Java Server Faces (JSF) Tutorial

JAVA SERVER FACES TUTORIAL

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ABOUT THE TUTORIAL

Java Server Faces Tutorial

JavaServer Faces (JSF) is a Java-based web application framework intended to simplify development integration of web-based user interfaces. JavaServer Faces is a standardized display technology which was formalized in a specification through the Java Community Process.

This tutorial will teach you basic JSF concepts and will also take you through various advance concepts related to JSF framework.

Audience

This tutorial has been prepared for the beginners to help them understand basic JSF programming. After completing this tutorial you will find yourself at a moderate level of expertise in JSF programming from where you can take yourself to next levels.

Prerequisites

Before proceeding with this tutorial you should have a basic understanding of Java programming language, text editor and execution of programs etc. Because we are going to develop web based applications using JSF, so it will be good if you have understanding on other web technologies like, HTML, CSS, AJAX etc.

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1

JSF-Overview

This chapter describes the basic definition and concepts of Java Server Faces (JSF).

What is JSF?

Java Server Faces (JSF) is a MVC web framework that simplifies the construction of user interfaces (UI) for server-based applications by using reusable UI components in a page. JSF provides facility to connect UI widgets with data sources and to server-side event handlers. The JSF specification defines a set of standard UI components and provides an Application Programming Interface (API) for developing components. JSF enables the reuse and extension of the existing standard UI components.

Benefits

JSF reduces the effort in creating and maintaining applications which will run on a Java application server and will render application UI on to a target client. JSF facilitates Web application development by

- proving reusable UI components
- making easy data transfer between UI components
- managing UI state across multiple server requests
- enabling implementation of custom components
- wiring client side event to server side application code

JSF UI component model

JSF provides developers capability to create Web application from collections of UI components that can render themselves in different ways for multiple client types (for example HTML browser, wireless or WAP devise).

JSF provides

- Core library

- A set of base UI components - standard HTML input elements
- Extension of the base UI components to create additional UI component libraries or to extend existing components.
- Multiple rendering capabilities that enable JSF UI components to render themselves differently depending on the client types.

CHAPTER

2

JSF - Environment Setup

This chapter describes the environment setup of Java Server Faces (JSF)

This tutorial will guide you on how to prepare a development environment to start your work with JSF Framework. This tutorial will also teach you how to setup JDK, Eclipse, Maven, and Tomcat on your machine before you setup JSF Framework:

System Requirement

JSF requires JDK 1.5 or higher so the very first requirement is to have JDK installed in your machine.

JDK	1.5 or above.
Memory	no minimum requirement.
Disk Space	no minimum requirement.
Operating System	no minimum requirement.

Follow the given steps to setup your environment to start with JSF application development.

Step 1 - Verify Java installation on your machine

Now open console and execute the following **java** command.

OS	Task	Command
Windows	Open Command Console	c:\> java -version
Linux	Open Command Terminal	$ java -version
Mac	Open Terminal	machine:~ joseph$ java -version

Let's verify the output for all the operating systems:

OS	Generated Output
Windows	java version "1.6.0_21"

	Java(TM) SE Runtime Environment (build 1.6.0_21-b07) Java HotSpot(TM) Client VM (build 17.0-b17, mixed mode, sharing)
Linux	java version "1.6.0_21" Java(TM) SE Runtime Environment (build 1.6.0_21-b07) Java HotSpot(TM) Client VM (build 17.0-b17, mixed mode, sharing)
Mac	java version "1.6.0_21" Java(TM) SE Runtime Environment (build 1.6.0_21-b07) Java HotSpot(TM)64-Bit Server VM (build 17.0-b17, mixed mode, sharing)

Step 2 - Setup Java Development Kit (JDK):

If you do not have Java installed then you can install the Java Software Development Kit (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.

Set the **JAVA_HOME** environment variable to point to the base directory location where Java is installed on your machine. For example

OS	Output
Windows	Set the environment variable JAVA_HOME to C:\Program Files\Java\jdk1.6.0_21
Linux	export JAVA_HOME=/usr/local/java-current
Mac	export JAVA_HOME=/Library/Java/Home

Append Java compiler location to System Path.

OS	Output
Windows	Append the string ;%JAVA_HOME%\bin to the end of the system variable, Path.
Linux	export PATH=$PATH:$JAVA_HOME/bin/
Mac	not required

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 given document of the IDE.

Step 3 - Setup Eclipse IDE

All the examples in this tutorial have been written using Eclipse IDE. So I would suggest you should have latest version of Eclipse installed on your machine based on your operating system.

To install Eclipse IDE, download the latest Eclipse binaries with WTP support fromhttp://www.eclipse.org/downloads/. Once you downloaded 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.

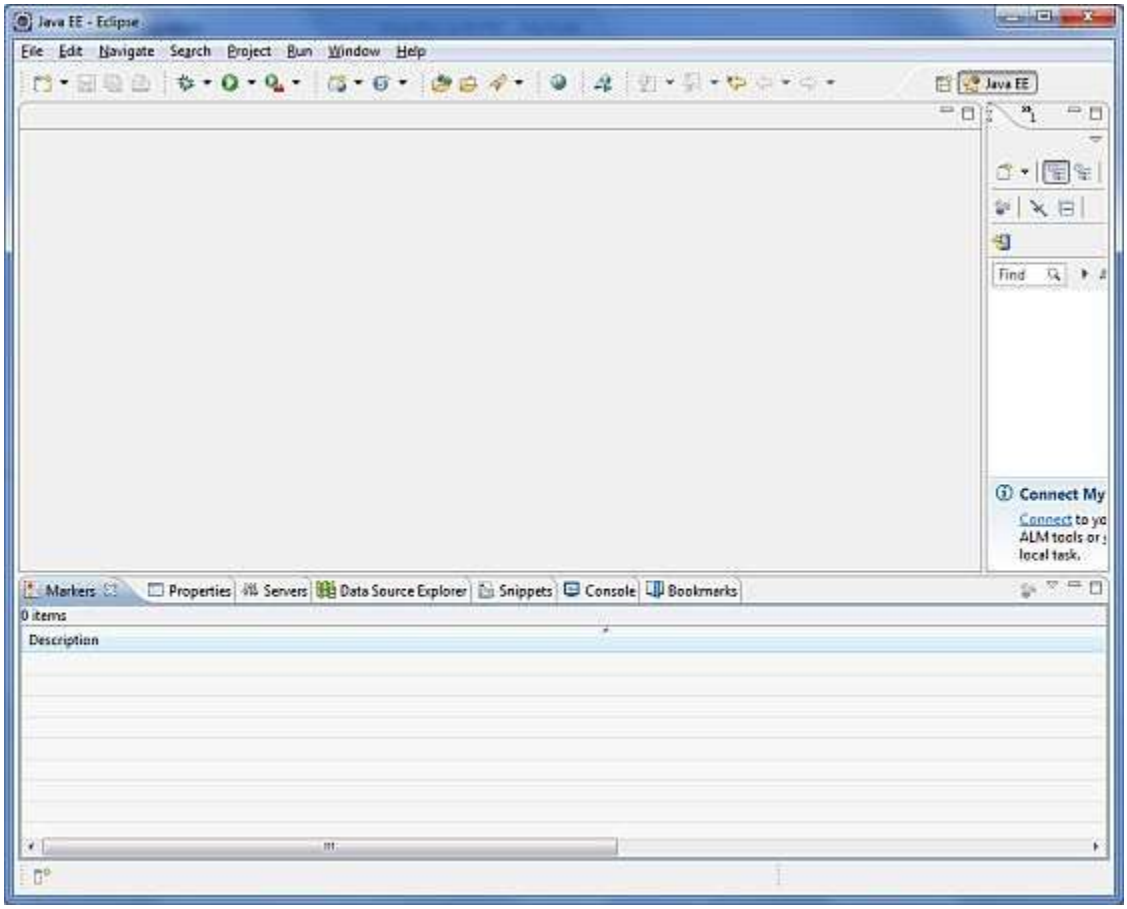
Eclipse can be started by executing the following commands on windows machine, or you can simply double click on eclipse.exe

```
%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 then it should display following result:



Step 4: Download Maven archive

Download Maven 2.2.1 from http://maven.apache.org/download.html

OS	Archive name
Windows	apache-maven-2.0.11-bin.zip
Linux	apache-maven-2.0.11-bin.tar.gz
Mac	apache-maven-2.0.11-bin.tar.gz

Step 5: Extract the Maven archive

Extract the archive, to the directory you wish to install Maven 2.2.1. The subdirectory apache-maven-2.2.1 will be created from the archive.

OS	Location (can be different based on your installation)
Windows	C:\Program Files\Apache Software Foundation\apache-maven-2.2.1
Linux	/usr/local/apache-maven
Mac	/usr/local/apache-maven

Step 6: Set Maven environment variables

Add M2_HOME, M2, MAVEN_OPTS to environment variables.

OS	Output
Windows	Set the environment variables using system properties. *M2_HOME=C:\Program Files\Apache Software Foundation\apache-maven-2.2.1* *M2=%M2_HOME%\bin* *MAVEN_OPTS=-Xms256m -Xmx512m*
Linux	Open command terminal and set environment variables. *export M2_HOME=/usr/local/apache-maven/apache-maven-2.2.1* *export M2=%M2_HOME%\bin* *export MAVEN_OPTS=-Xms256m -Xmx512m*
Mac	Open command terminal and set environment variables. *export M2_HOME=/usr/local/apache-maven/apache-maven-2.2.1* *export M2=%M2_HOME%\bin* *export MAVEN_OPTS=-Xms256m -Xmx512m*

Step 7: Add Maven bin directory location to system path

Now append M2 variable to System Path

OS	Output
Windows	Append the string ;%M2% to the end of the system variable, Path.
Linux	export PATH=$M2:$PATH
Mac	export PATH=$M2:$PATH

Step 8: Verify Maven installation

Now open console, execute the following **mvn** command.

OS	Task	Command
Windows	Open Command Console	c:\> mvn --version
Linux	Open Command Terminal	$ mvn --version
Mac	Open Terminal	machine:~ joseph$ mvn --version

Finally, verify the output of the above commands, which should be something as follows:

OS	Output
Windows	Apache Maven 2.2.1 (r801777; 2009-08-07 00:46:01+0530) Java version: 1.6.0_21 Java home: C:\Program Files\Java\jdk1.6.0_21\jre
Linux	Apache Maven 2.2.1 (r801777; 2009-08-07 00:46:01+0530) Java version: 1.6.0_21 Java home: C:\Program Files\Java\jdk1.6.0_21\jre
Mac	Apache Maven 2.2.1 (r801777; 2009-08-07 00:46:01+0530) Java version: 1.6.0_21 Java home: C:\Program Files\Java\jdk1.6.0_21\jre

Step 9: 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 set CATALINA_HOME environment variable pointing to the installation locations.

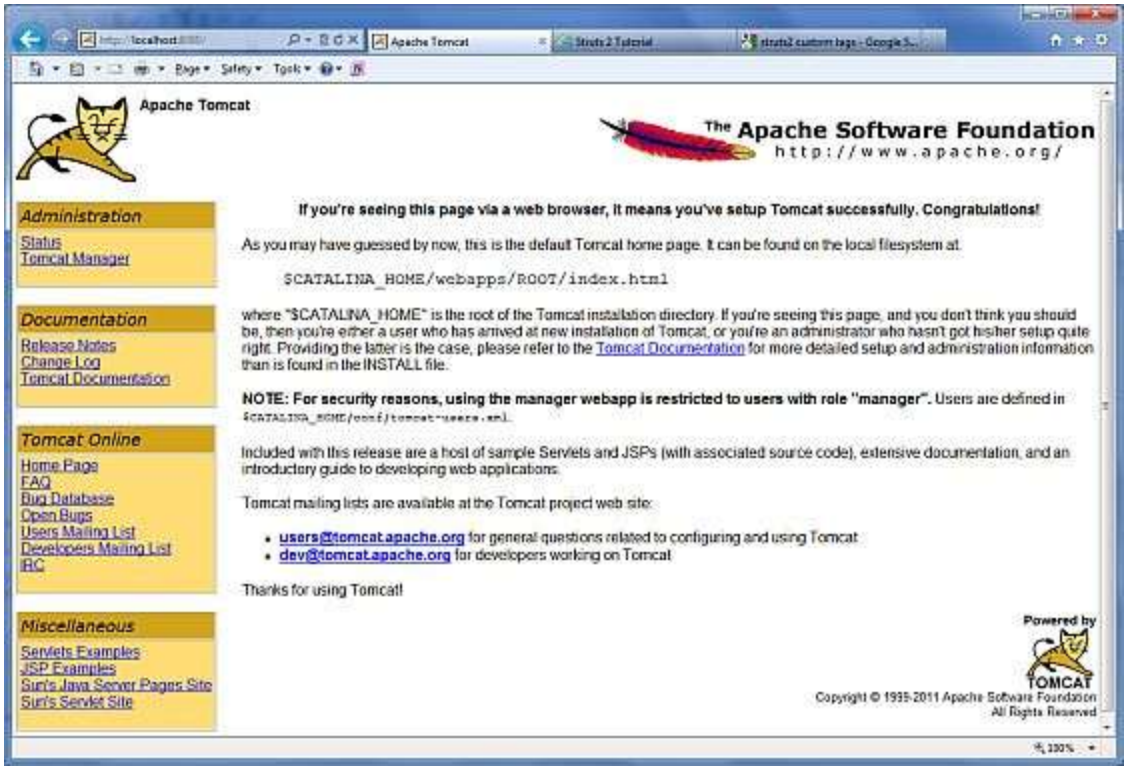
Tomcat can be started by executing the following commands on windows machine, or you can simply double click on startup.bat

```
%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 following result:



Further information about configuring and running Tomcat can be found in the documentation included here, as well as on the Tomcat web site: 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
```

CHAPTER

3

JSF - Architecture

JSF technology is a framework for developing, building server side User Interface Components and using them in a web application. JSF technology is based on the Model View Controller (MVC) architecture for separating logic from presentation.

What is MVC Design Pattern?

MVC design pattern designs an application using three separate modules:

Module	Description
Model	Carries Data and login
View	Shows User Interface
Controller	Handles processing of an application.

Purpose of MVC design pattern is to separate model and presentation to enable developers to set focus on their core skills and collaborate more clearly.

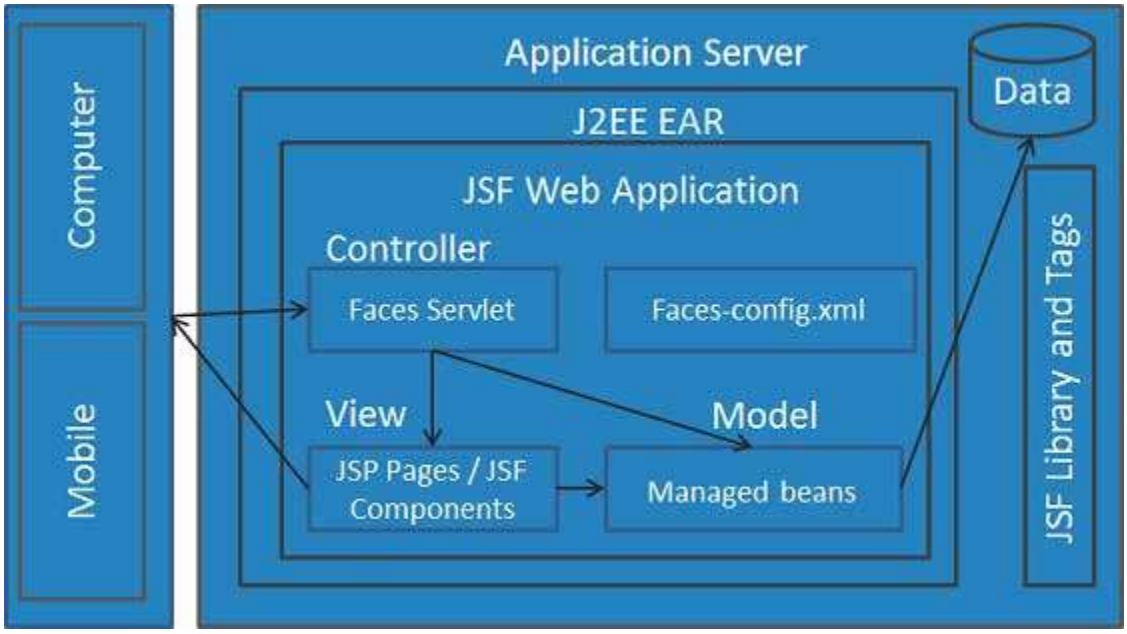
Web Designers have to concentrate only on view layer rather than model and controller layer. Developers can change the code for model and typically need not to change view layer. Controllers are used to process user actions. In this process layer model and views may be changed.

JSF Architecture

A JSF application is similar to any other Java technology-based web application; it runs in a Java servlet container, and contains

- JavaBeans components as models containing application-specific functionality and data
- A custom tag library for representing event handlers and validators
- A custom tag library for rendering UI components
- UI components represented as stateful objects on the server
- Server-side helper classes

- Validators, event handlers, and navigation handlers
- Application configuration resource file for configuring application resources



There are controllers which can be used to perform user actions. UI can be created by web page authors and the business logic can be utilized by managed beans.

JSF provides several mechanisms for rendering an individual component. It is up to the web page designer to pick the desired representation, and the application developer doesn't need to know which mechanism was used to render a JSF UI component.

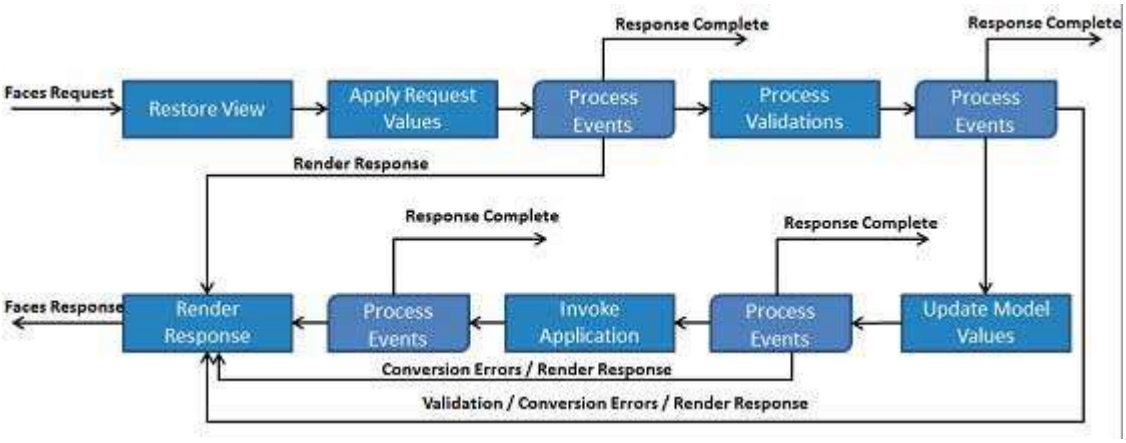
CHAPTER

4

JSF – Life Cycle

JSF application lifecycle consist of six phases which are as follows

- Restore view phase
- Apply request values phase; process events
- Process validations phase; process events
- Update model values phase; process events
- Invoke application phase; process events
- Render response phase



The six phases show the order in which JSF processes a form. The list shows the phases in their likely order of execution with event processing at each phase.

Phase 1: Restore view

JSF begins the restore view phase as soon as a link or a button is clicked and JSF receives a request.

During this phase, the JSF builds the view, wires event handlers and validators to UI components and saves the view in the FacesContext instance. The FacesContext instance will now contains all the information required to process a request.

Phase 2: Apply request values

After the component tree is created/restored, each component in component tree uses decode method to extract its new value from the request parameters. Component stores this value. If the conversion fails, an error message is generated and queued on FacesContext. This message will be displayed during the render response phase, along with any validation errors.

If any decode methods / event listeners called renderResponse on the current FacesContext instance, the JSF moves to the render response phase.

Phase 3: Process validation

During this phase, the JSF processes all validators registered on component tree. It examines the component attribute rules for the validation and compares these rules to the local value stored for the component.

If the local value is invalid, the JSF adds an error message to the FacesContext instance, and the life cycle advances to the render response phase and display the same page again with the error message.

Phase 4: Update model values

After the JSF checks that the data is valid, it walks over the component tree and set the corresponding server-side object properties to the components' local values. The JSF will update the bean properties corresponding to input component's value attribute.

If any updateModels methods called renderResponse on the current FacesContext instance, the JSF moves to the render response phase.

Phase 5: Invoke application

During this phase, the JSF handles any application-level events, such as submitting a form / linking to another page.

Phase 6: Render response

During this phase, the JSF asks container/application server to render the page if the application is using JSP pages. For initial request, the components represented on the page will be added to the component tree as the JSP container executes the page. If this is not an initial request, the component tree is already built so components need not to be added again. In either case, the components will render themselves as the JSP container/Application server traverses the tags in the page.

After the content of the view is rendered, the response state is saved so that subsequent requests can access it and it is available to the restore view phase.

CHAPTER

5

JSF – First Application

To create a simple JSF application, we'll use maven-archetype-webapp plugin. In example below, We'll create a maven based web application project in C:\JSF folder.

Create Project

Let's open command console, go the **C:\ > JSF** directory and execute the following **mvn** command.

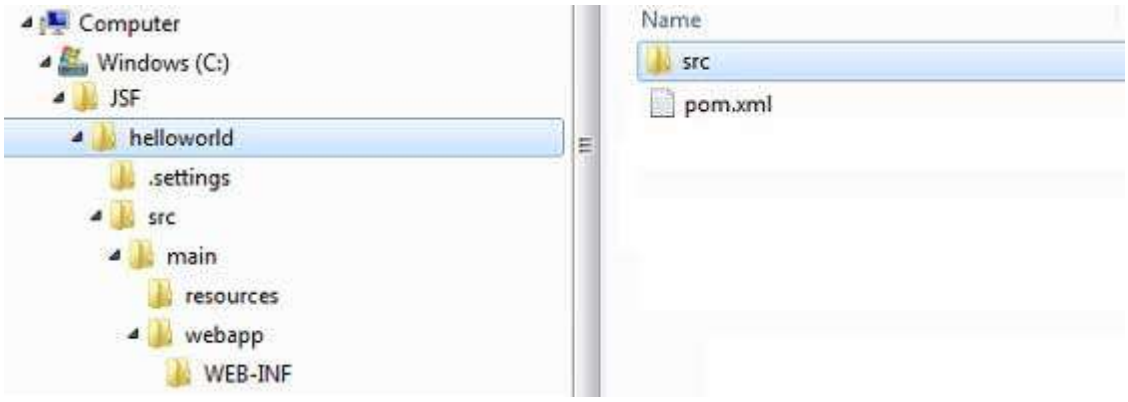
```
C:\JSF>mvn archetype:create
-DgroupId=com.tutorialspoint.test
-DartifactId=helloworld
-DarchetypeArtifactId=maven-archetype-webapp
```

Maven will start processing and will create the complete java web application project structure.

