CNT 4714: Enterprise Computing Summer 2014

Integrating Apache And Tomcat

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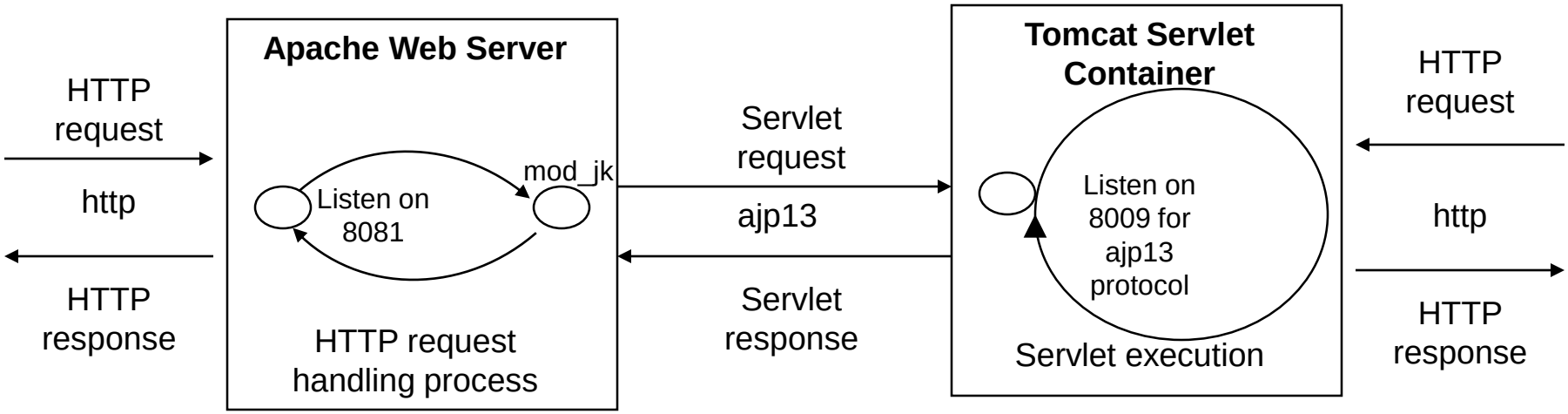
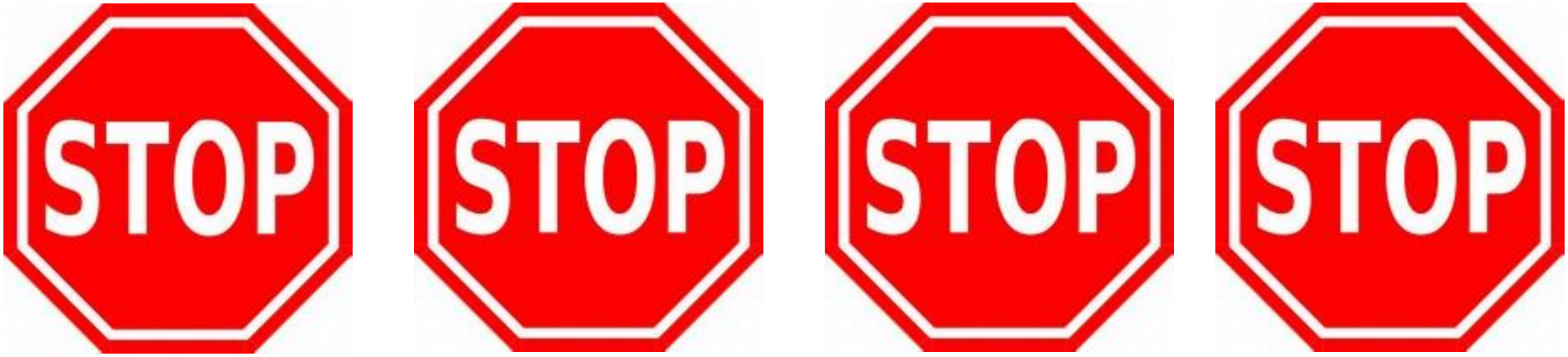
Connecting Apache To Tomcat

- 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.



