JSP Tutorial

Tutorialspoint.com

JavaServer Pages (JSP) is a server-side programming technology that enables the creation of dynamic, platform-independent method for building Web-based applications.

JSP have access to the entire family of Java APIs, including the JDBC API to access enterprise databases.

This tutorial gives an initial push to start you with JSP. For more detail kindly check tutorialspoint.com/jsp

What is JavaServer Pages?

JavaServer Pages (JSP) is a technology for developing web pages that support dynamic content which helps developers insert java code in HTML pages by making use of special JSP tags, most of which start with <% and end with %>.

A JavaServer Pages component is a type of Java servlet that is designed to fulfill the role of a user interface for a Java web application. Web developers write JSPs as text files that combine HTML or XHTML code, XML elements, and embedded JSP actions and commands.

Using JSP, you can collect input from users through web page forms, present records from a database or another source, and create web pages dynamically.

JSP tags can be used for a variety of purposes, such as retrieving information from a database or registering user preferences, accessing JavaBeans components, passing control between pages and sharing information between requests, pages etc.

Why Use JSP?

JavaServer Pages often serve the same purpose as programs implemented using the Common Gateway Interface (CGI). But JSP offer several advantages in comparison with the CGI.

- Performance is significantly better because JSP allows embedding Dynamic Elements in HTML Pages itself instead of having a separate CGI files.
- JSP are always compiled before it's processed by the server unlike CGI/Perl which requires the server to load an interpreter and the target script each time the page is requested.
- JavaServer Pages are built on top of the Java Servlets API, so like Servlets, JSP also has access to all the powerful Enterprise Java APIs, including JDBC, JNDI, EJB, JAXP etc.
- JSP pages can be used in combination with servlets that handle the business logic, the model supported by Java servlet template engines.

Finally, JSP is an integral part of J2EE, a complete platform for enterprise class applications. This means that JSP can play a part in the simplest applications to the most complex and demanding.

Setting up JSP Environment

This step involves downloading an implementation of the Java Software Development Kit (SDK) and setting up PATH environment variable appropriately.

You can downloaded SDK from Oracle's Java site: Java SE Downloads.

Once you download your Java implementation, follow the given instructions to install and configure the setup. Finally set PATH and JAVA_HOME environment variables to refer to the directory that contains java and javac, typically java_install_dir/bin and java_install_dir respectively.

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

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

Alternatively, on Windows NT/2000/XP, you could also right-click on My Computer, select Properties, then Advanced, then Environment Variables. Then, you would update the PATH value and press the OK button.

On Unix (Solaris, Linux, etc.), if the SDK is installed in /usr/local/jdk1.5.0_20 and you use the C shell, you would put the following into your .cshrc file.

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

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

Setting up Web Server: Tomcat

A number of Web Servers that support JavaServer Pages and Servlets development are available in the market. Some web servers are freely downloadable and Tomcat is one of them.

Apache Tomcat is an open source software implementation of the JavaServer Pages and Servlet technologies and can act as a standalone server for testing JSP and Servlets and can be integrated with the Apache Web Server. Here are the steps to setup Tomcat on your machine:

- Download 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-5.5.29 on windows, or /usr/local/apache-tomcat-5.5.29 on Linux/Unix and create CATALINA_HOME environment variable pointing to these locations.

