STRUTS-2.X

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About the Tutorial

Apache Struts 2 is an elegant, extensible framework for creating enterprise-ready Java web applications. This framework is designed to streamline the full development cycle from building, to deploying and maintaining applications over time. Apache Struts 2 was originally known as Web Work 2.

This tutorial will teach you, how to use Apache Struts for creating enterprise-ready Java web applications in simple and easy steps.

Audience

This tutorial is designed for Java programmers who are interested to learn the basics of Struts 2.x framework and its applications.

Prerequisites

Before proceeding with this tutorial, you should have a good understanding of the Java programming language. A basic understanding of MVC Framework and JSP or Servlet is very helpful.

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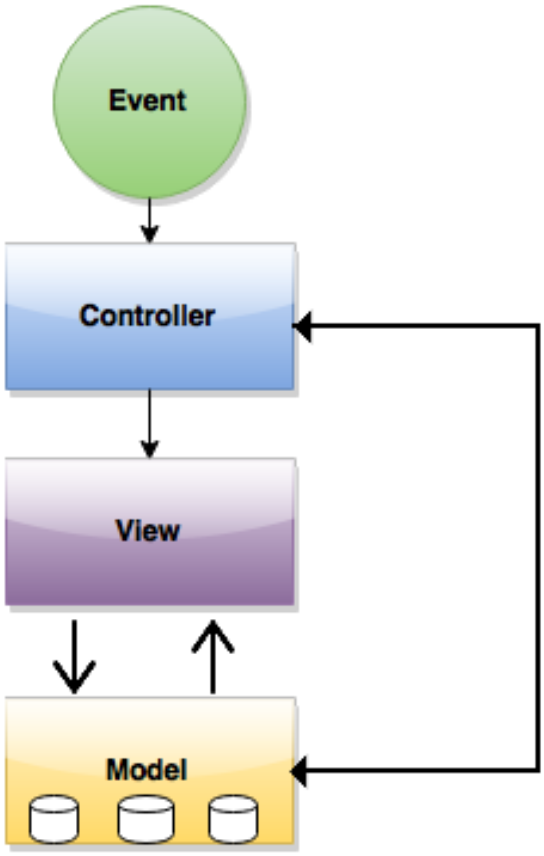
1. STRUTS 2 - BASIC MVC ARCHITECTURE

Model **V**iew **C**ontroller or **MVC** as it is popularly called, is a software design pattern for developing web applications. A Model View Controller pattern is made up of the following three parts:

- **Model** - The lowest level of the pattern which is responsible for maintaining data.
- **View** - This is responsible for displaying all or a portion of the data to the user.
- **Controller** - Software Code that controls the interactions between the Model and View.

MVC is popular as it isolates the application logic from the user interface layer and supports separation of concerns. Here the Controller receives all requests for the application and then works with the Model to prepare any data needed by the View. The View then uses the data prepared by the Controller to generate a final presentable response. The MVC abstraction can be graphically represented as follows.



The Model

The model is responsible for managing the data of the application. It responds to the request from the view and it also responds to instructions from the controller to update itself.

The View

It means presentation of data in a particular format, triggered by a controller's decision to present the data. They are script-based templating systems like JSP, ASP, PHP and very easy to integrate with AJAX technology.

The Controller

The controller is responsible for responding to the user input and perform interactions on the data model objects. The controller receives the input, it validates the input and then performs the business operation that modifies the state of the data model.

Struts2 is a MVC based framework. In the coming chapters, let us see how we can use the MVC methodology within Struts2.

2. STRUT 2 – OVERVIEW

Struts2 is a popular and mature web application framework based on the MVC design pattern. Struts2 is not just a new version of Struts 1, but it is a complete rewrite of the Struts architecture.

The Webwork framework initially started with Struts framework as the basis and its goal was to offer an enhanced and improved framework built on Struts to make web development easier for the developers.

After a while, the Webwork framework and the Struts community joined hands to create the famous Struts2 framework.

Struts 2 Framework Features

Here are some of the great features that may force you to consider Struts2:

- **Pojo Forms and Pojo Actions** - Struts2 has done away with the Action Forms that were an integral part of the Struts framework. With Struts2, you can use any POJO to receive the form input. Similarly, you can now see any POJO as an Action class.

- **Tag Support** - Struts2 has improved the form tags and the new tags which allow the developers to write less code.

