Server-side Web Development and Programming

Lecture 2: The Jakarta Tomcat Web Container and the NetBeans IDE

Client-Server Web Architecture

- Client browser sends request for page to server
- · Server sends response page and sends to client



Form Handling

Server must:

- Listen on port for requests
- Parse request to determine values of parameters
- <u>Generate</u> appropriate response page based on parameter values
- Send response page back to client

Web Containers

- Program running continuously on server
- Runs code to handle requests
- <u>Built-in methods</u> for parsing requests, generating responses
- Handles other important functions:
 - Session tracking
 - Database access
 - Email generation
 - Security and encryption

Web Containers

- Jakarta Tomcat
 - Written in Java
 - NetBeans IDE
 - Acts as engine for Java Server Pages and servlets
- Microsoft IIS
 - Visual Basic/Visual C++
 - Active Server Pages

Downloading the Java SDK



Downloading the Java SDK



Downloading the Java SDK

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Downloading the Java SDK

Downloading the Java SDK



Installing Tomcat

- Detailed Instructions in Chapter 2 (page 31)
- Copy JAR files from Tomcat to Java Runtime Environment
 - Necessary for JSPs and servlets to compile



Installing Tomcat

- Tell Tomcat where to look for Java (page 34)
 - Edit catalina.bat file in bin directory of Tomcat



Testing Tomcat

- Start Tomcat
 - Execute statup.bat in bin directory



Testing Tomcat

• This will open Tomcat control window



Testing Tomcat

- Tomcat is now listening for requests!
 - Listening at port 8080 by default
- Test: enter <u>http://localhost:8080/</u> in your browser



Tomcat Structure

- Listens on port 8080 for requests
- Retrieves page requested
 - Must be part of its file structure in webapps directory
- Example: http://localhost:8080/
 - Sends request to this machine for index.html file in <u>ROOT</u> subdirectory of <u>webapps</u>

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Tomcat Structure

 Another example: <u>http://localhost:8080/examples/jsp/simpletag/foo.jsp</u>



Tomcat Structure

• Side point:

JSPs/servlets can display messages in Tomcat window (often used for diagnostics)

💩 Tomcat	- 🗆 ×
Aug 21, 2008 1:23:12 PM org.apache.catalina.core.StandardEngine start INFO: Starting Serulet Engine: Apache Tomcat/6 0 16	^
Aug 21, 2008 1:23:12 PM org.apache.catalina.core.StandardContext addApp	licationL
istener INFA: The listener "listeners ContextListener" is already configured fo	r this co-
ntext. The duplicate definition has been ignored.	
Aug 21, 2008 1:23:12 PM org.apache.catalina.core.StandardContext addApp	licationL
INFO: The listener "listeners.SessionListener" is already configured fo	r this co
ntext. The duplicate definition has been ignored.	
INFO: Starting Covote HTTP/1.1 on http=8080	
Aug 21, 2008 1:23:13 PM org.apache.jk.common.ChannelSocket init	
Aug 21, 2008 1:23:13 PM org.apache.jk.server.JkMain start	
INFO: Jk running ID=0 time=0/31 config=null	
Nug 21, 2008 1:23:13 PH org.apache.catalina.startup.catalina start INFO: Server startum in 798 ms	
Did you see me on the stderr window?	
Did you see me on the browser window as well?	
	-

Tomcat Structure

• Meaning of this URL: <u>http://localhost:8080/examples/jsp/simpletag/foo.jsp</u> Invoke server listening on port 8080 of this machine Access this file in this subdirectory of the tomcat/webapps directory

Tomcat Structure

 Side note: Usually refer to server on <u>another</u> machine <u>http://www.hcmuaf.edu.yn/examples/jsp/simpletag/foo.jsp</u>

> Invoke server at this remote URL

Access this file in this subdirectory of the tomcat/webapps directory

• For testing, often run client and server on same machine



Tomcat Structure

- If requested page is server page/servlet, <u>executes code</u> embedded in page to generate corresponding html page
- · Final html page sent as response

```
<hrml>
<hrml>
<hrml>
<hrml>
cHEAD><TITLE>cgi-bin
response</TITLE></HEAD>
<BODY>
<P>
Thank you for your order of
<hrml>
c%= request.getParameter("quantity") %>
widgets!
</P>
</BODY>
</HTML>
```

The NetBeans IDE

- Integrated Development Environment for Java
 Programming
 - Editing code (with hints)
 - Compiling code
 - Running code
- Good for JSP/servlet development
 - Allows easy development of web applications
 - Automatically interacts with Tomcat
 - No need to manipulate Tomcat file structure



Adding a Tomcat Server

• Select Tomcat 6.0



Adding a Tomcat Server

- Enter the directory where you installed Tomcat
- Enter a name and a password for a "manager" role (we will use this more later)



Adding a Tomcat Server

• By default, Tomcat listens at port 8080

ervers:	
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	Connection Startup Platform Deployment Classes Sources Javadoc
	⊆atalina Home: c:\tomcat
	Catalina gase: c:\tomcat
	Credentials of an existing user in the "manager" role
	Username: Jiohn
	Password: ***** Show
	Server Port: 8080
	Shutgown Port: 8005
	Enable HTTP Monitor
	Note: Changes will take affect the next time you start the server
Add Server Remove Server	
	Close

Creating a Web Application

- In NetBeans: File → New Project
- Choose <u>Web</u> and <u>Web Application</u>



Creating a Web Application

- Give your project a name (I called this one "WidgetSite")
- Give it a location (I have put it in a directory called 6962)
- Make sure it is set as the Main Project

🔋 New Web Applica	ation	×
Steps 1. Choose Project 2. Name and Location 3. Server and Settings 4. Frameworks	Name and Location Project Name: WidgetSite Project Location: C:\Documents and Settings\john\My Documents\6962 Project Eolder: C:\Documents and Settings\john\My Documents\6962\WidgetSite	Biowse
	Use Dedicated Folder for Storing Libraries	Browse
	Set as Main Project	rom roranes (see Help for details).

Creating a Web Application

- The final page shows information (such as which server this project uses)
- You can press "finish" at this point



Creating a Web Application



Running a Web Application

- Running the site opens the index.jsp page
 - Can choose browser (and should test with all!)



Building a Web Application

· Modify and add files to create web site



Building a Web Application

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Adding a JSP



Running the Site



Deploying your Site to Tomcat

• Right-click project and choose "Deploy"

• This copies all web site files into build/web subdirectory

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Deploying your Site to Tomcat

 Copy these files into a subdirectory of <u>webapps</u> in Tomcat



Deploying your Site to Tomcat

- Start Tomcat (after closing NetBeans)
- Go to http://localhost:8080/WidgetSite in browser

