

Session Management

Sessions and Listeners

Technique: Error Handling in Servlets

- **JSP**

- JSP Syntax

- Comment
 - Scripting Element: declaration, scriptlets, expression
 - Directives (page, include, taglib)

- JSP Life Cycles

- JSP Implicit Object

- **MVC Pattern**

- No MVC

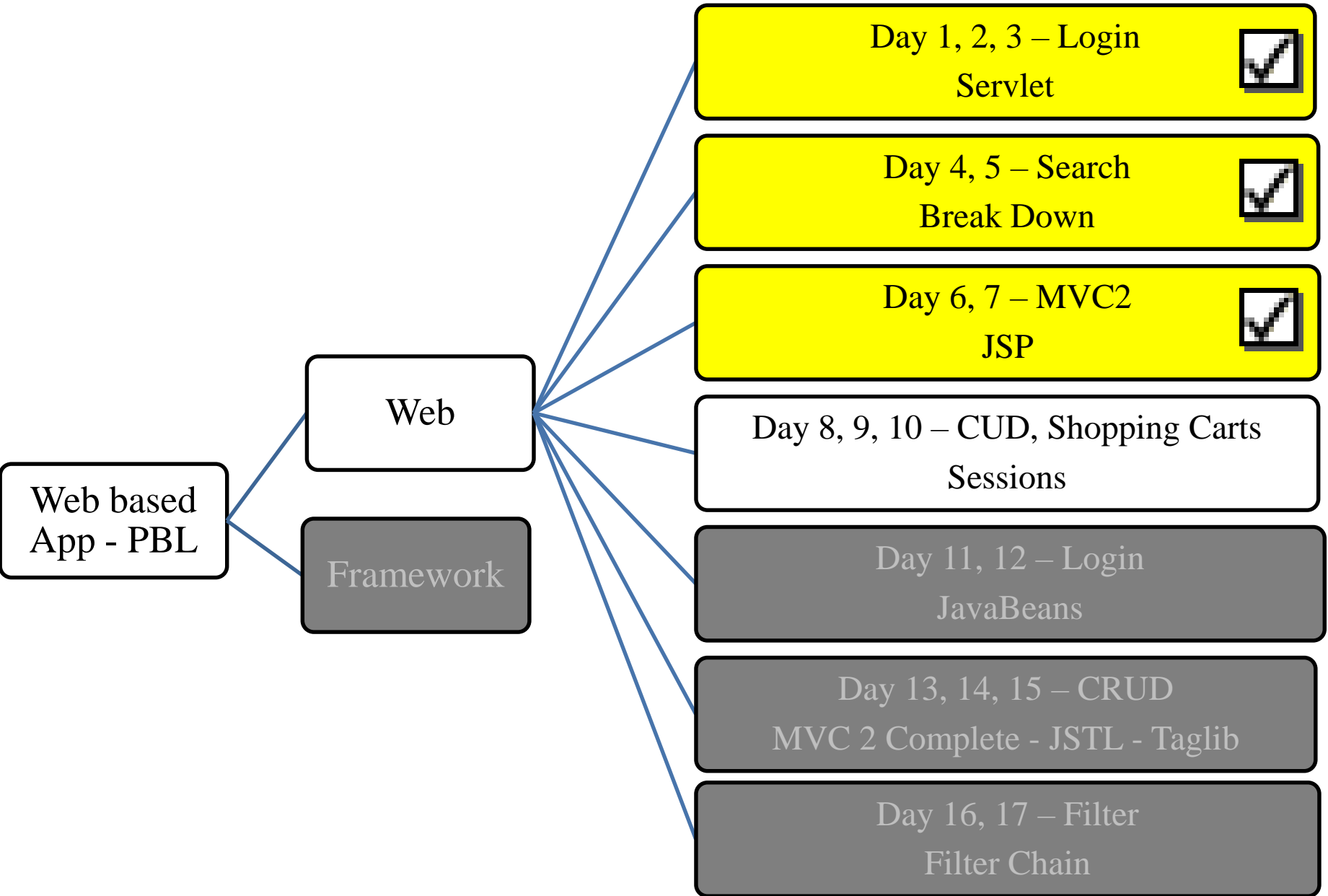
- MVC 1

- MVC 2

Objectives

- **How to write CUD Web Application?**
 - Session Tracking Techniques
 - Manipulate DB Techniques in Web Application
 - Break down structure component in building web application
- **Techniques: Error Handling in Servlets**
 - Reporting Errors
 - Logging Errors
 - Users Errors vs. System Errors

Objectives



How to write CRUD Web Application Requirements

- After the web application had searched and shown the result, some following functions are required
 - The data grid allows the user **delete the selected row. After delete** action is completed, **the data grid is updated**
 - The data grid also allows the user **update the password and roles on the selected row. After update** action is completed, **the data grid is refreshed**
 - The application allows to **store the user's account** that the user can **access the resource without login in the second access. The username can be shown at the search result**
 - The application allows the user **shopping book and order them**
 - When the user login fail, the **register page** is shown. When **register is fail**, the **error page** is shown. Otherwise, the **login page** is shown
- The GUI of web application is present as following

How to write CRUD Web Application

Expectation



Welcome, khanh

Search Page

Search Value

| No. | Username | Password | Last name | Role | Delete |
|-----|----------|----------|--------------|-------------------------------------|------------------------|
| 1 | IA1161 | 123456 | Class IA1161 | <input type="checkbox"/> | Delete |
| 2 | khanh | kieu123 | Khanh Kieu | <input checked="" type="checkbox"/> | Delete |
| 3 | SE1161 | 123456 | Class SE1161 | <input type="checkbox"/> | Delete |
| 4 | SE1162 | 123456 | Class Se1162 | <input type="checkbox"/> | Delete |
| 5 | SE1163 | 123456 | Class SE1163 | <input type="checkbox"/> | Delete |

http://localhost:8084/SE1162Servlet/SE1162Servlet?btAction=delete&pk=IA1161&lastSearchValue=a

How to write CRUD Web Application

Expectation



http://localhost:8084/SE1162Servlet/SE1162Servlet?txtSearchValue=a&btAction=Search

Welcome, khanh

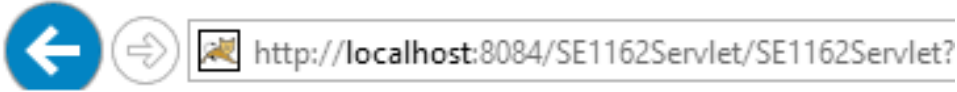
Search Page

Search Value

| No. | Username | Password | Last name | Role | Delete | Update |
|-----|----------|----------|--------------|-------------------------------------|------------------------|---------------------------------------|
| 1 | IA1161 | 123456 | Class IA1161 | <input type="checkbox"/> | Delete | <input type="button" value="Update"/> |
| 2 | khanh | kieu123 | Khanh Kieu | <input checked="" type="checkbox"/> | Delete | <input type="button" value="Update"/> |
| 3 | SE1161 | 123456 | Class SE1161 | <input type="checkbox"/> | Delete | <input type="button" value="Update"/> |
| 4 | SE1162 | 123456 | Class Se1162 | <input type="checkbox"/> | Delete | <input type="button" value="Update"/> |
| 5 | SE1163 | 123456 | Class SE1163 | <input type="checkbox"/> | Delete | <input type="button" value="Update"/> |

How to write CRUD Web Application

Expectation



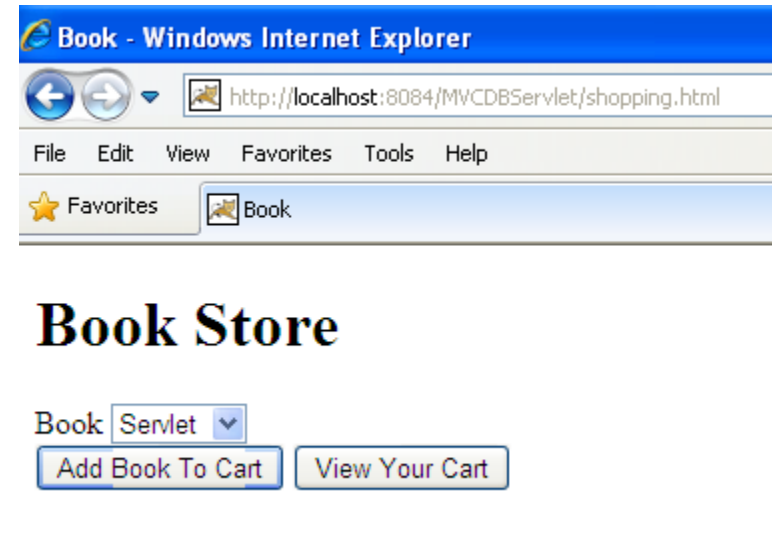
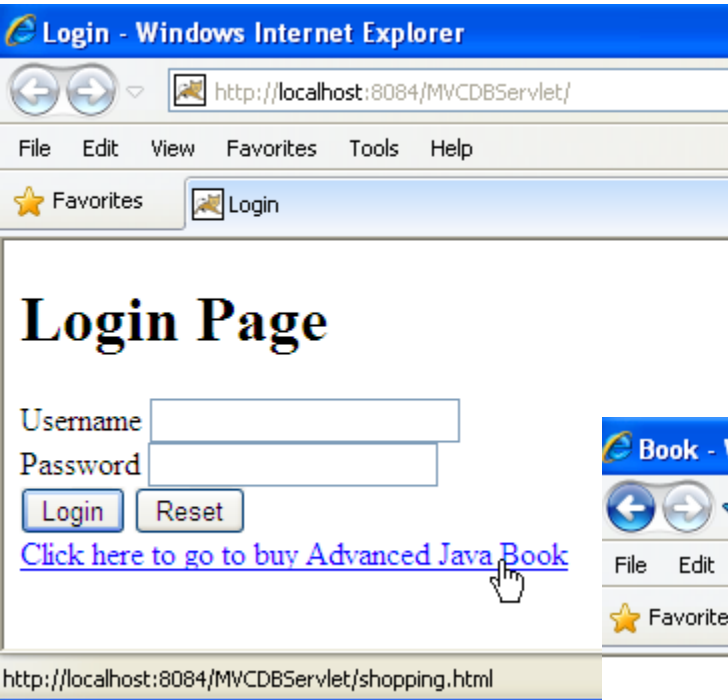
Welcome, khanh

Search Page

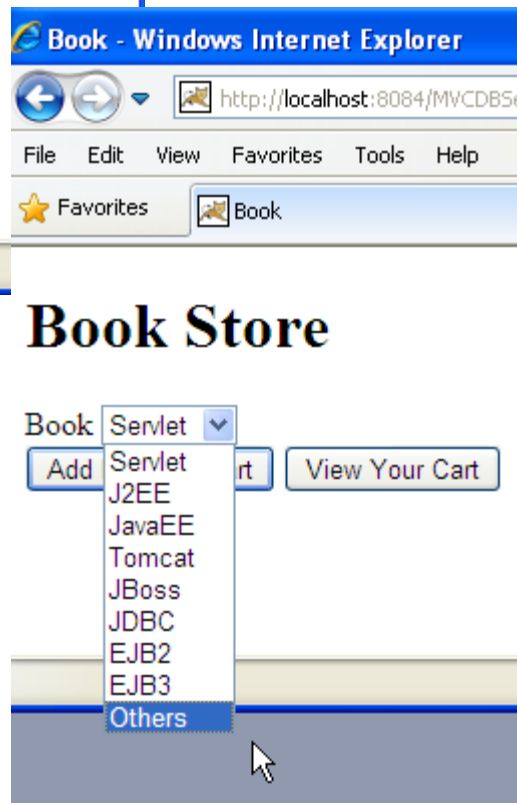
Search Value

How to write CRUD Web Application

Expectation



http://localhost:8084/MVCDServlet/shopping.html



How to write CRUD Web Application

Expectation

http://localhost:8084/MVCDService/ProcessServlet?cboBook=Servlet&btAction=View+Your+Cart

File Edit View Favorites Tools Help

★ Favorites Carts

Your Cart Items

| No. | Title | Quantity | Action |
|-----|---------|----------|--------------------------|
| 1 | JavaEE | 1 | <input type="checkbox"/> |
| 2 | Servlet | 2 | <input type="checkbox"/> |
| 3 | Tomcat | 2 | <input type="checkbox"/> |

[Add More Item to Cart](#)

Your Cart Items

| No. | Title | Quantity | Action |
|-----|---------|----------|-------------------------------------|
| 1 | JavaEE | 1 | <input checked="" type="checkbox"/> |
| 2 | Servlet | 2 | <input type="checkbox"/> |
| 3 | Tomcat | 2 | <input checked="" type="checkbox"/> |

[Add More Item to Cart](#)

http://localhost:8084/MVCDService/ProcessServlet?btAction=View%20Your%20Cart

File Edit View Favorites Tools Help

★ Favorites Carts

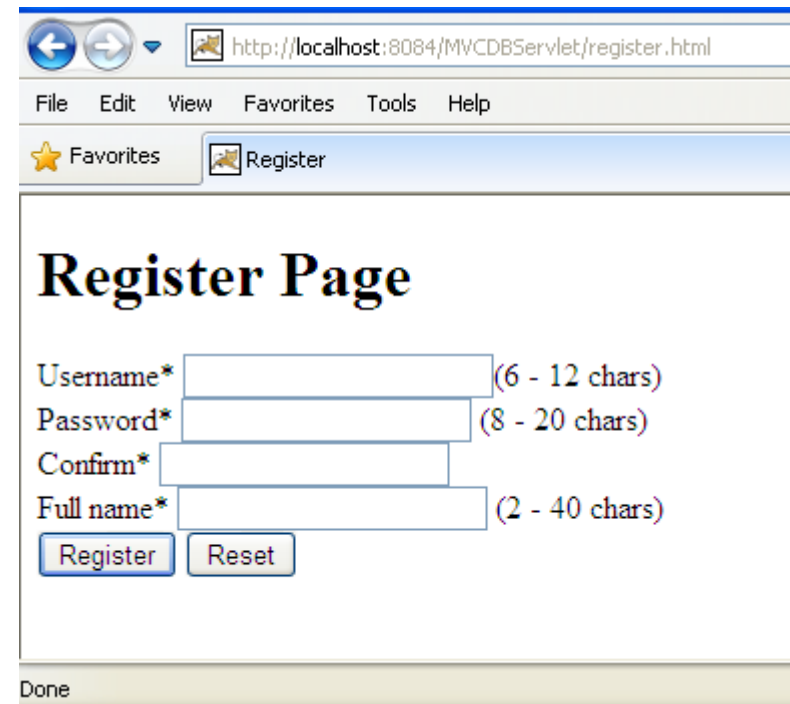
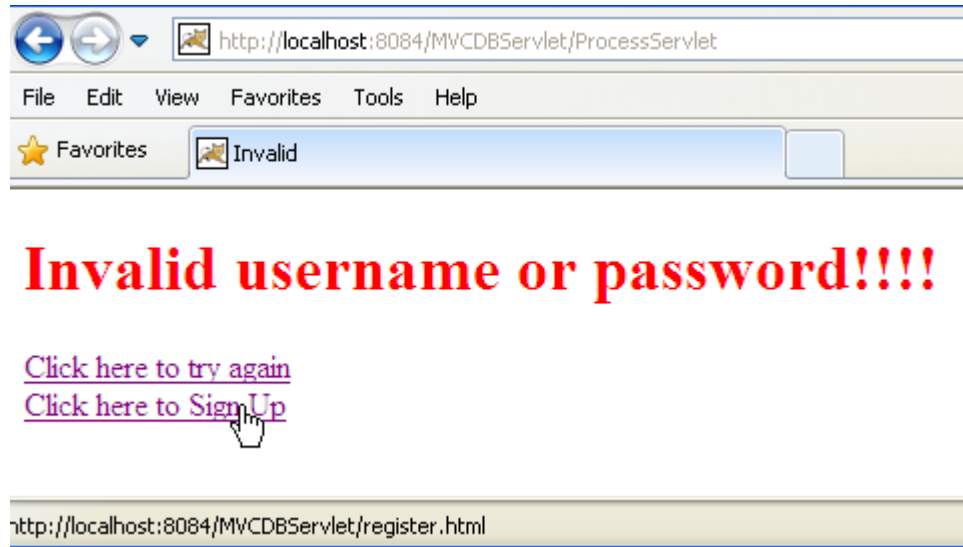
Your Cart Items

| No. | Title | Quantity | Action |
|-----|---------|----------|--------------------------|
| 1 | Servlet | 2 | <input type="checkbox"/> |

