

# Novell NetWare® 6.5

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TOMCAT ADMINISTRATION GUIDE

July 29, 2003



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U.S. Patent No. 5,157,663; 5,349,642; 5,455,932; 5,553,139; 5,553,143; 5,572,528; 5,594,863; 5,608,903; 5,633,931; 5,652,854; 5,671,414; 5,677,851; 5,692,129; 5,701,459; 5,717,912; 5,758,069; 5,758,344; 5,781,724; 5,781,733; 5,784,560; 5,787,439; 5,818,936; 5,828,882; 5,832,274; 5,832,275; 5,832,483; 5,832,487; 5,859,978; 5,870,561; 5,870,739; 5,873,079; 5,878,415; 5,884,304; 5,893,118; 5,903,650; 5,903,720; 5,905,860; 5,910,803; 5,913,025; 5,913,209; 5,915,253; 5,925,108; 5,933,503; 5,933,826; 5,946,002; 5,946,467; 5,956,718; 5,956,745; 5,964,872; 5,974,474; 5,983,223; 5,983,234; 5,987,471; 5,991,810; 6,002,398; 6,014,667; 6,016,499; 6,023,586; 6,029,247; 6,052,724; 6,061,726; 6,061,740; 6,061,743; 6,065,017; 6,081,774; 6,081,814; 6,094,672; 6,098,090; 6,105,062; 6,105,069; 6,105,132; 6,115,039; 6,119,122; 6,144,959; 6,151,688; 6,157,925; 6,167,393; 6,173,289; 6,216,123; 6,219,652; 6,233,859; 6,247,149; 6,269,391; 6,286,010; 6,308,181; 6,314,520; 6,324,670; 6,338,112; 6,345,266; 6,353,898; 6,424,976; 6,466,944; 6,477,583; 6,477,648; 6,484,186; 6,496,865; 6,510,450; 6,516,325; 6,519,610; 6,532,451; 6,532,491; 6,539,381; RE37,178. Patents Pending.

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Tomcat Administration Guide for NetWare 6.5

[July 29, 2003](#)

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# About This Guide

This guide introduces you to the Tomcat Servlet Container 4.1 as it is used on NetWare® 6.5. It introduces you to the two management tools used to manage Tomcat and to deploy servlets, JavaServer Pages\* (JSPs\*), and Web applications.

This guide is intended for administrators whose role is to install, configure, and manage Tomcat for NetWare. Web application developers will also find the information useful.

This guide is divided into the following sections:

- ♦ Chapter 1, “Overview: Tomcat Servlet Container,” on page 7
- ♦ Chapter 2, “Installation and Configuration,” on page 13
- ♦ Chapter 3, “Deploying Servlets and JSPs,” on page 17
- ♦ Chapter 4, “Securing Tomcat on NetWare,” on page 21

## Additional Documentation

For complete Tomcat documentation, visit the [Jakarta Project Web site](http://jakarta.apache.org/tomcat/tomcat-4.1-doc/index.html) (<http://jakarta.apache.org/tomcat/tomcat-4.1-doc/index.html>).

## Documentation Conventions

In this documentation, a greater-than symbol (>) is used to separate actions within a step and items within a cross-reference path.

Also, a trademark symbol (®, ™, etc.) denotes a Novell trademark. An asterisk (\*) denotes a third-party trademark.



# 1

## Overview: Tomcat Servlet Container

Tomcat is a *servlet container*, which is a runtime shell that manages and invokes servlets when they are requested by a Web browser or by another servlet. Servlets are programs that run on a Web server and automatically generate Web pages as a result of user input. Two or more servlets working together to provide a common set of functions is referred to as a Web application.

Web servers, like the Apache Web server, also included with NetWare® 6.5, depend on a servlet container like Tomcat to process JavaServer Pages (JSPs) and servlets.

Tomcat is developed under a larger project named Jakarta. Jakarta is a collaboration between Apache developers, major corporate sponsors, smaller companies, and individual private developers. Like the Apache project, Jakarta is an open-source project. Open-source means that the source code is freely available.

Tomcat is the reference implementation from Sun\* Microsystems\*. It implements the servlet specification 2.3 and the JSP specification 1.2.

For more information about the Jakarta Project, visit <http://jakarta.apache.org/tomcat/index.html> (<http://jakarta.apache.org/tomcat/index.html>).

