

I. Book Ordering Servlet Using Cookies

a. CookieSelectLanguage.html

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

<!-- CookieSelectLanguage.html -->
<html xmlns = "http://www.w3c.org/1999/xhtml">
<head><title>Select Language_cookie demo</title></head>

<body>
    <form action = "/coen235/cookies" method = "post">
        <p>
            <input type = "radio" name = "language" value = "C" />C <br />
            <input type = "radio" name = "language" value = "C++" />C++ <br />
            <input type = "radio" name = "language" value = "C#" />C# <br />
            <input type = "radio" name = "language" value = "Java" />Java <br />
            <input type = "radio" name = "language" value = "Python" />Python <br />
            <input type = "radio" name = "language" value = "JavaScript" />JavaScript <br />
            <input type = "radio" name = "language" value = "PHP" />PHP <br />
            <input type = "radio" name = "language" value = "Perl" />Perl <br />
            <input type = "radio" name = "language" value = "Ruby" />Ruby <br />
        </p>
        <p><input type = "submit" value = "Submit" /></p>
    </form>
</body>

</html>
```

b. CookieServlet.java

```
package com.oracle.coen235.servlets;

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

import java.io.*;
import java.util.*;
import java.util.Map.Entry;

public class CookieServlet extends HttpServlet {
    private final Map<String, String> books = new HashMap<String, String>();

    // initialize the servlet, add book information
    public void init() {
        books.put("C", "0123456780/45.50");
        books.put("C++", "0123456781/55.99");
        books.put("Java", "0123456782/55.99");
        books.put("Ruby", "0123456783/35.49");
        books.put("Python", "0123456784/65.99");
        books.put("JavaScript", "0123456785/45.99");
        books.put("C#", "0123456786/37.99");
        books.put("PHP", "0123456787/23.99");
        books.put("Perl", "0123456788/87.99");
    }

    protected void doPost ( HttpServletRequest request, HttpServletResponse response )
```

```

        throws ServletException, IOException {
// get request information from client
String language = request.getParameter("language");
String bookInfo = books.get(language);

// add request information to cookie
Cookie cookie = new Cookie("selected/" + language, bookInfo);
cookie.setMaxAge(-1);
if(language != null)
    response.addCookie(cookie);

// send html back to client
response.setContentType("text/html");
PrintWriter out = response.getWriter();

out.println("<?xml version = \"1.0\"?>");
out.println("<!DOCTYPE html PUBLIC \"-//W3C//DTD \" +
    \"XHTML 1.0 Strict//EN\" \"http://www.w3c.org\" +
    \"/TR/xhtml1-strict.dtd\">");
out.println("<html xmlns = \"http://www.w3c.org/1999/xhtml\">");
out.println("<head>");
out.println("<title>Language Selection</title>");
out.println("</head>");
out.println("<body>");
out.println("<form action = \" + \"\"/coen235/cookies\" + \" method = \" + \"get\">");
if(language != null)
    out.println("<p>You selected \" + language + \"</p>");
else out.println("<p>You didn't select any languages</p>");
out.println("<p><a href = \" + \"\"/coen235/servlets/CookieSelectLanguage.html\">\" +
    \"Click here to choose another language</a></p>\" );
out.println("<p><a href = \" + \"\"/coen235/cookies\">\" +
    \"Click here to choose book recommendations</a></p>");
out.println("</form>");
out.println("</body>");
out.println("</html>");
out.close();
}

```

```

protected void doGet (HttpServletRequest request, HttpServletResponse response)

```

```

    throws ServletException, IOException {
// get book information from cookie
Cookie[] cookies = request.getCookies();

Map<String, String> selectedLangs = new HashMap<String, String>();
if(cookies != null) {
    for(int i = 0; i < cookies.length; i++) {
        String name = cookies[i].getName();
        if(name.length() > 9 && name.substring(0, 9).equals("selected/"))
            selectedLangs.put(name.substring(9), cookies[i].getValue());
    }
}

```

```

response.setContentType ("text/html");
PrintWriter out = response.getWriter();

```

