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Chapter 10
JSP – II

10.1 Action elements

There are many JSP action tags or elements. Each JSP action tag is used to perform some specific tasks.The action tags are used to control the flow between pages and to use Java Bean. The Jsp action tags are given below.

JSP Action Tags	Description
jsp:forward	forwards the request and response to another resource.
jsp:include	includes another resource.
jsp:useBean	creates or locates bean object.
jsp:setProperty	sets the value of property in bean object.
jsp:getProperty	prints the value of property of the bean.
jsp:plugin	embeds another components such as applet.
jsp:param	sets the parameter value. It is used in forward and include mostly.
jsp:fallback	can be used to print the message if plugin is working. It is used in jsp:plugin.

The jsp:useBean, jsp:setProperty and jsp:getProperty tags are used for bean development. So we will see these tags in bean developement.

10.1.1 jsp:forward action tag

The `jsp:forward` action tag is used to forward the request to another resource it may be jsp, html or another resource.

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Syntax of jsp:forward action tag without parameter

```
<jsp:forward page="relativeURL | <%= expression %>" />
```

Syntax of jsp:forward action tag with parameter

```
<jsp:forward page="relativeURL | <%= expression %>">

<jsp:param name="parametername" value="parametervalue |
<%=expression%>" />

</jsp:forward>
```

Example of jsp:forward action tag without parameter

In this example, we are simply forwarding the request to the `printdate.jsp` file.

`index.jsp`

```
<html> <body>

<h2>this is index page</h2>

<jsp:forward page="printdate.jsp" />

</body> </html>
```

`printdate.jsp`

```
<html> <body>

 <% out.print("Today
is:"+java.util.Calendar.getInstance().getTime()); %>

</body> </html>
```

Example of jsp:forward action tag with parameter

In this example, we are forwarding the request to the `printdate.jsp` file with parameter and `printdate.jsp` file prints the parameter value with date and time.

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index.jsp

```
<html> <body>

<h2>this is index page</h2>

<jsp:forward page="printdate.jsp" >

<jsp:param name="name" value="ABC" />

</jsp:forward>

</body> </html>
```

printdate.jsp

```
<html> <body>

<% out.print("Today
is:"+java.util.Calendar.getInstance().getTime()); %>

<%= request.getParameter("name") %> </body> </html>
```

10.1.2 jsp:include action tag

The **jsp:include action tag** is used to include the content of another resource it may be jsp, html or servlet.The jsp include action tag includes the resource at request time so it is **better for dynamic pages** because there might be changes in future.

The `jsp:include` tag can be used to include static as well as dynamic pages.

Advantage of jsp:include action tag

Code reusability : We can use a page many times such as including header and footer pages in all pages. So it saves a lot of time.

Difference between jsp include directive and include action

JSP include directive	JSP include action
includes resource at translation time.	includes resource at request time.

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better for static pages.	better for dynamic pages.
includes the original content in the generated servlet.	calls the include method.

Syntax of jsp:include action tag without parameter

```
    <jsp:include page="relativeURL | <%= expression %>" />
```

Syntax of jsp:include action tag with parameter

```
<jsp:include page="relativeURL | <%= expression %>">

<jsp:param name="parametername" value="parametervalue |
<%=expression%>" />

</jsp:include>
```

Example of jsp:include action tag without parameter

In this example, index.jsp file includes the content of the printdate.jsp file.

```
File: index.jsp

<h2>this is index page</h2> <jsp:include
page="printdate.jsp" /> <h2>end section of index   page</h2>

File: printdate.jsp

    <% out.print("Today
is:"+java.util.Calendar.getInstance().getTime()); %>
```

10.1.3 jsp:useBean action tag

Java Bean

A Java Bean is a java class that should follow following conventions:

- It should have a no-arg constructor.
- It should be Serializable.
- It should provide methods to set and get the values of the properties, known as getter and setter methods.

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Why use Java Bean?

According to Java white paper, it is a reusable software component. A bean encapsulates many objects into one object, so we can access this object from multiple places. Moreover, it provides the easy maintenance.

Simple example of java bean class

```
//Employee.java
package mypack;
public class Employee implements java.io.Serializable{
private int id;
private String name;
public Employee(){}
public void setId(int id){this.id=id;
} public int getId(){return id;
} public void setName(String name){this.name=name;
} public String getName(){return name;
}
}
```

How to access the java bean class?