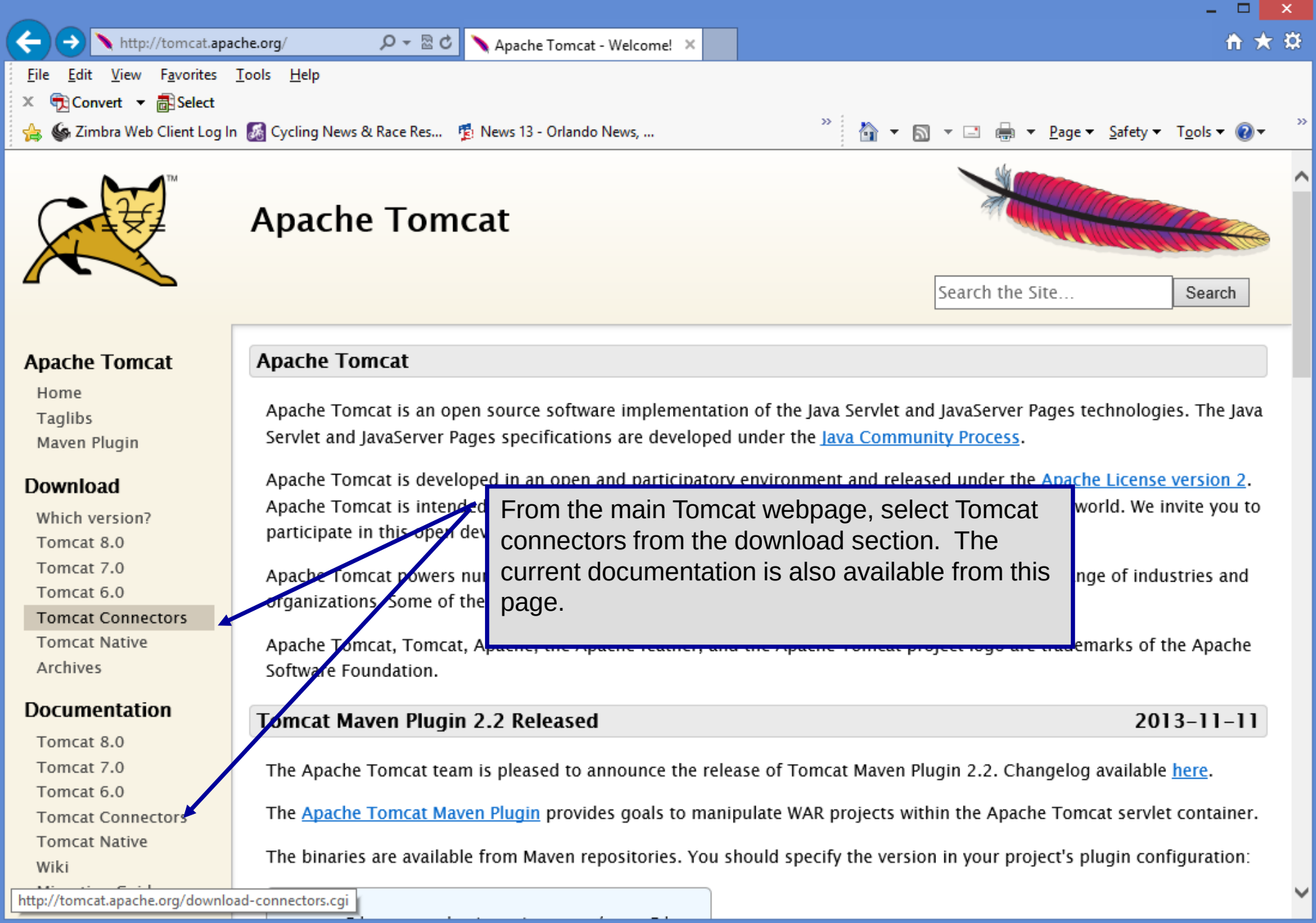


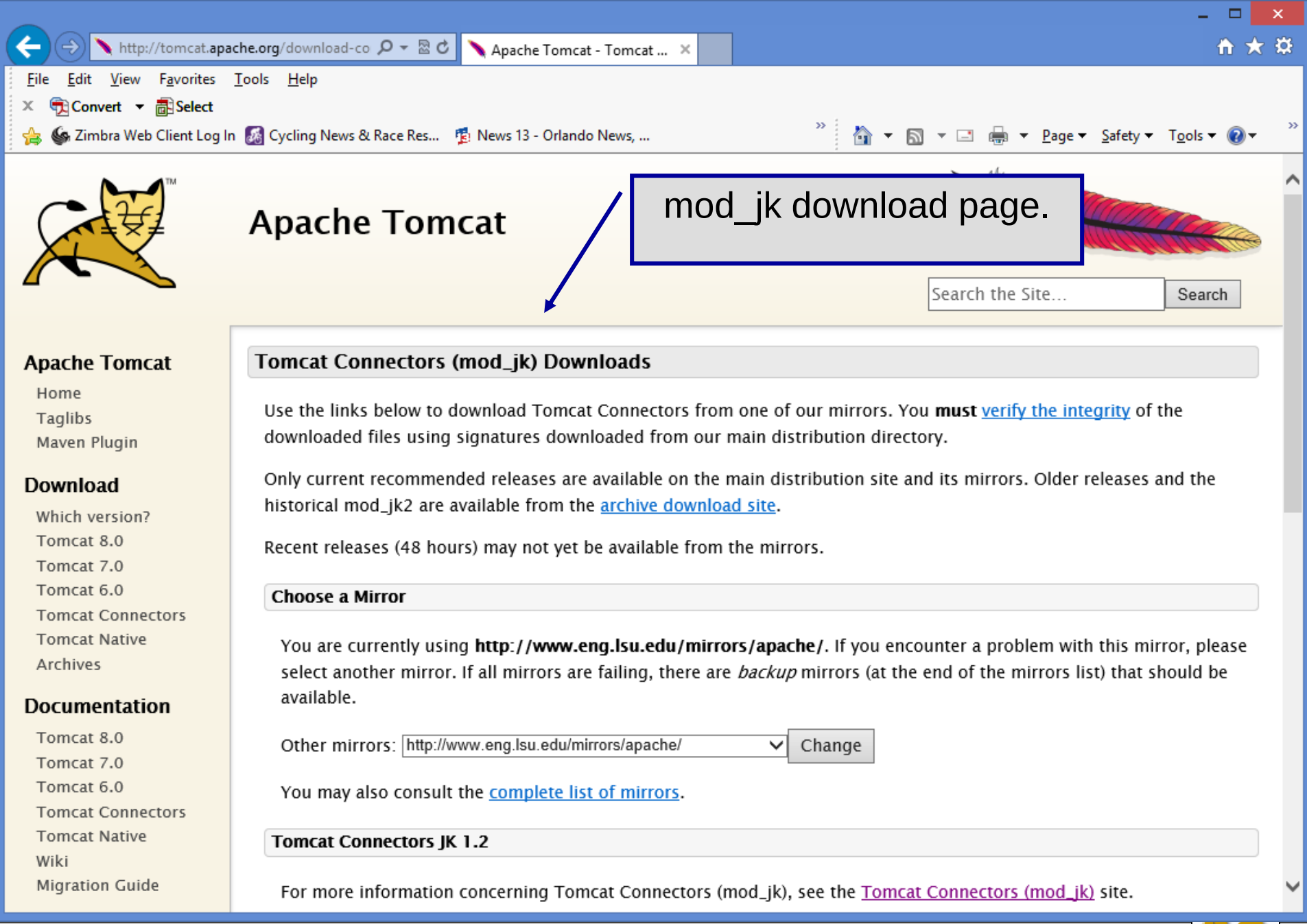
WARNING

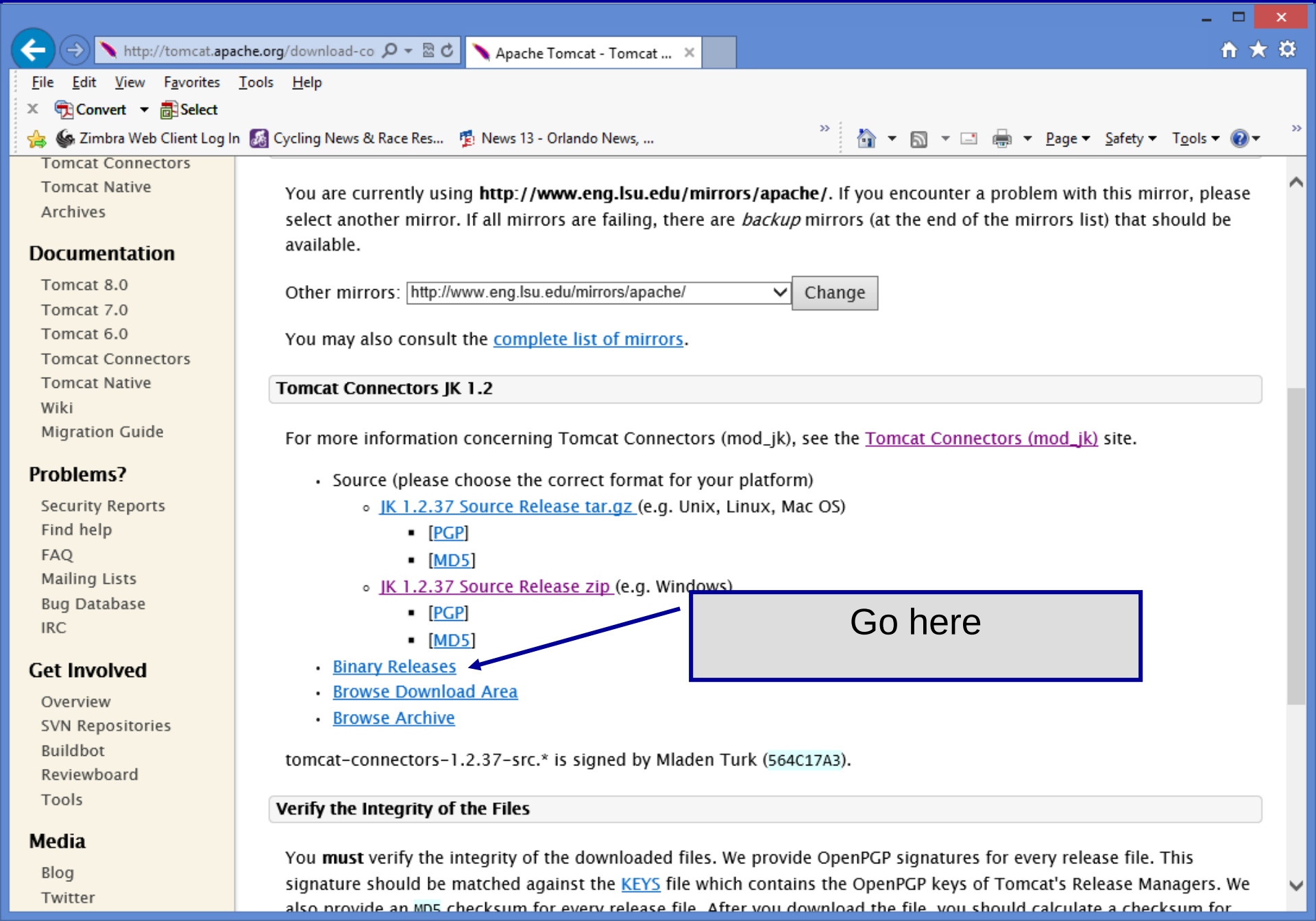
The task you are about to undertake can have serious repercussions on your Apache Server. DO NOT attempt this procedure until your final project is done. It is strongly advised that you create a backup copy of your current `httpd.conf` file before embarking on this modification.