[Add More Item to Cart](#)

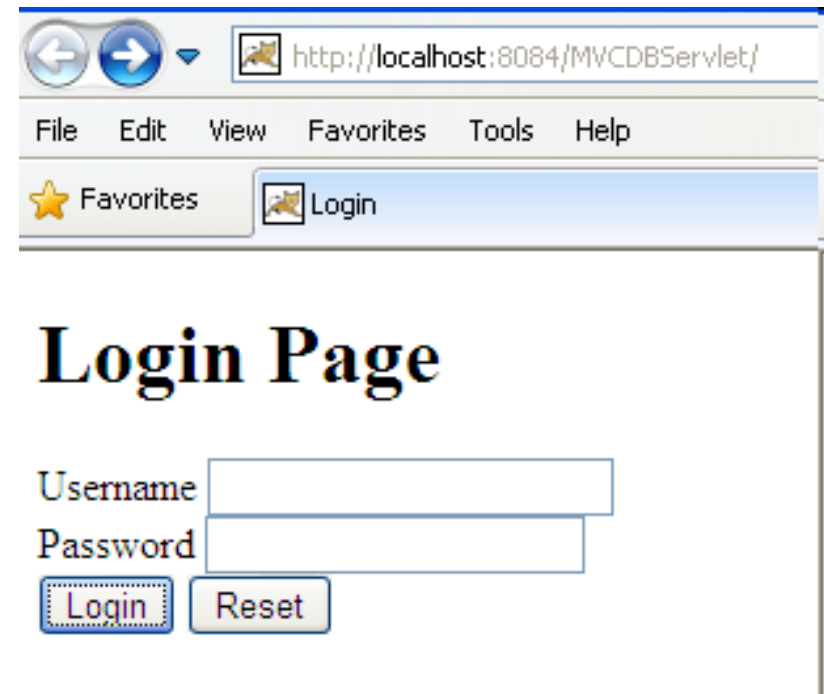
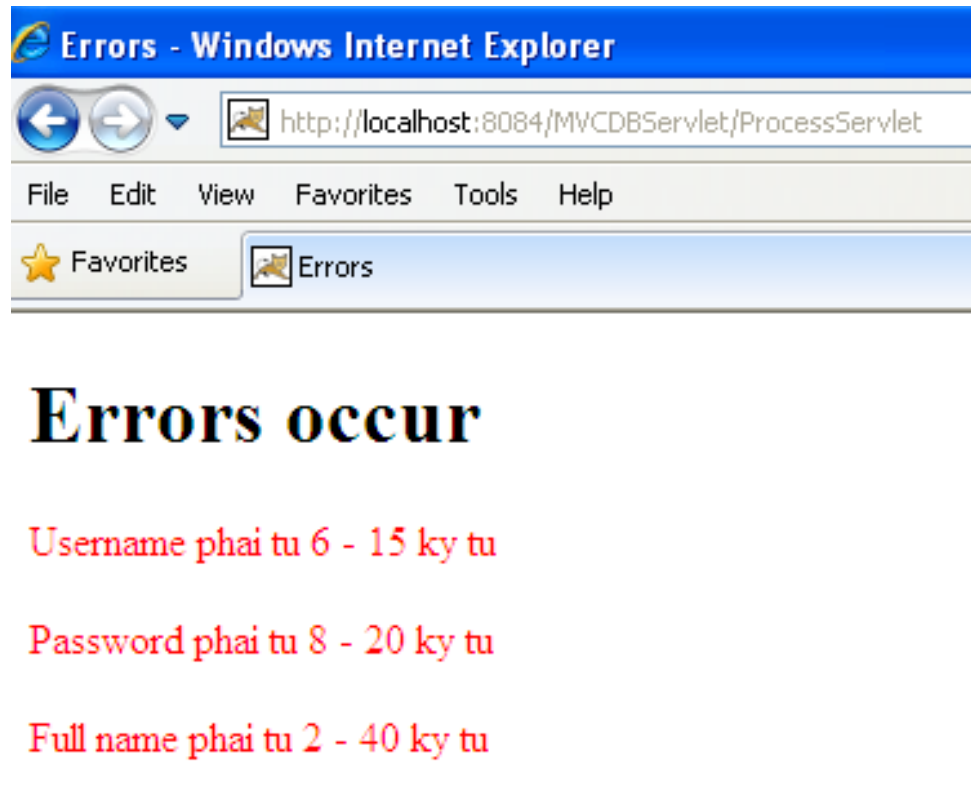
How to write CRUD Web Application

Expectation



How to write CRUD Web Application

Expectation



Sessions & Listeners

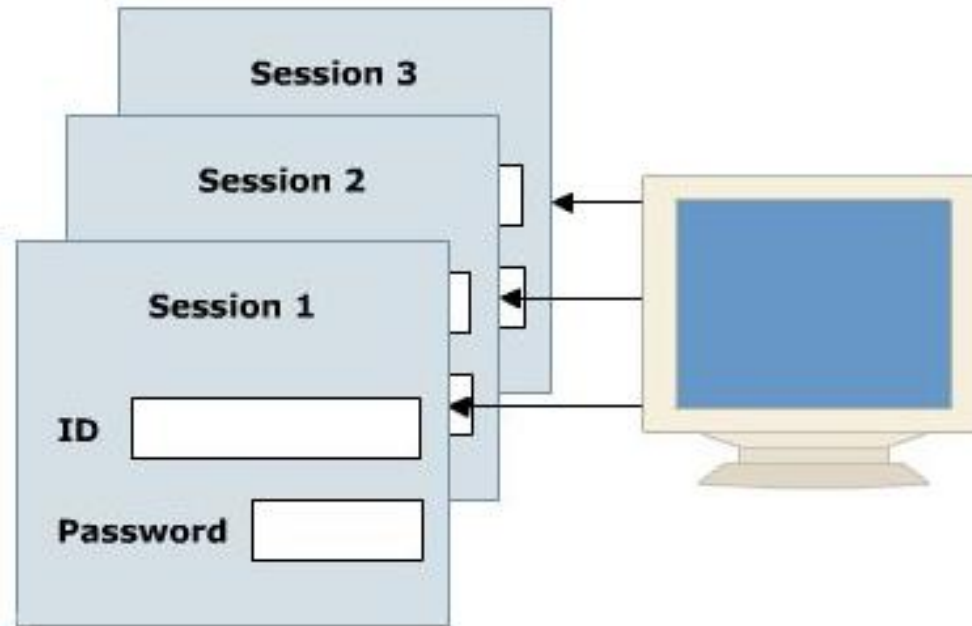
Session

- Is the **period of connection** between client and server
- Is a group of activities that are performed by a user while accessing a particular web site
- HttpSession are **virtual connection** between client and server
- Web container reserves **an individual memory block for storing information about each session** → **Session objects.**
- **The session tracking** (mechanism)
 - Serves the purpose **tracking** the client identity and other state information required throughout the session
 - Allows the **server to keep a track of successive requests** made by same client
 - Allows **the customer to maintain the information with the server** as long as the customer does not log out from the website

Sessions & Listeners

Session Tracking Techniques

- URL Rewriting
- Hidden form field
- Cookies
- HttpSession interface



Session Tracking

Sessions & Listeners

URL Rewriting

- **Maintains the state** of end user by **modifying the URL**.
- **Adds some extra data** at the end of the URL
- Is **used** when the **information to be transferred** is not critical.
- **Syntax: `url?query_string`**
- **Ex**
 - ` Java Books `
 - `<form action=“http://localhost:8080/UpdateProfile?uid=123” method=“get”>
----- </form>`
- **Disadvantages:**
 - Server side **processing is tedious**.
 - Every URL that is **returned** to the **user** should have **additional information appended** to it.
 - If the user **leaves the session** and **opens the Web page using a link or bookmark** then the session information is lost.
 - The **query string is limited**

Delete Function



Welcome, khanh

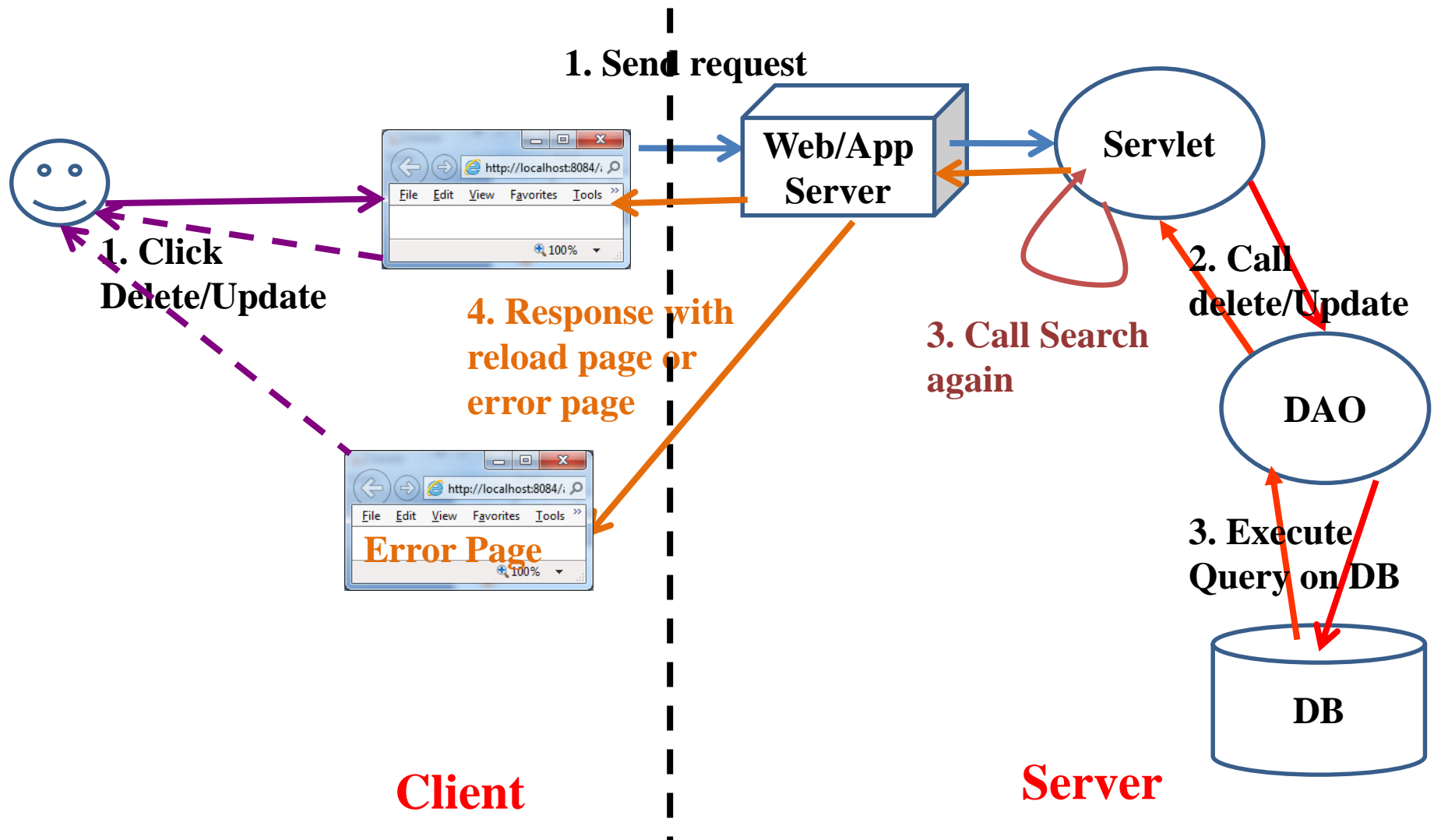
Search Page

Search Value

| No. | Username | Password | Last name | Role | Delete |
|-----|----------|----------|--------------|-------------------------------------|------------------------|
| 1 | IA1161 | 123456 | Class IA1161 | <input type="checkbox"/> | Delete |
| 2 | khanh | kieu123 | Khanh Kieu | <input checked="" type="checkbox"/> | Delete |
| 3 | SE1161 | 123456 | Class SE1161 | <input type="checkbox"/> | Delete |
| 4 | SE1162 | 123456 | Class Se1162 | <input type="checkbox"/> | Delete |
| 5 | SE1163 | 123456 | Class SE1163 | <input type="checkbox"/> | Delete |

How to write CRUD Web Application

Interactive Server Model



How to write CRUD Web Application

Delete Function



Welcome, khanh

Search Page

Search Value

| No. | Username | Password | Last name | Role | Delete |
|-----|----------|----------|--------------|-------------------------------------|------------------------|
| 1 | IA1161 | 123456 | Class IA1161 | <input type="checkbox"/> | Delete |
| 2 | khanh | kieu123 | Khanh Kieu | <input checked="" type="checkbox"/> | Delete |
| 3 | SE1161 | 123456 | Class SE1161 | <input type="checkbox"/> | Delete |
| 4 | SE1162 | 123456 | Class Se1162 | <input type="checkbox"/> | Delete |
| 5 | SE1163 | 123456 | Class SE1163 | <input type="checkbox"/> | Delete |

http://localhost:8084/SE1162Servlet/SE1162Servlet?btAction=delete&pk=IA1161&lastSearchValue=a

Sessions & Listeners

Hidden Form Fields

- Simplest technique to **maintain the state of an end user**.
- **Insert** the session identifier into the **hidden form field** in the HTML of each page
- **Embedded the hidden form field in an HTML form and not visible** when you view an HTML file in a browser window.
- The session information can be **extracted** by the application by **searching** for these fields. The servlets or JSP pages read the field using **request.getParameter()**.
- **Syntax**

<input type="hidden" name="..." value="...">

- **Ex**

`<input type="hidden" name="productId" value="P01">`
- **Advantages**
 - **Simplest** way to implement session tracking
 - Displays **nothing** on the HTML page but can be used to hold any kind of data
 - Helps to maintain a **connection between two pages**
- **Disadvantages:**
 - **Work** on the **dynamic pages**.
 - This method of session tracking **displays sensitive information to the user**.