```

// send XHTML page back to the client
out.println("<?xml version = \"1.0\"?>");
out.println("<!DOCTYPE html PUBLIC \"-//W3C//DTD \" +

```

```

"XML 1.0 Strict//EN\" \"http://www.w3c.org\" +
"/TR/xhtml1-strict.dtd\">");
out.println("<html xmlns = \"http://www.w3c.org/1999/xhtml\">");
out.println("<head>");
out.println("<title>Recommendations</title>");
out.println("</head>");
out.println("<body>");
out.println("<form action = \"/coen235/cookiesOrdered\" method = \"post\">");

// check if there's any information in cookies
if (selectedLangs != null && !selectedLangs.isEmpty()) {
    out.println("<h1>Recommendations</h1>");
    out.println("<p>");
    out.println("<table border = 1px>");
    out.println("<tr><th>Selection</th><th>Title</th><th>ISBN</th><th>Price</th></tr>");

    // get an iterator for the hash map of selected languages
    Iterator<Entry<String, String>> langs = selectedLangs.entrySet().iterator();
    // display all books for selected languages
    while(langs.hasNext()) {
        Entry<String, String> entry = langs.next();
        StringTokenizer st = new StringTokenizer(entry.getValue(), "/");
        String lang = entry.getKey();
        String isbn = st.nextToken();
        String price = st.nextToken();
        out.println("<tr>");
        out.println("<td><input type = \"radio\" name = \"language\" value = \"\"");
            + lang + "\" /></td>");
        out.println("<td>" + lang + " How to Program.</td><td>" + isbn
            + "</td><td>" + price + "</td>");
        out.println("</tr>");
    }

    out.println("</table>");
    out.println("</p>");
    out.println("<p><input type = \"submit\" value = \"Submit\" /></p>");
}
else {
    out.println("<h1>No Recommendations</h1>");
    out.println("<p>You did not select a language.</p>");
}
out.println("</form>");
out.println("</body>");
out.println("</html>");
out.close();
}
}

```

c. CookieServletOrdered.java

```
package com.oracle.coen235.servlets;
```

```
import javax.servlet.*;
import javax.servlet.http.*;
```

```
import java.io.*;
import java.util.*;
import java.util.Map.Entry;
```

```
public class CookieServletOrdered extends HttpServlet {
```

```

private final Map<String, String> books = new HashMap<String, String>();

// initialize the servlet, add book information
public void init() {
    books.put("C", "0123456780/45.50" );
    books.put("C++", "0123456781/55.99");
    books.put("Java", "0123456782/55.99");
    books.put("Ruby", "0123456783/35.49");
    books.put("Python", "0123456784/65.99");
    books.put("JavaScript", "0123456785/45.99");
    books.put("C#", "0123456786/37.99");
    books.put("PHP", "0123456787/23.99");
    books.put("Perl", "0123456788/87.99");
}

protected void doPost ( HttpServletRequest request, HttpServletResponse response )
    throws ServletException, IOException {
    // get book selection from client
    String book = request.getParameter("language");
    String bookInfo = books.get(request.getParameter("language"));

    // add newly ordered book with a tag "ordered/" to cookie
    HashSet<Cookie> cookies = new HashSet<Cookie>(Arrays.asList(request.getCookies()));
    // cookie name can only be ASCII alphanumeric(alphabet and numbers) characters
    Cookie cookie = new Cookie("ordered/" + book, bookInfo);
    cookie.setMaxAge(-1);
    if(bookInfo != null && !cookies.contains(cookie))
        response.addCookie(cookie);

