CNT 4714: Enterprise Computing
Fall 2010

Introduction to JavaServer Pages (JSP) – Part 3

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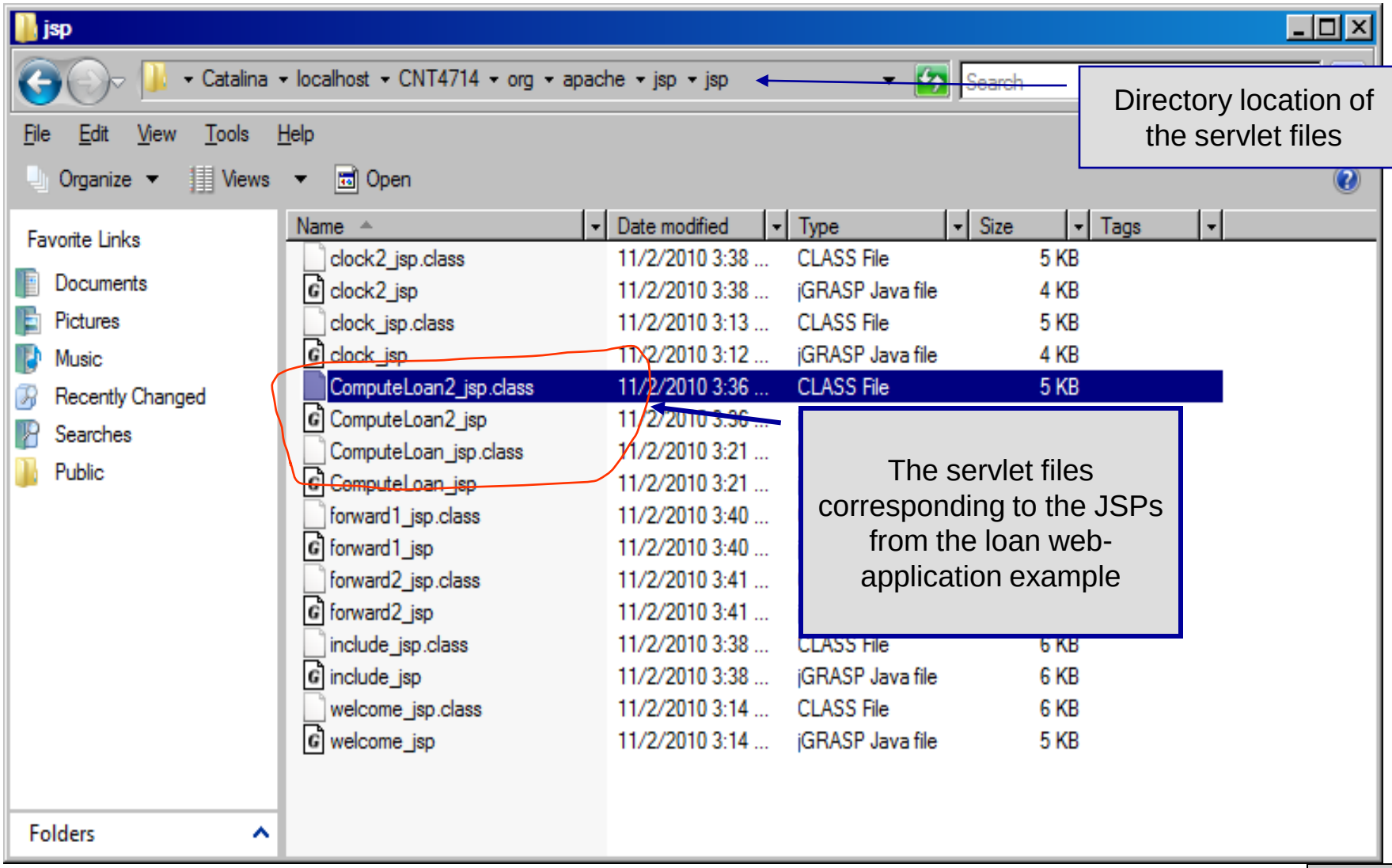
A JSPs Conversion To A Servlet

- As shown in the diagram of the lifecycle of a JSP shown in part 2 (page 2), a JSP is converted into a servlet during execution.
- While the converted servlet looks very similar in nature to those we have already seen, there are some differences.
- Within Tomcat, the servlet version of the JSP is stored in the `work` directory (see part 2, page 12).
- The exact directory within the `work` directory depends in part on your Tomcat set-up and in part on your web-application structure. The next slide illustrates the location of the servlet files that were generated for the `ComputeLoan.jsp` and `ComputeLoan2.jsp` applications that appeared in part 2 of the notes on pages 7 and 13 respectively.

Servlet Versions of JSPs in Tomcat



The Converted JSP - Servlet Version

ComputeLoan

```
package org.apache.jsp.jsp;

import javax.servlet.*;
import javax.servlet.http.*;
import javax.servlet.jsp.*;

public final class ComputeLoan_jsp extends org.apache.jasper.runtime.HttpJspBase
    implements org.apache.jasper.runtime.JspSourceDependent {

  private static java.util.Vector _jspx_dependants;

  public java.util.List getDependants() {
    return _jspx_dependants;
  }

  public void _jspService(HttpServletRequest request, HttpServletResponse response)
        throws java.io.IOException, ServletException {

    JspFactory _jspxFactory = null;
    PageContext pageContext = null;
    HttpSession session = null;
    ServletContext application = null;
    ServletConfig config = null;
    JspWriter out = null;
    Object page = this;
```

Note that this package is reflected in the location shown in the previous slide.

```
    Object page = this;
    JspWriter _jspx_out = null;
    PageContext _jspx_page_context = null;

    try {
      _jspxFactory = JspFactory.getDefaultFactory();
      response.setContentType("text/html");
      pageContext = _jspxFactory.getPageContext(this, request, response, null, true, 8192, true);
      _jspx_page_context = pageContext;
      application = pageContext.getServletContext();
      config = pageContext.getServletConfig();
      session = pageContext.getSession();
      out = pageContext.getOut();
      _jspx_out = out;

      out.write("<!-- ComputeLoan.jsp -->\r\n");
      out.write("<html>\r\n");
      out.write("<head>\r\n");
      out.write("<title>ComputeLoan</title>\r\n");
      out.write("</head><body bgcolor=white background=images/background.jpg lang=EN-US
link=blue vlink=blue\r\n");
      out.write("style='tab-interval:.5in'>\r\n");
 double loanAmount = Double.parseDouble( request.getParameter("loanAmount"));
   double annualInterestRate = Double.parseDouble(request.getParameter("annualInterestRate"));
   double numberOfYears = Integer.parseInt(request.getParameter("numberOfYears"));
   double monthlyInterestRate = annualInterestRate / 1200;
```