To access the java bean class, we should use getter and setter methods.

```
package mypack;
public class Test{
public static void main(String args[])
{
```

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```
    Employee e=new Employee();//object is created

    e.setName("Subodh");//setting value to the object

    System.out.println(e.getName()); }}
```

Note: There are two ways to provide values to the object, one way is by constructor and second is by setter method.

jsp:useBean action tag

The `jsp:useBean` action tag is used to locate or instantiate a bean class. If bean object of the Bean class is already created, it doesn't create the bean depending on the scope. But if object of bean is not created, it instantiates the bean.

Syntax of jsp:useBean action tag

```
    <jsp:useBean id= "instanceName" scope= "page | request |
session | application"

    class= "packageName.className" type=
"packageName.className"

    beanName="packageName.className | <%= expression >" >

    </jsp:useBean>
```

Attributes and Usage of jsp:useBean action tag

- **id:** is used to identify the bean in the specified scope.
- **scope:**represents the scope of the bean. It may be page, request, session or application. The default scope is page.
  - ✓ **page:** specifies that you can use this bean within the JSP page. The default scope is page.
  - ✓ **request:** specifies that you can use this bean from any JSP page that processes the same request. It has wider scope than page.
  - ✓ **session:** specifies that you can use this bean from any JSP page in the same session whether processes the same request or not. It has wider scope than request.

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- ✓ **application:** specifies that you can use this bean from any JSP page in the same application. It has wider scope than session.

- **class:** instantiates the specified bean class (i.e. creates an object of the bean class) but it must have no-arg or no constructor and must not be abstract.
- **type:**provides the bean a data type if the bean already exists in the scope. It is mainly used with class or beanName attribute. If you use it without class or beanName, no bean is instantiated.
- **beanName:**instantiates the bean using the `java.beans.Beans.instantiate()` method.

Simple example of jsp:useBean action tag

In this example, we are simply invoking the method of the Bean class.

Calculator.java (a simple Bean class)

```
public class Calculator{

public int cube(int n){return n*n*n;}

}
```

index.jsp file

```
<jsp:useBean id="obj" class="ABC"/>

<%

int m=obj.cube(5);

out.print("cube of 5 is "+m);

%>
```

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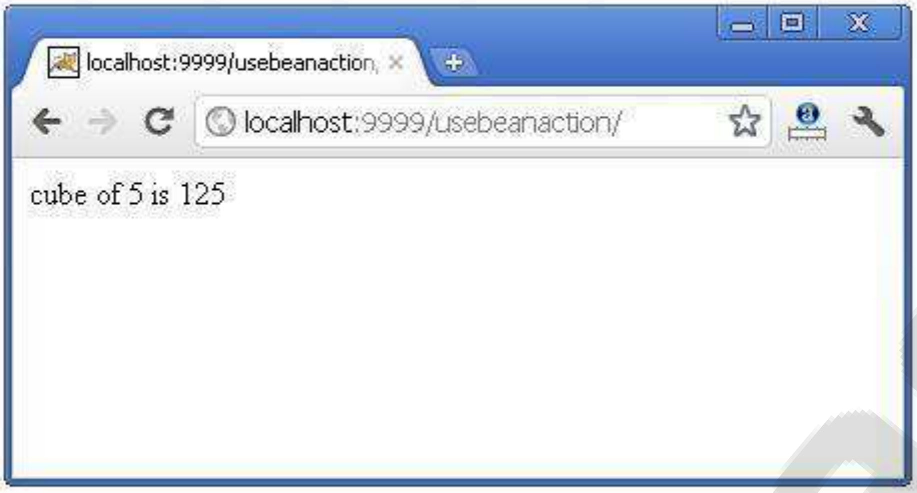

```
cube of 5 is 125
```

10.1.4 jsp:setProperty and jsp:getProperty action tags

The `setProperty` and `getProperty` action tags are used for developing web application with Java Bean. In web devlopment, bean class is mostly used because it is a reusable software component that represents data.

The `jsp:setProperty` action tag sets a property value or values in a bean using the setter method.

Syntax of jsp:setProperty action tag

```
<jsp:setProperty name="instanceOfBean" property= "*"   |

property="propertyName" param="parameterName"  |

property="propertyName" value="{ string | <%= expression
%>}"

/>
```

Example of jsp:setProperty action tag if you have to set all the values of incoming request in the bean

```
<jsp:setProperty name="bean" property="*" />
```

Example of jsp:setProperty action tag if you have to set value of the incoming specific property

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```
    <jsp:setProperty name="bean" property="username" />
```

Example of jsp:setProperty action tag if you have to set a specific value in the property

```
    <jsp:setProperty name="bean" property="username"
value="ABC" />
```

jsp:getProperty action tag

The jsp:getProperty action tag returns the value of the property.