How to write CRUD Web Application

Update Function



http://localhost:8084/SE1162Servlet/SE1162Servlet?txtSearchValue=a&btAction=Search

Welcome, khanh

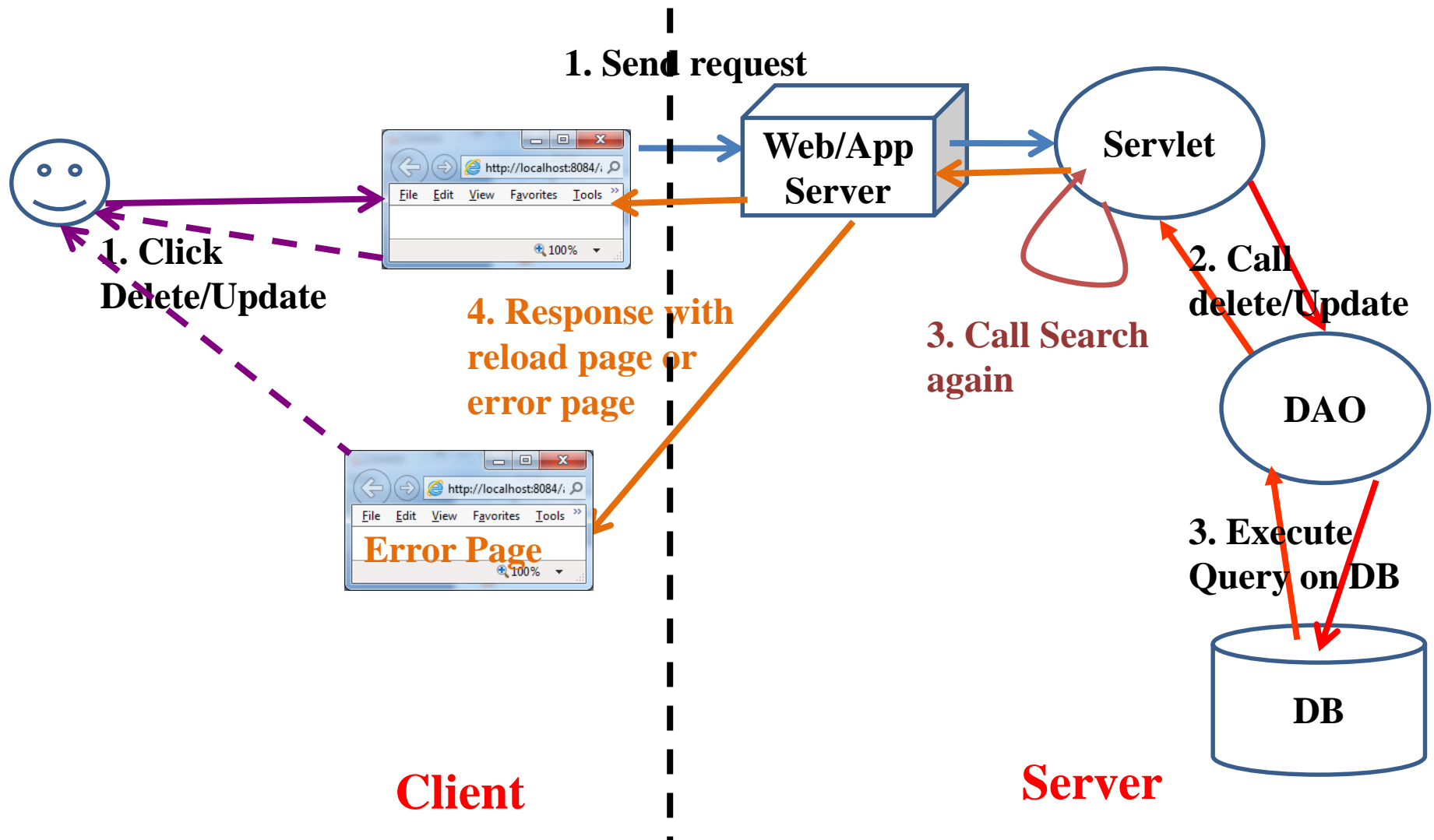
Search Page

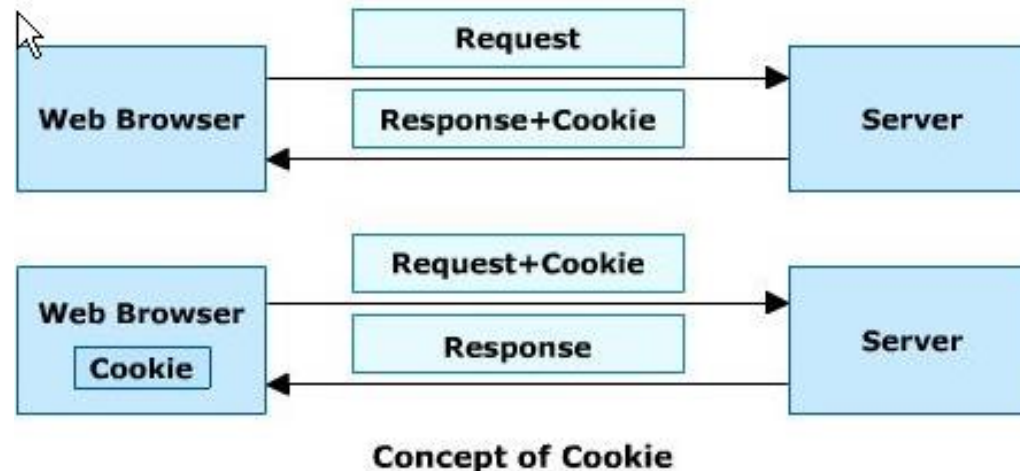
Search Value

| No. | Username | Password | Last name | Role | Delete | Update |
|-----|----------|----------|--------------|-------------------------------------|------------------------|---------------------------------------|
| 1 | IA1161 | 123456 | Class IA1161 | <input type="checkbox"/> | Delete | <input type="button" value="Update"/> |
| 2 | khanh | kieu123 | Khanh Kieu | <input checked="" type="checkbox"/> | Delete | <input type="button" value="Update"/> |
| 3 | SE1161 | 123456 | Class SE1161 | <input type="checkbox"/> | Delete | <input type="button" value="Update"/> |
| 4 | SE1162 | 123456 | Class Se1162 | <input type="checkbox"/> | Delete | <input type="button" value="Update"/> |
| 5 | SE1163 | 123456 | Class SE1163 | <input type="checkbox"/> | Delete | <input type="button" value="Update"/> |

How to write CRUD Web Application

Interactive Server Model





Sessions & Listeners

Cookies

- **Advantages**

- **Remember** user IDs and password.(low security)
- To **track** visitors on a Web site for better service and new features.
- Cookies enable **efficient ad processing**.
- Support **e-advertisement** on Internet.
- Security (can not affect virus).

- **Disadvantages**

- **Personal information** is **exposed** to the **other users**.
(spam/ junk mail, pop up ...)
- Cookies fails to work if the security level is set too high in the Internet browser.
- Most browsers **enable** the **user** at the **client machine** to **deactivate** (not to accept) cookies.
- The size and number of cookies **stored are limited**.

- **Note**

- **Browser is accepted cookies**
- **Cookies are stored at**
 - C:\Documents and Settings\LoggedInUserName\Cookies\LoggedInUserName@ContextPath[n].txt
 - C:\Users\LoggedInUserName\AppData\Local\Microsoft\Windows\Temporary Internet Files\LoggedInUserName@host[n].txt
- Cookies are existed following the **setMaxAge** and deleted automatically by OS

Sessions & Listeners

Cookies

- The servlet API provides **javax.servlet.http.Cookie** class for creating and working with cookies
- The **constructor** for the cookies class is: `Cookie(java.lang.String name, java.lang.String value)`
- **Sending Cookie**

| Methods | Descriptions |
|------------------|---|
| addCookie | <ul style="list-style-type: none"> - public void addCookie(cookie1); - Adds field to the HTTP response headers to send cookies to the browser, one at a time - Adds specified cookie to the response - Can be called multiple times to set more than one cookies |
| setValue | <ul style="list-style-type: none"> - public void setValue(String newValue); - Assigns a new value to a cookie after the cookie is created. In case if binary value is used, base 64 can be used for encoding |
| setPath | <ul style="list-style-type: none"> - public void setPath(String path); - Sets the path for the cookie. The cookie is available to all the pages specified in the directory and its subdirectories. A cookie's path must have the servlet which sets the cookie |
| setMaxAge | <ul style="list-style-type: none"> - public void setMaxAge(int expiry); - The maximum age of the cookie in seconds. If the value is positive, then the cookie will expire after that many seconds which is specified by the expiry |

Sessions & Listeners

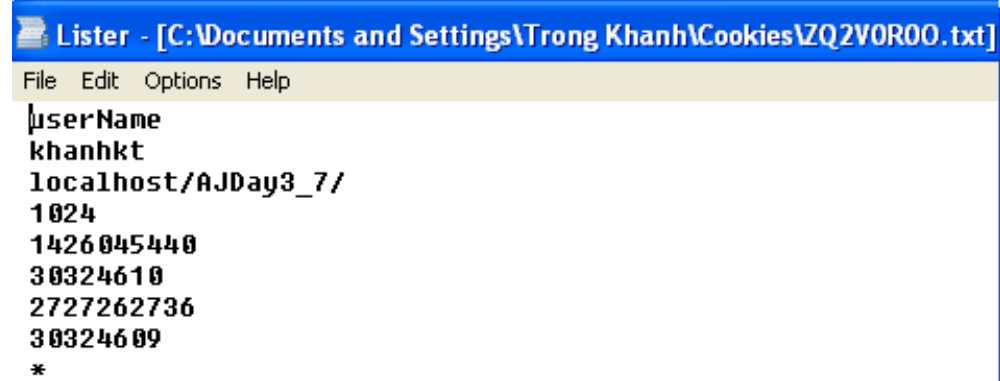
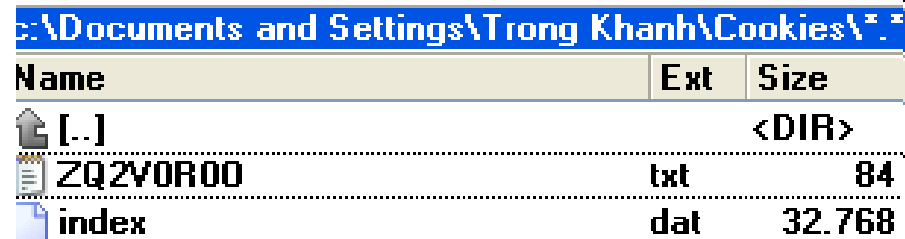
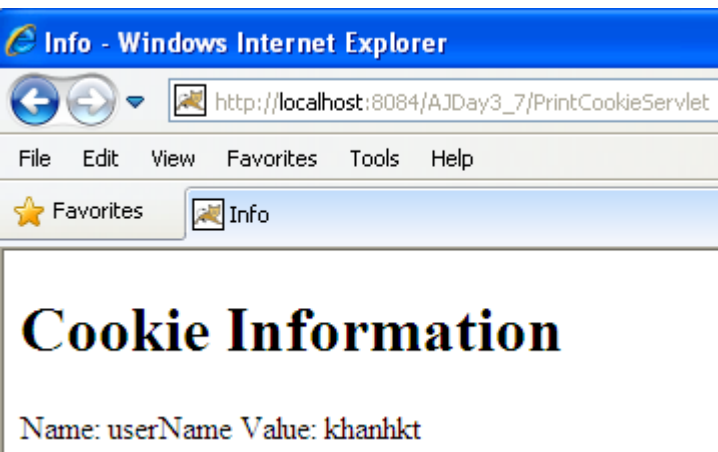
Cookies

- Reading Cookie

| Methods | Descriptions |
|-------------------|--|
| getCookies | <ul style="list-style-type: none">- Cookie [] cookies = request.getCookies();- Returns an array containing all of the Cookie objects the client sends with the request |
| getMaxAge | <ul style="list-style-type: none">- public int getMaxAge();- Returns the maximum age of the cookie.- Returns an integer which specify the maximum age of the cookies in seconds |
| getValue | <ul style="list-style-type: none">- public String getValue();- Returns the value of the cookie |
| getName | <ul style="list-style-type: none">- public String getName()- Returns the name of cookie. Once the cookie has been created its name cannot be changed |
| getPath | <ul style="list-style-type: none">- public void getPath()- Returns the path on the server to which the client return the cookie. The cookie is available to all sub paths on the server |

Sessions & Listeners

Cookies – Example



Sessions & Listeners

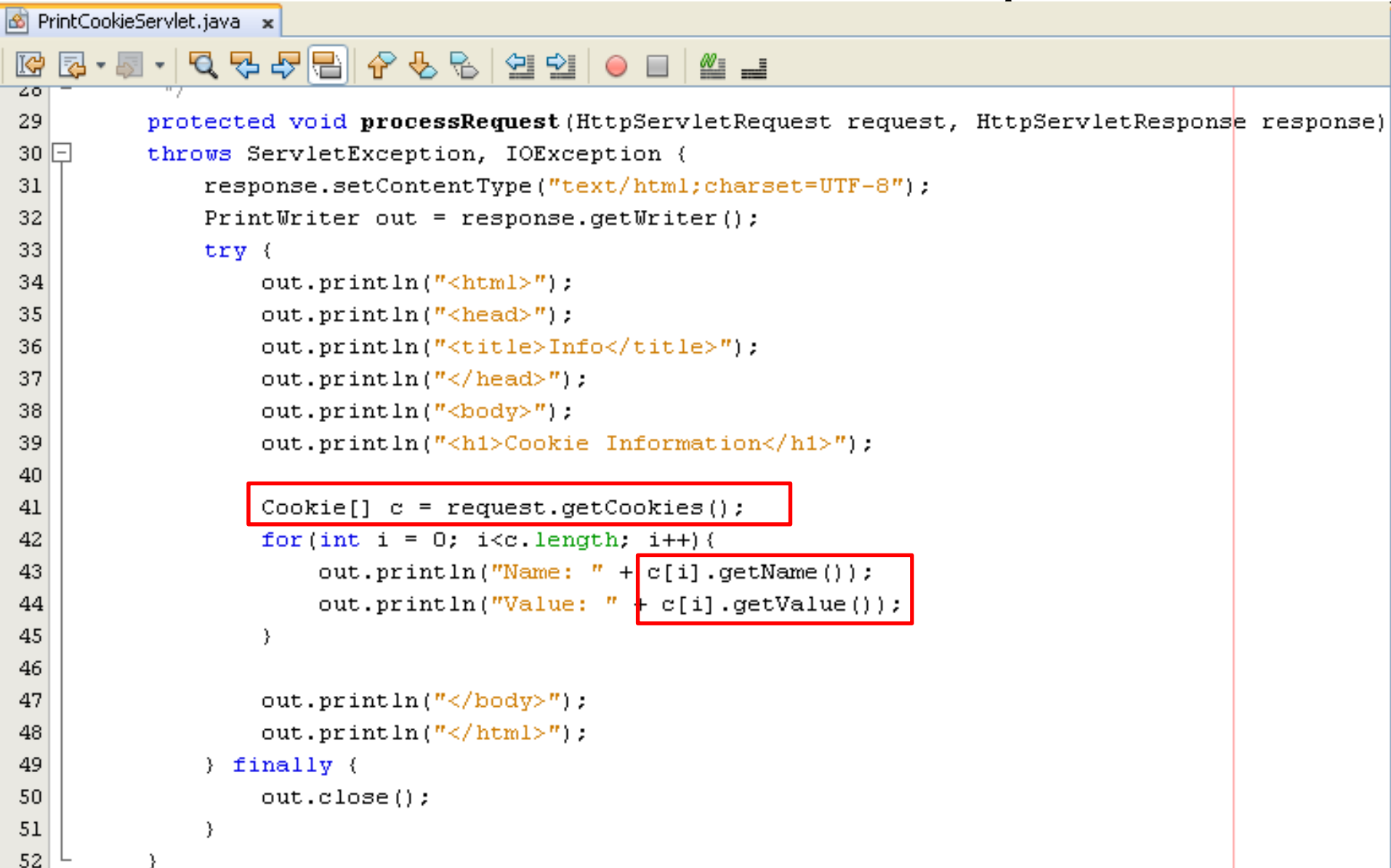
Cookies – Example

```

AddCookieServlet.java x
29  protected void processRequest(HttpServletRequest request, HttpServletResponse response)
30  throws ServletException, IOException {
31      response.setContentType("text/html;charset=UTF-8");
32      PrintWriter out = response.getWriter();
33      try {
34          out.println("<html>");
35          out.println("<head>");
36          out.println("<title>Add</title>");
37          out.println("</head>");
38          out.println("<body>");
39          out.println("<h1>Adding Cookie processing</h1>");
40
41          String sName = request.getParameter("txtName");
42          Cookie cookie = new Cookie("userName", sName);
43          cookie.setMaxAge(60*5);
44          response.addCookie(cookie);
45          out.println("<a href='PrintCookieServlet'>Print Cookie</a>");
46
47          out.println("</body>");
48          out.println("</html>");
49      } finally {
50          out.close();
51      }
52  }
  
