Module 7: EL, JSTL and Custom Tags

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Objectives

- Expression Language
- JSTL (JSP Standard Tag Library) 1.1
- Custom Tags

Expression Language

- EL expressions are **ALWAYS** within curly braces, and prefixed with the dollar sign

```
${firstThing.secondThing}
```

- `firstThing` can be
  - EL Implicit Object
  - Attribute

EL Implicit Object and Attribute

- EL Implicit Object
  - param
  - paramValues

  - header
  - headerValues

  - cookie

  - initParam

  - pageContext

  - pageScope
  - requestScope
  - sessionScope
  - applicationScope

Attribute

in page scope
in request scope
in session scope
in application scope

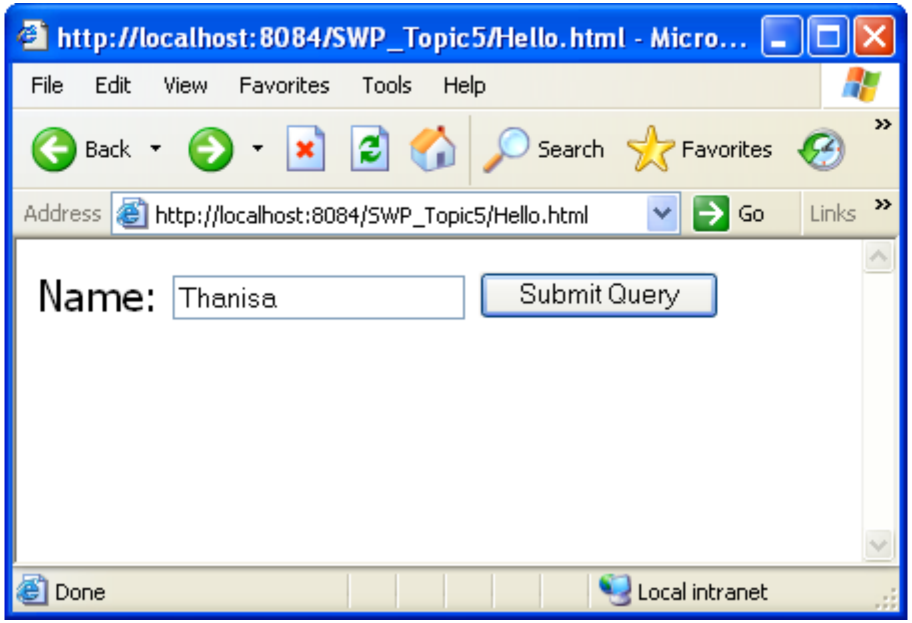
EL Implicit Objects

Implicit Object	Description
`param` `paramValues`	Maps of all the **form parameters** that were passed to your JSP
`header` `headerValues`	Maps of all the **request headers**
`cookie`	A Map of all the **cookies** passed to your JSP
`initParam`	A Map of the **context init parameters**

`pageScope`
`requestScope`
`sessionScope`
`applicationScope`
	A Map of all the objects that have page, request, session and application scope

hello.html

```
<form action="helloName.jsp" method="post">
   Name: <input name="username">
    <input type="submit">
</form>
```



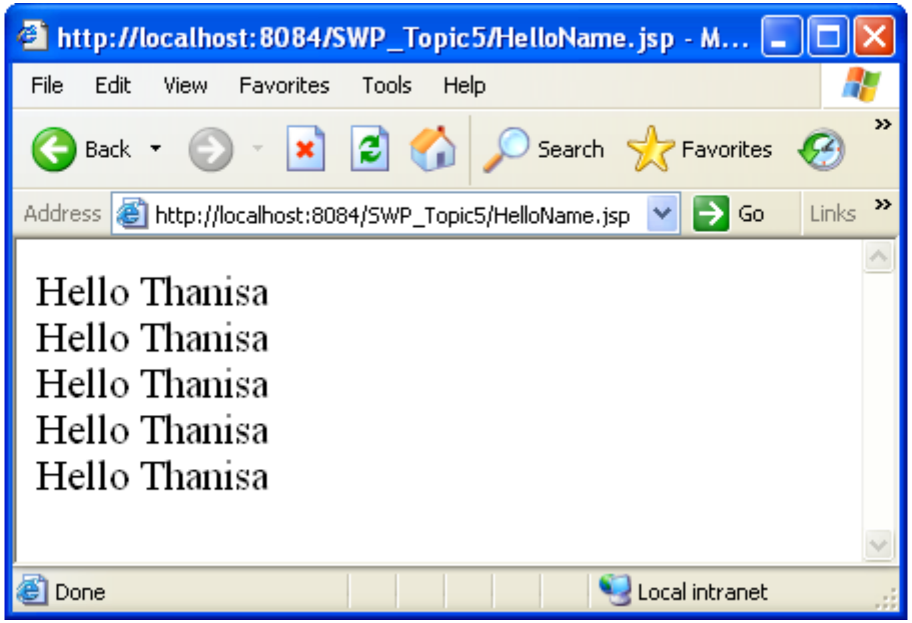
http://localhost:8084/SWP_Topic5/Hello.html - Micro...

http://localhost:8084/SWP_Topic5/Hello.html

Name: Thanisa

param

```
<%-- helloName.jsp --%>
Hello <%= request.getParameter("username") %><br>
Hello <% out.print(request.getParameter("username")); %><br>
Hello ${param.username}<br>
Hello ${param['username']}<br>
Hello ${param["username"]}<br>
```

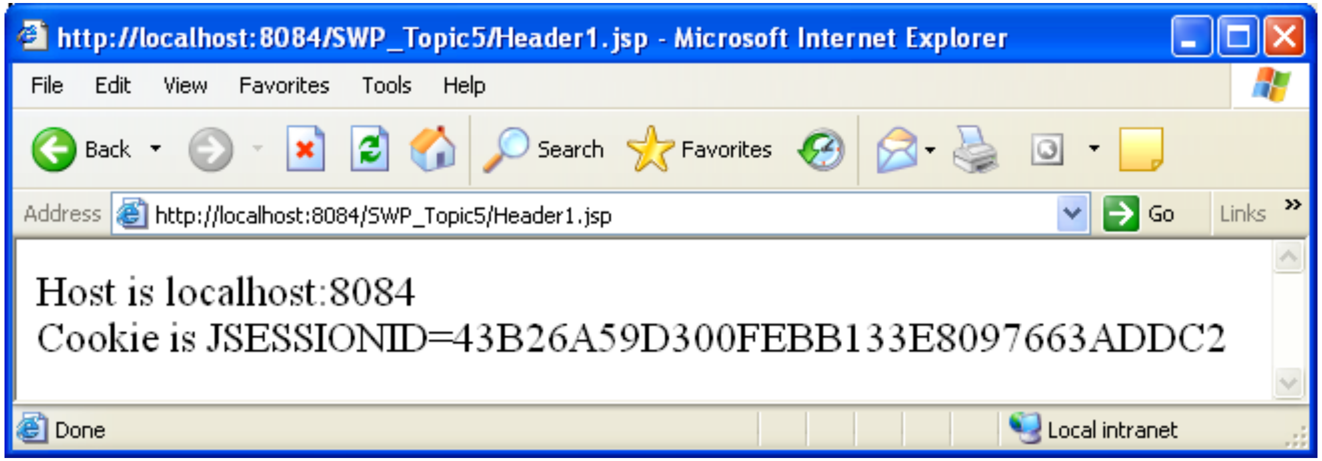


Address: http://localhost:8084/SWP_Topic5/HelloName.jsp

```
Hello Thanisa
Hello Thanisa
Hello Thanisa
Hello Thanisa
Hello Thanisa
```