This overview includes the following topics:

- ◆ “Benefits of Tomcat on NetWare” on page 7
- ◆ “How Tomcat is Used by NetWare 6.5” on page 8
- ◆ “Tomcat and the Novell exteNd Application Server” on page 10
- ◆ “Managing Tomcat” on page 10
- ◆ “Managing Web Applications and Servlets” on page 11
- ◆ “What’s Next” on page 11

## Benefits of Tomcat on NetWare

Tomcat provides many business benefits to your existing network that can ultimately increase productivity, improve communication between departments and employees. When used in conjunction with the Apache Web server, Tomcat can host powerful Web applications.

Here are some of the key uses and benefits of using Tomcat on NetWare:

- ◆ Offers a highly flexible, robust JSP servlet container that is tightly integrated with NetWare 6.5.
- ◆ Provides a simple entry point for organizations planning to prototype and deploy Java\* based utilities and solutions on a NetWare server.
- ◆ Works with major development tools available through commercial vendors and open source communities.

- ♦ Tomcat can be deployed with Novell® Cluster Services™ (included with NetWare 6.5) to provide high availability, load balancing, and fault tolerance for important business processes running in the Tomcat JSP servlet container.

## How Tomcat is Used by NetWare 6.5

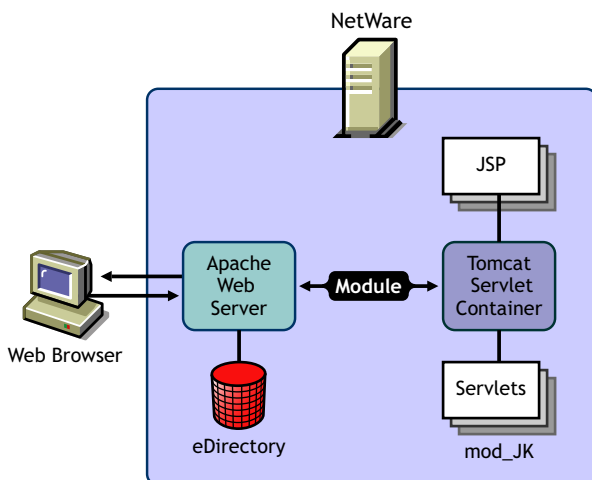
As with the Apache Web server, two instances of Tomcat are configured on your server: an administration and a public instance. Of course, if during the NetWare 6.5 installation you didn't choose to install Tomcat, only the administration instance is installed.

By default, Tomcat is installed to `sys:\tomcat`. Unlike Apache, which also includes administration and public versions, each installed into their own directories, both instances of Tomcat share the same Tomcat directory. Adding additional instances of Tomcat is a matter of modifying the `autoexec.ncf` file.

**HINT:** If you are a developer and you need to add additional instances of Tomcat, see the [Novell Developer Kit](http://developer.novell.com/ndk) (<http://developer.novell.com/ndk>).

## About the Administration Instance of Tomcat

The administration instance of Tomcat is used by NetWare 6.5 to host and manage Novell services such as Apache Manager and the NetWare 6.5 Welcome Web site. When requests come to the Apache Web server from any of the NetWare 6.5 products, Apache identifies requests that require the use of Tomcat. These requests are passed through the `mod_jk` module on Apache to Tomcat, as shown in the following diagram.



The `mod_jk` plug-in opens a socket to an instance of Tomcat and communicates with it using the AJP 13 protocol. Tomcat processes the HTTP request and then returns an HTTP response, which is sent back through the same socket connection to Apache. Apache then serves the response up to the client that requested it.

The following table lists key files used by the administration instance of Tomcat and how they are used.



Key Files	Purpose
sys:/adminsrv/conf/admin_tomcat.xml	Configuration file for the administration instance of Tomcat.
sys:/system/tcadmup.ncf	Use at the system console to start the administration instance of Tomcat.
sys:/system/tcadmdn.ncf	Use at the system console to stop the administration instance of Tomcat.
sys:/adminsrv/conf/mod_jk/workers.properties	Configuration file for the Apache/Tomcat interconnection.  <b>NOTE:</b> The ports specified in this file must match the ports specified in the server.xml and admin_tomcat.xml files. Also, worker names must correspond with those used in JkMount statements found in the httpd.conf and adminserv.conf files.