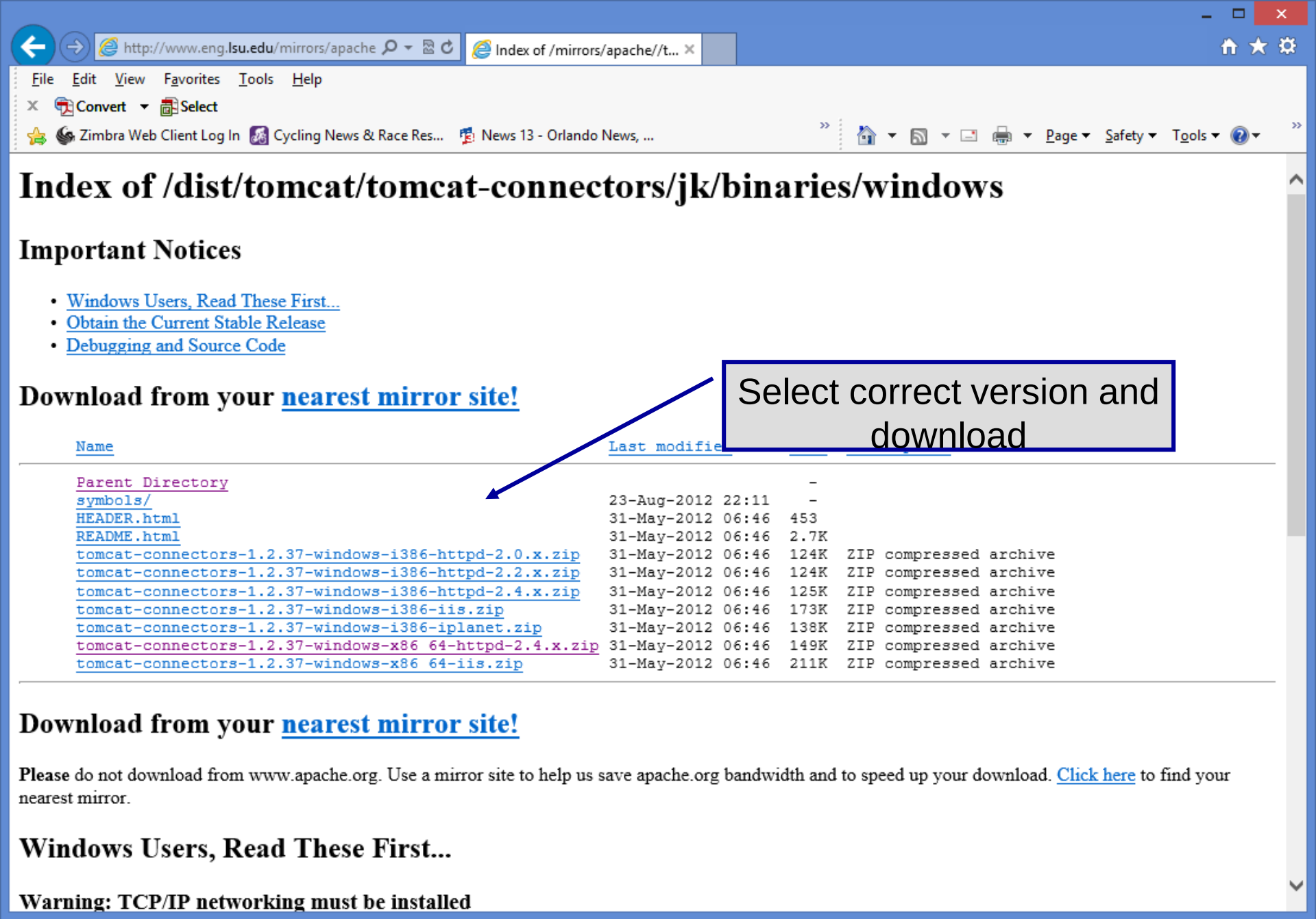
Getting The Tomcat Connector

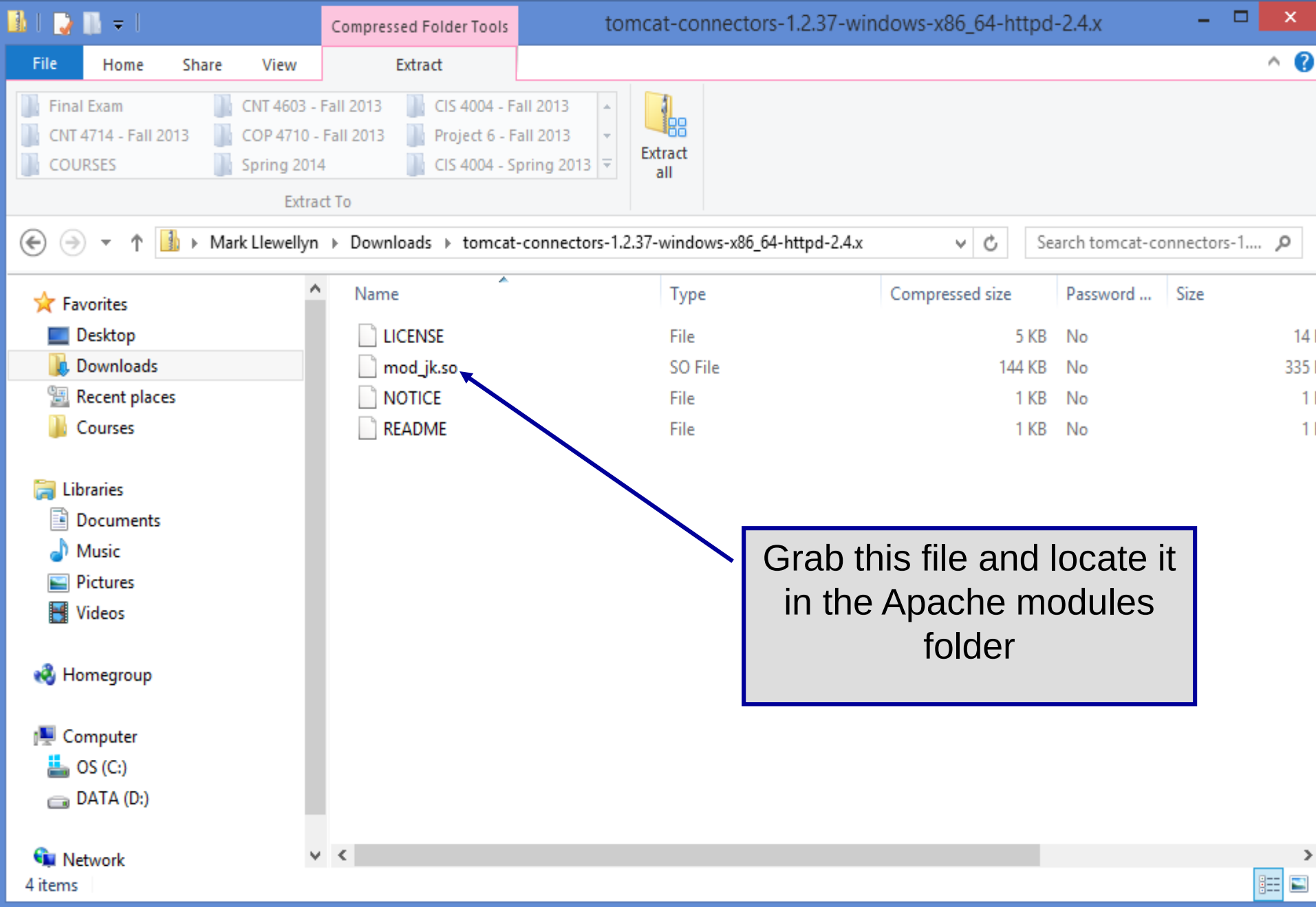
- The first step in Apache-Tomcat integration is to obtain the Tomcat connector from Apache.
- Follow the screen shots on the next few pages to obtain the `mod_jk` connector.
- Windows based connector binary files will typically have the name of `mod_jk.so`. (Files with `.so` extensions are typically shared library files compiled under either C or C++ environments.)


