

# CNT 4714: Enterprise Computing Summer 2012

## Integrating Apache And Tomcat

Instructor :      Dr. Mark Llewellyn  
                         markl@cs.ucf.edu  
                         HEC 236, 407-823-2790  
                         <http://www.cs.ucf.edu/courses/cnt4714/sum2012>

Department of Electrical Engineering and Computer Science  
Computer Science Division  
University of Central Florida



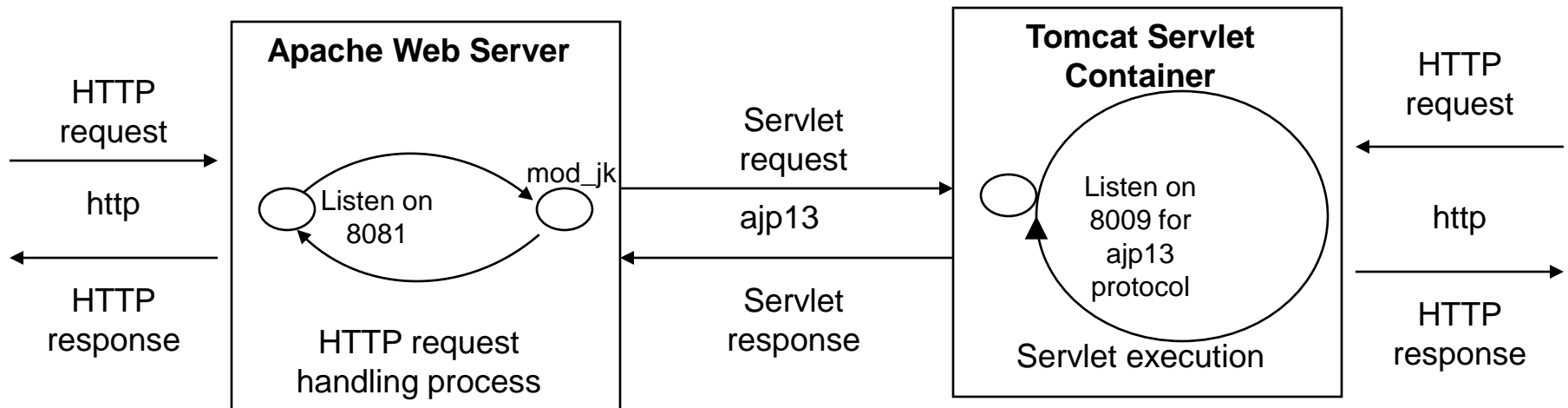
# Connecting Apache To Tomcat

- Although it is possible for Tomcat to run standalone and handle HTTP requests directly (we did this for servlets and jsps), the Apache server does a much better job of handling tasks such as static content and SSL connections.
- For this reason, Tomcat is typically used alongside an Apache server. Unlike PHP which runs as a module inside the Apache process, a JVM is external and requires a mechanism to connect it to the web server.
- Tomcat inherited the Apache JServ Protocol (AJP) from the JServ project. AJP is a protocol for connecting an external process to a servlet container. It is the responsibility of an Apache module, in this case `mod_jk`, to speak this protocol to the servlet container (Tomcat).



# Connecting Apache To Tomcat (cont.)

- In this section of notes, I'll show you how to integrate Apache and Tomcat into a single package.
- The ultimate set-up will resemble the figure shown below. Note that if you also would like Tomcat to run standalone HTTP requests, it will need to run on a different HTTP port than Apache. That's why I set-up Apache on port 8081 and Tomcat on port 8080.



# Getting The Tomcat Connector

- The first step in Apache-Tomcat integration is to obtain the Tomcat connector from Apache.
- Follow the screen shots on the next few pages to obtain the `mod_jk` connector.
- Windows based connector binary files will typically have the name of `mod_jk.so`.



Apache Tomcat - Welcome! - Windows Internet Explorer

http://tomcat.apache.org/

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Apache Tomcat - Welcome!

- [I aglibs](#)
- [Maven Plugin](#)

### Download

- [Which version?](#)
- [Tomcat 7.0](#)
- [Tomcat 6.0](#)
- [Tomcat 5.5](#)
- [Tomcat Connectors](#)
- [Tomcat Native](#)
- [Archives](#)

### Documentation

- [Tomcat 7.0](#)
- [Tomcat 6.0](#)
- [Tomcat 5.5](#)
- [Tomcat Connector](#)
- [Tomcat Native](#)
- [Wiki](#)
- [Migration Guide](#)

### Problems?

Community Process.

