

# JSP Standard Actions, XML, and EL

**JSP Standard Actions**  
**Dispatching Mechanisms**  
**JSPs in XML**  
**Expression Language**

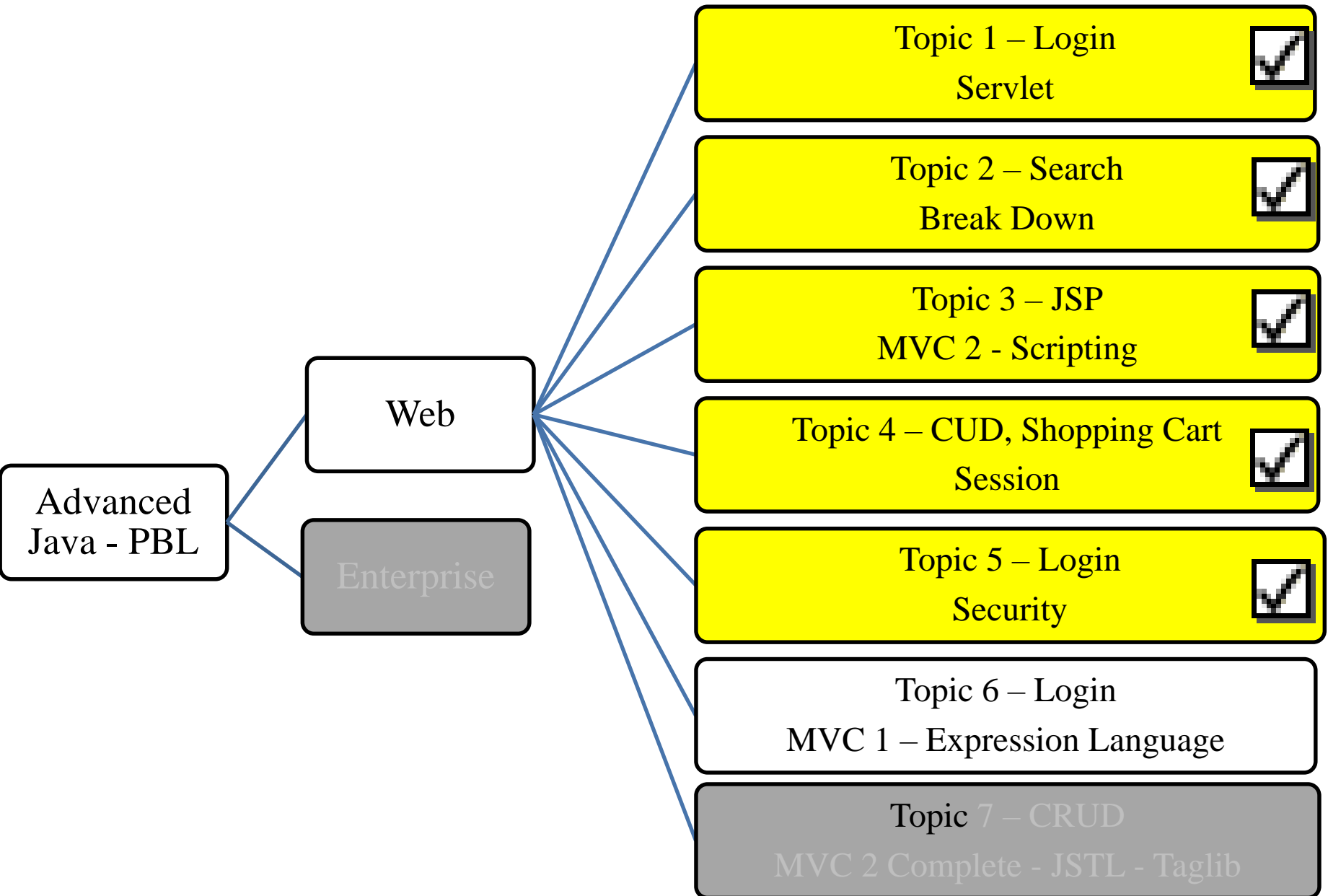
# Review

- **Security Mechanisms**
  - Authentication (BASIC, DIGEST, FORM)
  - Authorization
  - Data Integrity
  - Confidentiality (CLIENT-CERT or HTTPS CLIENT)
  - Applied JAAS and ACLs file
  - 2 types: Declarative or Programmatic, or Mixing
  - How to implement Security on Web application with supporting Web/Servlet container

# Objectives

- **How to build the Web Application using MVC1?**
  - Standard Actions
  - Dispatching Mechanisms
- **How to remove the scripting element (Java Code) in the jsp (view)?**
  - Expression Language

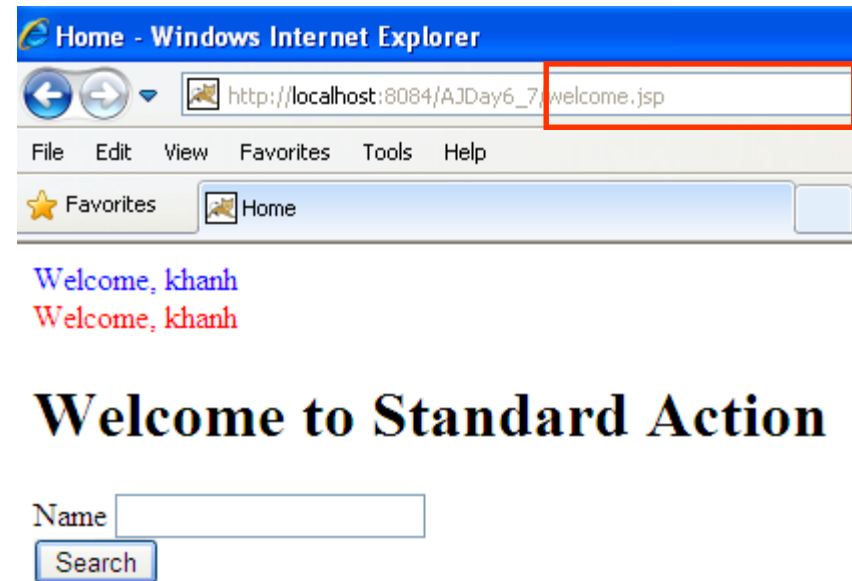
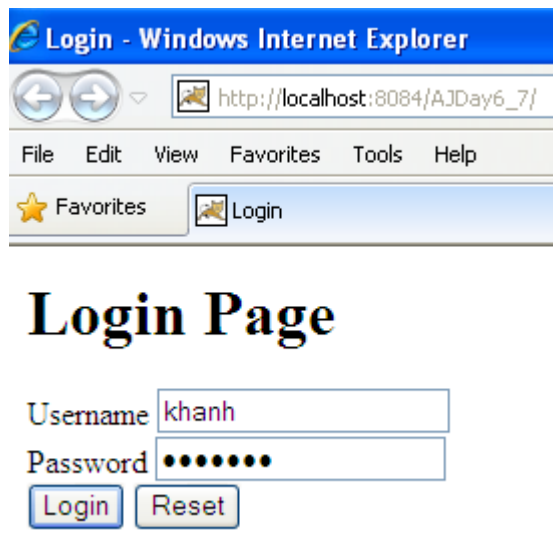
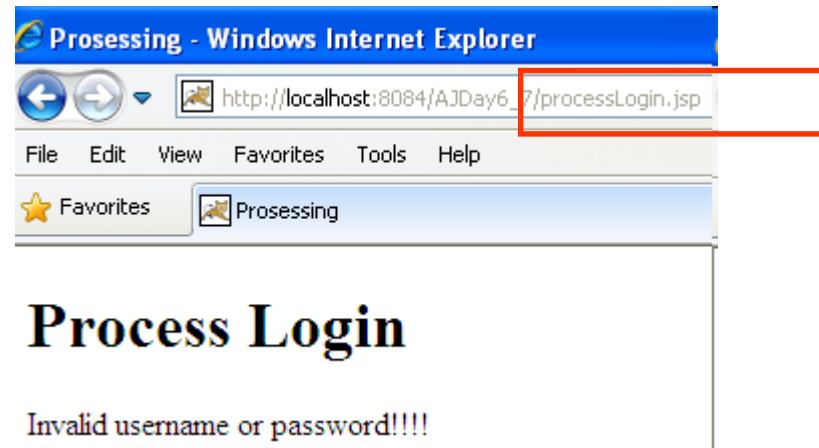
# Objectives



# MVC 1

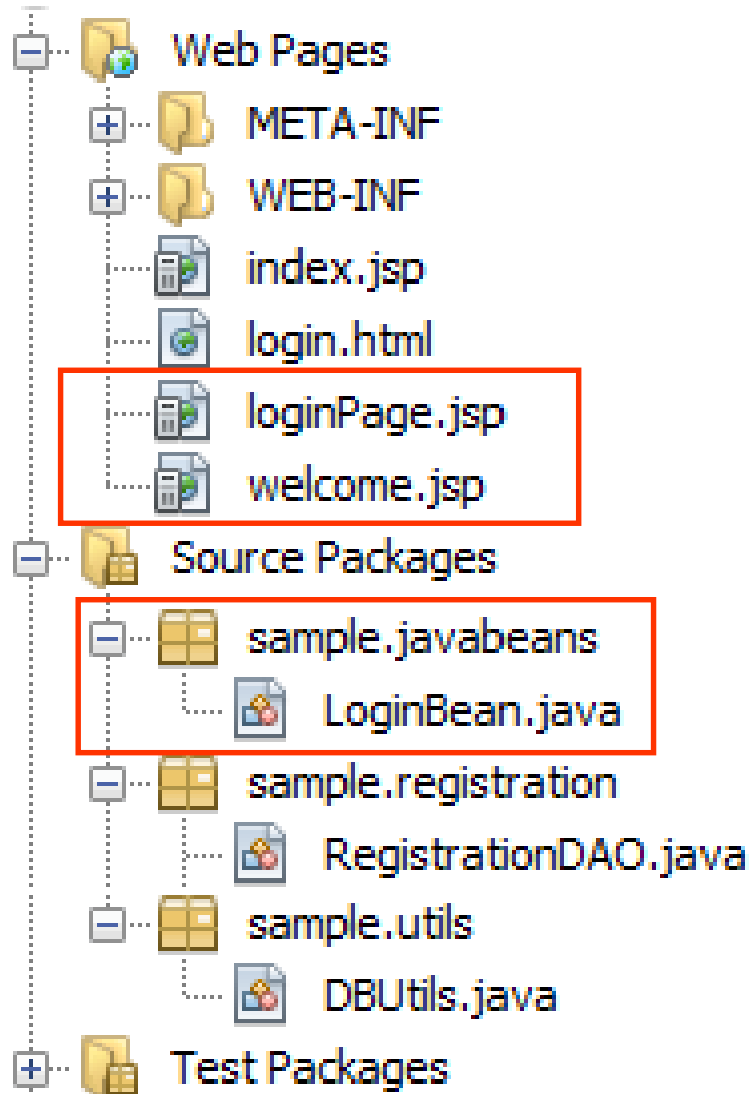
## Requirements

- Building the web application with authentication functions
  - The GUI is shown as



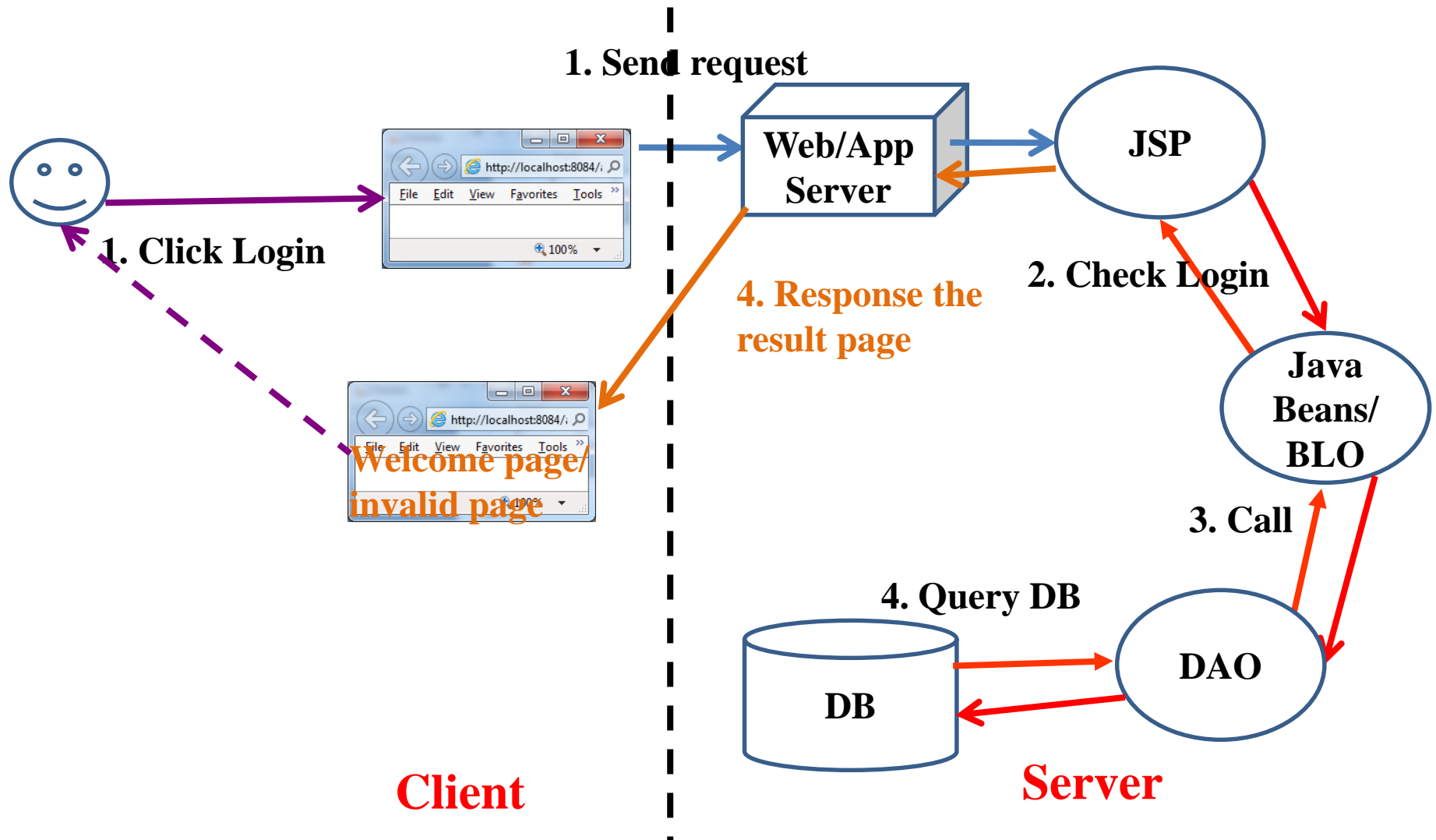
# MVC 1

## Expectation



# MVC1

## Interactive Server Model



# JSP Standard Actions

## Standard Actions

- An alternative to inserting java code into designed presentation page
- Are performed when a browser requests for a JSP page
- Are used for
  - Forwarding requests and performing includes in page
  - Embedding the appropriate HTML on pages
  - Interacting between pages and JavaBeans
  - Providing additional functionality to tag libraries
- Syntax: **<prefix:actionName att="...">...</prefix:actionName>**
- Some properties
  - It use “jsp” prefix
  - The attributes are case sensitive
  - Value in the attributes must be enclosed in double quotes
  - Standard actions can be either an empty or a container tag



# JSP Standard Actions

## Java Beans

- JavaBeans technology is the **component architecture** for the Java 2 Platform, Standard Edition (J2SE).
- JavaBeans technology is based on the **JavaBeans specification**.
- Components (JavaBeans) are **reusable** software programs that you can develop and **assemble easily** to create sophisticated applications.
  - Are reusable components which define the interactivity of Java objects
  - Are reusable software components that work **independently** on a workstation and with a set of other distributed components.
- **Encapsulate state and behavior** of software component
- The **different** point between Java Bean and Java class
  - Java Bean **implemented from Serializable**
    - The process of **create a copy** of an object **suitable** for **passing to another object/ package classes into streams** of bytes that **are transmitted through networks** or saved to the **disk**

# JSP Standard Actions

## Java Beans

- In order to function as a JavaBean class, an object class **must obey certain conventions** about **method naming, construction, and behavior**.
  - These conventions make it possible to have tools that can **use, reuse, replace, and connect** JavaBeans.
- A Bean a **simple Java Class** that follows certain **coding conventions**
  - Bean class should **always use a package name**
  - Bean class **must have a public no-argument constructor**
  - The **properties of bean** (persistence) is **not declared “public”**. They are **accessed through getter and setter methods**.
  - Public **getter** method is used to **retrieve the properties of a bean class**
  - Public **setter** method is used to **set the properties of a bean class**
- **Notes:**
  - The first character of each property should **name in lower case** then the **accessor** methods are used along with property name **with the first character of each word in upper case** (Ex: length – getLength và setLength)
  - The dataType of properties is **boolean** then the getter method is **isXxx** instead of **getXxx**

# JSP Standard Actions

## Java Beans

- A **JSP** page **accesses Java Beans using tag action and gets the result of processing without how to JavaBeans implementation and process**
- Java Bean tags are combined with JSP elements
- Java Bean tags are **translated into single java Servlet classes on the server**
- JSP technology directly supports using JavaBeans components with JSP language elements
- A JSP provides **03 Java bean tag (standard actions)**
  - **jsp:useBean**
  - **jsp:setProperty**
  - **jsp:getProperty**

