
- “Verifying HTTP Session Failover” on page 43

## High-availability Clusters and HADB

A highly availability cluster in Sun GlassFish Enterprise Server integrates a state replication service with the clusters and load balancer created earlier, enabling failover of HTTP sessions.

HttpSession objects and Stateful Session Bean state is stored in HADB, a high-availability database for storing session state. This horizontally scalable state management service can be managed independently of the application server tier. It was designed to support up to 99.999% service and data availability with load balancing, failover and state recovery capabilities.

Keeping state management responsibilities separated from Enterprise Server has significant benefits. Instances spend their cycles performing as a scalable and high performance Java™ Platform, Enterprise Edition 5 (Java EE™ 5 platform) containers delegating state replication to an external high availability state service. Due to this loosely coupled architecture, instances can be easily added to or deleted from a cluster. The HADB state replication service can be independently scaled for optimum availability and performance. When an application server instance also performs replication, the performance of J2EE applications can suffer and can be subject to longer garbage collection pauses.

Because each HADB node requires 512 Mbytes of memory, you need 1 Gbyte of memory to run two HADB nodes on the same machine. If you have less memory, set up each node on a different machine. Running a two-node database on only one host is not recommended for deployment since it is not fault tolerant.

## HADB Preinstallation Steps

This procedure covers the most common preinstallation tasks. For information on other preinstallation topics, including prerequisites for installing HADB, configuring network redundancy, and file system support, see [Chapter 10, “Installing and Setting Up High Availability Database,” in \*Sun GlassFish Enterprise Server 2.1 High Availability Administration Guide\*](#).

The recommended system configuration values in this section are sufficient for running up to six HADB nodes and do not take into consideration other applications on the system that also use shared memory.

## ▼ To Configure Your System for HADB

1 Get root access.

2 Define variables related to shared memory and semaphores

■ **On Solaris:**

a. **Add these lines to the `/etc/system` file (or if these lines are in the file as comments, uncomment them and make sure that the values match these):**

```
set shmsys:shminfo_shmmax=0x80000000
```

```
set shmsys:shminfo_shmseg=36
```

```
set semsys:seminfo_semmnu=600
```

Set `shminfo_shmmax` to the total memory in your system (in hexadecimal notation the value `0x80000000` shown is for 2 Gigabytes of memory).

If the `seminfo_*` variables are already defined, increment them by the amounts shown. The default values for `seminfo_semmni` and `seminfo_semmns` do not need to be changed. The variable `shminfo_shmeg` is obsolete after Solaris 8.

b. **Reboot, using this command:**

```
sync; sync; reboot
```

■ **On Linux:**

a. **Add these lines to the `/etc/sysctl.conf` file (or if they are in the file as comments, uncomment them). Set the value to the amount physical memory on the machine. Specify the value as a decimal number of bytes. For example, for a machine having 2 GB of physical memory:**

```
echo 2147483648 > /proc/sys/shmmax
```

```
echo 2147483648 > /proc/sys/shmall
```

b. **Reboot, using this command:**

```
sync; sync; reboot
```

■ **On Windows: No special system settings are needed.**

- 3 If you used existing JDK software when you installed a standalone Enterprise Server, check the JDK version.**

HADB requires Sun JDK 1.4.1\_03 or higher (for the latest information on JDK versions, see the [Sun GlassFish Enterprise Server 2.1 Release Notes](#)). Check the version installed, and if it is not done already, set the JAVA\_HOME environment variable to the directory where the JDK is installed.

- 4 If necessary after the reboot, restart the domain, Web Server, and node agent.**

To restart the domain, use the command `asadmin start-domain domain1`.

To restart the Web Server, execute the start program in `web_server_install_dir/https-hostname`.

To restart the node agent, use the command `asadmin start-node-agent hostname`. Replace the variable `hostname` with the name of the host where the Enterprise Server is running.

## Installing HADB

This section provides the steps for installing the high-availability database (HADB).

---

**Note** – If you plan to run the high-availability database on the Enterprise Server machine, and if you installed HADB when you installed Enterprise Server, skip to [“Starting HADB” on page 41](#).

---

You can install the HADB component on the same machine as your Enterprise Server system if you have 2 Gbytes of memory and 1-2 CPUs. If not, use additional hardware. For example:

- Two 1 CPU systems with 512 Mbytes to 1 Gbyte memory each
- One 1-2 CPU system with 1 Gbytes to 2 Gbytes memory

### ▼ To Install HADB

- 1 Run the installer.**
- 2 Choose the option to install HADB.**
- 3 Complete the installation on your hosts.**



## Starting HADB

This section describes starting the HADB management agent in most cases by running the `ma-initd` script. For a production deployment, start the management agent as a service to ensure its availability. For more information, see “Starting the HADB Management Agent” in *Sun GlassFish Enterprise Server 2.1 High Availability Administration Guide*.