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

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

or

C:\apache-tomcat-5.5.29\bin\startup.bat
```
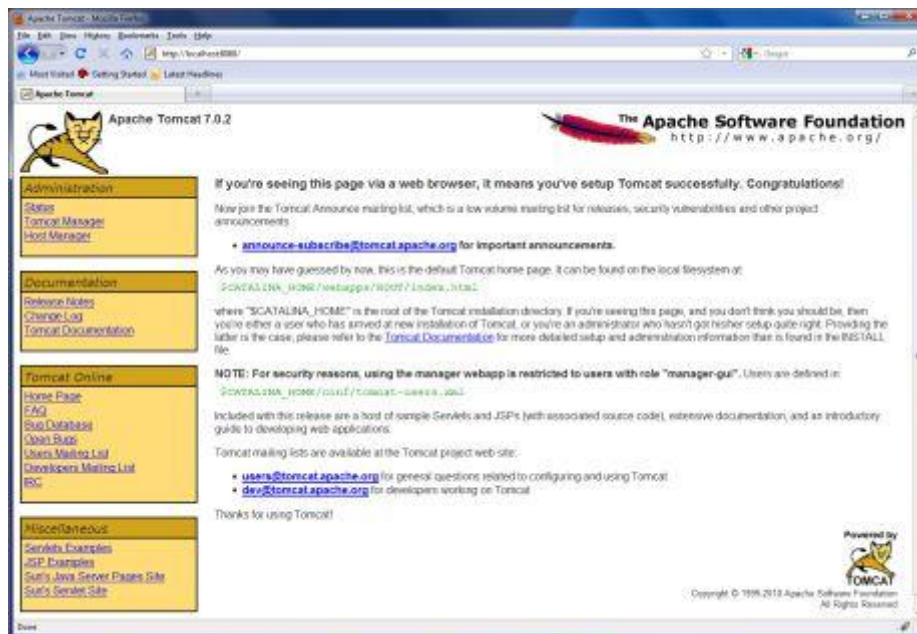
Tomcat can be started by executing the following commands on Unix (Solaris, Linux, etc.) machine:

```
$CATALINA_HOME/bin/startup.sh

or
```

```
/usr/local/apache-tomcat-5.5.29/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

JSP Processing:

The following steps explain how the web server creates the web page using JSP:

- As with a normal page, your browser sends an HTTP request to the web server.
- The web server recognizes that the HTTP request is for a JSP page and forwards it to a JSP engine. This is done by using the URL or JSP page which ends with **.jsp** instead of .html.
- The JSP engine loads the JSP page from disk and converts it into a servlet content. This conversion is very simple in which all template text is converted to println( ) statements and all JSP elements are converted to Java code that implements the corresponding dynamic behavior of the page.
- The JSP engine compiles the servlet into an executable class and forwards the original request to a servlet engine.
- A part of the web server called the servlet engine loads the Servlet class and executes it. During execution, the servlet produces an output in HTML format, which the servlet engine passes to the web server inside an HTTP response.
- The web server forwards the HTTP response to your browser in terms of static HTML content.
- Finally web browser handles the dynamically generated HTML page inside the HTTP response exactly as if it were a static page.

All the above mentioned steps can be shown below in the following diagram:
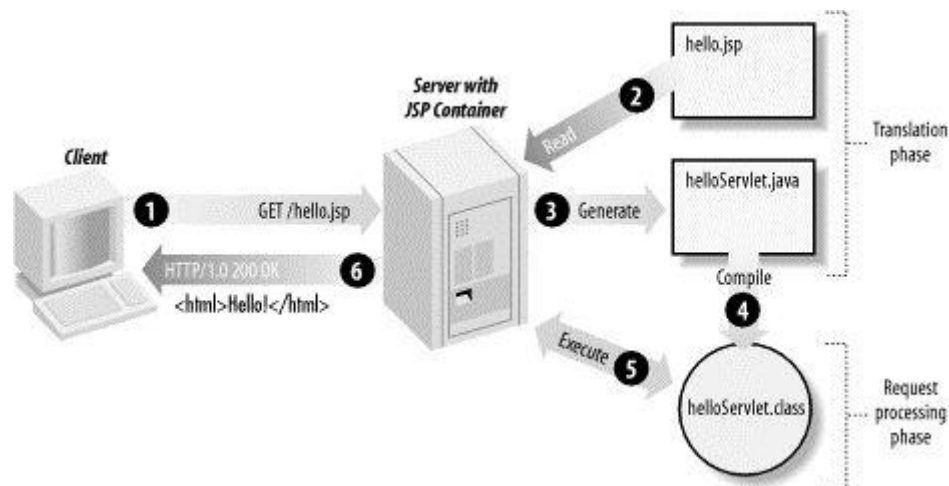
The Scriptlet:

A scriptlet can contain any number of JAVA language statements, variable or method declarations, or expressions that are valid in the page scripting language.