# JSP Standard Actions

## The `<jsp:useBean>` tag

- Is used to **locate or instantiate** a JavaBeans component
- **First tries to locate** an instance of the Bean **otherwise it instantiates** the Bean from a class
- To locate or instantiate the Bean, the `<jsp:useBean>` follows the following steps:
  - **Attempts to locate** a Bean (*means attribute containing object*) within the scope
  - **Defines an object reference variable with the name**
  - Stores a reference to it in the variable, if it retrieves the Bean
  - **Instantiates** it from the specified class, **if it cannot retrieve the Bean**
- **Syntax**  
`<jsp:useBean id="<identifier>" class="<class name>" [scope = "scope name"]/>`
  - **id**: is used to name the **attribute name**, to **refer** to the Bean **instance in specify scope**
  - **class**: a **class name implementing** a Bean processing.
  - **scope**: the **lifespan** of a bean (sharable). Default value is **page**

# JSP Standard Actions

## The `<jsp:useBean>` tag

- Use scriptlet element to declare Java Bean:

```
<%
```

```
    className id = (className) scope.getAttribute("identifier");  
    if (id == null) {  
        id = new className();  
        scope.setAttribute ("identifier", id);  
    }
```

```
%>
```

- **Ex**

- `<jsp:useBean id="book1" class="store.book"/>`

- **similar to**

```
<%
```

```
    store.book book1 = (store.book) pageContext.getAttribute("book1");  
    if (book1 == null) {  
        book1 = new store.book();  
        pageContext.setAttribute("book1", book1);  
    }
```

```
%>
```

# JSP Standard Actions

## The `<jsp:useBean>` tag

- **Casting**

```
<jsp:useBean id="<identifier>" class="<class name>" type = "<dataType>"  
[scope = "scope type"]/>
```

- **type:** Java – DataType

- **JSP Scriptlet element**

```
<%
```

```
    dataType id = (dataType) scope.getAttribute("identifier");  
    if (id == null) {  
        id = (dataType) (new className());  
        scope.setAttribute ("identifier", id);  
    }
```

```
%>
```

- **Ex**

- `<jsp:useBean id="book1" class="store.book" type="library.magazine" />`

- **Similar to**

```
<% library.magazine book1 = (library.magazine) pageContext.getAttribute("book1");  
    if (book1 == null) {  
        book1 = (library.magazine) (new store.book());  
        pageContext.setAttribute("book1", book1);  
    } %>
```

# JSP Standard Actions

## The `<jsp:useBean>` tag

- **Other syntax**

`<jsp:useBean ...> statement </jsp:useBean>`

- **Ex**

```
<jsp:useBean id="count" class="ABean.AccessBean" scope="application">  
  <jsp:setProperty name="count" property="firstPage" value="ATest.jsp" />  
</jsp:useBean>
```

- **Notes:**

- If using some specified symbol in command, the symbol “\” should put such as ‘(\’); “(\”), \ (\\), % (\%), ...
  - The JSP scriptlets use **id as a variable**.

# JSP Standard Actions

## The `<jsp:getProperty>` tag

- **Retrieves a bean property value** using the **getter methods** and **displays the output** in a JSP page
- **Before** using `<jsp:getProperty>` you **must create or locate a bean** with `<jsp:useBean>`
- **Drawback**
  - Fails to retrieve the values of an indexed property
  - Fails to directly access enterprise beans components
- **Syntax**  
`<jsp:getProperty name="<identifier>" property="<attr name>" />`
  - **name**: the identifier declared in `jsp:useBean`
  - **property**: the property name is implemented in Java Bean
- **Use scriptlet command**  
`<%= <identifier>.getXxx() %>`
- **Ex**  
`<jsp:getProperty name="book1" property="title"/>`  
**Similar to** `<%= book1.getTitle() %>`



# JSP Standard Actions

## The `<jsp:setProperty>` tag

- **Sets the value** of the properties in a bean, **using** the bean's **setter methods**
- **Before** using `<jsp:setProperty>` you **must create or locate** a bean with `<jsp:useBean>`
- **Syntax**

`<jsp:setProperty name="<identifiers>" property="<attr name>" value="<const/ expression>" />`

- **Use scriptlet command:**

```
<%  
    id.setXxx(<value>);  
    scope.setAttribute("identifier", id);  
%>
```

- **Ex:** `<jsp:setProperty name="book1" property="title" value="JSP Book" />`  
**Similar to** `<% book1.setTitle("JSP Book");  
 pageContext.setAttribute("book1", book1);  
 %>`

# JSP Standard Actions

## The `<jsp:setProperty>` tag

- **Assign an expression to action setProperty**
  - `String sMsg = request.getParameter("sms");`
  - `<jsp:setProperty name="msg" property="message" value="<%= sMsg %>" />`
- **Use param properties in setProperty:** receive an inputted value from a request (from other JSP page, application, or URL)
  - `<jsp:setProperty name="msg" property="message" param="message" />`
- **To set values to whole bean properties,** the symbol “\*” is assigned to setProperty

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

- **Notes:**
  - The Bean Action is **executed only** if all of **properties** is **assigned** values **because** the engine **does not assign a null value with lacked properties**.
  - In some web server, the **exceptions** are **thrown** if a **property** value is **assigned** to **double**
  - The **converted mechanism** does **not ensure** a **valid value** for **property** (instead of manual casting)
  - The **parameters name** should **similar** to **properties name** implemented in **Bean**

# JSP Standard Actions

Steps in design Web Application  
following MVC patterns

- **Step 1**
  - create **View**
- **Step 2**
  - **Depends on View, determine some persistence controls** that are implemented as the Java Bean (Model) 's properties
  - **Implement** the Java Bean with **accessor methods** and **some utilitie methods** that are used to query the properties of Java Bean
    - The methods are designed following the OO standard
- **Step 3**
  - **Create servlet (Controller)/JSP page combining View & Model**

# MVC1

## Requirements

**Login - Windows Internet Explorer**

http://localhost:8084/AJDay6\_7/

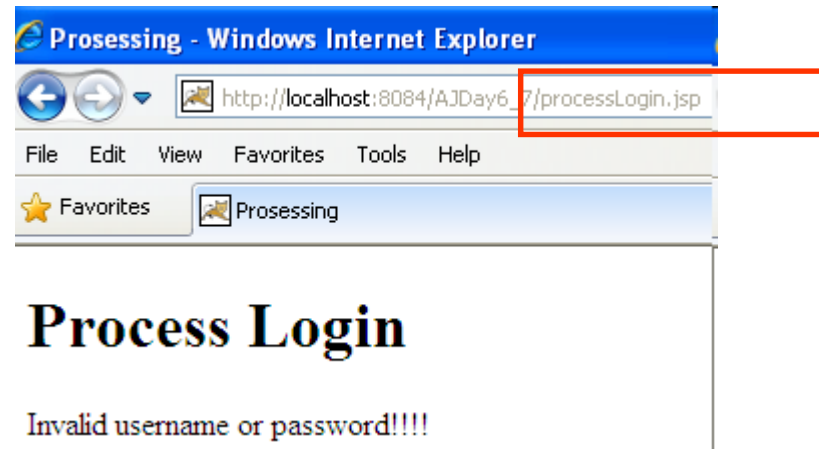
File Edit View Favorites Tools Help

★ Favorites Login

## Login Page

Username

Password



**Home - Windows Internet Explorer**

http://localhost:8084/AJDay6\_7/welcome.jsp

File Edit View Favorites Tools Help

★ Favorites Home

Welcome, khanh  
Welcome, khanh

## Welcome to Standard Action

Name

# JSP Standard Actions

## Scope of JavaBeans

- **page**
  - Accessible for **current page**. The life span till the current page displayed
  - The information is **stored in pageContext** (get values through the `getAttribute` method) – **default scope**
- **application**
  - Current and any successive request from the same Web Application. Global to all JSP and servlet.
  - The information is **stored in ServletContext**.
  - The life span is Application
- **session**
  - The information is **stored in HttpSession combined current request** (get values through the `getValues` method of Session interface (Implicit Object)).
  - The life span till the session destroyed, time out, or Web browser closed.
- **request**
  - Accessible for **current request** (get values through the `getAttribute` methods)
  - The information is **stored in ServletRequest**
  - The life Span till the request processed and the response is sent back to the Web browser

# JSP Standard Actions

## Scope of JavaBeans

- **Notes:**

- Using JavaBeans with Session or Application scope, a JSP page **must declare a tag action `jsp:useBean` with a same id and class name.**
- JSP, JSP/ Servlet **engine defines scope** in executing Web application, **if the instance bean existed**, the **engine** does **not instantatiate new one** (the tag `jsp:useBean` is **omited**) to execute Bean's methods. **Otherwise, the engine create a new instance.**

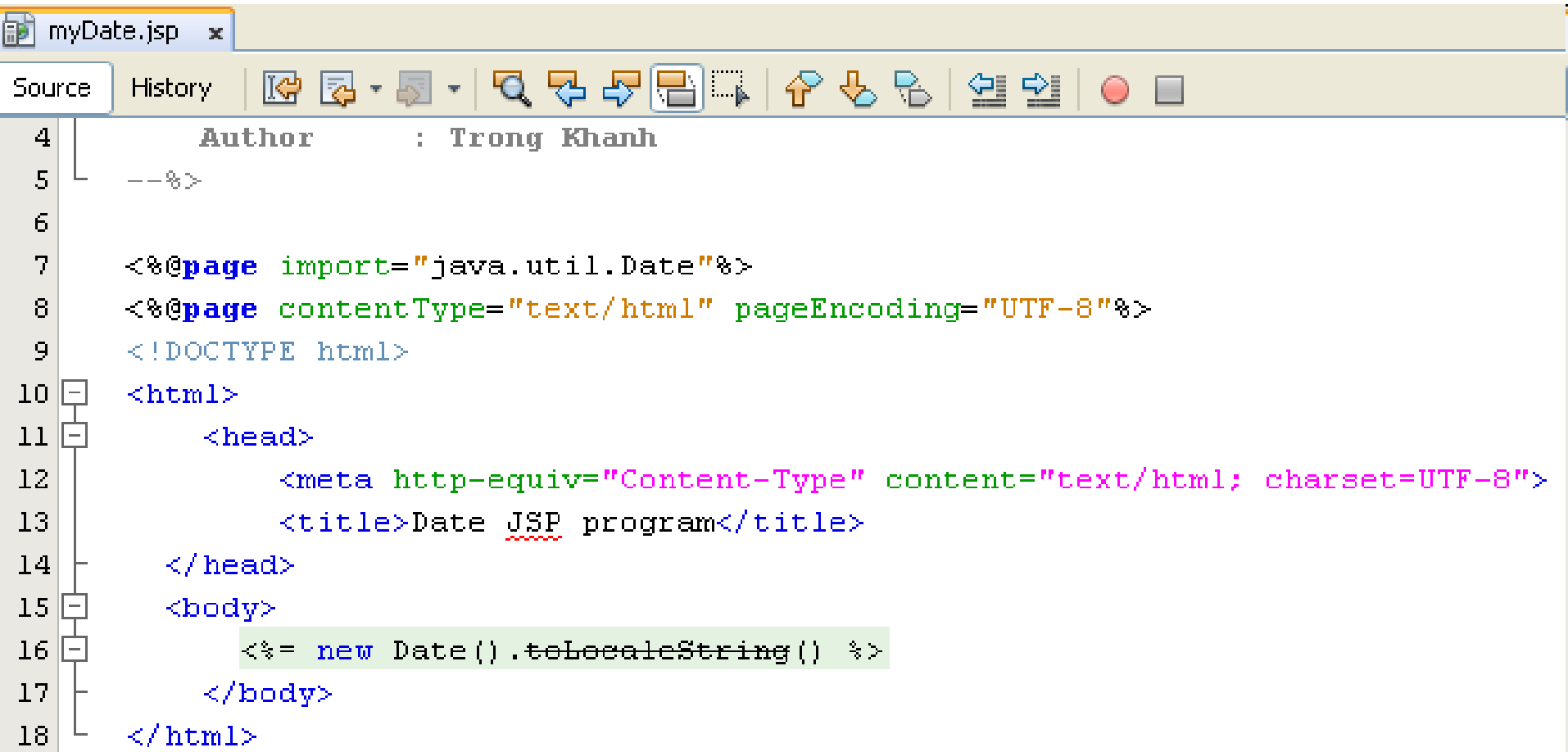
# Dispatching Mechanisms

## The `<jsp:include>` tag

- Can be used to **include** the **response from another file within** the **JSP page output**.
- To **incorporate** the content or **insert** a file from another page into current page
- **Syntax**  
`<jsp:include page="..." flush="true" />`
- The file whose response should be included **has to reside somewhere** in your web application **but doesn't have to be present until the page is actually requested**

# Dispatching Mechanisms

## The <jsp:include> tag – Example



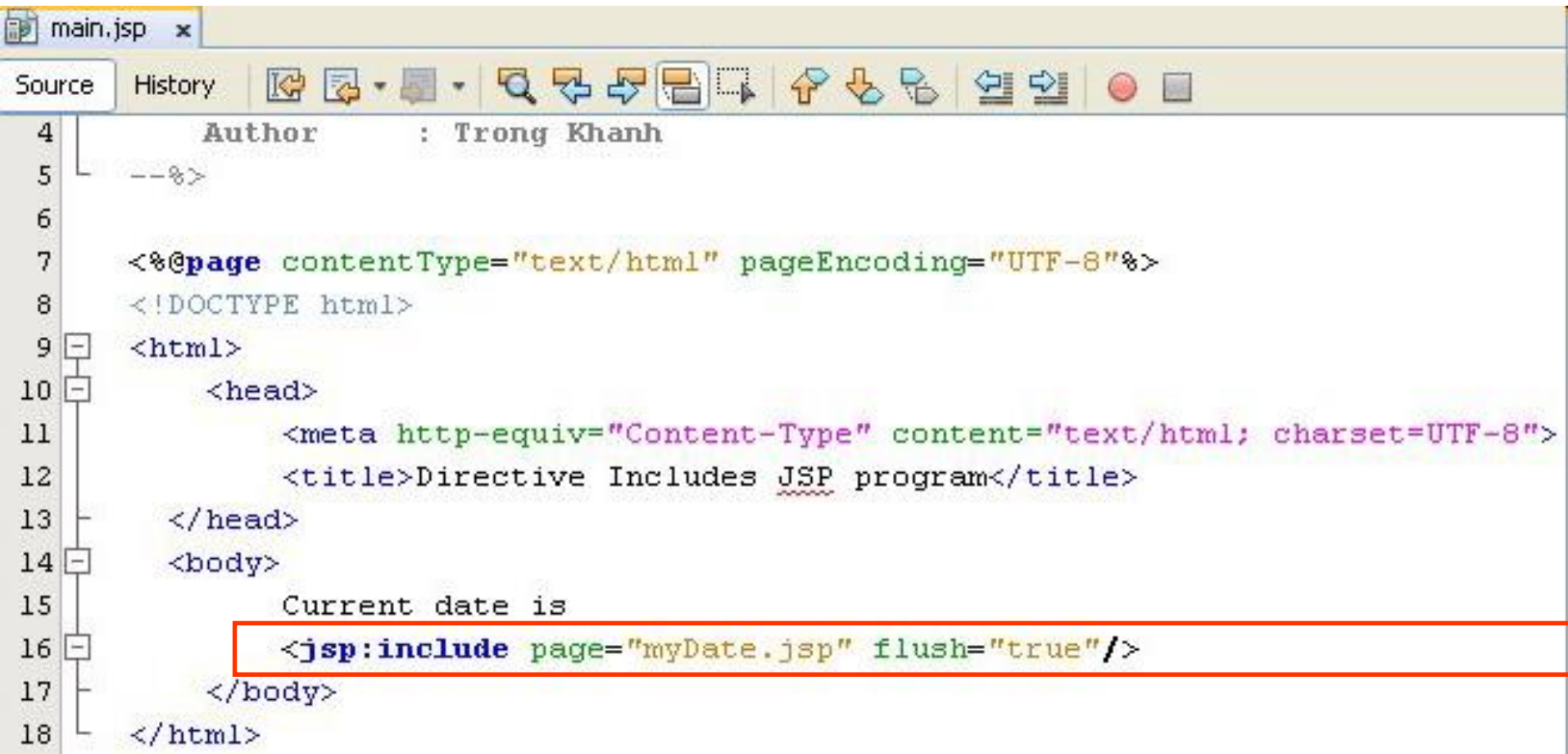
```

4      Author      : Trong Khanh
5      --%>
6
7      <%@page import="java.util.Date"%>
8      <%@page contentType="text/html" pageEncoding="UTF-8"%>
9      <!DOCTYPE html>
10     <html>
11     <head>
12         <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
13         <title>Date JSP program</title>
14     </head>
15     <body>
16         <%= new Date().toLocaleString() %>
17     </body>
18 </html>
  