    // send html back to client
    response.setContentType("text/html");
    PrintWriter out = response.getWriter();

    out.println("<?xml version = \"1.0\"?>");
    out.println("<!DOCTYPE html PUBLIC \"-//W3C//DTD \" +
        \"XHTML 1.0 Strict//EN\" \"http://www.w3c.org\" +
        \"/TR/xhtml1-strict.dtd\">");
    out.println("<html xmlns = \"http://www.w3c.org/1999/xhtml\">");
    out.println("<head>");
    out.println("<title>Book Selection</title>");
    out.println("</head>");
    out.println("<body>");

    out.println("<form action = \" + \"\"/coen235/cookies\"\" + \" method = \" + \"get\">");
    if(bookInfo != null)
        out.println("<p>You selected: \" + book + \" How to Program.</p>");
    else
        out.println("<p>You didn't select any books</p>");
    out.println("<p><a href = \" + \"\"/coen235/cookies\">\" +
        \"Click here to add another book</a></p>\" );
    out.println("</form>");

    out.println("<form action = \" + \"\"/coen235/cookiesOrdered\"\" + \" method = \" + \"get\">");
    out.println("<p><a href = \" + \"\"/coen235/cookiesOrdered\">\" +
        \"Click here to see summary of books and cost</a></p>");
    out.println("</form>");

    out.println("</body>");

```

```

        out.println("</html>");
        out.close();
    }

protected void doGet (HttpServletRequest request, HttpServletResponse response)
    throws ServletException, IOException {

    // get ordered books from cookies and store them in a hash map
    Cookie[] cookies = request.getCookies();
    Map<String, String> orderedBooks = new HashMap<String, String>();
    if(cookies != null) {
        for(int i = 0; i < cookies.length; i++) {
            String name = cookies[i].getName();
            if(name.length() > 8 && name.substring(0, 8).equals("ordered/"))
                orderedBooks.put(name.substring(8), cookies[i].getValue());
        }
    }

    response.setContentType ("text/html");
    PrintWriter out = response.getWriter();

    // send XHTML page back to the client
    out.println("<?xml version = \"1.0\"?>");
    out.println("<!DOCTYPE html PUBLIC \"-//W3C//DTD \" +
    \"XHTML 1.0 Strict//EN\" \"http://www.w3c.org\" +
    \"/TR/xhtml1-strict.dtd\">");
    out.println("<html xmlns = \"http://www.w3c.org/1999/xhtml\">");
    out.println("<head>");
    out.println("<title>Summary of Selected Books and Cost</title>");
    out.println("</head>");
    out.println("<body>");

    if (orderedBooks != null && !orderedBooks.isEmpty()) {
        out.println("<h1>Summary of Selected Books and Cost</h1>");
        out.println("<p>");
        out.println("<table border = 1px>");
        out.println("<tr><th>Title</th><th>ISBN</th><th>Price</th></tr>");

        // get an iterator for the hash map of ordered books
        Iterator<Entry<String, String>> orders = orderedBooks.entrySet().iterator();
        // display all books and cost for selected languages
        double sum = 0;
        while(orders.hasNext()) {
            // get title, isbn and price
            Entry<String, String> entry = orders.next();
            StringTokenizer st = new StringTokenizer(entry.getValue(), "/");
            String title = entry.getKey() + " How to Program.";
            String isbn = st.nextToken();
            String price = st.nextToken();
            sum += Double.parseDouble(price);

            out.println("<tr>");
            out.println("<td>" + title + "</td><td>" +
                isbn + "</td><td>" +
                price + "</td>");
            out.println("<tr>");
        }
        out.println("</table>");
    }
}

```

```

        out.println("</p>");
        out.printf("<p>total cost is: %.2f</p>", sum);
    }

    else {
        out.println("<h1>No selected books</h1>");
        out.println("<p>You did not select a book.</p>");
    }
    out.println("</form>");
    out.println("</body>");
    out.println("</html>");
    out.close();
}
}

```

II. Book Ordering Servlet HttpSession

a. SessionSelectLanguage.html

```

<?xml version = "1.0" ?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict //EN"
    "http://www.w3c.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- SessionSelectLanguage.html -->