header

```
Host is ${header.host} <br>
Cookie is ${header.cookie}
```

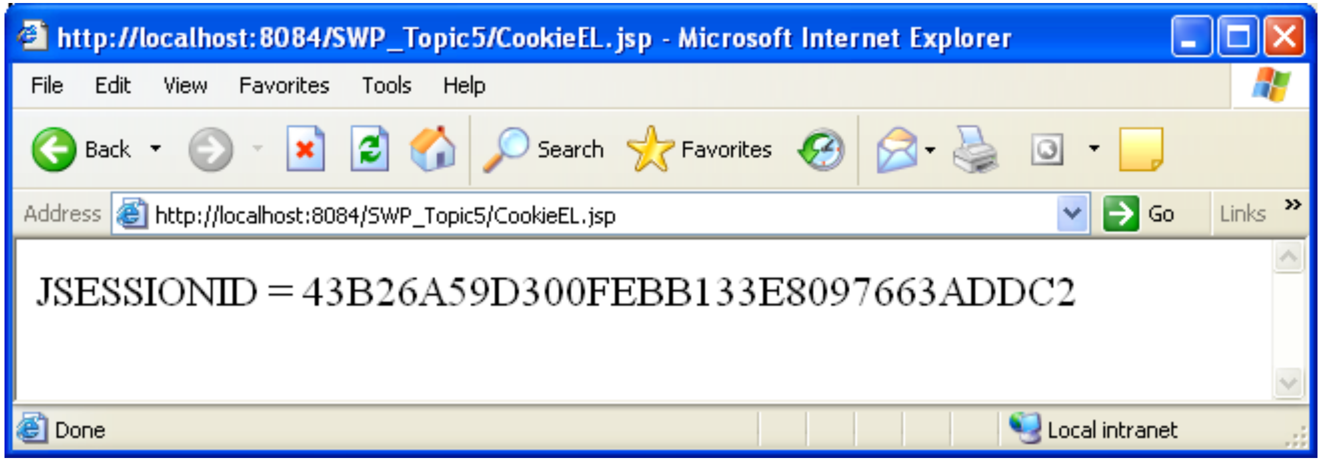


http://localhost:8084/SWP_Topic5/Header1.jsp - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back
Search
Favorites
Address
http://localhost:8084/SWP_Topic5/Header1.jsp
Go
Links
Done
Local intranet

```
Host is localhost:8084
Cookie is JSESSIONID=43B26A59D300FEBB133E8097663ADDC2
```

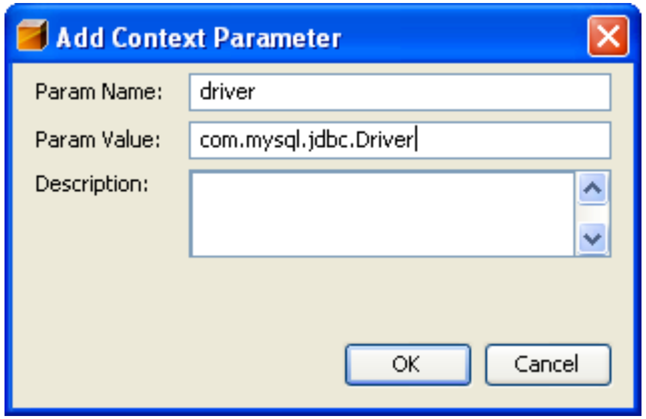
cookie

JSESSIONID = ${cookie.JSESSIONID.value}


http://localhost:8084/SWP_Topic5/CookieEL.jsp - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back
Search
Favorites
Address
http://localhost:8084/SWP_Topic5/CookieEL.jsp
Go
Links
Done
Local intranet

JSESSIONID = 43B26A59D300FEBB133E8097663ADDC2

initParam



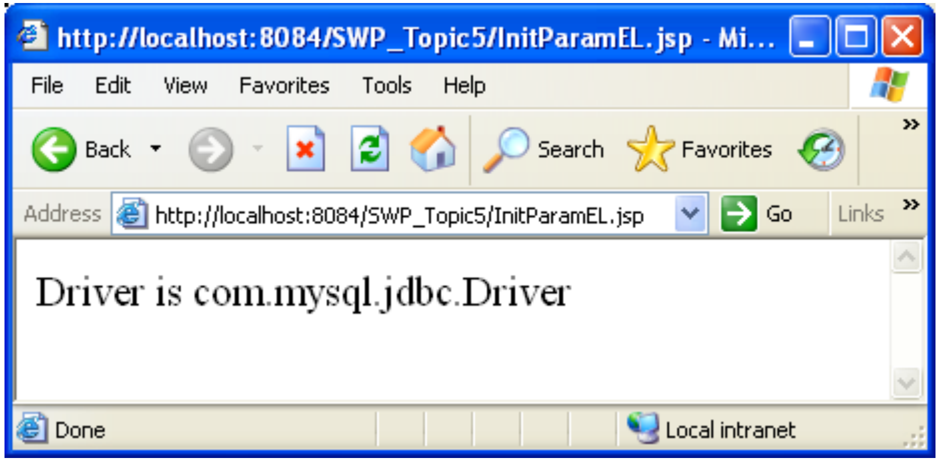
Param Name: driver

Param Value: com.mysql.jdbc.Driver

Description:

```
//web.xml
<web-app ...>
   :
   <context-param>
        <param-name> driver </param-name>
        <param-value> com.mysql.jdbc.Driver </param-value>
   </context-param>
   :
</web-app>
---------------------------------------------------------------------------
```

```
//InitParamEL.jsp
Driver is ${initParam.driver}
```


http://localhost:8084/SWP_Topic5/InitParamEL.jsp - Mi...
File
Edit
View
Favorites
Tools
Help
Back
Search
Favorites
Address
http://localhost:8084/SWP_Topic5/InitParamEL.jsp
Go
Links
Done
Local intranet

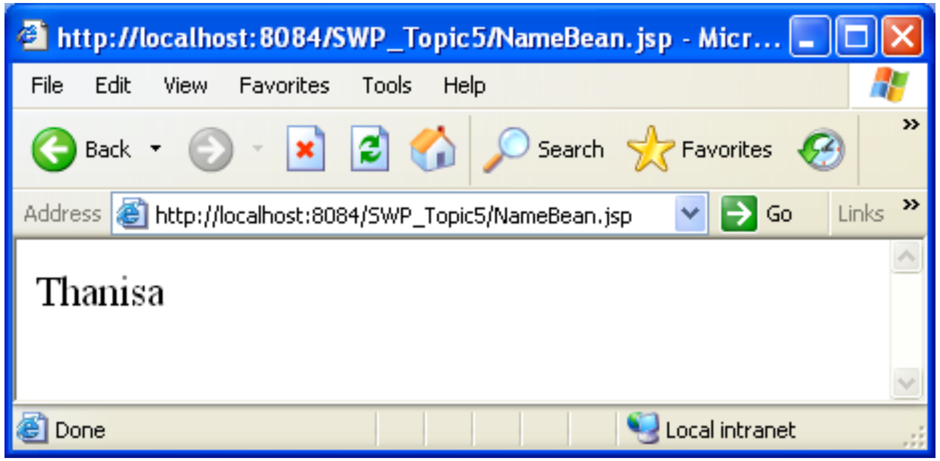
Driver is com.mysql.jdbc.Driver

Person.java

```
package myBeans;

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

EL and JavaBeans

```
<jsp:useBean id="personName" class="myBeans.Person" />
<jsp:setProperty name="personName" property="name" value="Thanisa" />

<%-- <jsp:getProperty name="personName" property="name" /> --%>

${personName.name}
```


http://localhost:8084/SWP_Topic5/NameBean.jsp - Micr...
File Edit View Favorites Tools Help
Back
Search
Favorites
Address
http://localhost:8084/SWP_Topic5/NameBean.jsp
Go
Links
Done
Local intranet

Thanisa

Disable the EL

- For a single page

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

- For an entire application

```
<jsp-property-group>
   <url-pattern>*.jsp</url-pattern>
   <el-enabled>false</el-enabled>
   <scripting-invalid>true</scripting-invalid>
</jsp-property-group>
```

The `taglib` Directive

- Tag libraries come in two different flavors:
  - JSTL (**J**avaServerPages **S**tandard **T**ag **L**ibrary)
  - Custom Tag Libraries

- The syntax for the taglib directive is as follows:

```
<%@ taglib uri=“taglibraryURI” prefix=“tagPrefix” %>
```

JSTL 1.1

- The “Core” library
  - Looping and Iteration
    - `<c:forEach>`
    - `<c:forTokens>`
  - Conditional
    - `<c:if>`
    - `<c:choose>`
    - `<c:when>`
    - `<c:otherwise>`
  - General-purpose
    - `<c:out>`
    - `<c:remove>`
    - `<c:catch>`
  - URL related
    - `<c:import>`
    - `<c:url>`
    - `<c:redirect>`
    - `<c:param>`

The “SQL” library

Database access