## About the Public Instance of Tomcat

The second, or public, instance of Tomcat serves as your own dedicated servlet container, which you can optimize and use to host your own Web applications.

The following table lists key files used by the public instance of Tomcat and how they are used.

Key Files	Purpose
sys:/tomcat/4/bin/tomcat4.ncf	Use at the system console to start the public instance of Tomcat by entering <b>tomcat4</b> .  You can also use <b>tomcat4 stop</b> to stop the server.
sys:/tomcat/4/bin/tc4stop.ncf	Use at the system console to stop the public instance of Tomcat by entering <b>tc4stop</b> .
sys:/tomcat/4/bin/catalina.pl	Primarily used as the start and stop script for Tomcat. But it is also used for other purposes, including to start JPDA mode.
sys:/tomcat/4/bin/startup.ncf	Used during startup to manage NetWare-specific command-line parameters. It is used by tomcat4.ncf (and tcadmup).
sys:/tomcat/4/conf/server.xml	Configuration file that contains port number specifications. Ports here must match those found in the workers.properties file.
sys:/adminsrv/conf/mod_jk/workers.properties	Same file used by the administrative instance of Tomcat. See “ <a href="#">sys:/adminsrv/conf/mod_jk/workers.properties</a> ” on page 9.

After reviewing this guide, see the [Tomcat documentation \(http://jakarta.apache.org/tomcat/tomcat-4.1-doc/index.html\)](http://jakarta.apache.org/tomcat/tomcat-4.1-doc/index.html) on the Jakarta Project Web site.

# Tomcat and the Novell exteNd Application Server

When you need greater processing power beyond what basic HTML and scripting has to offer, NetWare 6.5 offers two choices: Tomcat and Novell exteNd™ Application Server. Which one you choose depends on what you need.

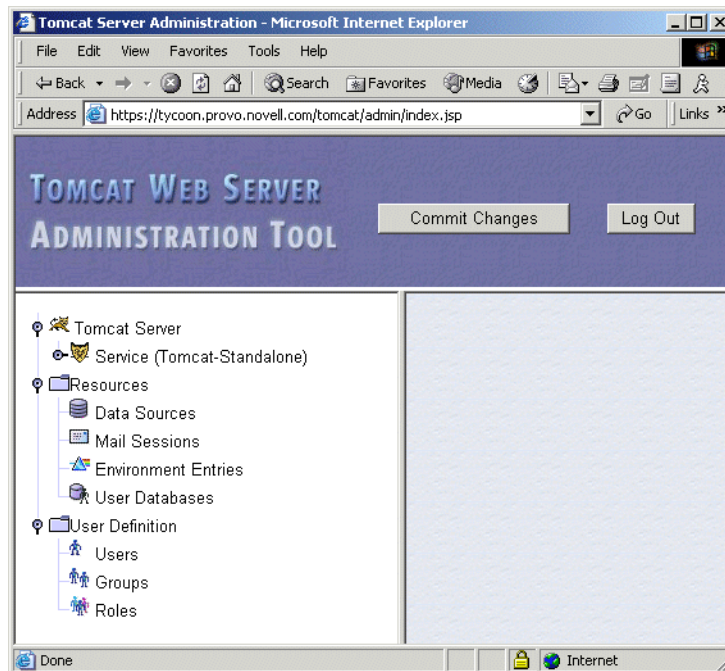
For example, if you need Java API support beyond servlets, JSPs, tag libraries, or basic JavaBeans\* components, either immediately or in the future, you should select the Novell exteNd Application Server. Also, if you are going to use any of the high-end development tools included with NetWare 6.5, such as exteNd Director™ exteNd Composer™, exteNd is the better choice because Tomcat is not supported by these tools. (For more information about Novell exteNd, see the [exteNd documentation \(http://www.novell.com/documentation-index/index.jsp?category=exteNd\)](http://www.novell.com/documentation-index/index.jsp?category=exteNd).)

However, if you need only very basic Java servlets and JSPs and you do not plan to migrate to a more robust solution, you should select Tomcat. Tomcat is also the better choice if you are new to, or inexperienced with, Java programming.