Following is the syntax of Scriptlet:

```
<% code fragment %>
```

You can write XML equivalent of the above syntax as follows:

```
<jsp:scriptlet>
   code fragment
</jsp:scriptlet>
```

Any text, HTML tags, or JSP elements you write must be outside the scriptlet. Following is the simple and first example for JSP:

```
<html>
<head><title>Hello World</title></head>
<body>
Hello World!<br/>
<%
out.println("Your IP address is " + request.getRemoteAddr());
%>
</body>
</html>
```

NOTE: Assuming that Apache Tomcat is installed in C:\apache-tomcat-7.0.2 and your environment is setup as per environment setup tutorial.

Let us keep above code in JSP file hello.jsp and put this file in **C:\apache-tomcat-7.0.2\webapps\ROOT** directory and try to browse it by giving URL http://localhost:8080/hello.jsp. This would generate following result:
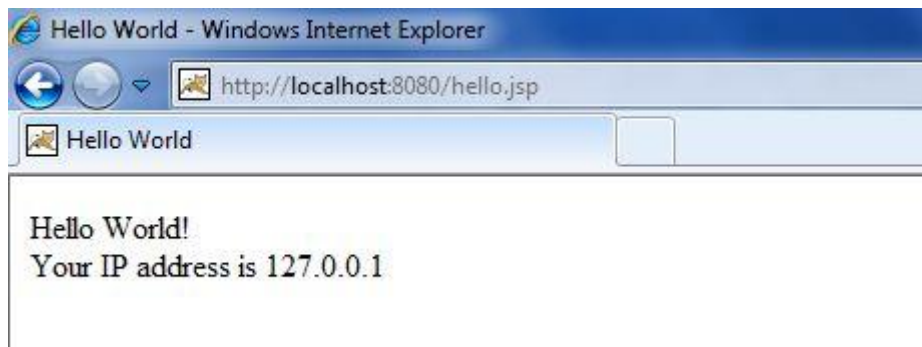
JSP Declarations:

A declaration declares one or more variables or methods that you can use in Java code later in the JSP file. You must declare the variable or method before you use it in the JSP file.

Following is the syntax of JSP Declarations:

```
<%! declaration; [ declaration; ]+ ... %>
```

You can write XML equivalent of the above syntax as follows:

```
<jsp:declaration>
   code fragment
</jsp:declaration>
```

Following is the simple example for JSP Comments:

```
<%! int i = 0; %>
<%! int a, b, c; %>
<%! Circle a = new Circle(2.0); %>
```

JSP Expression:

A JSP expression element contains a scripting language expression that is evaluated, converted to a String, and inserted where the expression appears in the JSP file.

Because the value of an expression is converted to a String, you can use an expression within a line of text, whether or not it is tagged with HTML, in a JSP file.

The expression element can contain any expression that is valid according to the Java Language Specification but you cannot use a semicolon to end an expression.

Following is the syntax of JSP Expression:

```
<%= expression %>
```

You can write XML equivalent of the above syntax as follows:

```
<jsp:expression>
   expression
```

```
</jsp:expression>
```

Following is the simple example for JSP Expression:

```
<html>
<head><title>A Comment Test</title></head>
<body>
<p>
    Today's date: <%= (new java.util.Date()).toLocaleString()%>
</p>
</body>
</html>
```

This would generate following result:

Today's date: 11-Sep-2010 21:24:25

JSP Comments:

JSP comment marks text or statements that the JSP container should ignore. A JSP comment is useful when you want to hide or "comment out" part of your JSP page.

Following is the syntax of JSP comments:

```
<%-- This is JSP comment --%>
```

Following is the simple example for JSP Comments:

```
<html>
<head><title>A Comment Test</title></head>
<body>
<h2>A Test of Comments</h2>
<%-- This comment will not be visible in the page source --%>
</body>
</html>
```

This would generate following result:

A Test of Comments

There are a small number of special constructs you can use in various cases to insert comments or characters that would otherwise be treated specially. Here's a summary:

Syntax	Purpose
<%-- comment --%>	A JSP comment. Ignored by the JSP engine.
<!-- comment -->	An HTML comment. Ignored by the browser.