```
<sql:query>
<sql:update>
<sql:setDataSource>
<sql:param>
<sql:dateParam>
```

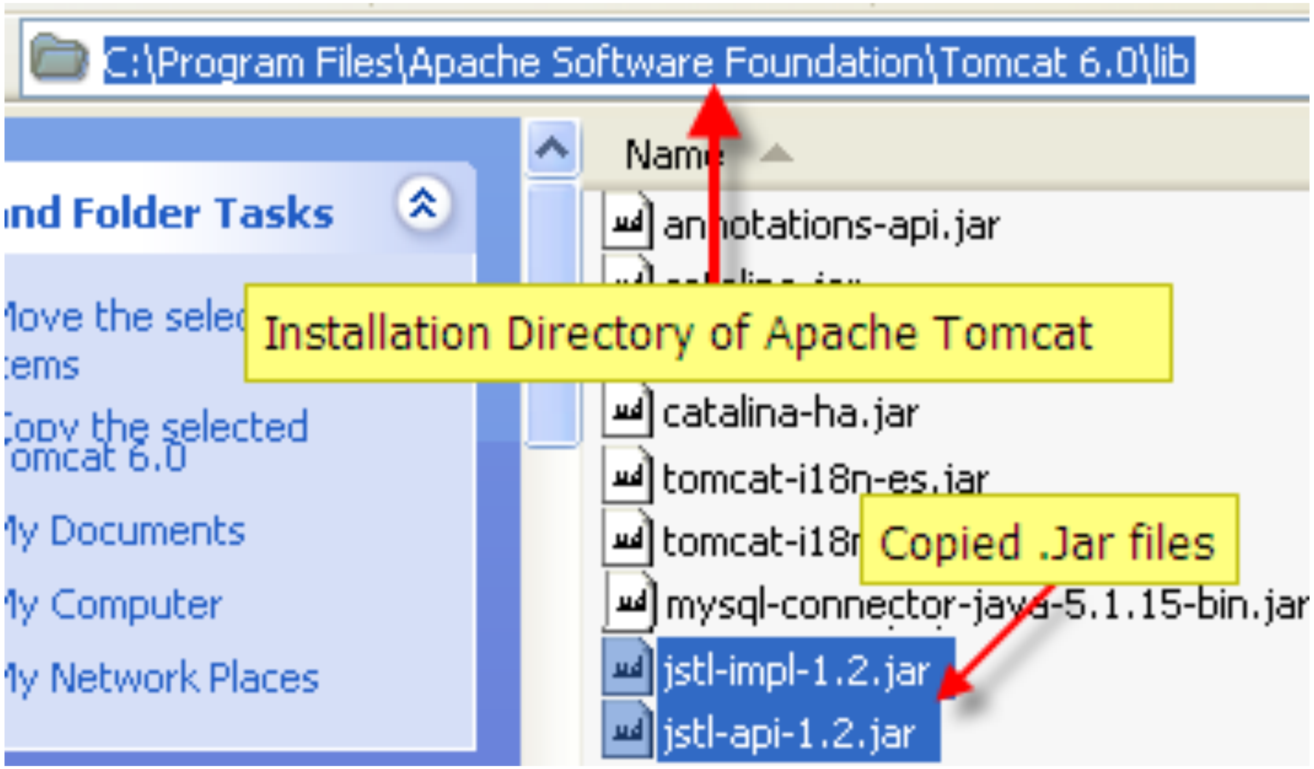
The “Formatting” library

```
<fmt:message>
  :
```

The “XML” library

```
<x:parse>
     :
```

Download and copy JSTL Libraries to Tomcat

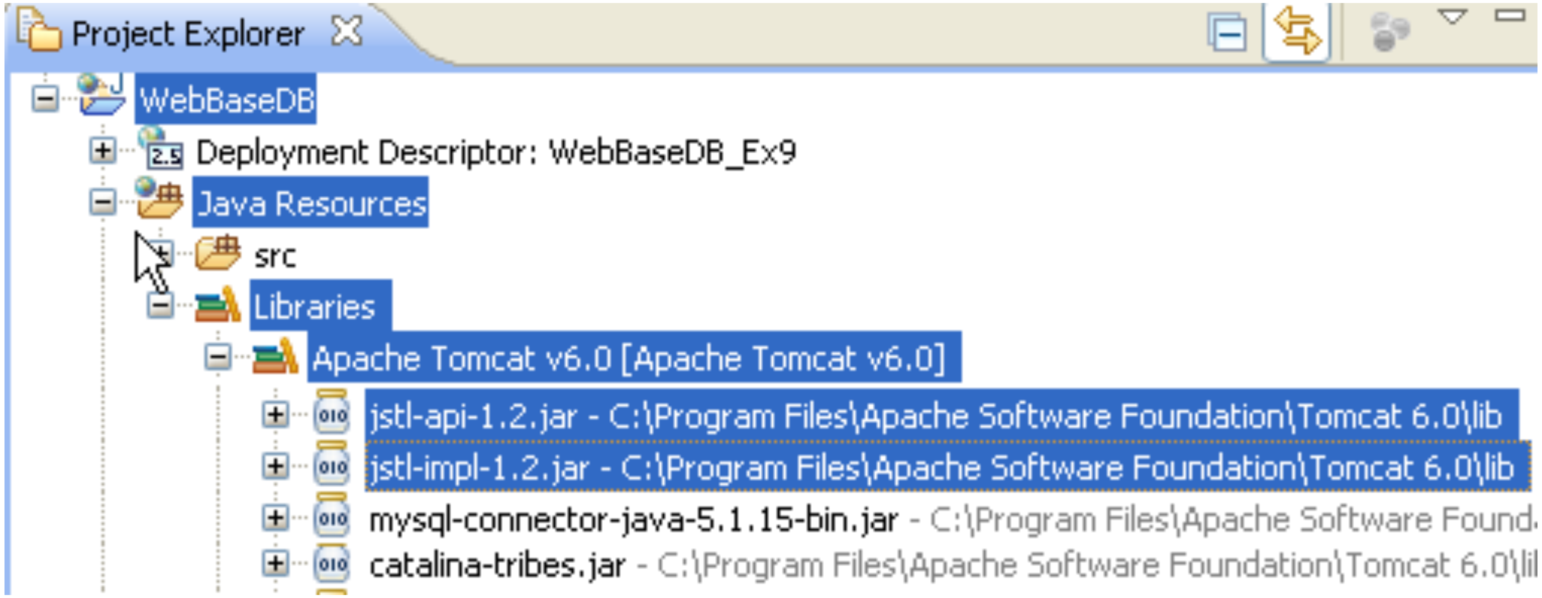


C:\Program Files\Apache Software Foundation\Tomcat 6.0\lib

Installation Directory of Apache Tomcat

Copied .Jar files

Check JSTL in Project



```
WebBaseDB
  Deployment Descriptor: WebBaseDB_Ex9
  Java Resources
    src
    Libraries
      Apache Tomcat v6.0 [Apache Tomcat v6.0]
        jstl-api-1.2.jar - C:\Program Files\Apache Software Foundation\Tomcat 6.0\lib
        jstl-impl-1.2.jar - C:\Program Files\Apache Software Foundation\Tomcat 6.0\lib
        mysql-connector-java-5.1.15-bin.jar - C:\Program Files\Apache Software Found
        catalina-tribes.jar - C:\Program Files\Apache Software Foundation\Tomcat 6.0\lil
```

Core Tag Library

- Looping and Iteration
- Conditional
- General-purpose
- URL related

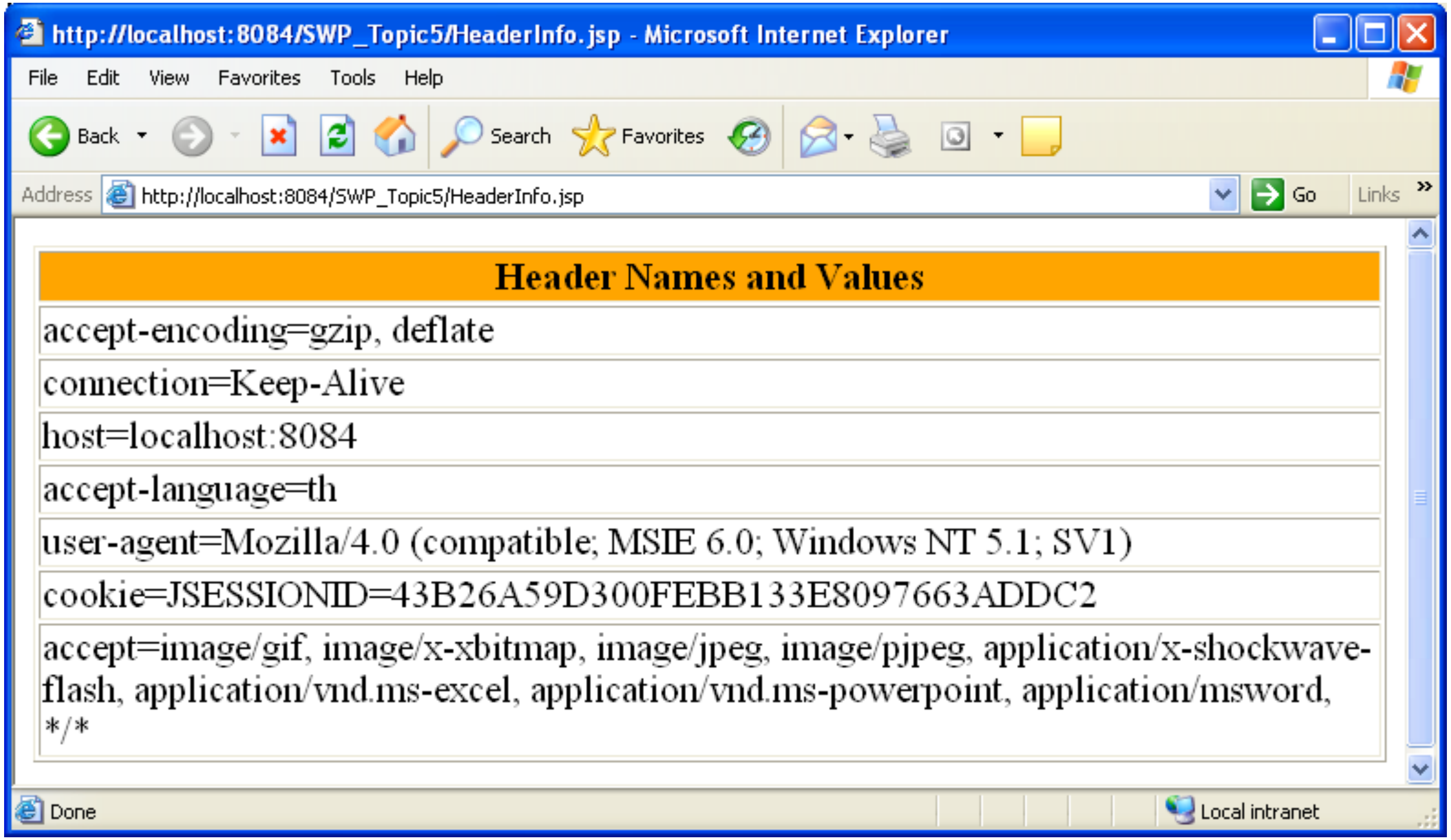
Looping and Iteration

- **`<c:forEach>`**
- **`<c:forTokens>`**

<c:forEach>