Syntax of jsp:getProperty action tag

```
    <jsp:getProperty name="instanceOfBean"
property="propertyName" />
```

Simple example of jsp:getProperty action tag

```
        <jsp:getProperty name="obj" property="name" />
```

10.1.5 Displaying applet in JSP (jsp:plugin action tag)

The jsp:plugin action tag is used to embed applet in the jsp file. The `jsp:plugin` action tag downloads plugin at client side to execute an applet or bean.

Syntax of jsp:plugin action tag

```
    <jsp:plugin type= "applet | bean" code= "nameOfClassFile"

    codebase= "directoryNameOfClassFile"

    </jsp:plugin>
```

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10.2 implicit objects

There are **9 jsp implicit objects**. These objects are created by the web container that are available to all the jsp pages.

The available implicit objects are out, request, config, session, application etc.

A list of the 9 implicit objects is given below:

Object	Type
Out	JspWriter
Request	HttpServletRequest
Response	HttpServletResponse
Config	ServletConfig
application	ServletContext
Session	HttpSession
pageContext	PageContext
page	Object
exception	Throwable

10.2.1 JSP out implicit object

For writing any data to the buffer, JSP provides an implicit object named out. It is the object of JspWriter. In case of servlet you need to write:

```
PrintWriter out=response.getWriter();
```

But in JSP, you don't need to write this code.

Example of out implicit object

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In this example we are simply displaying date and time.

index.jsp

```
<html> <body>

<% out.print("Today is:"+java.util.Calendar.getInstance().getTime()); %>

</body> </html>
```

10.2.2 JSP request implicit object

The **JSP request** is an implicit object of type `HttpServletRequest` i.e. created for each jsp request by the web container. It can be used to get request information such as parameter, header information, remote address, server name, server port, content type, character encoding etc.

It can also be used to set, get and remove attributes from the jsp request scope.

Let's see the simple example of request implicit object where we are printing the name of the user with welcome message.

Example of JSP request implicit object

index.html

```
<form action="welcome.jsp">

<input type="text" name="uname">

<input type="submit"      value="go">

<br/>

</form>
```

welcome.jsp

```
<%  String name=request.getParameter("uname");

out.print("welcome "+name);
```

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```
%>
```

10.2.3 JSP response implicit object

In JSP, response is an implicit object of type `HttpServletResponse`. The instance of HttpServletResponse is created by the web container for each jsp request.

It can be used to add or manipulate response such as redirect response to another resource, send error etc.

Let's see the example of response implicit object where we are redirecting the response to the Google.

Example of response implicit object

index.html

```
<form action="welcome.jsp">

<input type="text" name="uname">

<input type="submit" value="go"><br/>

</form>
```

welcome.jsp

```
<%

response.sendRedirect("http://www.google.com");

%>
```

Output

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10.2.4 JSP config implicit object

In JSP, config is an implicit object of type `ServletConfig`. This object can be used to get initialization parameter for a particular JSP page. The config object is created by the web container for each jsp page.

Generally, it is used to get initialization parameter from the web.xml file.

Example of config implicit object:

index.html

```
<form action="welcome">

<input type="text" name="uname">

<input type="submit" value="go"><br/>

</form>
```

web.xml file

```
<web-app>

 <servlet>
```

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```
<servlet-name>ABC</servlet-name>

 <jsp-file>/welcome.jsp</jsp-file>

<init-param>

<param-name>dname</param-name>

<param-value>sun.jdbc.odbc.JdbcOdbcDriver</param-value>

</init-param>

</servlet>

<servlet-mapping>

<servlet-name>ABC</servlet-name>

<url-pattern>/welcome</url-pattern>

</servlet-mapping>

</web-app>
```

welcome.jsp

```
<%

out.print("Welcome "+request.getParameter("uname"));

String driver=config.getInitParameter("dname");

out.print("driver name is="+driver);

%>
```

10.2.5 JSP application implicit object

In JSP, application is an implicit object of type `ServletContext`.The instance of ServletContext is created only once by the web container when application or project is deployed on the server.This object can be used to get initialization parameter from configuaration file `(web.xml)`. It can also be used to get, set or remove attribute from the application scope.