```

Sessions & Listeners

Cookies – Example



```
PrintCookieServlet.java x
protected void processRequest(HttpServletRequest request, HttpServletResponse response)
throws ServletException, IOException {
    response.setContentType("text/html;charset=UTF-8");
    PrintWriter out = response.getWriter();
    try {
        out.println("<html>");
        out.println("<head>");
        out.println("<title>Info</title>");
        out.println("</head>");
        out.println("<body>");
        out.println("<h1>Cookie Information</h1>");

        Cookie[] c = request.getCookies();
        for(int i = 0; i<c.length; i++){
            out.println("Name: " + c[i].getName());
            out.println("Value: " + c[i].getValue());
        }

        out.println("</body>");
        out.println("</html>");
    } finally {
        out.close();
    }
}
```

How to write CRUD Web Application Requirements

- After the web application had searched and shown the result, some following functions are required
 - ...
 - The application allows to **store the user's account** that the **user** can **access the resource without login in the second access.** **The username can be shown at the search result**
 - ...
- The GUI of web application is present as following

How to write CRUD Web Application

Store Info



Welcome, khanh

Search Page

Search Value

How to write CRUD Web Application

Interactive Server Model

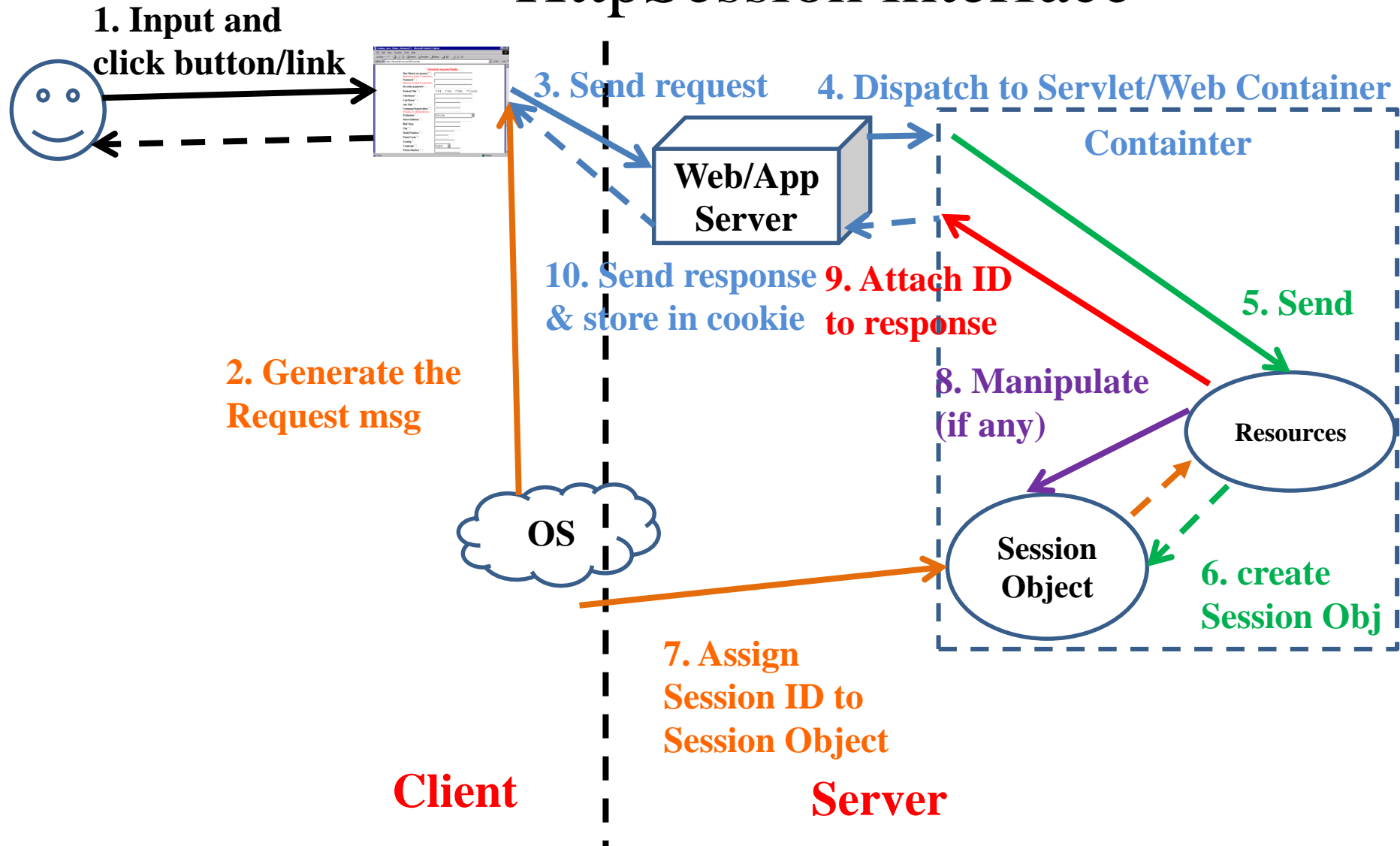
Draw your self

Client

Server

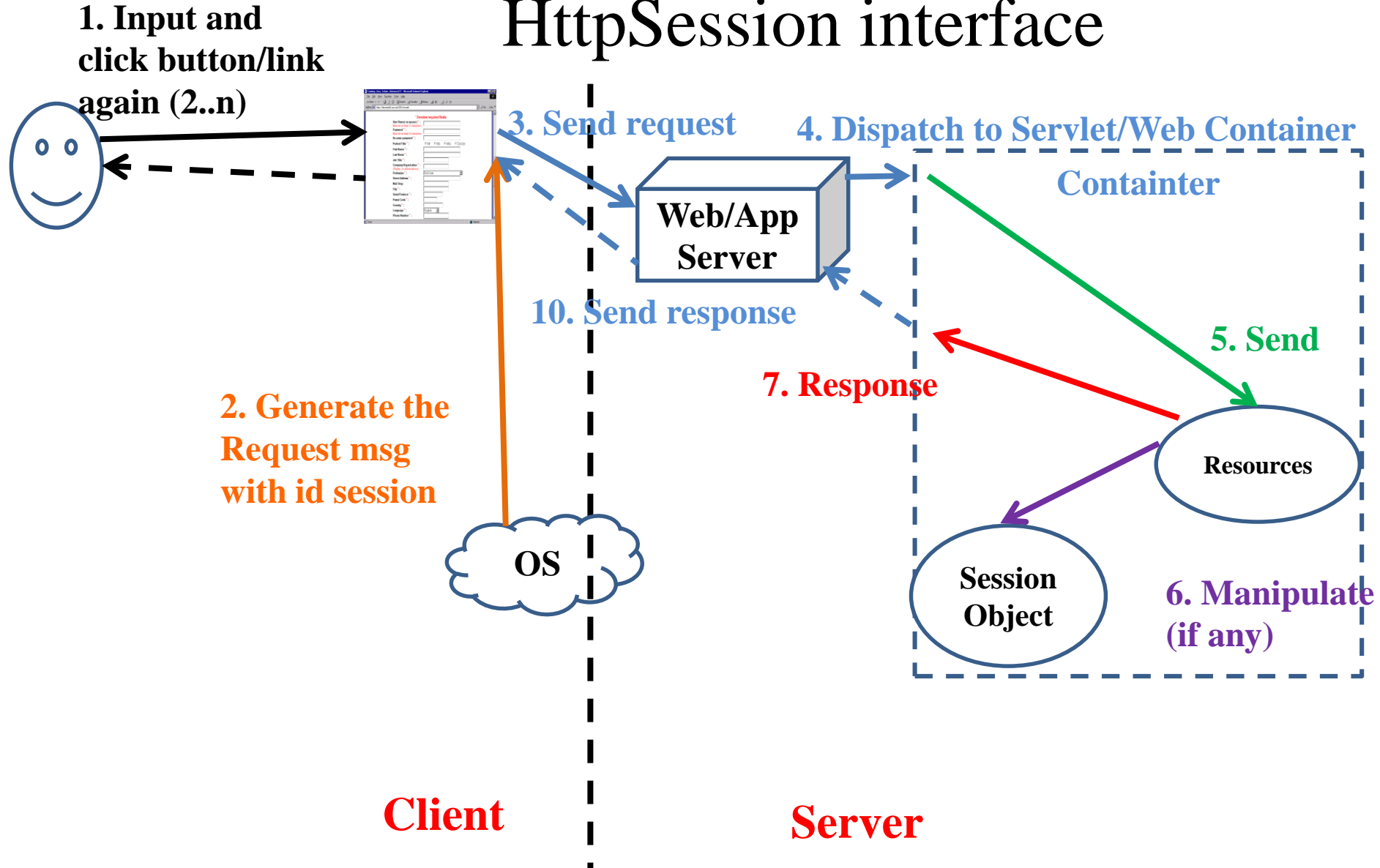
Sessions & Listeners

HttpSession interface



Sessions & Listeners

HttpSession interface



Sessions & Listeners

Session Management: General Principles

- Each of these requests **needs to carry a unique ID**, which identifies the session to which it belongs.
- The web application will **allocate this unique ID** on the first request from the client.
- The ID **must be passed back to the client** so that the client **can pass it back again with its next request**. In this way, the web application will know to which session the request belongs. This implies that the client **must need to store the unique ID somewhere—and** that's where session management mechanisms come in
- The **default mechanism for session management is cookie**

Sessions & Listeners

HttpSession interface

- Identifying user in a multi-page request scenario and information about that user
- Is used to **created** a **session between the client and server** by servlet container
 - When **users make a request**, the **server signs** it a **session object** and a **unique session ID**
 - The session ID matches the user with the session object in subsequent requests
 - The **session ID and the session object** are **passed** along with the **request** to the **server**
- **Session Timeout**
 - Is necessary as session utilizes the memory locations
 - Prevent the number of session increasing infinitely.
 - Set either in the web.xml file or can be set by the method **setMaxInactiveInterval()**

Sessions & Listeners

HttpSession interface Methods

| Methods | Descriptions |
|-------------------------------|--|
| getSession | <ul style="list-style-type: none">- request.getSession(boolean create);- Obtain a current session objects- The getSession() method with true parameter is used to create a new session (no current session) |
| getId | <ul style="list-style-type: none">- public String getId()- Returns a string containing the unique identifier assigned to this session. The servlet container assigns the identifier and it is implementation independent |
| getCreationTime | <ul style="list-style-type: none">- public long getCreationTime()- Returns the creation time of session. |
| getLastAccessedTime | <ul style="list-style-type: none">- public long getLastAccessedTime()- Returns the last accessed Time of session |
| getMaxInactiveInterval | <ul style="list-style-type: none">- public int getMaxInactiveInterval()- Returns the maximum time interval, in seconds, for which the servlet container will keep the session alive between the client accesses |
| setMaxInactiveInterval | <ul style="list-style-type: none">- public void setMaxInactiveInterval(int interval)- Specifies the time, in seconds, between the client requests before the servlet container invalidates the current session |

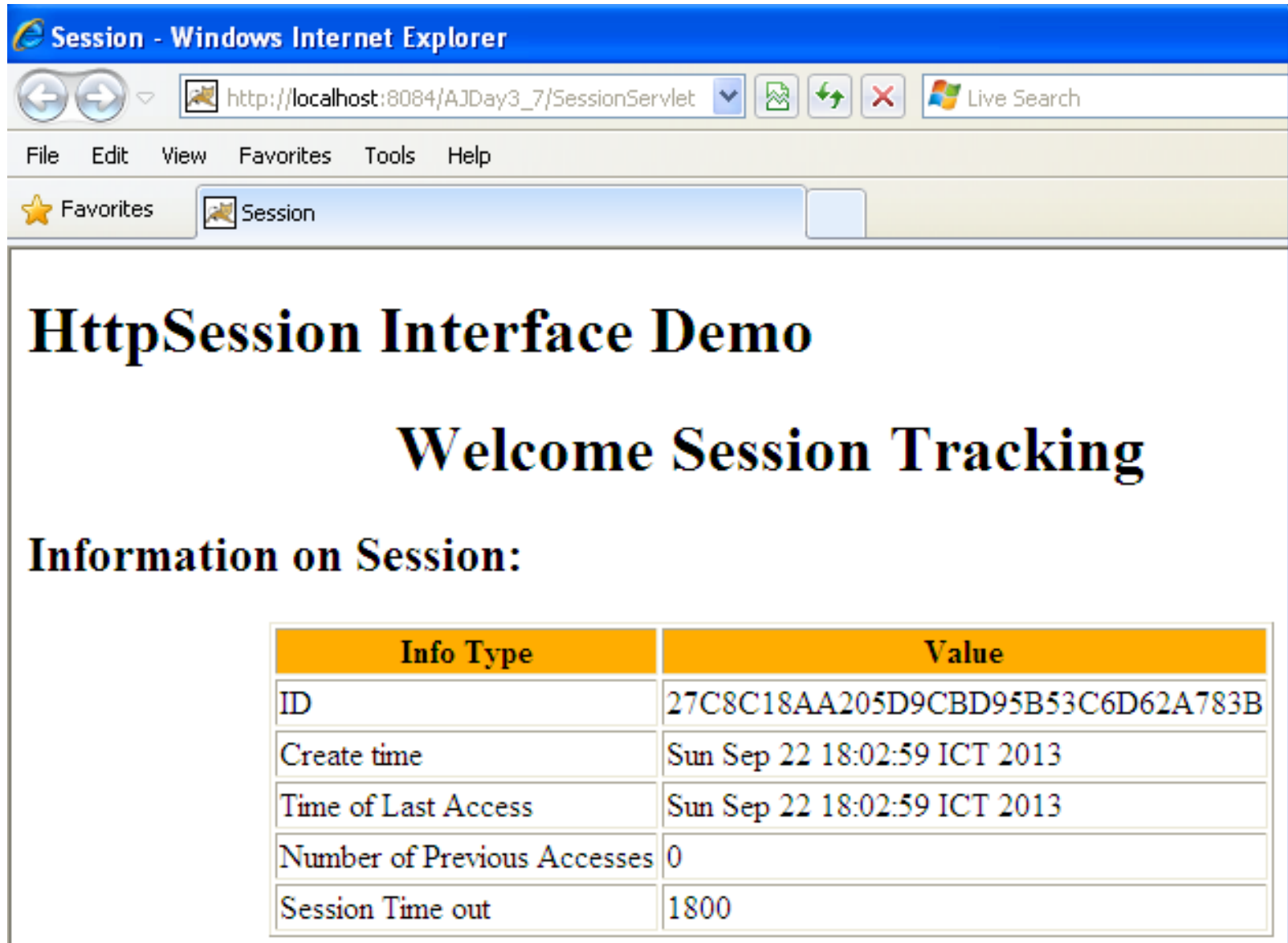
Sessions & Listeners

HttpSession interface Methods

| Methods | Descriptions |
|-------------------|--|
| isNew | <ul style="list-style-type: none">- public boolean isNew()- Returns true if the client is unaware about the session or choose not to be part of the session |
| invalidate | <ul style="list-style-type: none">- public void invalidate()- Invalidates the session and the objects bound to the session are bounded. This method throws <code>IllegalStateException</code> if called on already invalidated session- To avoid the hacker from causing any harm- Destroys the data in a session that another servlet or JSP might require in future. Therefore, invalidating a session should be done cautiously as sessions are associated with client, not with individual servlets or JSP pages |

Sessions & Listeners

HttpSession interface – Example



The screenshot shows a Windows Internet Explorer browser window titled "Session - Windows Internet Explorer". The address bar displays "http://localhost:8084/AJDay3_7/SessionServlet". The browser's menu bar includes "File", "Edit", "View", "Favorites", "Tools", and "Help". A "Favorites" bar is visible below the menu bar, showing a single item named "Session".