http://tomcat.apache.org/
Apache Tomcat - Welcome!
File Edit View Favorites Tools Help
Convert Select
Zimbra Web Client Log In
Cycling News & Race Res...
News 13 - Orlando News, ...
Page Safety Tools
Apache Tomcat
Search the Site...
Search
Apache Tomcat
Home
Taglibs
Maven Plugin
Download
Which version?
Tomcat 8.0
Tomcat 7.0
Tomcat 6.0
Tomcat Connectors
Tomcat Native
Archives
Documentation
Tomcat 8.0
Tomcat 7.0
Tomcat 6.0
Tomcat Connectors
Tomcat Native
Wiki
Apache Tomcat
Apache Tomcat is an open source software implementation of the Java Servlet and JavaServer Pages technologies. The Java Servlet and JavaServer Pages specifications are developed under the Java Community Process.
Apache Tomcat is developed in an open and participatory environment and released under the Apache License version 2.
Tomcat Maven Plugin 2.2 Released 2013-11-11
The Apache Tomcat team is pleased to announce the release of Tomcat Maven Plugin 2.2. Changelog available here.
The Apache Tomcat Maven Plugin provides goals to manipulate WAR projects within the Apache Tomcat servlet container.
The binaries are available from Maven repositories. You should specify the version in your project's plugin configuration:
http://tomcat.apache.org/download-connectors.cgi
From the main Tomcat webpage, select Tomcat connectors from the download section. The current documentation is also available from this page.


http://tomcat.apache.org/download-co
Apache Tomcat - Tomcat ...
File Edit View Favorites Tools Help
Convert Select
Zimbra Web Client Log In
Cycling News & Race Res...
News 13 - Orlando News, ...
Page Safety Tools
Apache Tomcat
mod_jk download page.
Search the Site...
Search
Apache Tomcat
Home
Taglibs
Maven Plugin
Download
Which version?
Tomcat 8.0
Tomcat 7.0
Tomcat 6.0
Tomcat Connectors
Tomcat Native
Archives
Documentation
Tomcat 8.0
Tomcat 7.0
Tomcat 6.0
Tomcat Connectors
Tomcat Native
Wiki
Migration Guide
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.eng.lsu.edu/mirrors/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.
Other mirrors: http://www.eng.lsu.edu/mirrors/apache/ Change
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.


http://tomcat.apache.org/download-co
Apache Tomcat - Tomcat ...
File Edit View Favorites Tools Help
Convert Select
Zimbra Web Client Log In
Cycling News & Race Res...
News 13 - Orlando News, ...
Page Safety Tools
Tomcat Connectors
Tomcat Native
Archives
Documentation
Tomcat 8.0
Tomcat 7.0
Tomcat 6.0
Tomcat Connectors
Tomcat Native
Wiki
Migration Guide
Problems?
Security Reports
Find help
FAQ
Mailing Lists
Bug Database
IRC
Get Involved
Overview
SVN Repositories
Buildbot
Reviewboard
Tools
Media
Blog
Twitter
You are currently using http://www.eng.lsu.edu/mirrors/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.
Other mirrors: http://www.eng.lsu.edu/mirrors/apache/ Change
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 1.2.37 Source Release tar.gz (e.g. Unix, Linux, Mac OS)
[PGP]
[MD5]
JK 1.2.37 Source Release zip (e.g. Windows)
[PGP]
[MD5]
Binary Releases
Browse Download Area
Browse Archive
Go here
tomcat-connectors-1.2.37-src.* is signed by Mladen Turk (564C17A3).
Verify the Integrity of the Files
You must verify the integrity of the downloaded files. We provide OpenPGP signatures for every release file. This signature should be matched against the KEYS file which contains the OpenPGP keys of Tomcat's Release Managers. We

