

# *Software Installation for Web Services on the Java Platform*

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This document<sup>1</sup> introduces you to the installation of software for Web service implementation and consumption on the Java platform. We choose *Apache Axis toolkit v. 1.2 Alpha* for the basic Web service support. This toolkit is open-source originally developed by IBM. This toolkit includes command-line tools for generating and consuming WSDL files, as well as Java libraries (jar files) for supporting SOAP and other Web service components. For Web service deployment, we choose the latest *Apache Jakarta Tomcat v. 5.5.9*. By the time of writing this document, most Java-based Web service tools only support Sun's J2SE v1.4.\*, not J2SE 5 (v1.5) (the main reason is the introduction of "enum" as a new reserved word in J2SE 5, and "enum" is used as a Java package name in some key Web service tool kits), while the latest Tomcat v5.5.\* needs the support of J2SE 5 by default.

The instructions in this document override all similar instructions in other documents, including software's original installation instructions. Please carefully read all the instructions and follow them in strict order. Any deviation from this file's instructions may cost you a lot of frustration.

## **1 Installation of Java J2SE 5 SDK**

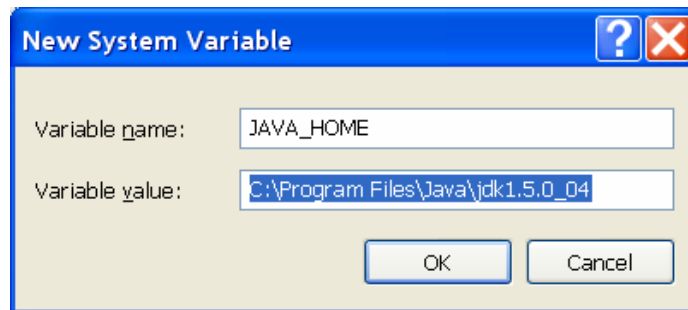
1. Visit "Start|Settings|Control Panel|Add/Remove Programs" to remove any of existing installations of Java SDK or JRE (Java runtime environment). Make sure you reboot the system before you install any new software. After rebooting, delete the installation directories for those removed installations. Let a PC have multiple Java installations may lead to confusion.
2. Visit <http://java.sun.com/j2se/1.5.0/download.jsp> with a Web browser. Click on hyperlink "Download JDK 5.0 Update 4" to get to the J2SE 5 SDK download page. Check the checkbox for accepting license agreement. In the section for "Windows Platform – J2SE (TM) Development Kit 5.0 Update 4" section, click on the hyperlink "Windows Offline Installation, Multi-language" to download the installation file "jdk-1\_5\_04-windows-i586-p.exe" to your PC. The file has 56.71 MB.
3. In a *Windows Explorer*, click on the downloaded file "jdk-1\_5\_04-windows-i586-p.exe" to start its installation. Accept the license agreement, and take all default values. By default, your J2SE 5 installation directory will be "C:\Program Files\Java\jdk1.5.0\_04". The installation of J2SE 5 will take about 120 MB of disk space. You only need the installation of JDK 1.5, which includes JRE (Java Runtime Environment) 1.5. After the

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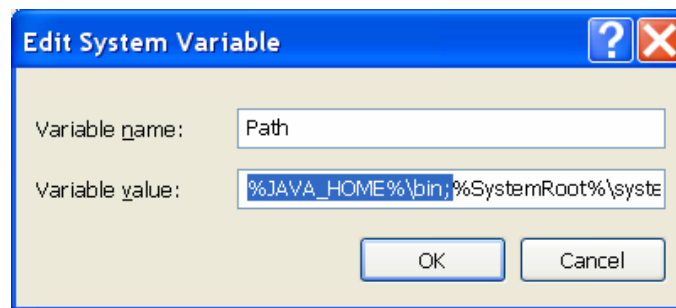
<sup>1</sup> This document is available at <http://csis.pace.edu/~lixin/pclc/ws/JavaWebServicesToolInstallation.pdf>. This document serves the hands-on lab session developed for the Pace University *Enterprise System Integration with Web Services* workshop. The document *Web Service Workshop Lab Manual* is available at <http://csis.pace.edu/~lixin/pclc/ws/webServiceWorkshopLab.pdf>.

JDK 1.5 is installed, you will be prompted for installing an external version of JRE, and you can just cancel it.

4. To run Java compiler **javac** and interpreter **java** on the command-line, you need to add the bin directory of your J2SE 5 on the environment variable PATH. Right-click on “My Computer” and choose “Properties” from the popup menu. In the “System Properties” window, click on the “Advanced” tab. Click on the “Environment Variables” button. In the bottom “System variables” area of the “Environment Variables” pane, click on button *New* to launch the “New System Variable” pane. Enter value “JAVA\_HOME” for variable name, and value “C:\Program Files\Java\jdk1.5.0\_04” for “Variable value”, as shown below. (If you use a Java SDK installation at another directory, you should update the variable value accordingly.)




Click on the *OK* button to complete the definition. Now click to highlight the line for “Path” in the “System variables” area, and then click on the “Edit” button. In the “Variable value” textbox, move the cursor to the left end, and insert “%JAVA\_HOME%\bin;” at the beginning, as shown below.



Click on the *OK* button to complete the modification. Click on the *OK* button of the “Environment Variables” pane to shut it down. Click on the *OK* button of the “System Properties” window to shut it down.

5. To test whether you have done correctly, click on “Start|Run...”, type “cmd” in the Open box, and click on the *OK* button to start a *Command Prompt* window. Type “javac” and the ENTER key in the window. If you see usage information of “javac”, you have completed this step successfully. Otherwise you need to carefully redo this step.

