Server-side Web Programming

Lecture 20:
The JSP Expression Language (EL)

Advantages of EL

- EL has more elegant and compact syntax than standard JSP tags
- EL lets you access nested properties
- EL let you access collections such as maps, arrays, and lists
- EL does a better job of handling null values
- EL provides more functionality

Disadvantages of EL

- EL doesn't create a JavaBean if it doesn't exist
- EL doesn't provide a way to set properties

```
<tr>
    <td align="right">First name:</td>
    <td><input type="text" name="firstName"
         value="${user.firstName}">
    </td>
</tr>
<tr>
    <td align="right">Last name:</td>
    <td><input type="text" name="lastName"
         value="${user.lastName}">
    </td>
</tr>
<tr>
    <td align="right">Email address:</td>
    <td><input type="text" name="emailAddress"
         value="${user.emailAddress}">
    </td>
 </tr>
```

```
<jsp:useBean id ="user" scope="session" class ="business.User"/>
<table cellspacing="5" cellpadding="5" border="1">
    <tr>
        <td align="right">First name:</td>
        <td><jsp:getProperty name = "user" property="firstName" />
    </tr>
    <tr>
        <td align="right">Last name:</td>
        <td><jsp:getProperty name = "user" property="lastName" />
    </tr>
    <tr>
        <td align="right">Email address:</td>
        <td><jsp:getProperty name = "user" property="emailAddress" />
    </tr>
</table>
```

Syntax

- ${attribute} : access an attribute name
- Servlet code

```
Date currentDate = new Date();
request.setAttribute("currentDate", currentDate)
```

- JSP code

```
<p> The current date is ${currentDate}</p>
```

Syntax

- **${attribute.property}: access the property of an attribute**
- Servlet code

```
User user = new User(firstName, lastName, emailAddress);
session.setAttribute("user", user)
```

- JSP code

```
<p> Hello ${user.firstName}</p>
```

${attribute.property}

- When you use the dot operator, the code to the left of the operator must specify a JavaBean or a map, and the code to the right of the operator must specify a JavaBean or a map key
- When you use this syntax, EL looks up the attribute starting with the smallest scope (page scope) and moving towards the largest scope (application scope)

Scope	**Description**
page	stored in the pageContext object
request	stored in the HttpServletRequest object
session	stored in the HttpSession object
application	stored in the ServletContext object

Implicit EL Object

Scope	**Implicit EL Object**
page	pageScope
request	requestScope
session	sessionScope
application	applicationScope

- Use this when you have a naming conflict

- ${scope.attribute}

  Servlet code

  ```
  Date currentDate = new Date();
  request.setAttribute("currentDate", currentDate)
  ```

  JSP code

  ```
  <p> The current date is ${requestScope.currentDate}</p>
  ```

- ${scope.attribute.property}

  Servlet code

  ```
  User user = new User(firstName, lastName, emailAddress);
  session.setAttribute("user", user)
  ```

  JSP code

  ```
  <p> Hello ${sessionScope.user.firstName}</p>
  ```

Use [ ] operator to work with arrays and lists

- ${attribute["propertyKeyOrIndex"]}

  Servlet code

  ```
  String[ ] colors = {"Red", "Green", "Blue"};
  ServletContext application = this.getServletContext();
  application.setAttribute("colors", colors);
  ```

  JSP code

  ```
  <p> The first color is ${colors[0]}<br>
        The second color is ${colors[1]}</p>
  ```

  Another way to write JSP code

  ```
  <p> The first color is ${colors["0"]}<br>
        The second color is ${colors["1"]}</p>
  ```

Servlet code

```
ArrayList<User> users = UserIO.getUsers(path);
session.setAttribute("users", users);
```

JSP code

```
<p> The first address on our list is ${users[0].emailAddress}<br>
    The second address on our list is ${users[1].emailAddress}
< p>
```

Another way to write JSP code

```
<p> The first address on our list is ${users["0"].emailAddress} <br>
    The second address on our list is ${users["1"].emailAddress}
< p>
```

Use Dot operator to access nested properties

- ${attribute.property1.property2}

Servlet code

```
Product p = new Product();
p.setCode("pf01");
LineItem lineItem = new LineItem(p,10);
session.setAttribute("item", lineItem);
```

JSP code

```
<p> Product code: ${item.product.code}</ p>
```

- Another way to access the nested property
- Syntax ${attribute[“property1”].property2}