```
<%@taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c" %>

<table border="1" align="center">
    <tr bgcolor="orange">
        <th>Header Names and Values</th>
    </tr>
    <c:forEach var="h" items="${header}">
        <tr>
            <td>${h.value}</td>
        </tr>
    </c:forEach>
</table>
```

Result

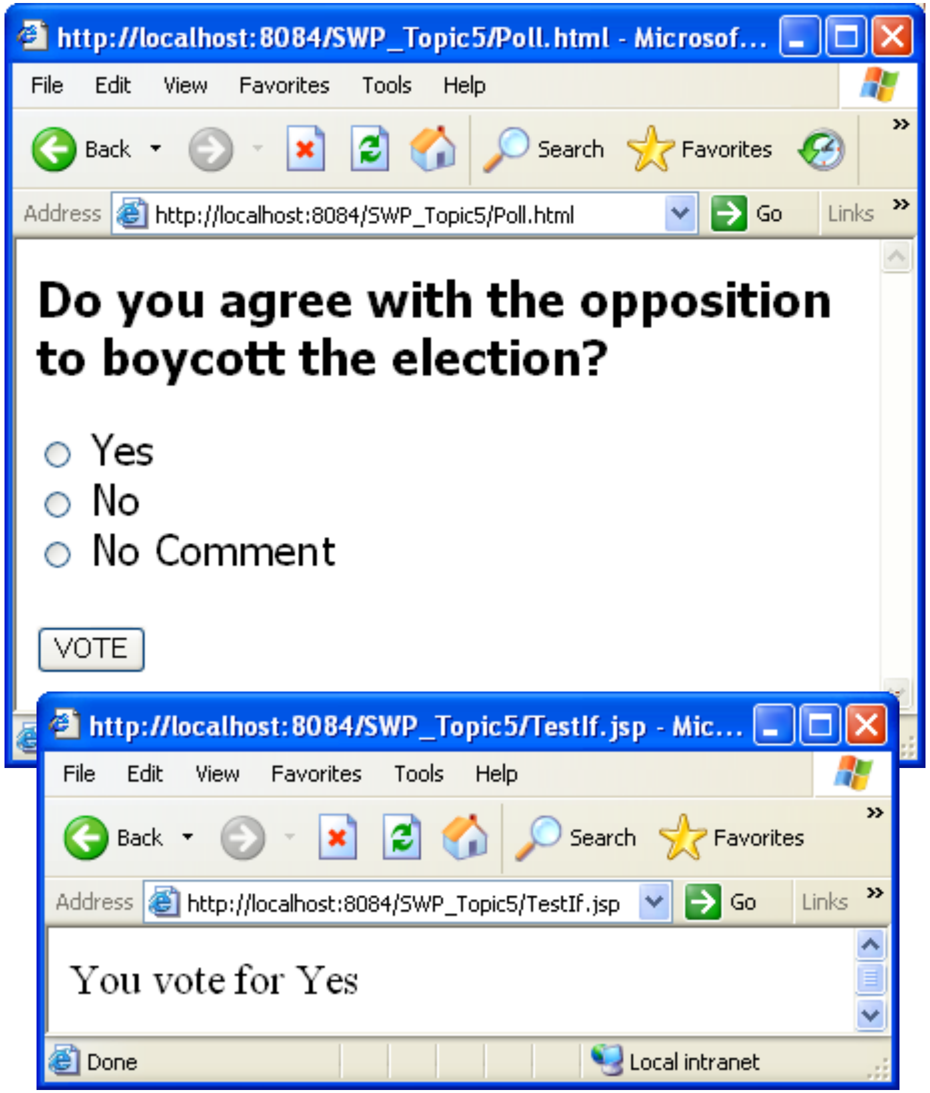

http://localhost:8084/SWP_Topic5/HeaderInfo.jsp - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back
Search
Favorites
Address
http://localhost:8084/SWP_Topic5/HeaderInfo.jsp
Go
Links
Done
Local intranet

Header Names and Values
accept-encoding=gzip, deflate
connection=Keep-Alive
host=localhost:8084
accept-language=th
user-agent=Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1; SV1)
cookie=JSESSIONID=43B26A59D300FEBB133E8097663ADDC2
accept=image/gif, image/x-xbitmap, image/jpeg, image/pjpeg, application/x-shockwave-flash, application/vnd.ms-excel, application/vnd.ms-powerpoint, application/msword, */*

Conditionals

- <c:if>
- <c:choose>, <c:when> and <c:otherwise>

Example


http://localhost:8084/SWP_Topic5/Poll.html - Microsof...
File Edit View Favorites Tools Help
Back Search Favorites
Address http://localhost:8084/SWP_Topic5/Poll.html Go Links
http://localhost:8084/SWP_Topic5/TestIf.jsp - Mic...
File Edit View Favorites Tools Help
Back Search Favorites
Address http://localhost:8084/SWP_Topic5/TestIf.jsp Go Links
Done
Local intranet

Do you agree with the opposition to boycott the election?

○ Yes
○ No
○ No Comment

VOTE

You vote for Yes

poll.html

```
:
<body>
   <h3>Do you agree with the opposition
        to boycott the election?</h3>
    <form action = "vote.jsp" method = "post">
      <input type=radio name=answer value="Yes"> Yes<br>
      <input type=radio name=answer value="No"> No<br>
      <input type=radio name=answer value="No Comment"> No Comment<br>
      <br><input type=submit value="VOTE">
    </form>
</body>
:
```

<c:if>