```



# Dispatching Mechanisms

## The <jsp:include> tag – Example

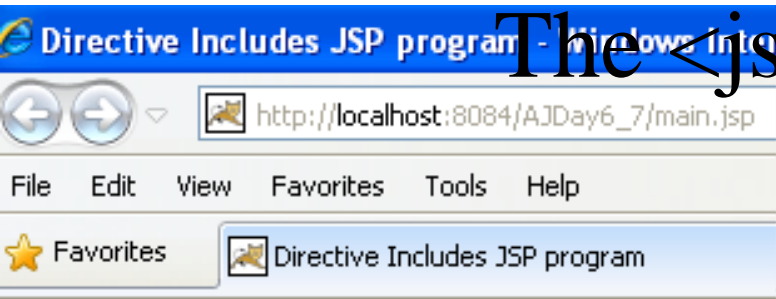


```

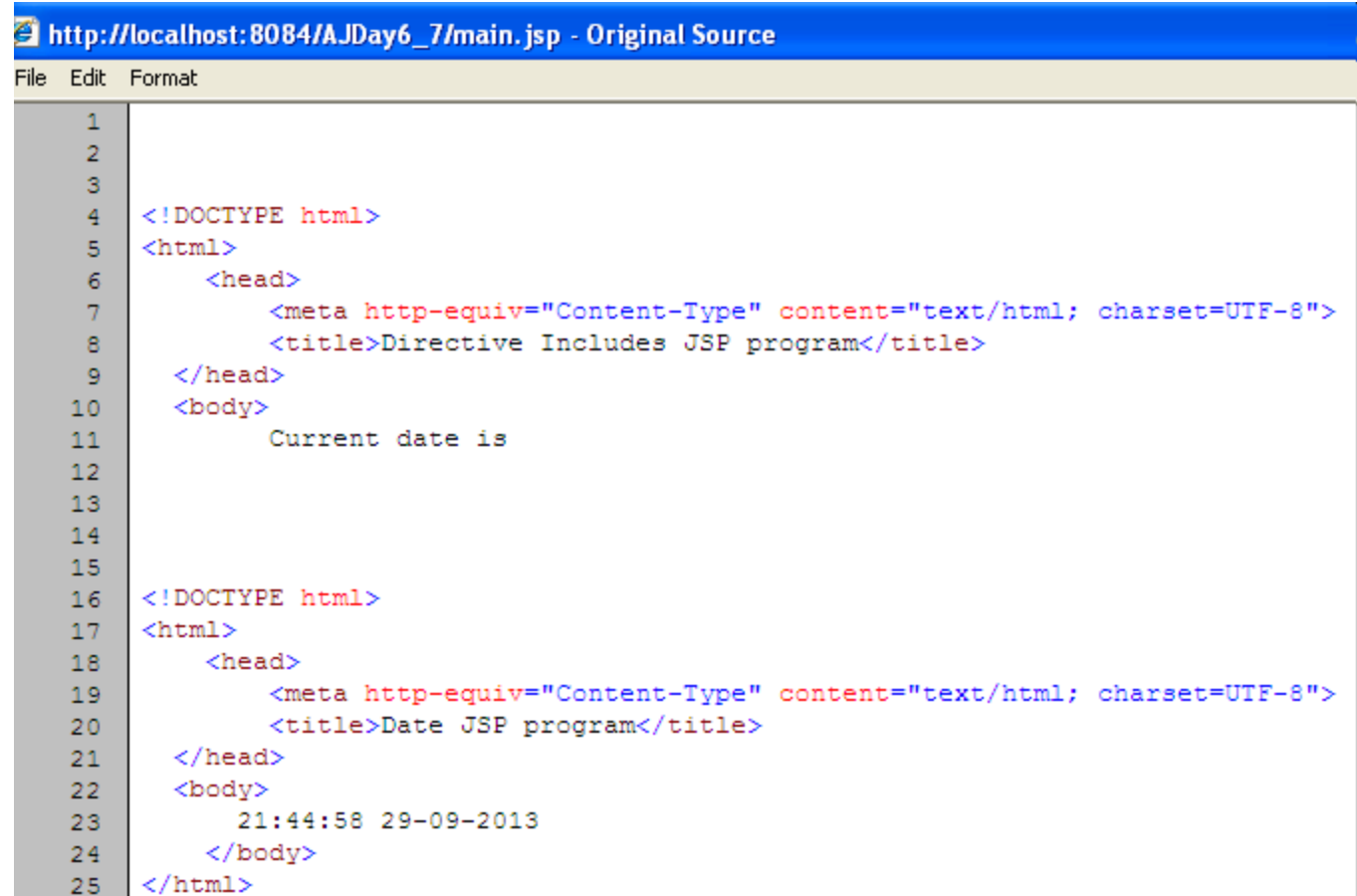
4      Author      : Trong Khanh
5      --%>
6
7      <%@page contentType="text/html" pageEncoding="UTF-8"%>
8      <!DOCTYPE html>
9      <html>
10     <head>
11         <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
12         <title>Directive Includes JSP program</title>
13     </head>
14     <body>
15         Current date is
16         <jsp:include page="myDate.jsp" flush="true"/>
17     </body>
18 </html>
  
```

# Dispatching Mechanisms

## The `<jsp:include>` tag – Example



Current date is 21:44:58 29-09-2013



# Dispatching Mechanisms

## The <jsp:include> tag – Example

C:\Documents and Settings\Trong Khanh\Application Data\NetBeans\7.2.1\apache-tomcat-7.0.27.0\_base\work\Catalina\localhost\AJDay6\_7\org\apache\jsp

main\_jsp CLASS File 5 KB

main\_jsp Java Source File 4 KB

myDate\_jsp CLASS File 5 KB

myDate\_jsp Java Source File 4 KB

main\_jsp.java x

Source History

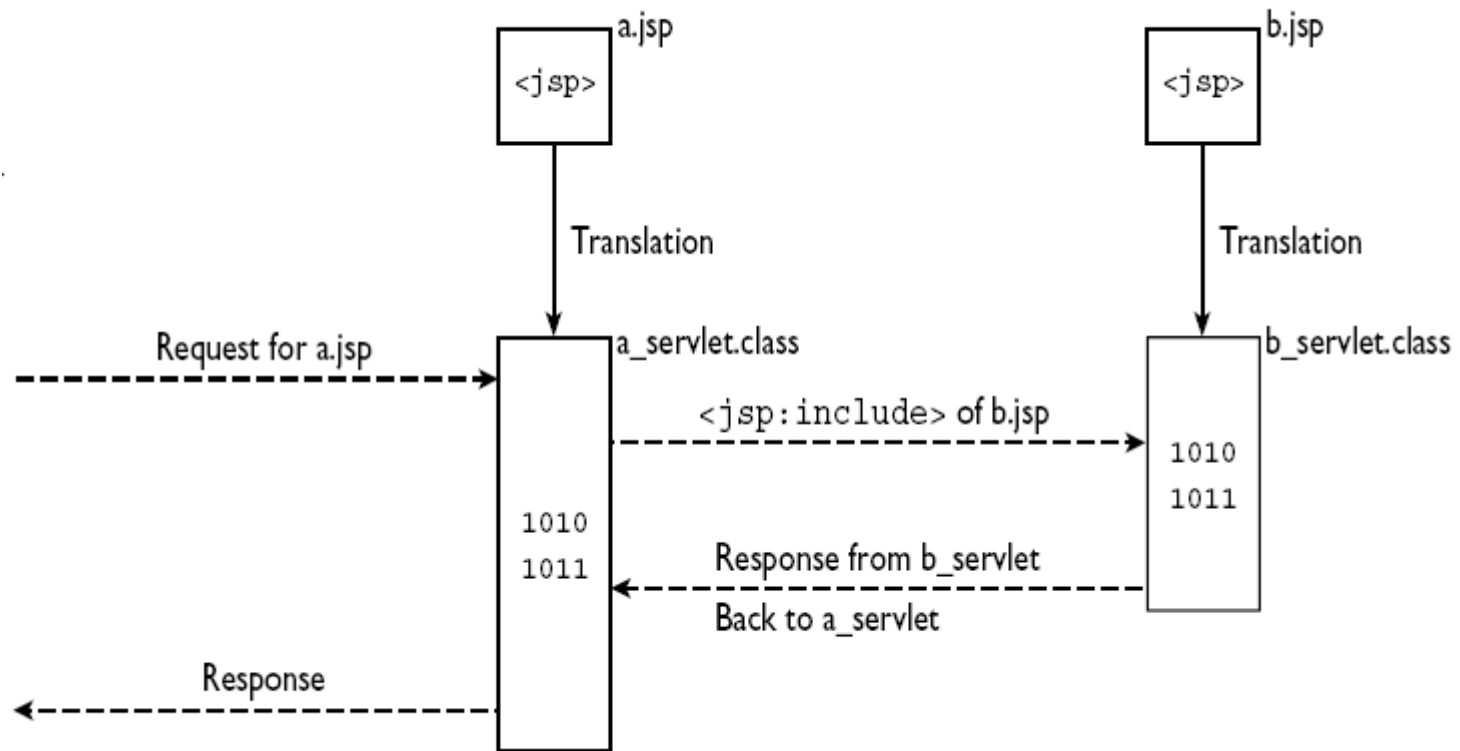
```

64 out.write("\n");
65 out.write("<!DOCTYPE html>\n");
66 out.write("<html>\n");
67 out.write("    <head>\n");
68 out.write("        <meta http-equiv=\"Content-Type\" o
69 out.write("        <title>Directive Includes JSP progr
70 out.write("    </head>\n");
71 out.write("    <body>\n");
72 out.write("        \tCurrent date is\n");
73 out.write("    ");
74 org.apache.jasper.runtime.JspRuntimeLibrary.include(
75     request, response, "myDate.jsp", out, true);
76 out.write("\n");
77 out.write("    </body>\n");
78 out.write("</html>\n");

```

# Dispatching Mechanisms

`<jsp:include>` vs. `<%@ include ...%>`

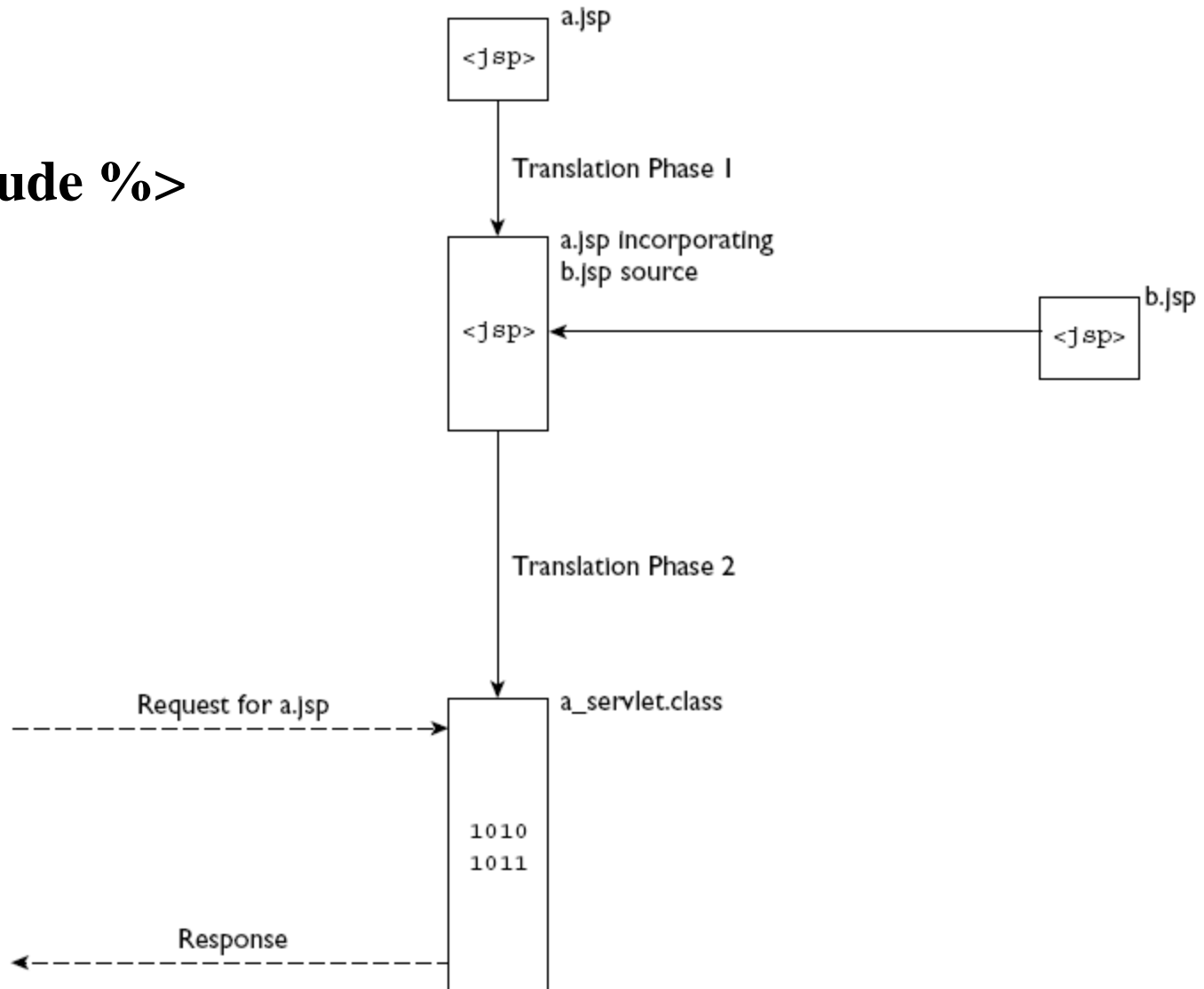


**`<jsp:include>`**

# Dispatching Mechanisms

`<jsp:include>` vs. `<%@ include ... %>`

**`<%@ include %>`**



# Dispatching Mechanisms

The `<jsp:forward>` tag

- **Forwards processing to another resource** within the web application
- To permanently **transfer control from a JSP page to another location** on the local server
- Is used to **redirect the request object containing the client request from one JSP file to another file**. The **target file** can be an **HTML file**, another **JSP file** or a **servlet**
- **The code after the `<jsp:forward>` element is not processed**
- **Syntax**

`<jsp:forward page="..." />` or

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

`<jsp:param name="..." value="..." />`

`</jsp:forward>`

# Dispatching Mechanisms

## The <jsp:param> tag

- Pass **one or more name and value pairs** as parameters to an **included or forwarded** resource like a JSP page, servlet or other resource that can process the parameter (such as jsp:forward and jsp:include)
- **Syntax**  
**<jsp:param name="..." value="{parValue|<%=exp%>}" />**

# Expression Languages

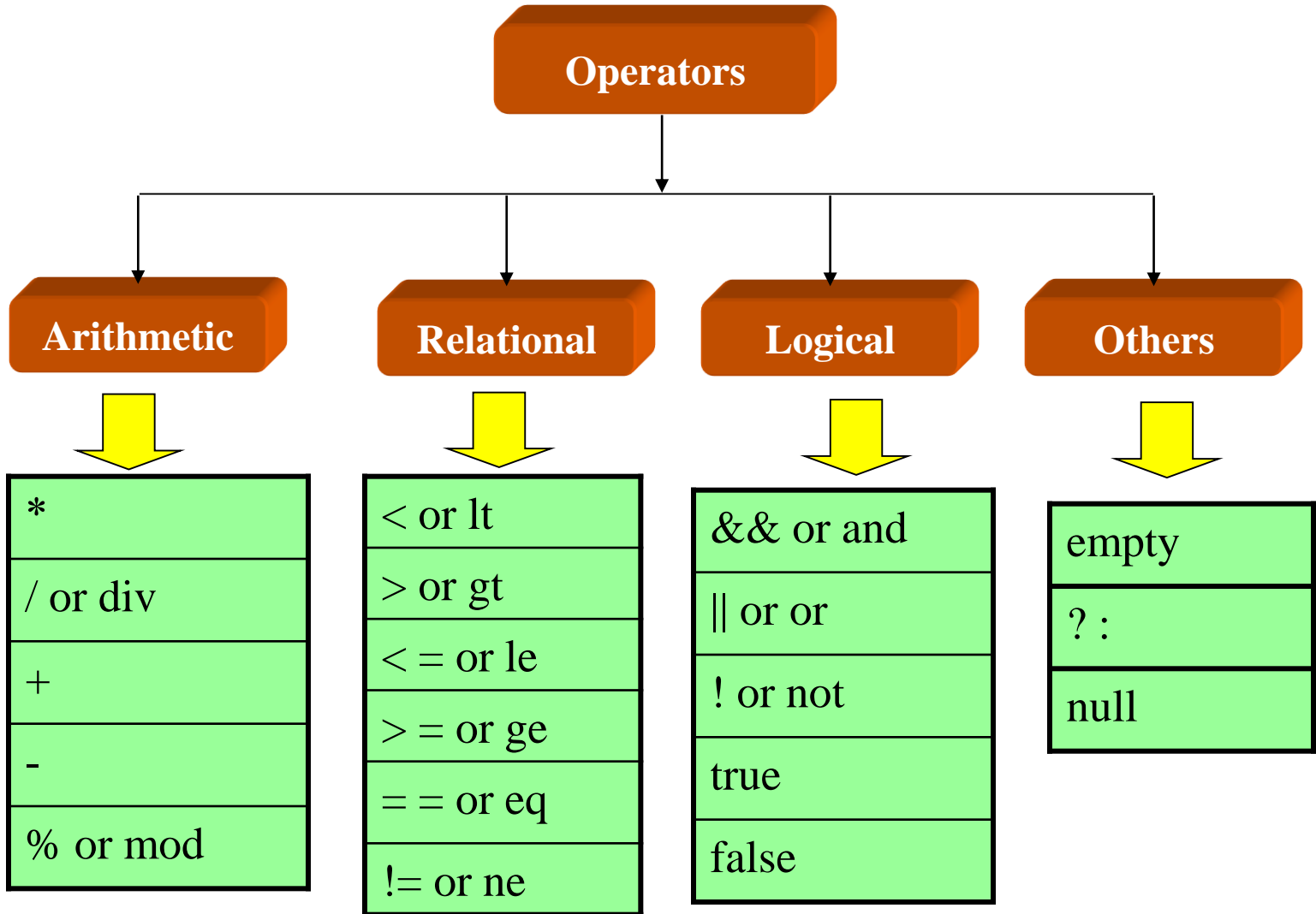
## EL Language Basics

- **New feature** of JSP 2.0
- Allows JSP developers to **access and manipulating java objects** via a **compact, easy-to-use shorthand style** (similar to JavaScript)
- It can **handle both expressions and literals**
- Can be used to display the **generated dynamic content** in a table on the web page and can also be used in HTML tags
- **Developed by two groups**
  - JSP Standard Tag Library expert group
  - JSP 2.0 expert group
- **Syntax: \${EL Expression}**
- **JSP EL expressions are used in**
  - **Static** text
  - **Standard** and **Custom** tags
- **Advantages**
  - **Clear** syntax
  - **Simple & robust**
  - **Easy access** application **data stored** (in **JavaBeans**)