- **Ajax Support** - Struts2 has recognized the take over by Web2.0 technologies, and has integrated AJAX support into the product by creating AJAX tags, this function is very similar to the standard Struts2 tags.

- **Easy Integration** - Integration with other frameworks like Spring, Tiles and SiteMesh is now easier with a variety of integration available with Struts2.

- **Template Support** - Support for generating views using templates.

- **Plugin Support** - The core Struts2 behavior can be enhanced and augmented by the use of plugins. A number of plugins are available for Struts2.

- **Profiling** - Struts2 offers integrated profiling to debug and profile the application. In addition to this, Struts also offers integrated debugging with the help of built in debugging tools.
- **Easy To Modify Tags** - Tag markups in Struts2 can be tweaked using Freemarker templates. This does not require JSP or java knowledge. Basic HTML, XML and CSS knowledge is enough to modify the tags.

- **Promote Less Configuration** - Struts2 promotes less configuration with the help of using default values for various settings. You don't have to configure something unless it deviates from the default settings set by Struts2.

- **View Technologies** - Struts2 has a great support for multiple view options (JSP, Freemarker, Velocity and XSLT)

Listed above are the Top 10 features of **Struts 2** which makes it as an Enterprise ready framework.

Struts 2 Disadvantages

Though Struts 2 comes with a list of great features, there are some limitations of the current version - Struts 2 which needs further improvement. Listed are some of the main points:

- **Bigger Learning Curve** - To use MVC with Struts, you have to be comfortable with the standard JSP, Servlet APIs and a large & elaborate framework.

- **Poor Documentation** - Compared to the standard servlet and JSP APIs, Struts has fewer online resources, and many first-time users find the online Apache documentation confusing and poorly organized.

- **Less Transparent -** With Struts applications, there is a lot more going on behind the scenes than with normal Java-based Web applications which makes it difficult to understand the framework.

Final note, a good framework should provide generic behavior that many different types of applications can make use of it.

Struts 2 is one of the best web frameworks and being highly used for the development of Rich Internet Applications (RIA).

3. ENVIRONMENT SETUP

Our first task is to get a minimal Struts 2 application running. This chapter will guide you on how to prepare a development environment to start your work with Struts 2.

I assume that you already have JDK (5+), Tomcat and Eclipse installed on your machine. If you do not have these components installed, then follow the given steps on fast track:

Step 1 - Setup Java Development Kit (JDK)

You can download the latest version of SDK from Oracle's Java site: Java SE Downloads. You will find instructions for installing JDK in downloaded files, follow the given instructions to install and configure the setup. Finally, set PATH and JAVA_HOME environment variables to refer to the directory that contains java and javac, typically java_install_dir/bin and java_install_dir respectively.

If you are running Windows and installed the SDK in C:\jdk1.5.0_20, you should be inputting the following line in your C:\autoexec.bat file.

```
set PATH=C:\jdk1.5.0_20\bin;%PATH%
set JAVA_HOME=C:\jdk1.5.0_20
```

Alternatively, on Windows NT/2000/XP:

- You can right-click on My Computer, Select Properties, then Advanced, then Environment Variables. Then, you would update the PATH value and press the OK button.
- On Unix (Solaris, Linux, etc.), if the SDK is installed in /usr/local/jdk1.5.0_20 and you use the C shell, you would put the following into your .cshrc file.

```
setenv PATH /usr/local/jdk1.5.0_20/bin:$PATH
setenv JAVA_HOME /usr/local/jdk1.5.0_20
```

Alternatively, if you use an Integrated Development Environment (IDE) like Borland JBuilder, Eclipse, IntelliJ IDEA, or Sun ONE Studio, compile and run a simple program to confirm that the IDE knows where you installed Java, otherwise do proper setup as per the given document of IDE.

Step 2 - Setup Apache Tomcat

You can download the latest version of Tomcat from http://tomcat.apache.org/. Once you downloaded the installation, unpack the binary distribution into a convenient location.

For example in C:\apache-tomcat-6.0.33 on windows, or /usr/local/apache-tomcat-6.0.33 on Linux/Unix and create CATALINA_HOME environment variable pointing to these locations.