```
[INFO] Scanning for projects...
[INFO] Searching repository for plugin with prefix: 'archetype'.
[INFO] ------------------------------------------------------------
[INFO] Building Maven Default Project
[INFO]    task-segment: [archetype:create] (aggregator-style)
[INFO] ------------------------------------------------------------
[INFO] [archetype:create {execution: default-cli}]
[INFO] Defaulting package to group ID: com.tutorialspoint.test
[INFO] artifact org.apache.maven.archetypes:maven-archetype-webapp:
checking for updates from central
[INFO] ------------------------------------------------------------
[INFO] Using following parameters for creating project
from Old (1.x) Archetype: maven-archetype-webapp:RELEASE
[INFO] ------------------------------------------------------------
```

```
[INFO] Parameter: groupId, Value: com.tutorialspoint.test
[INFO] Parameter: packageName, Value: com.tutorialspoint.test
[INFO] Parameter: package, Value: com.tutorialspoint.test
[INFO] Parameter: artifactId, Value: helloworld
[INFO] Parameter: basedir, Value: C:\JSF
[INFO] Parameter: version, Value: 1.0-SNAPSHOT
[INFO] project created from Old (1.x) Archetype in dir:
C:\JSF\helloworld
[INFO] ------------------------------------------------------------------
[INFO] BUILD SUCCESSFUL
[INFO] ------------------------------------------------------------------
[INFO] Total time: 7 seconds
[INFO] Finished at: Mon Nov 05 16:05:04 IST 2012
[INFO] Final Memory: 12M/84M
[INFO] ------------------------------------------------------------------
```

Now go to C:/JSF directory. You'll see a java web application project created named helloworld (as specified in artifactId). Maven uses a standard directory layout as shown below:



Using above example, we can understand following key concepts

Folder Structure	Description
helloworld	contains src folder and pom.xml
src/main/wepapp	contains WEB-INF folder and index.jsp page
src/main/resources	it contains images/properties files (In above example, we need to create this structure manually).

Add JSF capability to Project

Add the JSF dependencies as shown below.

```
<dependencies>
  <dependency>
              <groupId>com.sun.faces</groupId>
              <artifactId>jsf-api</artifactId>
              <version>2.1.7</version>
  </dependency>
  <dependency>
              <groupId>com.sun.faces</groupId>
              <artifactId>jsf-impl</artifactId>
              <version>2.1.7</version>
  </dependency>
</dependencies>
```

Complete POM.xml

```
<project xmlns="http://maven.apache.org/POM/4.0.0"
   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   xsi:schemaLocation="http://maven.apache.org/POM/4.0.0
   http://maven.apache.org/maven-v4_0_0.xsd">
   <modelVersion>4.0.0</modelVersion>
   <groupId>com.tutorialspoint.test</groupId>
   <artifactId>helloworld</artifactId>
   <packaging>war</packaging>
   <version>1.0-SNAPSHOT</version>
   <name>helloworld Maven Webapp</name>
   <url>http://maven.apache.org</url>
   <dependencies>
      <dependency>
         <groupId>junit</groupId>
         <artifactId>junit</artifactId>
         <version>3.8.1</version>
         <scope>test</scope>
      </dependency>
      <dependency>
         <groupId>com.sun.faces</groupId>
         <artifactId>jsf-api</artifactId>
         <version>2.1.7</version>
      </dependency>
      <dependency>
         <groupId>com.sun.faces</groupId>
         <artifactId>jsf-impl</artifactId>
         <version>2.1.7</version>
      </dependency>
   </dependencies>
   <build>
      <finalName>helloworld</finalName>
      <plugins>
         <plugin>
            <groupId>org.apache.maven.plugins</groupId>
            <artifactId>maven-compiler-plugin</artifactId>
            <version>2.3.1</version>
            <configuration>
               <source>1.6</source>
               <target>1.6</target>
            </configuration>
         </plugin>
```

```
      </plugins>
   </build>
</project>
```

Prepare Eclipse project

Let's open command console, go the **C:\ > JSF > helloworld** directory and execute the following **mvn**command.

```
C:\JSF\helloworld>mvn eclipse:eclipse -Dwtpversion=2.0
```

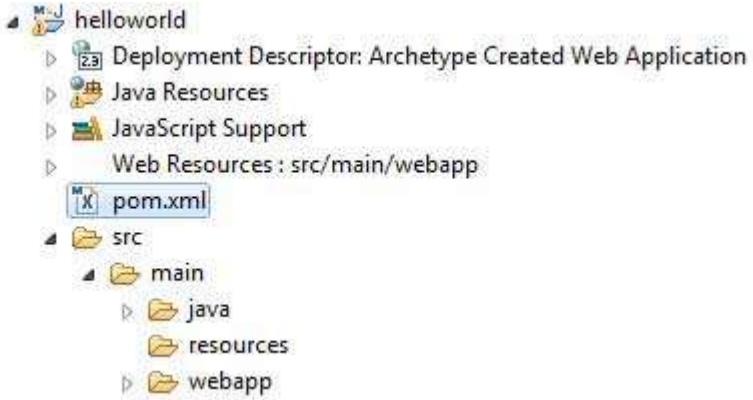
Maven will start processing and will create the eclipse ready project and will add wtp capability.

```
Downloading: http://repo.maven.apache.org/org/apache/maven/plugins/
maven-compiler-plugin/2.3.1/maven-compiler-plugin-2.3.1.pom
5K downloaded  (maven-compiler-plugin-2.3.1.pom)
Downloading: http://repo.maven.apache.org/org/apache/maven/plugins/
maven-compiler-plugin/2.3.1/maven-compiler-plugin-2.3.1.jar
29K downloaded  (maven-compiler-plugin-2.3.1.jar)
[INFO] Searching repository for plugin with prefix: 'eclipse'.
[INFO] ------------------------------------------------------------
[INFO] Building helloworld Maven Webapp
[INFO]    task-segment: [eclipse:eclipse]
[INFO] ------------------------------------------------------------
[INFO] Preparing eclipse:eclipse
[INFO] No goals needed for project - skipping
[INFO] [eclipse:eclipse {execution: default-cli}]
[INFO] Adding support for WTP version 2.0.
[INFO] Using Eclipse Workspace: null
[INFO] Adding default classpath container: org.eclipse.jdt.
launching.JRE_CONTAINER
Downloading: http://repo.maven.apache.org/
com/sun/faces/jsf-api/2.1.7/jsf-api-2.1.7.pom
12K downloaded  (jsf-api-2.1.7.pom)
Downloading: http://repo.maven.apache.org/
com/sun/faces/jsf-impl/2.1.7/jsf-impl-2.1.7.pom
10K downloaded  (jsf-impl-2.1.7.pom)
Downloading: http://repo.maven.apache.org/
com/sun/faces/jsf-api/2.1.7/jsf-api-2.1.7.jar
```

```
619K downloaded  (jsf-api-2.1.7.jar)
Downloading: http://repo.maven.apache.org/
com/sun/faces/jsf-impl/2.1.7/jsf-impl-2.1.7.jar
1916K downloaded  (jsf-impl-2.1.7.jar)
[INFO] Wrote settings to C:\JSF\helloworld\.settings\
org.eclipse.jdt.core.prefs
[INFO] Wrote Eclipse project for "helloworld" to C:\JSF\helloworld.
[INFO]
[INFO] ------------------------------------------------------------
[INFO] BUILD SUCCESSFUL
[INFO] ------------------------------------------------------------
[INFO] Total time: 6 minutes 7 seconds
[INFO] Finished at: Mon Nov 05 16:16:25 IST 2012
[INFO] Final Memory: 10M/89M
[INFO] ------------------------------------------------------------
```

Import project in Eclipse

- Now import project in eclipse using Import wizard
- Go to File > Import... > Existing project into workspace
- Select root directory to helloworld
- Keep Copy projects into workspace to be checked.
- Click Finish button.
- Eclipse will import and copy the project in its workspace C:\ > Projects > Data > WorkSpace



Create a Managed Bean

Create a package structure under **src > main > java** as **com > tutorialspoint > test** . Create HelloWorld.java class in this package. Update the code of **HelloWorld.java** as shown below.

```
package com.tutorialspoint.test;

import javax.faces.bean.ManagedBean;

@ManagedBean(name = "helloWorld", eager = true)
public class HelloWorld {
   public HelloWorld() {
      System.out.println("HelloWorld started!");
   }
   public String getMessage() {
      return "Hello World!";
   }
}
```

Create a JSF page

Create a page home.xhtml under **webapp** folder. Update the code of **home.xhtml** as shown below.

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
   "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
   <title>JSF Tutorial!</title>
</head>
<body>
   #{helloWorld.message}
</body>
</html>
```

Build the project

- Select helloworld project in eclipse
- Use Run As wizard
- Select Run As > Maven package
- Maven will start building the project and will create helloworld.war under C:\ > Projects > Data > WorkSpace > helloworld > target folder

```
[INFO] Scanning for projects...
[INFO] ------------------------------------------------------
[INFO] Building helloworld Maven Webapp
[INFO]
```

```
[INFO] Id: com.tutorialspoint.test:helloworld:war:1.0-SNAPSHOT
[INFO] task-segment: [package]
[INFO] ----------------------------------------------------
[INFO] [resources:resources]
[INFO] Using default encoding to copy filtered resources.
[INFO] [compiler:compile]
[INFO] Nothing to compile - all classes are up to date
[INFO] [resources:testResources]
[INFO] Using default encoding to copy filtered resources.
[INFO] [compiler:testCompile]
[INFO] No sources to compile
[INFO] [surefire:test]
[INFO] Surefire report directory:
C:\Projects\Data\WorkSpace\helloworld\target\surefire-reports

-------------------------------------------------------
 T E S T S
-------------------------------------------------------
There are no tests to run.

Results :

Tests run: 0, Failures: 0, Errors: 0, Skipped: 0

[INFO] [war:war]
[INFO] Packaging webapp
[INFO] Assembling webapp[helloworld] in
[C:\Projects\Data\WorkSpace\helloworld\target\helloworld]
[INFO] Processing war project
[INFO] Webapp assembled in[150 msecs]
[INFO] Building war:
C:\Projects\Data\WorkSpace\helloworld\target\helloworld.war
[INFO] ------------------------------------------------
[INFO] BUILD SUCCESSFUL
[INFO] ------------------------------------------------
```

```
[INFO] Total time: 3 seconds
[INFO] Finished at: Mon Nov 05 16:34:46 IST 2012
[INFO] Final Memory: 2M/15M
[INFO] ------------------------------------------------
```

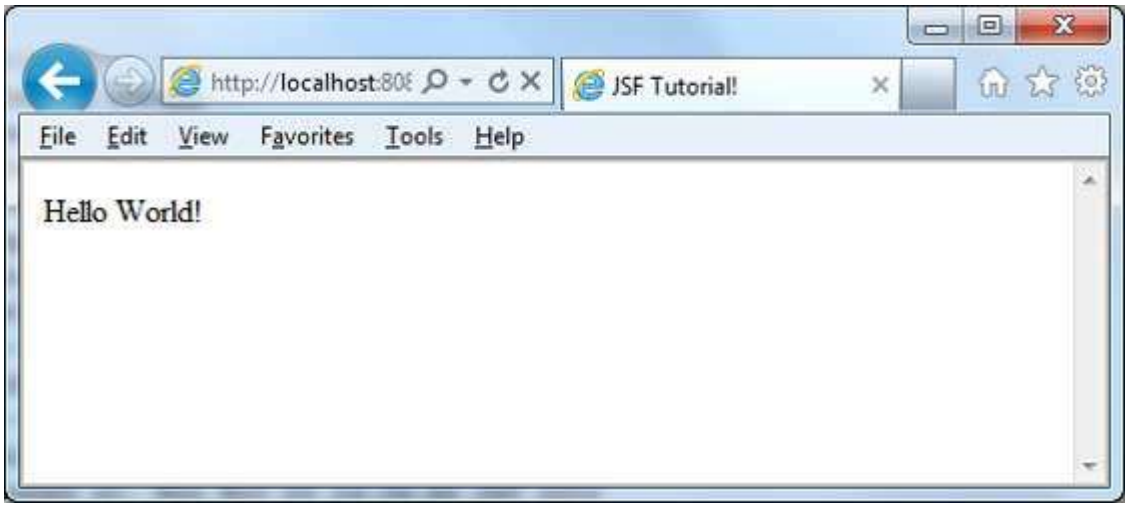
Deploy WAR file

- Stop the tomcat server.
- Copy the helloworld.war file to tomcat installation directory > webapps folder.
- Start the tomcat server.
- Look inside webapps directory, there should be a folder helloworld got created.
- Now helloworld.war is successfully deployed in Tomcat Webserver root.

Run Application

Enter a url in web browser: **http://localhost:8080/helloworld/home.jsf** to launch the application

Server name (localhost) and port (8080) may vary as per your tomcat configuration.



CHAPTER

6

JSF – Managed Beans

Managed Bean is a regular Java Bean class registered with JSF. In other words, Managed Beans is a java bean managed by JSF framework.

- The managed bean contains the getter and setter methods, business logic or even a backing bean (a bean contains all the HTML form value).
- Managed beans works as Model for UI component.
- Managed Bean can be accessed from JSF page.
- In JSF 1.2,a managed bean had to register it in JSF configuration file such as faces-config.xml.
- From JSF 2.0 onwards, Managed beans can be easily registered using annotations. This approach keeps beans and there registration at one place and it becomes easier to manage.

Using XML Configuration

```
<managed-bean>
  <managed-bean-name>helloWorld</managed-bean-name>
  <managed-bean-class>com.tutorialspoint.test.HelloWorld</managed-bean-class>
  <managed-bean-scope>request</managed-bean-scope>
</managed-bean>
<managed-bean>
  <managed-bean-name>message</managed-bean-name>
  <managed-bean-class>com.tutorialspoint.test.Message</managed-bean-class>
  <managed-bean-scope>request</managed-bean-scope>
</managed-bean>
```

Using Annotation

```
@ManagedBean(name = "helloWorld", eager = true)
@RequestScoped
public class HelloWorld {

   @ManagedProperty(value="#{message}")
   private Message message;
   ...
```

```
}
```

@ManagedBean Annotation

@ManagedBean marks a bean to be a managed bean with the name specified in **name** attribute. If the name attribute is not specified, then the managed bean name will default to class name portion of the fully qualified class name. In our case it would be helloWorld.

Another important attribute is **eager**. If eager="true" then managed bean is created before it is requested for the first time otherwise "lazy" initialization is used in which bean will be created only when it is requested.

Scope Annotations

Scope annotations set the scope into which the managed bean will be placed. If scope is not specified then bean will default to request scope. Each scope is briefly discussed below

Scope	Description
@RequestScoped	Bean lives as long as the HTTP request-response lives. It get created upon a HTTP request and get destroyed when the HTTP response associated with the HTTP request is finished.
@NoneScoped	Bean lives as long as a single EL evaluation. It get created upon an EL evaluation and get destroyed immediately after the EL evaluation.
@ViewScoped	Bean lives as long as user is interacting with the same JSF view in the browser window/tab. It get created upon a HTTP request and get destroyed once user postback to a different view.
@SessionScoped	Bean lives as long as the HTTP session lives. It get created upon the first HTTP request involving this bean in the session and get destroyed when the HTTP session is invalidated.
@ApplicationScoped	Bean lives as long as the web application lives. It get created upon the first HTTP request involving this bean in the application (or when the web application starts up and the eager=true attribute is set in @ManagedBean) and get destroyed when the web application shuts down.
@CustomScoped	Bean lives as long as the bean's entry in the custom Map which is created for this scope lives.