Begin original HTML output from the JSP.

```
   double monthlyPayment = loanAmount * monthlyInterestRate / (1 - 1 / Math.pow(1 +
monthlyInterestRate, numberOfYears * 12));
   double totalPayment = monthlyPayment * numberOfYears * 12;
     out.write("\r\n");      out.write("\r\n");
      out.write("<b><font size = 7> Loan Details </b></font><br><br>\r\n");
      out.write("<font size = 5>\r\n");
      out.write("Loan Amount: \r\n");      out.print( loanAmount );
      out.write("\r\n");      out.write("<br><br>\r\n");
      out.write("Annual Interest Rate: \r\n");      out.print( annualInterestRate );
      out.write("\r\n");      out.write("<br><br>\r\n");
      out.write("Number of Years: \r\n");      out.print( numberOfYears );
      out.write("\r\n");      out.write("<br><br>\r\n");      out.write("<b>\r\n");
      out.write("Monthly Payment:\r\n");      out.print( monthlyPayment );
      out.write("\r\n");      out.write("<br><br>\r\n");
      out.write("Total Payment:\r\n");      out.print( totalPayment );
      out.write("\r\n");      out.write("<br><br>\r\n");      out.write("</b>\r\n");      out.write("</body>\r\n");
      out.write("</html>");
    } catch (Throwable t) {
      if (!(t instanceof SkipPageException)){
        out = _jspx_out;
        if (out != null && out.getBufferSize() != 0)
          out.clearBuffer();
        if (_jspx_page_context != null) _jspx_page_context.handlePageException(t);
      }
    } finally {
      if (_jspxFactory != null) _jspxFactory.releasePageContext(_jspx_page_context);
    } } } }
```


The Converted JSP - Servlet Version

ComputeLoan2

```
package org.apache.jsp.jsp;

import javax.servlet.*;
import javax.servlet.http.*;
import javax.servlet.jsp.*;
import code.Loan;

public final class ComputeLoan2_jsp extends org.apache.jasper.runtime.HttpJspBase
    implements org.apache.jasper.runtime.JspSourceDependent {

  private static java.util.Vector _jspx_dependants;

  public java.util.List getDependants() {
    return _jspx_dependants;
  }

  public void _jspService(HttpServletRequest request, HttpServletResponse response)
        throws java.io.IOException, ServletException {

    JspFactory _jspxFactory = null;
    PageContext pageContext = null;
    HttpSession session = null;
    ServletContext application = null;
    ServletConfig config = null;
    JspWriter out = null;
```

Import the Loan class in package code

```
    Object page = this;
    JspWriter _jspx_out = null;
    PageContext _jspx_page_context = null;

    try {
      _jspxFactory = JspFactory.getDefaultFactory();
      response.setContentType("text/html");
      pageContext = _jspxFactory.getPageContext(this, request, response, null, true, 8192, true);
      _jspx_page_context = pageContext;
      application = pageContext.getServletContext();
      config = pageContext.getServletConfig();
      session = pageContext.getSession();
      out = pageContext.getOut();
      _jspx_out = out;

      out.write("<!-- ComputeLoan2.jsp -->\r\n");
      out.write("<html>\r\n");
      out.write("<head>\r\n");
      out.write("<title>ComputeLoan</title>\r\n");
      out.write("</head><body bgcolor=white background=images/background.jpg lang=EN-US
link=blue vlink=blue\r\n");
      out.write("style='tab-interval:.5in'>\r\n");
      out.write("\r\n");
      out.write("\r\n");
 double loanAmount = Double.parseDouble( request.getParameter("loanAmount"));
   double annualInterestRate = Double.parseDouble(request.getParameter("annualInterestRate"));
   int numberOfYears = Integer.parseInt(request.getParameter("numberOfYears"));
```

Begin the HTML content from the original ComputeLoad.jsp file now constructed from within the servlet (i.e., Java).

```
    Loan loan = new Loan (annualInterestRate, numberOfYears, loanAmount);

    out.write("\r\n");     out.write("\r\n");
    out.write("<b><font size = 7> Loan Details </b></font><br><br>\r\n");
    out.write("<font size = 5>\r\n");      out.write("Loan Amount: \r\n");
    out.print( loanAmount );
    out.write("\r\n");      out.write("<br><br>\r\n");
    out.write("Annual Interest Rate: \r\n");      out.print( annualInterestRate );
    out.write("\r\n");      out.write("<br><br>\r\n");
    out.write("Number of Years: \r\n");     out.print( numberOfYears );
    out.write("\r\n");      out.write("<br><br>\r\n");      out.write("<b>\r\n");
    out.write("Monthly Payment:\r\n");      out.print( loan.monthlyPayment() );
    out.write("\r\n");      out.write("<br><br>\r\n");
    out.write("Total Payment:\r\n");     out.print( loan.totalPayment() );
    out.write("\r\n");      out.write("<br><br>\r\n");      out.write("</b>\r\n");      out.write("</body>\r\n");
    out.write("</html>");
  } catch (Throwable t) {
    if (!(t instanceof SkipPageException)){
      out = _jspx_out;
      if (out != null && out.getBufferSize() != 0)
        out.clearBuffer();
      if (_jspx_page_context != null) _jspx_page_context.handlePageException(t);
    }
  } finally {
    if (_jspxFactory != null) _jspxFactory.releasePageContext(_jspx_page_context);
  }
}   }
```


<jsp: setProperty> Action

- Action <jsp: setProperty> sets JavaBean property values and is most useful for mapping request parameter values to JavaBean properties.
- Request parameters can be used to set properties of primitive types boolean, byte, char, short, int, long, float and double as well as java.lang types String, Boolean, Byte, Character, Short, Integer, Long, Float, and Double.
- The table on the following page summarizes the attributes of this action.

<jsp: setProperty> Action

Attribute	Description
name	The ID of the JavaBean for which a property (or properties) will be set.
property	The name of the property to set. Specifying "*" for this attribute specifies that the JSP should match the request parameters to the properties of the bean. For each request parameter that matches (i.e., the name of the request parameter is identical to the bean's property name), the corresponding property in the bean is set to the value of the parameter. If the value of the request parameter is "", the property value in the bean remains unchanged.
param	If the request parameter names do not match bean property names, this attribute can be used to specify which request parameter should be used to obtain the value for a specific bean property. This attribute is optional. If this attribute is omitted, the request parameter names must match the bean property names.
value	The value to assign to a bean property. The value typically is the result of a JSP expression. This attribute is particularly useful for setting bean properties that cannot be set using request parameters. This attribute is optional. If this attribute is omitted, the JavaBean property must be of a type that can be set using request parameters.

JSP Directives

- Directives are messages to the JSP container that enable the programmer to specify page settings, such as, the error page to invoke if an error occurs (page directive), including content from other resources (include directive), and to specify custom-tag libraries for use in a JSP (taglib directive).
- Directives are delimited by <%@ and %> and are processed at translation time. As such, directives do not produce any immediate output, because they are processed before the JSP accepts any requests.
- For our purposes here, the most important of these is the page directive, which we will make use of in the final example JSP. Some of the attributes of the page directive are shown on the next page.