```
<%@taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c" %>

<c:if test="${param.answer == 'Yes'}">
    You vote for Yes
</c:if>
<c:if test="${param.answer == 'No'}">
    You vote for No
</c:if>
<c:if test="${param.answer == 'No Comment'}">
    You vote for No Comment
</c:if>
```

<c:choose>, <c:when> and <c:otherwise>

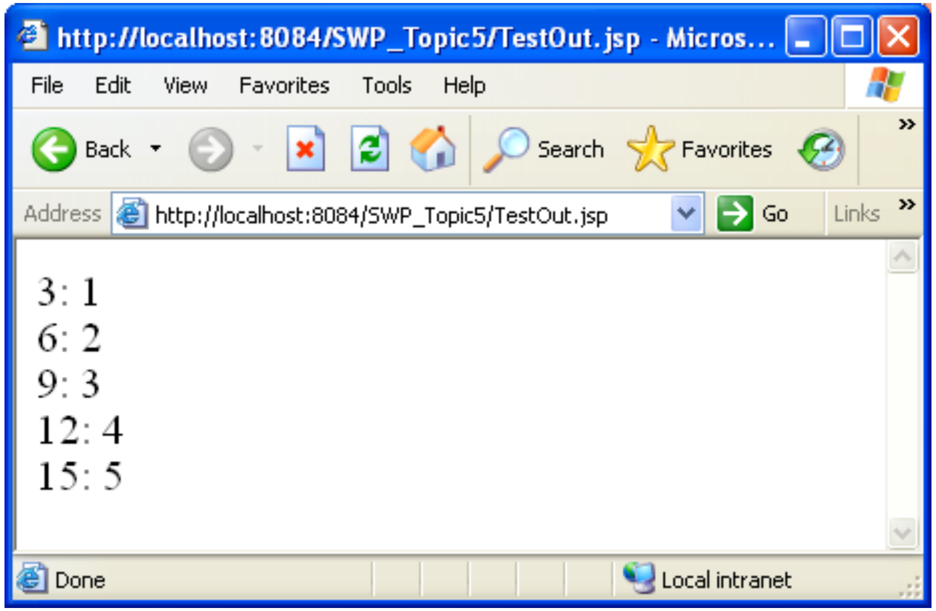
```
<%@taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c" %>

<c:choose>
    <c:when test="${param.field == 'Network'}">
        You choose Network
    </c:when>
    <c:when test="${param.field == 'Database'}">
        You choose Database
    </c:when>
    <c:otherwise>
        You choose Programming
    </c:otherwise>
</c:choose>
```

Scoped Variable Manipulation

- <c:out>
- <c:set>
- <c:remove>
- <c:catch>

<c:out>

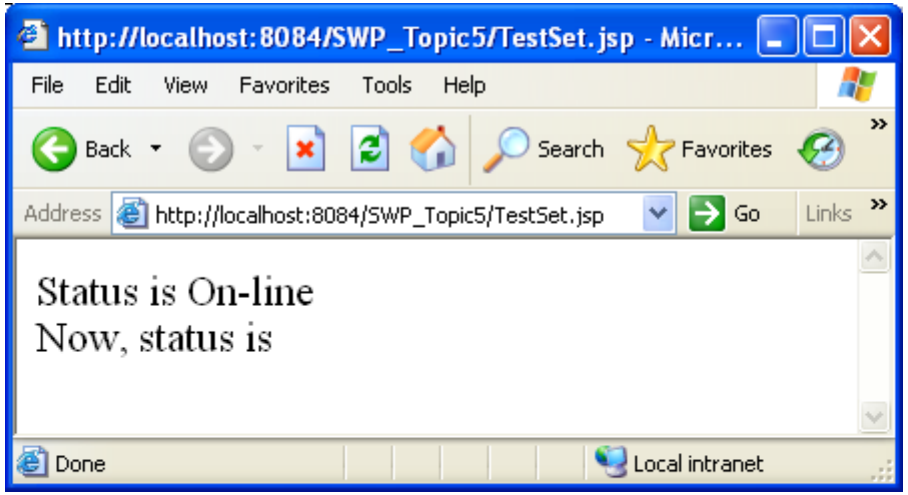
```
<%@taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c"%>

<c:forEach begin="3" end="15" step="3" var="index" varStatus="num">
    <c:out value="${index}" />: <c:out value="${num.count}" /><br>
</c:forEach>
```


http://localhost:8084/SWP_Topic5/TestOut.jsp - Micros...
File
Edit
View
Favorites
Tools
Help
Back
Search
Favorites
Address
http://localhost:8084/SWP_Topic5/TestOut.jsp
Go
Links
Done
Local intranet

```
3: 1
6: 2
9: 3
12: 4
15: 5
```

<c:set> and <c:remove>

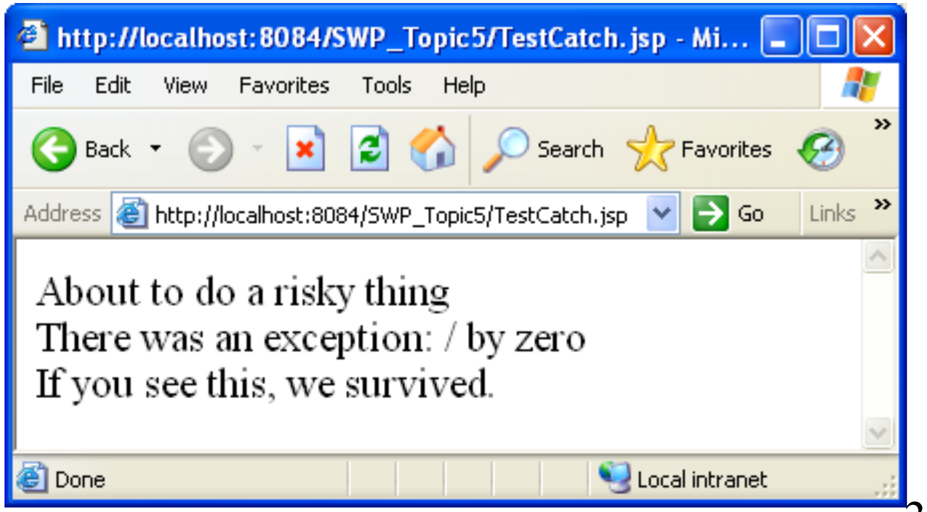
```
<%@taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c" %>

<c:set var="status" scope="request" value="On-line" />
Status is ${status} <br>

<c:remove var="status" scope="request" />
Now, status is ${status}
```


http://localhost:8084/SWP_Topic5/TestSet.jsp - Micr...
File
Edit
View
Favorites
Tools
Help
Back
Search
Favorites
Address
http://localhost:8084/SWP_Topic5/TestSet.jsp
Go
Links
Done
Local intranet

```
Status is On-line
Now, status is
```

<c:catch>

```
<%@taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c" %>

About to do a risky thing <br>
<c:catch var="myException" >
    <% int x = 10/0; %>
</c:catch>
<c:if test="${myException != null}">
    There was an exception: ${myException.message} <br>
</c:if>
If you see this, we survived.
```



http://localhost:8084/SWP_Topic5/TestCatch.jsp - Mi...
File Edit View Favorites Tools Help
Back
Search
Favorites
Address http://localhost:8084/SWP_Topic5/TestCatch.jsp
Go
Links
Done
Local intranet

About to do a risky thing
There was an exception: / by zero
If you see this, we survived.

URL Manipulation

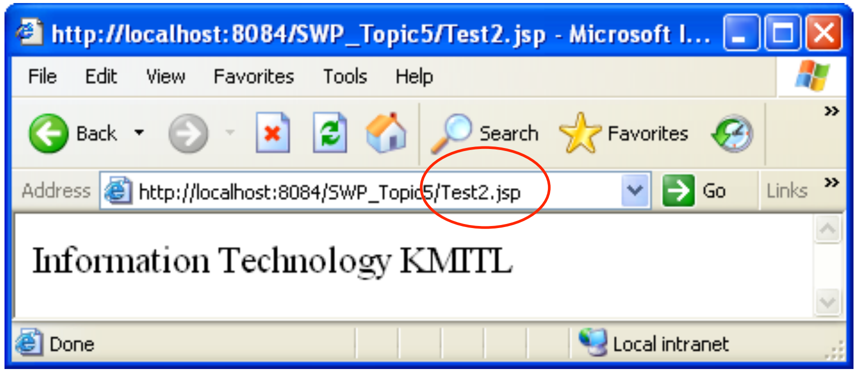
- <c:import>
- <c:redirect>
- <c:url>
- <c:param>

<c:import>

```
<%-- Header2.jsp --%>
Information Technology KMITL
```

```
<%-- Test2.jsp --%>
<%@taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c" %>
<c:import url="http://localhost:8084/SWP_Topic5/Header2.jsp" />
```

- The <c:import> action can also be used to specify absolute, relative and FTP URL resources to provide a lot more functionality than the standard <jsp:include> action.
- <c:import> can reach OUTSIDE the web app


http://localhost:8084/SWP_Topic5/Test2.jsp - Microsoft I...
File Edit View Favorites Tools Help
Back
Search
Favorites
Address
http://localhost:8084/SWP_Topic5/Test2.jsp
Go
Links
Done
Local intranet

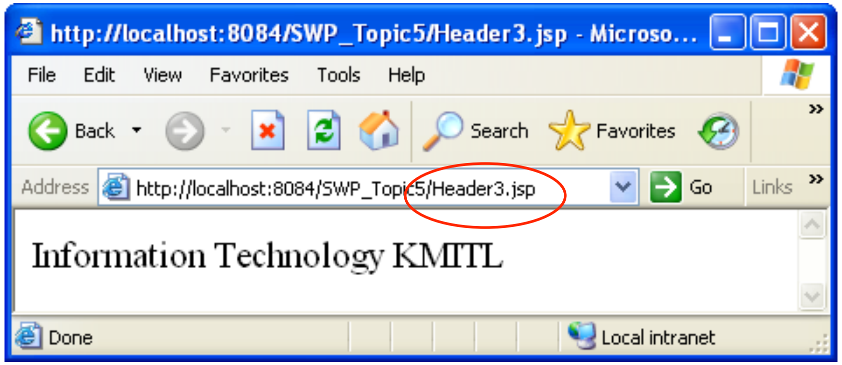
Information Technology KMITL

<c:redirect>