@ManagedProperty Annotation

JSF is a simple static Dependency Injection(DI) framework.Using **@ManagedProperty** annotation a managed bean's property can be injected in another managed bean.

Example Application

Let us create a test JSF application to test the above annotations for managed beans.

Step	Description

1	Create a project with a name *helloworld* under a package *com.tutorialspoint.test* as explained in the *JSF - Create Application* chapter.
2	Modify *HelloWorld.java* as explained below. Keep rest of the files unchanged.
3	Create *Message.java* under a package *com.tutorialspoint.test* as explained below.
4	Compile and run the application to make sure business logic is working as per the requirements.
5	Finally, build the application in the form of war file and deploy it in Apache Tomcat Webserver.
6	Launch your web application using appropriate URL as explained below in the last step.

HelloWorld.java

```
package com.tutorialspoint.test;

import javax.faces.bean.ManagedBean;
import javax.faces.bean.ManagedProperty;
import javax.faces.bean.RequestScoped;

@ManagedBean(name = "helloWorld", eager = true)
@RequestScoped
public class HelloWorld {

   @ManagedProperty(value="#{message}")
   private Message messageBean;

   private String message;

   public HelloWorld() {
      System.out.println("HelloWorld started!");
   }
   public String getMessage() {
      if(messageBean != null){
         message = messageBean.getMessage();
      }
      return message;
   }
   public void setMessageBean(Message message) {
      this.messageBean = message;
   }
}
```

Message.java

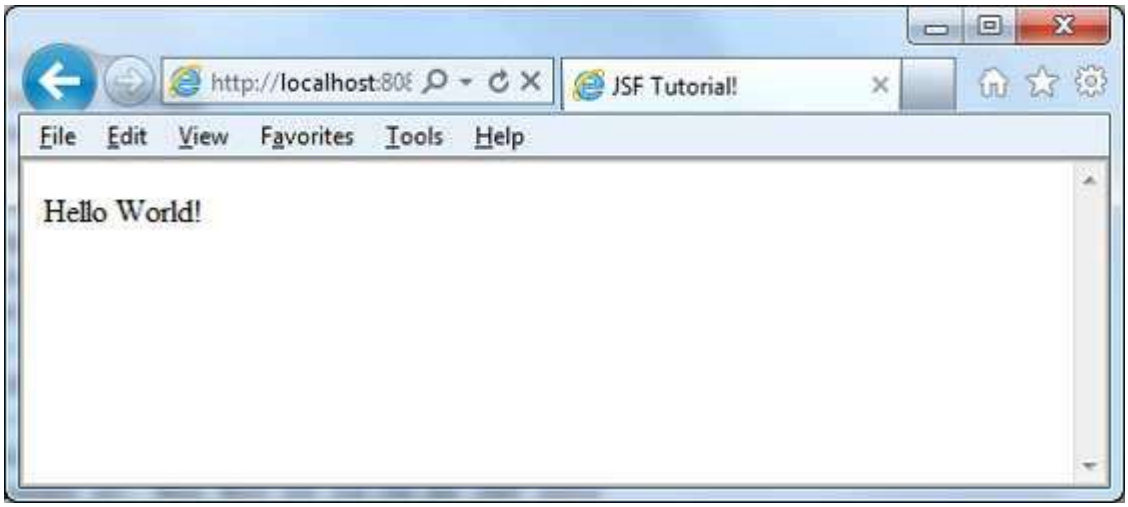
```
package com.tutorialspoint.test;

import javax.faces.bean.ManagedBean;
import javax.faces.bean.RequestScoped;

@ManagedBean(name = "message", eager = true)
@RequestScoped
public class Message {
```

```
            private String message = "Hello World!";

            public String getMessage() {
        return message;
    }
    public void setMessage(String message) {
        this.message = message;
    }
}
```

home.xhtml

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
   "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
   <title>JSF Tutorial!</title>
</head>
<body>
   #{helloWorld.message}
</body>
</html>
```

Once you are ready with all the changes done, let us compile and run the application as we did in JSF - Create Application chapter. If everything is fine with your application, this will produce following result:



CHAPTER

7

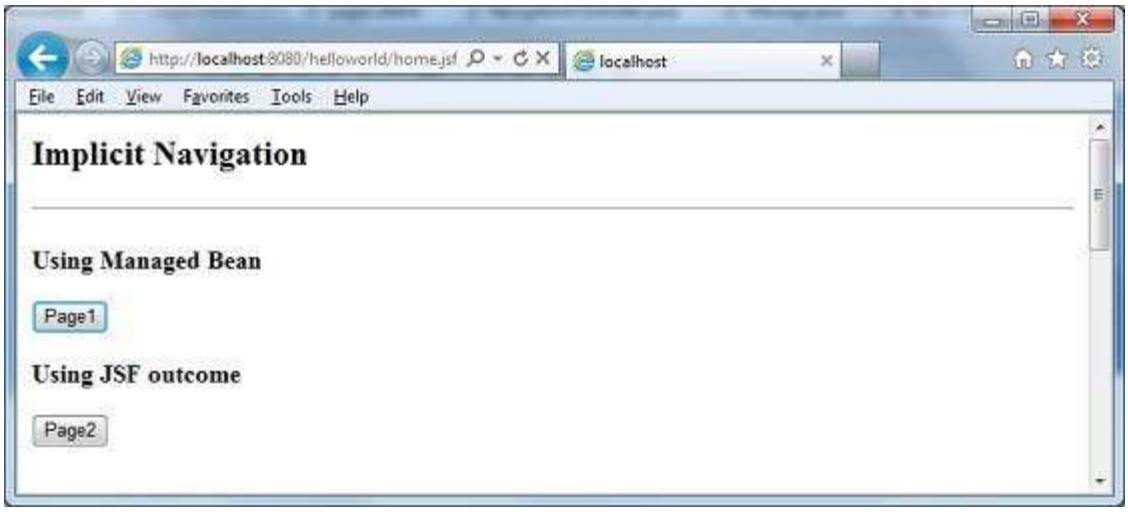
JSF – Page Navigation

Navigation rules are those rules provided by JSF Framework which describe which view is to be shown when a button or link is clicked.

- Navigation rules can be defined in JSF configuration file named faces-config.xml.
- Navigation rules can be defined in managed beans.
- Navigation rules can contain conditions based on which resulted view can be shown.
- JSF 2.0 provides implicit navigation as well in which there is no need to define navigation rules as such.

Implicit Navigation

JSF 2.0 provides **auto view page resolver** mechanism named **implicit navigation**. In this case you only need to put view name in **action** attribute and JSF will search the correct **view** page automatically in the deployed application.

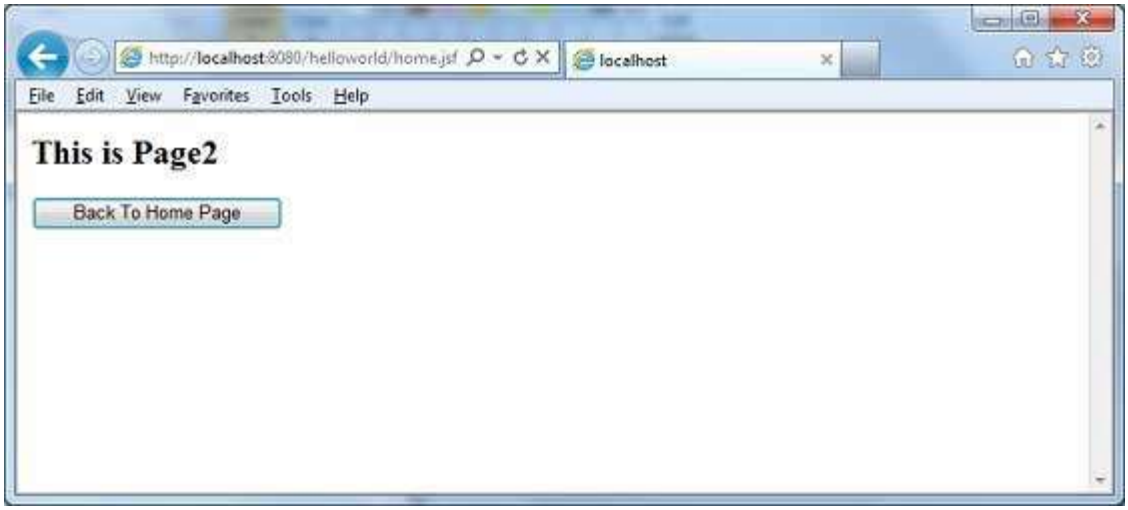


Auto navigation in JSF page

Set view name in action attribute of any JSF UI Component.

```
<h:form>
   <h3>Using JSF outcome</h3>
   <h:commandButton action="page2" value="Page2" />
</h:form>
```

Here when **Page2** button is clicked, JSF will resolve the view name, **page2** as page2.xhtml extension, and find the corresponding view file **page2.xhtml** in the current directory.



Auto navigation in Managed Bean

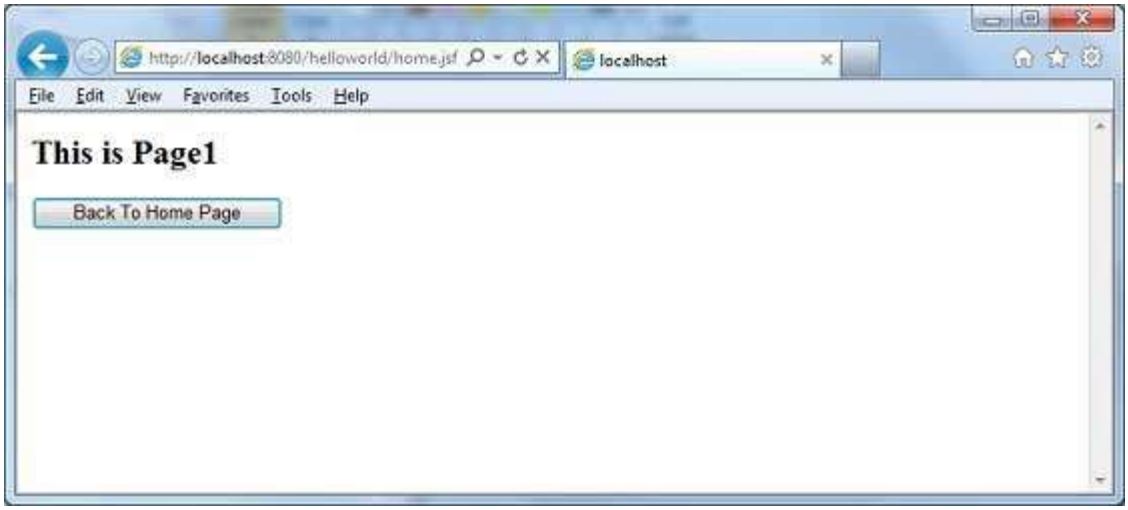
Define a method in managed bean to return a view name.

```
ManagedBean(name = "navigationController", eager = true)
@RequestScoped
public class NavigationController implements Serializable {
   public String moveToPage1(){
      return "page1";
   }
}
```

Get view name in action attribute of any JSF UI Component using managed bean.

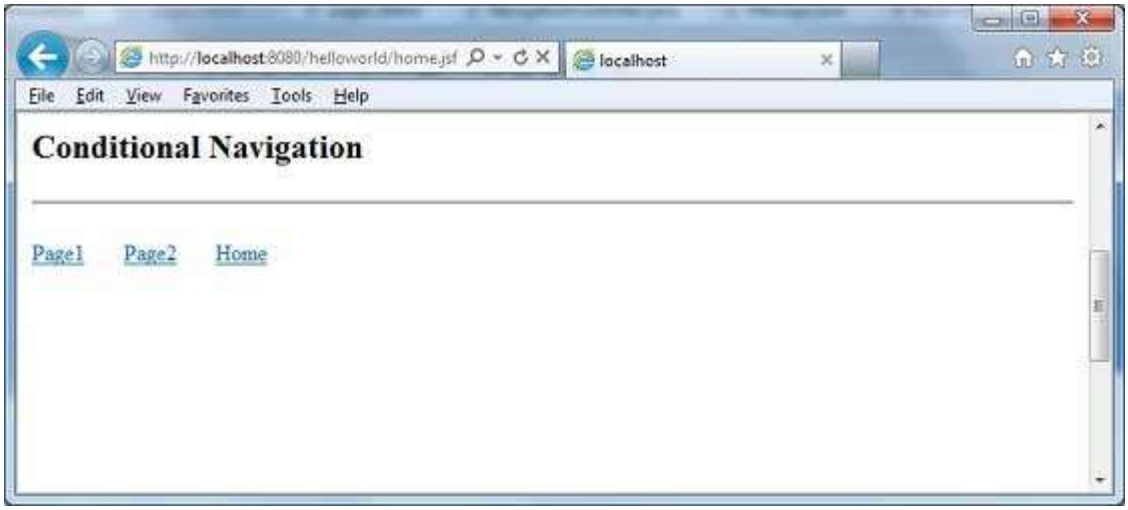
```
<h:form>
   <h3>Using Managed Bean</h3>
   <h:commandButton action="#{navigationController.moveToPage1}"
   value="Page1" />
</h:form>
```

Here when **Page1** button is clicked, JSF will resolve the view name, **page1** as page1.xhtml extension, and find the corresponding view file **page1.xhtml** in the current directory.



Conditional Navigation

Using managed bean we can very easily control the navigation. Look at following code in a managed bean.




```
ManagedBean(name = "navigationController", eager = true)
@RequestScoped
public class NavigationController implements Serializable {

   //this managed property will read value from request parameter pageId
   @ManagedProperty(value="#{param.pageId}")
   private String pageId;

   //condional navigation based on pageId
   //if pageId is 1 show page1.xhtml,
```

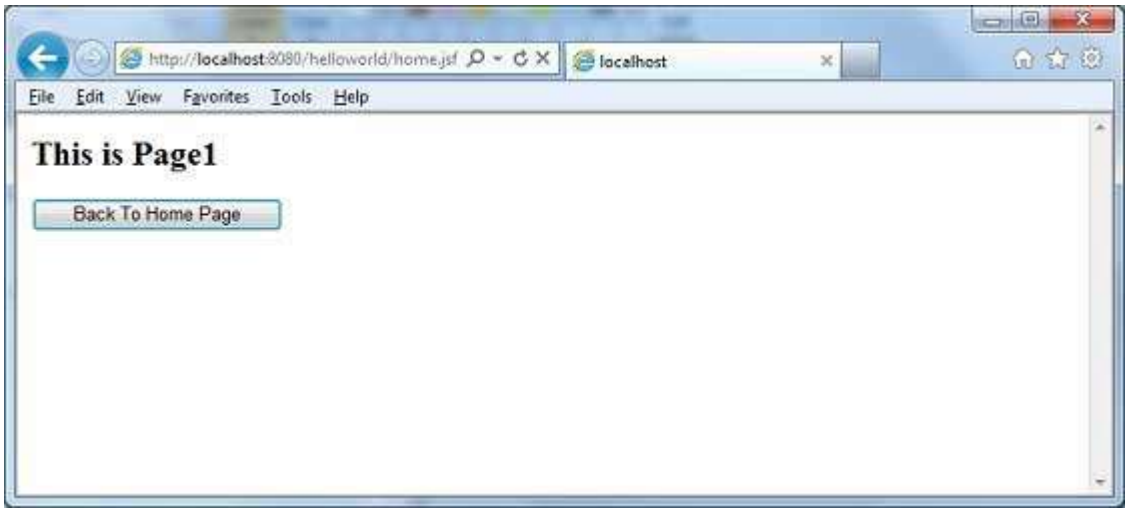
```
   //if pageId is 2 show page2.xhtml
   //else show home.xhtml
   public String showPage(){
      if(pageId == null){
         return "home";
      }
      if(pageId.equals("1")){
         return "page1";
      }else if(pageId.equals("2")){
         return "page2";
      }else{
         return "home";
      }
   }
}
```

Pass pageId as a request parameter in JSF UI Component.

```
<h:form>
   <h:commandLink action="#{navigationController.showPage}" value="Page1">
      <f:param name="pageId" value="1" />
   </h:commandLink>
   <h:commandLink action="#{navigationController.showPage}" value="Page2">
      <f:param name="pageId" value="2" />
   </h:commandLink>
   <h:commandLink action="#{navigationController.showPage}" value="Home">
      <f:param name="pageId" value="3" />
   </h:commandLink>
</h:form>
```

Here when "Page1" button is clicked

- JSF will create a request with parameter pageId=1
- Then JSF will pass this parameter to managed property pageId of navigationController
- Now navigationController.showPage() is called which will return view as page1 after checking the pageId
- JSF will resolve the view name, page1 as page1.xhtml extension
- and find the corresponding view file page1.xhtml in the current directory



Resolving Navigation based on from-action

JSF provides navigation resolution option even if managed bean different methods returns same view name.

Look at following code in a managed bean.

