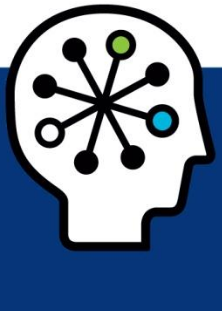
Configuring Tomcat with Apache or IIS for load balancing

How to configure the Web Application Server and the Web Servers



Introduction

For large implementation it is often required to set up multiple Web Application Servers with a single Web Server that functions as a load balancer. This document describes how to set up multiple Tomcat Web Application Servers with a single Apache Web Server as the load balancer.

This document outlines the steps needed to install and configure Apache HTTP and Microsoft IIS to load balance multiple Tomcat instances on single or multiple servers. Also covered is the configuration of multiple Apache Tomcat instances. This is applicable to ServiceCenter version 6.x and all versions of Service Manager. This document does not take into account any configuration in support of SSL sessions.

Prerequisites

This document is meant for ServiceCenter 6.x and higher and Service Manager, Tomcat 5.0, 5.5, 6.0, Apache 2.0 or 2.2 and IIS 6.0. HP recommends configuring the Tomcat JVM heap at 1024MB, minimum and maximum. The will allow a single Tomcat container to serve approximately 100 concurrent users.

Configuring Tomcat

This configuration will work on Tomcat 5.0, 5.5, 6.0 on any supported Operating System. Ensure to use a version of Tomcat that is listed in the compatibility matrix for your version of ServiceCenter or Service Manager. Examples in this document will be provided for both Windows and Unix.

For Windows, we recommend to download the ZIP file containing a complete Tomcat installation structure. The installer package for Windows does not contain the same files as other platforms. After uncompressing the Tomcat package, modify the /conf/server.xml file, and optionally, create the Windows service. The configuration described in this document uses the first Tomcat as the anchor for the Service Manager web tier, with all other Tomcats using the /tomcat/webapps of this anchor and creating their own work copy. This eases maintenance and upgrade issues by having only one sm.war file in the system.

Below is a sample of the changes needed in the server.xml file for the main / anchor Tomcat.

Note: Some lines are included to provide comparison and are not changed from the default.

For the chained Tomcats, some parameters must be incremented to provide unique values. These values that need to be adjusted are

- Shutdown Server Port
- HTTP Connector port
- AJP Connector port
- jvmRoute

jvmRoute is case sensitive and must match the values provided in the workers.properties file.

Server.xml – Anchor Tomcat

```
<Server port="8005" shutdown="SHUTDOWN">
...
<!-- Define a non-SSL HTTP/1.1 Connector on port 8080 -->
```

```
    <Connector port="8080" maxHttpHeaderSize="8192"
               enableLookups="false" redirectPort="8443"
acceptCount="100"
               debug="0" connectionTimeout="20000"
               disableUploadTimeout="true"/>
...
<!-- Define an AJP 1.3 Connector on port 8009 -->
    <Connector port="8009" maxThreads="900" minSpareThreads="75"
maxSpareThreads="225" enableLookups="false" redirectPort="8443"
protocol="AJP/1.3" />
...
<!-- Define the top level container in our container hierarchy -->
    <Engine name="Catalina" defaultHost="localhost" jvmRoute="tomcat1">
...
<Host name="localhost" appBase="webapps"
       unpackWARs="true" autoDeploy="true"
       xmlValidation="false" xmlNamespaceAware="false">
...
<Context path="/sm920" docBase="/sm920" crossContext="false" debug="0"
reloadable="false" />
```

Server.xml – Chained Tomcat

```
<Server port="9005" shutdown="SHUTDOWN">
...
    <!-- Define a non-SSL HTTP/1.1 Connector on port 8180 -->
    <Connector port="8180" maxHttpHeaderSize="8192"
     enableLookups="false" redirectPort="8443" acceptCount="100"
               debug="0" connectionTimeout="20000"
               disableUploadTimeout="true"/>
...
<!-- Define an AJP 1.3 Connector on port 9009 -->
<Connector port="9009" maxThreads="900" minSpareThreads="75"
maxSpareThreads="225" enableLookups="false" redirectPort="8443"
protocol="AJP/1.3" />
...
<!-- Define the top level container in our container hierarchy -->
    <Engine name="Catalina" defaultHost="localhost" debug="0"
jvmRoute="tomcat2">
...
<!-- For Windows -->
<Host name="localhost" appBase="c:\tomcat1\webapps"
       unpackWARs="true" autoDeploy="true"
       xmlValidation="false" xmlNamespaceAware="false">

<!-- For Unix -->
<Host name="localhost" appBase="/tomcat1/webapps"
       unpackWARs="true" autoDeploy="true"
       xmlValidation="false" xmlNamespaceAware="false">
...
<!-- For Windows -->
<Context path="/sm920" docBase="c:\tomcat1\webapps\sm920"
crossContext="false" debug="0" reloadable="false" />

<!-- For Unix -->
<Context path="/sm920" docBase="/tomcat1/webapps/sm920"
crossContext="false" debug="0" reloadable="false" />
```

Once the files outlined above are modified, the ServiceCenter / Service Manager WAR file can be deployed as documented in the Service Manager install guide.