## Managing Tomcat

The Tomcat Administration Tool, referred to as Tomcat Admin, lets you configure Tomcat from a Web browser. Changes made to Tomcat using Tomcat Admin can be saved persistently so that the changes remain when Tomcat is restarted, or they can be applied to the current session only.

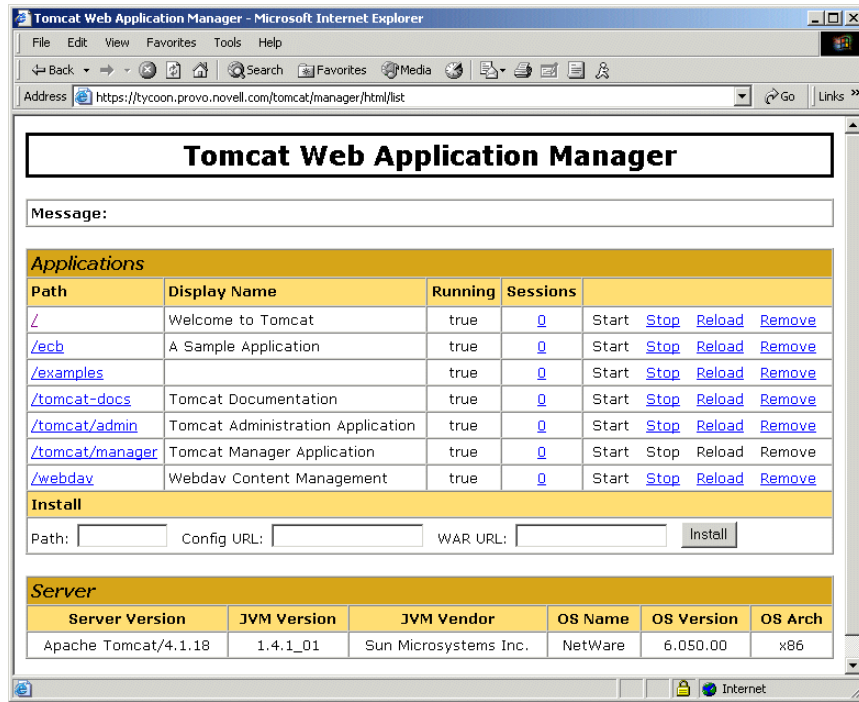
Tomcat Admin is a Web-based administration tool created by the Apache Foundation and is included and fully configured to run on NetWare 6.5. It can be accessed from any Web browser that has access to your server.



For more information, see “[Managing Tomcat with Tomcat Admin](#)” on page 14.

# Managing Web Applications and Servlets

For deploying and managing Web servlets and applications, you can use Tomcat Manager, also a Web-based administration utility. When you install NetWare 6.5, Tomcat Manager is automatically installed and configured.



When you install Tomcat with NetWare 6.5, Tomcat Manager is automatically installed and configured.

For more information about Tomcat Manager on NetWare 6.5, see [“About Tomcat Manager”](#) on page 18.

## What's Next

For information about installing and using Tomcat, see [Chapter 2, “Installation and Configuration,”](#) on page 13.



# 2

## Installation and Configuration

The administration instance of tomcat is installed automatically during the NetWare® 6.5 installation process. It is a required component for several key NetWare products. However, if you want to host your own servlets and JavaServer Pages (JSPs), you can install a public instance of Tomcat during the NetWare 6.5 installation process, or after NetWare is already installed and running.

Once installed, you can use Tomcat Admin, a browser-based administration utility, to manage Tomcat.

This section includes the following topics:

- ♦ “Installing Tomcat on NetWare” on page 13
- ♦ “Starting and Stopping Tomcat from the System Console” on page 14
- ♦ “Managing Tomcat with Tomcat Admin” on page 14
- ♦ “What’s Next” on page 15

### Installing Tomcat on NetWare

You can install the public instance of Tomcat during or after the NetWare 6.5 installation. The administration instance of Tomcat is installed by default.

During the NetWare 6.5 installation process, you can customize your server by selecting individual components to be installed, or you can select a specific server type from a list of fifteen pre-configured servers, which installs the necessary software needed to support a specific server solution.

For example, if you wanted to dedicate a NetWare server to hosting Web servlets and JSPs, you could select the Apache/Tomcat Server from the Pre-Configured Servers list. Or, if you simply wanted a Web server and servlet container available on your NetWare server, you could select Apache2 Web Server and Tomcat 4 Servlet Container from the Components dialog box when you choose the Custom NetWare Server option.