```
public String processPage1(){
   return "page";
}
public String processPage2(){
   return "page";
}
```

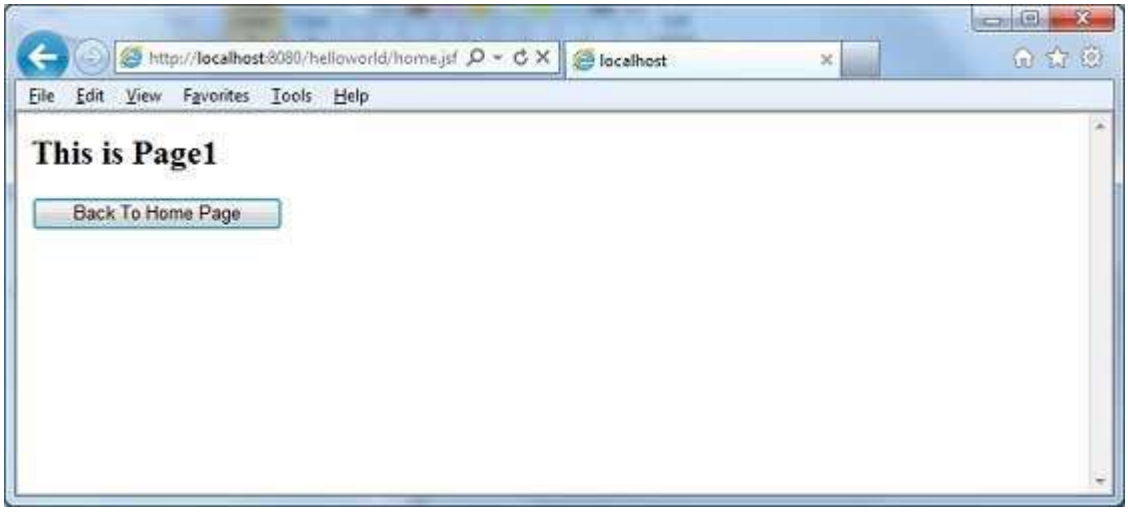
To resolve views, define following navigation rule in **faces-config.xml**

```
<navigation-rule>
   <from-view-id>home.xhtml</from-view-id>
   <navigation-case>
```

```
      <from-action>#{navigationController.processPage1}</from-action>
      <from-outcome>page</from-outcome>
      <to-view-id>page1.jsf</to-view-id>
   </navigation-case>
   <navigation-case>
      <from-action>#{navigationController.processPage2}</from-action>
      <from-outcome>page</from-outcome>
      <to-view-id>page2.jsf</to-view-id>
   </navigation-case>
</navigation-rule>
```

Here when **Page1** button is clicked

- navigationController.processPage1() is called which will return view as page
- JSF will resolve the view name, page1 as view name is page and from-action in faces-config isnavigationController.processPage1
- and find the corresponding view file page1.xhtml in the current directory



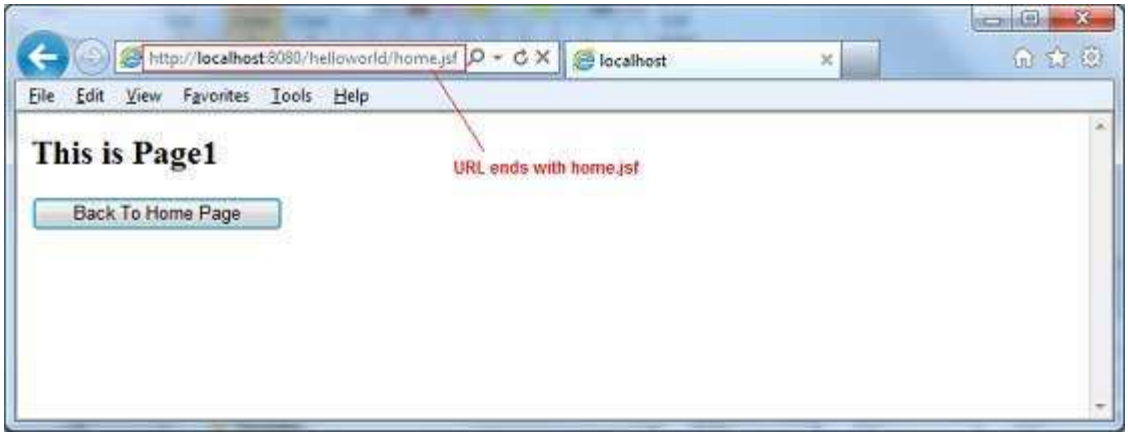
Forward vs Redirect

JSF by default performs a server page forward while navigating to another page and the URL of the application do not changes.

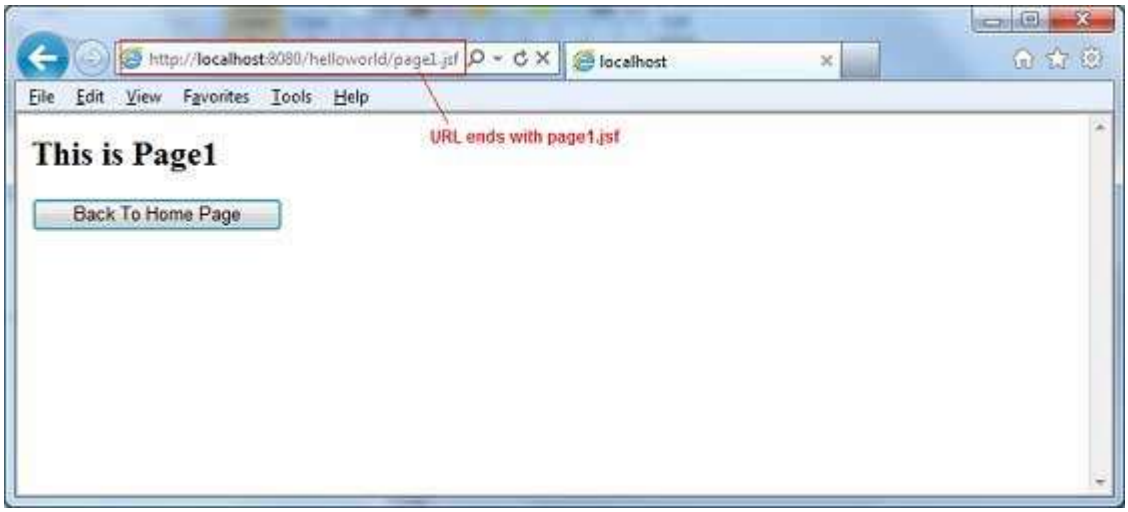
To enable the page redirection, append **faces-redirect=true** at the end of the view name.


```
<h:form>
   <h3>Forward</h3>
   <h:commandButton action="page1" value="Page1" />
   <h3>Redirect</h3>
   <h:commandButton action="page1?faces-redirect=true" value="Page1" />
</h:form>
```

Here when **Page1** button under **Forward** is clicked



Here when **Page1** button under **Redirect** is clicked



Example Application

Let us create a test JSF application to test all of the above navigation examples.

Step	Description
1	Create a project with a name *helloworld* under a package *com.tutorialspoint.test* as explained in the *JSF - Create Application* chapter.
2	Create *NavigationController.java* under a package *com.tutorialspoint.test* as explained below.
3	Create *faces-config.xml* under a *WEB-INF* folder and updated its contents as explained below.
4	Update *web.xml* under a *WEB-INF* folder as explained below.
5	Create *page1.xhtml* and *page2.xhtml* and modify *home.xhtml* under a *webapp* folder as explained below.
6	Compile and run the application to make sure business logic is working as per the requirements.
7	Finally, build the application in the form of war file and deploy it in Apache Tomcat Webserver.
8	Launch your web application using appropriate URL as explained below in the last step.

NavigationController.java

```
package com.tutorialspoint.test;

import java.io.Serializable;

import javax.faces.bean.ManagedBean;
import javax.faces.bean.ManagedProperty;
import javax.faces.bean.RequestScoped;

@ManagedBean(name = "navigationController", eager = true)
@RequestScoped
public class NavigationController implements Serializable {

   private static final long serialVersionUID = 1L;
```

```
   @ManagedProperty(value="#{param.pageId}")
   private String pageId;

   public String moveToPage1(){
      return "page1";
   }

   public String moveToPage2(){
      return "page2";
   }

   public String moveToHomePage(){
      return "home";
   }

   public String processPage1(){
      return "page";
   }

   public String processPage2(){
      return "page";
   }

   public String showPage(){
      if(pageId == null){
         return "home";
      }
      if(pageId.equals("1")){
         return "page1";
      }else if(pageId.equals("2")){
         return "page2";
      }else{
         return "home";
      }
   }

   public String getPageId() {
      return pageId;
   }

   public void setPageId(String pageId) {
      this.pageId = pageId;
   }
}
```

faces-config.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<faces-config
   xmlns="http://java.sun.com/xml/ns/javaee"
   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   xsi:schemaLocation="http://java.sun.com/xml/ns/javaee
   http://java.sun.com/xml/ns/javaee/web-facesconfig_2_0.xsd"
   version="2.0">
   <navigation-rule>
```

```
      <from-view-id>home.xhtml</from-view-id>
      <navigation-case>
         <from-action>#{navigationController.processPage1}</from-action>
         <from-outcome>page</from-outcome>
         <to-view-id>page1.jsf</to-view-id>
      </navigation-case>
      <navigation-case>
         <from-action>#{navigationController.processPage2}</from-action>
         <from-outcome>page</from-outcome>
         <to-view-id>page2.jsf</to-view-id>
      </navigation-case>
   </navigation-rule>
</faces-config>
```

web.xml

```
<!DOCTYPE web-app PUBLIC
   "-//Sun Microsystems, Inc.//DTD Web Application 2.3//EN"
   "http://java.sun.com/dtd/web-app_2_3.dtd" >

   <web-app>
   <display-name>Archetype Created Web Application</display-name>

   <context-param>
      <param-name>javax.faces.PROJECT_STAGE</param-name>
      <param-value>Development</param-value>
   </context-param>
   <context-param>
      <param-name>javax.faces.CONFIG_FILES</param-name>
      <param-value>/WEB-INF/faces-config.xml</param-value>
   </context-param>
   <servlet>
      <servlet-name>Faces Servlet</servlet-name>
      <servlet-class>javax.faces.webapp.FacesServlet</servlet-class>
   </servlet>
   <servlet-mapping>
      <servlet-name>Faces Servlet</servlet-name>
      <url-pattern>*.jsf</url-pattern>
   </servlet-mapping>
</web-app>
```

page1.xhtml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
   "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml"
   xmlns:h="http://java.sun.com/jsf/html">
   <h:body>
      <h2>This is Page1</h2>
      <h:form>
         <h:commandButton action="home?faces-redirect=true"
            value="Back To Home Page" />
      </h:form>
   </h:body>
```

```
</html>
```

page2.xhtml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
   "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml"
   xmlns:h="http://java.sun.com/jsf/html">
   <h:body>
      <h2>This is Page2</h2>
      <h:form>
         <h:commandButton action="home?faces-redirect=true"
            value="Back To Home Page" />
      </h:form>
   </h:body>
</html>
```

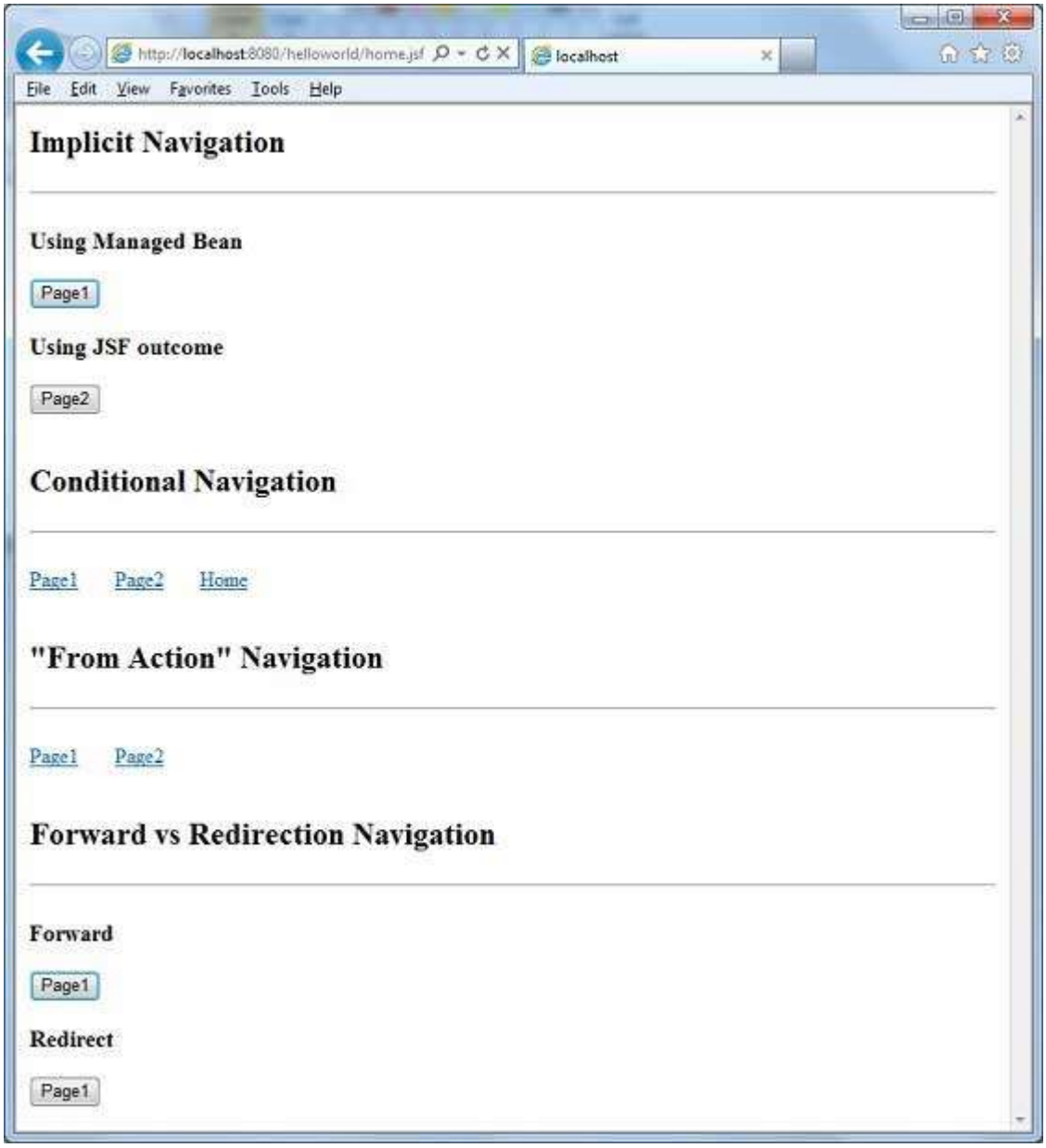
home.xhtml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml"
   xmlns:f="http://java.sun.com/jsf/core"
   xmlns:h="http://java.sun.com/jsf/html">

   <h:body>
      <h2>Implicit Navigation</h2>
      <hr />
      <h:form>
         <h3>Using Managed Bean</h3>
         <h:commandButton action="#{navigationController.moveToPage1}"
            value="Page1" />
         <h3>Using JSF outcome</h3>
         <h:commandButton action="page2" value="Page2" />
      </h:form>
      <br/>
      <h2>Conditional Navigation</h2>
      <hr />
      <h:form>
         <h:commandLink action="#{navigationController.showPage}"
            value="Page1">
            <f:param name="pageId" value="1" />
         </h:commandLink>

         <h:commandLink action="#{navigationController.showPage}"
            value="Page2">
            <f:param name="pageId" value="2" />
         </h:commandLink>

         <h:commandLink action="#{navigationController.showPage}"
            value="Home">
            <f:param name="pageId" value="3" />
         </h:commandLink>
      </h:form>
```

```
      <br/>
      <h2>"From Action" Navigation</h2>
      <hr />
      <h:form>
         <h:commandLink action="#{navigationController.processPage1}"
         value="Page1" />

         <h:commandLink action="#{navigationController.processPage2}"
         value="Page2" />

      </h:form>
      <br/>
      <h2>Forward vs Redirection Navigation</h2>
      <hr />
      <h:form>
         <h3>Forward</h3>
         <h:commandButton action="page1" value="Page1" />
         <h3>Redirect</h3>
         <h:commandButton action="page1?faces-redirect=true"
         value="Page1" />
      </h:form>
   </h:body>
```

```
</html>
```

Once you are ready with all the changes done, let us compile and run the application as we did in JSF - Create Application chapter. If everything is fine with your application, this will produce following result:


http://localhost:8080/helloworld/home.jsf
localhost
File Edit View Favorites Tools Help
Implicit Navigation
Using Managed Bean
Page1
Using JSF outcome
Page2
Conditional Navigation
Page1 Page2 Home
"From Action" Navigation
Page1 Page2
Forward vs Redirection Navigation
Forward
Page1
Redirect
Page1

CHAPTER

8

JSF – Basic Tags

JSF provides a standard HTML tag library. These tags get rendered into corresponding html output.

For these tags you need to use the following namespaces of URI in html node.

```
<html
   xmlns="http://www.w3.org/1999/xhtml"
   xmlns:h="http://java.sun.com/jsf/html"
>
```

Following are important *Basic Tags* in JSF 2.0:

S.N.	Tag & Description
1	h:inputText Renders a HTML input of type="text", text box.
2	h:inputSecret Renders a HTML input of type="password", text box.
3	h:inputTextarea Renders a HTML textarea field.
4	h:inputHidden Renders a HTML input of type="hidden".
5	h:selectBooleanCheckbox Renders a single HTML check box.
6	h:selectManyCheckbox Renders a group of HTML check boxes.
7	h:selectOneRadio Renders a single HTML radio button.
8	h:selectOneListbox Renders a HTML single list box.
9	h:selectManyListbox Renders a HTML multiple list box.
10	h:selectOneMenu Renders a HTML combo box.

11	h:outputText Renders a HTML text.
12	h:outputFormat Renders a HTML text. It accepts parameters.
13	h:graphicImage Renders an image.
14	h:outputStylesheet Includes a CSS style sheet in HTML output.
15	h:outputScript Includes a script in HTML output.
16	h:commandButton Renders a HTML input of type="submit" button.
17	h:Link Renders a HTML anchor.
18	h:commandLink Renders a HTML anchor.
19	h:outputLink Renders a HTML anchor.
20	h:panelGrid Renders an HTML Table in form of grid.
21	h:message Renders message for a JSF UI Component.
22	h:messages Renders all message for JSF UI Components.
23	f:param Pass parameters to JSF UI Component.
24	f:attribute Pass attribute to a JSF UI Component.
25	f:setPropertyActionListener Sets value of a managed bean's property

CHAPTER

9

JSF – Facelets Tags

JSF provides special tags to create common layout for a web application called facelets tags. These tags gives flexibility to manage common parts of a multiple pages at one place.

For these tags you need to use the following namespaces of URI in html node.

```
<html
   xmlns="http://www.w3.org/1999/xhtml"
   xmlns:ui="http://java.sun.com/jsf/facelets"
>
```

Following are important *Facelets Tags* in JSF 2.0:

S.N.	Tag & Description
1	Templates We'll demonstrate how to use templates using following tags <ui:insert> <ui:define> <ui:include> <ui:define>
2	Parameters We'll demonstrate how to pass parameters to a template file using following tag <ui:param>
3	Custom We'll demonstrate how to create custom tags.
4	Remove We'll demonstrate capability to remove JSF code from generated HTML page.

CHAPTER

11

JSF – Convertor Tags

JSF provides inbuilt convertors to convert its UI component's data to object used in a managed bean and vice versa. For example, these tags can convert a text into date object and can validate the format of input as well.

For these tags you need to use the following namespaces of URI in html node.

```
<html
   xmlns="http://www.w3.org/1999/xhtml"
   xmlns:f="http://java.sun.com/jsf/core"
>
```

Following are important *Convertor Tags* in JSF 2.0:

S.N.	Tag & Description
1	f:convertNumber Converts a String into a Number of desired format
2	f:convertDateTime Converts a String into a Date of desired format
3	Custom Convertor Creating a custom convertor

CHAPTER

11

JSF – Validator Tags

JSF provides inbuilt validators to validate its UI components. These tags can validates length of field, type of input which can be a custom object.

For these tags you need to use the following namespaces of URI in html node.

```
<html
   xmlns="http://www.w3.org/1999/xhtml"
   xmlns:f="http://java.sun.com/jsf/core"
>
```

Following are important *Validator Tags* in JSF 2.0:

S.N.	Tag & Description
1	f:validateLength Validates length of a string
2	f:validateLongRange Validates range of numeric value
3	f:validateDoubleRange Validates range of float value
4	f:validateRegex Validate JSF component with a given regular expression.
5	Custom Validator Creating a custom validator

CHAPTER

12

JSF – Data Table

JSF provides a rich control named DataTable to render and format html tables.

- DataTable can iterate over collection or array of values to display data.
- DataTable provides attributes to modify its data in easy way.

HTML Header

```
<html
   xmlns="http://www.w3.org/1999/xhtml"
   xmlns:h="http://java.sun.com/jsf/html">
</html>
```

Following are important *DataTable* operations in JSF 2.0:

S.N.	Tag & Description
1	Display DataTable How to display a datatable
2	Add data How to add a new row in a datatable
3	Edit data How to edit a row in a datatable
4	Delete data How to delete a row in datatable
5	Using DataModel Use DataModel to display row numbers in a datatable

CHAPTER

13

JSF – Composite Components

JSF provides developer a powerful capability to define own custom components which can be used to render custom contents.

Define Custom Component

Defining a custom component in JSF is a two step process

Step No.	Description
1a	Create a resources folder. Create a xhtml file in resources folder with a composite namespace.
1b	Use composite tags *composite:interface*, *composite:attribute* and*composite:implementation*, to define content of the composite component. Use *cc.attrs* in *composite:implementation* to get variable defined using *composite:attribute*in *composite:interface*.

Step 1a: Create custom component : loginComponent.xhtml

Create a folder tutorialspoint in resources folder and create a file loginComponent.xhtml in it

Use composite namespace in html header.