<html xmlns = "http://www.w3c.org/1999/xhtml">

<head><title>Using Sessions</title></head>

<body>
    <form action = "/coen235/sessions" method = "post">
        <p>
            <input type = "radio" name = "language" value = "C" />C <br />
            <input type = "radio" name = "language" value = "C++" />C++ <br />
            <input type = "radio" name = "language" value = "C#" />C# <br />
            <input type = "radio" name = "language" value = "Java" />Java <br />
            <input type = "radio" name = "language" value = "Python" />Python <br />
            <input type = "radio" name = "language" value = "JavaScript" />JavaScript <br />
            <input type = "radio" name = "language" value = "PHP" />PHP <br />
            <input type = "radio" name = "language" value = "Perl" />Perl <br />
            <input type = "radio" name = "language" value = "Ruby" />Ruby <br />
        </p>
        <p><input type = "submit" value = "Submit" /></p>
    </form>
</body>

</html>

```

b. SessionServlet.java

```
package com.oracle.coen235.servlets;
```

```
import javax.servlet.*;
import javax.servlet.http.*;
```

```
import java.io.*;
import java.util.*;
import java.util.Map.Entry;
```

```
public class SessionServlet extends HttpServlet {
```

```

private final Map<String, String> books = new HashMap<String, String>();

// initialize the servlet, add book information
public void init() {
    books.put("C", "0123456780/45.50");
    books.put("C++", "0123456781/55.99");
    books.put("Java", "0123456782/55.99");
    books.put("Ruby", "0123456783/35.49");
    books.put("Python", "0123456784/65.99");
    books.put("JavaScript", "0123456785/45.99");
    books.put("C#", "0123456786/37.99");
    books.put("PHP", "0123456787/23.99");
    books.put("Perl", "0123456788/87.99");
}

protected void doPost ( HttpServletRequest request, HttpServletResponse response )
    throws ServletException, IOException {
    // get request information from client
    String language = request.getParameter("language");
    String bookInfo = books.get(language);
    HashMap<String, String> selectedLanguages;

    HttpSession session = request.getSession( true );
    // if no information of selected languages are stored in session
    // create a hash map to store user selections
    if(session.getAttribute("selectedLanguages") == null) {
        selectedLanguages = new HashMap<String, String>();
        session.setAttribute("selectedLanguages", selectedLanguages);
    }

    // get the hash map of selected languages and add the newly selected one
    selectedLanguages = (HashMap<String, String>) session.getAttribute("selectedLanguages");
    if(language != null)
        selectedLanguages.put(language, bookInfo);

    response.setContentType("text/html");
    PrintWriter out = response.getWriter();

    // send html back to client
    out.println("<?xml version = \"1.0\"?>");
    out.println("<!DOCTYPE html PUBLIC \"-//W3C//DTD \" +
        \"XHTML 1.0 Strict//EN\" \"http://www.w3c.org\" +
        \"/TR/xhtml1-strict.dtd\">");
    out.println("<html xmlns = \"http://www.w3c.org/1999/xhtml\">");
    out.println("<head>");
    out.println("<title>Language Selection</title>");
    out.println("</head>");
    out.println("<body>");
    out.println("<form action = \" + \"\"/coen235/sessions\"\" + \" method = \" + \"get\">");
    if(language != null)
        out.println("<p>You selected \" + language + "</p>");

```

```

else out.println("<p>You didn't select any languages</p>");

out.println("<p>Your unique session ID is: " + session.getId() + "<br />");
out.println("This " + (session.isNew() ? "is" : "is not") + " a new session<br />");
out.println("The session was created at: " + new Date(session.getCreationTime()) + "<br />");
out.println("You last accessed the session at: " + new Date(session.getLastAccessedTime()) + "<br />");
out.println("The Max inactive interval is: " + session.getMaxInactiveInterval() + " seconds</p>");

out.println("<p><a href = \" + \"\"/coen235/servlets/SessionSelectLanguage.html\">\" +
    \"Click here to choose another language</a></p>\" );
out.println("<p><a href = \" + \"\"/coen235/sessions\">\" +
    \"Click here to choose book recommendations</a></p>");

out.println("</form>");
out.println("</body>");
out.println("</html>");
out.close();
}

```

```

protected void doGet (HttpServletRequest request, HttpServletResponse response)
    throws ServletException, IOException {

```