<\%	Represents static <% literal.
%\>	Represents static %> literal.
\'	A single quote in an attribute that uses single quotes.
\"	A double quote in an attribute that uses double quotes.

JSP Directives:

A JSP directive affects the overall structure of the servlet class. It usually has the following form:

```
<%@ directive attribute="value" %>
```

There are three types of directive tag:

Directive	Description
<%@ page ... %>	Defines page-dependent attributes, such as scripting language, error page, and buffering requirements.
<%@ include ... %>	Includes a file during the translation phase.
<%@ taglib ... %>	Declares a tag library, containing custom actions, used in the page

We would explain JSP directive in separate chapter JSP - Directives

JSP Actions:

JSP actions use constructs in XML syntax to control the behavior of the servlet engine. You can dynamically insert a file, reuse JavaBeans components, forward the user to another page, or generate HTML for the Java plugin.

There is only one syntax for the Action element, as it conforms to the XML standard:

```
<jsp:action_name attribute="value" />
```

Action elements are basically predefined functions and there are following JSP actions available:

Syntax	Purpose
jsp:include	Includes a file at the time the page is requested

jsp:include	Includes a file at the time the page is requested
jsp:useBean	Finds or instantiates a JavaBean
jsp:setProperty	Sets the property of a JavaBean
jsp:getProperty	Inserts the property of a JavaBean into the output
jsp:forward	Forwards the requester to a new page
jsp:plugin	Generates browser-specific code that makes an OBJECT or EMBED tag for the Java plugin
jsp:element	Defines XML elements dynamically.
jsp:attribute	Defines dynamically defined XML element's attribute.
jsp:body	Defines dynamically defined XML element's body.
jsp:text	Use to write template text in JSP pages and documents.

We would explain JSP actions in separate chapter JSP - Actions

JSP Implicit Objects:

JSP supports nine automatically defined variables, which are also called implicit objects. These variables are:

Objects	Description
request	This is the **HttpServletRequest** object associated with the request.
response	This is the **HttpServletResponse** object associated with the response to the client.
out	This is the **PrintWriter** object used to send output to the client.
session	This is the **HttpSession** object associated with the request.
application	This is the **ServletContext** object associated with application context.
config	This is the **ServletConfig** object associated with the page.

pageContext	This encapsulates use of server-specific features like higher performance **JspWriters**.
page	This is simply a synonym for **this**, and is used to call the methods defined by the translated servlet class.
Exception	The **Exception** object allows the exception data to be accessed by designated JSP.

We would explain JSP Implicit Objects in separate chapter JSP - Implicit Objects.

Control-Flow Statements:

JSP provides full power of Java to be embedded in your web application. You can use all the APIs and building blocks of Java in your JSP programming including decision making statements, loops etc.

Decision-Making Statements:

The **if...else** block starts out like an ordinary Scriptlet, but the Scriptlet is closed at each line with HTML text included between Scriptlet tags.

```
<%! int day = 3; %>
<html>
<head><title>IF...ELSE Example</title></head>
<body>
<% if (day == 1 | day == 7) { %>
     <p> Today is weekend</p>
<% } else { %>
     <p> Today is not weekend</p>
<% } %>
</body>
</html>
```

This would produce following result:

```
Today is not weekend
```

Now look at the following **switch...case** block which has been written a bit differentlty using **out.println()** and inside Scriptletas:

```
<%! int day = 3; %>
<html>
<head><title>SWITCH...CASE Example</title></head>
<body>
<%
switch(day) {
case 0:
   out.println("It\'s Sunday.");
   break;
```

```
case 1:
   out.println("It\'s Monday.");
   break;
case 2:
   out.println("It\'s Tuesday.");
   break;
case 3:
   out.println("It\'s Wednesday.");
   break;
case 4:
   out.println("It\'s Thursday.");
   break;
case 5:
   out.println("It\'s Friday.");
   break;
default:
   out.println("It's Saturday.");
}
%>
</body>
</html>
```

This would produce following result:

```
It's Wednesday.
```

Loop Statements:

You can also use three basic types of looping blocks in Java: **for, while,and do.while** blocks in your JSP programming.