```
<html xmlns="http://www.w3.org/1999/xhtml"
      xmlns:h="http://java.sun.com/jsf/html"
      xmlns:f="http://java.sun.com/jsf/core"
      xmlns:composite="http://java.sun.com/jsf/composite"
      >
...
</html>
```

Step 1b: Use composite tags : loginComponent.xhtml

Following table describes use of composite tags.

S.N.	tag & Description
1	**composite:interface** Declare configurable values to be used in composite:implementation
2	**composite:attribute** Configuration values are declared using this tag
3	**composite:implementation** Declares JSF component. Can access the configurable values defined in composite:interface using #{cc.attrs.attribute-name} expression.

```
<composite:interface>
   <composite:attribute name="usernameLabel" />
   <composite:attribute name="usernameValue" />
</composite:interface>
<composite:implementation>
<h:form>
   #{cc.attrs.usernameLabel} :
   <h:inputText id="username" value="#{cc.attrs.usernameValue}" />
</h:form>
```

Use Custom Component

Using a custom component in JSF is a simple process

Step No.	Description
2a	Create a xhtml file and use custom component's namespace. Namespace will the *http://java.sun.com/jsf/<folder-name> where folder-name is folder in resources directory containing the custom compoent*
2b	Use the custom component as normal JSF tags

Step 2a: Use Custom Namespace: home.xhtml

```
<html xmlns="http://www.w3.org/1999/xhtml"
   xmlns:h="http://java.sun.com/jsf/html"
   xmlns:ui="http://java.sun.com/jsf/facelets">
   xmlns:tp="http://java.sun.com/jsf/composite/tutorialspoint">
```

Step 2b: Use Custom Tag: home.xhtml and pass values

```
<h:form>
   <tp:loginComponent
      usernameLabel="Enter User Name: "
      usernameValue="#{userData.name}" />
</h:form>
```

Example Application

Let us create a test JSF application to test the custom component in JSF.

Step	Description
1	Create a project with a name *helloworld* under a package *com.tutorialspoint.test* as explained in the *JSF - First Application* chapter.
2	Create *resources* folder under *src* > *main* folder.
3	Create *tutorialspoint* folder under *src* > *main* > *resources* folder.
4	Create *loginComponent.xhtml* file under *src* > *main* > *resources* > *tutorialspoint* folder.
5	Modify *UserData.java* file as explained below.
6	Modify *home.xhtml* as explained below. Keep rest of the files unchanged.
7	Compile and run the application to make sure business logic is working as per the requirements.
8	Finally, build the application in the form of war file and deploy it in Apache Tomcat Webserver.
9	Launch your web application using appropriate URL as explained below in the last step.

loginComponent.xhtml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml"
   xmlns:h="http://java.sun.com/jsf/html"
   xmlns:f="http://java.sun.com/jsf/core"
   xmlns:composite="http://java.sun.com/jsf/composite">
   <composite:interface>
      <composite:attribute name="usernameLabel" />
      <composite:attribute name="usernameValue" />
      <composite:attribute name="passwordLabel" />
      <composite:attribute name="passwordValue" />
      <composite:attribute name="loginButtonLabel" />
      <composite:attribute name="loginButtonAction"
         method-signature="java.lang.String login()" />
   </composite:interface>
   <composite:implementation>
      <h:form>
         <h:message for="loginPanel" style="color:red;" />
         <h:panelGrid columns="2" id="loginPanel">
            #{cc.attrs.usernameLabel} :
            <h:inputText id="username" value="#{cc.attrs.usernameValue}" />
            #{cc.attrs.passwordLabel} :
            <h:inputSecret id="password" value="#{cc.attrs.passwordValue}" />
         </h:panelGrid>
         <h:commandButton action="#{cc.attrs.loginButtonAction}"
            value="#{cc.attrs.loginButtonLabel}"/>
      </h:form>
   </composite:implementation>
</html>
```

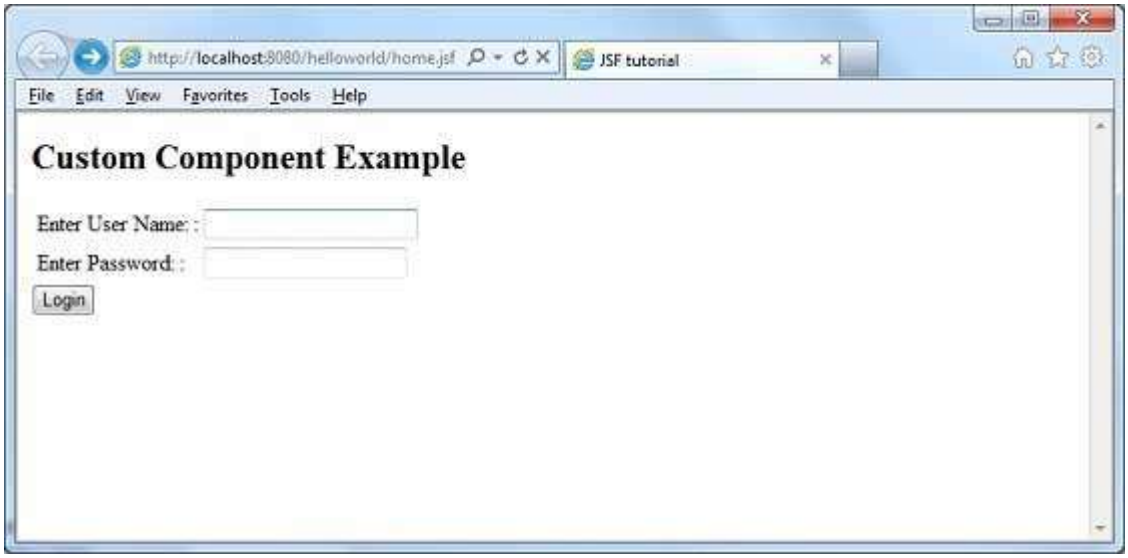
UserData.java

```
package com.tutorialspoint.test;

import java.io.Serializable;

import javax.faces.bean.ManagedBean;
import javax.faces.bean.SessionScoped;

@ManagedBean(name = "userData", eager = true)
@SessionScoped
public class UserData implements Serializable {

   private static final long serialVersionUID = 1L;

   private String name;
   private String password;
   public String getName() {
      return name;
   }
   public void setName(String name) {
      this.name = name;
   }
   public String getPassword() {
      return password;
   }
   public void setPassword(String password) {
      this.password = password;
   }
   public String login(){
      return "result";
   }
}
```

home.xhtml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml"
   xmlns:h="http://java.sun.com/jsf/html"
   xmlns:f="http://java.sun.com/jsf/core"
   xmlns:tp="http://java.sun.com/jsf/composite/tutorialspoint">
   <h:head>
      <title>JSF tutorial</title>
   </h:head>
   <h:body>
      <h2>Custom Component Example</h2>
      <h:form>
      <tp:loginComponent
         usernameLabel="Enter User Name: "
         usernameValue="#{userData.name}"
         passwordLabel="Enter Password: "
         passwordValue="#{userData.password}"
         loginButtonLabel="Login"
         loginButtonAction="#{userData.login}" />
      </h:form>
   </h:body>
</html>
```

Once you are ready with all the changes done, let us compile and run the application as we did in JSF - First Application chapter. If everything is fine with your application, this will produce following result:



CHAPTER

14

JSF – Ajax

Ajax: A Brief Introduction

- AJAX stands for Asynchronous JavaScrict And Xml.
- Ajax is a technique to use HTTPXMLObject of JavaScript to send data to server and receive data from server asynchronously.
- So using Ajax technique, javascript code exchanges data with server, updates parts of web page without reloading the whole page.
- JSF provides execellent support for making ajax call. It provides f:ajax tag to handle ajax calls.

JSF Tag

```
<f:ajax execute="input-component-name" render="output-component-name" />
```

Tag Attributes

S.N.	Attribute & Description
1	**disabled** If true, the Ajax behavior will be applied to any parent or child components. If false, the Ajax behavior will be disabled.
2	**event** The event that will invoke Ajax requests, for example "click", "change", "blur", "keypress", etc.
3	**execute** A space-separated List of IDs for components that should be included in the Ajax request.
4	**immediate** If "true" behavior events generated from this behavior are broadcast during Apply Request Values phase. Otherwise, the events will be broadcast during Invoke Applications phase
5	**listener** An EL expression for a method in a backing bean to be called during the Ajax request.
6	**onerror** The name of a JavaScript callback function that will be invoked if there is an error during the Ajax request
7	**onevent**

	The name of a JavaScript callback function that will be invoked to handle UI events.
8	**render** A space-separated list of IDs for components that will be updated after an Ajax request.

Example Application

Let us create a test JSF application to test the custom component in JSF.

Step	Description
1	Create a project with a name *helloworld* under a package *com.tutorialspoint.test* as explained in the *JSF - First Application* chapter.
2	Modify *UserData.java* file as explained below.
3	Modify *home.xhtml* as explained below. Keep rest of the files unchanged.
4	Compile and run the application to make sure business logic is working as per the requirements.
5	Finally, build the application in the form of war file and deploy it in Apache Tomcat Webserver.
6	Launch your web application using appropriate URL as explained below in the last step.

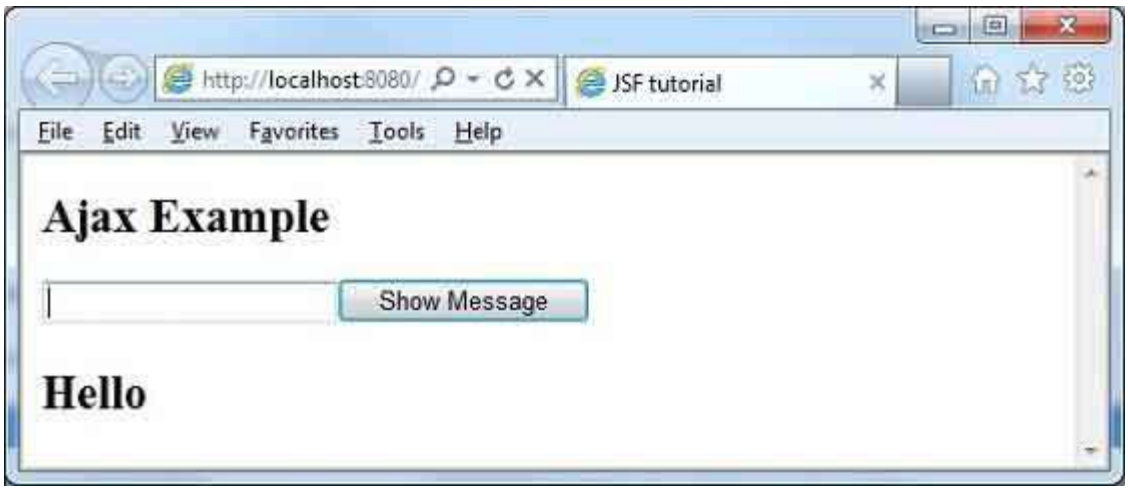
UserData.java

```
package com.tutorialspoint.test;

import java.io.Serializable;

import javax.faces.bean.ManagedBean;
import javax.faces.bean.SessionScoped;

@ManagedBean(name = "userData", eager = true)
@SessionScoped
public class UserData implements Serializable {

   private static final long serialVersionUID = 1L;

   private String name;
   public String getName() {
      return name;
   }
   public void setName(String name) {
      this.name = name;
   }

   public String getWelcomeMessage(){
      return "Hello " + name;
   }
}
```

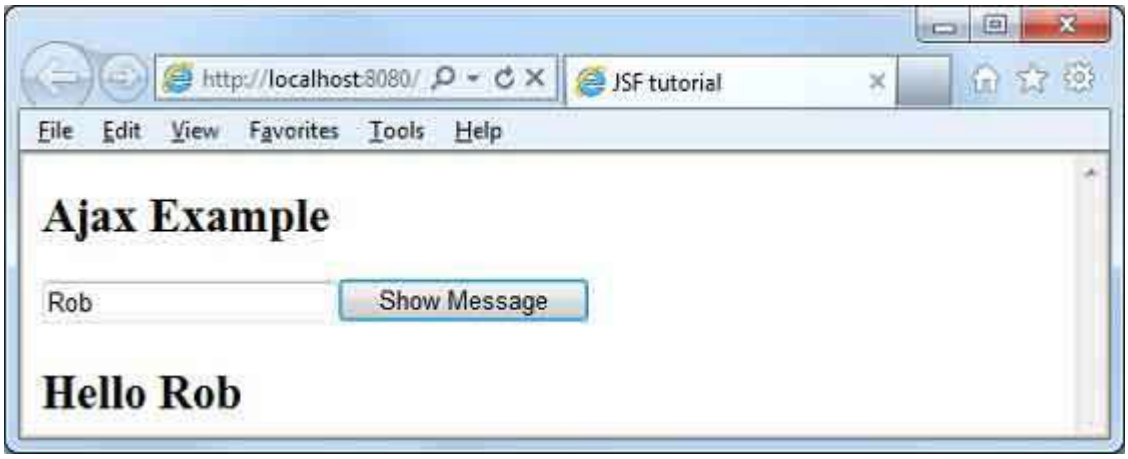
home.xhtml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml"
   xmlns:h="http://java.sun.com/jsf/html"
   xmlns:f="http://java.sun.com/jsf/core"
   xmlns:tp="http://java.sun.com/jsf/composite/tutorialspoint">
   <h:head>
      <title>JSF tutorial</title>
   </h:head>
   <h:body>
      <h2>Ajax Example</h2>
      <h:form>
      <h:inputText id="inputName" value="#{userData.name}"></h:inputText>
       <h:commandButton value="Show Message">
         <f:ajax execute="inputName" render="outputMessage" />
      </h:commandButton>
      <h2><h:outputText id="outputMessage"
         value="#{userData.welcomeMessage !=null ?
            userData.welcomeMessage : ''}"
         /></h2>
      </h:form>
   </h:body>
</html>
```

Once you are ready with all the changes done, let us compile and run the application as we did in JSF - First Application chapter. If everything is fine with your application, this will produce following result:



Enter name and press *Show Message* button. You will see the following result without page refresh/form submit.


http://localhost:8080/
JSF tutorial
File Edit View Favorites Tools Help
Ajax Example
Rob
Show Message
Hello Rob

CHAPTER

15

JSF – Event Handling

When a user clicks a JSF button or link or changes any value in text field, JSF UI component fires event which will be handled by the the application code.

- To handle such JSF event, event handler are to be registered in the application code or managed bean.
- When a UI component checks that a user event has happened, it creates an instance of the corresponding event class and adds it to an event list.
- Then, Component fires the event, i.e., checks the list of listeners for that event and call the event notification method on each listener or handler.
- JSF also provide system level event handlers which can be used to do some tasks when application starts or is stopping.

Following are important *Event Handler* in JSF 2.0:

S.N.	Event Handlers & Description
1	valueChangeListener Value change events get fired when user make changes in input components.
2	actionListener Action events get fired when user clicks on a button or link component.
3	Application Events Events firing during JSF lifecycle: PostConstructApplicationEvent, PreDestroyApplicationEvent , PreRenderViewEvent.

(1) valueChangeListener

When user interacts with input components, such as h:inputText or h:selectOneMenu, the JSF fires a valueChangeEvent which can be handled in two ways.

Technique	Description
Method Binding	Pass the name of the managed bean method in *valueChangeListener*attribute of UI Component.

ValueChangeListener	Implement ValueChangeListener interface and pass the implementation class name to *valueChangeListener* attribute of UI Component.

Method Binding

Define a method

```
public void localeChanged(ValueChangeEvent e){
   //assign new value to country
   selectedCountry = e.getNewValue().toString();
}
```

Use above method

```
<h:selectOneMenu value="#{userData.selectedCountry}"  onchange="submit()"
   valueChangeListener="#{userData.localeChanged}" >
   <f:selectItems value="#{userData.countries}" />
</h:selectOneMenu>
```

ValueChangeListener

Implement ValueChangeListener

```
public class LocaleChangeListener implements ValueChangeListener {
   @Override
   public void processValueChange(ValueChangeEvent event)
      throws AbortProcessingException {
     //access country bean directly
     UserData userData = (UserData) FacesContext.getCurrentInstance().
        getExternalContext().getSessionMap().get("userData");
     userData.setSelectedCountry(event.getNewValue().toString());
   }
}
```

Use listener method

```
<h:selectOneMenu value="#{userData.selectedCountry}" onchange="submit()">
   <f:valueChangeListener type="com.tutorialspoint.test.LocaleChangeListener"
      />
   <f:selectItems value="#{userData.countries}" />
</h:selectOneMenu>
```

Example Application

Let us create a test JSF application to test the valueChangeListener in JSF.

Step	Description
1	Create a project with a name *helloworld* under a package *com.tutorialspoint.test* as explained in

	the *JSF - First Application* chapter.
2	Modify *UserData.java* file as explained below.
3	Create *LocaleChangeListener.java* file under a package *com.tutorialspoint.test*.Modify it as explained below
4	Modify *home.xhtml* as explained below. Keep rest of the files unchanged.
5	Compile and run the application to make sure business logic is working as per the requirements.
6	Finally, build the application in the form of war file and deploy it in Apache Tomcat Webserver.
7	Launch your web application using appropriate URL as explained below in the last step.