Note: The WAR file only needs to be deployed in the anchor Tomcat's /webapps directory. The chained Tomcats will read that deployed war file and create their own local copy in ./work/Catalina/localhost.

The Service Manager web tier web.xml then needs to be configured and the anchor Tomcat restarted first before starting any of the chained Tomcats. Once all chained Tomcats are started and the Web Server is configured and pointing to the Tomcat systems, the system is ready for use.

Configuring Apache

For this configuration, Apache 2.0 or 2.2 can be used on any supported operating system. The mod_jk.so must be in ./modules in the Apache install directory. Additional information on advanced Apache with Tomcat options, such as options in the mod_jk.so, are available at http://tomcat.apache.org/connectors-doc/.

After installing Apache, first create a workers.properties file in the ./conf directory as highlighted below and modify the httpd.conf file that was created in ./conf in the Apache install directory. Below is a sample of the changes needed in the httpd.conf file, followed by a sample workers.properties which was configured for six Tomcat instances:

Httpd.conf

```
# WinNT MPM
# ThreadsPerChild: constant number of worker threads in the server
process
# MaxRequestsPerChild: maximum  number of requests a server process
serves
<IfModule mpm_winnt.c>
ThreadLimit 9000
ThreadsPerChild 3000
MaxRequestsPerChild  0
</IfModule>

…

#
# Add to end of httpd.conf for easy location
#

LoadModule jk_module modules/mod_jk.so

JkMount /sm930 loadbalancer
JkMount /sm930/* loadbalancer
JkMount /sm930/servlet/* loadbalancer
JkMount /sm930/*.jsp loadbalancer
JkMount /sm930/*.do loadbalancer
JkMount /sm930/attachments/* loadbalancer
JkMount /sm930/cwc/nav.menu loadbalancer

JkWorkersFile conf/workers.properties
JkLogFile logs/mod_jk.log
JkLogLevel info
```

Workers.properties

```
worker.list=loadbalancer

worker.tomcat1.port=8009
worker.tomcat1.host=webserver01
worker.tomcat1.type=ajp13
worker.tomcat1.lbfactor=1

worker.tomcat2.port=9009
worker.tomcat2.host=webserver02
worker.tomcat2.type=ajp13
worker.tomcat2.lbfactor=1

worker.tomcat3.port=10009
worker.tomcat3.host=webserver03
worker.tomcat3.type=ajp13
worker.tomcat3.lbfactor=1

worker.tomcat4.port=11009
worker.tomcat4.host=webserver04
worker.tomcat4.type=ajp13
worker.tomcat4.lbfactor=1

worker.tomcat5.port=12009
worker.tomcat5.host=webserver05
worker.tomcat5.type=ajp13
worker.tomcat5.lbfactor=1
worker.tomcat5.cachesize=100

worker.tomcat6.port=13009
worker.tomcat6.host=webserver06
worker.tomcat6.type=ajp13
worker.tomcat6.lbfactor=1
worker.tomcat6.cachesize=100

worker.loadbalancer.type=lb
worker.loadbalancer.balance_workers=tomcat1, tomcat2, tomcat3, tomcat4,
tomcat5, tomcat6
```

Start the Apache HTTP Server – the configuration is complete and Apache will act as the load balancer for the multiple tomcat instances that were configured previously.

Configuring Microsoft Internet Information Server

This configuration was tested with Microsoft IIS 5.0 or 6.0, but this document uses examples provided for IIS 6.0. Ensure that isapi_redirect.dll is placed in the ./bin directory within the Tomcat install directory. The Apache Tomcat ISAPI redirector and additional information on IIS with Tomcat options are available at http://tomcat.apache.org/connectors-doc/webserver_howto/iis.html. The files downloaded from there will have the version number as part of the file name. Remove that version information from the filename and save it as isapi_redirect.dll.

After downloading the ISAPI redirector, create the Isapi_redirect.properties file in the ./bin folder of the Tomcat install directory. Create the workers.properties and uriworkermap.properties files in the ./conf folder in the Tomcat install directory. Below are samples of these properties files.