JSP Page Directive Attributes

Attribute	Description
import	Specifies a comma-separated list of fully qualified type names and/or packages that will be used in the current JSP.
errorPage	Any exceptions in the current page that are not caught are sent to the error page for processing. The error-page implicit object `exception` references the original exception.
extends	Specifies the class from which the translated JSP can inherit. This attribute must be a fully qualified class name.

<jsp: useBean> Action

- Action <jsp: useBean> enables a JSP to manipulate a Java object. This action creates a Java object or locates an existing object for use in the JSP.
- The table on the following page summarizes the attributes of this action.
- If attributes class and beanName are not specified, the JSP container attempts to locate an existing object of the type specified in attribute type.
- Like JSP implicit objects, objects specified with this action have scope – page, request, session, or application – which indicates where they can be used in a web application. (Recall that objects with page scope are only accessible by the page in which they are defined. For example, all JSPs that process a single request can access an object in request scope.)

<jsp: useBean> Action

Attribute	Description
id	The name used to manipulate the Java object with actions <jsp:setProperty> and <jsp:getProperty>. A variable of this name is also declared for use in JSP scripting elements. Case sensitive.
scope	The scope in which the Java object is accessible – page, request, session, or application. The default scope is page.
class	The fully qualified class name of the Java object.
beanName	The name of the JavaBean that can be used with method instantiate of class java.beans.Beans to load a JavaBean into memory.
type	The type of the JavaBean. This can be the same type as the class attribute, a superclass of that type, or an interface implemented by that type. The default value is the same as for attribute class. A ClassCastException occurs if the Java object is not of the type specified with attribute type.

A JSP Using <jsp: useBean> Action

- A common feature on many web sites is to place rotating advertisements on their webpages. Each visit to one of these pages results in a different advertisement being displayed in the user's web browser. Typically, when you click on the advertisement (or picture of a product) you are redirected to the website of the company that placed the advertisement or to the page that more completely describes the product.
- The next example illustrates a similar scenario, by rotating through a series of pictures (click the refresh button of your browser to simulate multiple logins or login from different browsers). In this example, I set it up to rotate through some pictures of some of my toys. If you click on a picture…you'll be redirected to the manufacturer's web page.

A JSP Using the <jsp: useBean> Action

```
// Rotator.java
// A JavaBean that rotates pictures.
package com.cnt4174.jsp.beans;

public class Rotator
{
   private String images[] = { "images/image1.jpg",
      "images/image2.jpg", "images/image3.jpg",
      "images/image4.jpg", "images/image5.jpg" };

   private String links[] = {
      "http://www.eddymerckx.be",
      "http://www.competitivecyclist.com",
      "http://www.bianchi-usa.com",
      "http://www.colnago.it",
      "http://www.cometkartsales.com" };

   private int selectedIndex = 0;

   // returns image file name for current ad
   public String getImage()
   {
      return images[ selectedIndex ];
   } // end method getImage
```

```
//continue here -- returns the URL for corresponding Web
site
   public String getLink()  {
      return links[ selectedIndex ];
   } // end method getLink

   // update selectedIndex so next calls to getImage and
   // getLink return a different picture
   public void nextPic()
   {
      selectedIndex = ( selectedIndex + 1 ) % images.length;
   } // end method nextPic
} // end class Rotator
```

picturerotator.jsp

```
<?xml version = "1.0"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
  "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- picturerotator.jsp -->
<jsp:useBean id = "rotator" scope = "session"
  class = "com.cnt4714.jsp.beans.Rotator" />
<html xmlns = "http://www.w3.org/1999/xhtml">
  <head>
    <title>PictureRotator Example</title>
    <style type = "text/css">
      .big { font-family: helvetica, arial, sans-serif;  font-weight: bold; font-size: 2em }
    </style>
    <%-- update picture --%>
    <% rotator.nextPic(); %>
  </head>
  <body>
    <p class = "big">PictureRotator Example</p>
    <p>
      <a href = "<jsp:getProperty name = "rotator"
        property = "link" />">

        <img src = "<jsp:getProperty name = "rotator"
          property = "image" />" alt = "picture" />
      </a>
    </p>
  </body>
</html>
```

<jsp: useBean> action specifying id, scope, and class

AdRotator Example - Opera

File Edit View Bookmarks Widgets Tools Help

/manager | Downloads | AdRotator Example

http://localhost:8080/CNT4714/jsp/picturerotator.jsp

Search with Google

PictureRotator Example

First image seen in the rotation of five images.

View (80%)

AdRotator Example - Opera

File Edit View Bookmarks Widgets Tools Help

/manager | Downloads | AdRotator Example

http://localhost:8080/CNT4714/jsp/picturerotator.jsp

Search with Google

PictureRotator Example

Second image seen in the rotation of five images.

View (80%)

AdRotator Example - Opera

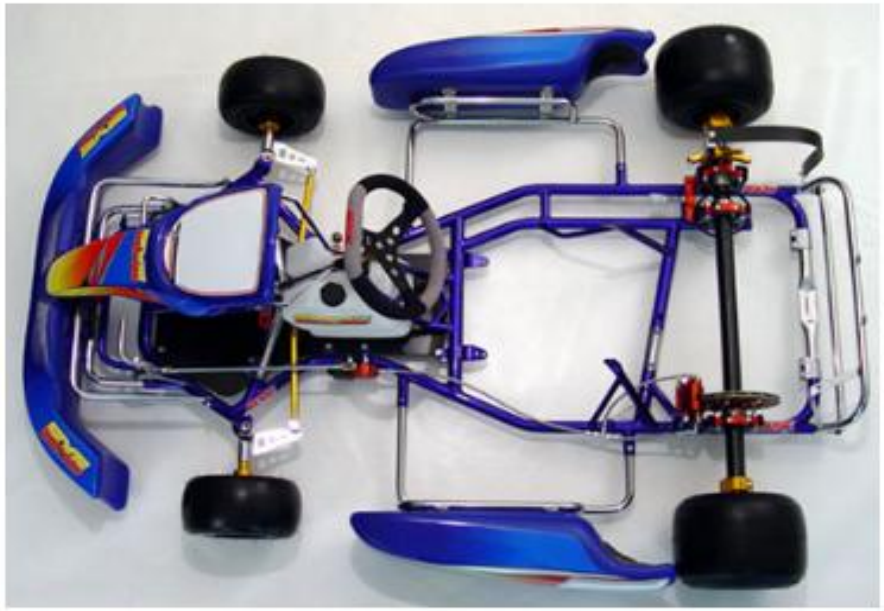
File Edit View Bookmarks Widgets Tools Help