```

    HttpSession session = request.getSession(false);
    Iterator<Entry<String, String>> valueNames;
    if (session != null) {
        Map<String, String> selectedLanguages =
            (Map<String, String>) session.getAttribute("selectedLanguages");
        valueNames = selectedLanguages.entrySet().iterator();
    }
    else valueNames = null;

```

```

    response.setContentType ("text/html");
    PrintWriter out = response.getWriter();

```

```

    // send XHTML page back to the client
    out.println("<?xml version = \"1.0\"?>");
    out.println("<!DOCTYPE html PUBLIC \"-//W3C//DTD \" +
        \"XHTML 1.0 Strict//EN\" \"http://www.w3c.org\" +
        \"/TR/xhtml1-strict.dtd\">");
    out.println("<html xmlns = \"http://www.w3c.org/1999/xhtml\">");
    out.println("<head>");
    out.println("<title>Recommendations</title>");
    out.println("</head>");
    out.println("<body>");
    out.println("<form action = \"\"/coen235/sessionsOrdered\" method = \"post\">");

```

```

    if(valueNames != null && valueNames.hasNext()) {
        out.println("<h1>Recommendations</h1>");
        out.println("<p>");
        out.println("<table border = 1px>");
        out.println("<tr><th>Selection</th><th>Title</th><th>ISBN</th><th>Price</th></tr>");
    }

```



```

        while(valueNames.hasNext()) {
            Entry<String, String> entry = valueNames.next();
            String language = entry.getKey();
            String title = language + " How to Program.";
            String isbn_price = entry.getValue();
            String isbn = isbn_price.substring(0, 10);
            String price = isbn_price.substring(11);
            out.println("<tr>");
            out.println("<td><input type = \"radio\" name = \"language\" value = \""
                + language + "\" /></td>");
            out.println("<td>" + title + "</td><td>" + isbn
                + "</td><td>" + price + "</td>");
            out.println("</tr>");
        }

        out.println("</table>");
        out.println("</p>");
        out.println("<p><input type = \"submit\" value = \"Submit\" /></p>");
    }
    else {
        out.println("<h1>No Recommendations</h1>");
        out.println("<p>You did not select a language.</p>");
    }
    out.println("</form>");
    out.println("</body>");
    out.println("</html>");
    out.close();
}
}

```

c. SessionServletOrdered.java

```

package com.oracle.coen235.servlets;

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

import java.io.*;
import java.util.*;
import java.util.Map.Entry;

public class SessionServletOrdered extends HttpServlet {
    private final Map<String, String> books = new HashMap<String, String>();
    private final ArrayList<String> selectedBooks = new ArrayList<String>();

    // initialize the servlet, add book information
    public void init() {
        books.put("C", "0123456780/45.50" );
        books.put("C++", "0123456781/55.99");
        books.put("Java", "0123456782/55.99");
        books.put("Ruby", "0123456783/35.49");
        books.put("Python", "0123456784/65.99");
        books.put("JavaScript", "0123456785/45.99");
    }
}

```

```

books.put("C#", "0123456786/37.99");
books.put("PHP", "0123456787/23.99");
books.put("Perl", "0123456788/87.99");
}

protected void doPost ( HttpServletRequest request, HttpServletResponse response )
    throws ServletException, IOException {
    // get book selection from client
    String book = request.getParameter("language") + " How to Program.";
    String bookInfo = books.get(request.getParameter("language"));
    HashMap<String, String> orderedBooks;

    HttpSession session = request.getSession( true );
    // if no information of ordered books are stored in session
    // create a hash map to store user selections
    if(session.getAttribute("orderedBooks") == null) {
        orderedBooks = new HashMap<String, String>();
        session.setAttribute("orderedBooks", orderedBooks);
    }

    // get the hash map of ordered books and add the newly selected one
    orderedBooks = (HashMap<String, String>) session.getAttribute("orderedBooks");

    // add the newly selected to orderedBooks
    if(bookInfo != null && !orderedBooks.containsKey(book))
        orderedBooks.put(book, bookInfo);