The following table can help you decide which installation option you should choose based on how you want to use the Tomcat servlet container on NetWare 6.5.

If You Want To	Do This
Dedicate a NetWare 6.5 server to hosting Web site content and deploying and hosting servlets and JSPs	Select Apache/Tomcat Server from the Pre-configured Servers list during the NetWare 6.5 installation.  This option installs Apache Web Server 2.0 and the Tomcat Servlet Container 4.1.

If You Want To	Do This
Add Tomcat as a component to your customized NetWare 6.5 installation, which you can use to deploy and host servlets and JSPs	Select Apache2 Web Server and Tomcat 4 Servlet Container from the Components list when selecting the Customized NetWare Server option.  This option installs Apache Web Server 2.0 and the Tomcat Servlet Container 4.1.
Install Tomcat after installing NetWare 6.5	Run the NetWare post-install program from the NetWare GUI and select Apache2 Web Server and Tomcat 4 Servlet Container.  <b>NOTE:</b> You can also install Tomcat remotely using the NetWare Deployment Manager.  This option installs Apache Web Server 2.0 and the Tomcat Servlet Container 4.1.

## About Installing the Apache/Tomcat Pre-Configured Server

When installing the Apache/Tomcat Server option, Novell® eDirectory™ Java LDAP beans are also included to provide a broad range of eDirectory authentication and identity mechanisms that are customized for use in setting up browser-based access to protected information. For additional development and deployment power, install the Novell exteNd™ Workbench™ IDE from the NetWare 6.5 Client CD.

## Installing Tomcat

Once you have decided which installation option to use, see the *NetWare 6.5 Overview and Installation Guide* for detailed installation instructions.

## Installing the Administration Instance of Tomcat

As mentioned above, the administration instance of the Tomcat servlet container is installed by default during the NetWare 6.5 installation. However, if for any reason you need to install it after you have installed NetWare, you can do so by running the NetWare post-installation program from the NetWare GUI or the NetWare Deployment Manager and then selecting Tomcat 4 Admin Instance.

For detailed information about installing products after installing NetWare 6.5, see Installing Products and Updates in the *NetWare 6.5 Overview and Installation Guide*.

## Starting and Stopping Tomcat from the System Console

To start Tomcat, enter **tomcat4** at the system console. To stop Tomcat, enter **tcadmdn** at the system console.

## Managing Tomcat with Tomcat Admin

Once Tomcat is running, you can access the Tomcat Admin utility from a Web browser to make configuration changes to Tomcat.

### To access Tomcat Admin:

- 1** Make sure tomcat is running by entering **tomcat4** at the NetWare system console.
- 2** Start a Web browser.
- 3** In the Web browser, point to the following URL:

`https://domain_name/tomcat/admin/`

Replace *domain\_name* with either your server's domain name or IP address.

**IMPORTANT:** You must include the trailing slash mark (/) at the end of the URL. If you do not include it, the server will return a 404 Not Found error.

- 4** Enter the administrator username and password created when you installed NetWare 6.5.

Once Tomcat Admin starts, refer to the [Tomcat Admin documentation \(http://java.sun.com/webservices/docs/1.0/tutorial/doc/Admintool.html\)](http://java.sun.com/webservices/docs/1.0/tutorial/doc/Admintool.html) on Sun's Web site.

## What's Next

Once Tomcat is running and you can access both Tomcat Admin and Tomcat Manager, you're ready to deploy Web applications. See [Chapter 3, "Deploying Servlets and JSPs," on page 17](#).

For information about making Tomcat secure, see [Chapter 4, "Securing Tomcat on NetWare," on page 21](#).