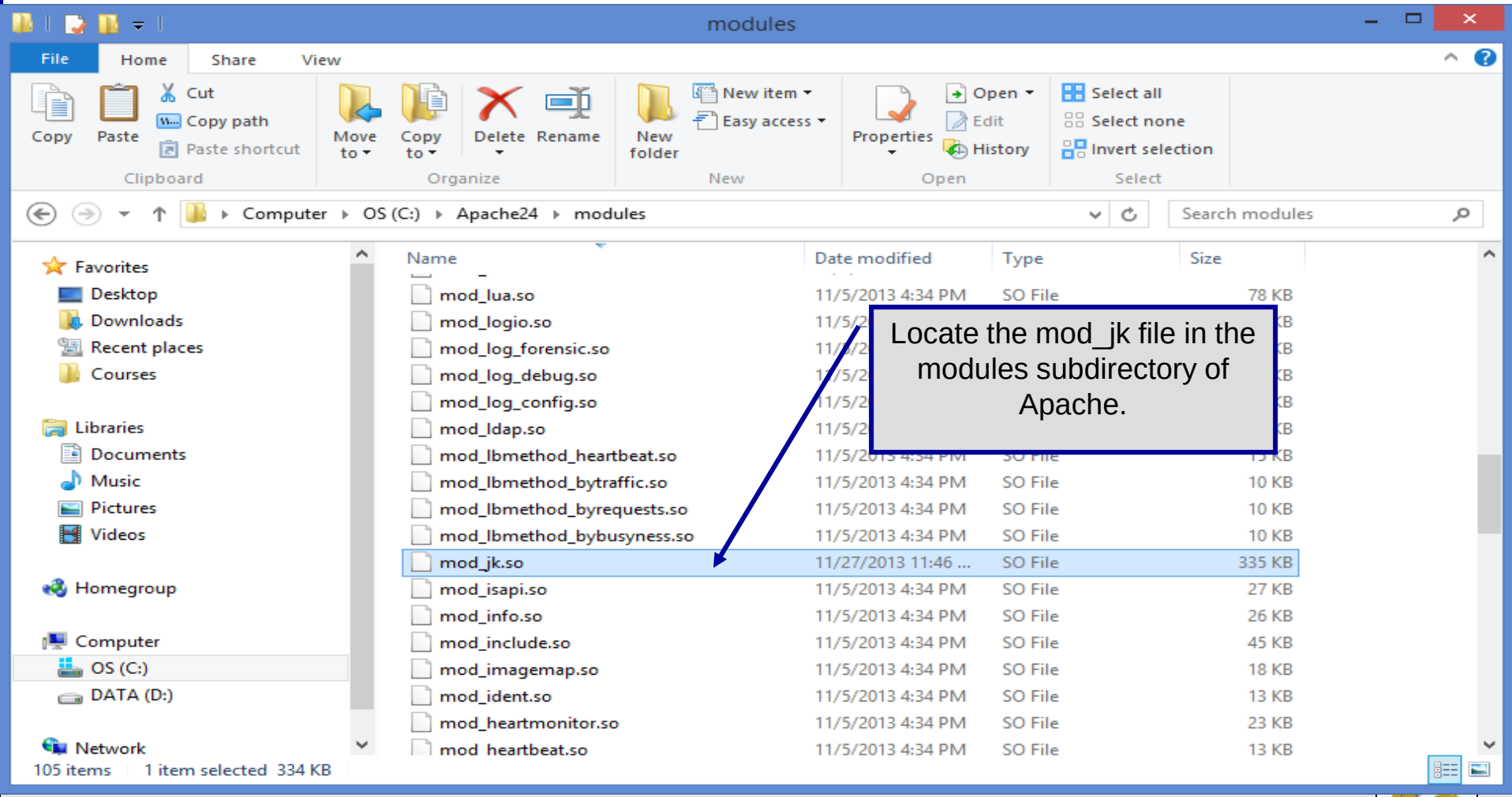

http://www.eng.lsu.edu/mirrors/apache
Index of /mirrors/apache//t...
File Edit View Favorites Tools Help
Convert Select
Zimbra Web Client Log In
Cycling News & Race Res...
News 13 - Orlando News, ...
Page Safety Tools
Index of /dist/tomcat/tomcat-connectors/jk/binaries/windows
Important Notices
Windows Users, Read These First...
Obtain the Current Stable Release
Debugging and Source Code
Download from your nearest mirror site!
Select correct version and download
Name
Last modifie
Parent Directory -
symbols/ 23-Aug-2012 22:11 -
HEADER.html 31-May-2012 06:46 453
README.html 31-May-2012 06:46 2.7K
tomcat-connectors-1.2.37-windows-i386-httpd-2.0.x.zip 31-May-2012 06:46 124K ZIP compressed archive
tomcat-connectors-1.2.37-windows-i386-httpd-2.2.x.zip 31-May-2012 06:46 124K ZIP compressed archive
tomcat-connectors-1.2.37-windows-i386-httpd-2.4.x.zip 31-May-2012 06:46 125K ZIP compressed archive
tomcat-connectors-1.2.37-windows-i386-iis.zip 31-May-2012 06:46 173K ZIP compressed archive
tomcat-connectors-1.2.37-windows-i386-iplanet.zip 31-May-2012 06:46 138K ZIP compressed archive
tomcat-connectors-1.2.37-windows-x86_64-httpd-2.4.x.zip 31-May-2012 06:46 149K ZIP compressed archive
tomcat-connectors-1.2.37-windows-x86_64-iis.zip 31-May-2012 06:46 211K ZIP compressed archive
Download from your nearest mirror site!
Please do not download from 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.
Windows Users, Read These First...
Warning: TCP/IP networking must be installed


Compressed Folder Tools
tomcat-connectors-1.2.37-windows-x86_64-httpd-2.4.x
File
Home
Share
View
Extract
Final Exam
CNT 4603 - Fall 2013
CIS 4004 - Fall 2013
CNT 4714 - Fall 2013
COP 4710 - Fall 2013
Project 6 - Fall 2013
COURSES
Spring 2014
CIS 4004 - Spring 2013
Extract To
Extract all
Mark Llewellyn ▸ Downloads ▸ tomcat-connectors-1.2.37-windows-x86_64-httpd-2.4.x
Search tomcat-connectors-1....
Favorites
Desktop
Downloads
Recent places
Courses
Libraries
Documents
Music
Pictures
Videos
Homegroup
Computer
OS (C:)
DATA (D:)
Network
Name
Type
Compressed size
Password ...
Size
LICENSE
File
5 KB
No
14
mod_jk.so
SO File
144 KB
No
335
NOTICE
File
1 KB
No
1
README
File
1 KB
No
1
4 items
Grab this file and locate it in the Apache modules folder

©

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.



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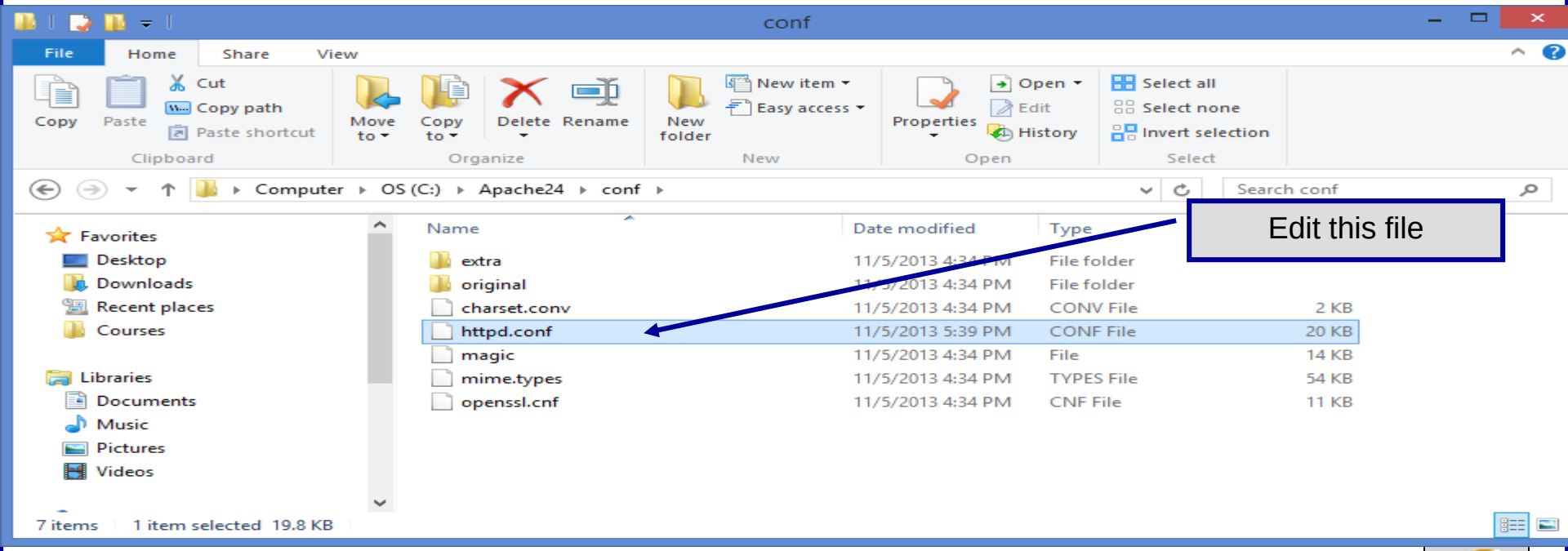
Enabling The Tomcat Connector

- 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`.
- **NOTE: Before modifying the configuration file, I would strongly suggest making a duplicate backup copy so that you can reinitialize a working version of Apache if necessary.**