The main content area of the browser displays the following text:

HttpSession Interface Demo

Welcome Session Tracking

Information on Session:

| Info Type | Value |
|-----------------------------|----------------------------------|
| ID | 27C8C18AA205D9CBD95B53C6D62A783B |
| Create time | Sun Sep 22 18:02:59 ICT 2013 |
| Time of Last Access | Sun Sep 22 18:02:59 ICT 2013 |
| Number of Previous Accesses | 0 |
| Session Time out | 1800 |

Sessions & Listeners

HttpSession interface – Example

```

30  protected void processRequest(HttpServletRequest request, HttpServletResponse response)
31      throws ServletException, IOException {
32      response.setContentType("text/html;charset=UTF-8");
33      PrintWriter out = response.getWriter();
34      try {
35          out.println("<html>");
36          out.println("<head>");
37          out.println("<title>Session</title>");
38          out.println("</head>");
39          out.println("<body>");
40          out.println("<h1>HttpSession Interface Demo</h1>");
41
42          HttpSession session = request.getSession(true);
43          String heading;
44          Integer accessCount = (Integer) session.getAttribute("accessCount");
45          if (accessCount == null) {
46              accessCount = new Integer(0);
47              heading = "Welcome Session Tracking";
48          } else {
49              heading = "Comeback";
50              accessCount = new Integer(accessCount.intValue() + 1);
51          }

```

Sessions & Listeners

HttpSession interface – Example

```

DateFormat formatter = DateFormat.getDateInstance(
    DateFormat.MEDIUM, DateFormat.MEDIUM);
out.println("<H1 ALIGN=\"CENTER\">" + heading +
    "</H1>\n<H2>Information on Session:</H2>\n"
    + "<TABLE BORDER=1 ALIGN=\"CENTER\">\n<TR BGCOLOR=\""
    + "\"#FFA000\">\n <TH>Info Type<TH>Value\n"
    + "<TR>\n <TD>ID\n <TD>" + session.getId() +
    "\n<TR>\n <TD>Create time\n <TD>"
    + new Date(session.getCreationTime()) +
    "\n<TR>\n <TD>Time of Last Access\n <TD>"
    + new Date(session.getLastAccessedTime()) +
    "\n<TR>\n <TD>Number of Previous Accesses\n <TD>"
    + accessCount + "\n<TR>\n <TD>Session Time out\n <TD>" +
    session.getMaxInactiveInterval()
    + "<TABLE>\n</BODY></HTML>");
out.println("</body>");
out.println("</html>");

} finally {
    out.close();
}
}

```




Comeback

| Info Type | Value |
|-----------------------------|----------------------------------|
| ID | 198A528D0D5B47FD7BCBDA0FCEFA3229 |
| Create time | Sun Sep 22 18:05:14 ICT 2013 |
| Time of Last Access | Sun Sep 22 18:05:14 ICT 2013 |
| Number of Previous Accesses | 1 |
| Session Time out | 1800 |

Sessions & Listeners

HttpSession interface

- **Distributed Session**

- A session is **available** to be **shared** between web resources in a single web application (*e.g. a session cannot cross web application boundaries*)

- **Session Death** is **controlled** in one of **3** ways

- **Application Server Global Default**
- **Web Application Default (minutes)**
 - A negative value or zero value causes the session to never expire



```

web.xml
General  Servlets  Filters  Pages
132  <session-config>
133      <session-timeout>
134          30
135      </session-timeout>
136  </session-config>
    
```

- Individual Session Setting using **setMaxInactiveInterval()** method
 - A negative value supplied as an argument causes the session to never expire

- **Other Session APIs**

- **HttpSession.getServletContext()** returns the **ServletContext** that the session is attached

How to write CRUD Web Application

Shopping Cart



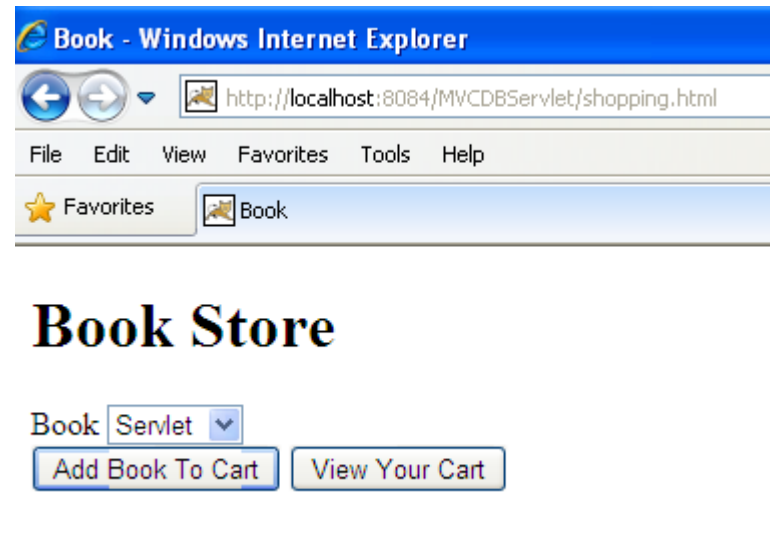
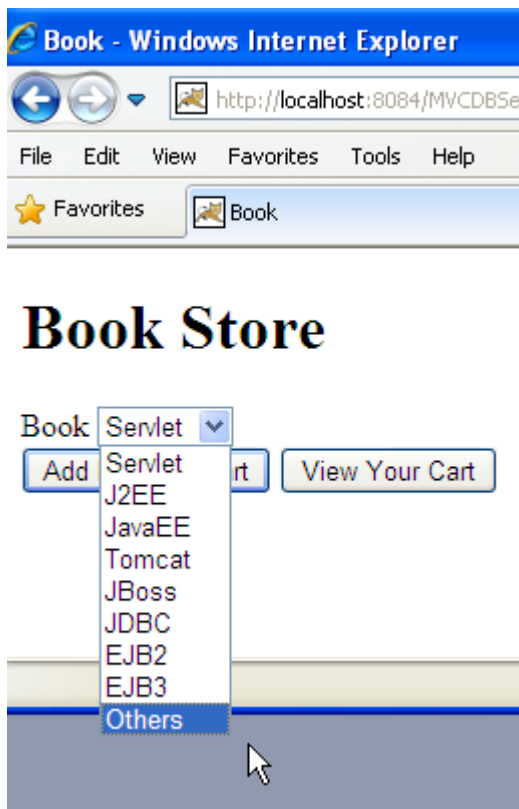
The screenshot shows a Windows Internet Explorer browser window. The title bar reads "Login - Windows Internet Explorer". The address bar shows the URL "http://localhost:8084/MVCDBServlet/". The menu bar includes "File", "Edit", "View", "Favorites", "Tools", and "Help". The Favorites bar shows a single item named "Login". The main content area displays the "Login Page" with the following elements:

- A "Username" label followed by a text input field.
- A "Password" label followed by a text input field.
- Two buttons: "Login" and "Reset".
- A blue underlined link: "Click here to go to buy Advanced Java Book". A mouse cursor is hovering over this link.

The status bar at the bottom of the browser window shows the full path: "http://localhost:8084/MVCDBServlet/shopping.html".

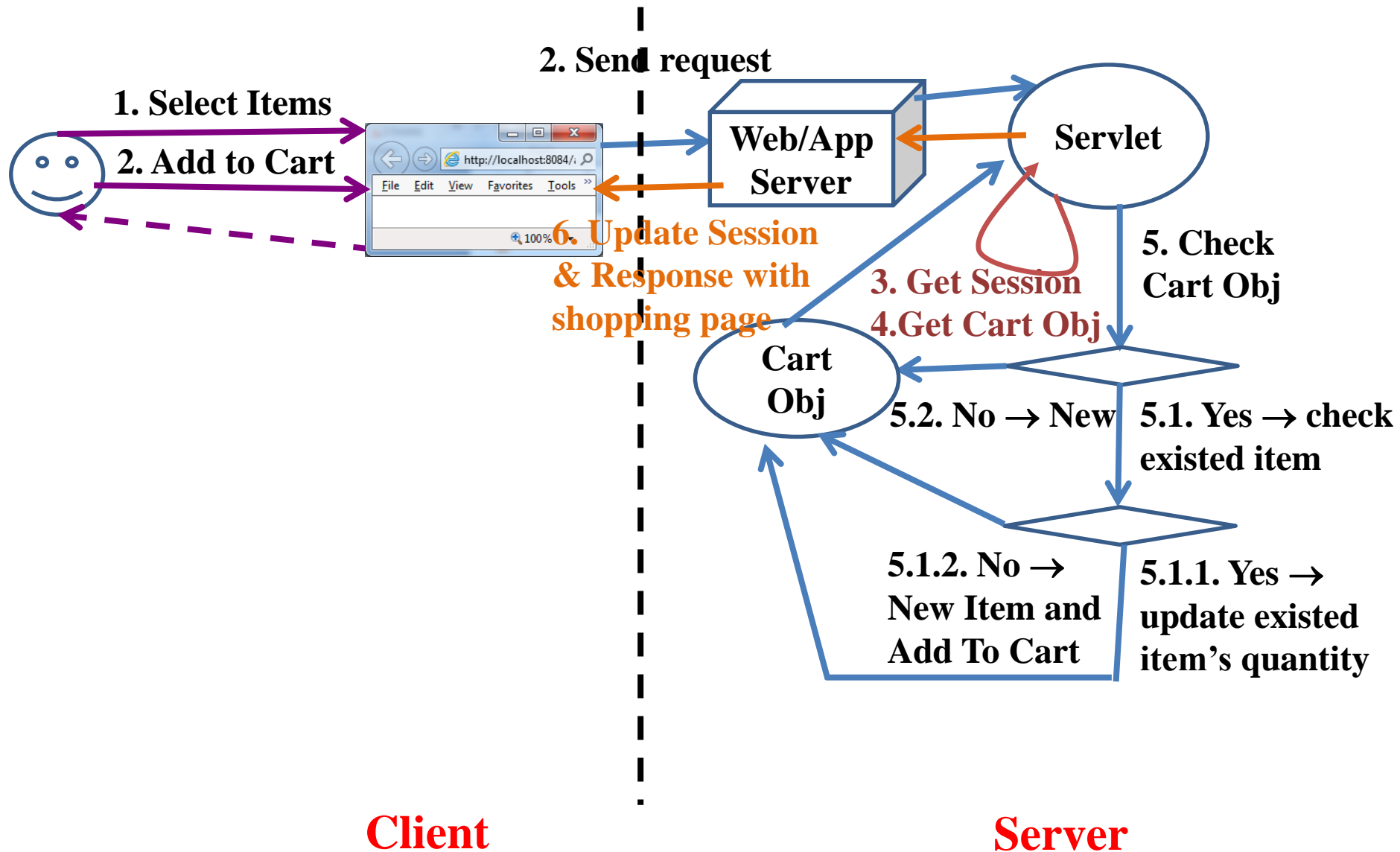
How to write CRUD Web Application

Shopping Cart – Add To Cart



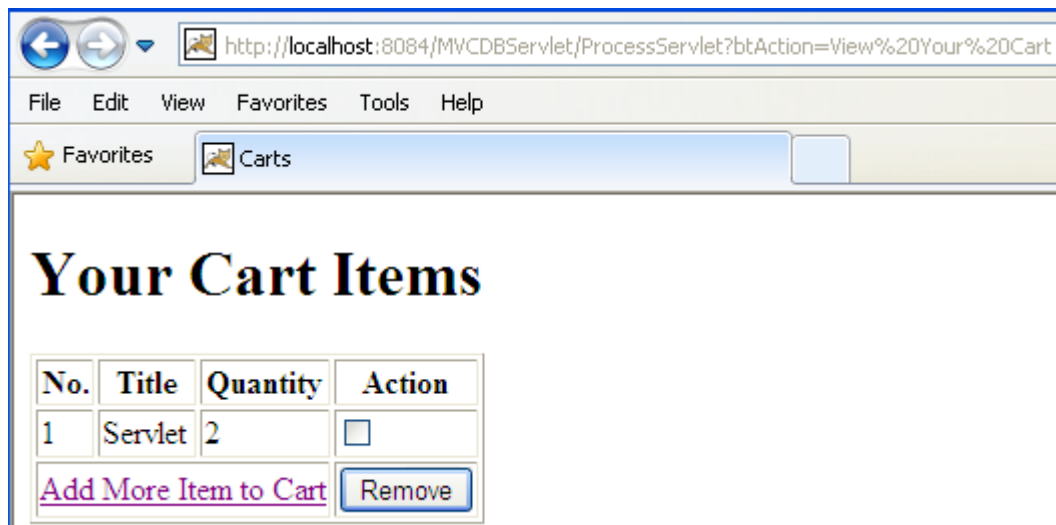
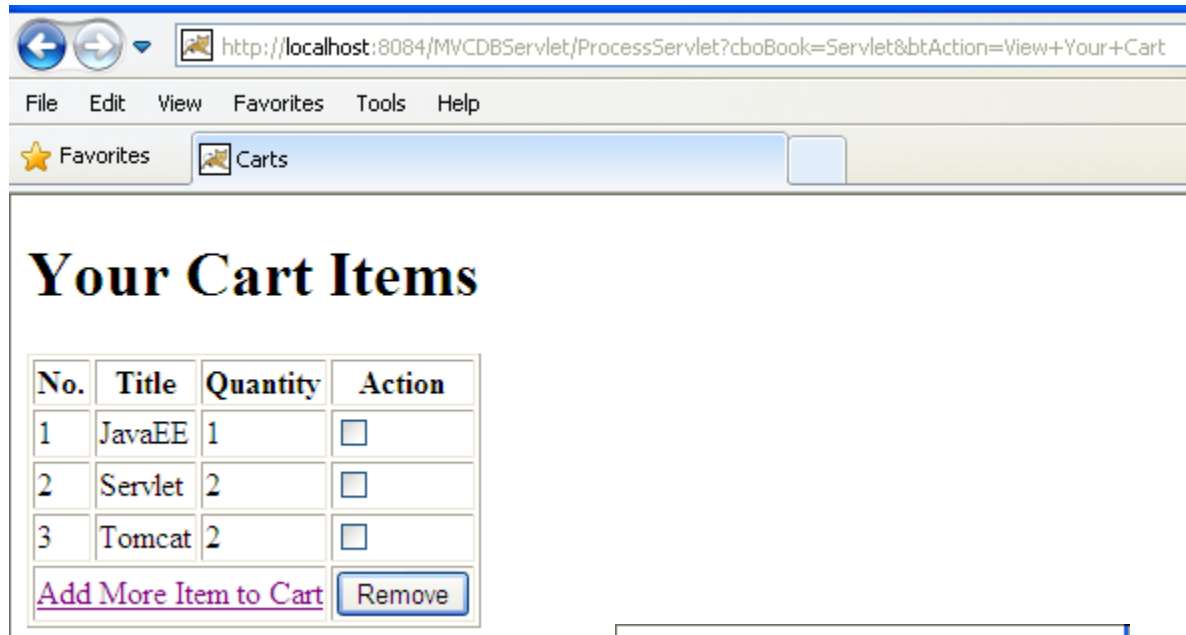
How to write CRUD Web Application