UserData.java

```
package com.tutorialspoint.test;

import java.io.Serializable;
import java.util.LinkedHashMap;
import java.util.Map;

import javax.faces.bean.ManagedBean;
import javax.faces.bean.SessionScoped;
import javax.faces.event.ValueChangeEvent;

@ManagedBean(name = "userData", eager = true)
@SessionScoped
public class UserData implements Serializable {

private static final long serialVersionUID = 1L;

   private static Map<String,String> countryMap;

   private String selectedCountry = "United Kingdom"; //default value

   static{
      countryMap = new LinkedHashMap<String,String>();
      countryMap.put("en", "United Kingdom"); //locale, country name
      countryMap.put("fr", "French");
      countryMap.put("de", "German");
   }

   public void localeChanged(ValueChangeEvent e){
      //assign new value to country
      selectedCountry = e.getNewValue().toString();
   }

   public Map<String, String> getCountries() {
      return countryMap;
   }

   public String getSelectedCountry() {
      return selectedCountry;
   }

   public void setSelectedCountry(String selectedCountry) {
      this.selectedCountry = selectedCountry;
```

```
   }
}
```

LocaleChangeListener.java

```
package com.tutorialspoint.test;

import javax.faces.context.FacesContext;
import javax.faces.event.AbortProcessingException;
import javax.faces.event.ValueChangeEvent;
import javax.faces.event.ValueChangeListener;

public class LocaleChangeListener implements ValueChangeListener {
   @Override
   public void processValueChange(ValueChangeEvent event)
      throws AbortProcessingException {
      //access country bean directly
      UserData userData = (UserData) FacesContext.getCurrentInstance().
         getExternalContext().getSessionMap().get("userData");

      userData.setSelectedCountry(event.getNewValue().toString());
   }
}
```

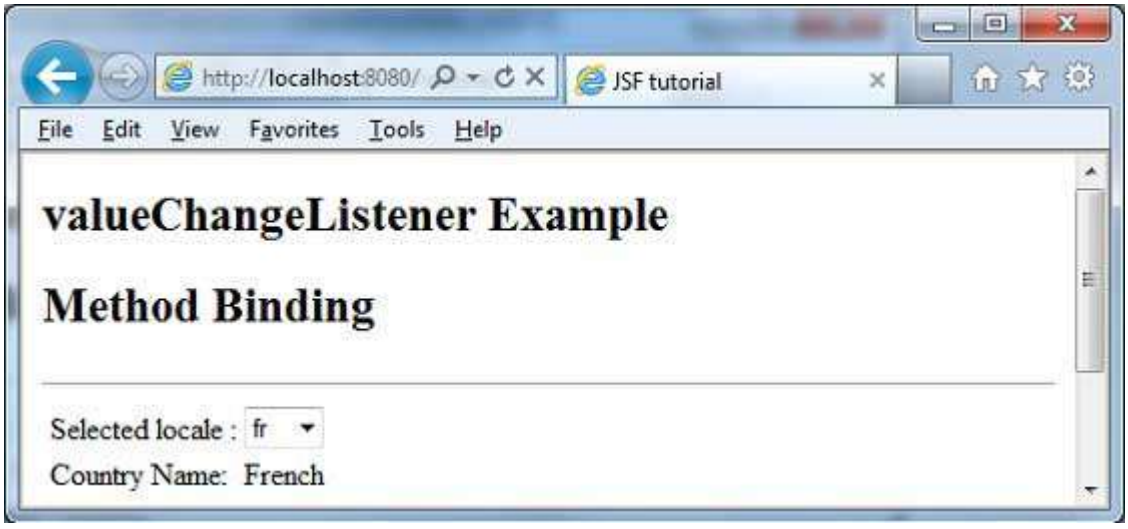
home.xhtml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml"
   xmlns:h="http://java.sun.com/jsf/html"
   xmlns:f="http://java.sun.com/jsf/core">
   <h:head>
      <title>JSF tutorial</title>
   </h:head>
   <h:body>
      <h2>valueChangeListener Examples</h2>
      <h:form>
      <h2>Method Binding</h2>
      <hr/>
      <h:panelGrid columns="2">
         Selected locale :
         <h:selectOneMenu value="#{userData.selectedCountry}"
            onchange="submit()"
            valueChangeListener="#{userData.localeChanged}" >
            <f:selectItems value="#{userData.countries}" />
         </h:selectOneMenu>
         Country Name:
         <h:outputText id="country" value="#{userData.selectedCountry}"
            size="20" />
      </h:panelGrid>
      </h:form>
    </h:body>
```

```
</html>
```

Once you are ready with all the changes done, let us compile and run the application as we did in JSF - First Application chapter. If everything is fine with your application, this will produce following result:

Select locale. You will see the following result.



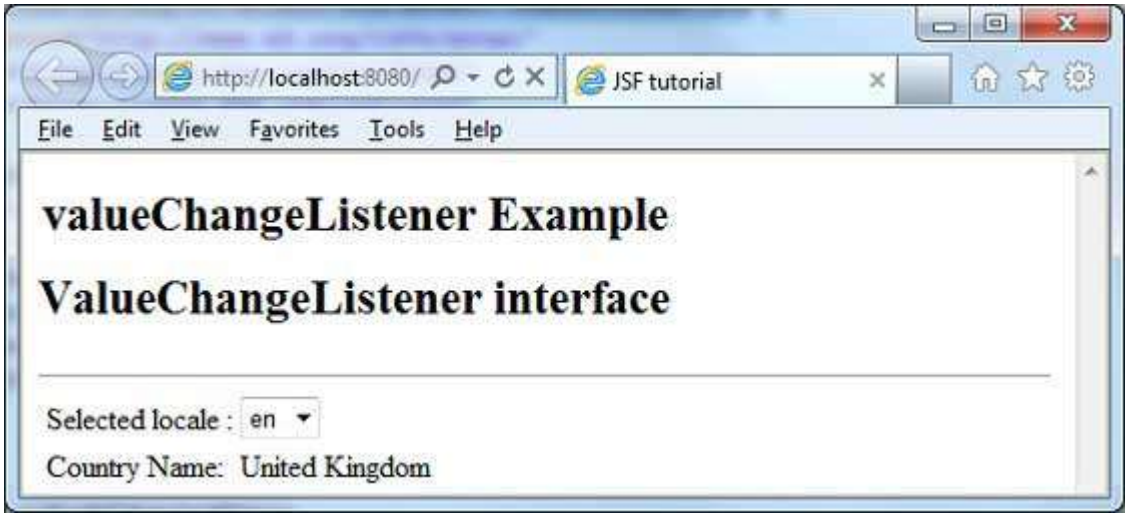
Modify *home.xhtml* again in deployed directory where you've deployed the application as explained below. Keep rest of the files unchanged.

home.xhtml

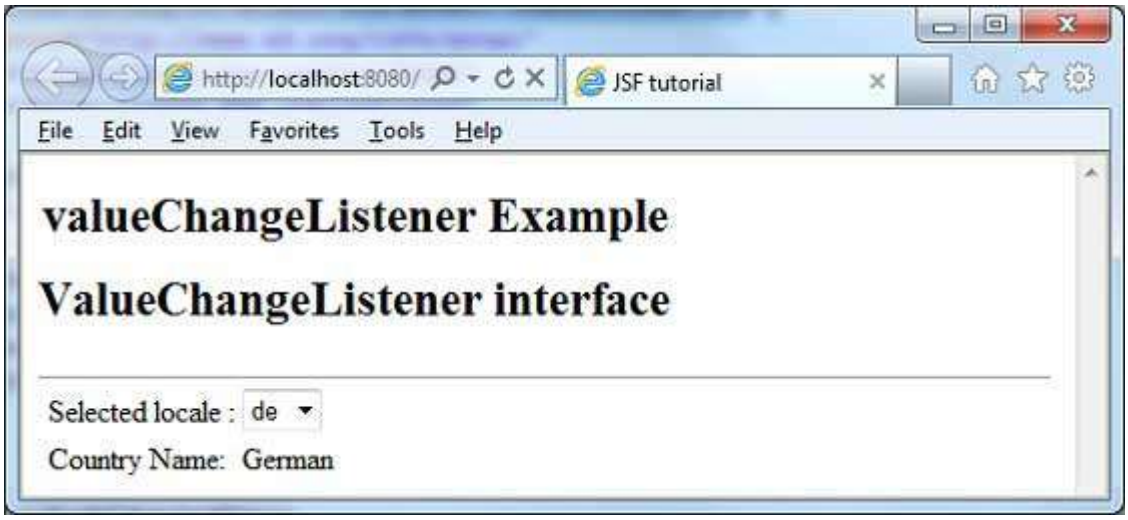
```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml"
```

```
   xmlns:h="http://java.sun.com/jsf/html"
   xmlns:f="http://java.sun.com/jsf/core">
   <h:head>
      <title>JSF tutorial</title>
   </h:head>
   <h:body>
      <h2>valueChangeListener Examples</h2>
      <h:form>
      <h2>ValueChangeListener interface</h2>
      <hr/>
      <h:panelGrid columns="2">
         Selected locale :
         <h:selectOneMenu value="#{userData.selectedCountry}"
            onchange="submit()">
            <f:valueChangeListener
            type="com.tutorialspoint.test.LocaleChangeListener" />
            <f:selectItems value="#{userData.countries}" />
         </h:selectOneMenu>
         Country Name:
         <h:outputText id="country1" value="#{userData.selectedCountry}"
            size="20" />
      </h:panelGrid>
</h:form>
</h:body>
</html>
```

Once you are ready with all the changes done, refresh the page in browser. If everything is fine with your application, this will produce following result:



Select locale. You will see the following result.



(2) actionListener

When user interacts with components, such as h:commandButton or h:link, the JSF fires a action events which can be handled in two ways.

Technique	Description
Method Binding	Pass the name of the managed bean method in *actionListener* attribute of UI Component.
ActionListener	Implement ActionListener interface and pass the implementation class name to *actionListener* attribute of UI Component.

Method Binding

Define a method

```
public void updateData(ActionEvent e){
   data="Hello World";
}
```

Use above method

```
<h:commandButton id="submitButton"
   value="Submit" action="#{userData.showResult}"
   actionListener="#{userData.updateData}" />
</h:commandButton>
```

ActionListener

Implement ActionListener

```
public class UserActionListener implements ActionListener{
   @Override
   public void processAction(ActionEvent arg0)
   throws AbortProcessingException {
      //access userData bean directly
      UserData userData = (UserData) FacesContext.getCurrentInstance().
         getExternalContext().getSessionMap().get("userData");
      userData.setData("Hello World");
   }
}
```

Use listener method

```
<h:commandButton id="submitButton1"
   value="Submit" action="#{userData.showResult}" >
   <f:actionListener type="com.tutorialspoint.test.UserActionListener" />
</h:commandButton>
```

Example Application

Let us create a test JSF application to test the actionListener in JSF.

Step	Description
1	Create a project with a name *helloworld* under a package *com.tutorialspoint.test* as explained in the *JSF - First Application* chapter.
2	Modify *UserData.java* file as explained below.
3	Create *UserActionListener.java* file under a package *com.tutorialspoint.test*.Modify it as explained below
4	Modify *home.xhtml* as explained below. Keep rest of the files unchanged.
5	Modify *result.xhtml* as explained below. Keep rest of the files unchanged.
6	Compile and run the application to make sure business logic is working as per the requirements.
7	Finally, build the application in the form of war file and deploy it in Apache Tomcat Webserver.
8	Launch your web application using appropriate URL as explained below in the last step.

UserData.java

```
package com.tutorialspoint.test;

import java.io.Serializable;
import java.util.LinkedHashMap;
import java.util.Map;

import javax.faces.bean.ManagedBean;
import javax.faces.bean.SessionScoped;
import javax.faces.event.ValueChangeEvent;
```

```
@ManagedBean(name = "userData", eager = true)
@SessionScoped
public class UserData implements Serializable {

private static final long serialVersionUID = 1L;

   private static Map<String,String> countryMap;
   private String data = "sample data";

   public String showResult(){
      return "result";
   }

   public void updateData(ActionEvent e){
      data="Hello World";
   }

   public String getData() {
      return data;
   }

   public void setData(String data) {
      this.data = data;
   }
}
```

UserActionListener.java

```
package com.tutorialspoint.test;

import javax.faces.context.FacesContext;
import javax.faces.event.AbortProcessingException;
import javax.faces.event.ActionEvent;
import javax.faces.event.ActionListener;

public class UserActionListener implements ActionListener{
   @Override
   public void processAction(ActionEvent arg0)
   throws AbortProcessingException {
      //access userData bean directly
      UserData userData = (UserData) FacesContext.getCurrentInstance().
         getExternalContext().getSessionMap().get("userData");
      userData.setData("Hello World");
   }
}
```

home.xhtml

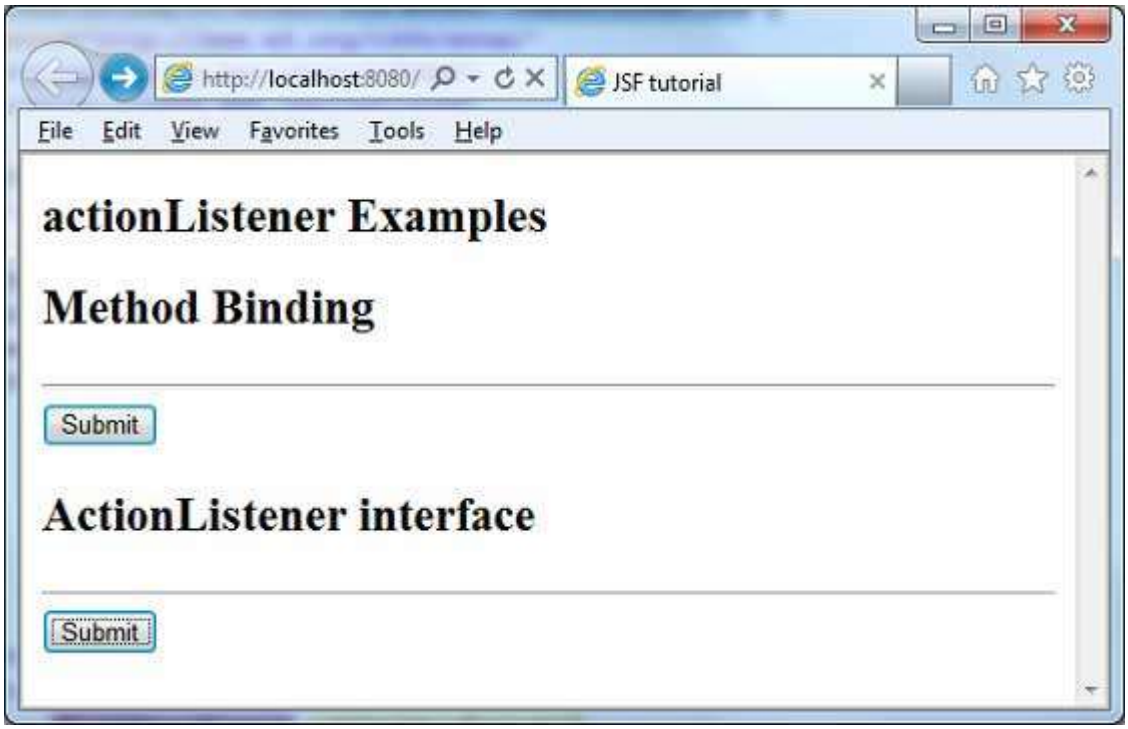
```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml"
   xmlns:h="http://java.sun.com/jsf/html"
   xmlns:f="http://java.sun.com/jsf/core">
```

```
   <h:head>
      <title>JSF tutorial</title>
   </h:head>
   <h:body>
      <h2>actionListener Examples</h2>
      <h:form>
      <h2>Method Binding</h2>
      <hr/>
      <h:commandButton id="submitButton"
         value="Submit" action="#{userData.showResult}"
         actionListener="#{userData.updateData}" />
      </h:commandButton>
      <h2>ActionListener interface</h2>
      <hr/>
      <h:commandButton id="submitButton1"
         value="Submit" action="#{userData.showResult}" >
         <f:actionListener
            type="com.tutorialspoint.test.UserActionListener" />
      </h:commandButton>
      </h:form>
    </h:body>
</html>
```

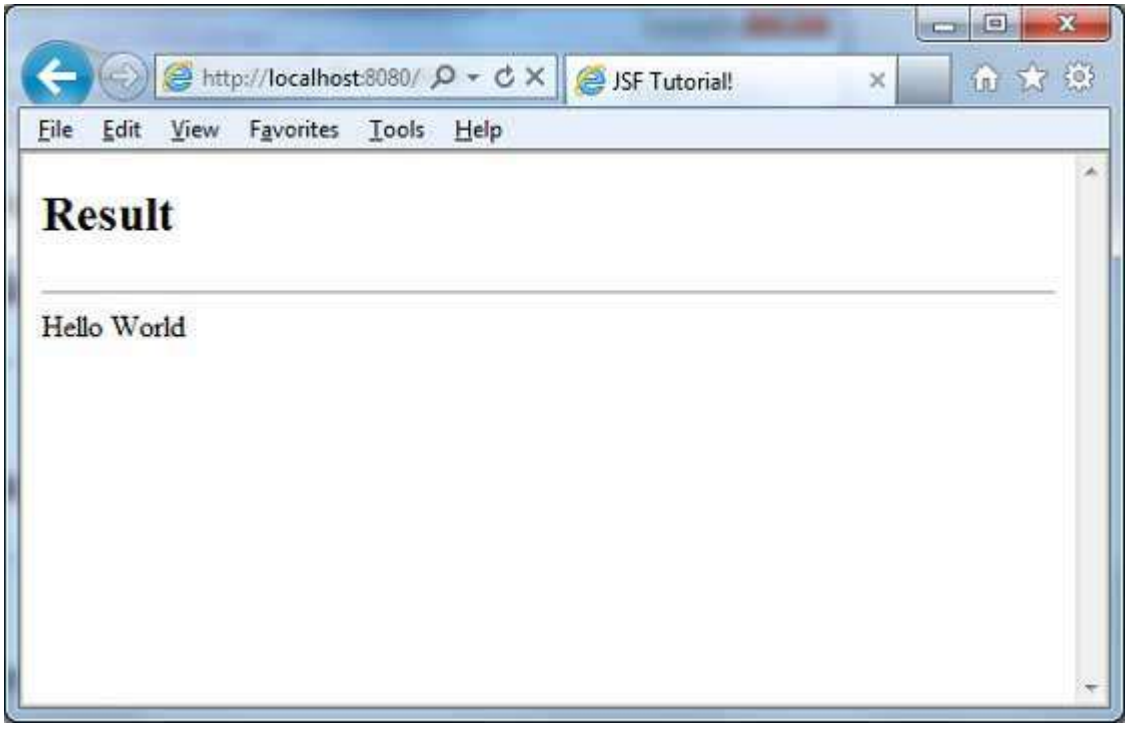
result.xhtml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml"
   xmlns:f="http://java.sun.com/jsf/core"
   xmlns:h="http://java.sun.com/jsf/html">
   <h:head>
   <title>JSF Tutorial!</title>
   </h:head>
   <h:body>
   <h2>Result</h2>
   <hr />
   #{userData.data}
   </h:body>
</html>
```

Once you are ready with all the changes done, let us compile and run the application as we did in JSF - First Application chapter. If everything is fine with your application, this will produce following result:



Click on any submit button. You will see the following result.



(3) Application Events

JSF provides system event listeners to do application specific tasks during JSF application Life Cycle.

System Event	Description
PostConstructApplicationEvent	Fires when application starts.Can be used to perform initialization tasks after application has started.
PreDestroyApplicationEvent	Fires when application is about to shut down.Can be used to perform a cleanup tasks before application is about to be shut down.
PreRenderViewEvent	Fires before a JSF page is to be displayed. Can be used to authenticate user and provide restricted access to JSF View.

System Events which can be handled in following manner.

Technique	Description
SystemEventListener	Implement SystemEventListener interface and register the system-event-listener class in faces-config.xml
Method Binding	Pass the name of the managed bean method in *listener* attribute of f:event.

SystemEventListener

Implement SystemEventListener Interface

```
public class CustomSystemEventListener implements SystemEventListener {
   @Override
   public void processEvent(SystemEvent event) throws
      AbortProcessingException {
      if(event instanceof PostConstructApplicationEvent){
         System.out.println("Application Started.
             PostConstructApplicationEvent occurred!");
      }
   }
}
```

Register custom system event listener for system event in faces-config.xml

```
<system-event-listener>
   <system-event-listener-class>
      com.tutorialspoint.test.CustomSystemEventListener
   </system-event-listener-class>
   <system-event-class>
      javax.faces.event.PostConstructApplicationEvent
   </system-event-class>
</system-event-listener>
```

Method Binding

Define a method

```
public void handleEvent(ComponentSystemEvent event){
```

```
   data="Hello World";
}
```

Use above method

```
<f:event listener="#{user.handleEvent}" type="preRenderView" />
```

Example Application

Let us create a test JSF application to test the system events in JSF.