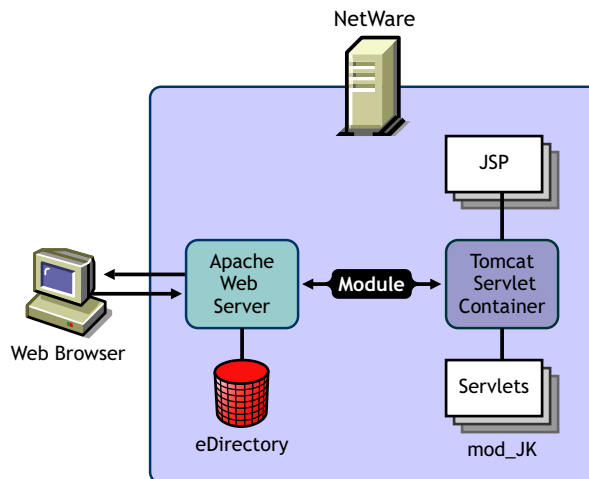


# 3

## Deploying Servlets and JSPs

Servlets are programs that run on a Web server and automatically generate Web pages as a result of user input.

This chapter describes the methods and tools you can use to deploy servlets and JavaServer Pages (JSPs) on Tomcat Servlet Container 4.1 on NetWare®. It also introduces you to Tomcat Manager, a browser-based tool you can use to deploy your servlets.



This chapter contains the following topics:

- ♦ “About JSPs” on page 17
- ♦ “Deploying Servlets” on page 18
- ♦ “About Tomcat Manager” on page 18
- ♦ “What’s Next” on page 20

### About JSPs

JSP technology offers a simple way to create dynamic Web pages that are both platform-independent and server-independent, giving you more freedom through Java\* technology's *Write Once, Run Anywhere\** capability.

JSP technology separates content generation from presentation and takes advantage of reusable tags and objects, simplifying the maintenance of your Web applications. JSP technology provides the scripting ability you need to create simple interactive Web pages, or it scales to support complex Web sites that are fully integrated with enterprise class applications.

# Deploying Servlets

On Tomcat 4.1, Web applications are deployed in one of the following ways:

- ♦ By placing a WAR file in the `sys:/tomcat/4/webapps` directory (Recommended)
- ♦ By placing an exploded WAR in the `sys:/tomcat/4/webapps` directory
- ♦ By placing an exploded WAR anywhere on disk and then creating an XML file in `sys:/tomcat/4/webappsexploded` WAR in `sys:/tomcat/4/webapps`
- ♦ By using the first and second methods above with an XML file that specifies the settings for your application

These are standard methods across all platforms for deploying applications using Tomcat 4.x.

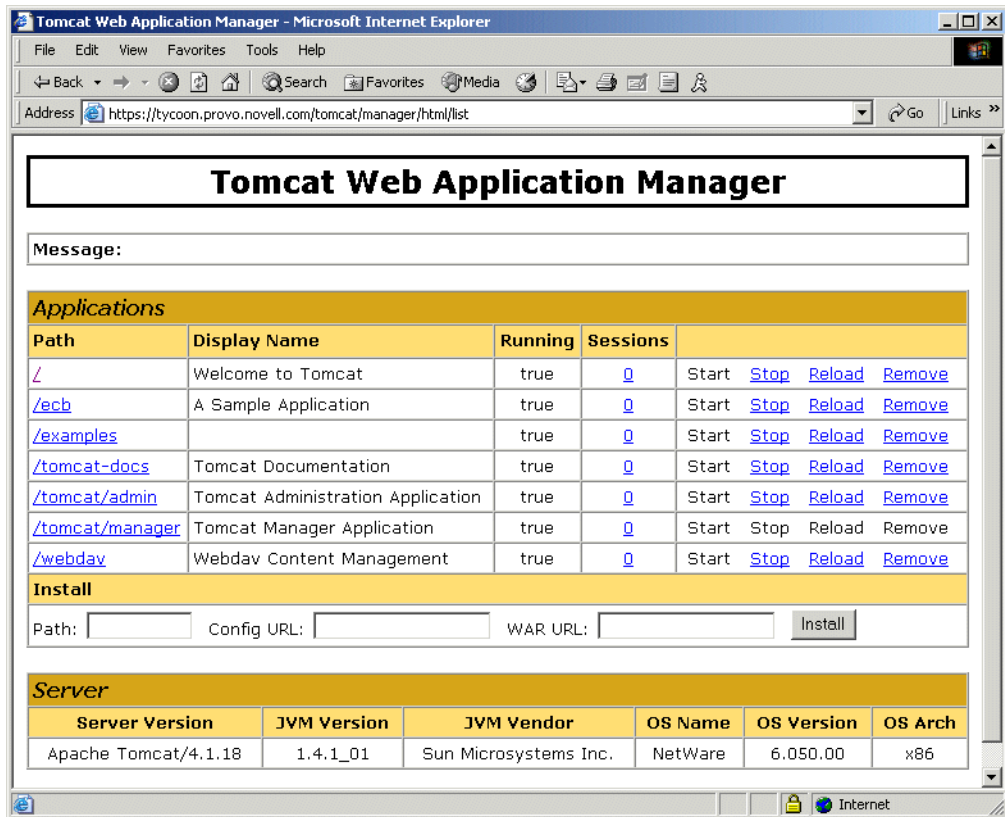
To deploy servlets and JSPs, use Tomcat Manager and see the [Tomcat Web Application Manager How To](http://jakarta.apache.org/tomcat/tomcat-4.1-doc/html-manager-howto.html) (<http://jakarta.apache.org/tomcat/tomcat-4.1-doc/html-manager-howto.html>) documentation on the Apache Web site.