    // send html back to client
    response.setContentType("text/html");
    PrintWriter out = response.getWriter();

    out.println("<?xml version = \"1.0\"?>");
    out.println("<!DOCTYPE html PUBLIC \"-//W3C//DTD \" +
        \"XHTML 1.0 Strict//EN\" \"http://www.w3c.org\" +
        \"/TR/xhtml11-strict.dtd\">");
    out.println("<html xmlns = \"http://www.w3c.org/1999/xhtml\">");
    out.println("<head>");
    out.println("<title>Book Selection</title>");
    out.println("</head>");
    out.println("<body>");

    out.println("<form action = \" + \"\"/coen235/sessions\"\" + \" method = \" + \"\"get\">");
    if(bookInfo != null)
        out.println("<p>You selected: \" + book + \"</p>");
    else
        out.println("<p>You didn't select any books</p>");
    out.println("<p><a href = \" + \"\"/coen235/sessions\"\">\" +
        \"Click here to add another book</a></p>\" );
    out.println("</form>");

    out.println("<form action = \" + \"\"/coen235/sessionsOrdered\"\" + \" method = \" + \"\"get\">");
    out.println("<p><a href = \" + \"\"/coen235/sessionsOrdered\"\">\" +
        \"Click here to see summary of books and cost</a></p>");
    out.println("</form>");
    out.println("</body>");
    out.println("</html>");
    out.close();
}

```

```

protected void doGet (HttpServletRequest request, HttpServletResponse response)
    throws ServletException, IOException {
    HttpSession session = request.getSession(false);
    Iterator<Entry<String, String>> orders;
    if (session.getAttribute("orderedBooks") != null) {
        Map<String, String> orderedBooks =
            (Map<String, String>) session.getAttribute("orderedBooks");
        orders = orderedBooks.entrySet().iterator();
    }
    else orders = null;

    response.setContentType ("text/html");
    PrintWriter out = response.getWriter();

    // send XHTML page back to the client
    out.println("<?xml version = \"1.0\"?>");
    out.println("<!DOCTYPE html PUBLIC \"-//W3C//DTD \" +
        \"XHTML 1.0 Strict//EN\" \"http://www.w3c.org\" +
        \"/TR/xhtml1-strict.dtd\">");
    out.println("<html xmlns = \"http://www.w3c.org/1999/xhtml\">");
    out.println("<head>");
    out.println("<title>Summary of Selected Books and Cost</title>");
    out.println("</head>");
    out.println("<body>");

    if (orders != null && orders.hasNext()) {
        out.println("<h1>Summary of Selected Books and Cost</h1>");
        out.println("<p>");
        out.println("<table border = 1px>");
        out.println("<tr><th>Title</th><th>ISBN</th><th>Price</th></tr>");

        // display all books and cost for selected languages
        double sum = 0;
        while(orders.hasNext()) {
            // get title, isbn and price
            Entry<String, String> entry = orders.next();
            StringTokenizer st = new StringTokenizer(entry.getValue(), "/");
            String title = entry.getKey();
            String isbn = st.nextToken();
            String price = st.nextToken();
            sum += Double.parseDouble(price);

            out.println("<tr>");
            out.println("<td>" + title + "</td><td>" +
                isbn + "</td><td>" +
                price + "</td>");
            out.println("<tr>");
        }
        out.println("</table>");
        out.println("</p>");
        out.printf("<p>total cost is: %.2f</p>", sum);
    }

    else {
        out.println("<h1>No selected books</h1>");
        out.println("<p>You did not select a book.</p>");
    }
}

```

```

        out.println("</form>");
        out.println("</body>");
        out.println("</html>");
        out.close();
    }
}

```

III. Universal ResultSet Tag Handler for Book Database

a. BooksQuery.jsp

```

<%@ page language="java" contentType="text/html; charset=ISO-8859-1"
    pageEncoding="ISO-8859-1"%>
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN" "http://www.w3.org/TR/html4/loose.dtd">
<%@ taglib uri = "ResultSetTag" prefix = "coen235" %>
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=ISO-8859-1">
<title>Query the Book Database</title>
</head>
<body>
    <%= new java.util.Date() %>
    <form action="" method="GET">
        Enter a SQL statement: <input type="text" name="statement" size = 40><br />
    </form>
    <br/>
    <table border = 2px>
    <coen235:rs statement="<%=request.getParameter("statement")%>">
        <tr><%= row %></tr>
    </coen235:rs>
    </table>
</body>
</html>

```

b. ResultSetTag.java