Servlet code

```
Product p = new Product();
p.setCode(“pf01”);
LineItem lineItem = new LineItem(p,10);
session.setAttribute(“item”, lineItem);
```

JSP code

```
<p> Product code: ${item[“product”].code}</ p>
```

There is no limit to the number of nested properties that you can access with the dot operator

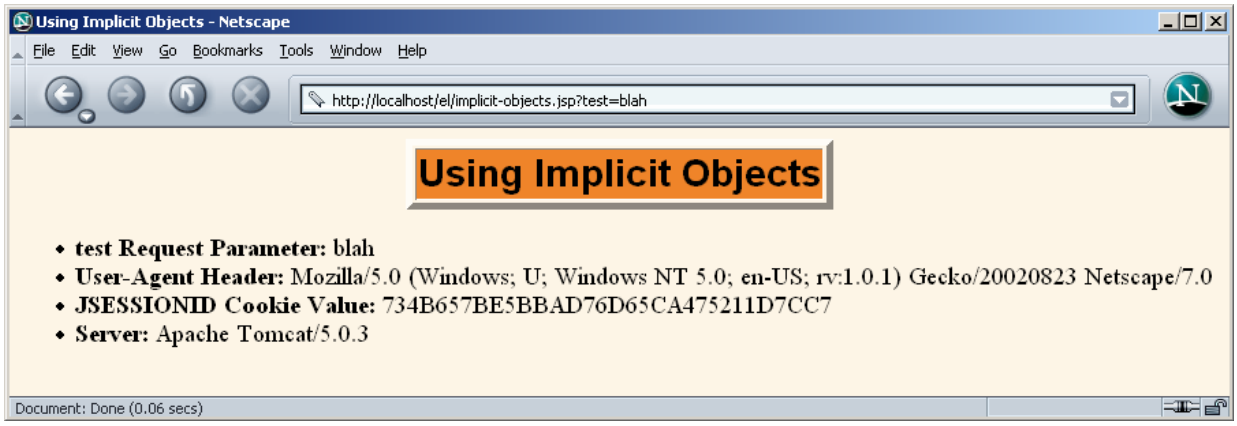
Other Implicit EL Objects

- **pageContext. The PageContext object.**
  - E.g. ${pageContext.session.id}
- **param and paramValues. Request params.**
  - E.g. ${param.custID}
- **header and headerValues. Request headers.**
  - E.g. ${header.Accept} or ${header["Accept"]}
  - ${header["Accept-Encoding"]}
- **cookie. Cookie object (not cookie value).**
  - E.g. ${cookie.userCookie.value} or ${cookie["userCookie"].value}
- **initParam. Context initialization param.**

Example

```
<!DOCTYPE ...>
...
    <UL>
        <LI><B>test Request Parameter:</B>
            ${param.test}
        <LI><B>User-Agent Header:</B>
            ${header["User-Agent"]}
        <LI><B>JSESSIONID Cookie Value:</B>
            ${cookie.JSESSIONID.value}
        <LI><B>Server:</B>
            ${pageContext.servletContext.serverInfo}
    </UL>
</BODY></HTML>
```