Apache Tomcat is developed in an open and participatory environment and released under the [Apache License version 2](#). Apache Tomcat is intended to be a collaboration of the best-of-breed developers from around the world about getting involved.

Apache Tomcat powers a wide range of industries and organizations. Visit our [page](#).

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#### Tomcat 7.0.27 Released 2012-04-05

The Apache Tomcat Project is proud to announce the release of version 7.0.27 of Apache Tomcat. This release includes significant new features as well as a number of bug fixes compared to version 7.0.26. The notable changes include:

- Support for the WebSocket protocol (RFC6455). Both streaming and message based APIs are provided and the implementation currently fully passes the Autobahn test suite. Also included are several examples.

From the main Tomcat webpage, select Tomcat connectors from the download section. The current documentation is also available from this page.

Internet | Protected Mode: Off 100%



http://tomcat.apache.org/download-connectors.cgi

File Edit View Favorites Tools Help

Google Search More >> Sign In

Apache Tomcat - Tomcat Connectors (mod\_jk) ...

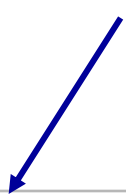


# Apache Tomcat



The Apache  
Foundation  
apache.org/

mod\_jk download page.



Search the Site

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## Apache Tomcat

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## Download

- [Which version?](#)
- [Tomcat 7.0](#)
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## Tomcat Connectors (mod\_jk) Downloads

Use the links below to download Tomcat Connectors from one of our mirrors. You **must** verify the integrity of the downloaded files using signatures downloaded from our main distribution directory.

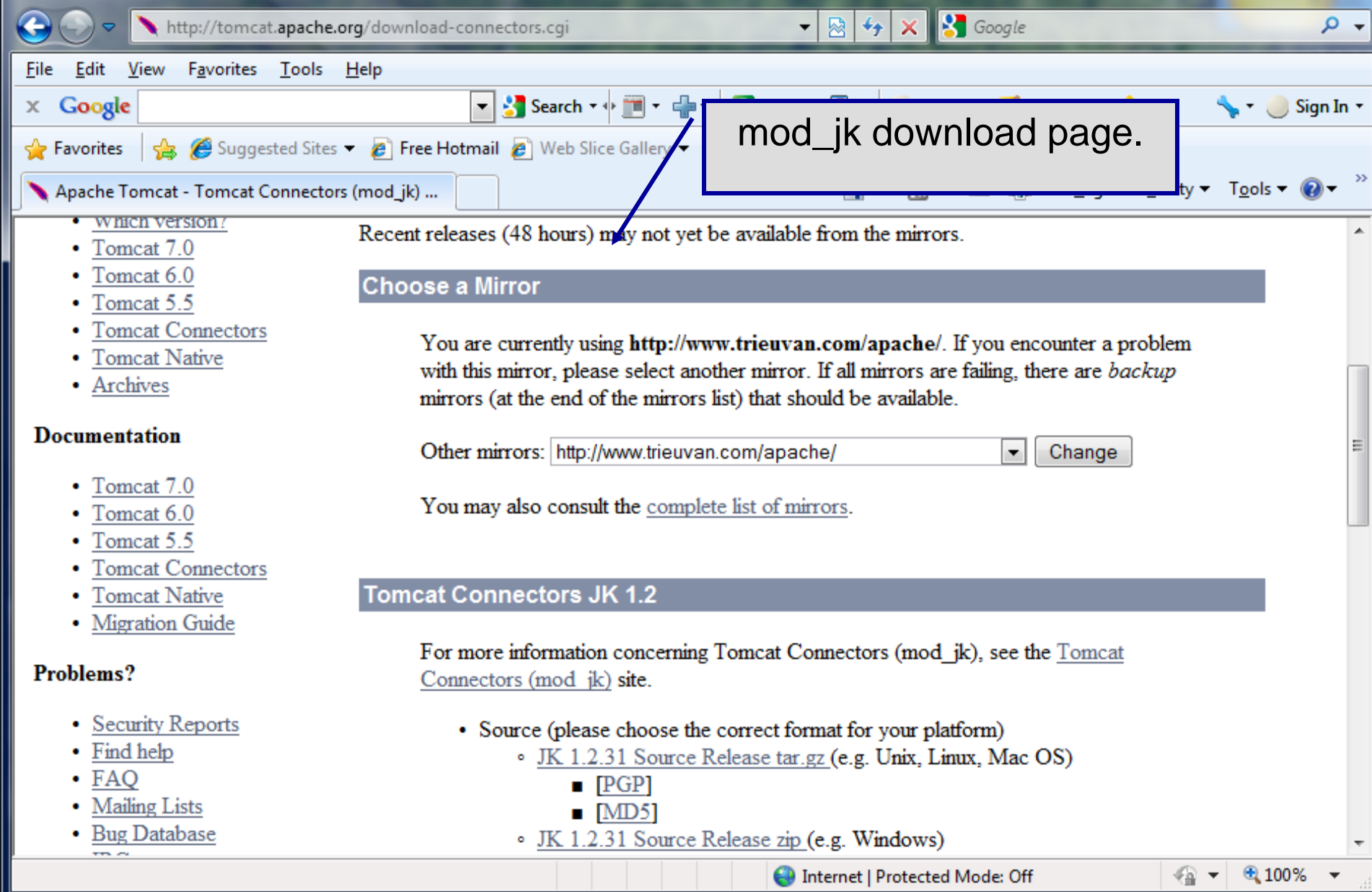
Only current recommended releases are available on the main distribution site and its mirrors. Older releases and the historical mod\_jk2 are available from the archive download site.