# Expression Languages

## EL Operators



# Expression Languages

## EL Operators – Example

```

math.jsp x
Source History
4      Author      : Trong Khanh
5      --%>
6
7      <%@page contentType="text/html" pageEncoding="UTF-8"%>
8      <!DOCTYPE html>
9      <html>
10     <head>
11         <meta http-equiv="Content-Type" content="text/html; charset=UTF-8"%>
12         <title>Math</title>
13     </head>
14     <body>
15         <h1>EL Expression</h1>
16         <table border="1">
17             <tr>
18                 <td>Concept</td>
19                 <td>Expression</td>
20                 <td>Result</td>
21             </tr>
22             <tr>
23                 <td>Literal</td>
24                 <td>${"10"}</td>
25                 <td>10</td>
26             </tr>
27             <tr>
28                 <td>Addition</td>
29                 <td>${"10" + 10}</td>
30                 <td>20</td>
31             </tr>

```

```

32     <tr>
33         <td>Subtraction</td>
34         <td>${"10" - 10}</td>
35         <td>0</td>
36     </tr>
37     <tr>
38         <td>Multiplication</td>
39         <td>${"10" * 10}</td>
40         <td>100</td>
41     </tr>
42     <tr>
43         <td>Division</td>
44         <td>${"10" / 3}</td>
45         <td>3.33</td>
46     </tr>
47     <tr>
48         <td>Modulus</td>
49         <td>${"10" % 3}</td>
50         <td>1</td>
51     </tr>

```

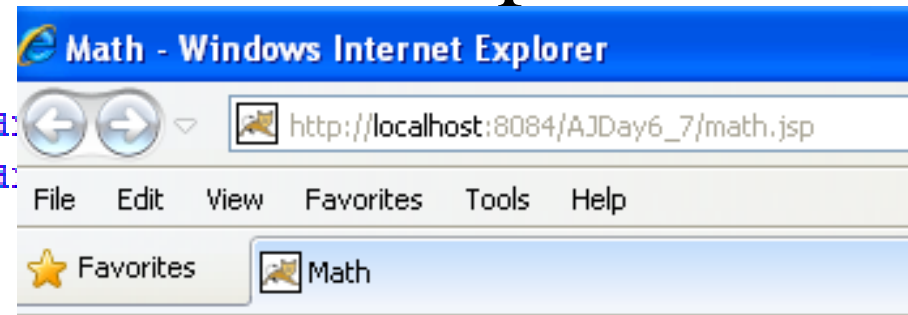
# Expression Languages

## EL Operators – Example

```

52 <tr>
53 <td>Divide by Zero</td>
54 <td>${"${"}10 / 0}</td>
55 <td>${10 / 0}</td>
56 </tr>
57 <tr>
58 <td>Exponential</td>
59 <td>${"${"}2E2}</td>
60 <td>${2E2}</td>
61 </tr>
62 <tr>
63 <td>Unary Minus</td>
64 <td>${"${"}-10}</td>
65 <td>${-10}</td>
66 </tr>
67 </table>
68 </body>
69 </html>
70

```



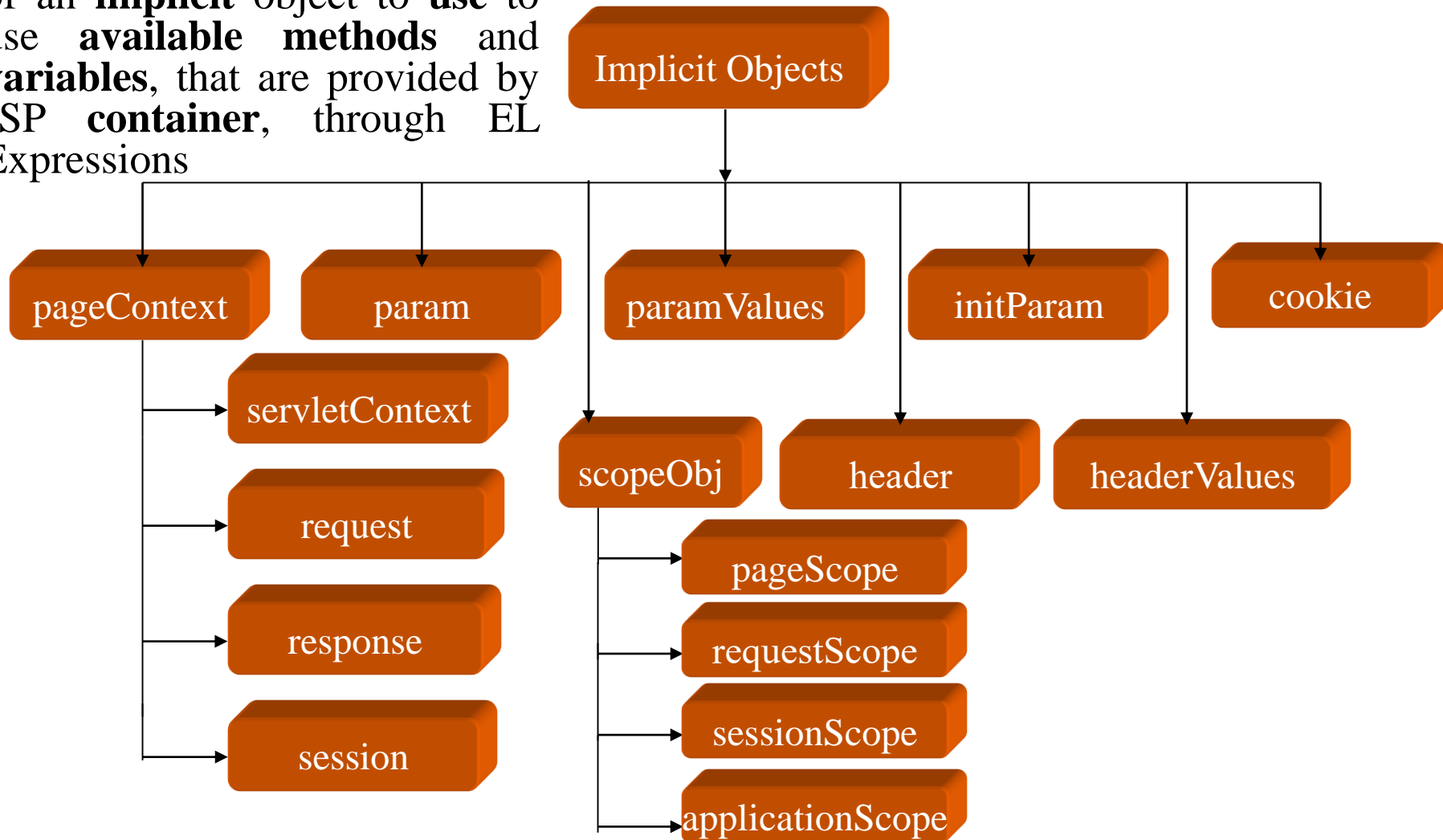
## EL Expression

Concept	Expression	Result
Literal	<code>\${10}</code>	10
Addition	<code>\${10 + 10}</code>	20
Subtraction	<code>\${10 - 10}</code>	0
Multiplication	<code>\${10 * 10}</code>	100
Division	<code>\${10 / 3}</code>	3.3333333333333335
Modulus	<code>\${10 % 3}</code>	1
Divide by Zero	<code>\${10 / 0}</code>	Infinity
Exponential	<code>\${2E2}</code>	200.0
Unary Minus	<code>\${-10}</code>	-10

# Expression Languages

## EL Implicit Objects

- Are a **standard set of classes**.
- The user **creates** an **instance** of an **implicit** object to **use** to use **available methods** and **variables**, that are provided by **JSP container**, through **EL Expressions**



# EL Implicit Objects

Objects	Descriptions
<b>pageContext</b>	<ul style="list-style-type: none"> <li>- Can be used without creating an instance of the object</li> <li>- Provides access to <b>page attributes</b></li> <li>- Can be used to access different page attributes</li> </ul>
<b>servletContext</b>	- Specifies the JSP page, servlet and Web components contained in the same <b>application. Communication</b> with servlet container
<b>session</b>	- Represents the <b>session</b> created for the client sending a request
<b>request</b>	- Represents the <b>request</b> accepted by the JSP page from client
<b>response</b>	- Represents the <b>response</b> sent to the client by the JSP page. The response contains the data passed between a client and servlet
<b>param</b>	- Returns a value that <b>maps</b> a request parameter name to a single string value
<b>paramValues</b>	- Returns an <b>array of values</b> , which is mapped to the request parameters from client
<b>header</b>	- Returns a request <b>header</b> name & maps the value to single string value
<b>headerValues</b>	- Returns an <b>array of values</b> that is mapped to the request header
<b>cookie</b>	- Returns the <b>cookie</b> name mapped to a single cookie object
<b>initParam</b>	- Returns a <b>context initialization parameter name</b> , which is mapped to a single value

# Expression Languages

## EL Implicit Objects

- **getParameter**
  - **`${param.param_Name}`**
  - Similar to: `request.getParameter("param_Name")`
- **Get Properties in Java Beans**
  - **`${bean_id.property_name}` or `${bean_id["property_name"]}`**
    - Similar to: `<%= bean_id.getProperty_name %>`
    - Or, `<jsp:getProperty name="bean_id" property="prop_name"/>`

# Expression Languages

## Scoped Variables

- **Variables**
  - Are used to **store and access values** in JSP program
  - **Refers as a attributes** that are stored in standard scope such as **page, request, session and application**
    - **Ex:** `<% xxxContext.setAttribute(“info”, “att”) %>`  
`${info}` or `${xxxScope.info}`
  - **Dot operator “.” or square brackets [ ]** can be used to access value of variable
    - The **“.” and []** is used to **display a property** of java bean (**getter** method)
    - They are **not limited one level**
    - They support **accessing the arrays, lists, and map** element (e.g. `a[i]`, `list.get(i)`, `map.getValue(key)`)
  - **Ex**
    - `${pageScope.color}`
    - `${pageScope[“color”]}`
- The term **scoped variable** means that the variable confined to the **mentioned context only**.
- The EL enhances supporting the retrieval of the stored objects as **scoped variables**

# Expression Languages

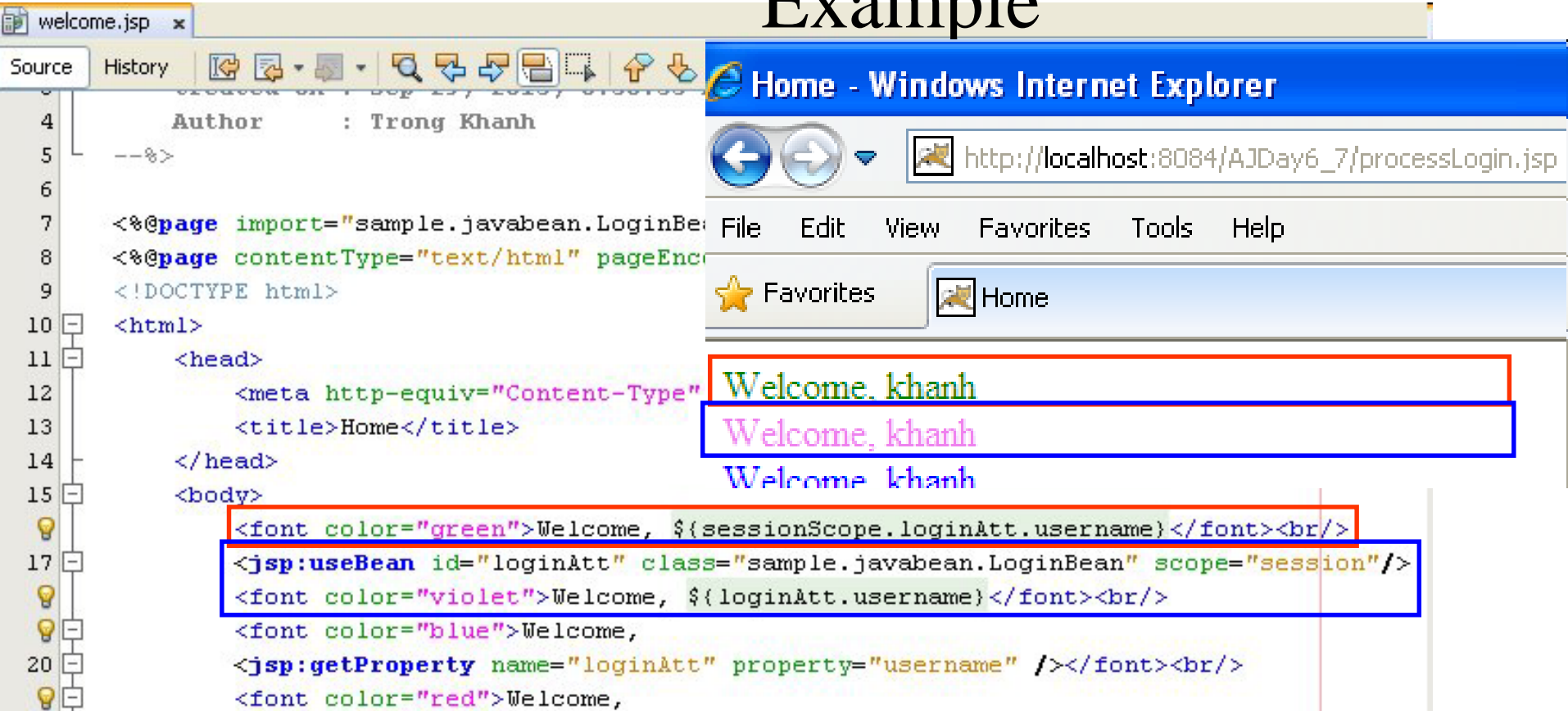
## Scoped Variables

Scopes	Descriptions
<b>pageScope</b>	<ul style="list-style-type: none"><li>- Returns <b>page-scoped variable names</b>, which are mapped to their values</li><li>- Is accessible from the JSP page that creates the object</li></ul>
<b>requestScope</b>	<ul style="list-style-type: none"><li>- Provides access to the attributes of <b>request object</b></li><li>- Returns <b>requests coped variable names</b>, which are mapped to their values</li><li>- Is accessible from web components handling a request that belongs to the session</li></ul>
<b>sessionScope</b>	<ul style="list-style-type: none"><li>- Returns <b>session-scoped variable names</b>, which are mapped to their values</li><li>- Is accessible from Web components handling a request that belong to the session</li></ul>
<b>applicationScope</b>	<ul style="list-style-type: none"><li>- Returns <b>application-scoped variable</b> and maps the variable name to their values</li></ul>



# Expression Languages

## Example



The screenshot illustrates the output of a JSP page using Expression Language (EL) to display a user's name. The browser window shows the rendered HTML, while the source code on the left shows the underlying JSP logic.