Let us look at the following **for** loop example:

```
<%! int fontSize; %>
<html>
<head><title>FOR LOOP Example</title></head>
<body>
<%for ( fontSize = 1; fontSize <= 3; fontSize++){ %>
   <font color="green" size="<%= fontSize %>">
    JSP Tutorial
   </font><br />
<%}%>
</body>
</html>
```

This would produce following result:

JSP Tutorial
JSP Tutorial
JSP Tutorial

Above example can be written using **while** loop as follows:

```
<%! int fontSize; %>
```

```
<html>
<head><title>WHILE LOOP Example</title></head>
<body>
<%while ( fontSize <= 3){ %>
   <font color="green" size="<%= fontSize %>">
    JSP Tutorial
   </font><br />
<%fontSize++;%>
<%}%>
</body>
</html>
```

This would also produce following result:

JSP Tutorial
JSP Tutorial
JSP Tutorial

JSP Operators:

JSP supports all the logical and arithmatic operators supported by Java. Following table give a list of all the operators with the highest precedence appear at the top of the table, those with the lowest appear at the bottom.

Within an expression, higher precedenace operators will be evaluated first.

Category	Operator	Associativity
Postfix	() [] . (dot operator)	Left to right
Unary	++ - - ! ~	Right to left
Multiplicative	* / %	Left to right
Additive	+ -	Left to right
Shift	>> >>> <<	Left to right
Relational	> >= < <=	Left to right
Equality	== !=	Left to right
Bitwise AND	&	Left to right
Bitwise XOR	^	Left to right
Bitwise OR			Left to right

Logical AND	&&	Left to right
Logical OR	||	Left to right
Conditional	?:	Right to left
Assignment	= += -= *= /= %= >>= <<= &= ^= |=	Right to left
Comma	,	Left to right

JSP Literals:

The JSP expression language defines the following literals:

- **Boolean:** true and false
- **Integer:** as in Java
- **Floating point:** as in Java
- **String:** with single and double quotes; " is escaped as \", ' is escaped as \', and \ is escaped as \\.
- **Null:** null

JSP - Sending Email

To send an email using a JSP is simple enough but to start with you should have **JavaMail API** and **Java Activation Framework (JAF)** installed on your machine.

- You can download latest version of JavaMail (Version 1.2) from Java's standard website.
- You can download latest version of JavaBeans Activation Framework JAF (Version 1.0.2) from Java's standard website.

Download and unzip these files, in the newly created top level directories you will find a number of jar files for both the applications. You need to add **mail.jar** and **activation.jar** files in your CLASSPATH.

Send a Simple Email:

Here is an example to send a simple email from your machine. Here it is assumed that your **localhost** is connected to the internet and capable enough to send an email. Same time make sure all the jar files from Java Email API package and JAF package ara available in CLASSPATH.

```
<%@ page import="java.io.*,java.util.*,javax.mail.*"%>
<%@ page import="javax.mail.internet.*,javax.activation.*"%>
<%@ page import="javax.servlet.http.*,javax.servlet.*" %>
<%
   String result;
   // Recipient's email ID needs to be mentioned.
   String to = "abcd@gmail.com";

   // Sender's email ID needs to be mentioned
   String from = "mcmohd@gmail.com";

   // Assuming you are sending email from localhost
```

```
        String host = "localhost";

        // Get system properties object
        Properties properties = System.getProperties();

        // Setup mail server
        properties.setProperty("mail.smtp.host", host);

        // Get the default Session object.
        Session mailSession = Session.getDefaultInstance(properties);

        try{
            // Create a default MimeMessage object.
            MimeMessage message = new MimeMessage(mailSession);
            // Set From: header field of the header.
            message.setFrom(new InternetAddress(from));
            // Set To: header field of the header.
            message.addRecipient(Message.RecipientType.TO,
                                 new InternetAddress(to));
            // Set Subject: header field
            message.setSubject("This is the Subject Line!");
            // Now set the actual message
            message.setText("This is actual message");
            // Send message
            Transport.send(message);
            result = "Sent message successfully....";
        }catch (MessagingException mex) {
            mex.printStackTrace();
            result = "Error: unable to send message....";
        }
%>
<html>
<head>
<title>Send Email using JSP</title>
</head>
<body>
<center>
<h1>Send Email using JSP</h1>
</center>
<p align="center">
<%
    out.println("Result: " + result + "\n");
%>
</p>
</body>
</html>
```