Step	Description
1	Create a project with a name *helloworld* under a package *com.tutorialspoint.test* as explained in the *JSF - First Application* chapter.
2	Modify *UserData.java* file as explained below.
3	Create *CustomSystemEventListener.java* file under a package *com.tutorialspoint.test*.Modify it as explained below
4	Modify *home.xhtml* as explained below.
5	Create *faces-config.xml* in *WEB-INF* folder.Modify it as explained below. Keep rest of the files unchanged.
6	Compile and run the application to make sure business logic is working as per the requirements.
7	Finally, build the application in the form of war file and deploy it in Apache Tomcat Webserver.
8	Launch your web application using appropriate URL as explained below in the last step.

UserData.java

```
package com.tutorialspoint.test;

import java.io.Serializable;

import javax.faces.bean.ManagedBean;
import javax.faces.bean.SessionScoped;
import javax.faces.event.ComponentSystemEvent;

@ManagedBean(name = "userData", eager = true)
@SessionScoped
public class UserData implements Serializable {

private static final long serialVersionUID = 1L;

   private String data = "sample data";

   public void handleEvent(ComponentSystemEvent event){
      data="Hello World";
   }
```

```
   public String getData() {
      return data;
   }

   public void setData(String data) {
      this.data = data;
   }
}
```

CustomSystemEventListener.java

```
package com.tutorialspoint.test;
import javax.faces.application.Application;
import javax.faces.event.AbortProcessingException;
import javax.faces.event.PostConstructApplicationEvent;
import javax.faces.event.PreDestroyApplicationEvent;
import javax.faces.event.SystemEvent;
import javax.faces.event.SystemEventListener;

public class CustomSystemEventListener implements SystemEventListener {

   @Override
   public boolean isListenerForSource(Object value) {
      //only for Application
      return (value instanceof Application);
   }

   @Override
   public void processEvent(SystemEvent event)
      throws AbortProcessingException {
      if(event instanceof PostConstructApplicationEvent){
         System.out.println("Application Started.
                        PostConstructApplicationEvent occurred!");
      }
      if(event instanceof PreDestroyApplicationEvent){
         System.out.println("PreDestroyApplicationEvent occurred.
          Application is stopping.");
      }
   }
}
```

home.xhtml

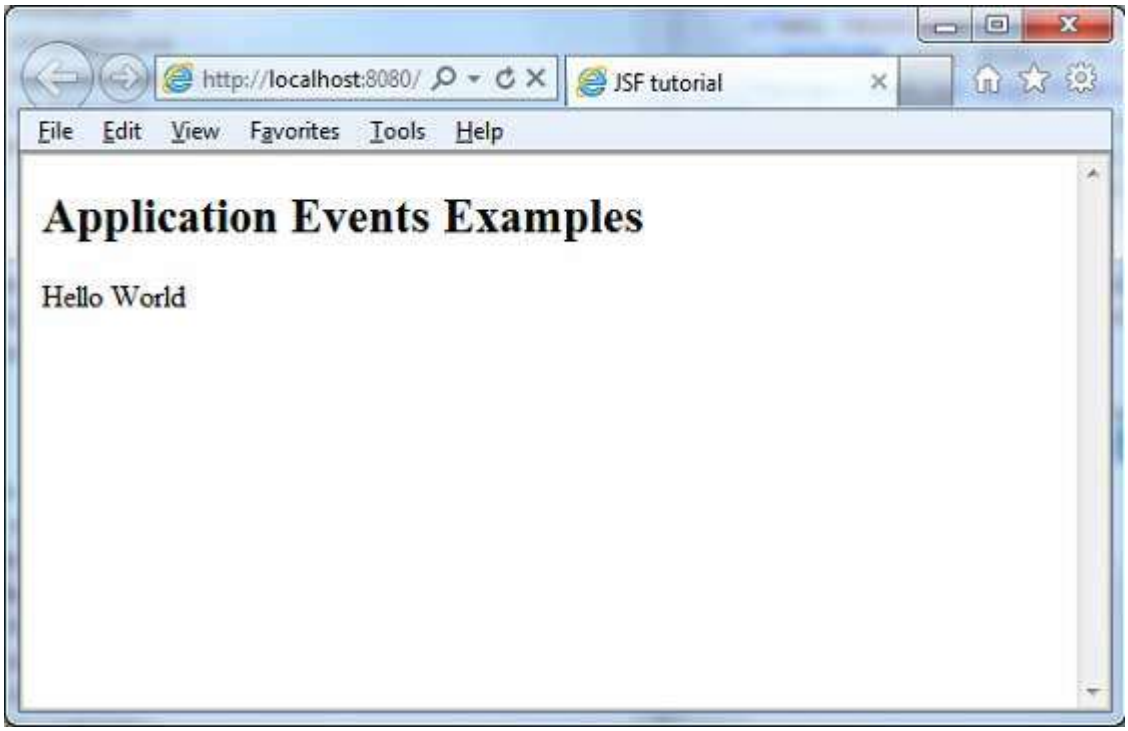
```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml"
   xmlns:h="http://java.sun.com/jsf/html"
   xmlns:f="http://java.sun.com/jsf/core">
   <h:head>
      <title>JSF tutorial</title>
   </h:head>
   <h:body>
```

```
   <h2>Application Events Examples</h2>
      <f:event listener="#{userData.handleEvent}" type="preRenderView" />
      #{userData.data}
   </h:body>
</html>
```

faces-config.xhtml

```
<?xml version="1.0" encoding="UTF-8"?>
<faces-config
   xmlns="http://java.sun.com/xml/ns/javaee"
   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   xsi:schemaLocation="http://java.sun.com/xml/ns/javaee
   http://java.sun.com/xml/ns/javaee/web-facesconfig_2_0.xsd"
   version="2.0">
   <application>
      <!-- Application Startup -->
      <system-event-listener>
         <system-event-listener-class>
            com.tutorialspoint.test.CustomSystemEventListener
         </system-event-listener-class>
         <system-event-class>
            javax.faces.event.PostConstructApplicationEvent
         </system-event-class>
      </system-event-listener>
      <!-- Before Application is to shut down -->
      <system-event-listener>
         <system-event-listener-class>
            com.tutorialspoint.test.CustomSystemEventListener
         </system-event-listener-class>
         <system-event-class>
            javax.faces.event.PreDestroyApplicationEvent
         </system-event-class>
      </system-event-listener>
   </application>
</faces-config>
```

Once you are ready with all the changes done, let us compile and run the application as we did in JSF - First Application chapter. If everything is fine with your application, this will produce following result:



Look into your web-server console output. You will see the following result.

```
INFO: Deploying web application archive helloworld.war

Dec 6, 2012 8:21:44 AM com.sun.faces.config.ConfigureListener contextInitialized

INFO: Initializing Mojarra 2.1.7 (SNAPSHOT 20120206) for context '/helloworld'

Application Started. PostConstructApplicationEvent occurred!
Dec 6, 2012 8:21:46 AM com.sun.faces.config.ConfigureListener
$WebConfigResourceMonitor$Monitor <init>
INFO: Monitoring jndi:/localhost/helloworld/WEB-INF/faces-config.xml
for modifications
Dec 6, 2012 8:21:46 AM org.apache.coyote.http11.Http11Protocol start
INFO: Starting Coyote HTTP/1.1 on http-8080
Dec 6, 2012 8:21:46 AM org.apache.jk.common.ChannelSocket init
INFO: JK: ajp13 listening on /0.0.0.0:8009
Dec 6, 2012 8:21:46 AM org.apache.jk.server.JkMain start
INFO: Jk running ID=0 time=0/24  config=null
Dec 6, 2012 8:21:46 AM org.apache.catalina.startup.Catalina start
INFO: Server startup in 44272 ms
```

CHAPTER

16

JSF – JDBC Integration

In this chapter, we'll demonstrate how to integrate database in JSF using JDBC

Database requirements to run this example

S.N.	Software & Description
1	PostgreSQL 9.1 Open Source and light weight database
2	PostgreSQL JDBC4 Driver JDBC driver for PostgreSQL 9.1 and JDK 1.5 or above

Put PostgreSQL JDBC4 Driver jar in tomcat web server's lib directory

Database SQL Commands

```
create user user1;

create database testdb with owner=user1;

CREATE TABLE IF NOT EXISTS authors (
    id int PRIMARY KEY,
    name VARCHAR(25)
);

INSERT INTO authors(id, name) VALUES(1, 'Rob Bal');
INSERT INTO authors(id, name) VALUES(2, 'John Carter');
INSERT INTO authors(id, name) VALUES(3, 'Chris London');
INSERT INTO authors(id, name) VALUES(4, 'Truman De Bal');
INSERT INTO authors(id, name) VALUES(5, 'Emile Capote');
INSERT INTO authors(id, name) VALUES(7, 'Breech Jabber');
INSERT INTO authors(id, name) VALUES(8, 'Bob Carter');
INSERT INTO authors(id, name) VALUES(9, 'Nelson Mand');
INSERT INTO authors(id, name) VALUES(10, 'Tennant Mark');

alter user user1 with password 'user1';

grant all on authors to user1;
```

Example Application

Let us create a test JSF application to test jdbc integration.

Step	Description
1	Create a project with a name *helloworld* under a package *com.tutorialspoint.test* as explained in the *JSF - First Application* chapter.
2	Create *resources* folder under *src* > *main* folder.
3	Create *css* folder under *src* > *main* > *resources* folder.
4	Create *styles.css* file under *src* > *main* > *resources* > *css* folder.
5	Modify *styles.css* file as explained below.
6	Modify *pom.xml* as explained below.
7	Create *Author.java* under package *com.tutorialspoint.test* as explained below.
8	Create *UserData.java* under package *com.tutorialspoint.test* as explained below.
9	Modify *home.xhtml* as explained below. Keep rest of the files unchanged.
10	Compile and run the application to make sure business logic is working as per the requirements.
11	Finally, build the application in the form of war file and deploy it in Apache Tomcat Webserver.
12	Launch your web application using appropriate URL as explained below in the last step.

styles.css

```
.authorTable{
   border-collapse:collapse;
   border-bottom:1px solid #000000;
}

.authorTableHeader{
   text-align:center;
   background:none repeat scroll 0 0 #B5B5B5;
   border-bottom:1px solid #000000;
   border-top:1px solid #000000;
   padding:2px;
}

.authorTableOddRow{
   text-align:center;
   background:none repeat scroll 0 0 #FFFFFFF;
}

.authorTableEvenRow{
   text-align:center;
   background:none repeat scroll 0 0 #D3D3D3;
}
```

pom.xml

```
<project xmlns="http://maven.apache.org/POM/4.0.0"
   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   xsi:schemaLocation="http://maven.apache.org/POM/4.0.0
   http://maven.apache.org/maven-v4_0_0.xsd">
   <modelVersion>4.0.0</modelVersion>
   <groupId>com.tutorialspoint.test</groupId>
   <artifactId>helloworld</artifactId>
   <packaging>war</packaging>
   <version>1.0-SNAPSHOT</version>
   <name>helloworld Maven Webapp</name>
   <url>http://maven.apache.org</url>
   <dependencies>
      <dependency>
         <groupId>junit</groupId>
         <artifactId>junit</artifactId>
         <version>3.8.1</version>
         <scope>test</scope>
      </dependency>
      <dependency>
         <groupId>com.sun.faces</groupId>
         <artifactId>jsf-api</artifactId>
         <version>2.1.7</version>
      </dependency>
      <dependency>
         <groupId>com.sun.faces</groupId>
         <artifactId>jsf-impl</artifactId>
         <version>2.1.7</version>
      </dependency>
      <dependency>
         <groupId>javax.servlet</groupId>
         <artifactId>jstl</artifactId>
         <version>1.2</version>
      </dependency>
     <dependency>
        <groupId>postgresql</groupId>
        <artifactId>postgresql</artifactId>
        <version>9.1-901.jdbc4</version>
     </dependency>
   </dependencies>
   <build>
      <finalName>helloworld</finalName>
      <plugins>
         <plugin>
            <groupId>org.apache.maven.plugins</groupId>
            <artifactId>maven-compiler-plugin</artifactId>
            <version>2.3.1</version>
            <configuration>
               <source>1.6</source>
               <target>1.6</target>
            </configuration>
         </plugin>
         <plugin>
            <artifactId>maven-resources-plugin</artifactId>
            <version>2.6</version>
            <executions>
               <execution>
                  <id>copy-resources</id>
                  <phase>validate</phase>
                  <goals>
                     <goal>copy-resources</goal>
```

```
                  </goals>
                  <configuration>
                     <outputDirectory>${basedir}/target/helloworld/resources
                        </outputDirectory>
                     <resources>
                        <resource>
                           <directory>src/main/resources</directory>
                           <filtering>true</filtering>
                        </resource>
                     </resources>
                  </configuration>
               </execution>
            </executions>
         </plugin>
      </plugins>
   </build>
</project>
```

Author.java

```
package com.tutorialspoint.test;

public class Author {
   int id;
   String name;
   public String getName() {
      return name;
   }
   public void setName(String name) {
      this.name = name;
   }
   public int getId() {
      return id;
   }
   public void setId(int id) {
      this.id = id;
   }
}
```

UserData.java

```
package com.tutorialspoint.test;

import java.io.Serializable;
import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.PreparedStatement;
import java.sql.ResultSet;
import java.sql.SQLException;
import java.util.ArrayList;
import java.util.List;

import javax.faces.bean.ManagedBean;
import javax.faces.bean.SessionScoped;
import javax.faces.event.ComponentSystemEvent;
```

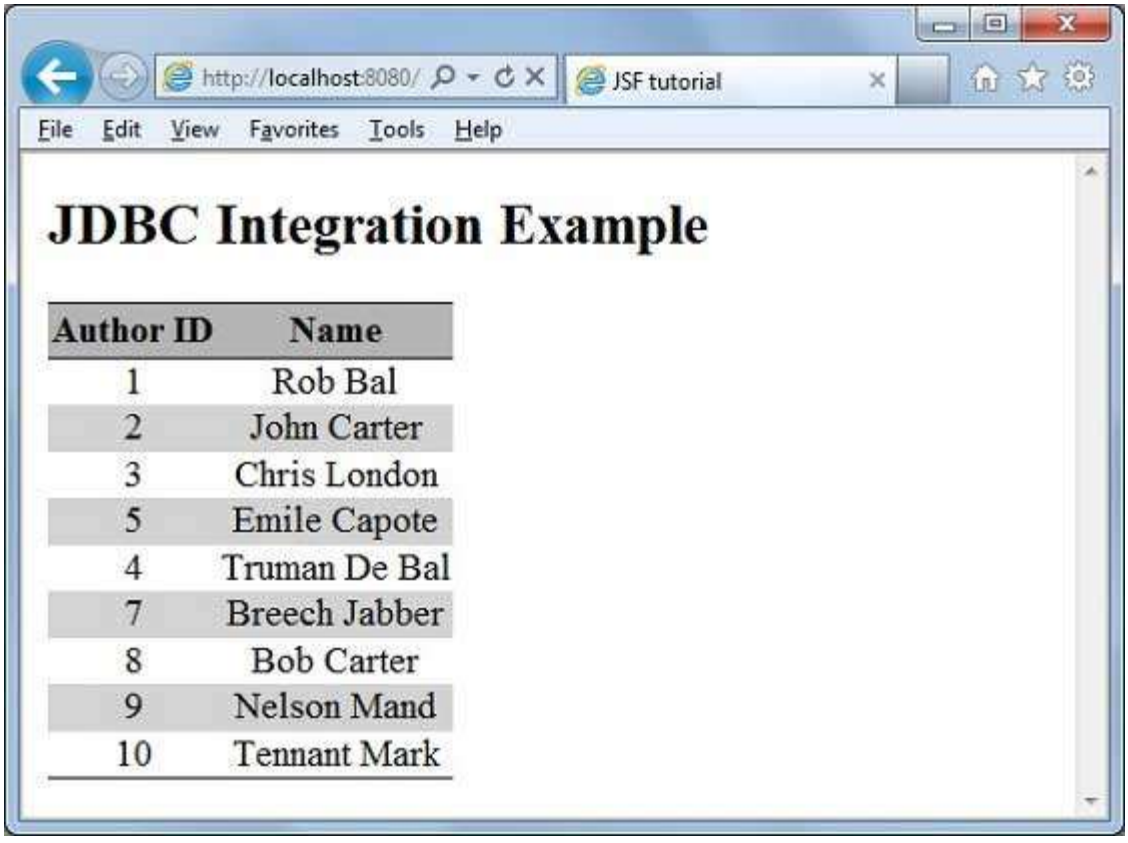
```
@ManagedBean(name = "userData", eager = true)
@SessionScoped
public class UserData implements Serializable {

   private static final long serialVersionUID = 1L;

   public List<Author> getAuthors(){
      ResultSet rs = null;
      PreparedStatement pst = null;
      Connection con = getConnection();
      String stm = "Select * from authors";
      List<Author> records = new ArrayList<Author>();
      try {
         pst = con.prepareStatement(stm);
         pst.execute();
         rs = pst.getResultSet();

         while(rs.next()){
            Author author = new Author();
            author.setId(rs.getInt(1));
            author.setName(rs.getString(2));
            records.add(author);
         }
      } catch (SQLException e) {
         e.printStackTrace();
      }
      return records;
   }

   public Connection getConnection(){
      Connection con = null;

      String url = "jdbc:postgresql://localhost/testdb";
      String user = "user1";
      String password = "user1";
      try {
         con = DriverManager.getConnection(url, user, password);
         System.out.println("Connection completed.");
      } catch (SQLException ex) {
         System.out.println(ex.getMessage());
      }
      finally{
      }
      return con;
   }
}
```

home.xhtml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml"
   xmlns:f="http://java.sun.com/jsf/core"
   xmlns:h="http://java.sun.com/jsf/html">
   <h:head>
      <title>JSF Tutorial!</title>
```

```
      <h:outputStylesheet library="css" name="styles.css"  />
   </h:head>
   <h2>JDBC Integration Example</h2>
   <h:dataTable value="#{userData.authors}" var="c"
      styleClass="authorTable"
      headerClass="authorTableHeader"
      rowClasses="authorTableOddRow,authorTableEvenRow">
      <h:column><f:facet name="header">Author ID</f:facet>
         #{c.id}
      </h:column>
      <h:column><f:facet name="header">Name</f:facet>
         #{c.name}
      </h:column>
   </h:dataTable>
   </h:body>
</html>
```

Once you are ready with all the changes done, let us compile and run the application as we did in JSF - First Application chapter. If everything is fine with your application, this will produce following result:



CHAPTER

17

JSF – Spring Integration

Spring provides special class **DelegatingVariableResolver** to integrate JSF and Spring together in seamless manner.

Following steps are required to integrate Spring Dependency Injection (IOC) feature in JSF

Step 1. Add DelegatingVariableResolver

Add a variable-resolver entry in faces-config.xml to point to spring class **DelegatingVariableResolver**.