/manager | Downloads | AdRotator Example

http://localhost:8080/CNT4714/jsp/picturerotator.jsp

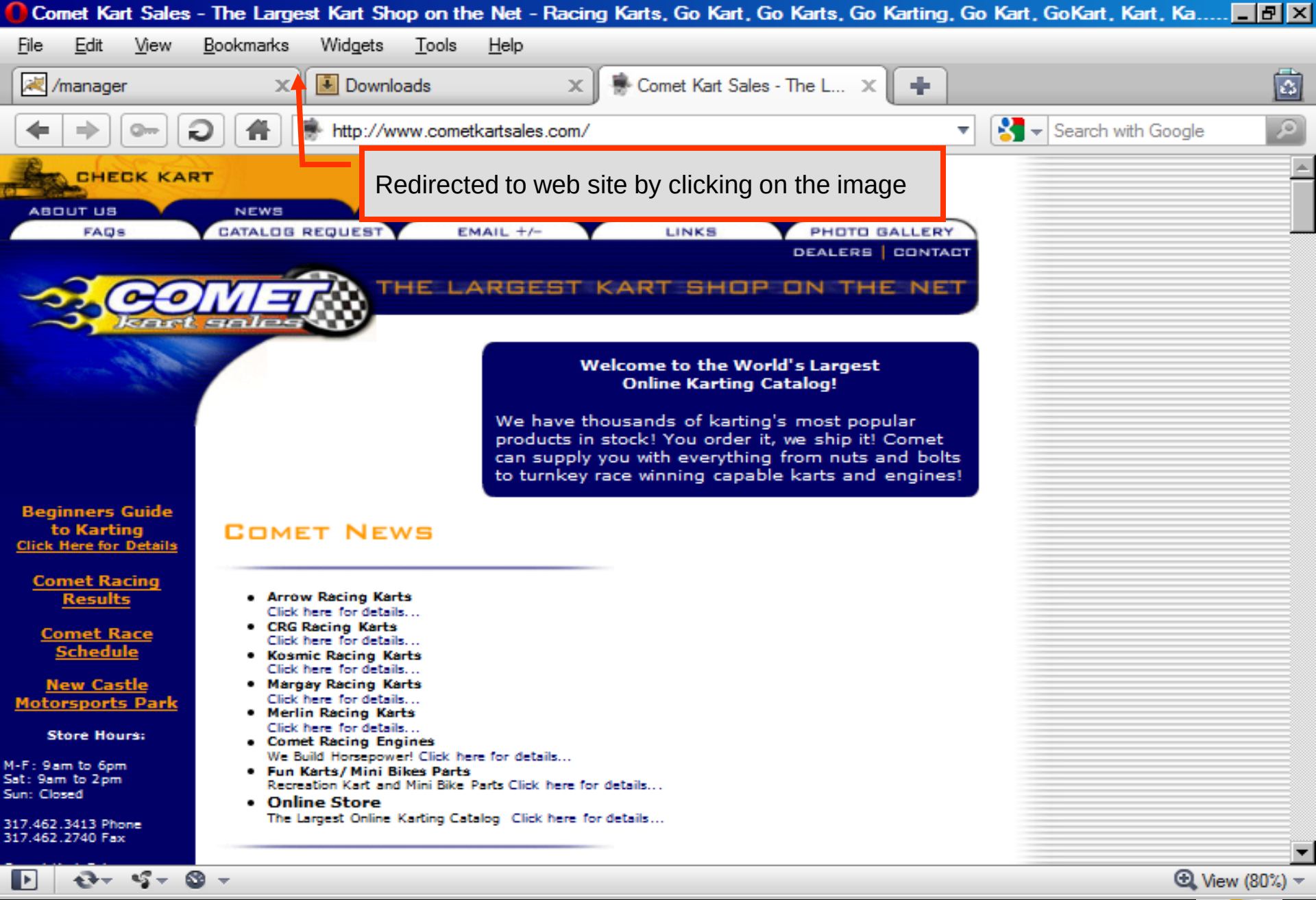
Search with Google

PictureRotator Example



Fifth and final image seen in the rotation of five images.

View (80%)


Comet Kart Sales - The Largest Kart Shop on the Net - Racing Karts, Go Kart, Go Karts, Go Karting, Go Kart, GoKart, Kart, Ka.....
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Recreation Kart and Mini Bike Parts Click here for details...
Online Store
The Largest Online Karting Catalog Click here for details...
View (80%)

More Details On Using Beans

- The `Rotator` bean has three elements: `getImage`, `getLink`, and `nextPic`.
  - Method `getImage` returns the image file name for the picture to be displayed.
  - Method `getLink` returns the hyperlink to the manufacturer/supplier of the "toy".
  - Method `nextPic` updates the Rotator so that the next calls to getImage and getLink will return information for a different picture.
- Methods `getImage` and `getLink` each represent a read-only JavaBean property – `image` and `link`, respectively. These are read-only properties because no *set* methods are provided to change their values.
- `Rotator` keeps track of the current picture with its `selectedIndex` variable, which is updated by invoking method `nextPic`.

More Details On Using Beans (cont.)

- JavaBeans were originally intended to be manipulated visually in visual development environments (often called builder tools or IDEs).
- Builder tools that support beans provide programmers with tremendous flexibility by allowing for the reuse and integration of existing disparate components that, in many cases, were never intended to be used together.
- When used in an IDE, JavaBeans adhere to the following coding conventions:

1. Implements the Serializable interface.
2. Provides a public no-argument (default) constructor.
3. Provides `get` and/or `set` methods for properties (which are normally implemented as fields.)

More Details On Using Beans (cont.)

- When used on the server side, such as within a JSP or a servlet, JavaBeans are less restricted.
  - Notice for example, that the `Rotator` bean does not implement the `Serializable` interface because there is no need to save and load the `Rotator` bean as a file.
- The JSP `picturerotator.jsp` (see page 6) obtains a reference to an instance of class `Rotator`. The `id` for the bean is `rotator`. The JSP uses this name to manipulate the bean. The scope of the object is `session`, so that every client will see the same sequence of pictures during their browsing sessions.

More Details On Using Beans (cont.)

- When `picturerotator.jsp` receives a request from a new client, the JSP container creates the bean and stores it in that client's `session` (an `HttpSession` object).
- In each request to this JSP, the `rotator` reference which is created is used to invoke the `Rotator` bean's `nextPic` method. Therefore, each request will receive the next picture selected by the `Rotator` bean.
- Notice the two `<jsp: getProperty>` actions in the `picturerotator.jsp` file. One of these obtains the `link` property value from the bean, the other obtains the `image` property value.
  - Action `<jsp: getProperty>` has two attributes: name and property, which specify the bean object to manipulate and the property to get.

More Details On Using Beans (cont.)

- Action `<jsp: getProperty>` has two attributes: name and property, which specify the bean object to manipulate and the property to get.
  - If the JavaBean object uses standard JavaBean naming conventions, the method used to obtain the `link` property value from the bean should be `getLink`.
  - Action `<jsp: getProperty>` invokes `getLink` on the bean referenced with `rotator`, converts the return value into a `String` and outputs the `String` as a part of the response to the client.

More Details On Using Beans (cont.)

- The link and image properties can also be obtained with JSP expressions.
  - The action <jsp: getProperty> (see page 6 for location, the line looks like: <a href = "<jsp:getProperty name = "rotator" property = "link" />">) could be replaced with the expression: <%= rotator.getLink() %>
  - Similarly, the action <jsp: getProperty> (see page 6 for location, the line looks like: <img src = "<jsp:getProperty name = "rotator" property = "image" />" alt = "picture" />) could be replaced with the expression:

    <%= rotator.getImage() %>
- However, the benefit of using actions is that someone who is unfamiliar with Java can be told the name of a property and the name of a bean, and it is the action's responsibility to invoke the appropriate methods. The Java programmer's job is to create a bean that supports the capabilities required by the page designer.