Now let us put above code in SendEmail.jsp file and call this JSP using URL http://localhost:8080/SendEmail.jsp which would send an email to given email ID *abcd@gmail.com* and would display following response:

Send Email using JSP

Result: Sent message successfully....

If you want to send an email to multiple recipients then following methods would be used to specify multiple email IDs:

```
void addRecipients(Message.RecipientType type,
                   Address[] addresses)
throws MessagingException
```

Here is the description of the parameters:

- **type:** This would be set to TO, CC or BCC. Here CC represents Carbon Copy and BCC represents Black Carbon Copy. Example *Message.RecipientType.TO*
- **addresses:** This is the array of email ID. You would need to use InternetAddress() method while specifying email IDs

Send an HTML Email:

Here is an example to send an HTML email from your machine. Here it is assumed that your **localhost** is connected to the internet and capable enough to send an email. Same time make sure all the jar files from Java Email API package and JAF package ara available in CLASSPATH.

This example is very similar to previous one, except here we are using setContent() method to set content whose second argument is "text/html" to specify that the HTML content is included in the message.

Using this example, you can send as big as HTML content you like.

```
<%@ page import="java.io.*,java.util.*,javax.mail.*"%>
<%@ page import="javax.mail.internet.*,javax.activation.*"%>
<%@ page import="javax.servlet.http.*,javax.servlet.*" %>
<%
   String result;
   // Recipient's email ID needs to be mentioned.
   String to = "abcd@gmail.com";

   // Sender's email ID needs to be mentioned
   String from = "mcmohd@gmail.com";

   // Assuming you are sending email from localhost
   String host = "localhost";

   // Get system properties object
   Properties properties = System.getProperties();

   // Setup mail server
   properties.setProperty("mail.smtp.host", host);

   // Get the default Session object.
   Session mailSession = Session.getDefaultInstance(properties);

   try{
      // Create a default MimeMessage object.
      MimeMessage message = new MimeMessage(mailSession);
      // Set From: header field of the header.
      message.setFrom(new InternetAddress(from));
      // Set To: header field of the header.
      message.addRecipient(Message.RecipientType.TO,
                             new InternetAddress(to));
      // Set Subject: header field
      message.setSubject("This is the Subject Line!");

      // Send the actual HTML message, as big as you like
```

```
        message.setContent("<h1>This is actual message</h1>",
                            "text/html" );
        // Send message
        Transport.send(message);
        result = "Sent message successfully....";
    }catch (MessagingException mex) {
        mex.printStackTrace();
        result = "Error: unable to send message....";
    }
%>
<html>
<head>
<title>Send HTML Email using JSP</title>
</head>
<body>
<center>
<h1>Send Email using JSP</h1>
</center>
<p align="center">
<%
    out.println("Result: " + result + "\n");
%>
</p>
</body>
</html>
```

Now try to use above JSP to send HTML message on a given email ID.