If starting a database with HADB nodes on several hosts, start the management agent on each host.

### ▼ To Start HADB in a Java Enterprise System Installation on Solaris or Linux

- 1 Change to the `/etc/init.d` directory:

```
cd /etc/init.d
```

- 2 Run the command to start the agent:

```
./ma-initd start
```

### ▼ To Start HADB in a Java Enterprise System Installation on Windows

HADB is started by default when Sun Java System is configured and running. However, if you need to start it manually, follow these steps:

- 1 Go to **Start**⇒**Settings**⇒**Control Panel**, and double click **Administrative Tools**.
- 2 Double click **Services** shortcut.
- 3 Select **HADBMgmtAgent Service** from the **Services** list.
- 4 From the **Action** menu, select **Start**.

## ▼ To Start HADB in a Stand-Alone Installation on Solaris or Linux

- 1 Change to the HADB `bin` directory in the Enterprise Server installation: `as-install/hadb/4/bin`
- 2 Run the command to start the agent:  
`./ma-initd start`

## ▼ To Start HADB in a Stand-Alone Installation on Windows

- 1 In a terminal window, change to the HADB `bin` directory in the Enterprise Server installation:  
`as-install\hadb\4.x\bin`  
The `x` represents the release number of HADB.
- 2 Run the command to start the agent:  
`ma -i ma.cfg`

# Configuring a Cluster and Application for High Availability

The FirstCluster cluster must be configured to use HADB and high-availability must be enabled for the clusterjsp application before you can verify HTTP session persistence. Use the `asadmin configure-ha-cluster` command to configure an existing cluster for high availability. For more information on how to use this command, type `configure-ha-cluster --help` at the `asadmin` command prompt or see the [configure-ha-cluster\(1\)](#) man page.

## Restarting the Cluster

Before the changes made in the previous section take effect, the cluster's instances must be restarted.

### ▼ To Restart the Cluster

- 1 In the Admin Console, expand the Clusters node.
- 2 Click `FirstCluster`.

- 3 In the right pane, click **Stop Instances**.
- 4 Once the instances are stopped, click **Start Instances**.

## Verifying HTTP Session Failover

The steps for testing session data failover are similar for testing load balancing as described in the topic [“Verifying Load Balancing” on page 33](#). This time Session Data is preserved after failure. Failover is transparent to the user because the sample application is configured for automatic retry after failure.

### ▼ To Verify HTTP Session Failover

- 1 To display the first page of the clusterjsp application, type this URL in your browser:

```
http://localhost:web_server_port/clusterjsp
```

Replace the *localhost* variable with the name of the system that the Web Server is running on.

Replace the *web\_server\_port* variable with the value of the port attribute of the LS element in *web\_server\_install\_dir/https-hostname/config/server.xml*. For this example, port 38000 is used.

A page similar to what you saw in [“To Verify Application Deployment” on page 28](#) appears.

- 2 Examine the Session and Host information displayed. For example:

- Executed From Server: *localhost*
- Server Port Number: *38000*
- Executed Server IP Address: *192.18.145.133*
- Session ID: *41880f618e4593e14fb5d0ac434b1*
- Session Created: *Wed Feb 23 15:23:18 PST 2005*

- 3 View the server access log files to determine which instance is serving the application. The log files are located here:

- Solaris Java Enterprise System installation:

```
/var/opt/SUNWappserver/nodeagents/nodeagent_name/i1/logs/  
access/server_access_log
```

```
/var/opt/SUNWappserver/nodeagents/nodeagent_name/i2/logs/  
access/server_access_log
```

- Linux Java Enterprise System installation:

```
/var/opt/sun/appserver/nodeagents/nodeagent_name/i1/logs/  
access/server_access_log
```

```
/var/opt/sun/appserver/nodeagents/nodeagent_name/i2/logs/  
access/server_access_log
```

- Windows Java Enterprise System installation:

```
as-install\nodeagents\nodeagent_name\i1\logs\access\server_access_log
```

```
as-install\nodeagents\nodeagent_name\i2\logs\access\server_access_log
```

- Standalone Enterprise Server installations:

```
as-install/nodeagents/nodeagent_name/i1/logs/access/server_access_log
```

```
as-install/nodeagents/nodeagent_name/i2/logs/access/server_access_log
```

**4 Stop the instance that is serving the page.**

- a. In the Admin Console, in the left pane, expand Clusters.

- b. Click `FirstCluster`.

- c. In the right pane, click the Instances tab.

- d. Click the checkbox next to the server instance that served the request and click the Stop button.

**5 Reload the `cluster.jsp` sample application page.**

The session ID and session attribute data is retained.

**6 Check the access log of the other instance, and notice that it is now servicing the request.**

The state failover features work because the HTTP session is stored persistently in the HADB. In addition to the HTTP session state, the Enterprise Server also can store the state of EJB in the HADB.