```
<%-- Header3.jsp --%>
Information Technology KMITL
```

```
<%-- Test3.jsp --%>
<%@taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c" %>
<c:redirect url="http://localhost:8084/SWP_Topic5/Header3.jsp" />
```

- The <c:redirect> action simply sends an HTTP redirect to a client.



http://localhost:8084/SWP_Topic5/Header3.jsp - Microso...
File Edit View Favorites Tools Help
Back
Search
Favorites
Address
http://localhost:8084/SWP_Topic5/Header3.jsp
Go
Links
Done
Local intranet

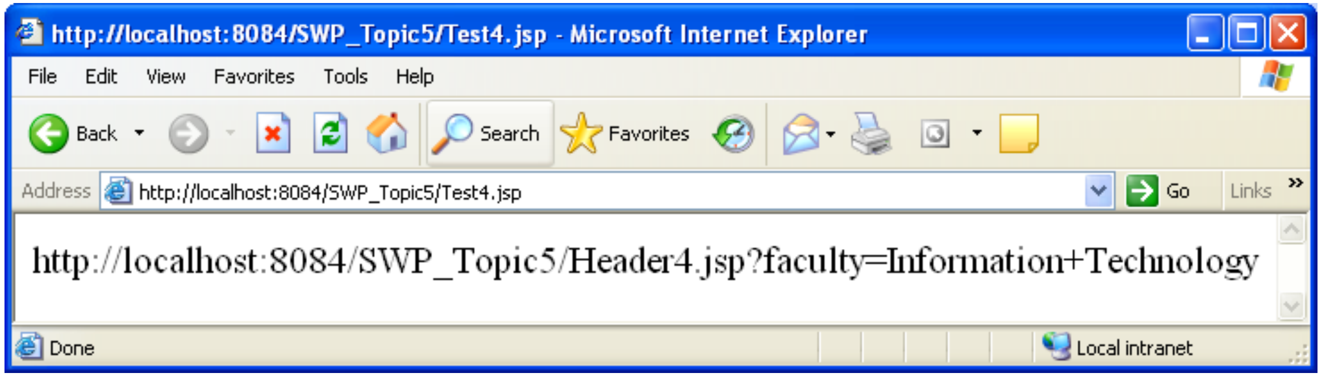
Information Technology KMITL

<c:url> and <c:param>

```
<%-- Header4.jsp --%>
${param.faculty}
-----------------------------------------------------------------
<%-- Test4.jsp --%>
<%@taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c" %>
<c:url value="http://localhost:8084/SWP_Topic5/Header4.jsp " >
   <c:param name="faculty" value="Information Technology" />
</c:url>
-----------------------------------------------------------------
```

- The <c:url> action takes care of the encoding and all the URL rewriting.

`http://localhost:8084/JSP2/Header.jsp;jsessionid=543ferew432esd23`


http://localhost:8084/SWP_Topic5/Test4.jsp - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back
Search
Favorites
Address
http://localhost:8084/SWP_Topic5/Test4.jsp
Go
Links
Done
Local intranet

http://localhost:8084/SWP_Topic5/Header4.jsp?faculty=Information+Technology

SQL Tag Library

- <sql:setDataSource>
- <sql:query>
- <sql:update>
- <sql:param> and <sql:dateParam>
- <sql:transaction>

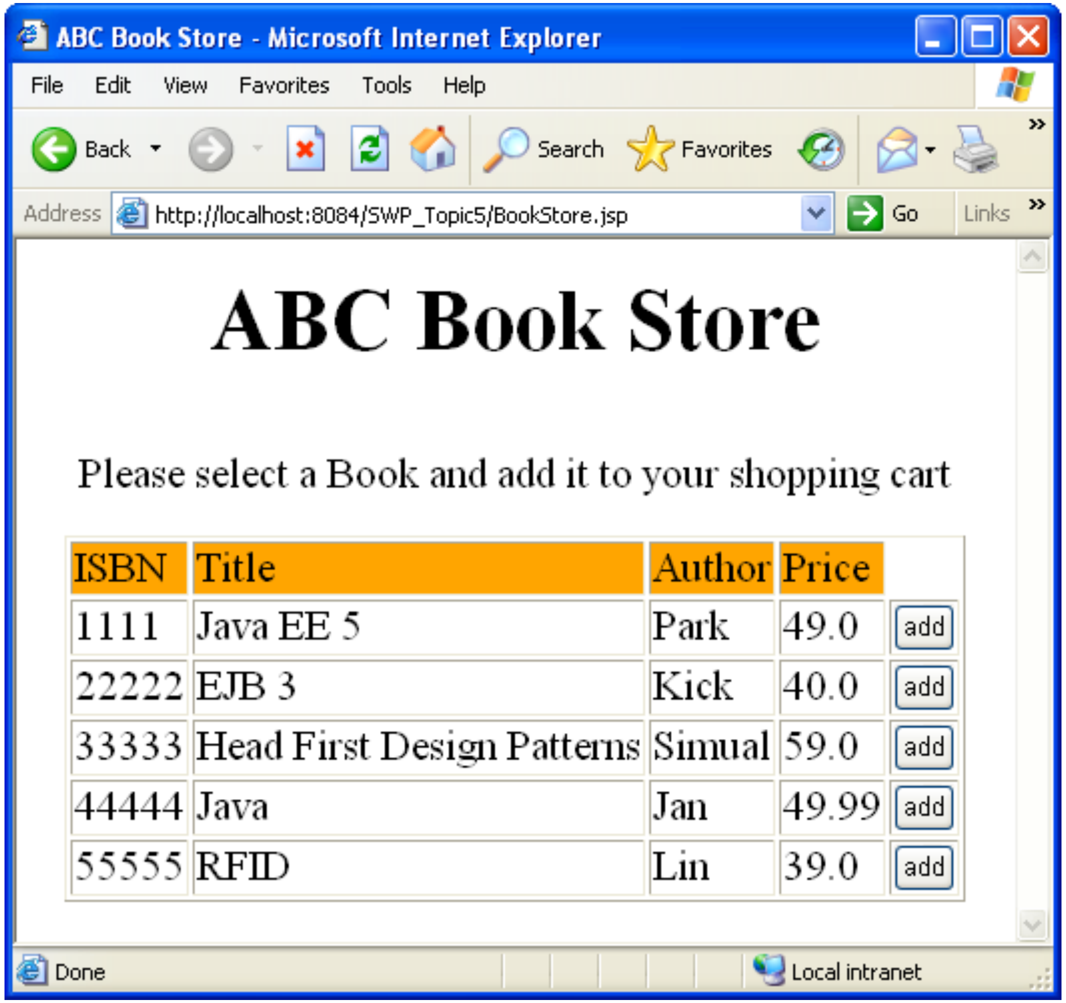
BookStore.jsp

```
<%@taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c" %>
<%@taglib uri="http://java.sun.com/jsp/jstl/sql" prefix="sql" %>

<html>
    <head><title>ABC Book Store </title></head>
    <body>
     <center>
      <form action="BookStore.jsp">
      <h1> ABC Book Store </h1>
      <br> Please select a Book and add it to your shopping cart
      </p>

      <sql:setDataSource var="datasource"
             driver="com.mysql.jdbc.Driver"
   url="jdbc:mysql:///test"                              user="root"
   password="root" />

      <sql:query var="books" dataSource="${datasource}" >
             select * from books
      </sql:query>
```

BookStore.jsp (cont.)