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This initialization parameter can be used by all jsp pages.

Example of application implicit object:

index.html

```
<form action="welcome">

<input type="text" name="uname">

<input type="submit" value="go"><br/>

</form>
```

web.xml file

```
<web-app>

<servlet>

<servlet-name>ABC</servlet-name>

<jsp-file>/welcome.jsp</servlet-class>

</servlet>

<servlet-mapping>

<servlet-name>ABC</servlet-name>

<url-pattern>/welcome</url-pattern>

</servlet-mapping>

<context-param>

<param-name>dname</param-name>

<param-value>sun.jdbc.odbc.JdbcOdbcDriver</param-value>

</context-param>

</web-app>
```

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welcome.jsp

```
<%

out.print("Welcome "+request.getParameter("uname"));

String driver=application.getInitParameter("dname");

out.print("driver name is="+driver);

%>
```

10.2.6 session implicit object

In JSP, session is an implicit object of type HttpSession.The Java developer can use this object to set,get or remove attribute or to get session information.

Example of session implicit object

index.html

```
<html>

<body>

<form action="welcome.jsp">

<input type="text" name="uname">

<input type="submit" value="go"><br/>

</form>

</body>

</html>
```

welcome.jsp

```
<html>

<body>

<%
```

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```
String name=request.getParameter("uname");

out.print("Welcome "+name);

session.setAttribute("user",name);

<a href="second.jsp">second jsp page</a>

%>

</body>

</html>
```

second.jsp

```
<html>

<body>

<%

String name=(String)session.getAttribute("user");

out.print("Hello "+name);

%>

</body>

</html>
```

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10.2.7 pageContext implicit object

In JSP, pageContext is an implicit object of type PageContext class.The pageContext object can be used to set,get or remove attribute from one of the following scopes:

- page
- request
- session

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Application

In JSP, page scope is the default scope.

Example of pageContext implicit object

index.html

```
<html>

<body>

<form action="welcome.jsp">

<input type="text" name="uname">

<input type="submit" value="go"><br/>

</form>

</body>

</html>
```

welcome.jsp

```
<html>

<body>

<%

String name=request.getParameter("uname");

out.print("Welcome "+name);

pageContext.setAttribute("user",name,PageContext.SESSION_SC
OPE);

<a href="second.jsp">second jsp page</a>

%>
```

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```
    </body>

    </html>
```

second.jsp

```
    <html>

    <body>

    <%

    String
name=(String)pageContext.getAttribute("user",PageContext.SESSI
ON_SCOPE);

    out.print("Hello "+name);

    %>

    </body>

    </html>
```

10.2.8 page implicit object

In JSP, page is an implicit object of type Object class.This object is assigned to the reference of auto generated servlet class. It is written as:

```
    Object page=this;
```

For using this object it must be cast to Servlet type.For example:

```
    <% (HttpServlet)page.log("message"); %>
```

Since, it is of type Object it is less used because you can use this object directly in jsp.For example:

```
    <% this.log("message"); %>
```

10.2.9 exception implicit object

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In JSP, exception is an implicit object of type `java.lang.Throwable` class. This object can be used to print the exception. But it can only be used in error pages.Let's see a simple example:

Example of exception implicit object:

error.jsp

```
<%@ page isErrorPage="true" %>

<html>

<body>

Sorry following exception occured:<%= exception %>

</body>

</html>
```

10.3 Scope

Scope of JSP Objects

The availability of a JSP object for use from a particular place of the application is defined as the scope of that JSP object. Every object created in a JSP page will have a scope. Object scope in JSP is segregated into four parts and they are page, request, session and application.

a) **Page:**

‘page’ scope means, the JSP object can be accessed only from within the same page where it was created.

The default scope for JSP objects created using `<jsp:useBean>` tag is page.

JSP implicit objects out, exception, response, pageContext, config and page have ‘page’ scope.

b) **Request:**

A JSP object created using the ‘request’ scope can be accessed from any pages that serves that request.