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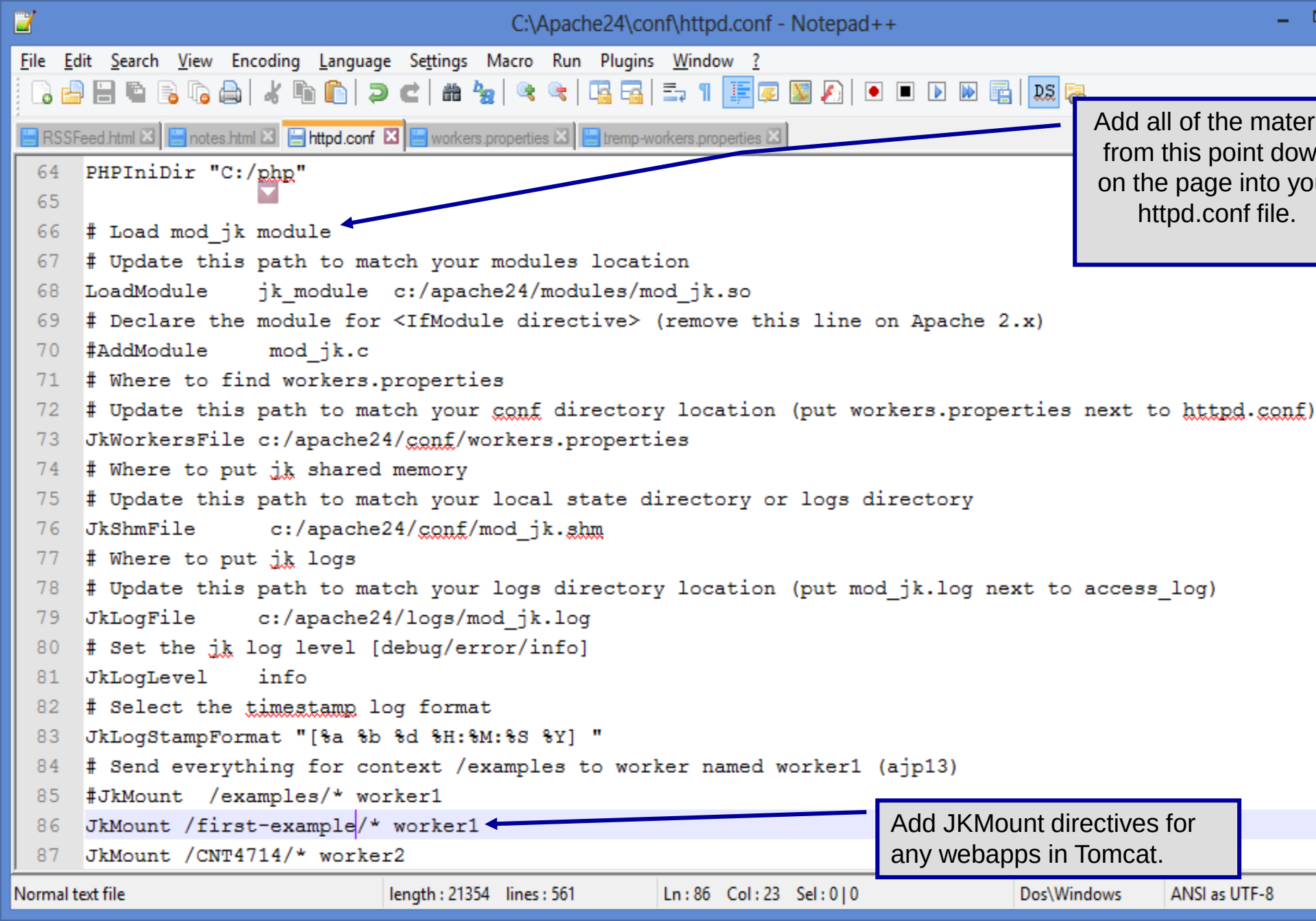
C:\Apache24\conf\httpd.conf - Notepad++
File Edit Search View Encoding Language Settings Macro Run Plugins Window ?
RSSFeed.html notes.html httpd.conf workers.properties tremp-workers.properties
64 PHPIniDir "C:/php"
65
66 # Load mod_jk module
67 # Update this path to match your modules location
68 LoadModule jk_module c:/apache24/modules/mod_jk.so
69 # Declare the module for <IfModule directive> (remove this line on Apache 2.x)
70 #AddModule mod_jk.c
71 # Where to find workers.properties
72 # Update this path to match your conf directory location (put workers.properties next to httpd.conf)
73 JkWorkersFile c:/apache24/conf/workers.properties
74 # Where to put jk shared memory
75 # Update this path to match your local state directory or logs directory
76 JkShmFile c:/apache24/conf/mod_jk.shm
77 # Where to put jk logs
78 # Update this path to match your logs directory location (put mod_jk.log next to access_log)
79 JkLogFile c:/apache24/logs/mod_jk.log
80 # Set the jk log level [debug/error/info]
81 JkLogLevel info
82 # Select the timestamp log format
83 JkLogStampFormat "[%a %b %d %H:%M:%S %Y] "
84 # Send everything for context /examples to worker named worker1 (ajp13)
85 #JkMount /examples/* worker1
86 JkMount /first-example/* worker1
87 JkMount /CNT4714/* worker2
Add all of the mater
from this point dow
on the page into yo
httpd.conf file.
Add JKMount directives for
any webapps in Tomcat.
Normal text file length : 21354 lines : 561 Ln : 86 Col : 23 Sel : 0 | 0 Dos\Windows ANSI as UTF-8

©

- 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.