Recent releases (48 hours) may not yet be available from the mirrors.

## Choose a Mirror

You are currently using <http://www.trieuvan.com/apache/>. If you encounter a problem with this mirror, please select another mirror. If all mirrors are failing, there are *backup* mirrors (at the end of the mirrors list) that should be available.





http://tomcat.apache.org/download-connectors.cgi

File Edit View Favorites Tools Help

Google Search

Apache Tomcat - Tomcat Connectors (mod\_jk) ...

Recent releases (48 hours) may not yet be available from the mirrors.

### Choose a Mirror

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Other mirrors:

You may also consult the [complete list of mirrors](#).

### Tomcat Connectors JK 1.2

For more information concerning Tomcat Connectors (mod\_jk), see the [Tomcat Connectors \(mod\\_jk\)](#) site.

- Source (please choose the correct format for your platform)
  - [JK 1.2.31 Source Release tar.gz](#) (e.g. Unix, Linux, Mac OS)
    - [\[PGP\]](#)
    - [\[MD5\]](#)
  - [JK 1.2.31 Source Release zip](#) (e.g. Windows)

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mod\_jk download page.





Index of /apache//tomcat/tomcat-connectors/jk/binaries - Windows Internet Explorer





http://www.trieuvan.com/apache//tomcat/tomcat-connectors/jk/binaries/

File Edit View Favorites Tools Help

Google Search Sign In

Index of /apache//tomcat/tomcat-connectors/jk...

# Index of /apache//tomcat/tomcat-connectors/jk/binaries

<a href="#">Name</a>	<a href="#">Last modified</a>	<a href="#">Size</a>	<a href="#">Description</a>
 <a href="#">Parent Directory</a>		-	
 <a href="#">netware/</a>	03-Mar-2012 11:38	-	
 <a href="#">windows/</a>	26-Mar-2012 00:49	-	
 <a href="#">README.html</a>	13-Mar-2012 10:10	468	

**Download from your [nearest mirror site!](#)**

Please do not download from [www.apache.org](http://www.apache.org). Use a mirror site to help us save apache.org bandwidth and to speed up your download. [Click here](#) to find your nearest mirror.

Hosted by [champhay](#)

Done Internet | Protected Mode: Off 100%





Index of /apache//tomcat/tomcat-connectors/jk/binaries/windows - Windows Internet Explorer

http://www.trieuvan.com/apache//tomcat/tomcat-connectors/jk/binaries/wind

File Edit View Favorites Tools Help

Google Search More >> Sign In



Index of /apache//tomcat/tomcat-connectors/jk...