Final JSP Example - GuestBook

- Our final JSP example will illustrate many of the techniques that we've covered in dealing with JDBC, servlets, and JSPs.
- This example constructs a simple MySQL database to maintain a guest book that includes a guest's first name, last name, and email address.
  - Once a guest enters their name into the guestbook, they will see a webpage containing all the guests in the guest book. Each email address is displayed as a hyperlink that makes it possible for guests to send email to another guest.
- This example illustrates the `<jsp: setProperty>` action, the JSP page directive, JSP error pages, and using JDBC from a JSP.

GuestBean.java

```
//  GuestBean.java
// JavaBean to store data for a guest in the guest book.
package com.cnt4714.jsp.beans;

public class GuestBean
{
   private String firstName;
   private String lastName;
   private String email;

   // set the guest's first name
   public void setFirstName( String name )
   {
      firstName = name;
   } // end method setFirstName

   // get the guest's first name
   public String getFirstName()
   {
      return firstName;
   } // end method getFirstName
```

This JavaBean maintains information for one guest.

GuestBean.java (cont.)

```
   // set the guest's last name
   public void setLastName( String name )
   {
      lastName = name;
   } // end method setLastName

   // get the guest's last name
   public String getLastName()
   {
      return lastName;
   } // end method getLastName

   // set the guest's email address
   public void setEmail( String address )
   {
      email = address;
   } // end method setEmail

   // get the guest's email address
   public String getEmail()
   {
      return email;
   } // end method getEmail
} // end class GuestBean
```


GuestDataBean.java

```
// GuestDataBean.java
// Class GuestDataBean makes a database connection and supports
// inserting and retrieving data from the database.
package com.cnt4714.jsp.beans;

import java.sql.SQLException;
import javax.sql.rowset.CachedRowSet;
import java.util.ArrayList;
import com.sun.rowset.CachedRowSetImpl; // CachedRowSet implementation

public class GuestDataBean
{
   private CachedRowSet rowSet;

   // construct TitlesBean object
   public GuestDataBean() throws Exception
   {
      // load the MySQL driver
      Class.forName( "com.mysql.jdbc.Driver" );

      // specify properties of CachedRowSet
      rowSet = new CachedRowSetImpl();
      rowSet.setUrl( "jdbc:mysql://localhost/guestbook" );
      rowSet.setUsername( "root" );
      rowSet.setPassword( "root" );
```

This JavaBean performs the database access on behalf of the guestBookLogin.jsp

This application uses the CachedRowSet data model rather than the TableSet from our earlier JDBC application example.

Load JDBC driver and connect to database

GuestDataBean.java (cont.)

```
// obtain list of titles
   rowSet.setCommand(
      "SELECT firstName, lastName, email FROM guests" );
   rowSet.execute();
 } // end GuestDataBean constructor

 // return an ArrayList of GuestBeans
 public ArrayList< GuestBean > getGuestList() throws SQLException
 {
   ArrayList< GuestBean > guestList = new ArrayList< GuestBean >();

   rowSet.beforeFirst(); // move cursor before the first row

   // get row data
   while ( rowSet.next() )
   {
      GuestBean guest = new GuestBean();

      guest.setFirstName( rowSet.getString( 1 ) );
      guest.setLastName( rowSet.getString( 2 ) );
      guest.setEmail( rowSet.getString( 3 ) );

      guestList.add( guest );
   } // end while
```


GuestDataBean.java

```
return guestList;
   } // end method getGuestList

   // insert a guest in guestbook database
   public void addGuest( GuestBean guest ) throws SQLException
   {
      rowSet.moveToInsertRow(); // move cursor to the insert row

      // update the three columns of the insert row
      rowSet.updateString( 1, guest.getFirstName() );
      rowSet.updateString( 2, guest.getLastName() );
      rowSet.updateString( 3, guest.getEmail() );
      rowSet.insertRow(); // insert row to rowSet
      rowSet.moveToCurrentRow(); // move cursor to the current row
      rowSet.acceptChanges(); // propagate changes to database
   } // end method addGuest
} // end class GuestDataBean
```


GuestBookLogin.jsp

```
<?xml version = "1.0"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
   "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">

<!-- guestBookLogin.jsp -->

<%-- page settings --%>
<%@ page errorPage = "guestBookErrorPage.jsp" %>

<%-- beans used in this JSP --%>
<jsp:useBean id = "guest" scope = "page"
   class = "com.cnt4714.jsp.beans.GuestBean" />
<jsp:useBean id = "guestData" scope = "request"
   class = "com.cnt4714.jsp.beans.GuestDataBean" />

<html xmlns = "http://www.w3.org/1999/xhtml">
<head>
   <title>Guest Book Login</title>
   <style type = "text/css">
      body
      {
         font-family: tahoma, helvetica, arial, sans-serif;
      }
```

GuestBookLogin.jsp is a modified version of our welcome1.jsp and welcome1 servlet that we've already seen. It displays a form that the guest uses to enter their information. When the form is submitted, GuestBookLogin.jsp is requested again so that it can ensure that all of the data is entered. If not, the form is regenerated until the guest enters all information. If all information is entered, then this JSP forwards the request to guestBookView.jsp to display the contents of the guest book.

All uncaught exceptions are forwarded to guestBookErrorPage.jsp for processing.

GuestBookLogin.jsp (cont.)

```
      table, tr, td {
         font-size: 1.4em;
         border: 3px groove;
         padding: 5px;
         background-color: #dddddd;
      }
   </style>
</head>
<body>
   <jsp:setProperty name = "guest" property = "*" />
   <% // start scriptlet
      if ( guest.getFirstName() == null ||
           guest.getLastName() == null ||
           guest.getEmail() == null )
      {
   %> <%-- end scriptlet to insert fixed template data --%>
         <form method = "post" action = "guestBookLogin.jsp">
            <p>Enter your first name, last name and email
               address to register in our guest book.</p>
            <table>
               <tr>
                  <td>First name</td>
                  <td>
                     <input type = "text" name = "firstName" />
                  </td>
               </tr>
```

<jsp: setProperty> action

GuestBookLogin.jsp (cont.)

```
            <tr>
              <td>Last name</td>
              <td>   <input type = "text" name = "lastName" />     </td>
            </tr>
            <tr>
              <td>Email</td>
              <td>   <input type = "text" name = "email" />        </td>
            </tr>
            <tr>
              <td colspan = "2">   <input type = "submit" value = "Submit" />   </td>
            </tr>
          </table>
        </form>
    <% // continue scriptlet
      }  // end if
      else
      {
        guestData.addGuest( guest );
    %> <%-- end scriptlet to insert jsp:forward action --%>
        <%-- forward to display guest book contents --%>
        <jsp:forward page = "guestBookView.jsp" />
    <% // continue scriptlet
      }  // end else
    %> <%-- end scriptlet --%>
</body>
</html>
```

Once the guest has entered their information into the database, the guestBookView is generated via the <jsp: forward> action which invokes the guestBookView JSP.