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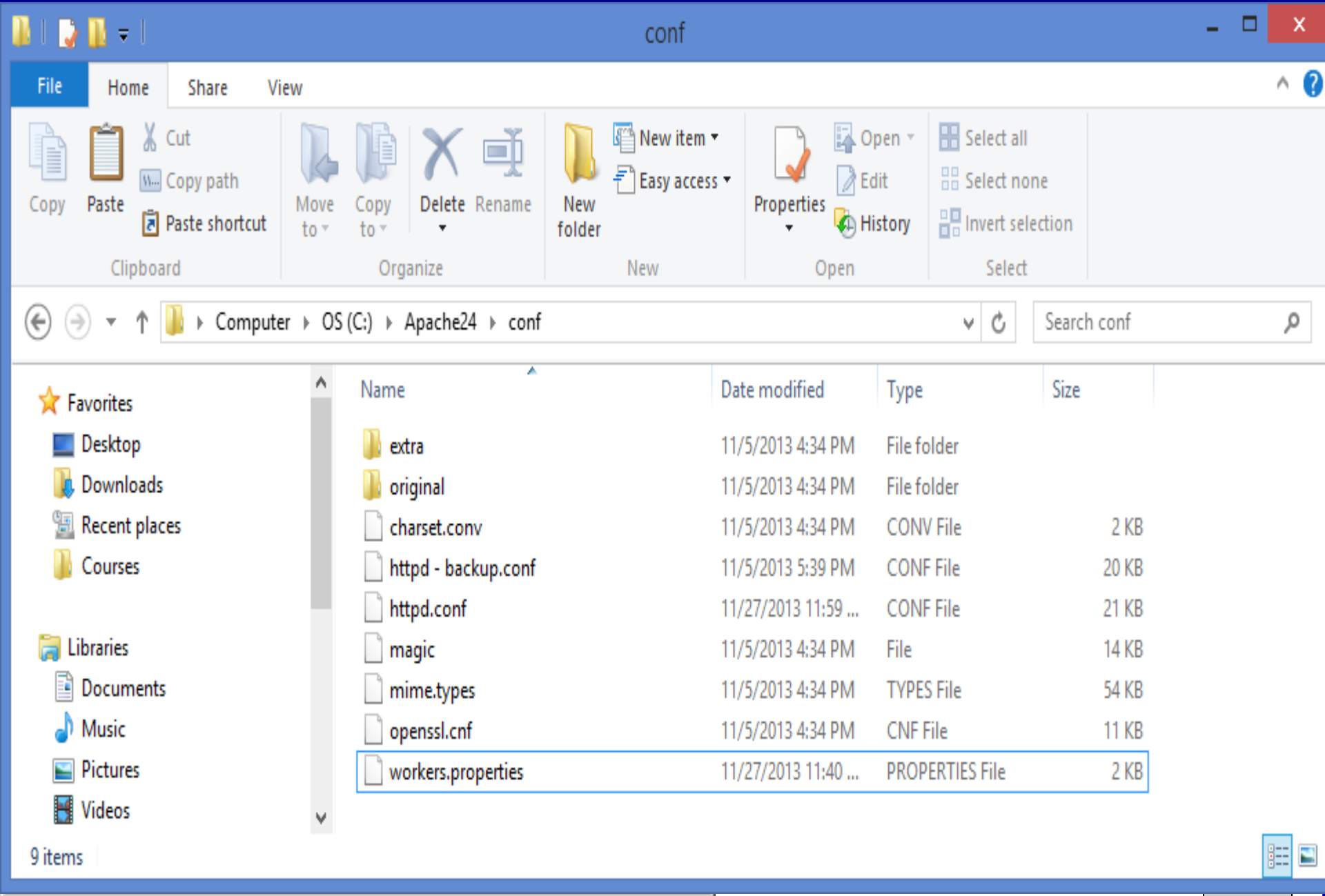
conf
File
Home
Share
View
Copy
Paste
Cut
Copy path
Paste shortcut
Clipboard
Move to
Copy to
Delete
Rename
Organize
New folder
New item
Easy access
New
Properties
Open
Edit
History
Open
Select all
Select none
Invert selection
Select
Computer
OS (C:)
Apache24
conf
Search conf
Favorites
Desktop
Downloads
Recent places
Courses
Libraries
Documents
Music
Pictures
Videos
Name
Date modified
Type
Size
extra 11/5/2013 4:34 PM File folder
original 11/5/2013 4:34 PM File folder
charset.conv 11/5/2013 4:34 PM CONV File 2 KB
httpd - backup.conf 11/5/2013 5:39 PM CONF File 20 KB
httpd.conf 11/27/2013 11:59 ... CONF File 21 KB
magic 11/5/2013 4:34 PM File 14 KB
mime.types 11/5/2013 4:34 PM TYPES File 54 KB
openssl.cnf 11/5/2013 4:34 PM CNF File 11 KB
workers.properties 11/27/2013 11:40 ... PROPERTIES File 2 KB
9 items
Ln : 1 Col : 1 Sel : 0
Dos\Windows
ANSI
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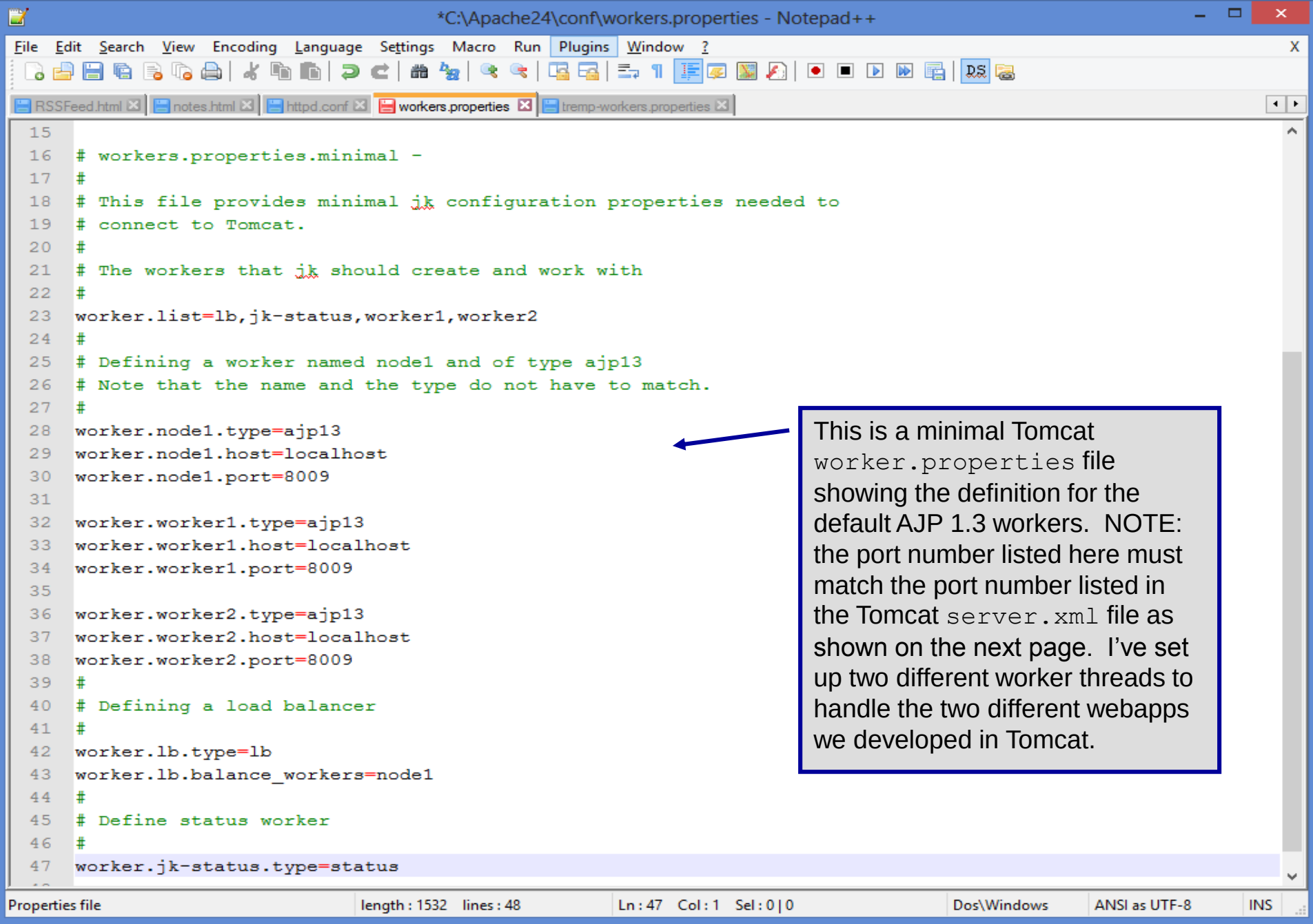


This is a minimal Tomcat `worker.properties` file showing the definition for the default AJP 1.3 workers. NOTE: the port number listed here must match the port number listed in the Tomcat `server.xml` file as shown on the next page. I've set up two different worker threads to handle the two different webapps we developed in Tomcat.

©

C:\Program Files\Apache Software Foundation\Tomcat 7.0\conf\server.xml - Notepad++

File Edit Search View Encoding Language Settings Macro Run Plugins Window ?

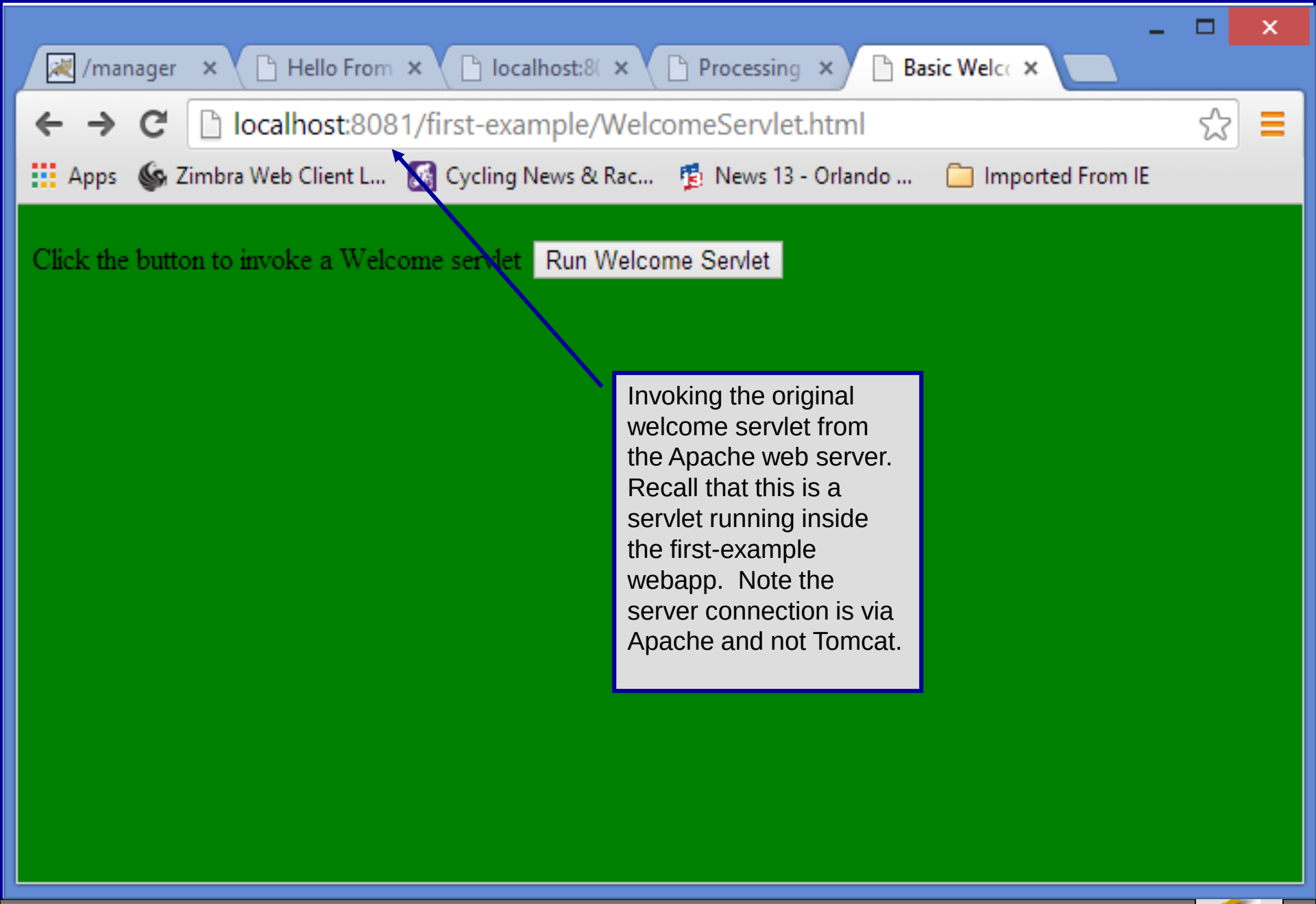
RSSFeed.html | notes.html | httpd.conf | workers.properties | tremp-workers.properties | server.xml

```
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 process
95          every request.  The Engine implementation for Tomcat stand alone
96          analyzes the HTTP headers included with the request, and passes ther
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">
104
```