**JSP Source Code:**

```

4      Author      : Trong Khanh
5      --%>
6
7      <%@page import="sample.javabean.LoginBean"%>
8      <%@page contentType="text/html" pageEncoding="UTF-8"%>
9      <!DOCTYPE html>
10     <html>
11     <head>
12         <meta http-equiv="Content-Type" content="text/html; charset=UTF-8"%>
13         <title>Home</title>
14     </head>
15     <body>
16         <font color="green">Welcome, ${sessionScope.loginAtt.username}</font><br/>
17         <jsp:useBean id="loginAtt" class="sample.javabean.LoginBean" scope="session"/>
18         <font color="violet">Welcome, ${loginAtt.username}</font><br/>
19         <font color="blue">Welcome,
20         <jsp:getProperty name="loginAtt" property="username" /></font><br/>
21         <font color="red">Welcome,

```

**Browser Output:**

Home - Windows Internet Explorer  
 http://localhost:8084/AJDay6\_7/processLogin.jsp  
 File Edit View Favorites Tools Help  
 Home  
 Welcome, khanh  
 Welcome, khanh  
 Welcome, khanh

# Expression Languages

## Example

```

home.jsp x
Source History
4      Author      : Trong Khanh
5      --%>
6
7      <%@page import="sample.javabeen.LoginBean"%>
8      <%@page contentType="text/html" pageEncoding="UTF-8"%>
9      <!DOCTYPE html>
10     <html>
11     <head>
12         <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
13         <title>Home</title>
14     </head>
15     <body>
16         <font color="green">Welcome, ${sessionScope.loginAtt.username}</font><br/>
17         <font color="violet">Welcome, ${loginAtt.username}</font><br/>
18         <h1>Welcome to EL + JSTL</h1>
19         <form action="welcome.jsp">
20             Name <input type="text" name="txtName" value="" /><br/>
21             <input type="submit" value="Search" />
22         </form>
23         Title ${param.title}<br/>
24         Course ${param.course}<br/>
25     </body>
26 </html>

```

# Expression Languages

## Example

EL - Windows Internet Explorer

http://localhost:8084/AJDay6\_7/elDemo.jsp

File Edit View Favorites Tools Help

★ Favorites EL

### Calculating with EL

Num 1

Num 2

Total: 0

Avg: 0.0

EL - Windows Internet Explorer

http://localhost:8084/AJDay6\_7/elDemo.jsp

File Edit View Favorites Tools Help

★ Favorites EL

### Calculating with EL

Num 1

Num 2

Total: 11

Avg: 5.5

```
<form method="POST">
  Num 1 <input type="text" name="num1" value="${param.num1}" /><br/>
  Num 2 <input type="text" name="num2" value="${param.num2}" /><br/>
  Total: ${param["num1"] + param.num2} <br/>
  Avg: ${ (param.num1 + param["num2"]) / 2 } <br/>
  <input type="submit" value="Calculate" />
</form>
```

# Summary

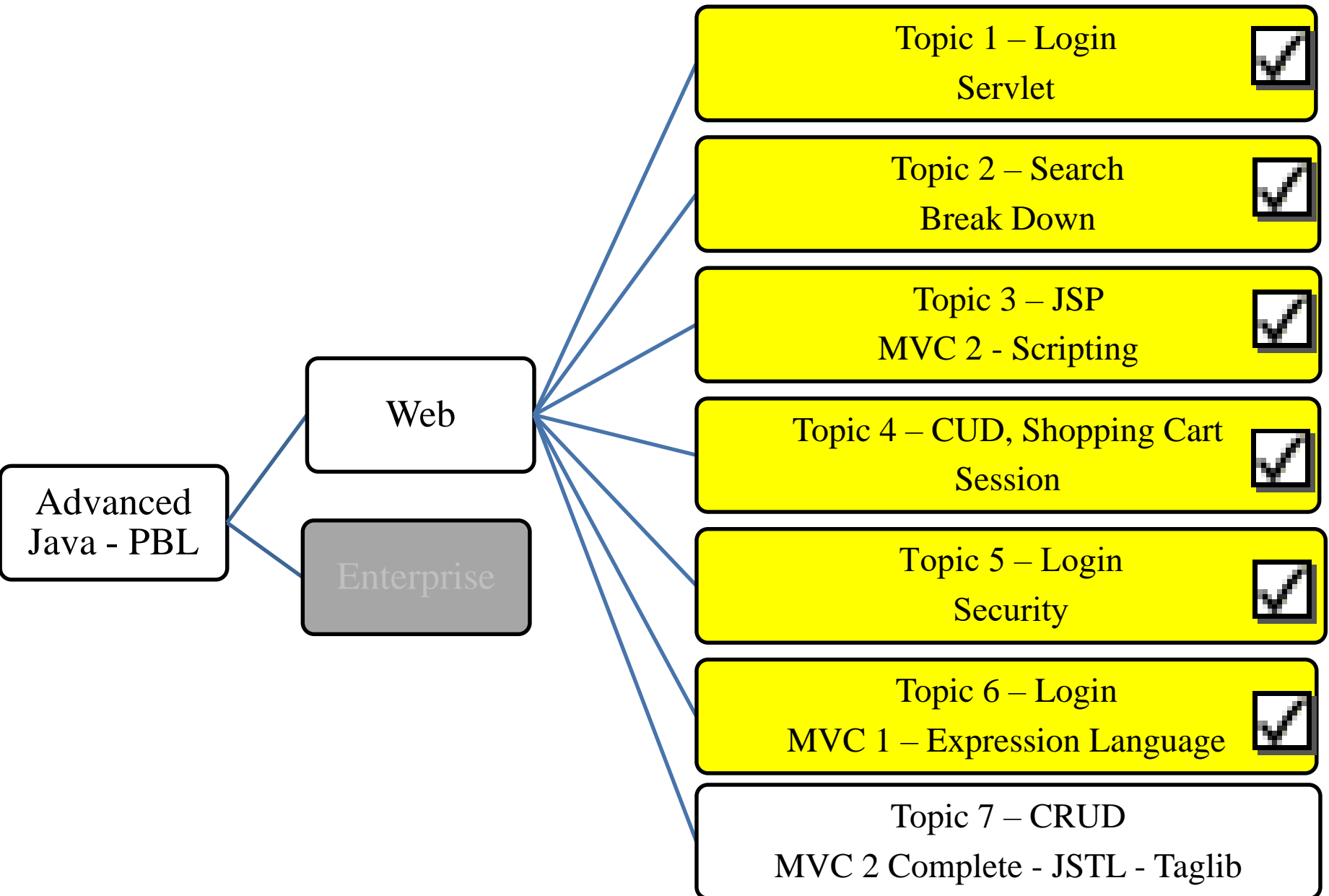
- **How to build the Web Application using MVC1?**  
**How to remove the java code in the jsp (view)?**
  - Standard Actions
  - Dispatching Mechanisms
  - Expression Language

Q&A

# Next Lecture

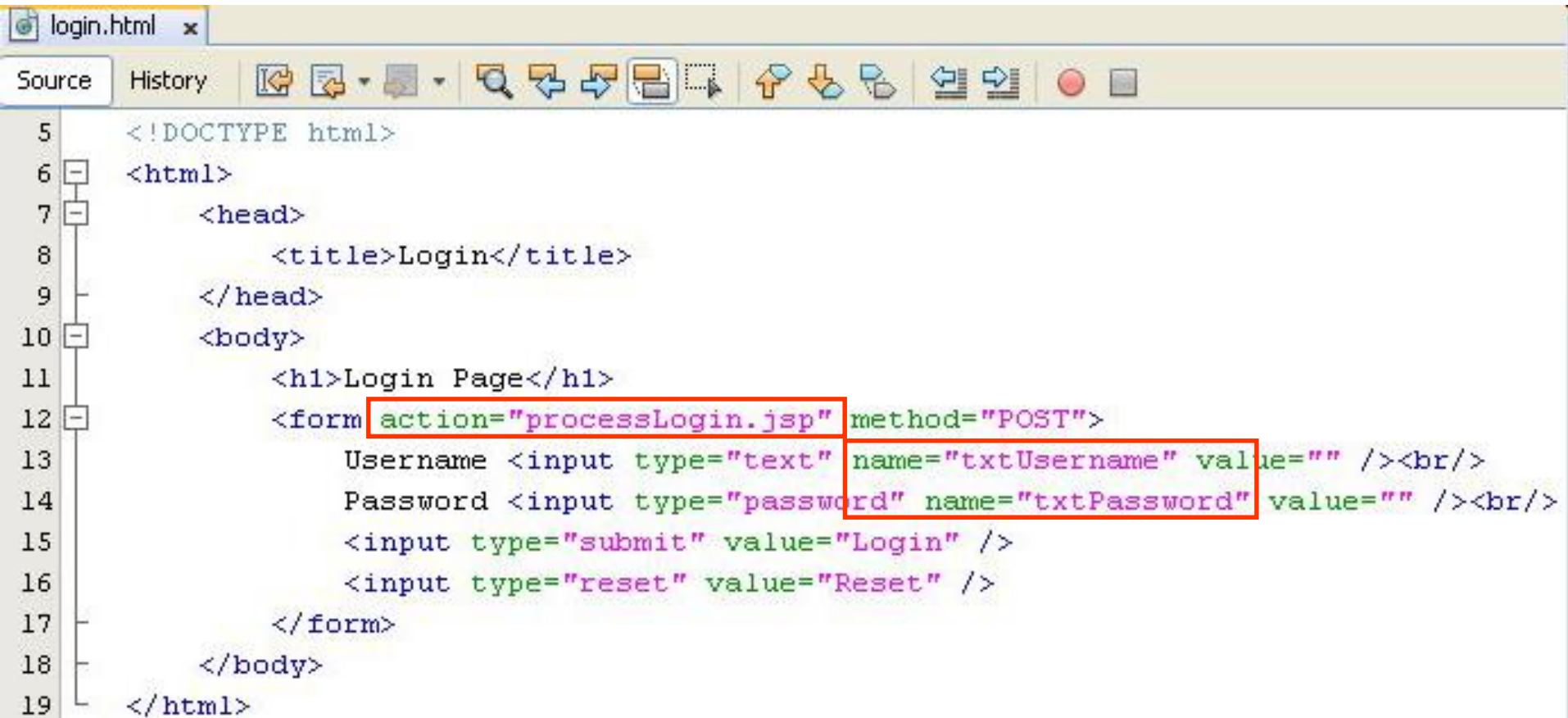
- **How to remove completed Scripting Element (Java Code) in JSP (View)? Complete the View of MVC 2 Design Pattern**
  - JSTL
- **How to build the data grid tag library using in JSP?**
  - **Tag Libraries**
    - Model
    - Classical, Simple, and Handles
    - How to implement the custom Tag Lib and use it in JSP

# Next Lecture



# Appendix - MVC1

## Login page



```
5 <!DOCTYPE html>
6 <html>
7   <head>
8     <title>Login</title>
9   </head>
10  <body>
11    <h1>Login Page</h1>
12    <form action="processLogin.jsp" method="POST">
13      Username <input type="text" name="txtUsername" value="" /><br/>
14      Password <input type="password" name="txtPassword" value="" /><br/>
15      <input type="submit" value="Login" />
16      <input type="reset" value="Reset" />
17    </form>
18  </body>
19 </html>
```



# MVC1

## Login Beans

```

LoginBean.java
Source History
14  * @author Trong Khanh
15  */
16  public class LoginBean implements Serializable {
17      private String username;
18      private String password;
19
20      public LoginBean() {...2 lines }
21
22
23      /**...3 lines */
24
26      public String getUsername() {...3 lines }
27
28
29
30      /**...3 lines */
31
33      public void setUsername(String username) {...3 lines }
34
35
36
37      /**...3 lines */
38
40      public String getPassword() {...3 lines }
41
42
43
44      /**...3 lines */
45
47      public void setPassword(String password) {...3 lines }
48
49
50
51      public boolean checkLogin () {
52          RegistrationDAO dao = new RegistrationDAO();
53          boolean result = dao.checkLogin(username, password);
54
55          return result;
56      }
57  }

```



# MVC1

## Process Login JSP

```

processLogin.jsp x
Source History
4      Author      : Trong Khanh
5      --%>
6      <%@page contentType="text/html" pageEncoding="UTF-8"%>
7      <!DOCTYPE html>
8      <html>
9      <head>
10         <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
11         <title>Processing</title>
12     </head>
13     <body>
14         <h1>Process Login</h1>
15         <jsp:useBean id="loginAtt" class="sample.javabeans.LoginBean" scope="session"/>
16         <jsp:setProperty name="loginAtt" property="username"
17             value='<%= request.getParameter("txtUsername") %>' />
18         <jsp:setProperty name="loginAtt" property="password"
19             value='<%= request.getParameter("txtPassword") %>' />
20         <%
21             if (loginAtt.checkLogin()) {
22                 response.sendRedirect("welcome.jsp");
23             } else {
24                 out.print("Invalid username or password!!!!");
25             }
26         %>
27     </body>
28 </html>

```

# MVC1

## Process Login JSP

```
processLogin.jsp x
Source History
4      Author      : Trong Khanh
5      --%>
6
7      <%@page contentType="text/html" pageEncoding="UTF-8"%>
8      <!DOCTYPE html>
9      <html>
10     <head>
11         <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
12         <title>Processing</title>
13     </head>
14     <body>
15         <h1>Process Login</h1>
16         <jsp:useBean id="loginAtt" class="sample.javabean.LoginBean" scope="session"/>
17         <jsp:setProperty name="loginAtt" property="username" param="txtUsername"/>
18         <jsp:setProperty name="loginAtt" property="password" param="txtPassword"/>
19
20         <%
21             if (loginAtt.checkLogin()) {
22                 response.sendRedirect("welcome.jsp");
23             } else {
24                 out.print("Invalid username or password!!!!");
25             }
26         %>
27     </body>
28 </html>
```

# MVC1

## Welcome page

```

welcome.jsp x
Source History
4      Author      : Trong Khanh
5      --%>
6
7      <%@page import="sample.javabeen.LoginBean"%>
8      <%@page contentType="text/html" pageEncoding="UTF-8"%>
9      <!DOCTYPE html>
10     <html>
11     <head>
12         <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
13         <title>Home</title>
14     </head>
15     <body>
16         <jsp:useBean id="loginAtt" class="sample.javabeen.LoginBean" scope="session"/>
17         <font color="blue">Welcome,
18         <jsp:getProperty name="loginAtt" property="username" /></font><br/>
19         <font color="red">Welcome,
20         <%= ((LoginBean) session.getAttribute("loginAtt")).getUsername() %></font><br/>
21         <h1>Welcome to Standard Action</h1>
22         <form action="welcome.jsp">
23             Name <input type="text" name="txtName" value="" /><br/>
24             <input type="submit" value="Search" />
25         </form>
26     </body>
27 </html>

```

# MVC1

## Optimizing

```
<form action="processLogin.jsp" method="POST">
    Username <input type="text" name="username" value="" /><br/>
    Password <input type="password" name="password" value="" /><br/>
    <input type="submit" value="Login" />
    <input type="reset" value="Reset" />
</form>
```

```
<jsp:useBean id="loginAtt" class="sample.javabeen.LoginBean" scope="session"/>
<jsp:setProperty name="loginAtt" property="username" />
<jsp:setProperty name="loginAtt" property="password" />
```

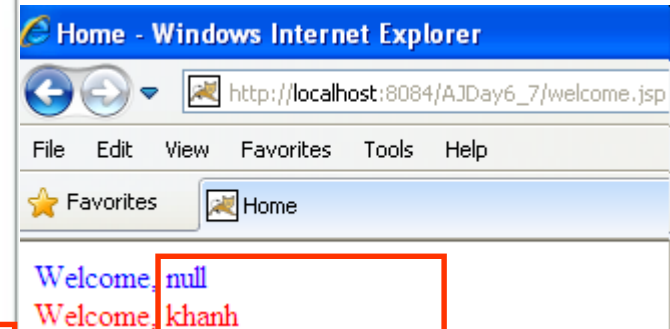
```
<jsp:useBean id="loginAtt" class="sample.javabeen.LoginBean" scope="session"/>
<jsp:setProperty name="loginAtt" property="*" />
```

# Appendix – JSP Standard Actions

## Scope of JavaBeans – Example

```
processLogin.jsp
Source History
4      Author      : Trong Khanh
5      --%>
6
7      <%@page contentType="text/html" pageEncoding="UTF-8"%>
8      <!DOCTYPE html>
9      <html>
10     <.../>
11
12     <body>
13         <h1>Process Login</h1>
14         <jsp:useBean id="loginAtt" class="sample.javabeen.LoginBean" scope="session"/>
15         <jsp:setProperty name="loginAtt" property="*" />
16
17     </body>
18 </html>
```

```
welcome.jsp
Source History
4      Author      : Trong Khanh
5      --%>
6
7      <%@page import="sample.javabeen.LoginBean"%>
8      <%@page contentType="text/html" pageEncoding="UTF-8"%>
9      <!DOCTYPE html>
10     <html>
11     <.../>
12
13     <body>
14         <jsp:useBean id="loginAtt" class="sample.javabeen.LoginBean"/>
15
16     </body>
17 </html>
```



## Scope of JavaBeans – Example

```

welcome.jsp
Source History
4      Author      : Trong Khanh
5      -->
6
7      <%@page import="sample.javabeen.LoginBean"%>
8      <%@page contentType="text/html" pageEncoding="UTF-8"%>
9      <!DOCTYPE html>
10     <html>
11     <.../>
12
13     <body>
14
15     <font color="blue">Welcome,
16
17     <jsp:getProperty name="loginAtt" property="username" /></font><br/>
18

```

Apache Tomcat/7.0.34 - Error report - Windows Internet Explorer

http://localhost:8084/AJDay6\_7/welcome.jsp

File Edit View Favorites Tools Help

★ Favorites Apache Tomcat/7.0.34 - Error report

**HTTP Status 500 - file:/welcome.jsp(18,8) jsp:getProperty for bean with name 'loginAtt'. Name was not previously introduced as per JSP.5.3**

**type** Exception report

**message** file:/welcome.jsp(18,8) jsp:getProperty for bean with name 'loginAtt'. Name was not previously introduced as per JSP.5.3

**description** The server encountered an internal error that prevented it from fulfilling this request.

**exception**

org.apache.jasper.JasperException: file:/welcome.jsp(18,8) jsp:getProperty for bean with name 'loginAtt'.