**NOTE:** If you are deploying administration applications on the Admin version of Tomcat (`sys:/adminsrv/webapps`), use the same methods outlined above, except that you should place XML in the `sys:/adminsrv/webapps` directory rather than in the `sys:/tomcat/4/webapps` directory.

## About Tomcat Manager

Tomcat Manager is a browser-based administration tool you can use for installing and deploying Web applications.

**HINT:** *Web application* is a term used to describe two or more servlets and JSPs, or a combination of both, working together to provide a set of end-user functions or services. However, Web application is also often used synonymously with servlet.



Tomcat Manager lets you do the following things:

- ♦ Install a new Web application, which can be anywhere on the server's disks
- ♦ Deploy a new Web application on a specified context path from the uploaded contents of a WAR file
- ♦ List the currently deployed Web applications, as well as the sessions that are currently active for them
- ♦ Reload an existing Web application to reflect changes in the contents of /WEB-INF/classes or /WEB-INF/lib
- ♦ List operating system and Java Virtual Machine (JVM) property values
- ♦ List available global JNDI resources for use in deployment tools that are preparing <ResourceLink> elements nested in a <Context> deployment description
- ♦ List available security roles defined in the user database
- ♦ Remove an installed Web application
- ♦ Restart a Web application that has, for any reason, stopped running
- ♦ Stop an existing Web application, making it unavailable to users, without having to undeploy it
- ♦ Undeploy a deployed Web application and delete its document base directory

You can access Tomcat Manager, the browser-based servlet and application management tool, from any Web browser that has access to your NetWare® 6.5 server.

## To access Tomcat Manager:

- 1 Open a Web browser and enter the URL to Tomcat Manager using the following syntax:

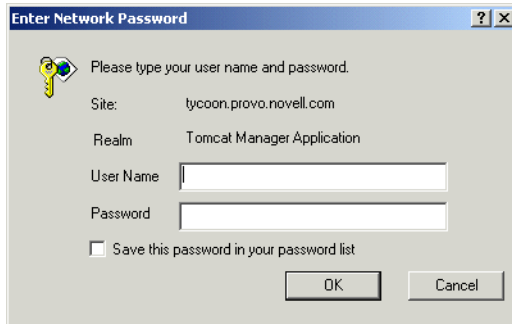
`https://domain_name/tomcat/manager/html`

For example:

`https://www.digitalairlines.com/tomcat/manager/html`

**HINT:** You can replace the domain name with your server's IP address. This is helpful if you do not have a DNS server.

- 2 When your browser's user authentication dialog box appears, enter your NetWare administrator username and password.



- 3 Click OK.

**HINT:** When you access Tomcat Manager for the first time, it might take a minute before it appears in your Web browser.

For complete Tomcat Manager documentation, see the [Tomcat Web Application Manager How To \(http://jakarta.apache.org/tomcat/tomcat-4.1-doc/html-manager-howto.html\)](http://jakarta.apache.org/tomcat/tomcat-4.1-doc/html-manager-howto.html) documentation on the Apache Web site.

## What's Next

Once Tomcat is installed and running on NetWare 6.5, refer to the [Tomcat 4 Servlet/JSP Container documentation \(http://jakarta.apache.org/tomcat/tomcat-4.1-doc/index.html\)](http://jakarta.apache.org/tomcat/tomcat-4.1-doc/index.html) on the Apache Web site.