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More than one page can serve a single request.

The JSP object will be bound to the request object.

Implicit object request has the ‘request’ scope.

c) **Session:**

‘session’ scope means, the JSP object is accessible from pages that belong to the same session from where it was created.

The JSP object that is created using the session scope is bound to the session object.

Implicit object session has the ‘session’ scope.

d) **Application:**

A JSP object created using the ‘application’ scope can be accessed from any pages across the application.

The JSP object is bound to the application object.

Implicit object application has the ‘application’ scope.

10.4 Character quoting conventions

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

Character Quoting And Data Conventions :

Syntax	**Purpose**
<\%	Used in template text (static HTML) where you really want "<%".
%\>	Used in scripting elements where you really want "%>".
\'	A single quote in an attribute that uses single quotes. Remember, however, that you can use either single or double quotes, and the other type of quote will then be a regular character.

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\"	A double quote in an attribute that uses double quotes. Remember, however, that you can use either single or double quotes, and the other type of quote will then be a regular character.
%\>	%> in an attribute.
<\%	<% in an attribute.
\	Used as a delimiter.
<%--comment--%>	A JSP comment. Ignored by JSP-to- scriptlet translator. Any embedded JSP scripting elements, directives, or actions are ignored.
<!--comment-->	An HTML comment. Passed through to resultant HTML. Any embedded JSP scripting elements, directives, or actions are executed normally.

10.5 unified expression language

What Is the Expression Language(EL)?

The Expression Language (EL) provides a way to simplify expressions in JSP. It is a simple language used for accessing implicit objects and Java classes, and for manipulating collections in an elegant manner. EL provides the ability to use run-time expressions outside of JSP scripting elements.

Why a "Unified" Expression Language?

JavaServer Pages each has its own expression language. The expression language included in JSP provides greater flexibility to the web application developer. Deferred evaluation means that the technology using the unified EL takes over the responsibility of evaluating the expression from the JSP engine and evaluates the expression at the appropriate time during the page lifecycle. But the JSP EL is designed for immediate evaluation of expressions.

The **Expression Language** (EL) simplifies the accessibility of data stored in the Java Bean component, and other objects like request, session, application etc.

There are many implicit objects, operators and reserve words in EL.

It is the newly added feature in JSP technology version 2.0.

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Syntax for Expression Language (EL)

```
${ expression }
```

Implicit Objects in Expression Language (EL)

There are many implicit objects in the Expression Language. They are as follows:

Implicit Objects	Usage
pageScope	it maps the given attribute name with the value set in the page scope
requestScope	it maps the given attribute name with the value set in the request scope
sessionScope	it maps the given attribute name with the value set in the session scope
applicationScope	it maps the given attribute name with the value set in the application scope
param	it maps the request parameter to the single value
paramValues	it maps the request parameter to an array of values
header	it maps the request header name to the single value
headerValues	it maps the request header name to an array of values
cookie	it maps the given cookie name to the cookie value
initParam	it maps the initialization parameter
pageContext	it provides access to many objects request, session etc.

Simple example of Expression Language that prints the name of the user

In this example, we have created two files index.jsp and process.jsp. The index.jsp file gets input from the user and sends the request to the process.jsp which in turn prints the name of the user using EL.

index.jsp

```
<form action="process.jsp">
```

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```
Enter Name:<input type="text" name="name" /><br/><br/>

<input type="submit" value="go"/>

</form>
```

process.jsp

```
Welcome, ${ param.name }
```

Example of Expression Language that prints the value set in the session scope

In this example, we printing the data stored in the session scope using EL. For this purpose, we have used sessionScope object.

index.jsp

```
<h3>welcome to index page</h3>

<%

session.setAttribute("user","ABC");

%>

<a href="process.jsp">visit</a>
```

process.jsp

```
Value is ${ sessionScope.user }
```

Precedence of Operators in EL

There are many operators that have been provided in the Expression Language.

Their precedence are as follows:

[] .
()

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-(unary) not ! empty
* / div % mod
+ - (binary)
< <= > >= lt le gt ge
== != eq ne
&& and
|| or
?:

Reserve words in EL

There are many reserve words in the Expression Language. They are as follows:

lt	le	gt	ge
eq	ne	true	false
and	or	not	instanceof
div	mod	empty	null

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