# JSP Standard Actions

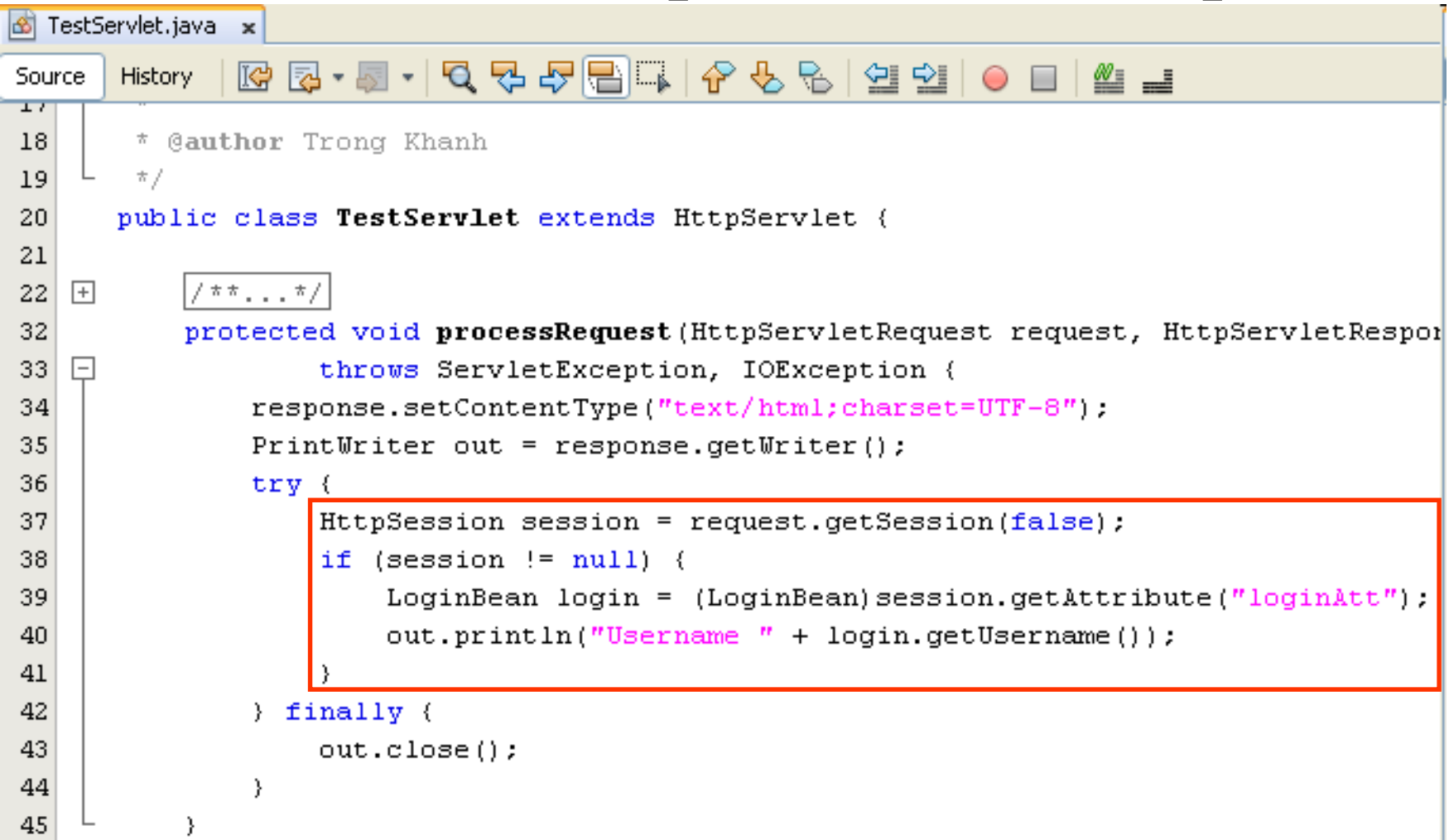
## Scope of JavaBeans, accessing on Servlet via HttpSession– Example

```

welcome.jsp x
Source History
4      Author      : Trong Khanh
5      --%>
6
7      <%@page import="sample.javabeen.LoginBean"%>
8      <%@page contentType="text/html" pageEncoding="UTF-8"%>
9      <!DOCTYPE html>
10     <html>
11         <.../>
12     </html>
13
14     <body>
15
16         <jsp:useBean id="loginAtt" class="sample.javabeen.LoginBean" scope="session"/>
17         <font color="blue">Welcome,
18         <jsp:getProperty name="loginAtt" property="username" /></font><br/>
19         <font color="red">Welcome,
20         <%= ((LoginBean) session.getAttribute("loginAtt")).getUsername() %></font><br/>
21         <h1>Welcome to Standard Action</h1>
22         <form action="welcome.jsp">
23             Name <input type="text" name="txtName" value="" /><br/>
24             <input type="submit" value="Search" />
25         </form>
26         <a href="TestServlet">Go to Test Servlet </a>
27     </body>
28 </html>
  
```

# JSP Standard Actions

## Scope of JavaBeans, accessing on Servlet via HttpSession– Example



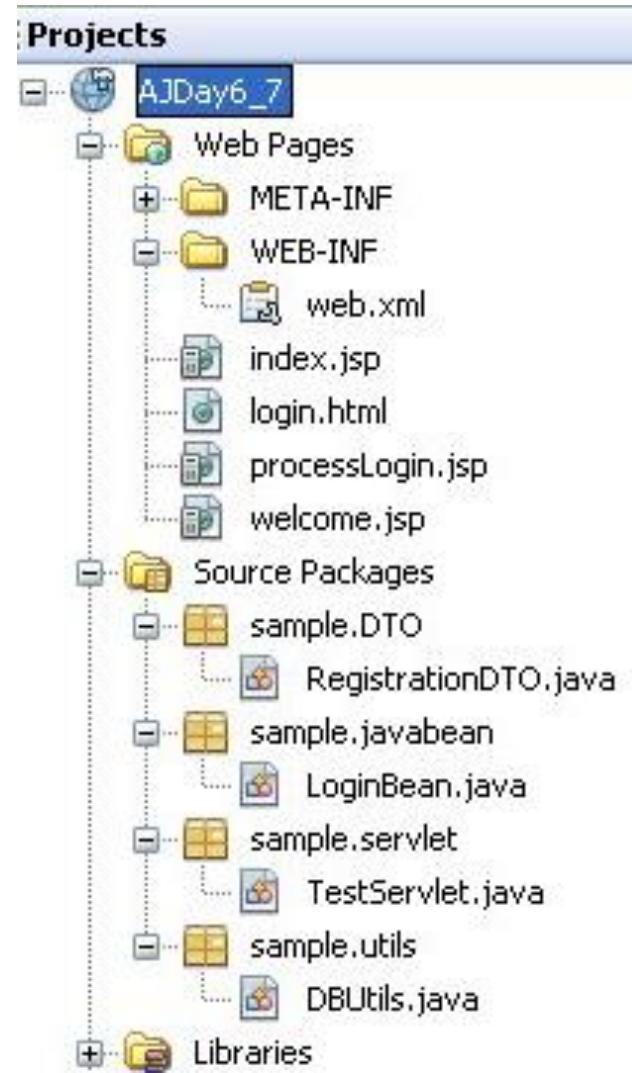
```

17
18  * @author Trong Khanh
19  */
20  public class TestServlet extends HttpServlet {
21
22      /**...*/
23
24      protected void processRequest(HttpServletRequest request, HttpServletResponse response)
25          throws ServletException, IOException {
26          response.setContentType("text/html; charset=UTF-8");
27          PrintWriter out = response.getWriter();
28          try {
29              HttpSession session = request.getSession(false);
30              if (session != null) {
31                  LoginBean login = (LoginBean) session.getAttribute("loginAtt");
32                  out.println("Username " + login.getUsername());
33              }
34          } finally {
35              out.close();
36          }
37      }
38  }
  
```



# JSP Standard Actions

## Scope of JavaBeans, accessing on Servlet via HttpSession– Example



# Appendix – Dispatching Mechanisms

## Example

```
processLogin.jsp x
Source History
4 Author : Trong Khanh
5 --%>
6 <%@page contentType="text/html" pageEncoding="UTF-8"%>
7 <!DOCTYPE html>
8 <html>
9 <head>
10 <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
11 <title>Processing</title>
12 </head>
13 <body>
14 <h1>Process Login</h1>
15 <jsp:useBean id="loginAtt" class="sample.javabean.LoginBean" scope="session"/>
16 <jsp:setProperty name="loginAtt" property="*" />
17 <%
18     if (loginAtt.checkLogin()) {
19
20         <jsp:forward page="welcome.jsp">
21             <jsp:param name="title" value="Forward"/>
22             <jsp:param name="course" value="AJCourse"/>
23         </jsp:forward>
24     <%
25     }
26     %>
27     <h2><font color="red">Invalid username or password!!!</font> </h2>
28 </body>
29 </html>
```

# Dispatching Mechanisms

## Example

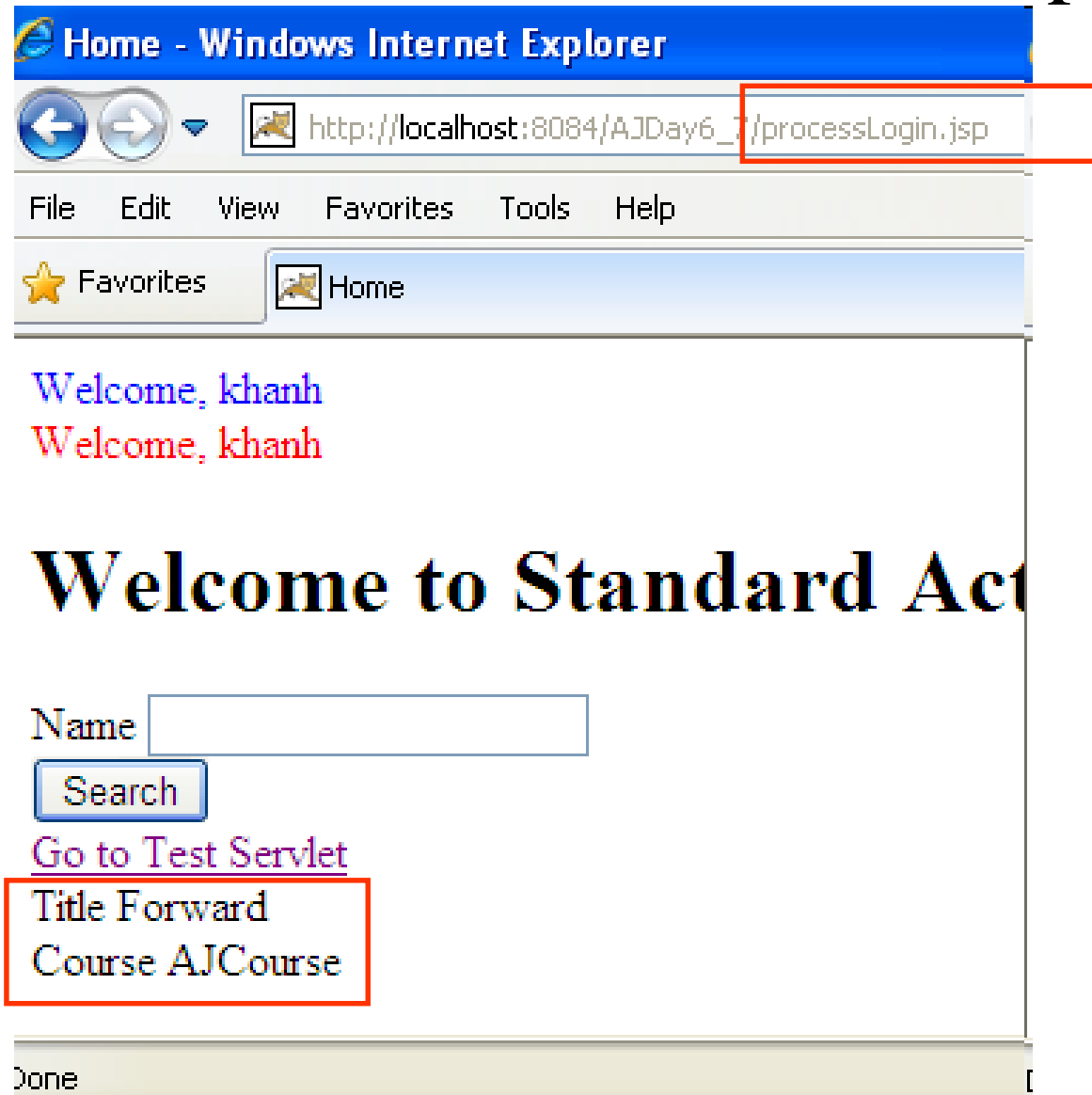
```

welcome.jsp x
Source History
4      Author      : Trong Khanh
5      --%>
6
7      <%@page import="sample.javabeen.LoginBean"%>
8      <%@page contentType="text/html" pageEncoding="UTF-8"%>
9      <!DOCTYPE html>
10     <html>
11     <head>
12         <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
13         <title>Home</title>
14     </head>
15     <body>
16         <jsp:useBean id="loginAtt" class="sample.javabeen.LoginBean" scope="session"/>
17         <font color="blue">Welcome,
18         <jsp:getProperty name="loginAtt" property="username" /></font><br/>
19         <font color="red">Welcome,
20         <%= ((LoginBean) session.getAttribute("loginAtt")).getUsername() %></font><br/>
21         <h1>Welcome to Standard Action</h1>
22         <form action="welcome.jsp">
23             Name <input type="text" name="txtName" value="" /><br/>
24             <input type="submit" value="Search" />
25         </form>
26         <a href="TestServlet">Go to Test Servlet </a><br/>
27         Title <%= request.getParameter("title") %><br/>
28         Course <%= request.getParameter("course") %><br/>
29     </body>
30 </html>

```

# Dispatching Mechanisms

## Example



# Appendix

## XML for JSPs

- **HTML is narrowly focused** on marking up take
- **XML can be defined by users** and can **used for making up text** (as in XHTML), but it has a pretty much infinite set of the other possible uses
- **The tag in jsp has**
  - **Opening tag**
  - **Closing tag**
  - **Data content between** the opening and closing tags (called as the body)
  - The **opening tag can have a prefix** and can **contain many attributes**
  - **Contain the nested tag**

# Appendix

## XML-Friendly Syntax

- **JSP documents**

- Are JSP source files written entirely in XML syntax
- Have a **.jspx** extension
- Can be also be **identified by setting in web deployment descriptor**

```
<jsp-config>
```

```
  <jsp-property-group>
```

```
    <url-pattern>/jspx/*</url-pattern>
```

```
    <is-xml>true</is-xml>
```

```
  </jsp-property-group>
```

```
</jsp-config>
```

- Or, Define in a JSP document as form

```
<jsp:root xmlns:jsp="http://java.sun.com/JSP/Page">
```

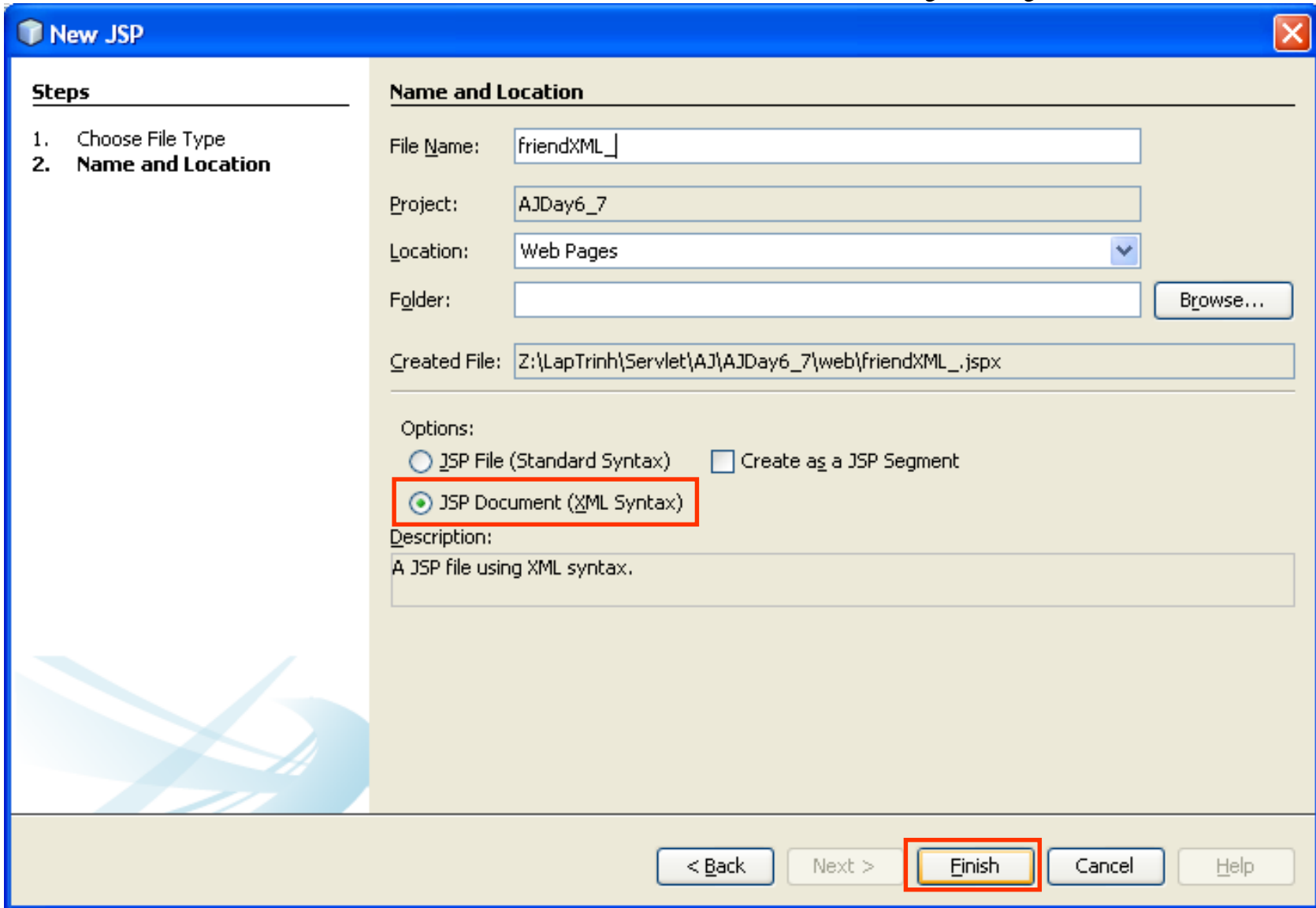
# Appendix

## XML-Friendly Syntax

- JSP document **syntax provides replacements for all <%-type scripting element syntax**
  - `<jsp:scriptlet>...</jsp:scriptlet>` replace `<%...%>`
  - `<jsp:expression>...</jsp:expression>` replace `<%= ... %>`
  - `<jsp:declaration>...</jsp:declaration>` replace `<%! ... %>`
  - `<jsp:directive.page .../>` replace `<% @page ...%>`
  - `<jsp:directive.include .../>` replace `<% @ include ...%>`
  - `<!-- ... -->` replace `<%-- ... --%>`
  - There are some things within the Java language itself that are anathema to XML validators (ex: “<” symbol looks like the beginning of an opening or closing tag, and an XML validator will assuredly treat it as such)
    - Using as an **entity** in **XML** that **begin** with an **ampersand (&)** and **end** on a **semicolon (;)**. Ex: `&lt;`
    - Using `<![CDATA[symbol]]>` or `<![CDATA[command]]>`
      - Ex: `<![CDATA[for(int i=0; i<10; i++)]]>` or `i <![CDATA[<]]> 10`

# Appendix

## XML-Friendly Syntax



**New JSP**

**Steps**

1. Choose File Type
2. **Name and Location**

**Name and Location**

File Name: friendXML\_

Project: AJDay6\_7

Location: Web Pages

Folder: Browse...