Send Attachment in Email:

Here is an example to send an email with attachment from your machine:

```
<%@ page import="java.io.*,java.util.*,javax.mail.*"%>
<%@ page import="javax.mail.internet.*,javax.activation.*"%>
<%@ page import="javax.servlet.http.*,javax.servlet.*" %>
<%
    String result;
    // Recipient's email ID needs to be mentioned.
    String to = "abcd@gmail.com";

    // Sender's email ID needs to be mentioned
    String from = "mcmohd@gmail.com";

    // Assuming you are sending email from localhost
    String host = "localhost";

    // Get system properties object
    Properties properties = System.getProperties();

    // Setup mail server
    properties.setProperty("mail.smtp.host", host);

    // Get the default Session object.
    Session mailSession = Session.getDefaultInstance(properties);

    try{
        // Create a default MimeMessage object.
        MimeMessage message = new MimeMessage(mailSession);
```

```
      // Set From: header field of the header.
      message.setFrom(new InternetAddress(from));

      // Set To: header field of the header.
      message.addRecipient(Message.RecipientType.TO,
                           new InternetAddress(to));

      // Set Subject: header field
      message.setSubject("This is the Subject Line!");

      // Create the message part
      BodyPart messageBodyPart = new MimeBodyPart();

      // Fill the message
      messageBodyPart.setText("This is message body");

      // Create a multipar message
      Multipart multipart = new MimeMultipart();

      // Set text message part
      multipart.addBodyPart(messageBodyPart);

      // Part two is attachment
      messageBodyPart = new MimeBodyPart();
      String filename = "file.txt";
      DataSource source = new FileDataSource(filename);
      messageBodyPart.setDataHandler(new DataHandler(source));
      messageBodyPart.setFileName(filename);
      multipart.addBodyPart(messageBodyPart);

      // Send the complete message parts
      message.setContent(multipart );

      // Send message
      Transport.send(message);
      String title = "Send Email";
      result = "Sent message successfully....";
   }catch (MessagingException mex) {
      mex.printStackTrace();
      result = "Error: unable to send message....";
   }
%>
<html>
<head>
<title>Send Attachement Email using JSP</title>
</head>
<body>
<center>
<h1>Send Attachement Email using JSP</h1>
</center>
<p align="center">
<%
   out.println("Result: " + result + "\n");
%>
</p>
</body>
</html>
```

Now try to run above JSP to send a file as an attachement along with a message on a given email ID.

User Authentication Part:

If it is required to provide user ID and Password to the email server for authentication purpose then you can set these properties as follows:

```
props.setProperty("mail.user", "myuser");
props.setProperty("mail.password", "mypwd");
```

Rest of the email sending mechanism would remain as explained above.

Using Forms to send email:

You can use HTML form to accept email parameters and then you can use **request** object to get all the information as follows:

```
String to = request.getParameter("to");
String from = request.getParameter("from");
String subject = request.getParameter("subject");
String messageText = request.getParameter("body");
```

Once you have all the information, you can use above mentioned programs to send email.

Further Detail:

Refer to the link http://www.tutorialspoint.com/jsp

List of Tutorials from TutorialsPoint.com

- Learn Servlets
- Learn log4j
- Learn iBATIS
- Learn Java
- Learn JDBC
- Java Examples
- Learn Best Practices
- Learn Python
- Learn Ruby
- Learn Ruby on Rails
- Learn SQL
- Learn MySQL
- Learn AJAX
- Learn C Programming
- Learn C++ Programming
- Learn CGI with PERL
- Learn DLL
- Learn ebXML
- Learn Euphoria
- Learn GDB Debugger
- Learn Makefile
- Learn Parrot
- Learn Perl Script
- Learn PHP Script
- Learn Six Sigma
- Learn SEI CMMI
- Learn WiMAX
- Learn Telecom Billing

- Learn ASP.Net
- Learn HTML
- Learn HTML5
- Learn XHTML
- Learn CSS
- Learn HTTP
- Learn JavaScript
- Learn jQuery
- Learn Prototype
- Learn script.aculo.us
- Web Developer's Guide
- Learn RADIUS
- Learn RSS
- Learn SEO Techniques
- Learn SOAP
- Learn UDDI
- Learn Unix Sockets
- Learn Web Services
- Learn XML-RPC
- Learn UML
- Learn UNIX
- Learn WSDL
- Learn i-Mode
- Learn GPRS
- Learn GSM
- Learn WAP
- Learn WML
- Learn Wi-Fi

webmaster@TutorialsPoint.com