You can start Tomcat by executing the following commands on windows machine, or you can simply double click on startup.bat

```
%CATALINA_HOME%\bin\startup.bat

or

C:\apache-tomcat-6.0.33\bin\startup.bat
```

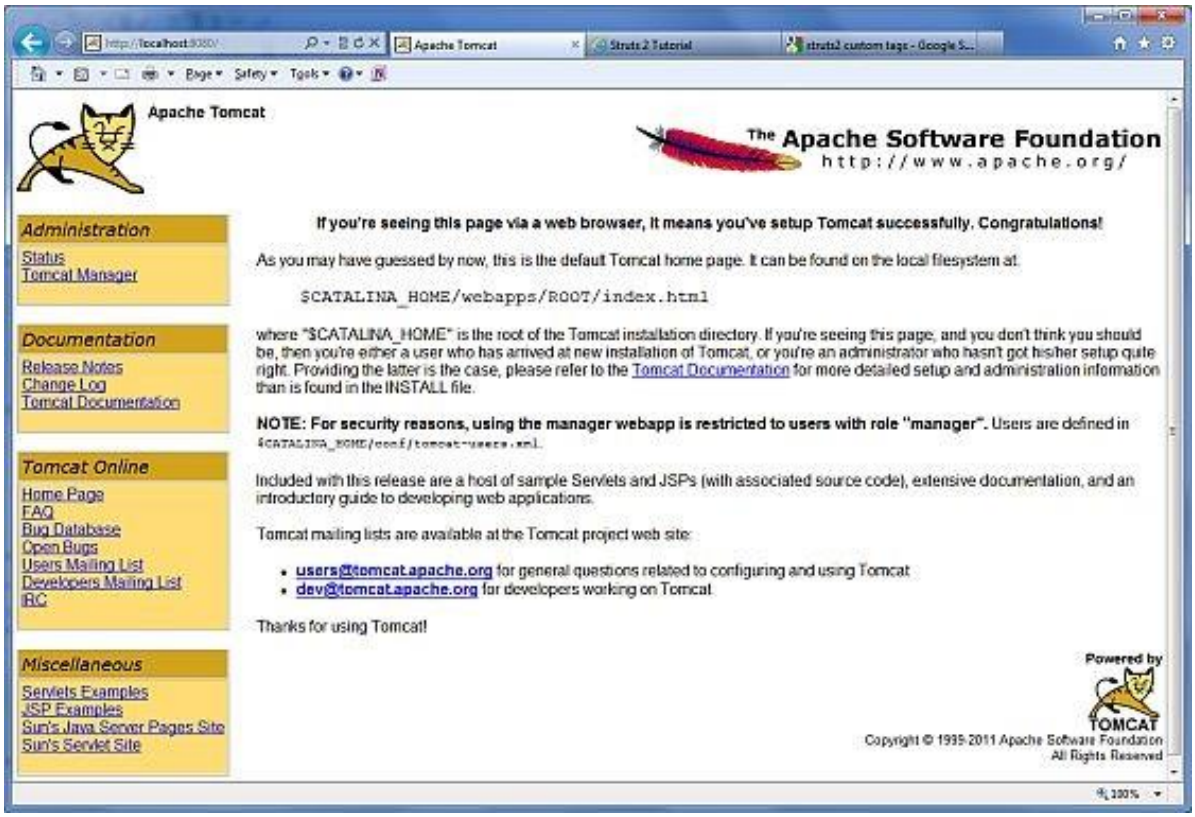
Tomcat can be started by executing the following commands on Unix (Solaris, Linux, etc.) machine:

```
$CATALINA_HOME/bin/startup.sh

or

/usr/local/apache-tomcat-6.0.33/bin/startup.sh
```

After a successful startup, the default web applications included with Tomcat will be available by visiting **http://localhost:8080/**. If everything is fine, then it should display the following result:



Further information about configuring and running Tomcat can be found in the documentation included here, as well as on the Tomcat website: http://tomcat.apache.org

Tomcat can be stopped by executing the following commands on windows machine:

```
%CATALINA_HOME%\bin\shutdown

or


C:\apache-tomcat-5.5.29\bin\shutdown
```

Tomcat can be stopped by executing the following commands on Unix (Solaris, Linux, etc.) machine:

```
$CATALINA_HOME/bin/shutdown.sh


or


/usr/local/apache-tomcat-5.5.29/bin/shutdown.sh
```

Step 3 - Setup Eclipse (IDE)

All the examples in this tutorial are written using Eclipse IDE. I suggest that, you have the latest version of Eclipse installed in your machine.

To install Eclipse Download the latest Eclipse binaries from http://www.eclipse.org/downloads/. Once you download the installation, unpack the binary distribution into a convenient location.