Isapi_redirect.properties

```
# Configuration file for the Jakarta ISAPI Redirector

# The path to the ISAPI Redirector Extension, relative to the website
# This must be in a virtual directory with execute privileges
extension_uri=/jakarta/isapi_redirect.dll

# Full path to the log file for the ISAPI Redirector
log_file=c:\tomcat1\logs\isapi_redirect.log

# Log level (debug, info, warn, error or trace)
log_level=info

# Full path to the workers.properties file
worker_file=c:\tomcat1\conf\workers.properties

# Full path to the uriworkermap.properties file
worker_mount_file=c:\tomcat1\conf\uriworkermap.properties

# Use the logs in the installation path of ISAPI Redirector
#log_file=$(ISAPI_PATH)\$(ISAPI_NAME).log
```

Uriworkermap.properties

```
/servlet/*=loadbalancer

/sm920/*=loadbalancer
/sm920=loadbalancer

/ROOT=loadbalancer
/ROOT/*=loadbalancer

/*.jsp=loadbalancer

[uri:/sm920/servlet/*]
info=Prefix mapping

[uri:/sm920/*.do]
info=Extension mapping

[uri:/sm920/*.jsp]
info=Extension mapping

[uri:/sm920/answers/attachments/*]
info=Prefix mapping

[uri:/sm920/attachments/*]
info=Attachment mapping

[uri:/sm920/logs/*]
info=Attachment mapping

[uri:/sm920/cwc/nav.menu]
info=Extension mapping
```

Workers.properties

```
worker.list=loadbalancer
worker.tomcat1.port=8009
worker.tomcat1.host=locahost
worker.tomcat1.type=ajp13
worker.tomcat1.lbfactor=1

worker.tomcat2.port=9009
worker.tomcat2.host=localhost
worker.tomcat2.type=ajp13
worker.tomcat2.lbfactor=1

worker.tomcat3.port=10009
worker.tomcat3.host=localhost
worker.tomcat3.type=ajp13
worker.tomcat3.lbfactor=1

worker.tomcat4.port=11009
worker.tomcat4.host=localhost
worker.tomcat4.type=ajp13
worker.tomcat4.lbfactor=1

worker.tomcat5.port=12009
worker.tomcat5.host=localhost
worker.tomcat5.type=ajp13
worker.tomcat5.lbfactor=1

worker.tomcat6.port=13009
worker.tomcat6.host=localhost
worker.tomcat6.type=ajp13
worker.tomcat6.lbfactor=1

worker.loadbalancer.type=lb
worker.loadbalancer.balance_workers=tomcat1, tomcat2, tomcat3, tomcat4,
tomcat5, tomcat6
```

Once these properties files are in place, you can configure IIS. Open the Internet Information Services Manager and navigate to your site. First, you will need follow these steps to configure the ISAPI filter for that site:

1. Right-click on your site
2. Select *Properties*
3. Choose the *ISAPI Filters* tab
4. Click **Add**
5. Name the filter *jakarta*
6. Click **Browse** and select *isapi_redirect.dll* in *<Tomcat_install_dir>/bin*
7. Click **OK** to close the Add dialog

   It is not necessary to restart IIS yet, this will be done at the end

8. Click **OK** to close the Properties dialog

Next, follow the below steps to add a virtual directory to your site:

1. Right-click on your site
2. Choose *New/Virtual Directory*
3. Click **Next** on the Wizard screen

4. Enter *jakarta* for the Alias and click **Next**
5. For the Path, click **Browse** and select *<Tomcat_install_dir>/bin*

   This path must contain the isapi_redirect.dll

6. Click **Next**
7. Check the box for *Execute*, click **Next**
8. Click **Finish**

Next, we need to add an entry to enable the redirector in Web Service Extensions. To do this, follow these steps:

1. Right-click on Web Service Extensions
2. Choose *Add a new Web service extension…*
3. Enter *Jakarta-Tomcat* for the name
4. Check the box for *Set extension status to Allowed*
5. Click **Add**
6. For the path, click **Browse** and select isapi*_redirect.dll in <Tomcat_install_dir>/bin*
7. Click **OK**

The configuration of IIS is now complete. Restart the IIS and WWW services from the Service Control Panel to activate the configuration. Microsoft IIS Server will now act as the load balancer for multiple tomcat instances as configured above.

For more information

Please visit the HP Software support Web site at:

www.hp.com/go/hpsoftwaresupport

This Web site provides contact information and details about the products, services, and support that HP Software offers.

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- Manage a support contract
- Look up HP support contacts
- Review information about available services
- Enter discussions with other software customers
- Research and register for software training

Note: Most of the support areas require that you register as an HP Passport user and sign in. Many also require an active support contract.

To find more information about support access levels, go to the following URL:

www.hp.com/go/hpsoftwaresupport/new_access_levels

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www.hp.com/go/hpsoftwaresupport/passport-registration

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