# Index of /dist/tomcat/tomcat-connectors/jk/binaries/windows

## Important Notices

- [Windows Users, Read These First...](#)
- [Obtain the Current Stable Release](#)
- [Debugging and Source Code](#)

## Download from your [nearest mirror site!](#)

<a href="#">Name</a>	<a href="#">Last modified</a>	<a href="#">Size</a>	<a href="#">Description</a>
 <a href="#">Parent Directory</a>		-	
 <a href="#">symbols/</a>	26-Mar-2012 00:49	-	
 <a href="#">HEADER.html</a>	21-Feb-2012 03:00	453	
 <a href="#">README.html</a>	24-Mar-2012 06:53	2.7K	
 <a href="#">tomcat-connectors-1.2.35-windows-i386-httpd-2.0.x.zip</a>	24-Mar-2012 06:53	124K	ZIP compressed archive
 <a href="#">tomcat-connectors-1.2.35-windows-i386-httpd-2.0.x.zip.asc</a>	24-Mar-2012 06:53	198	OpenPGP ASCII armored sign

Internet | Protected Mode: Off 100%



Index of /apache//tomcat/tomcat-connectors/jk/binaries/windows - Windows Internet Explorer

http://www.trieuvan.com/apache//tomcat/tomcat-connectors/jk/binaries/wind

File Edit View Favorites Tools Help

Google Search More Sign In

Index of /apache//tomcat/tomcat-connectors/jk...

<a href="#">SYMBOLS/</a>	26-Mar-2012 00:49	-	
<a href="#">HEADER.html</a>	21-Feb-2012 03:00	453	
<a href="#">README.html</a>	24-Mar-2012 06:53	2.7K	
<a href="#">tomcat-connectors-1.2.35-windows-i386-httpd-2.0.x.zip</a>	24-Mar-2012 06:53	124K	ZIP compressed archive
<a href="#">tomcat-connectors-1.2.35-windows-i386-httpd-2.0.x.zip.asc</a>	24-Mar-2012 06:53	198	OpenPGP ASCII armored sign
<a href="#">tomcat-connectors-1.2.35-windows-i386-httpd-2.2.x.zip</a>	24-Mar-2012 06:53	124K	ZIP compressed archive
<a href="#">tomcat-connectors-1.2.35-windows-i386-httpd-2.2.x.zip.asc</a>	24-Mar-2012 06:53	198	OpenPGP ASCII armored sign
<a href="#">tomcat-connectors-1.2.35-windows-i386-httpd-2.4.x.zip</a>	26-Mar-2012 00:49	124K	ZIP compressed archive
<a href="#">tomcat-connectors-1.2.35-windows-i386-httpd-2.4.x.zip.asc</a>	26-Mar-2012 00:49	198	OpenPGP ASCII armored sign
<a href="#">tomcat-connectors-1.2.35-windows-i386-iis.zip</a>	24-Mar-2012 06:53	173K	ZIP compressed archive
<a href="#">tomcat-connectors-1.2.35-windows-i386-iis.zip.asc</a>	24-Mar-2012 06:53	198	OpenPGP ASCII armored sign
<a href="#">tomcat-connectors-1.2.35-windows-i386-iplanet.zip</a>	24-Mar-2012 06:53	138K	ZIP compressed archive
<a href="#">tomcat-connectors-1.2.35-windows-i386-iplanet.zip.asc</a>	24-Mar-2012 06:53	198	OpenPGP ASCII armored sign
<a href="#">tomcat-connectors-1.2.35-windows-x86_64-iis.zip</a>	24-Mar-2012 06:53	211K	ZIP compressed archive
<a href="#">tomcat-connectors-1.2.35-windows-x86_64-iis.zip.asc</a>	24-Mar-2012 06:53	198	OpenPGP ASCII armored sign