```

package com.oracle.coen235.jsp.taglib;

import java.io.*;
import java.sql.*;
import javax.servlet.*;
import javax.servlet.jsp.*;
import javax.servlet.jsp.tagext.*;
import javax.servlet.jsp.tagext.Tag.*;

public class ResultSetTag extends BodyTagSupport {
    private String statement;
    private ResultSet rs;
    private ResultSetMetaData rsmd;
    private int numCols;
    private String row;
    // private String status;

    public int doStartTag() throws JspException {
        // load the JDBC driver
        try {
            Class.forName("oracle.jdbc.driver.OracleDriver");
        }
        catch(ClassNotFoundException e) {
            System.out.println("Unable to load the Driver class");
            System.exit(0);
        }
    }
}

```

```

    }

    // connect to the books database and get query statement from user for processing
    try {
        // get connection to the database using a username, and a password
        //System.out.println("\nConnecting to the database...");
        Connection conn = DriverManager.getConnection(
            "jdbc:oracle:thin:@dagobah.engr.scu.edu:1521:db11g", "lpeng", "1985927pLPI");
        //System.out.println("Database connected...\n");
        //
        status = "Database connected...";
        //
        pageContext.setAttribute("status", status);

        // only select query if permitted
        Statement stmt = conn.createStatement();
        statement = statement.trim();
        if(statement.length() <= 7 || !statement.substring(0, 6).equalsIgnoreCase("select")
            || !stmt.execute(statement))
            return SKIP_BODY;

        // query the database and get the result set and its meta data
        rs = stmt.executeQuery(statement);
        rsmd = rs.getMetaData();
        numOfCols = rsmd.getColumnCount();

        // generate the column headers
        if(rsmd != null)
            processColHeader();

        // go to doAfterBody()
        return EVAL_BODY_TAG;
    }
    catch(Exception e) {
        e.printStackTrace();
        return SKIP_BODY;
    }
}

public int doAfterBody() {
    try {
        // bodyContent is inherited from BodyTagSupport
        // getPreviousOut() returns JspWriter object for the JSP that invoked the custom tag.
        bodyContent.writeOut(getPreviousOut());

        // to prevent the content just outputed from being processed again in the next call to doAfterBody()
        bodyContent.clearBody();

        // generate the contents of each row
        if(rs != null && rs.next()) {
            processColContent();
            return EVAL_BODY_TAG;
        }
        else return SKIP_BODY;

    } catch (Exception e) {
        e.printStackTrace();
        return SKIP_BODY;
    }
}

```

```

}

// pass attribute statement from html to tag handler
public void setStatement(String statement) {
    this.statement = statement;
}

private void processColHeader() throws Exception {
    row = "";
    for(int i = 0; i < numOfCols; i++) {
        // column index starts with 1
        row += ("<td>" + rsmd.getColumnName(i + 1) + "</td>");
    }
    pageContext.setAttribute("row", row);
}

private void processColContent() throws Exception {
    row = "";
    for(int i = 0; i < numOfCols; i++) {
        // column index starts with 1
        row += ("<td>" + rs.getString(i + 1) + "</td>");
    }
    pageContext.setAttribute("row", row);
}
}

```

c. `ResultSetTagExtraInfo.java`

```
package com.oracle.coen235.jsp.taglib;
```

```
import javax.servlet.jsp.tagext.*;
```

```
public class ResultSetTagExtraInfo extends TagExtraInfo {
    public VariableInfo [] getVariableInfo(TagData tagData)
    {
        VariableInfo row = new VariableInfo("row", "String", true, VariableInfo.NESTED);
        VariableInfo variableInfo [] = {row};
        return variableInfo;
    }
}

```