Interactive Server Model – Add To Cart



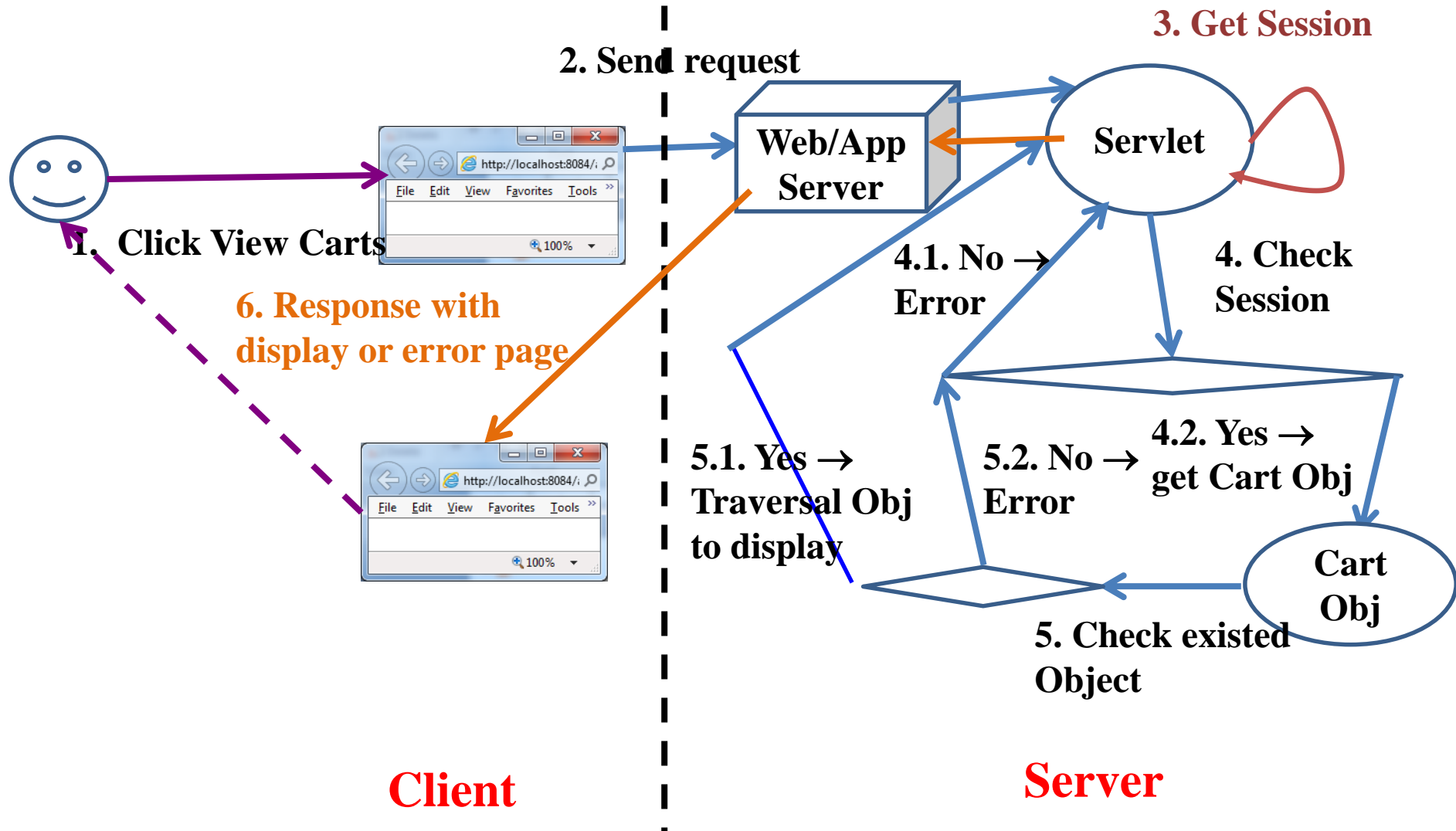
How to write CRUD Web Application

Shopping Cart – View Cart



How to write CRUD Web Application

Interactive Server Model – View Cart



How to write CRUD Web Application

Shopping Cart – Remove Cart

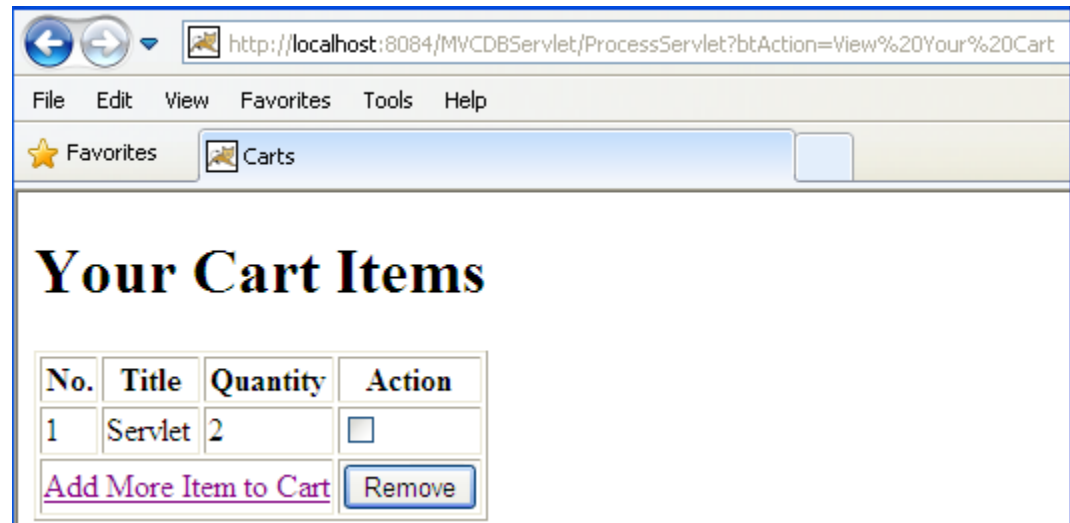
Your Cart Items

| No. | Title | Quantity | Action |
|-----|---------|----------|-------------------------------------|
| 1 | JavaEE | 1 | <input checked="" type="checkbox"/> |
| 2 | Servlet | 2 | <input type="checkbox"/> |
| 3 | Tomcat | 2 | <input checked="" type="checkbox"/> |

[Add More Item to Cart](#)

http://localhost:8084/MVCDBServlet/ProcessServlet?btAction=View%20Your%20Cart

File Edit View Favorites Tools Help

★ Favorites  Carts

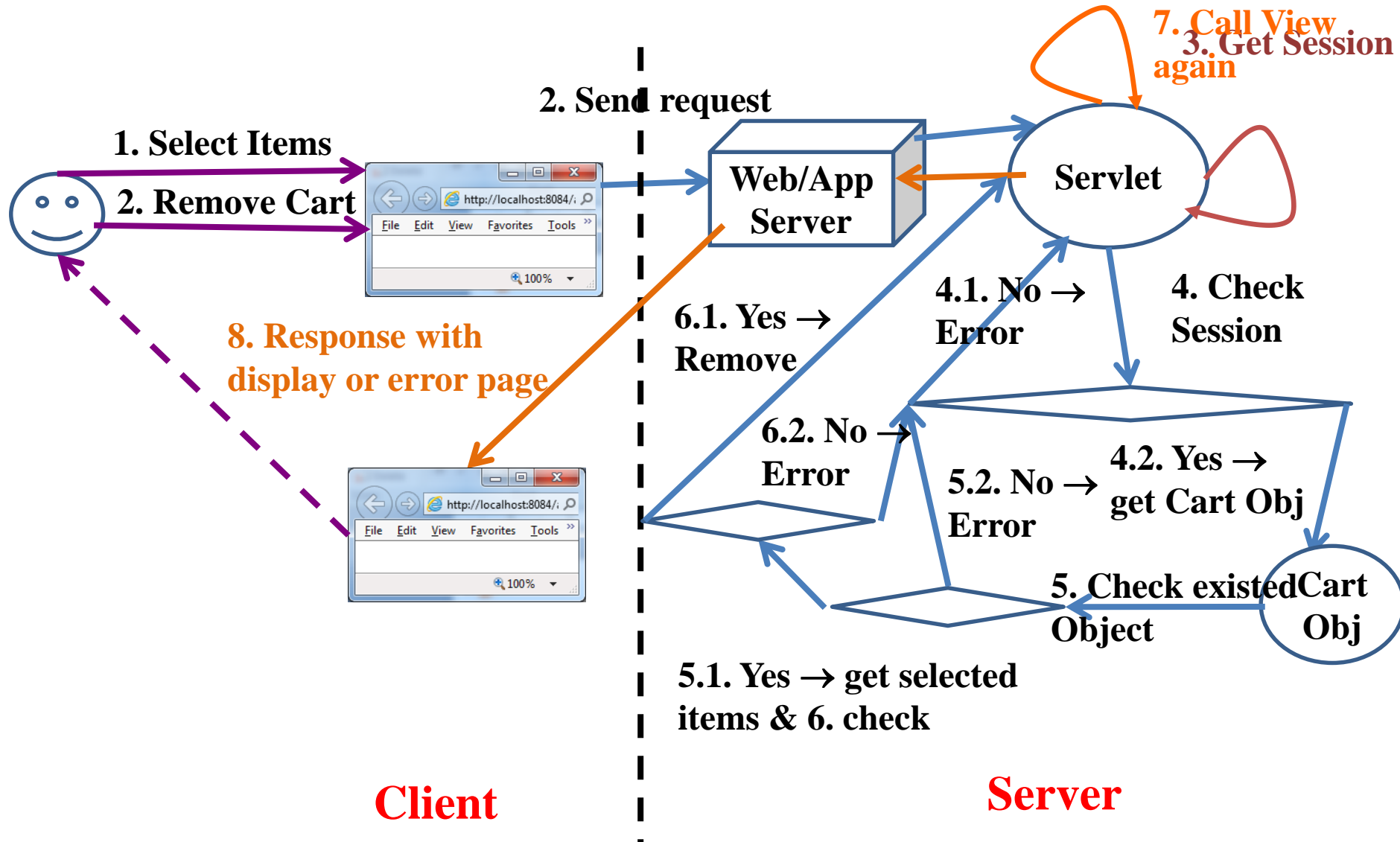
Your Cart Items

| No. | Title | Quantity | Action |
|-----|---------|----------|--------------------------|
| 1 | Servlet | 2 | <input type="checkbox"/> |

[Add More Item to Cart](#)