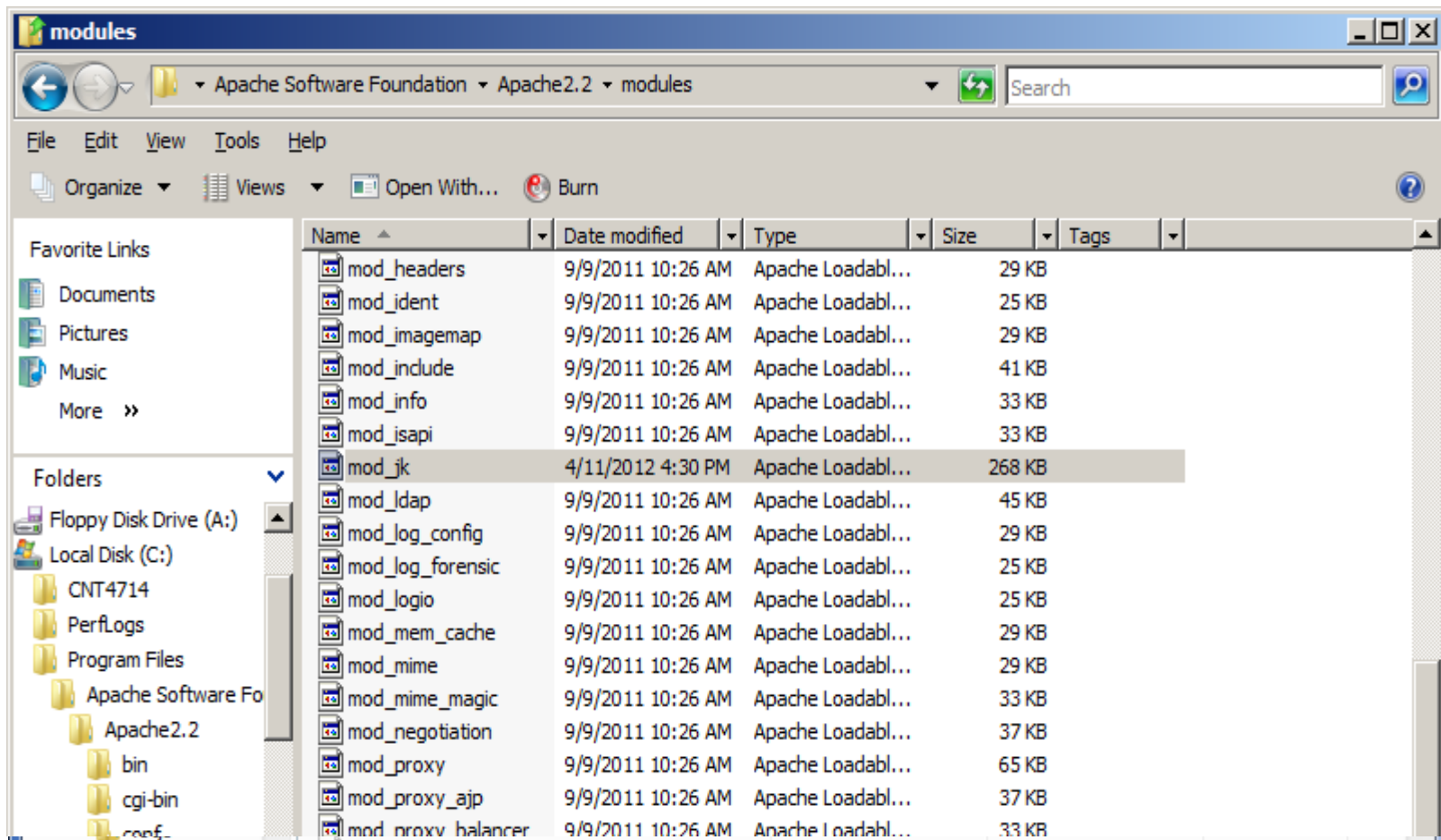
**Download from your nearest mirror site!**