eXtensible Markup Language file | length : 6577 lines : 143 | Ln : 1 Col : 1 Sel : 0 | 0 | Dos\Windows | ANSI as UTF-8 | INS

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.

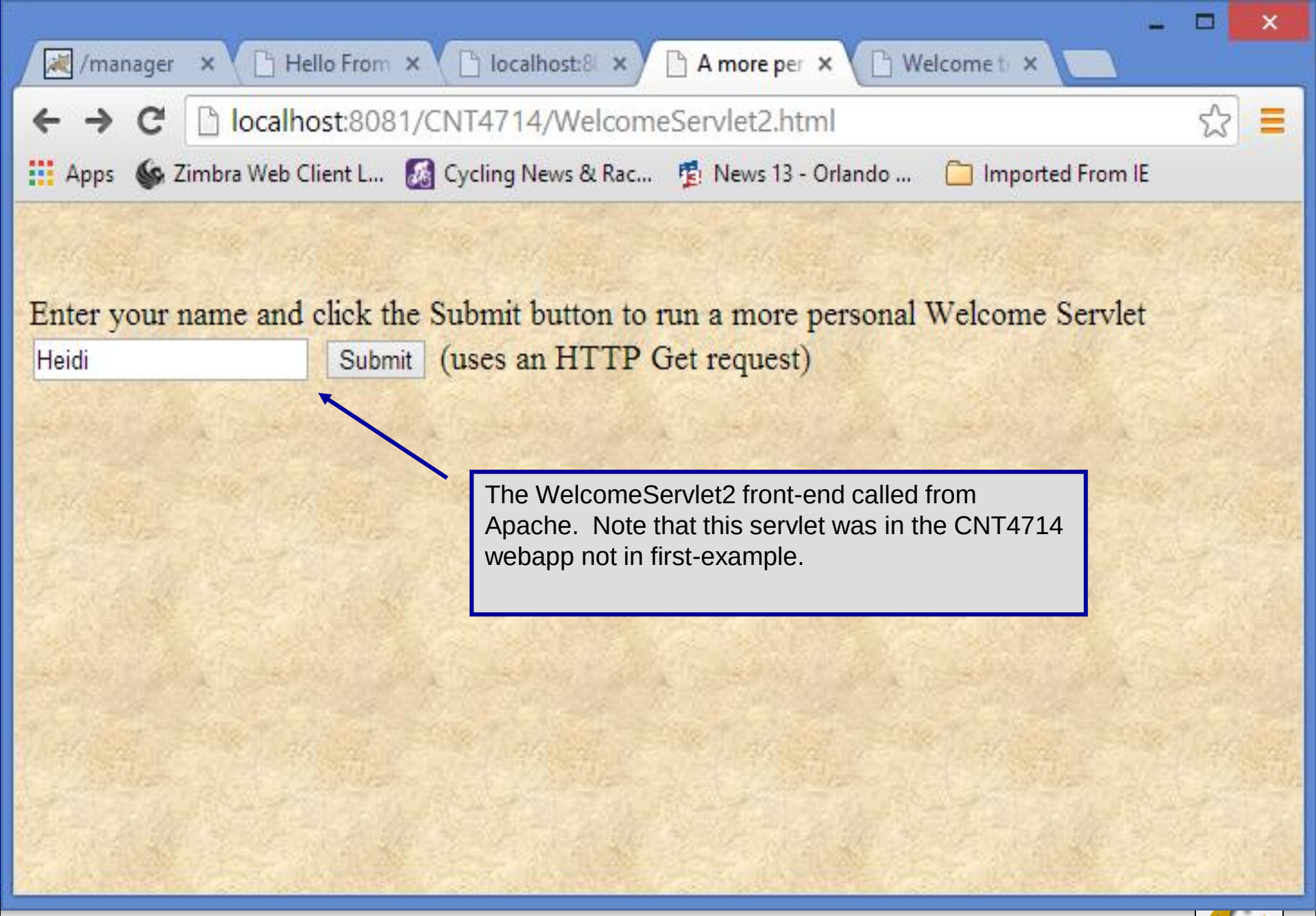
©


/manager
Hello From
localhost:8(
Processing
Basic Welc
localhost:8081/first-example/WelcomeServlet.html
Apps
Zimbra Web Client L...
Cycling News & Rac...
News 13 - Orlando ...
Imported From IE
Click the button to invoke a Welcome servlet
Run Welcome Servlet
Invoking the original welcome servlet from the Apache web server. Recall that this is a servlet running inside the first-example webapp. Note the server connection is via Apache and not Tomcat.

©

/manager
Hello From
localhost:8
Processing
Welcome t
localhost:8081/first-example/welcome1?
Apps
Zimbra Web Client L...
Cycling News & Rac...
News 13 - Orlando ...
Imported From IE
Hello!!
Welcome To The Exciting World Of Servlet Technology!
The output from the first-examples/WelcomeServlet servlet from Tomcat via Apache

©


/manager
Hello From
localhost:8
A more per
Welcome t
localhost:8081/CNT4714/WelcomeServlet2.html
Apps
Zimbra Web Client L...
Cycling News & Rac...
News 13 - Orlando ...
Imported From IE
Enter your name and click the Submit button to run a more personal Welcome Servlet
Heidi
Submit
(uses an HTTP Get request)
The WelcomeServlet2 front-end called from Apache. Note that this servlet was in the CNT4714 webapp not in first-example.

©

/manager
Hello From
localhost:8
Processing
Welcome t
localhost:8081/CNT4714/welcome2?clientname=Heidi
Apps
Zimbra Web Client L...
Cycling News & Rac...
News 13 - Orlando ...
Imported From IE
Hello Heidi,
Welcome to the Exciting World of Servlet Technology!
The output from Tomcat via Apache.

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