Created File: Z:\LapTrinh\Servlet\AJ\AJDay6\_7\web\friendXML\_.jspx

Options:

☐ JSP File (Standard Syntax) ☐ Create as a JSP Segment

☒ **JSP Document (XML Syntax)**

Description:

A JSP file using XML syntax.

< Back Next > **Finish** Cancel Help

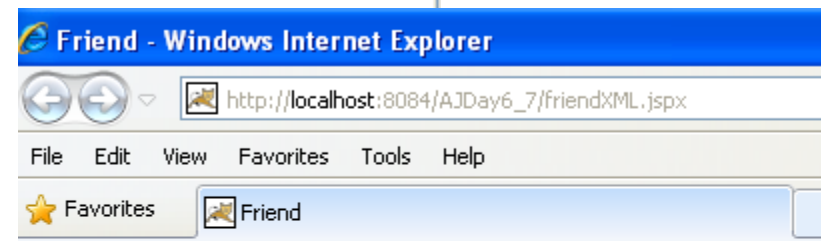


# Appendix

## XML-Friendly Syntax – Sample

```

5      Author      : Trong Khanh
6      -->
7      <jsp:root xmlns:jsp="http://java.sun.com/JSP/Page" version="2.0">
8          <jsp:directive.page contentType="text/html" pageEncoding="UTF-8"/>
9          <jsp:element name="text">
10              <title>Friend</title>
11              <jsp:body>
12                  <h1>XML Friendly Syntax Demo</h1>
13                  <jsp:declaration>
14                      public int add(int n) {
15                          return n + 5;
16                      }
17                  </jsp:declaration>
18                  <jsp:scriptlet>int a = add(5);</jsp:scriptlet>
19                  The Result is: <jsp:expression>a</jsp:expression>
20              </jsp:body>
21          </jsp:element>
22      </jsp:root>
  
```



## XML Friendly Syntax Demo

The Result is: 10

# Appendix

## XML-Friendly Syntax – Sample



```

5  Author      : Trong Khanh
6  -->
7  <jsp:root xmlns:jsp="http://java.sun.com/JSP/Page" version="2.0">
8    <jsp:directive.page contentType="text/html" pageEncoding="UTF-8"/>
9    <jsp:element name="text">
10      <title>Friend</title>
11      <jsp:body>
12        <h1>XML Friendly Syntax Demo</h1>
13        <jsp:declaration>
14          public int add(int n) {
15            return n + 5;
16          }
17        </jsp:declaration>
18        <jsp:scriptlet>int a = add(5);</jsp:scriptlet>
19        The Result is: <jsp:expression>a</jsp:expression>
20        <br/>
21        <jsp:scriptlet>
22          for (int i = 0; i < 5; i++) {
23            out.print("");
24          }
25        </jsp:scriptlet>
26      </jsp:body>
27    </jsp:element>
28  </jsp:root>
  
```

<jsp:scriptlet>  
 for (int i = 0; <![CDATA[i < 5]]>; i++) {  
 out.print("");  
 }  
 </jsp:scriptlet>

<jsp:scriptlet>  
 <![CDATA[for (int i = 0; i < 5; i++)]]> {  
 out.print("");  
 }  
 </jsp:scriptlet>

# Appendix

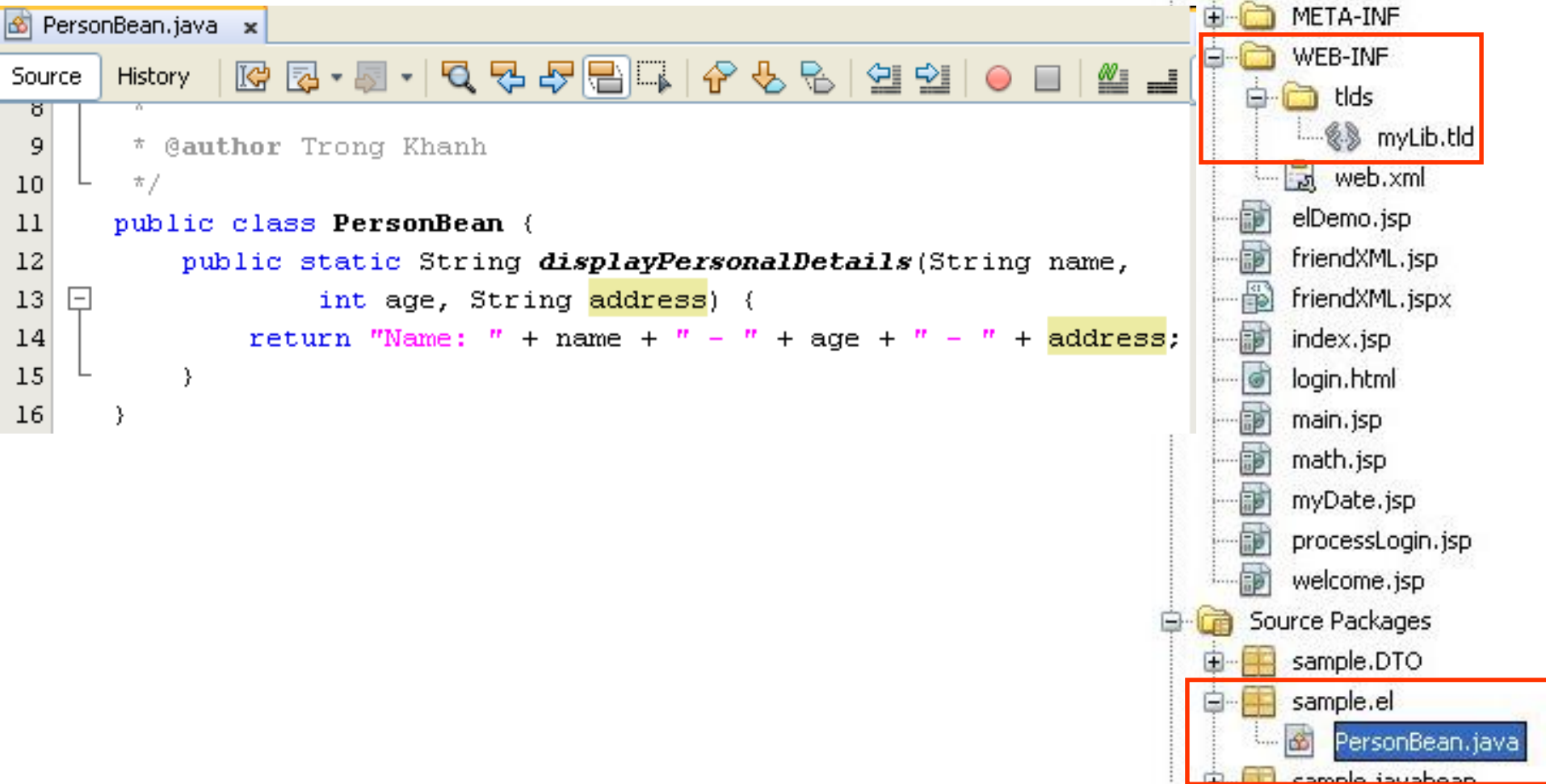
## Functions using EL

- Supports **using** of the **Java function within** the JSP page is an **easy** as **using a tag**
- The **following steps** to set up EL to Java functions
  - **Step 1:** Creating “static” method
  - **Step 2:** Creating Tag Library Descriptor
  - **Step 3:** Modifying Deployment Descriptor and locating the TLD file in web deployment descriptor (if necessary)
  - **Step 4:** Access EL functions within JSP

# Appendix

## Creating “static” method

- The static java methods can be called within the EL expression
- Ex:



The screenshot displays an IDE with two main components: a source code editor on the left and a project explorer on the right.

**Source Code Editor:** The file `PersonBean.java` is open. It contains the following code:

```

8  "
9  * @author Trong Khanh
10 * /
11 public class PersonBean {
12     public static String displayPersonalDetails(String name,
13         int age, String address) {
14         return "Name: " + name + " - " + age + " - " + address;
15     }
16 }
    
```

**Project Explorer:** The project structure is shown on the right. The `Projects pane lists the following items:`

- `AJDay6_7` (Project)
  - `Web Pages` (Folder)
    - `META-INF` (Folder)
      - `WEB-INF` (Folder)
        - `tlds` (Folder)
          - `myLib.tld` (File) - **Highlighted with a red box**
        - `web.xml` (File)
      - `elDemo.jsp` (File)
      - `friendXML.jsp` (File)
      - `friendXML.jspx` (File)
      - `index.jsp` (File)
      - `login.html` (File)
      - `main.jsp` (File)
      - `math.jsp` (File)
      - `myDate.jsp` (File)
      - `processLogin.jsp` (File)
      - `welcome.jsp` (File)
    - `Source Packages` (Folder)
      - `sample.DTO` (Package)
      - `sample.el` (Package)
        - `PersonBean.java` (File) - **Highlighted with a red box**

# Appendix

## Creating Tag Library Descriptor

- **After defining** the functions, the **function name** should be mapped with EL **using a Tag Library Descriptor (TLD) file**
- A defined in a class with EL. **TLD file uses XML syntax to map the name of functions**
- Save this TLD file in the **/WEB-INF/tlds folder**, where tlds is a user-created folder

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

```
<taglib version="2.0" xmlns="http://java.sun.com/xml/ns/j2ee"  
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"  
  xsi:schemaLocation="http://java.sun.com/xml/ns/j2ee web-  
    jsptaglibrary_2_0.xsd">
```

```
<tlib-version>1.0</tlib-version>
```

```
<function>
```

```
  <description>information description</description>
```

```
  <name>functionName</name>
```

```
  <function-class>Java class</function-class>
```

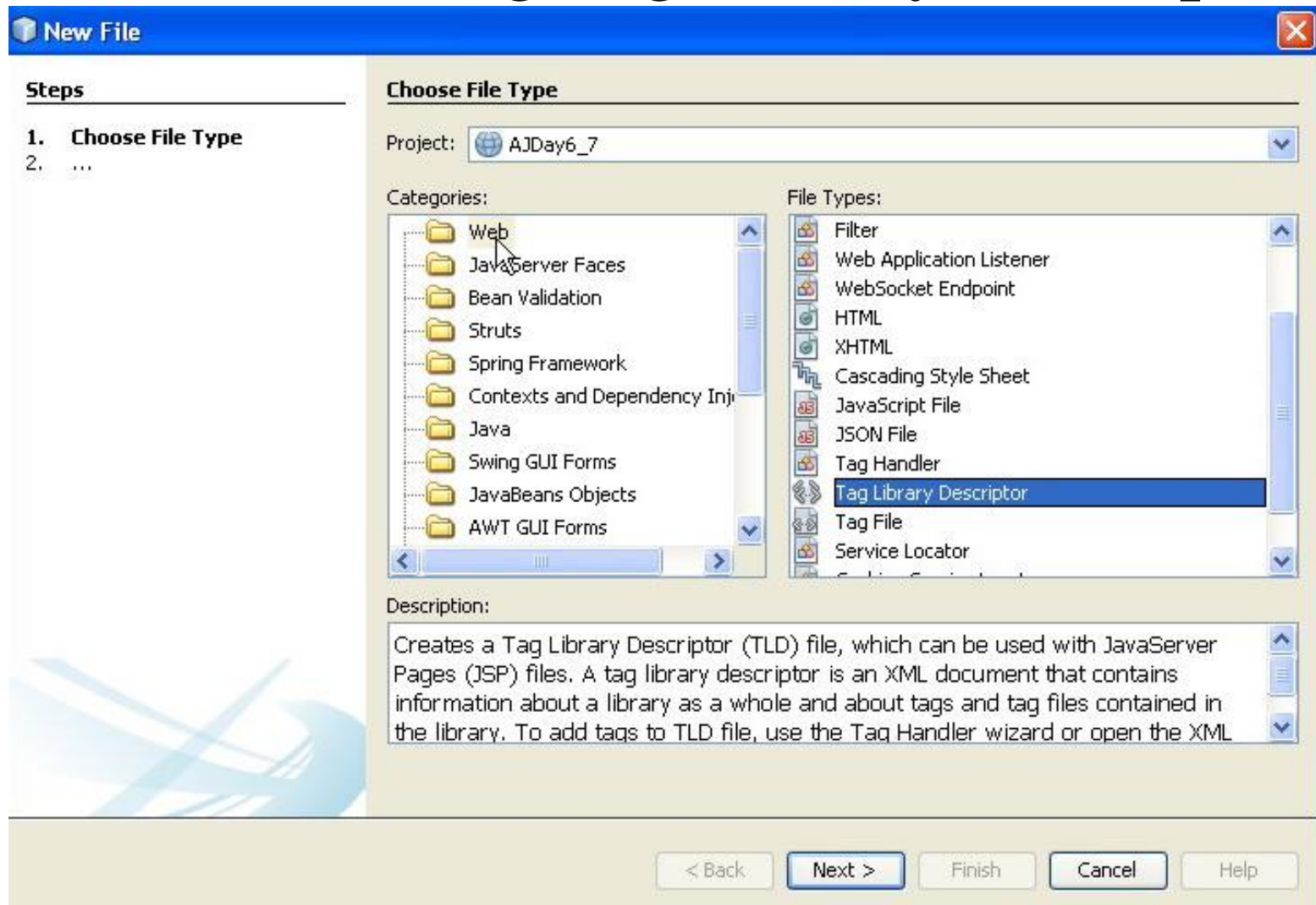
```
  <function-signature>declared method with parameters</function-signature>
```

```
</function>
```

```
</taglib>
```

# Appendix

## Creating Tag Library Descriptor



- Click Next button



# Appendix

## Creating Tag Library Descriptor

The screenshot shows the 'New Tag Library Descriptor' dialog box. On the left, a 'Steps' pane lists: 1. Choose File Type, 2. **Name and Location**. The main area is titled 'Name and Location' and contains the following fields:

- TLD Name:** newtag\_library (highlighted with a red box and an arrow pointing to the text 'Fill taglib name')
- Project:** AJDay6\_7
- Location:** WEB-INF (highlighted with a red box)
- Folder:** tlds/ (highlighted with a red box)
- Browse...** button (highlighted with a red box and an arrow pointing to the text 'Browse to directory containing taglib. Should not be changed')
- Created File:** Z:\LapTrinh\Servlet\AJ\AJDay6\_7\web\WEB-INF\tlds\newtag\_library.tld
- URI:** /WEB-INF/tlds/newtag\_library (highlighted with a red box)
- Prefix:** newtag\_library (highlighted with a red box)

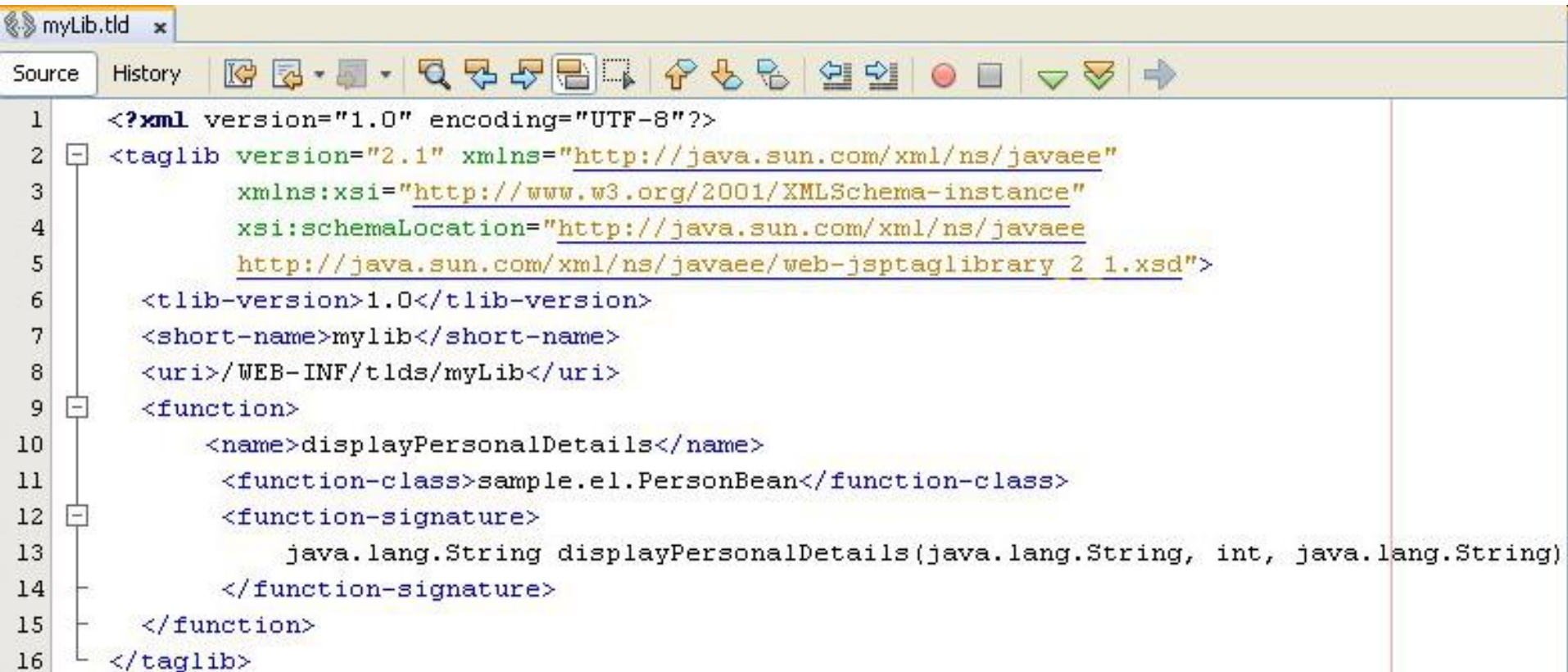
At the bottom of the dialog are buttons: < Back, Next >, **Finish**, Cancel, and Help.