```
                 <table border="1" align="center">
                    <tr bgcolor="orange">
                      <td>ISBN</td><td>Title</td>
                      <td>Author</td><td>Price</td></tr>
                        <c:forEach var="row" items="${books.rows}">
                        <tr>
                            <td>${row.isbn}</td>
                            <td>${row.title} /></td>
                            <td>${row.author} /></td>
                            <td>${row.price} /></td>
                            <td><input type=submit value="add"></td>
                        </tr>
                    </c:forEach>
                </table>
            </form>
        </center>
    </body>
</html>
```

Result



ABC Book Store - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back
Search
Favorites
Address
http://localhost:8084/SWP_Topic5/BookStore.jsp
Go
Links
Done
Local intranet

ABC Book Store

Please select a Book and add it to your shopping cart

ISBN	Title	Author	Price	
1111	Java EE 5	Park	49.0	add
22222	EJB 3	Kick	40.0	add
33333	Head First Design Patterns	Simual	59.0	add
44444	Java	Jan	49.99	add
55555	RFID	Lin	39.0	add

Custom Tag Libraries

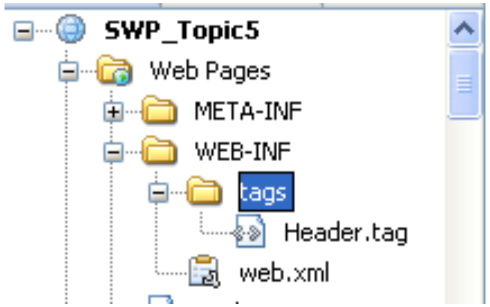
- The JSP 1.1 specifications introduced the ability to define new tags called custom tags
- Can be used in any number of JSP files
- A user can define how the tag, its attributes and its body are to be interpreted, and then group these tags into collections, called tag libraries.

Simple Tag Files

1. Take an included file (such as “Header.jsp”) and rename it with a **.tag** extension

```
<%-- Header.jsp --%>
<img src="Duke_Cont.png"><br><br>
Welcome to Java World!!
```

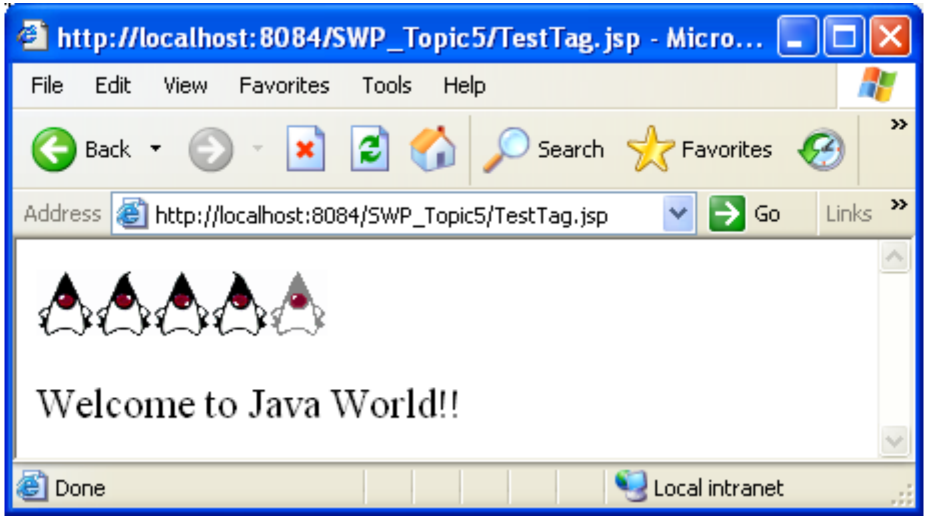
1. Put the tag file (such as “Header.tag”) in a directory named “**tags**” inside the “WEB-INF” directory



1. Put a taglib directive (with a tagdir atttribute) in the JSP **(TestTag.jsp)**

```
<%@taglib tagdir="/WEB-INF/tags" prefix="myTags" %>
<myTags:Header/>
```

Result



http://localhost:8084/SWP_Topic5/TestTag.jsp - Micro...
File
Edit
View
Favorites
Tools
Help
Back
Search
Favorites
Address
http://localhost:8084/SWP_Topic5/TestTag.jsp
Go
Links
Done
Local intranet

Welcome to Java World!!

Components that make up a Tag library

1. The Tag Library Descriptor (TLD) file
2. The Tag Handler class
    - Classic
    - Simple
3. The JSP file

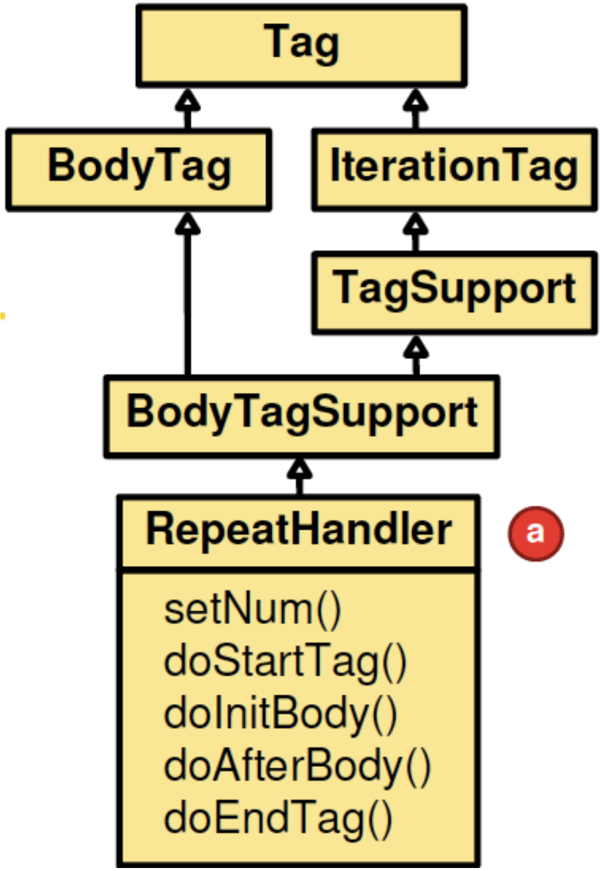
Repeat Tag Implemented as a Classic JSP 1.2 Tag Extension

Usage

```
<%@ taglib prefix="my"
        uri="/mytags" %>
<my:repeat num="3">
    tag body
</my:repeat>
```

Implementation

```
int doStartTag() {
    this.count = this.num;
    return Tag.EVAL_BODY_INCLUDE;
}

int doAfterBody() {
    this.count--;
    return (this.count > 0) ?
      Tag.EVAL_BODY_AGAIN :
      Tag.SKIP_BODY;
}
```



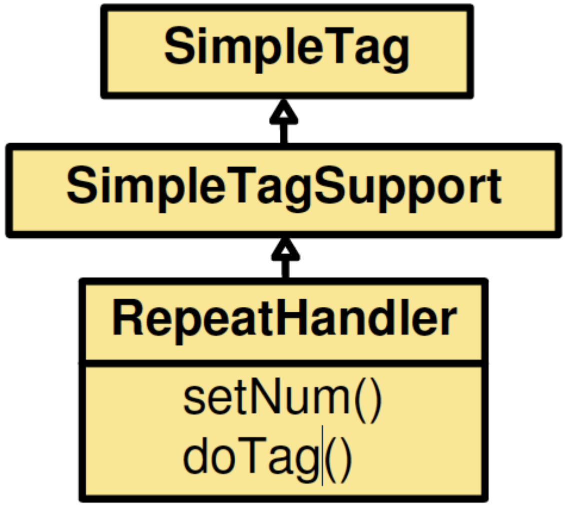
Repeat Tag Implemented as a Simple JSP 2.0 Tag Extension

Usage

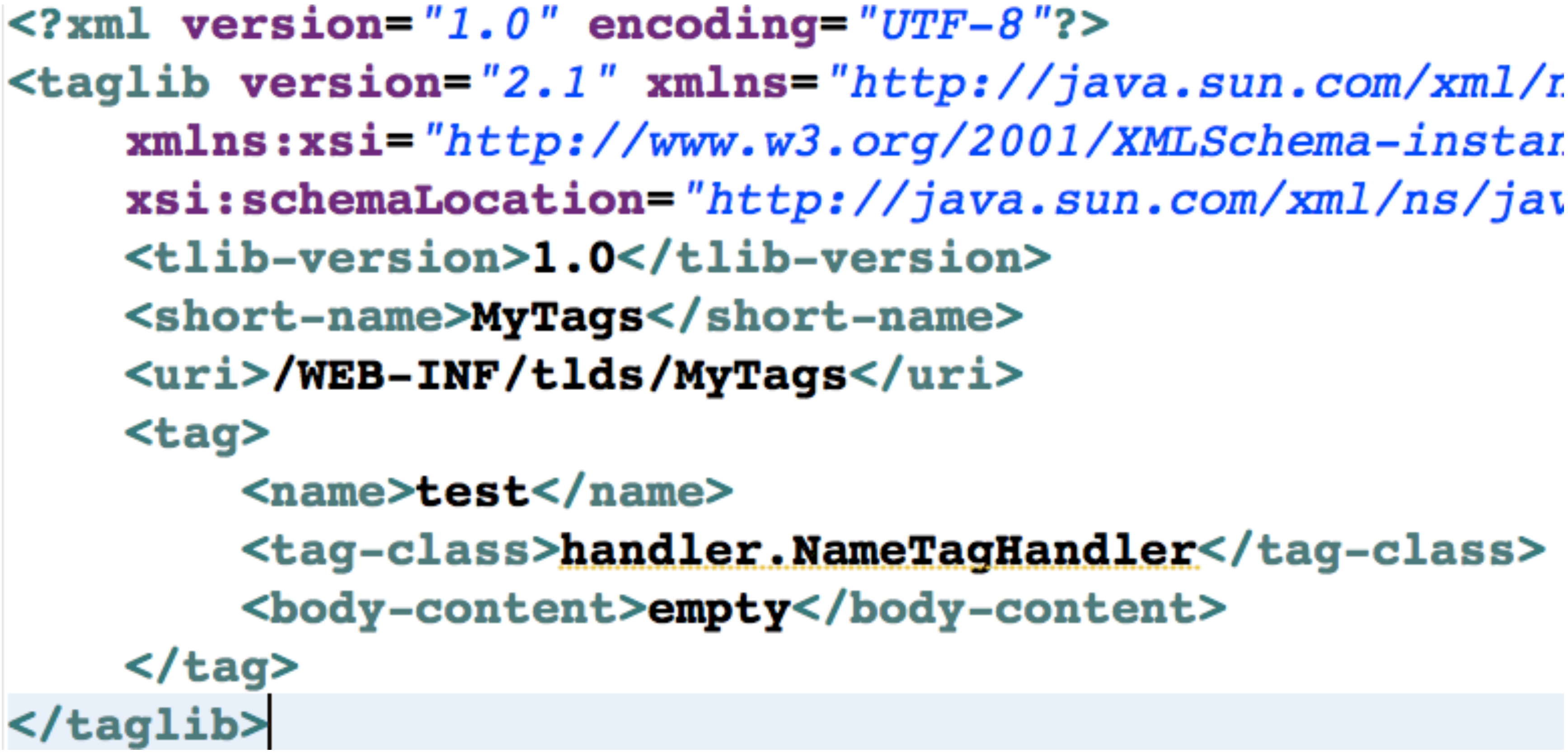
```
<%@ taglib prefix="my"
        uri="/mytags" %>
<my:repeat num="3">
   tag body
</my:repeat>
```

Implementation