GuestBookView.jsp

```
<?xml version = "1.0"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
   "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">

<!-- guestBookView.jsp -->

<%-- page settings --%>
<%@ page errorPage = "guestBookErrorPage.jsp" %>
<%@ page import = "java.util.*" %>
<%@ page import = "com.cnt4714.jsp.beans.*" %>

<%-- GuestDataBean to obtain guest list --%>
<jsp:useBean id = "guestData" scope = "request"
   class = "com.cnt4714.jsp.beans.GuestDataBean" />

<html xmlns = "http://www.w3.org/1999/xhtml">
   <head>
      <title>Guest List</title>
      <style type = "text/css">
         body
                                 {
            font-family: tahoma, helvetica, arial, sans-serif;
         }
```

These three page directives specify that the error page for this JSP is guestBookErrorPage.jsp, that classes from package java.util are used in this JSP, and classes from the package com.cnt4714.jsp.beans are also used.

GuestBookView.jsp (cont.)

```
    table, tr, td, th
    {
       text-align: center;
       font-size: 1.4em;
       border: 3px groove;
       padding: 5px;
       background-color: #dddddd;
    }
  </style>
</head>
<body>
  <p style = "font-size: 2em;">Guest List</p>
  <table>
    <thead>
      <tr>
        <th style = "width: 100px;">Last name</th>
        <th style = "width: 100px;">First name</th>
        <th style = "width: 200px;">Email</th>
      </tr>
    </thead>
    <tbody>
    <% // start scriptlet
      List guestList = guestData.getGuestList();
      Iterator guestListIterator = guestList.iterator();
      GuestBean guest;
```

GuestBookView.jsp (cont.)

```
while ( guestListIterator.hasNext() )
          {
             guest = ( GuestBean ) guestListIterator.next();
        %> <%-- end scriptlet; insert fixed template data --%>
             <tr>
                <td><%= guest.getLastName() %></td>
                <td><%= guest.getFirstName() %></td>
                <td>
                   <a href = "mailto:<%= guest.getEmail() %>">
                      <%= guest.getEmail() %></a>
                </td>
             </tr>
        <% // continue scriptlet
           } // end while
        %> <%-- end scriptlet --%>
        </tbody>
      </table>
   </body>
</html>
```

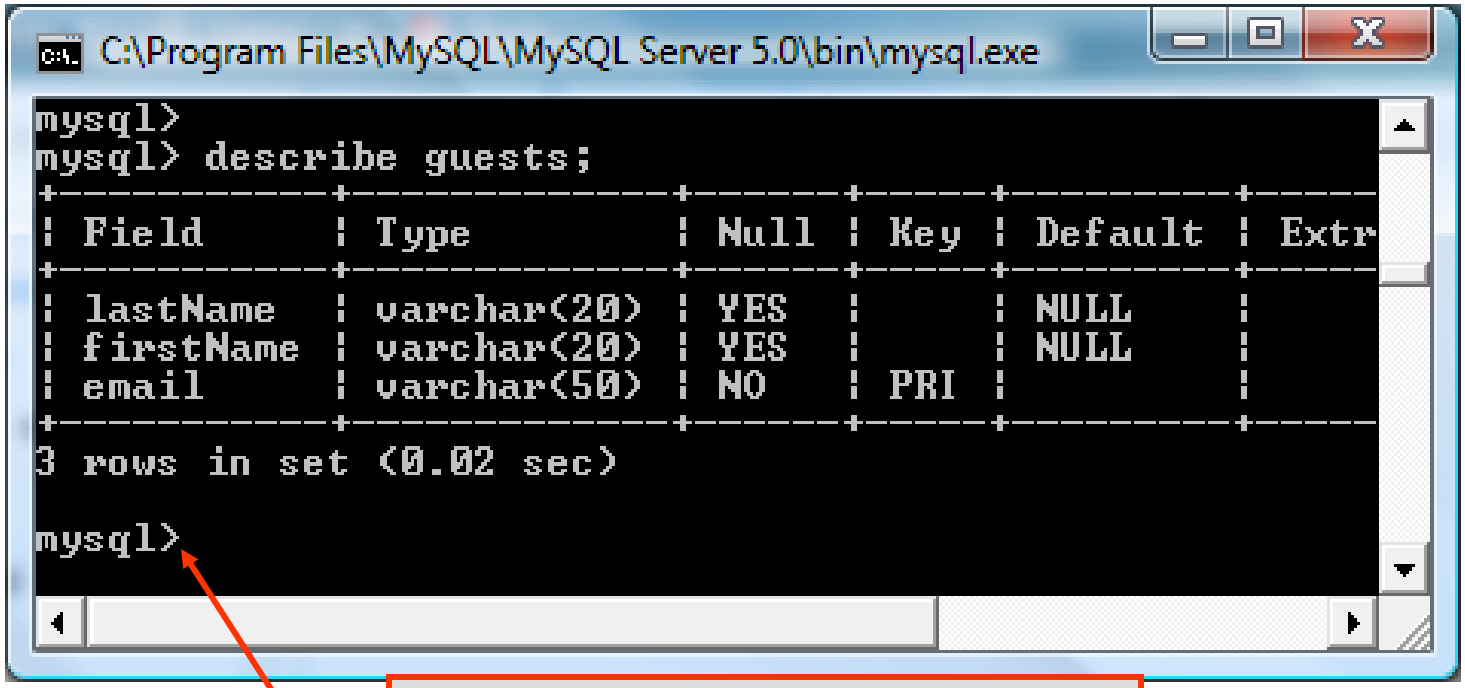

guestBookErrorPage.jsp

```
<?xml version = "1.0"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
   "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">

<!-- guestBookErrorPage.jsp -->

<%-- page settings --%>
<%@ page isErrorPage = "true" %>
<%@ page import = "java.util.*" %>
<%@ page import = "java.sql.*" %>

<html xmlns = "http://www.w3.org/1999/xhtml">
   <head>
      <title>Error!</title>
      <style type = "text/css">
         .bigRed  {   font-size: 2em;   color: red;     font-weight: bold;     }
      </style>
   </head>
   <body>
      <p class = "bigRed">
      <% // scriptlet to determine exception type
         // and output beginning of error message
         if ( exception instanceof SQLException )
         {
      %>
```


guestBookErrorPage.jsp (cont.)

```
        A SQLException
    <%
      } // end if
              else if ( exception instanceof ClassNotFoundException )
      {
    %>
        A ClassNotFoundException
    <%
      } // end else if
      else
      {
    %>
        A general exception
    <%
      } // end else
    %>
    <%-- end scriptlet to insert fixed template data --%>
     <%-- continue error message output --%>
      occurred while interacting with the guestbook database.
    </p>
    <p class = "bigRed">  The error message was:<br />   <%= exception.getMessage() %>
    </p>
    <p class = "bigRed">Please try again later</p>
  </body>
</html>
```