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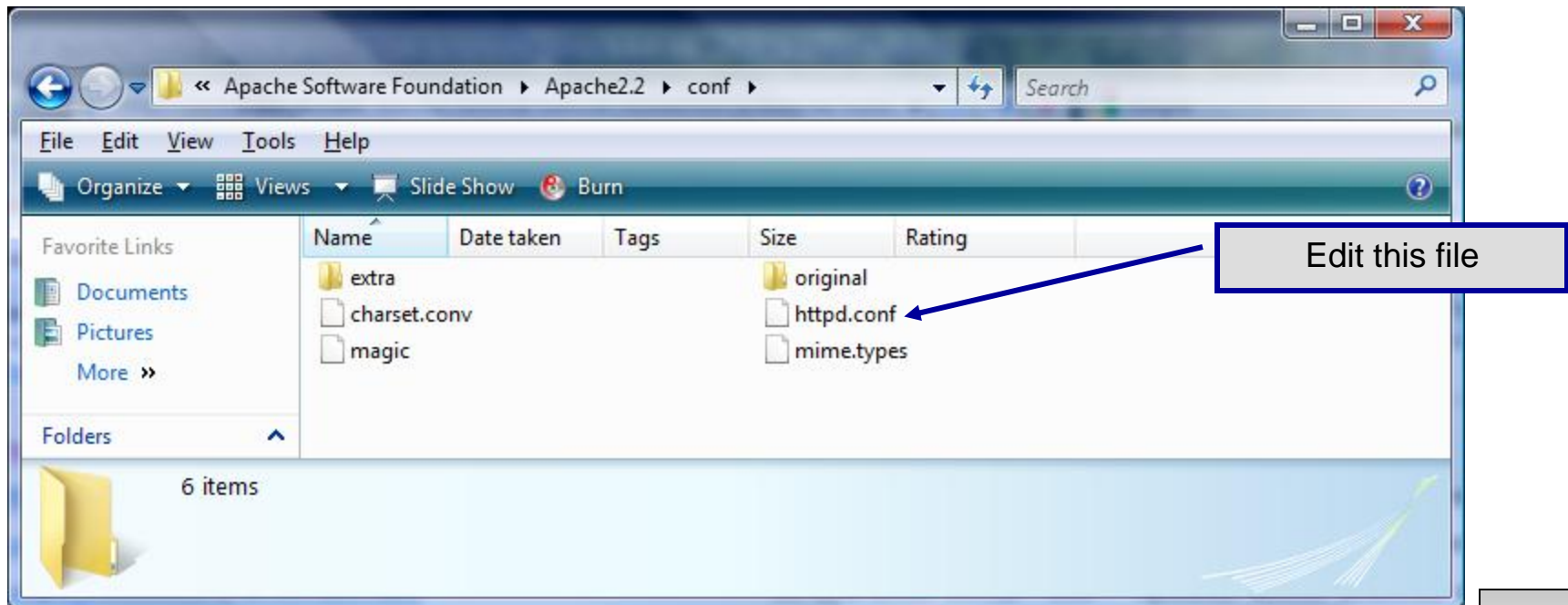
# Installing The Tomcat Connector

- Once you've downloaded the Tomcat connector, put it in the `modules` sub-directory of your Apache installation's root directory.



# Enabling The Tomcat Connector

- Once you've put the connector file in the `modules` sub-directory of your Apache installation's root directory, you are now ready to configure Apache to recognize and enable the module.
- To do this you'll need to edit your Apache configuration file. This is the same file you edited to enable PHP.
- This file is located in the `conf` subdirectory and is named `httpd.conf`.



```
*C:\Program Files\Apache Software Foundation\Apache2.2\conf\httpd.conf - Notepad++
File Edit Search View Encoding Language Settings Macro Run Plugins Window ?
PS-Part6-p15.ps1 Python-Part1-page10.py httpd.conf
57 #configure the path to php.ini
58 PHPIniDir "C:/Program Files/php"
59
60 # Load mod_jk module
61 # Update this path to match your modules location
62 # LoadModule jk_module libexec/mod_jk.so
63 LoadModule jk_module "C:/Program Files/Apache Software Foundation/Apache2.2/modules/mod_jk.so"
64 # Declare the module for <IfModule directive> (remove this line on Apache 2.x)
65 # AddModule mod_jk.c
66 # Where to find workers.properties
67 # Update this path to match your conf directory location (put workers.properties next to httpd.conf)
68 JkWorkersFile "C:/Program Files/Apache Software Foundation/Apache2.2/conf/workers.properties"
69 # Where to put jk shared memory
70 # Update this path to match your local state directory or logs directory
71 JkShmFile "C:/Program Files/Apache Software Foundation/Apache2.2/logs/mod_jk.shm"
72 # Where to put jk logs
73 # Update this path to match your logs directory location (put mod_jk.log next to access_log)
74 JkLogFile "C:/Program Files/Apache Software Foundation/Apache2.2/logs/mod_jk.log"
75 # Set the jk log level [debug/error/info]
76 JkLogLevel info
77 # Select the timestamp log format
78 #JkLogStampFormat "[%a %b %d %H:%M:%S %Y] "
79 # Send everything for context /examples to worker named worker1 (ajp13)
80 #JkMount /examples/* worker1
81 JkMount /CNT4714/* worker1
82
```