```
void doTag() {
   for( int i = 0; i < num; i++ ) {
      getJspBody().invoke( null );
   }
}
```

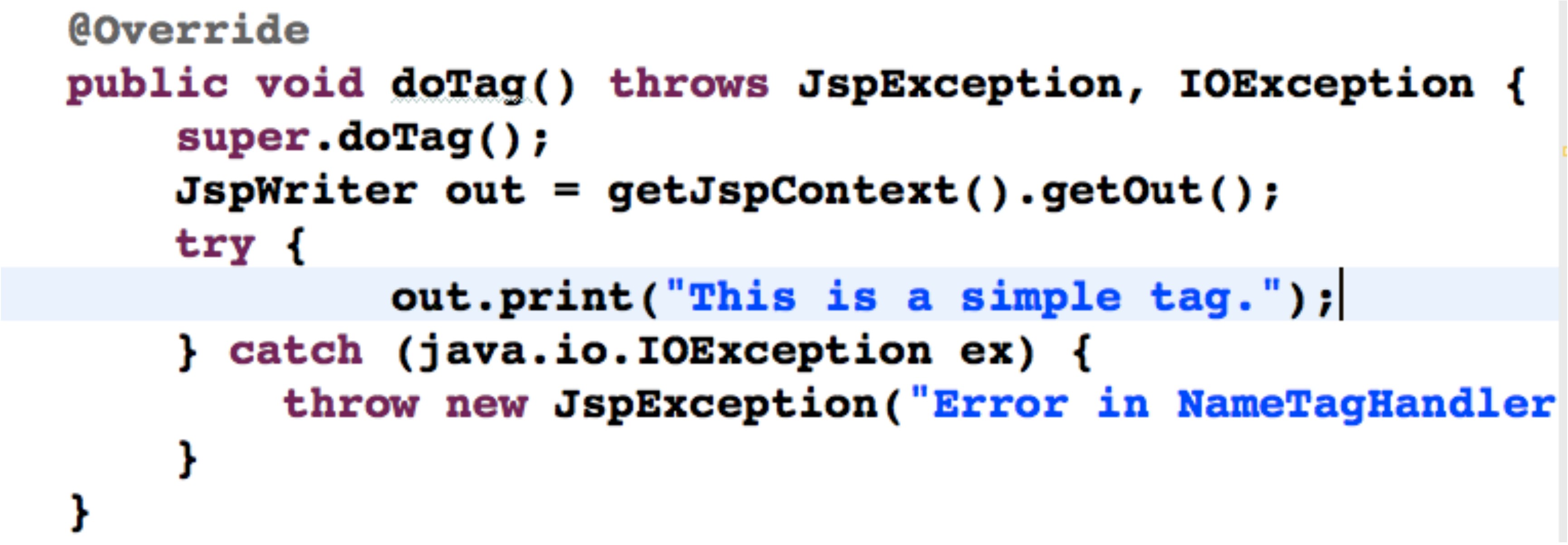


Create a TLD for the tag



```
<?xml version="1.0" encoding="UTF-8"?>
<taglib version="2.1" xmlns="http://java.sun.com/xml/n
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instan
    xsi:schemaLocation="http://java.sun.com/xml/ns/jav
    <tlib-version>1.0</tlib-version>
    <short-name>MyTags</short-name>
    <uri>/WEB-INF/tlds/MyTags</uri>
    <tag>
        <name>test</name>
        <tag-class>handler.NameTagHandler</tag-class>
        <body-content>empty</body-content>
    </tag>
</taglib>
```

Making a Simple Tag Handler



```
@Override
public void doTag() throws JspException, IOException {
    super.doTag();
    JspWriter out = getJspContext().getOut();
    try {
        out.print("This is a simple tag.");
    } catch (java.io.IOException ex) {
        throw new JspException("Error in NameTagHandler
    }
}
```

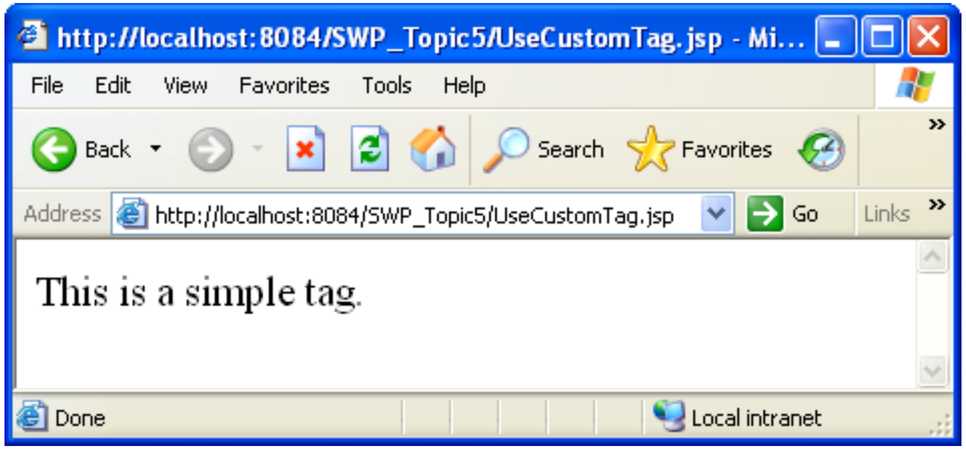
JSP File

- Import the tag library
  - Specify location of TLD file and define a tag prefix (namespace)

    ```
    <%@ taglib uri="myTaglib" prefix="myPrefix" %>
    ```
- Use the tags
  - `<prefix:tagName />`
  - Prefix comes from taglib directive
  - Tag name comes from tag added into TLD file
  - Example `<myPrefix:myTag />`

Write a JSP that uses the tag

```
<%-- UseCustomTag.jsp --%>
<%@taglib uri="TestMyTag1" prefix="my" %>
<my:test1/>
```



http://localhost:8084/SWP_Topic5/UseCustomTag.jsp - Mi...
File Edit View Favorites Tools Help
Back
Search
Favorites
Address
http://localhost:8084/SWP_Topic5/UseCustomTag.jsp
Go
Links
Done
Local intranet

This is a simple tag.