Example



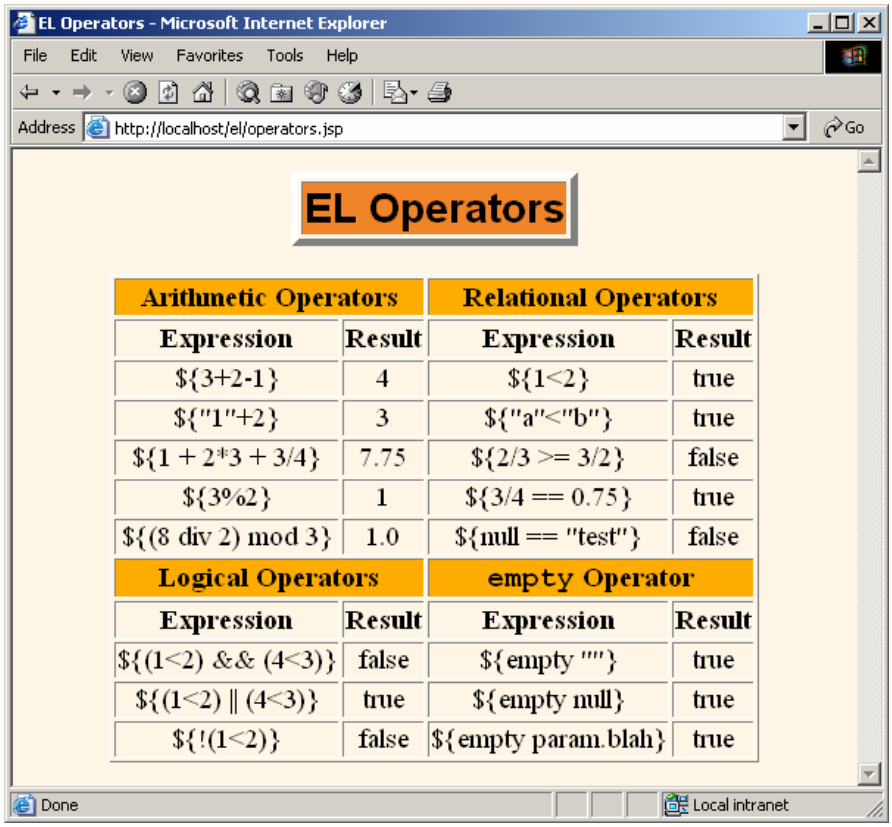
EL Operators

- **Arithmetic**
  - + - * / div % mod
- **Relational**
  - == eq != ne < lt > gt <= le >= ge
- **Logical**
  - && and || or ! Not
- **Empty**
  - Empty
  - True for null, empty string, empty array, empty list, empty map. False otherwise.
- **CAUTION**
  - Use extremely sparingly to preserve MVC model

Example

```
<TABLE BORDER=1 ALIGN="CENTER">
<TR><TH CLASS="COLORED" COLSPAN=2>Arithmetic Operators
<TH CLASS="COLORED" COLSPAN=2>Relational Operators
<TR><TH>Expression<TH>Result<TH>Expression<TH>Result
<TR ALIGN="CENTER">
<TD>\${3+2-1}<TD>${3+2-1}
<TD>\${1&lt;2}<TD>${1<2}
<TR ALIGN="CENTER">
<TD>\${"1"+2}<TD>${"1"+2}
<TD>\${"a"&lt;"b"}<TD> ${"a"<"b"}
<TR ALIGN="CENTER">
<TD>\${1 + 2*3 + 3/4}<TD> ${1 + 2*3 + 3/4}
<TD>\${2/3 &gt;= 3/2}<TD> ${2/3 >= 3/2}
<TR ALIGN="CENTER">
<TD>\${3%2}<TD> ${3%2}
<TD>\${3/4 == 0.75}<TD> ${3/4 == 0.75}
```

Output



Common (but Confusing) EL Problem

- **Scenario**
  - You use ${something} in a JSP page
  - You literally get "${something}" in the output
  - You realize you forgot to update the web.xml file to refer to servlets 2.4, so you do so
  - You redeploy your Web app and restart the server
  - You *still* literally get "${something}" in the output
- **Why?**
  - The JSP page was already translated into a servlet
    - A servlet that ignored the expression language
- **Solution**
  - Resave the JSP page to update its modification date

Preventing EL Evaluation

- **What if JSP page contains ${ ?**
- **Deactivating the EL in an entire Web application.**
  - Use a web.xml file that refers to servlets 2.3 (JSP 1.2) or earlier.

```
<jsp-config>
        <jsp-property-group>
                <url-pattern>*.jsp</url-pattern>
                <el-ignored>true</el-ignored>
        </jsp-property-group
</jsp-config>
```

- **Deactivating the expression language in multiple JSP pages.**
  - Use the jsp-property-group web.xml element
- **Deactivating the expression language in individual JSP pages.**
  - Use <%@ page isELIgnored="true" %>
    - This is particularly useful in pages that use JSTL

Preventing Use of Standard Scripting Elements

- To enforce EL-only with no scripting, use scripting-invalid in web.xml
-

```
<jsp-config>
        <jsp-property-group>
                <url-pattern>*.jsp</url-pattern>
                <scripting-invalid>true</scripting-invalid>
        </jsp-property-group
</jsp-config>
```

Summary

- **The JSP 2.0 EL provides concise, easy-to read access to**
  - Bean properties
  - Collection elements
  - Standard HTTP elements such as request parameters, request headers, and cookies
- **The JSP 2.0 EL works best with MVC**
  - Use only to output values created by separate Java code
- **Resist use of EL for business logic**