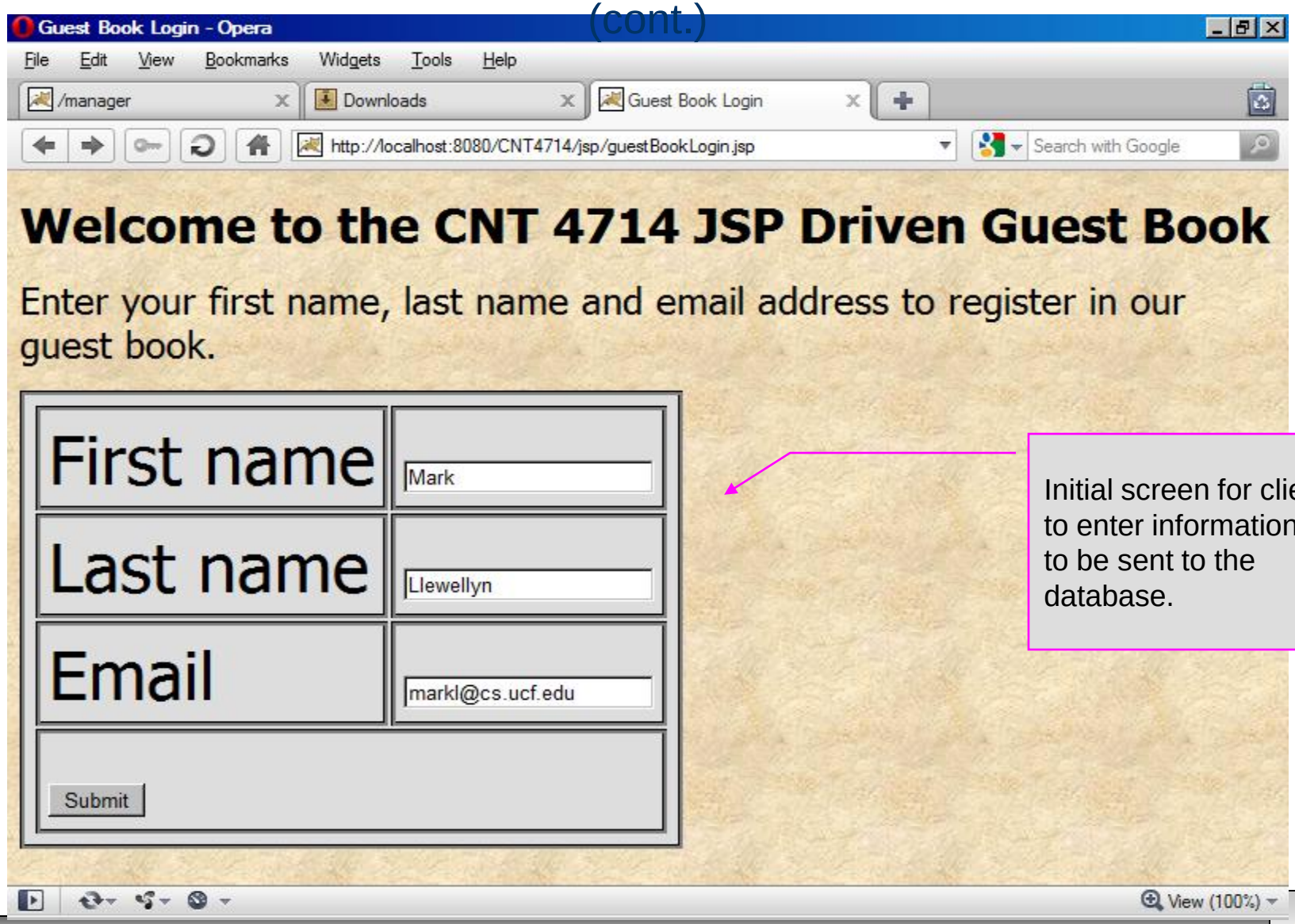

MySQL Database: Guestbook



To run this example you will need to create the database named guestbook and the table named guests with the schema shown above.

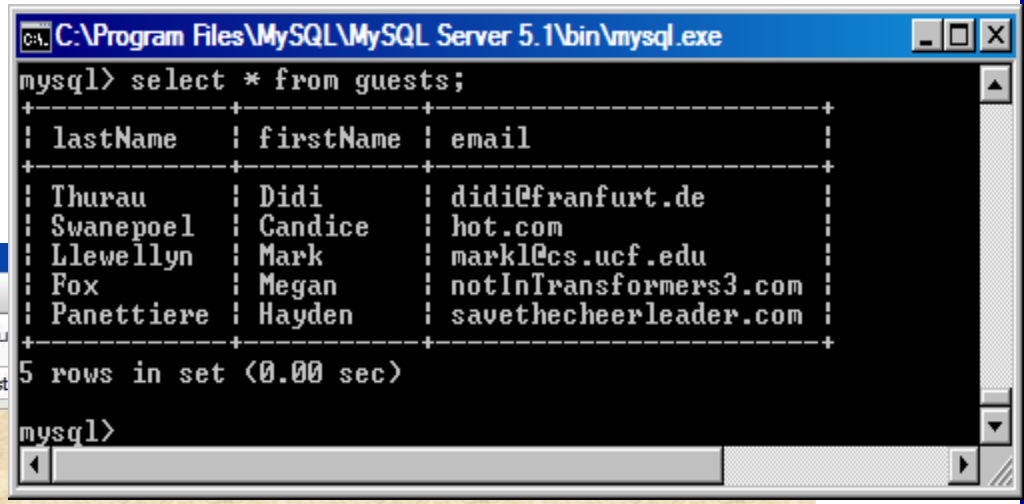
The script named "guestbookscript.sql" is on the course code page for you to use.