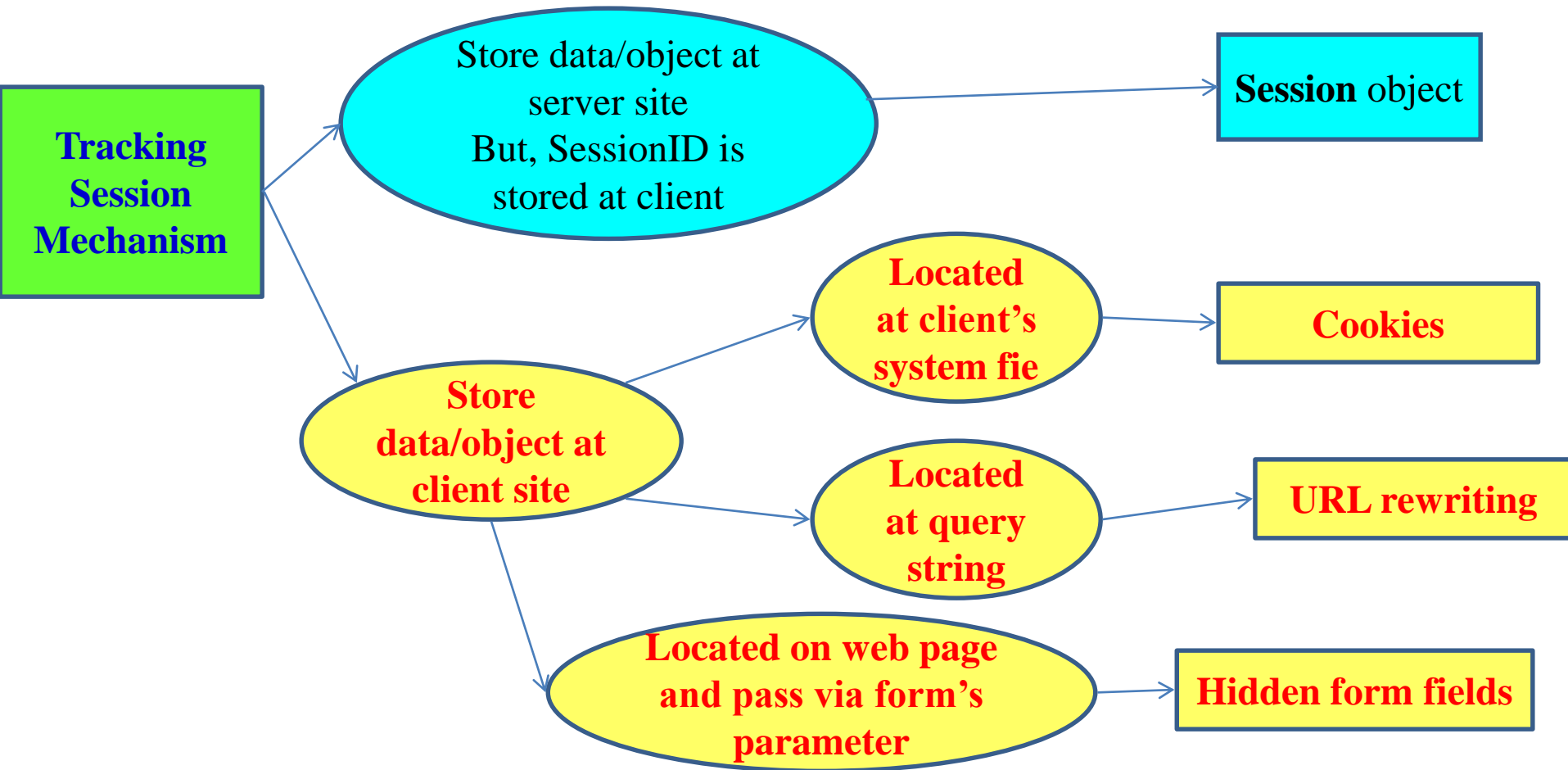
How to write CRUD Web Application

Interactive Server Model – Remove



Sessions & Listeners

Conclusion



Error Handling in Servlet

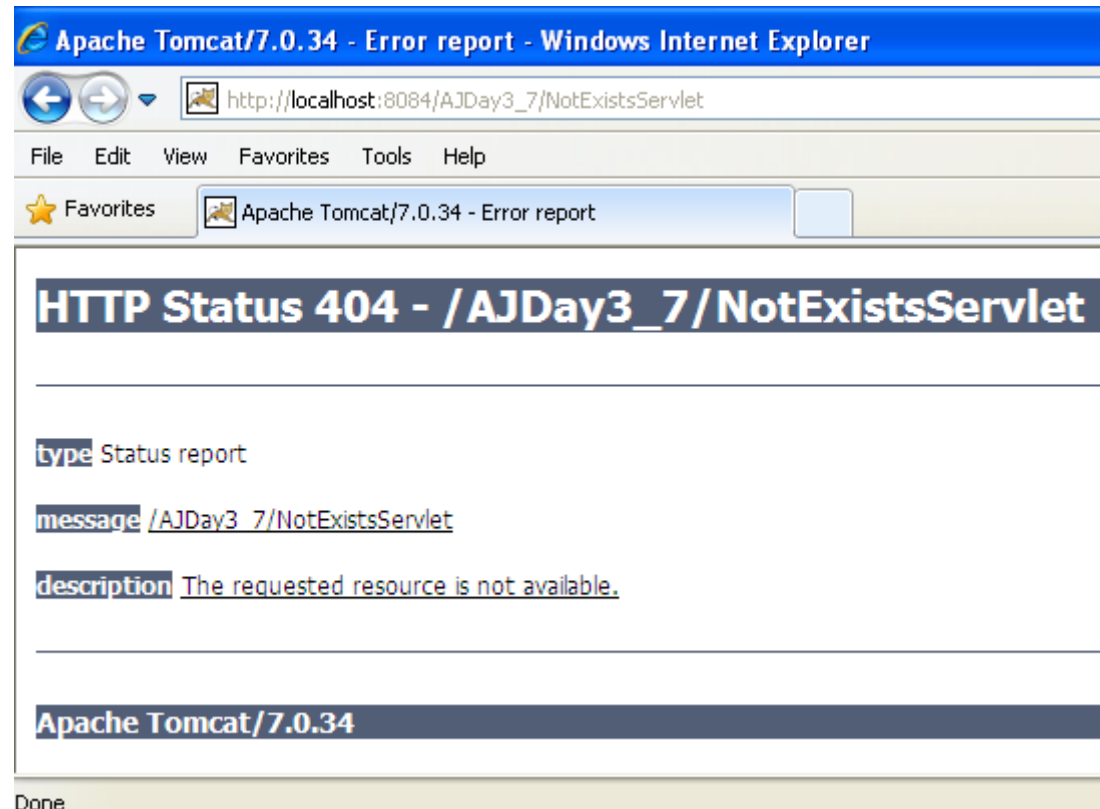
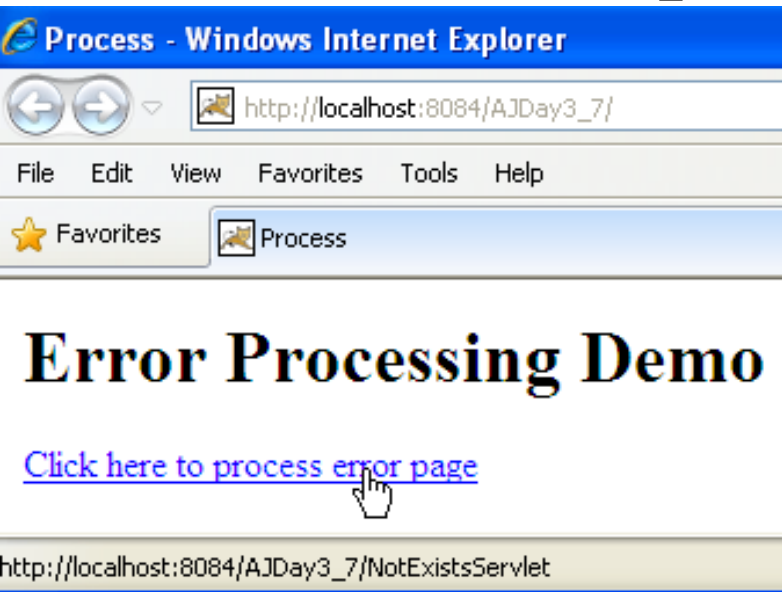
Reporting Error

- **There are many situations occur an error**
 - A requested page may be moved from one location to another.
 - The address may be wrongly typed.
 - The requested page may be forbidden, may be temporarily deleted or correct HTTP version might not have found.
 - There are other situations where an error may generated.
- Error during the execution of a web application are reported

| Methods | Descriptions |
|------------------|---|
| sendError | <ul style="list-style-type: none"> - public void sendError(int sc) throws IOException - Checks for the status code and sends to the user the specified response message - After sending the error message the buffer is cleared - <code>response.sendError(response.SC_NOT_FOUND);</code> |
| setStatus | <ul style="list-style-type: none"> - public void HttpServletResponse.setStatus(int sc) - This code is specified earlier so that on receiving the setStatus() method, the error message is throw. Or redirected to another default Web page - <code>response.setStatus(response.SC_NOT_MODIFIED);</code> |

Error Handling in Servlet

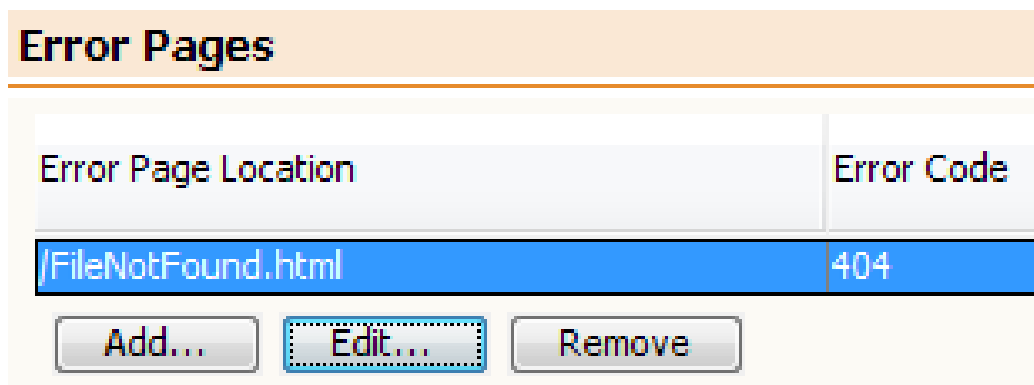
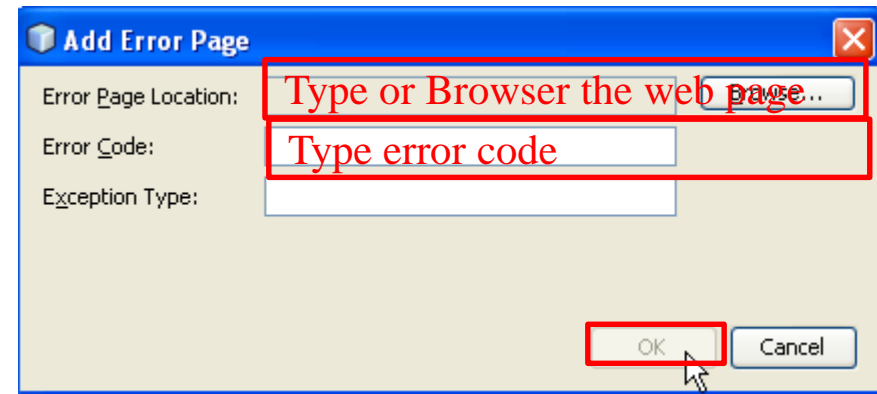
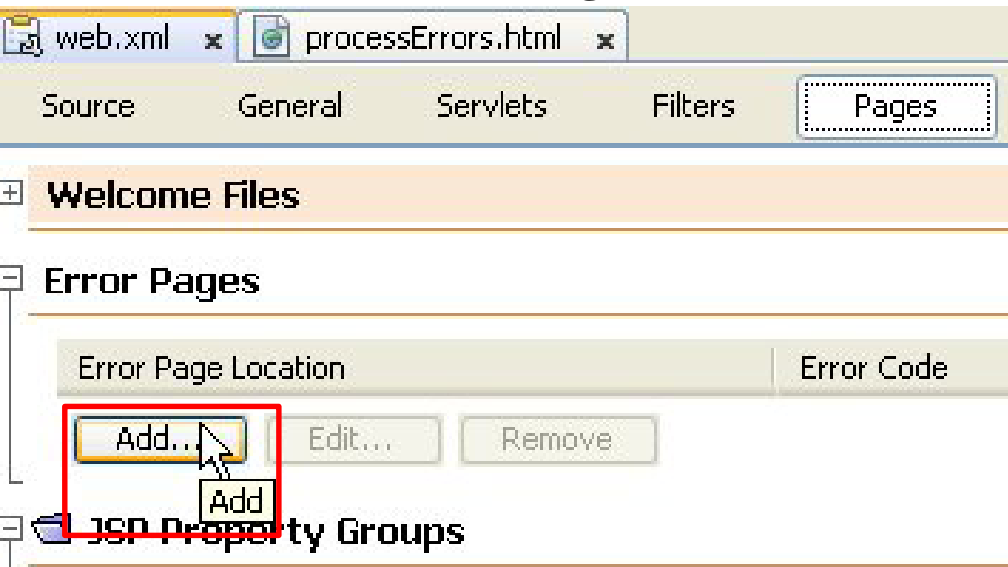
Reporting Error – Example



Error Handling in Servlet

Reporting Error – Example

- Addition the following contents to web.xml file
 - In web.xml, choose Page tab, choose Error Pages, click Add

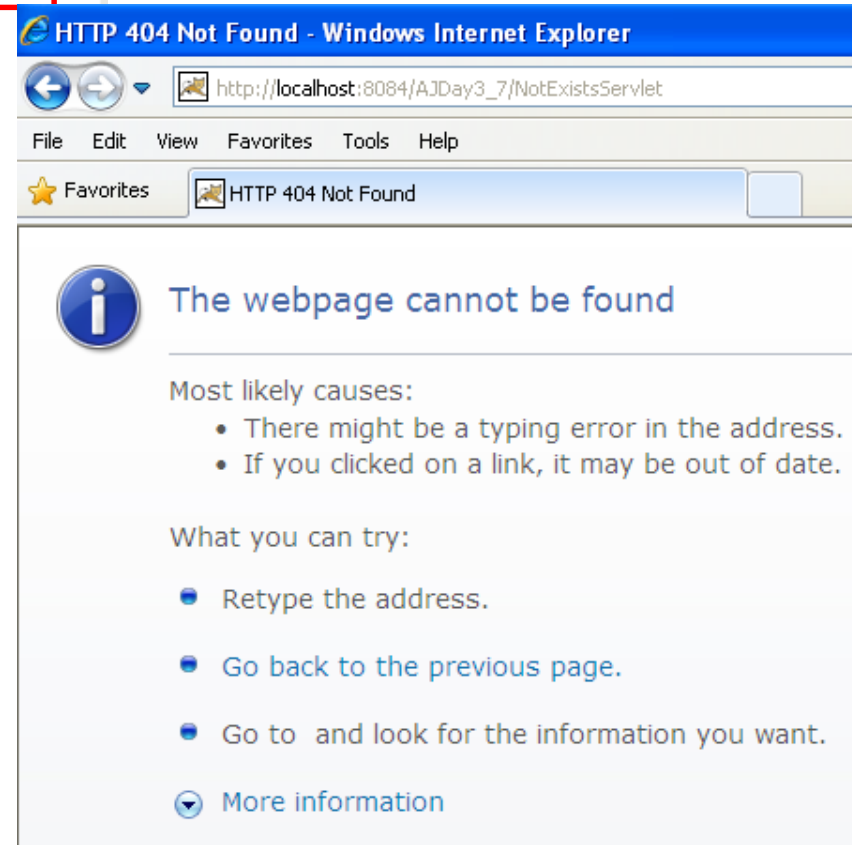


Error Handling in Servlet

Reporting Error – Example

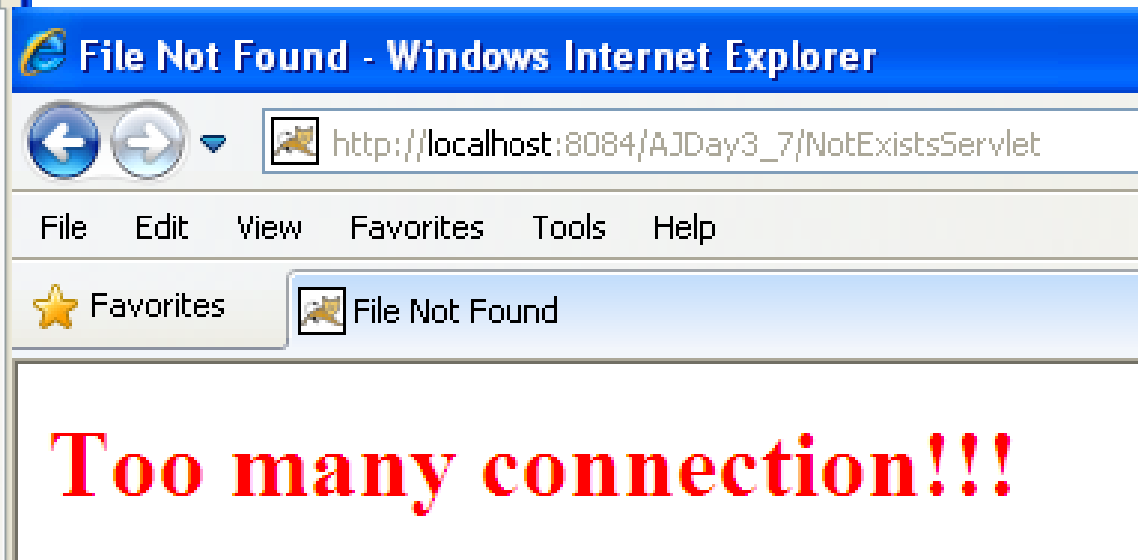
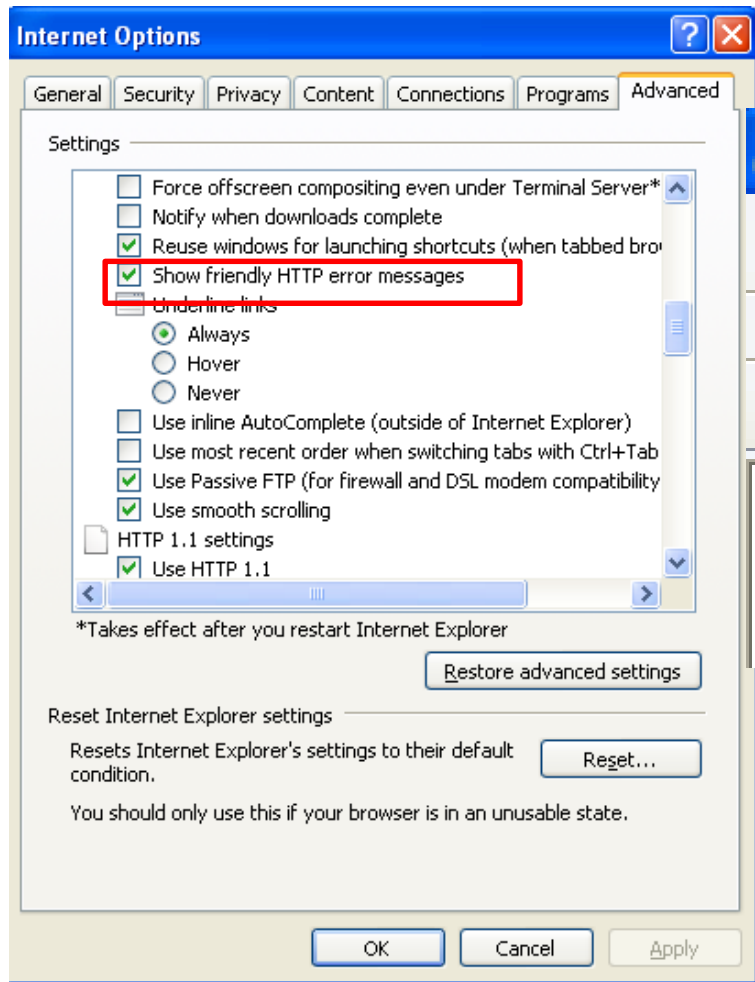
```

web.xml
Source  General  Servlets  Filters  Pages  References  Security
172  <welcome-file-list>
173      <welcome-file>logine.html</welcome-file>
174  </welcome-file-list>
175  <error-page>
176      <error-code>404</error-code>
177      <location>/fileNotFound.html</location>
178  </error-page>
179  </web-app>
  
```



Error Handling in Servlet

Reporting Error



Too many connection!!!