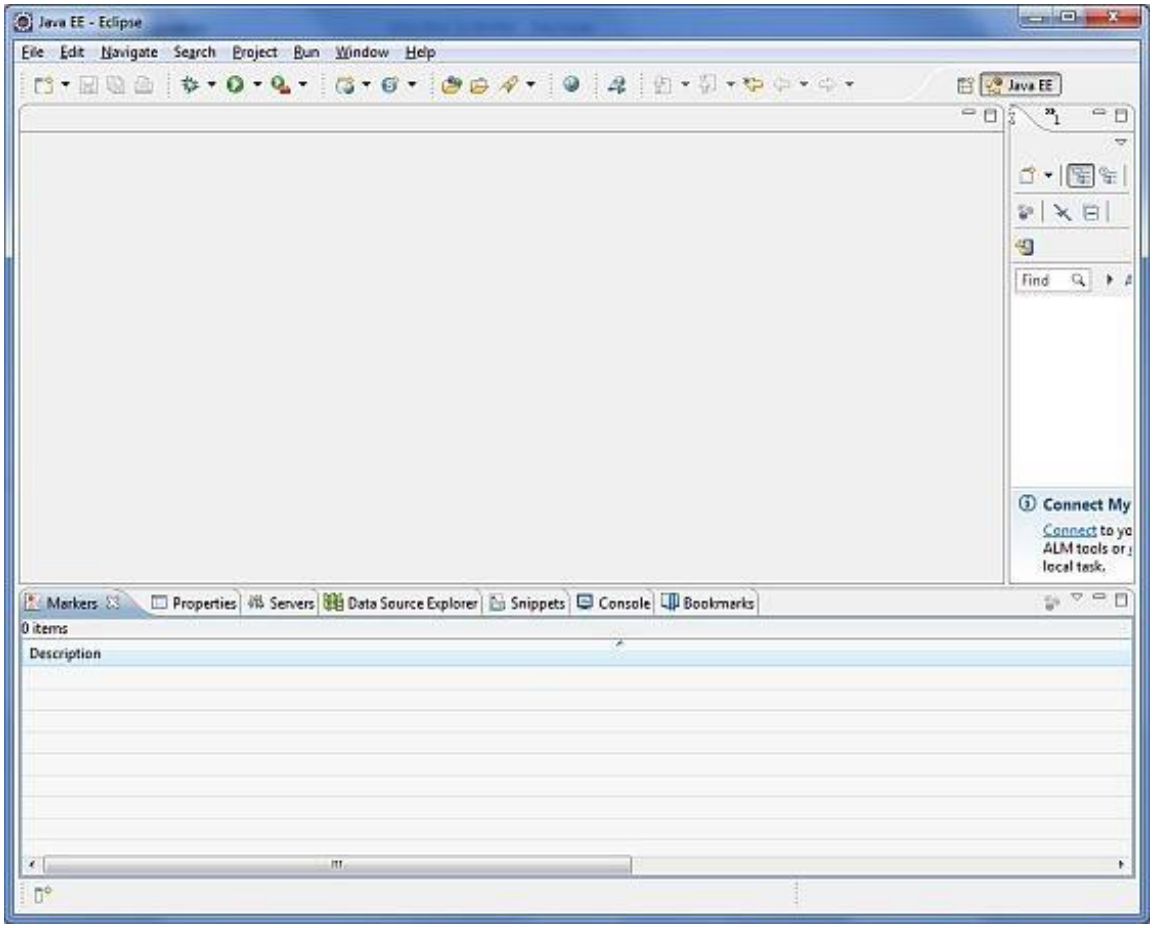
For example in C:\eclipse on windows, or /usr/local/eclipse on Linux/Unix and finally set PATH variable appropriately. Eclipse can be started by executing the following commands on windows machine, or you can simply double click on eclipse.exe

```
%C:\eclipse\eclipse.exe
```

Eclipse can be started by executing the following commands on Unix (Solaris, Linux, etc.) machine:

```
$/usr/local/eclipse/eclipse
```

After a successful startup, if everything is fine, it should display the following result:



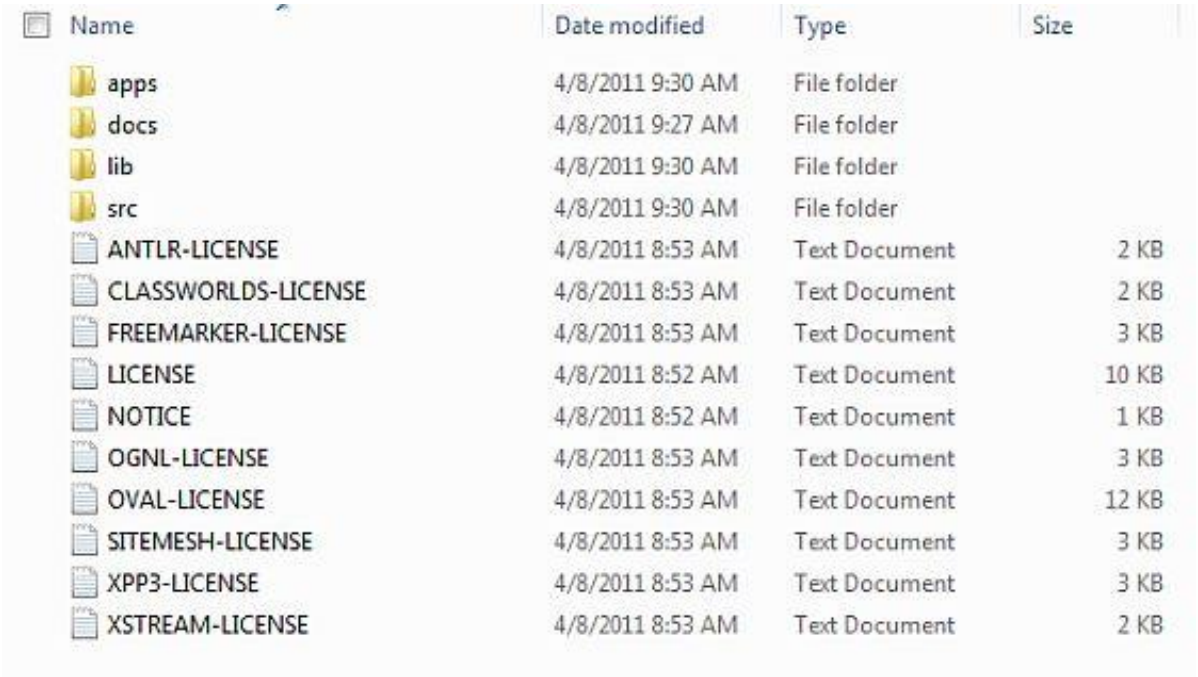
Step 4 - Setup Struts2 Libraries

Now if everything is fine, then you can proceed to setup your Struts2 framemwork. Following are the simple steps to download and install Struts2 on your machine.

- Make a choice whether you want to install Struts2 on Windows, or Unix and then proceed to the next step to download .zip file for windows and .tz file for Unix.

- Download the latest version of Struts2 binaries from http://struts.apache.org/download.cgi.

- At the time of writing this tutorial, I downloaded **struts-2.0.14-all.zip** and when you unzip the downloaded file it will give you directory structure inside C:\struts-2.2.3 as follows.



Name	Date modified	Type	Size
apps	4/8/2011 9:30 AM	File folder	
docs	4/8/2011 9:27 AM	File folder	
lib	4/8/2011 9:30 AM	File folder	
src	4/8/2011 9:30 AM	File folder	
ANTLR-LICENSE	4/8/2011 8:53 AM	Text Document	2 KB
CLASSWORLDS-LICENSE	4/8/2011 8:53 AM	Text Document	2 KB
FREEMARKER-LICENSE	4/8/2011 8:53 AM	Text Document	3 KB
LICENSE	4/8/2011 8:52 AM	Text Document	10 KB
NOTICE	4/8/2011 8:52 AM	Text Document	1 KB
OGNL-LICENSE	4/8/2011 8:53 AM	Text Document	3 KB
OVAL-LICENSE	4/8/2011 8:53 AM	Text Document	12 KB
SITEMESH-LICENSE	4/8/2011 8:53 AM	Text Document	3 KB
XPP3-LICENSE	4/8/2011 8:53 AM	Text Document	3 KB
XSTREAM-LICENSE	4/8/2011 8:53 AM	Text Document	2 KB

Second step is to extract the zip file in any location, I downloaded & extracted **struts-2.2.3-all.zip** in **c:** folder on my Windows 7 machine so that I have all the jar files into **C:\struts-2.2.3\lib**. Make sure you set your CLASSPATH variable properly otherwise you will face problem while running your application.

End of ebook preview

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