```
<faces-config>
   <application>
   <variable-resolver>
      org.springframework.web.jsf.DelegatingVariableResolver
   </variable-resolver>
   ...
</faces-config>
```

Step 2. Add Context Listeners

Add **ContextLoaderListener** and **RequestContextListener** listener provided by spring framework in web.xml

```
<web-app>
   ...
   <!-- Add Support for Spring -->
   <listener>
      <listener-class>
         org.springframework.web.context.ContextLoaderListener
      </listener-class>
   </listener>
   <listener>
      <listener-class>
         org.springframework.web.context.request.RequestContextListener
      </listener-class>
   </listener>
   ...
</web-app>
```

Step 3. Define Dependency

Define bean(s) in applicationContext.xml which will be used as dependency in managed bean

```
<beans>
   <bean id="messageService"
      class="com.tutorialspoint.test.MessageServiceImpl">
      <property name="message" value="Hello World!" />
   </bean>
</beans>
```

Step 4. Add Dependency

DelegatingVariableResolver first delegates value lookups to the default resolver of the JSF and then to Spring's WebApplicationContext. This allows one to easily inject spring based dependencies into one's JSF-managed beans.

We've injected messageService as spring based dependency here

```
<faces-config>
   ...
   <managed-bean>
      <managed-bean-name>userData</managed-bean-name>
      <managed-bean-class>com.tutorialspoint.test.UserData</managed-bean-class>
      <managed-bean-scope>request</managed-bean-scope>
      <managed-property>
         <property-name>messageService</property-name>
         <value>#{messageService}</value>
      </managed-property>
   </managed-bean>
</faces-config>
```

Step 5. Use Dependency

```
//jsf managed bean
public class UserData {
   //spring managed dependency
   private MessageService messageService;

   public void setMessageService(MessageService messageService) {
      this.messageService = messageService;
   }

   public String getGreetingMessage(){
      return messageService.getGreetingMessage();
   }
}
```

Example Application

Let us create a test JSF application to test spring integration.

Step	Description
1	Create a project with a name *helloworld* under a package *com.tutorialspoint.test* as explained in the *JSF - First Application* chapter.
2	Modify *pom.xml* as explained below.
3	Create *faces-config.xml* in *WEB-INF* folder as explained below.
4	Modify *web.xml* as explained below.
5	Create *applicationContext.xml* in *WEB-INF* folder as explained below.
6	Create *MessageService.java* under package *com.tutorialspoint.test* as explained below.
7	Create *MessageServiceImpl.java* under package *com.tutorialspoint.test* as explained below.
8	Create *UserData.java* under package *com.tutorialspoint.test* as explained below.
9	Modify *home.xhtml* as explained below. Keep rest of the files unchanged.
10	Compile and run the application to make sure business logic is working as per the requirements.
11	Finally, build the application in the form of war file and deploy it in Apache Tomcat Webserver.
12	Launch your web application using appropriate URL as explained below in the last step.

pom.xml

```
<project xmlns="http://maven.apache.org/POM/4.0.0"
   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   xsi:schemaLocation="http://maven.apache.org/POM/4.0.0
    http://maven.apache.org/maven-v4_0_0.xsd">
   <modelVersion>4.0.0</modelVersion>
   <groupId>com.tutorialspoint.test</groupId>
   <artifactId>helloworld</artifactId>
   <packaging>war</packaging>
   <version>1.0-SNAPSHOT</version>
   <name>helloworld Maven Webapp</name>
   <url>http://maven.apache.org</url>
   <dependencies>
      <dependency>
         <groupId>junit</groupId>
         <artifactId>junit</artifactId>
         <version>3.8.1</version>
         <scope>test</scope>
      </dependency>
      <dependency>
         <groupId>com.sun.faces</groupId>
         <artifactId>jsf-api</artifactId>
         <version>2.1.7</version>
      </dependency>
      <dependency>
         <groupId>com.sun.faces</groupId>
         <artifactId>jsf-impl</artifactId>
         <version>2.1.7</version>
      </dependency>
```

```
      <dependency>
         <groupId>javax.servlet</groupId>
         <artifactId>jstl</artifactId>
         <version>1.2</version>
      </dependency>
      <dependency>
         <groupId>org.springframework</groupId>
         <artifactId>spring-core</artifactId>
         <version>3.1.2.RELEASE</version>
      </dependency>
      <dependency>
         <groupId>org.springframework</groupId>
         <artifactId>spring-web</artifactId>
         <version>3.1.2.RELEASE</version>
      </dependency>
               </dependencies>
   <build>
      <finalName>helloworld</finalName>
      <plugins>
         <plugin>
            <groupId>org.apache.maven.plugins</groupId>
            <artifactId>maven-compiler-plugin</artifactId>
            <version>2.3.1</version>
            <configuration>
               <source>1.6</source>
               <target>1.6</target>
            </configuration>
         </plugin>
         <plugin>
            <artifactId>maven-resources-plugin</artifactId>
            <version>2.6</version>
            <executions>
               <execution>
                  <id>copy-resources</id>
                  <phase>validate</phase>
                  <goals>
                     <goal>copy-resources</goal>
                  </goals>
                  <configuration>
                     <outputDirectory>${basedir}/target/helloworld/resources
                        </outputDirectory>
                     <resources>
                        <resource>
                           <directory>src/main/resources</directory>
                           <filtering>true</filtering>
                        </resource>
                     </resources>
                  </configuration>
               </execution>
            </executions>
         </plugin>
      </plugins>
   </build>
</project>
```

faces-config.xml

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<faces-config
   xmlns="http://java.sun.com/xml/ns/javaee"
   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   xsi:schemaLocation="http://java.sun.com/xml/ns/javaee
    http://java.sun.com/xml/ns/javaee/web-facesconfig_2_0.xsd"
   version="2.0">
   <application>
      <variable-resolver>
         org.springframework.web.jsf.DelegatingVariableResolver
      </variable-resolver>
   </application>
   <managed-bean>
      <managed-bean-name>userData</managed-bean-name>
      <managed-bean-class>com.tutorialspoint.test.UserData</managed-bean-class>
      <managed-bean-scope>request</managed-bean-scope>
      <managed-property>
         <property-name>messageService</property-name>
         <value>#{messageService}</value>
      </managed-property>
   </managed-bean>
</faces-config>
```

web.xml

```
<!DOCTYPE web-app PUBLIC
   "-//Sun Microsystems, Inc.//DTD Web Application 2.3//EN"
   "http://java.sun.com/dtd/web-app_2_3.dtd" >
<web-app>
   <display-name>Archetype Created Web Application</display-name>

   <context-param>
       <param-name>javax.faces.PROJECT_STAGE</param-name>
       <param-value>Development</param-value>
   </context-param>
   <!-- Add Support for Spring -->
   <listener>
       <listener-class>
           org.springframework.web.context.ContextLoaderListener
       </listener-class>
   </listener>
   <listener>
      <listener-class>
         org.springframework.web.context.request.RequestContextListener
      </listener-class>
   </listener>
   <servlet>
      <servlet-name>Faces Servlet</servlet-name>
      <servlet-class>javax.faces.webapp.FacesServlet</servlet-class>
   </servlet>
   <servlet-mapping>
      <servlet-name>Faces Servlet</servlet-name>
      <url-pattern>*.jsf</url-pattern>
   </servlet-mapping>
</web-app>
```

applicationContext.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE beans PUBLIC "-//SPRING//DTD BEAN 2.0//EN"
   "http://www.springframework.org/dtd/spring-beans-2.0.dtd">
<beans>
   <bean id="messageService"
      class="com.tutorialspoint.test.MessageServiceImpl">
      <property name="message" value="Hello World!" />
   </bean>
</beans>
```

MessageService.java

```
package com.tutorialspoint.test;

public interface MessageService {
   String getGreetingMessage();
}
```

MessageServiceImpl.java

```
package com.tutorialspoint.test;

public class MessageServiceImpl implements MessageService {

   private String message;

   public String getGreetingMessage() {
      return message;
   }
   public String getMessage() {
      return message;
   }
   public void setMessage(String message) {
      this.message = message;
   }
}
```

UserData.java

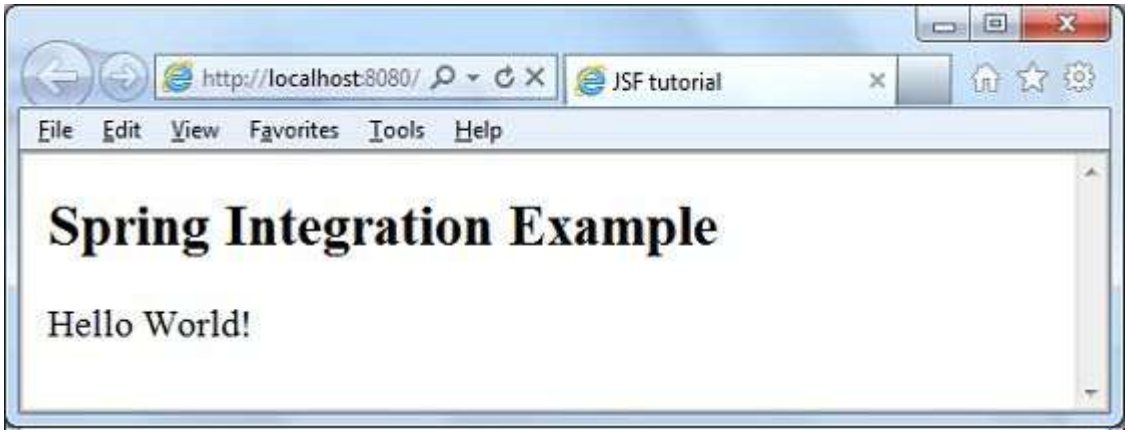
```
package com.tutorialspoint.test;

import java.io.Serializable;

public class UserData implements Serializable {

   private static final long serialVersionUID = 1L;

   private MessageService messageService;

   public MessageService getMessageService() {
      return messageService;
```

```
   }

   public void setMessageService(MessageService messageService) {
      this.messageService = messageService;
   }

   public String getGreetingMessage(){
      return messageService.getGreetingMessage();
   }
}
```

home.xhtml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml"
   xmlns:f="http://java.sun.com/jsf/core"
   xmlns:h="http://java.sun.com/jsf/html">
   <h:head>
      <title>JSF Tutorial!</title>
   </h:head>
   <h2>Spring Integration Example</h2>
    #{userData.greetingMessage}
   </h:body>
</html>
```

Once you are ready with all the changes done, let us compile and run the application as we did in JSF - First Application chapter. If everything is fine with your application, this will produce following result:



CHAPTER

18

JSF – Expression Language

JSF provides a rich expression language. We can write normal operations using #{operation-expression} notation. Some of the advantages of JSF Expression languages are following.

- Can reference bean properties where bean can be a object stored in request, session or application scope or is a managed bean.
- Provides easy access to elements of a collection which can be a list, map or an array.
- Provides easy access to predefined objects such as request.
- Arithmetic, logical, relational operations can be done using expression language.
- Automatic type conversion.
- Shows missing values as empty strings instead of NullPointerException.

Example Application

Let us create a test JSF application to test expression language.

Step	Description
1	Create a project with a name *helloworld* under a package *com.tutorialspoint.test* as explained in the *JSF - First Application* chapter.
8	Modify *UserData.java* under package *com.tutorialspoint.test* as explained below.
9	Modify *home.xhtml* as explained below. Keep rest of the files unchanged.
10	Compile and run the application to make sure business logic is working as per the requirements.
11	Finally, build the application in the form of war file and deploy it in Apache Tomcat Webserver.
12	Launch your web application using appropriate URL as explained below in the last step.

UserData.java

```
package com.tutorialspoint.test;

import java.io.Serializable;
import java.util.Date;

import javax.faces.bean.ManagedBean;
import javax.faces.bean.SessionScoped;

@ManagedBean(name = "userData", eager = true)
@SessionScoped
public class UserData implements Serializable {

private static final long serialVersionUID = 1L;

   private Date createTime = new Date();
   private String message = "Hello World!";

   public Date getCreateTime() {
      return(createTime);
   }
   public String getMessage() {
      return(message);
   }
}
```

home.xhtml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml"
   xmlns:f="http://java.sun.com/jsf/core"
   xmlns:h="http://java.sun.com/jsf/html">
   <h:head>
      <title>JSF Tutorial!</title>
   </h:head>
   <h2>Expression Language Example</h2>
   Creation time:
   <h:outputText value="#{userData.createTime}"/>
   <br/><br/>Message:
   <h:outputText value="#{userData.message}"/>
   </h:body>
</html>
```

Once you are ready with all the changes done, let us compile and run the application as we did in JSF - First Application chapter. If everything is fine with your application, this will produce following result:


http://localhost:8080/
JSF tutorial
File Edit View Favorites Tools Help
Expression Language Example
Creation time: Sun Dec 09 22:29:35 IST 2012
Message: Hello World!

CHAPTER

19

JSF - Internationalization

Internationalization is a technique in which status messages, GUI component labels, currency, date are not hardcoded in the program instead they are stored outside the source code in resource bundles and retrieved dynamically. JSF provide a very convenient way to handle resource bundle.

Following steps are required to internalize a JSF application

Step 1. Define properties files

Create properties file for each locale. Name should be in <file-name>_<locale>.properties format.

Default locale can be omitted in file name.

Messages.properties

```
greeting=Hello World!
```

Messages_fr.properties

```
greeting=Bonjour tout le monde!
```

Step 2. Update faces-config.xml

Faces-config.xml

```
<application>
   <locale-config>
      <default-locale>en</default-locale>
      <supported-locale>fr</supported-locale>
   </locale-config>
   <resource-bundle>
      <base-name>com.tutorialspoint.messages</base-name>
      <var>msg</var>
```

```
   </resource-bundle>
</application>
```

Step 3. Use resource-bundle var

home.xhtml

```
<h:outputText value="#{msg['greeting']}" />
```

Example Application

Let us create a test JSF application to test internationalization in JSF.

Step	Description
1	Create a project with a name *helloworld* under a package *com.tutorialspoint.test* as explained in the *JSF - First Application* chapter.
2	Create *resources* folder under *src* > *main* folder.
3	Create *com* folder under *src* > *main* > *resources* folder.
4	Create *tutorialspoint* folder under *src* > *main* > *resources* > *com* folder.
5	Create *messages.properties* file under *src* > *main* > *resources* > *com* > *tutorialspoint*folder.Modify it as explained below
6	Create *messages_fr.properties* file under *src* > *main* > *resources* > *com* > *tutorialspoint*folder.Modify it as explained below
7	Create *faces-config.xml* in *WEB-INF* folder as explained below.
8	Create *UserData.java* under package *com.tutorialspoint.test* as explained below.
9	Modify *home.xhtml* as explained below. Keep rest of the files unchanged.
10	Compile and run the application to make sure business logic is working as per the requirements.
11	Finally, build the application in the form of war file and deploy it in Apache Tomcat Webserver.
12	Launch your web application using appropriate URL as explained below in the last step.

messages.properties

```
greeting=Hello World!
```

messages_fr.properties

```
greeting=Bonjour tout le monde!
```

faces-config.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<faces-config
   xmlns="http://java.sun.com/xml/ns/javaee"
   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   xsi:schemaLocation="http://java.sun.com/xml/ns/javaee
    http://java.sun.com/xml/ns/javaee/web-facesconfig_2_0.xsd"
   version="2.0">
   <application>
      <locale-config>
         <default-locale>en</default-locale>
         <supported-locale>fr</supported-locale>
      </locale-config>
      <resource-bundle>
         <base-name>com.tutorialspoint.messages</base-name>
         <var>msg</var>
      </resource-bundle>
   </application>
</faces-config>
```

UserData.java

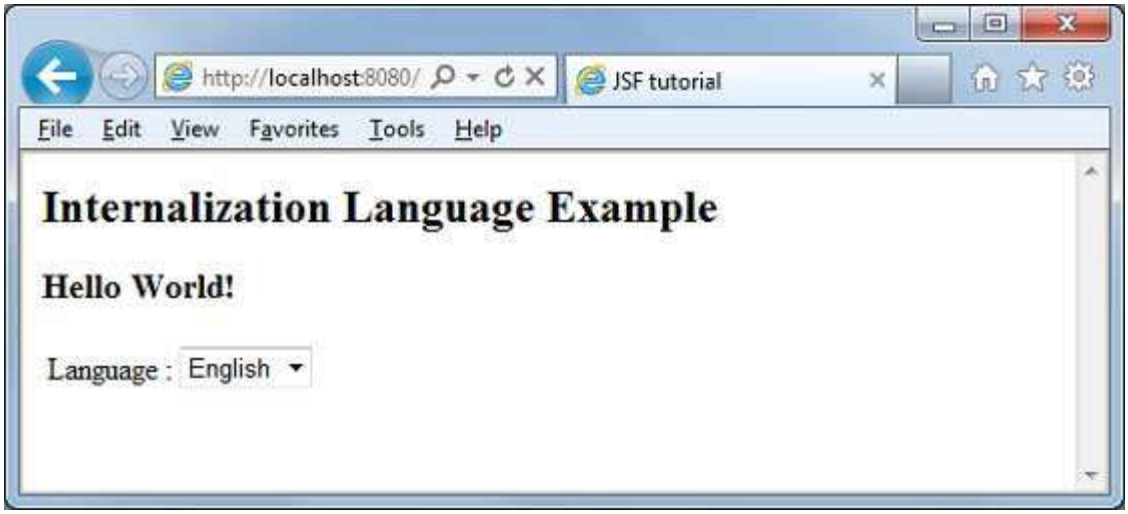
```
package com.tutorialspoint.test;

import java.io.Serializable;
import java.util.LinkedHashMap;
import java.util.Locale;
import java.util.Map;

import javax.faces.bean.ManagedBean;
import javax.faces.bean.SessionScoped;
import javax.faces.context.FacesContext;
import javax.faces.event.ValueChangeEvent;

@ManagedBean(name = "userData", eager = true)
@SessionScoped
public class UserData implements Serializable {

   private static final long serialVersionUID = 1L;
   private String locale;

   private static Map<String,Object> countries;

   static{
      countries = new LinkedHashMap<String,Object>();
      countries.put("English", Locale.ENGLISH);
      countries.put("French", Locale.FRENCH);
   }

   public Map<String, Object> getCountries() {
      return countries;
   }

   public String getLocale() {
      return locale;
```

```
    }

    public void setLocale(String locale) {
        this.locale = locale;
    }

    //value change event listener
    public void localeChanged(ValueChangeEvent e){
        String newLocaleValue = e.getNewValue().toString();
        for (Map.Entry<String, Object> entry : countries.entrySet()) {
            if(entry.getValue().toString().equals(newLocaleValue)){
                FacesContext.getCurrentInstance()
                    .getViewRoot().setLocale((Locale)entry.getValue());
            }
        }
    }
}
```

home.xhtml

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml"
xmlns:h="http://java.sun.com/jsf/html"
xmlns:f="http://java.sun.com/jsf/core"
>
    <h:head>
        <title>JSF tutorial</title>
    </h:head>
    <h:body>
        <h2>Internalization Language Example</h2>
    <h:form>
        <h3><h:outputText value="#{msg['greeting']}" /></h3>
        <h:panelGrid columns="2">
            Language :
            <h:selectOneMenu value="#{userData.locale}" onchange="submit()"
                valueChangeListener="#{userData.localeChanged}">
                <f:selectItems value="#{userData.countries}" />
            </h:selectOneMenu>
        </h:panelGrid>
    </h:form>
</h:body>
</html>
```

Once you are ready with all the changes done, let us compile and run the application as we did in JSF - First Application chapter. If everything is fine with your application, this will produce following result:



Change language from dropdown. You will see the following output.