## 2 Installation of Tomcat Web Server

1. To install Tomcat, download Tomcat v5.5.9 from <http://apache.secsup.org/dist/jakarta/tomcat-5/v5.5.9/bin/jakarta-tomcat-5.5.9.exe>. Make sure you have already installed J2SE 5 and set up environment variable JAVA\_HOME, as explained earlier in this document. Tomcat v5.5.9 needs J2SE 5 by default. In *Windows Explorer*, click on file “jakarta-tomcat-5.5.9.exe” to start its installation. On the *Choose Components* pane, check all the four check boxes to choose all options. On the *Choose Install Location* pane, use “C:\Tomcat5.5” as the *Destination Folder* value. On the *Configuration* pane, use “password” as the password value for user *admin* for avoiding later confusion. On the *Java Virtual Machine* pane, browse to or type “C:\Program Files\Java\jdk1.5.0\_04”. Please make sure that you don’t choose “C:\Program Files\Java\jre1.5.0\_04”. On the last pane with the *Finish* button, leave the two check boxes checked, and click on the *Finish* button to complete the installation. You will notice that a new icon  appears in the *system tray* in the right-bottom corner of your screen. If you leave the mouse cursor on top of the icon, it will pop up message “Apache Tomcat”. To start Tomcat, right-click on this icon and click on “Start service” in the popup menu. To stop Tomcat, right-click on this icon and click on “Stop service” in the popup menu. If you cannot see this icon in the *system tray*, click on “Start|All Programs|Apache Tomcat 5.5|Monitor Tomcat” to restart this Tomcat icon in the *system tray*. Tomcat installation will take 11.7 MB disk space.
2. When Tomcat is running, direct your Web browser to <http://localhost:8080/> to see the default startup page of your Tomcat. In unusual situations in which the Web browser fails to find “localhost” (normally due to the configuration by some other software), you can use URL <http://127.0.0.1:8080/> to test your Tomcat. Name “localhost” is just a user-friendly name for IP address “127.0.0.1”, which is always assigned to your local PC.

### 3 Installation of Axis Toolkit

1. Use your Web browser to visit <http://csis.pace.edu/~lixin/pclc/ws/axis.zip> and <http://csis.pace.edu/~lixin/pclc/ws/endorsed.zip> to download contents of files “axis.zip” and “endorsed.zip”, and save the contents of file “axis.zip” in a directory named “axis” at any directory location on your PC, and save the contents of file “endorsed.zip” in a directory named “endorsed” at any directory location on your PC. Make sure your directories “axis” and “endorsed” don’t have subdirectories of the same name.
2. Copy your new directory “axis” under “C:\Tomcat5.5\webapps”. Make sure you can see file “C:\Tomcat5.5\webapps\axis\index.html”.
3. Copy your new directory “endorsed” under both “C:\Program Files\Java\jdk1.5.0\_04\lib” and “C:\Program Files\Java\jdk1.5.0\_04\jre\lib” (don’t replace “C:\Program Files\Java\jdk1.5.0\_04” with “C:\Program Files\Java\jre1.5.0\_04”). Make sure you can see files “C:\Program Files\Java\jdk1.5.0\_04\lib\endorsed\axis.jar” and “C:\Program Files\Java\jdk1.5.0\_04\jre\lib\endorsed\axis.jar”.

### 4 Installation of Web service workshop lab source files

The source code for the lab session is available at

<http://csis.pace.edu/~lixin/pclc/ws/webServiceLab.zip>.

Download file “webServiceLab.zip”, and unzip its contents to “C:\”. Make sure you can see directory path “C:\webServiceLab\dotNet” in *Windows Explorer*.

## 5 Introduction on changing working directory in a *Command Prompt* window

Not liking *Microsoft Visual Studio .NET*, we have to work in *Command Prompt* windows to experiment with Web service creation and consumption with our current tools (*Tomcat* and *Axis*). Fancy IDEs for Java development do exist, but their steep learning curve and their cost and availability prevent them from being good choices for this course. We need tools that allow us to learn Java-based Web service creation and consumption in a few hours or a few days (assuming our existing knowledge on Web services). If you are serious in a programming career or using Unix/Linux, some experience in command-line operation is also necessary.

To start a Windows *Command Prompt* window, you can either click on “Start|Run ...” and then run “cmd”, or click on “Start|All Programs|Accessories|Command Prompt”.

You can change your working directory by using *changing directory* (cd) command, as in the following examples:

- To work on drive **C:** (suppose you are not on drive **C:** now), type “C:” and the ENTER key.
- To move up to the top level of your drive **C:**, type “cd \” and the ENTER key.
- Suppose you are now at “C:\”. To change directory to “C:\webServiceLab”, type “cd webServiceLab” and the ENTER key.
- To move up working directory by one level, type “cd ..” and the ENTER key

## 6 Check out a sample Web service installation

- While Tomcat is running, you can visit *Axis*’ home page at <http://localhost:8080/axis/>. You can also visit a simple Web service by visiting <http://localhost:8080/axis/SimpleStockExample.jws>. Note that its WSDL file is at <http://localhost:8080/axis/SimpleStockExample.jws?WSDL>. Directory “C:\Tomcat5.5\webapps\axis” is where you deploy your new Java Web services.

If you want to study the fundamental concepts of Web services now, please read my document “*Essential Concepts of Web Services*” (<http://csis.pace.edu/~lixin/pcl/ws/webServiceConcepts.pdf>). If you want to learn how to use the installed tools to develop Java-based Web services and their client applications, refer to my document *Web Service Workshop Lab Manual* (available online at <http://csis.pace.edu/~lixin/pcl/ws/webServiceWorkshopLab.pdf>.)