# 4

## Securing Tomcat on NetWare

The Tomcat Servlet Container has many built-in security mechanisms. On NetWare® 6.5, LDAP is used as the default security realm.

This chapter contains the following topics:

- ♦ “Authentication and Authorization” on page 21
- ♦ “OU Container Rights” on page 21
- ♦ “Use of Dynamic Groups” on page 22
- ♦ “What’s Next” on page 22

### Authentication and Authorization

There are two parts to Tomcat security: authentication and authorization. Authentication occurs when a valid username is entered during login. A valid username is one that matches a Novell® eDirectory™ user ID. Authorization occurs if the valid user has been assigned the correct roles which allow the user to have access to a secured Web application.

To facilitate authorization, a collection of role names is created in the Tomcat-Roles Organizational Unit (OU) in eDirectory. By default, this OU is created in the same container where the NetWare server’s context is created during installation of NetWare 6.5.

Roles are represented as eDirectory groups contained in the Tomcat-Roles OU. A role can then be used for authentication purposes when a client requests access to a specific Web application. For example, if you had an inventory tracking application that you wanted to secure, you would add the name of the role to the application’s XML file. When users request access to the application, they are prompted for their username and password. If their user object does not exist in the Tomcat-Roles OU, they will not have access to the application. So for users to be authorized in the "admin" role, they need to be a member of the "admin" Group.

### OU Container Rights

During installation, Public browse rights are granted on the Tomcat-Roles Organizational Unit. Tomcat first authenticates with the user-supplied username and password. If successful, it does an anonymous LDAP bind to discover if the user is authorized in the role. If there are no Public browse rights, the authorization fails.

### Required Settings

For secure access to work, the following settings are required:

- ♦ Public must be a trustee of Tomcat-Roles

- ♦ On the Public trustee, the assigned right of All Attributes Rights with Compare and Read rights must be granted. This must be inheritable.
- ♦ On the Public trustee, the assigned right of Entry Rights with browse rights is granted. This also must be inheritable.

## Relocating the Tomcat-Roles Container

If needed, you can relocate the Tomcat-Roles container so that it is available across a directory tree, or you can move it to a lower level container.

To move the Tomcat-Roles container, move it as you do any other container, or you can recreate it as long as you maintain the correct rights. Then modify the server.xml and admin-tomcat.xml files to reflect the new location.

In sys:/tomcat/4/conf/server.xml, locate the `<Realm name="JNDIRealm">` tag. There is an LDAP search string to match the users for authentication, and also for lookup of roles for authorization. {0} represents the user name supplied at login time. You can simply use {0} as the authentication string, requiring a fully-specified LDAP context to login (for example, cn=admin,ou=myorg,o=mycompany), or you can specify the context of the users such as is done by the default. This gives you a context-less login, though it requires all of the users to be in the same container. Because there is only one Tomcat-Roles container involved in the authorization process, it is more straightforward; simply supply the path of the Tomcat-Roles container in the authorization search string, whether this container is tree-wide or in a container that is more specific to the individual server.

You can add additional roles to your NetWare 6.5 server by simply adding additional groups with role names into the Tomcat-Roles OU. If you have existing web applications that use role-based security, they will automatically work once you create the required role group and add members to it.

## Use of Dynamic Groups

Using groups to represent roles lets you set roles up as dynamic groups. Dynamic groups can be created using iManager. If you are using dynamic groups, the administrator does not need to constantly manage the Tomcat roles. In this case, eDirectory can take care of it. For example, if you have a payroll application that requires the Payroll role, you can set up a dynamic payroll group in the Tomcat-Roles container. It could contain a rule to include all members of the ou=payroll.o=yourcompany, and when users are created in that container, they are automatically granted access to the payroll Web application.

The same rule applies when a user moves out of the payroll container; they immediately cease to have rights to the payroll Web application without the system administrator or Web application administrator having to do anything at all.

## What's Next

Once Tomcat is installed and running on NetWare 6.5, see the [Tomcat 4 Servlet/JSP Container documentation](http://jakarta.apache.org/tomcat/tomcat-4.1-doc/index.html) (<http://jakarta.apache.org/tomcat/tomcat-4.1-doc/index.html>) on the Apache Web site.