This was added earlier to enable PHP

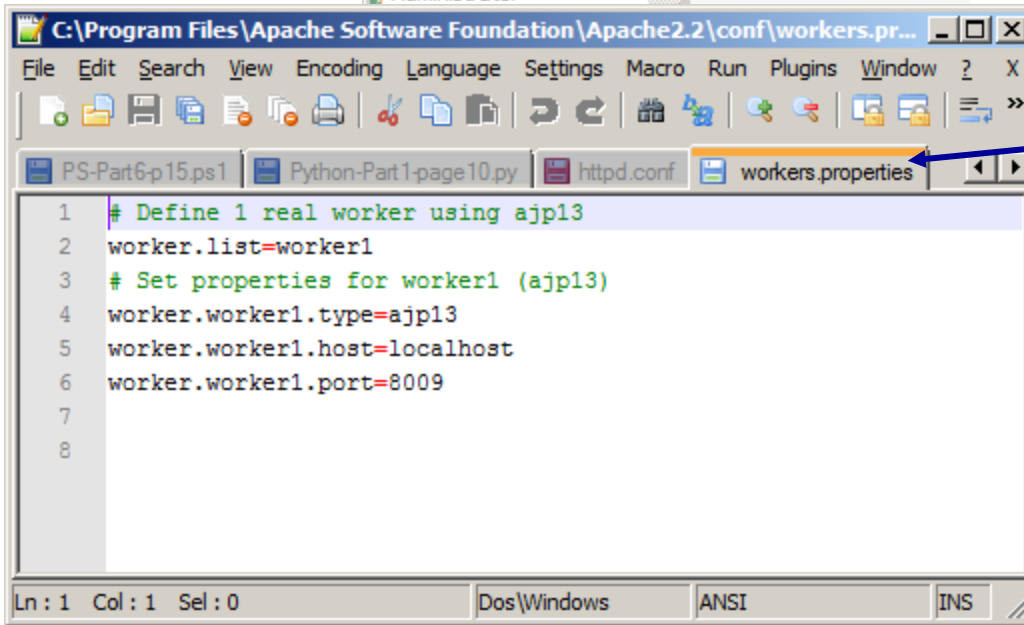
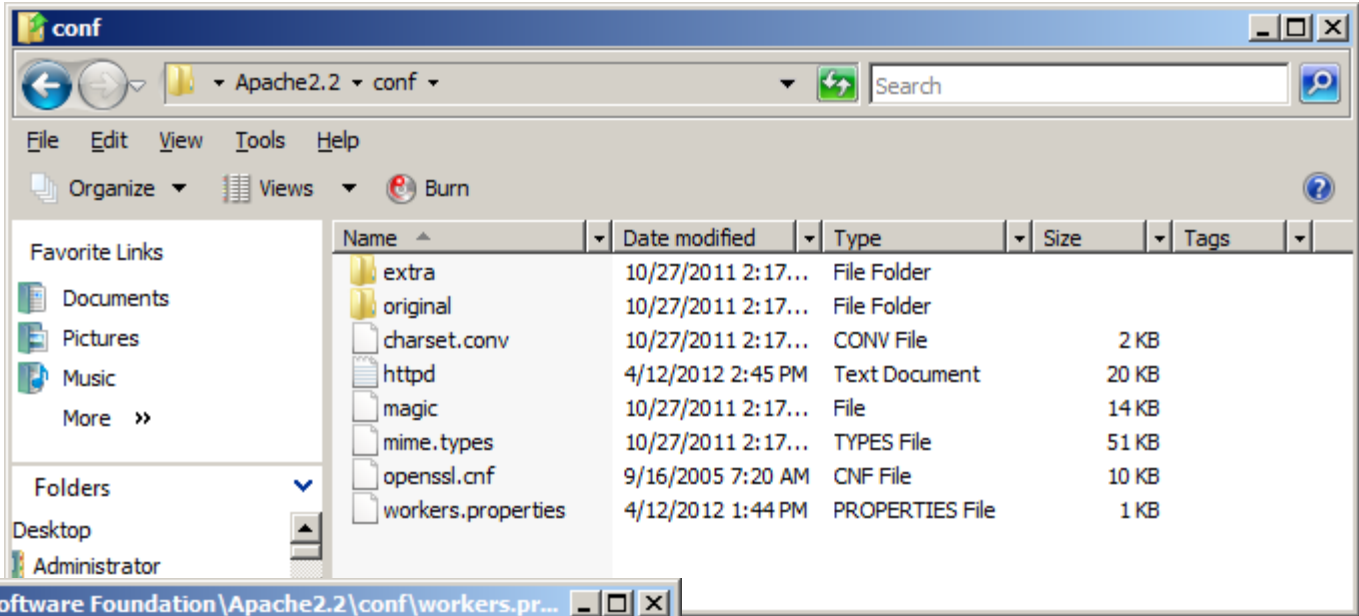
Add all of this material to enable mod\_jk