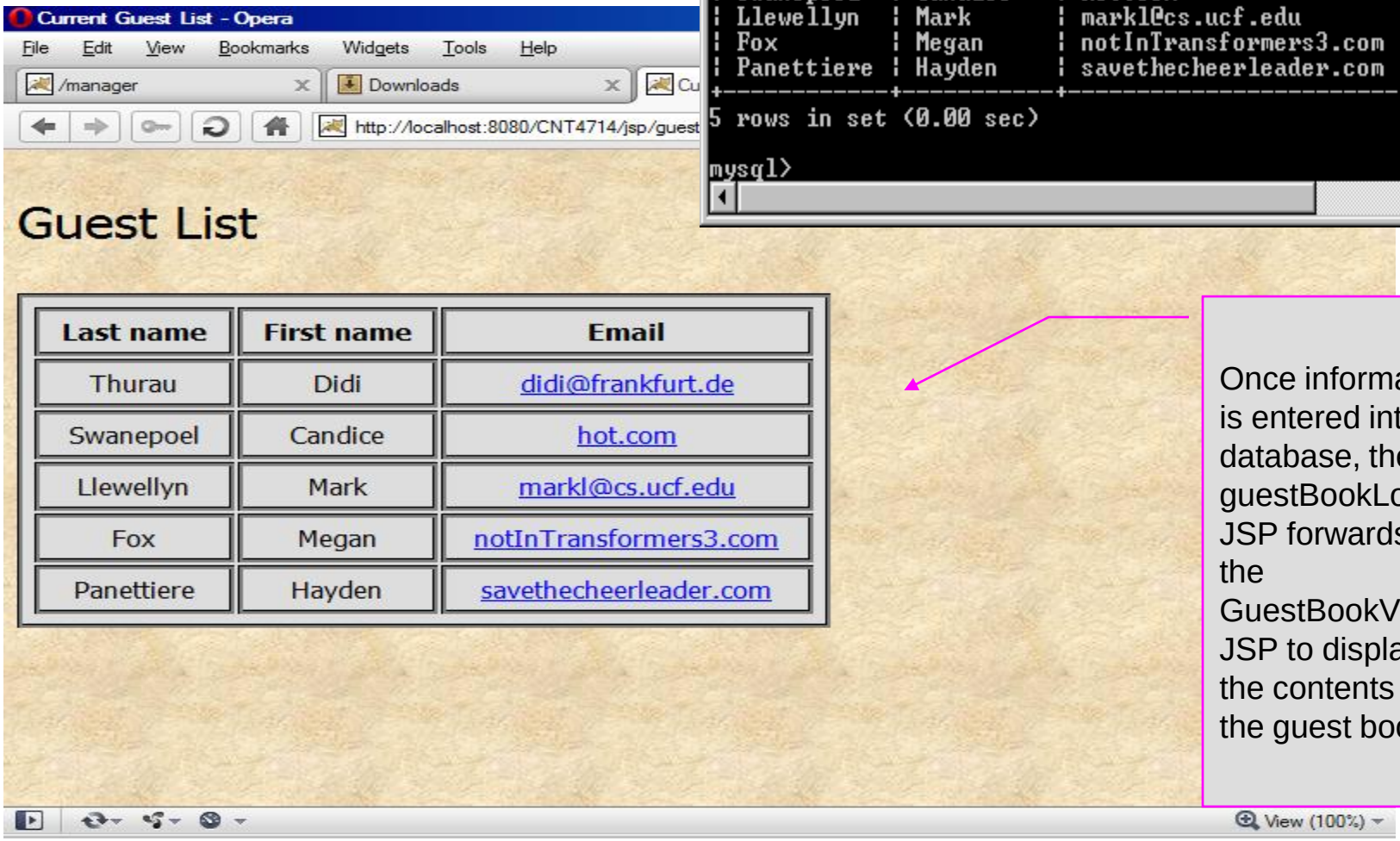
Output From Execution of GuestBookLogin JSP (cont.)



Initial screen for client to enter information to be sent to the database.

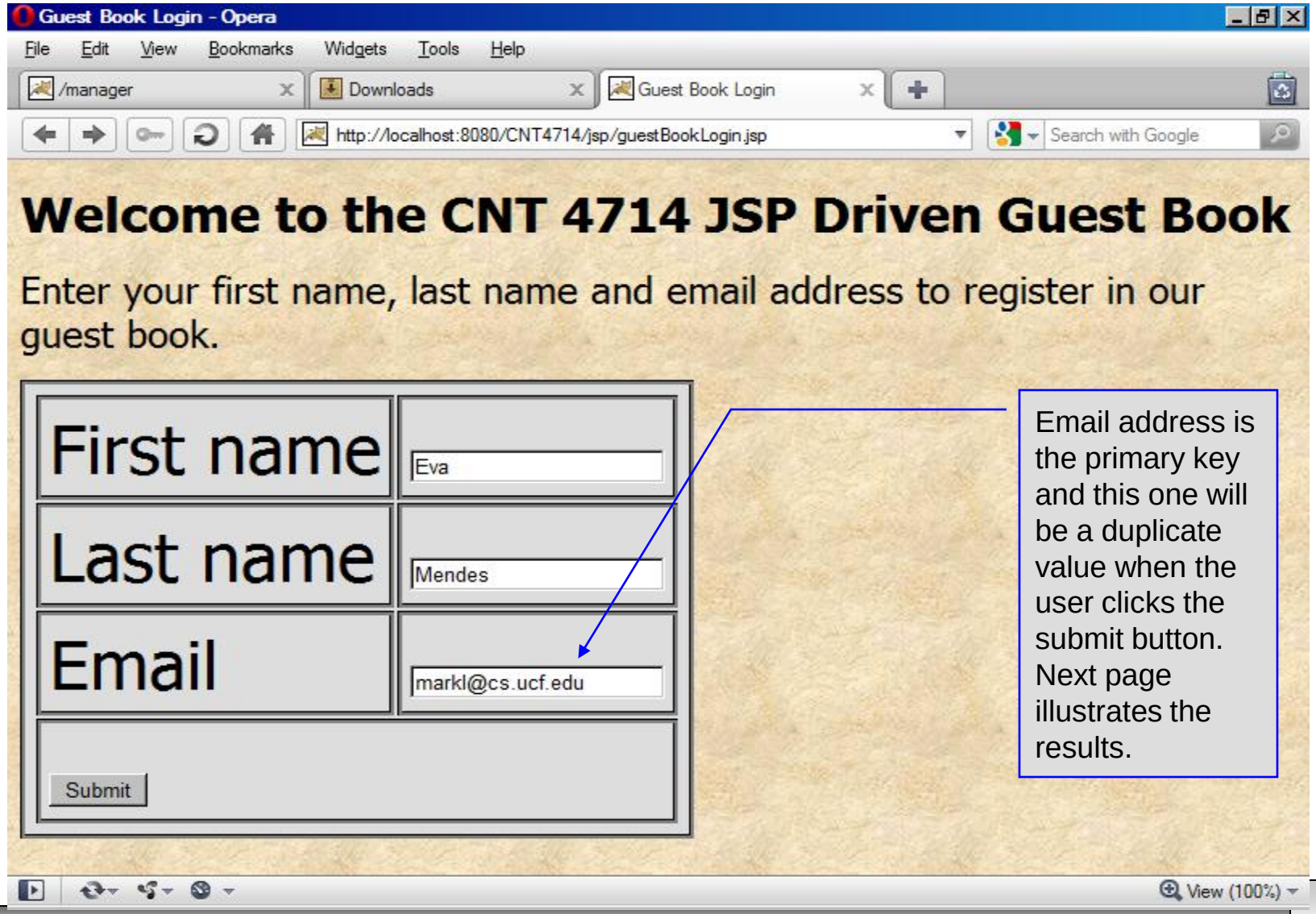
Output From Execution of GuestBookLogin JSP





Once information is entered into the database, the guestBookLogin JSP forwards to the GuestBookView JSP to display the contents of the guest book.

Causing An Error From GuestBookLogin JSP



Email address is the primary key and this one will be a duplicate value when the user clicks the submit button. Next page illustrates the results.

Causing An Error From GuestBookLogin JSP (cont.)