- Click **Finish** button
- The taglib file with extension is **tld** located at the **WEB-INF/tlds** directory

# Appendix

## Creating Tag Library Descriptor

- Modified the .tld file



```

1  <?xml version="1.0" encoding="UTF-8"?>
2  <taglib version="2.1" xmlns="http://java.sun.com/xml/ns/javaee"
3      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
4      xsi:schemaLocation="http://java.sun.com/xml/ns/javaee
5          http://java.sun.com/xml/ns/javaee/web-jsptaglibrary_2_1.xsd">
6      <tlib-version>1.0</tlib-version>
7      <short-name>mylib</short-name>
8      <uri>/WEB-INF/tlds/myLib</uri>
9      <function>
10         <name>displayPersonalDetails</name>
11         <function-class>sample.el.PersonBean</function-class>
12         <function-signature>
13             java.lang.String displayPersonalDetails(java.lang.String, int, java.lang.String)
14         </function-signature>
15     </function>
16 </taglib>
  
```



# Appendix

## Modifying the Deployment Descriptor

- The default mode for JSP pages delivered with JSP version 2.0 technology is to evaluate EL expressions
- JSP EL expression can be **enabled or disabled** with **02 ways**

- Using isELIgnored attribute in the JSP page directive

`<%@ page isELIgnored= “true | false” %>`

- Modifying in web.xml

`<jsp-config>`

`<jsp-property-group>`

`<url-pattern>*.jsp</url-pattern>`

`<el-ignored>false</el-ignored>`

`</jsp-property-group>`

`</jsp-config>`

# Appendix

## Accessing EL functions within JSP

- To **access** the **function** created in a TLD file using a JSP file, developer need **to import the TLD file** using the **taglib directive**. In the directive statement, developer **need** to **mention** a prefix for the tags and location of the TLD file

**<%@taglib prefix="prefix" uri="path" %>**

- **After importing** the TLD file, **developer** can **access the function** **using** an EL expression

**\${prefix:funcName(args)}**

# Appendix

## Example

```

Source History
4      Author      : Trong Khanh
5      --%>
6
7      <%@page contentType="text/html" pageEncoding="UTF-8"%>
8      <!DOCTYPE html>
9      <%@taglib uri="/WEB-INF/tlds/myLib.tld" prefix="my"%>
10     <html>
11     <head>
12         <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
13         <title>ElFunc</title>
14     </head>
15     <body>
16         <h1>EL Function Demo</h1>
17         ${my:displayPersonalDetails("KhanhKT", 33, "QTSC")}<br/>
18         ${my:displayPersonalDetails("KTKhanh", 43, "HCMC")}<br/>
19         ${my:displayPersonalDetails("KhanhKK", 23, "HCMC")}
20     </body>
21 </html>

```

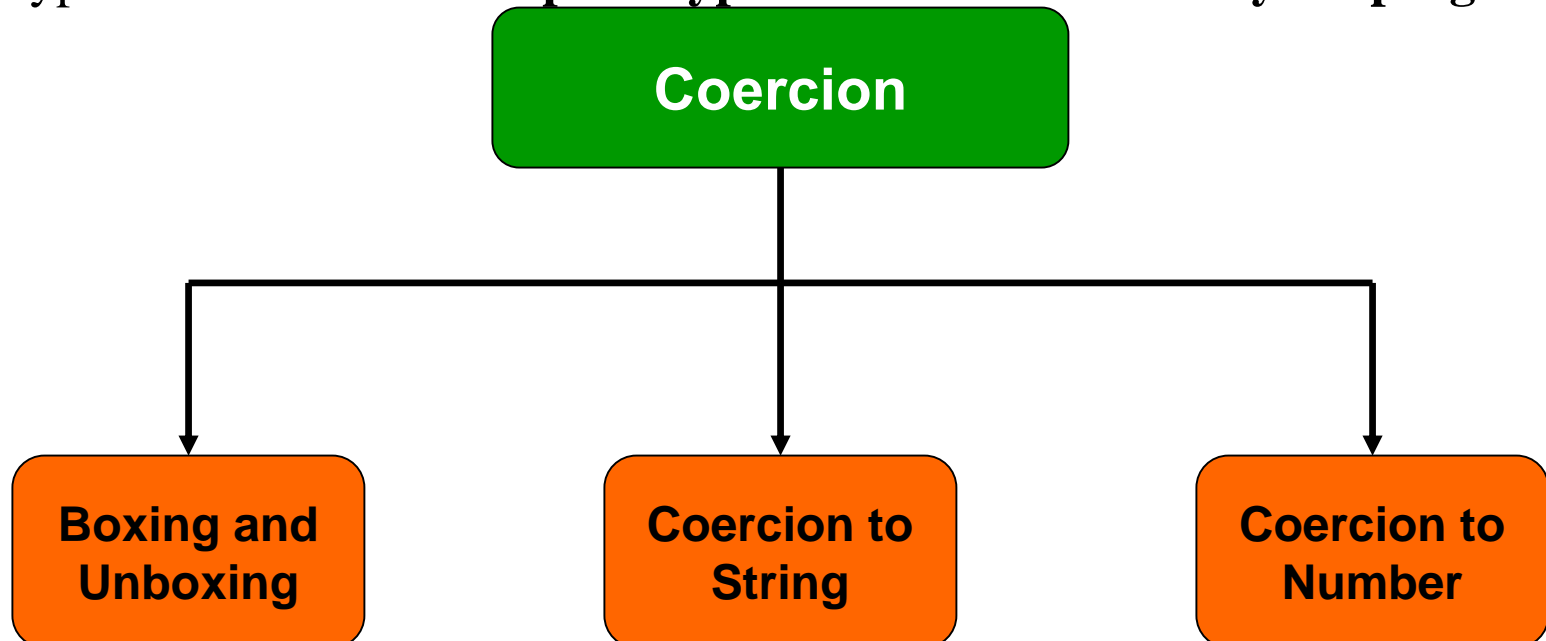
## EL Function Demo

Name: KhanhKT - 33 - QTSC  
 Name: KTKhanh - 43 - HCMC  
 Name: KhanhKK - 23 - HCMC

# Appendix

## Coersion

- Means that the **parameters are converted to the appropriate objects or primitives automatically**
- EL defines appropriate **conversion with default values**
  - For example, a string parameter from a request will be coerced to the appropriate object or primitive.
- There is a **difference between type coercion and type conversion.**
  - **Coercion** is **implicit type conversion** and its usually **performed automatically by the compiler**
  - **Type conversion** is an **explicit type conversion** inserted by the **programmer**.



# Appendix

## Coersion

- **Boxing an Unboxing**

- **Boxing converts values of primitive type to corresponding values of reference type.**

- If *i* is a **boolean** value, then boxing conversion **converts** *i* into a reference *r* or class and type **Boolean**, such that *r.value()* = *i*.
    - If *i* is a **byte** value, then boxing conversion **converts** *i* into a **reference** *r* of class and type **Byte**, such that *r.value()* = *i*

- **Unboxing converts values of reference type to corresponding values of primitive type**

- If *r* is a **Boolean** reference, then unboxing **conversion converts** *r* into *v* of type **boolean**, such that *r.value()* = *v*.
    - If *r* is a **Byte** reference, then unboxing **conversion converts** *r* into a value *v* of type **byte**, such that *r.value()* = *v*.

- **Coercion to String**

- *A* is **String**, return *A*

- *A* is **null**, return “”

- *A.toString()* **throws exception**, return **error**. Otherwise return *A.toString()*

# Appendix

## Coersion

- **Coercion to Number**

- The rule to coerce a value to number type are If A is **null or “”**, return **0**
- A is **character** and is **converted to short**, developer apply following rules:
  - If A is **Boolean**, return **error**
  - If A is **number** type, return **A**
- A is **number**, coerce occurs quietly to type N using the following algorithm:
  - If N is **BigInteger**
    - If A is **BigDecimal**, return **A.toBigInteger()**
    - **Otherwise**, return **BigInteger.valueOf(A.longValue())**
  - If N is **BigDecimal**
    - If A is a **BigInteger**, return **new BigDecimal(A)**
    - **Otherwise**, return **new BigDecimal (A.doubleValue())**
  - If N is **Byte**, return **new Byte (A.byteValue())**
  - If N is **Short**, return **new Short (A.shortValue())**
  - If N is **Integer**, return **new Integer(A.intValue())**
  - If N is **Long**, return **new Long(A.longValue())**
  - If N is **Float**, return **new Float(A.floatValue())**
  - If N is **Double**, return **new Double(A.doubleValue())**
  - **Otherwise** return **error**

# Appendix

## Coersion – Example

`\${"2" + "2"} = ${"2" + "2"}`

`${"2" + "2"} = 4`

`\${"2" + "2"} = ${"2" + "2"} <br/>`  
`\${"2" + 2} = ${"2" + 2}`

`${"2" + "2"} = $ {"2" + "2"}`

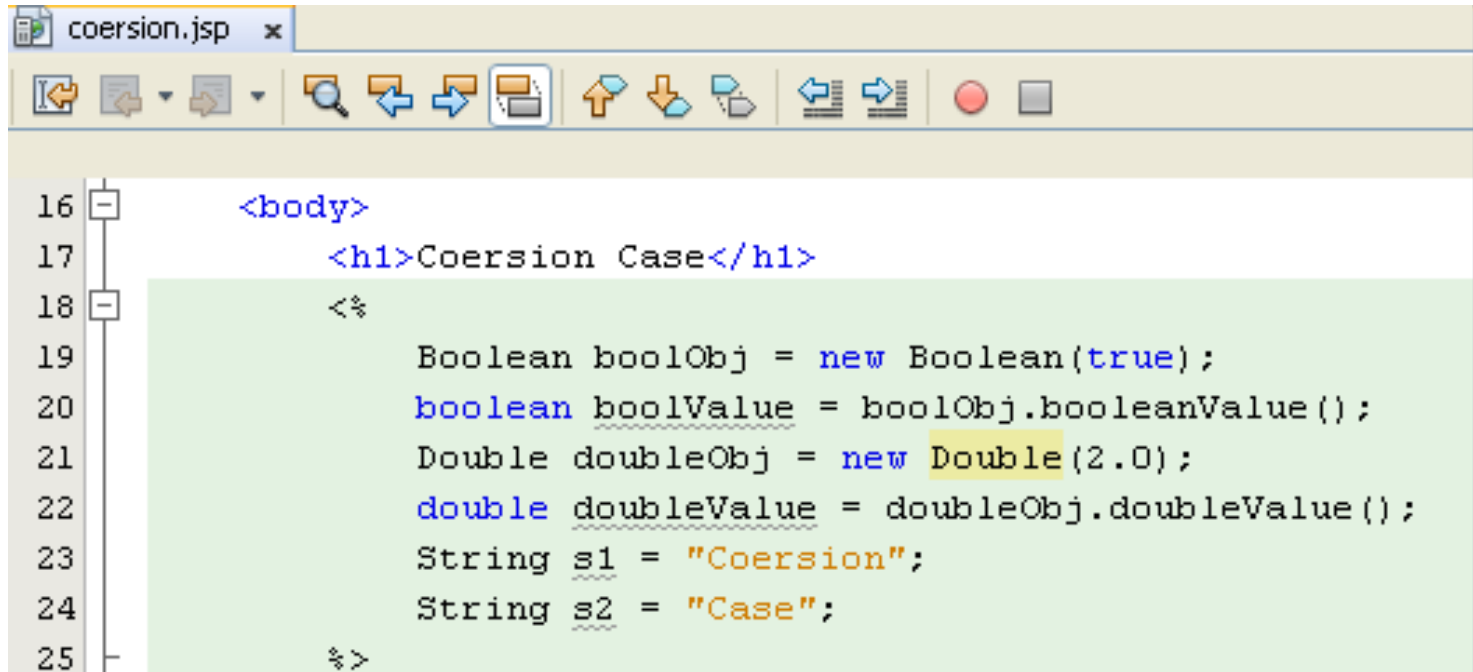
`${"2" + 2} = 4`

# Appendix

## Coersion

- Notes:

- **Variables declared in JSP page** (in scriptlet or declaration) **cannot be accessed** in JSP page or all of them can be presented with `${variable_name}`
- Therefore, if these **variables are forced in expression with EL**, the **value of these variables are converted to 0 (number) or false (boolean)**
- The EL operators' arithmetic or logical **is only applied to arithmetic or logic**. If the **value is not same type**, the **exception is thrown**
- The EL can **access the attribute in particular scope** (page, request, session, application)
- The **coersion** is **applied on the used operator in expression**



```

16 <body>
17     <h1>Coersion Case</h1>
18     <%
19         Boolean boolObj = new Boolean(true);
20         boolean boolValue = boolObj.booleanValue();
21         Double doubleObj = new Double(2.0);
22         double doubleValue = doubleObj.doubleValue();
23         String s1 = "Coersion";
24         String s2 = "Case";
25     %>

```



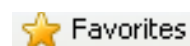
# Appendix

## Coersion – Example

```

26 Variable String concat: ${s1 + s2}<br/>
27 <% try { %>
28     Constant String concat: ${"abc" + "def"}<br/>
29 <% } catch (Exception e) {
30     out.print(e + "<br/>");
31 }
32 %>
33 ${doubleValue + doubleValue}<br/>
34 ${doubleObj + doubleObj}<br/>
35 ${boolObj && true}<br/>
36 ${doubleValue}<br/>
37 ${boolObj && doubleValue}<br/>
38 </body>
39 </html>

```



Favorites



Coersion

## Coersion Case

Variable String concat: 0

Constant String concat: java.lang.NumberFormatException: For input string: "abc"

0

0

false

false

# Appendix

## Coersion – Example

```

Source History
4      Author      : Trong Khanh
5      -->
6
7      <%@page contentType="text/html" pageEncoding="UTF-8"%>
8      <!DOCTYPE html>
9      <html>
10     <head>
11         <meta http-equiv="Content-Type" content="text/html; charset=
12         <title>Coersion</title>
13     </head>
14     <body>
15         <h1>Coersion Demo</h1>
16         <%
17             pageContext.setAttribute("BOOLOBJ", new Boolean(true));
18             pageContext.setAttribute("STRING1", "khanhkt");
19             pageContext.setAttribute("STRING2", " AJ");
20             pageContext.setAttribute("DOUBLEOBJ", new Double(2.0));
21             pageContext.setAttribute("INTEGER", new Integer(2));
22         %>
23         Presenting the value using EL<br/>
24         ${BOOLOBJ}<br/>
25         ${STRING1}<br/>
26         ${DOUBLEOBJ}<br/>
27         ${INTEGER}<br/>

```

# Appendix

## Coersion – Example

```

28      Combination with operators in EL Expression<br/>
29      ${BOOLOBJ && BOOLOBJ}<br/>
30      ${BOOLOBJ && false}<br/>
31      ${DOUBLEOBJ + DOUBLEOBJ}<br/>
32      ${DOUBLEOBJ + 5.0}<br/>
33      ${DOUBLEOBJ + 5}<br/>
34      ${INTEGER + INTEGER}<br/>
35      ${INTEGER + DOUBLEOBJ}<br/>
36      ${INTEGER + 5}<br/>
37      ${INTEGER + 5.0}<br/>
38      <% try {%>
39          ${BOOLOBJ + DOUBLEOBJ}<br/>
40      <% } catch (Exception e) {
41          out.print(e + "<br/>");
42      }
43      %>
44      <% try {%>
45          ${STRING1 + STRING2}<br/>
46      <% } catch (Exception e) {
47          out.print(e + "<br/>");
48      }
49      %>
50      </body>
51      </html>
  
```

## Coersion – Example