Add JKMount directives for any servlets and jsps to go through Tomcat.



- The `JWorkerFile` directive (see previous page) refers to a separate file that configures the `ajp13` protocol communications parameters. An example called `workers.properties` is included with `mod_jk`. For a basic set-up, this default file will work fine.
- There are a couple of things you should verify however: (1) `workers.tomcat_home` should agree with the value you've already set for Tomcat called `CATALINA_HOME`, and (2) `worker.ajp13.port` must be the same as the one listed in the Tomcat `server.xml` file as shown on the next page.
- In more robust applications, additional editing of the `JWorkerFile` will be required. For example, if you have more than one installation of Tomcat on your machine, you'll need to adjust the `worker.ajp.port` parameter in `workers.properties` to make sure that `mod_jk` is connecting to the correct Tomcat installation as Tomcat installations will not be able to start up sharing port numbers.





The portion of the Tomcat worker.properties file showing the definition for the default AJP 1.3 worker. NOTE: the port number listed here must match the port number listed in the Tomcat server.xml file as shown on the next page.





```
C:\Program Files\Apache Software Foundation\Tomcat 7.0_Tomcat7.0.25\conf\server.xml - Notepad++
File Edit Search View Encoding Language Settings Macro Run Plugins Window ?
workers.properties httpd.conf web.xml server.xml
79 -->
80 <!-- Define a SSL HTTP/1.1 Connector on port 8443
81     This connector uses the JSSE configuration, when using APR, the
82     connector should be using the OpenSSL style configuration
83     described in the APR documentation -->
84 <!--
85 <Connector port="8443" protocol="HTTP/1.1" SSLEnabled="true"
86     maxThreads="150" scheme="https" secure="true"
87     clientAuth="false" sslProtocol="TLS" />
88 -->
89
90 <!-- Define an AJP 1.3 Connector on port 8009 -->
91 <Connector port="8009" protocol="AJP/1.3" redirectPort="8443" />
92
93
94 <!-- An Engine represents the entry point (within Catalina) that processes
95     every request. The Engine implementation for Tomcat stand alone
96     analyzes the HTTP headers included with the request, and passes them
97     on to the appropriate Host (virtual host).
98     Documentation at /docs/config/engine.html -->
99
100 <!-- You should set jvmRoute to support load-balancing via AJP ie :
101 <Engine name="Catalina" defaultHost="localhost" jvmRoute="jvm1">
102 -->
103 <Engine name="Catalina" defaultHost="localhost">
```

The portion of the Tomcat server.xml file showing the definition for the AJP 1.3 connector. This connector port number listed here must match the port number in the workers.properties file as shown on the previous page.

The screenshot shows an Opera browser window titled "Basic Welcome Servlet - Opera". The address bar displays "localhost:8081/WelcomeServlet.html". The page content consists of a green background with the text "Click the button to invoke a Welcome servlet" and a button labeled "Run Welcome Servlet". A blue arrow originates from a text box on the right and points to the button.

Invoking the original welcome servlet from the Apache web server. Recall that this is a servlet running inside the CNT4714 webapp (also inside first-example webapp).

Welcome to Servlets! - Opera

Opera Welcome to Servlets!

http://localhost:8081/CNT4714/welcome1? Search with Google

# Hello!!

## Welcome To The Exciting World Of Servlet Technology!

Zoom (100%)