Uncheck the option “Show friendly HTTP error messages” from Tools/ “Internet Options” to set up the browser would be presented the user defined message

Error Handling in Servlet

Reporting Error – Example

ErrorProcessingServlet.java x

```

Source History
16  * @author Trong Khanh
17  */
18  public class ErrorProcessingServlet extends HttpServlet {
19
20      /**...*/
30  protected void processRequest(HttpServletRequest request, HttpServletResponse response)
31      throws ServletException, IOException {
32      response.setContentType("text/html;charset=UTF-8");
33      PrintWriter out = response.getWriter();
34      try {
35          int a = Integer.parseInt("a");
36      } catch (NumberFormatException e) {
37          response.sendError(response.SC_INTERNAL_SERVER_ERROR, e.getMessage());
38      } finally {
39          out.close();
40      }
41  }
    
```

Apache Tomcat/7.0.34 - Error report - Windows Internet Explorer

http://localhost:8084/AJDay3_7/ErrorProcessingServlet

File Edit View Favorites Tools Help

★ Favorites Apache Tomcat/7.0.34 - Error report

HTTP Status 500 - For input string: "a"

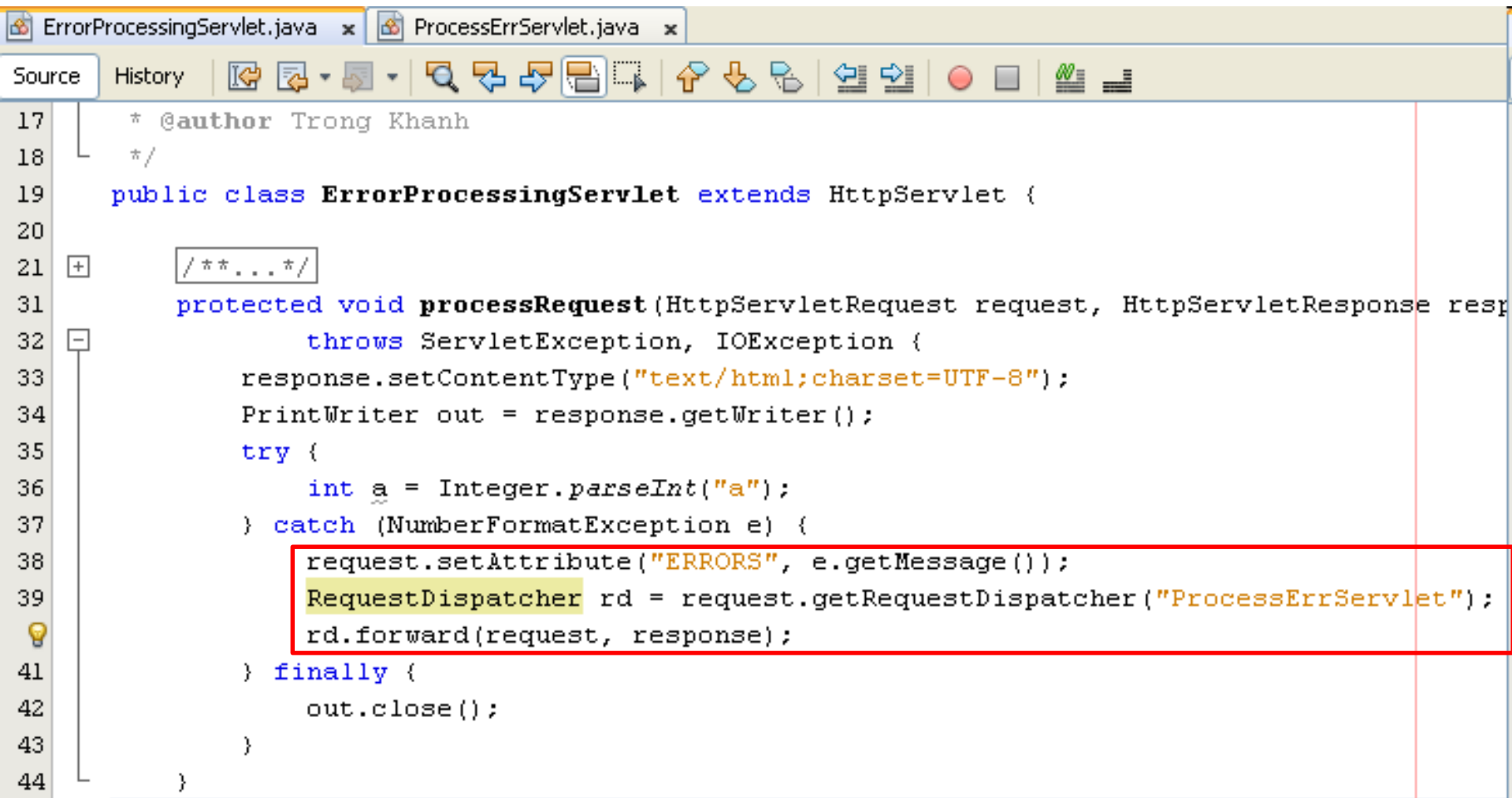
type Status report

message For input string: "a"

description The server encountered an internal error that prevented it from

Error Handling in Servlet

Reporting Error – Example



```

17  * @author Trong Khanh
18  */
19  public class ErrorProcessingServlet extends HttpServlet {
20
21      /**...*/
31  protected void processRequest(HttpServletRequest request, HttpServletResponse response)
32      throws ServletException, IOException {
33      response.setContentType("text/html; charset=UTF-8");
34      PrintWriter out = response.getWriter();
35      try {
36          int a = Integer.parseInt("a");
37      } catch (NumberFormatException e) {
38          request.setAttribute("ERRORS", e.getMessage());
39          RequestDispatcher rd = request.getRequestDispatcher("ProcessErrServlet");
40          rd.forward(request, response);
41      } finally {
42          out.close();
43      }
44  }
  
```

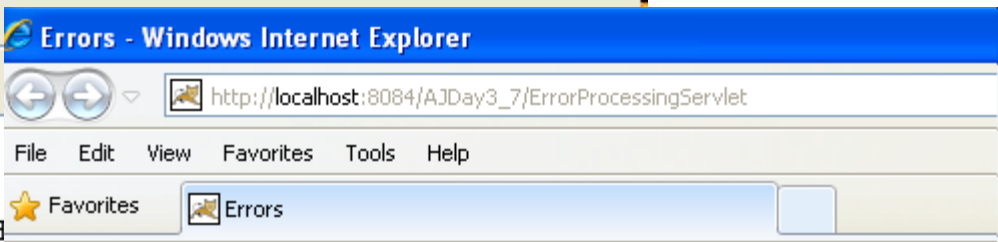
Error Handling in Servlet

Reporting Error – Example

```

ProcessErrServlet.java x
Source History
16 * @author Trong Khanh
17 */
18 public class ProcessErrServlet extends HttpServlet {
19
20     /**
30     protected void processRequest(HttpServletRequest request, HttpServletResponse response)
31         throws ServletException, IOException {
32         response.setContentType("text/html;charset=UTF-8");
33         PrintWriter out = response.getWriter();
34         try {
35             /* TODO output your page here. You may use following sample
36             out.println("<!DOCTYPE html>");
37             out.println("<html>");
38             out.println("<head>");
39             out.println("<title>Errors</title>");
40             out.println("</head>");
41             out.println("<body>");
42             out.println("<h1><font color='red'>Errors occur: "
43                 + request.getAttribute("ERRORS") + "</font></h1>");
44             out.println("</body>");
45             out.println("</html>");
46         } finally {
47             out.close();
48         }
49     }

```



Errors occur: For input string: "a"

Error Handling in Servlet

Reporting Error – Example

```

DisplayErrorServlet.java x
Source History
15
16 * @author Trong Khanh
17 */
18 public class DisplayErrorServlet extends HttpServlet {
19
20     /**...*/
30     protected void processRequest(HttpServletRequest request, HttpServletResponse response)
31         throws ServletException, IOException {
32         response.setContentType("text/html;charset=UTF-8");
33         PrintWriter out = response.getWriter();
34         try {
35             String action = request.getParameter("action");
36             if (action == null) {
37                 response.setStatus(HttpServletResponse.SC_TEMPORARY_REDIRECT);
38                 String url = "http://" + request.getLocalName() + ":"
39                     + request.getLocalPort() + request.getContextPath() +
40                     "/login.html";
41                 response.setHeader("Location", url);
42             }
43         } finally {
44             out.close();
45         }
46     }
  
```

Error Handling in Servlet

Reporting Error – Example

Login - Windows Internet Explorer

http://localhost:8084/AJDay3_7/logine.html

File Edit View Favorites Tools Help

★ Favorites Login

Login Page

Username

Password

Login Reset

```

logine.html x
Source History
5 <!DOCTYPE html>
6 <html>
7 <head>
8 <title>Login</title>
9 <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
10 </head>
11 <body>
12 <h1>Login Page</h1>
13 <form action="TestServlet" method="POST">
14 Username <input type="text" name="txtUser" value="" /><br/>
15 Password <input type="password" name="txtPass" value="" /><br/>
16 <input type="submit" value="Login" name="action" />
17 <input type="reset" value="Reset" />
18 </form>
19 </body>
20 </html>

```

Error Handling in Servlet

Reporting Error – Example – Others

```

DisplayErrorServlet.java x
Source History
15
16 * @author Trong Khanh
17 */
18 public class DisplayErrorServlet extends HttpServlet {
19
20     /**...*/
30     protected void processRequest(HttpServletRequest request, HttpServletResponse response)
31         throws ServletException, IOException {
32         response.setContentType("text/html;charset=UTF-8");
33         PrintWriter out = response.getWriter();
34         try {
35             String action = request.getParameter("action");
36             if (action == null) {
37                 response.setStatus(HttpServletResponse.SC_TEMPORARY_REDIRECT);
38                 int pos = request.getRequestURL().lastIndexOf("/");
39                 String url = request.getRequestURL().substring(0, pos);
40                 url = url + "/logine.html";
41                 System.out.println("ddd " + url);
42                 response.setHeader("Location", url);
43             }
44         } finally {
45             out.close();
46         }
47     }
  
```

Error Handling in Servlet

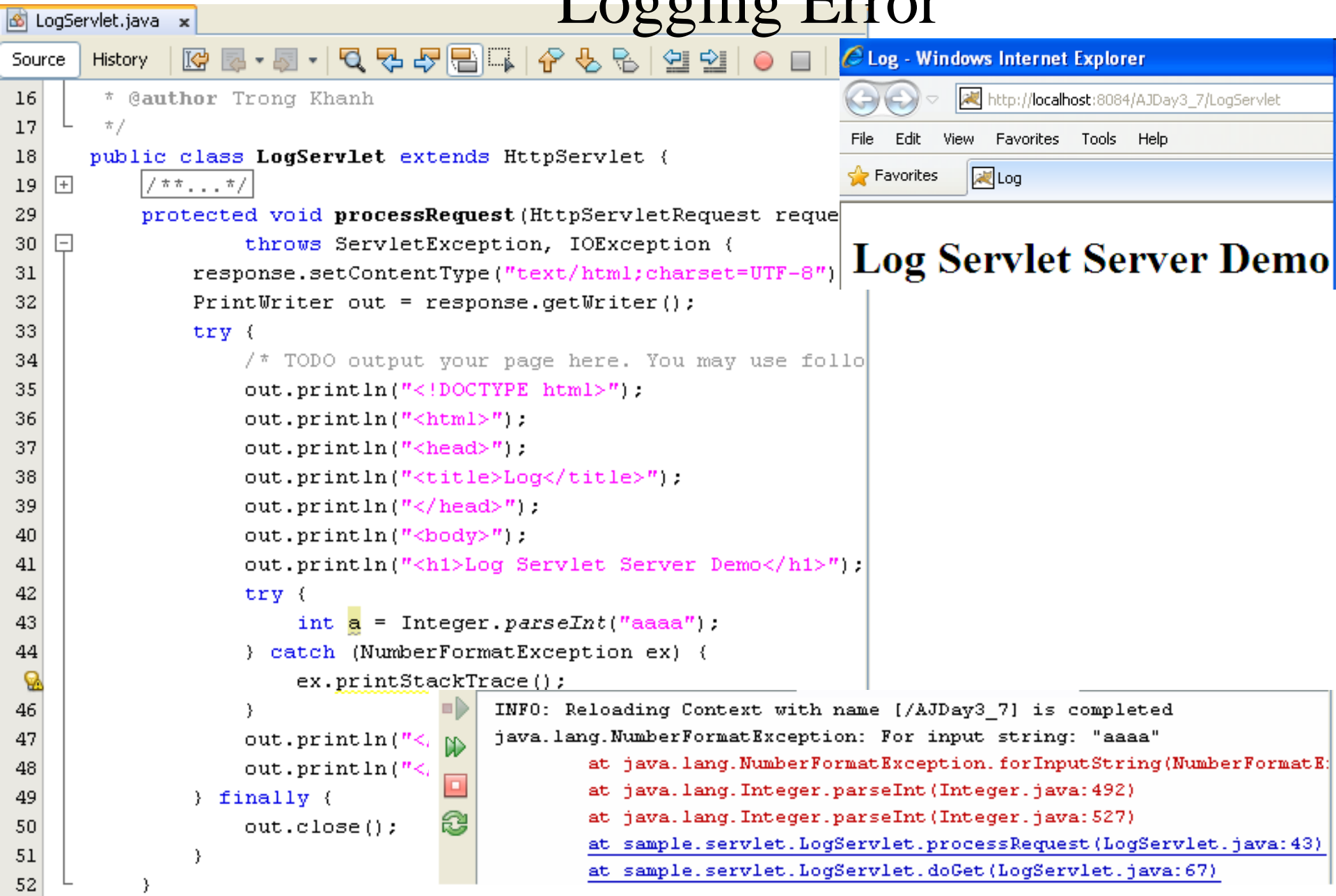
Logging Error

```

LogServlet.java x
Source History
16  * @author Trong Khanh
17  */
18  public class LogServlet extends HttpServlet {
19      /**...*/
29  protected void processRequest(HttpServletRequest request
30      throws ServletException, IOException {
31      response.setContentType("text/html;charset=UTF-8");
32      PrintWriter out = response.getWriter();
33      try {
34          /* TODO output your page here. You may use follo
35          out.println("<!DOCTYPE html>");
36          out.println("<html>");
37          out.println("<head>");
38          out.println("<title>Log</title>");
39          out.println("</head>");
40          out.println("<body>");
41          out.println("<h1>Log Servlet Server Demo</h1>");
42          try {
43              int a = Integer.parseInt("aaaa");
44          } catch (NumberFormatException ex) {
45              ex.printStackTrace();
46          }
47          out.println("</body>");
48          out.println("</html>");
49      } finally {
50          out.close();
51      }
52  }
  
```

Error Handling in Servlet

Logging Error



The screenshot displays a Java IDE with the file `LogServlet.java` open. The code implements a servlet that attempts to parse the string "aaaa" as an integer, which results in a `NumberFormatException`. The code includes a `try-catch` block to handle this exception by printing the stack trace.

```

16  * @author Trong Khanh
17  */
18  public class LogServlet extends HttpServlet {
19      /**...*/
20
21      protected void processRequest(HttpServletRequest request)
22          throws ServletException, IOException {
23          response.setContentType("text/html;charset=UTF-8");
24          PrintWriter out = response.getWriter();
25          try {
26              /* TODO output your page here. You may use follo
27              out.println("<!DOCTYPE html>");
28              out.println("<html>");
29              out.println("<head>");
30              out.println("<title>Log</title>");
31              out.println("</head>");
32              out.println("<body>");
33              out.println("<h1>Log Servlet Server Demo</h1>");
34              try {
35                  int a = Integer.parseInt("aaaa");
36              } catch (NumberFormatException ex) {
37                  ex.printStackTrace();
38              }
39              out.println("<");
40              out.println("<");
41          } finally {
42              out.close();
43          }
44      }
45  }

```

The browser window (Internet Explorer) shows the page title "Log Servlet Server Demo". The status bar at the bottom indicates an error: `java.lang.NumberFormatException: For input string: "aaaa"`. The stack trace shows the error originates from `Integer.parseInt` and is caught in `LogServlet.processRequest`.

Error Handling in Servlet

Logging Error

- Servlet can store the actions and errors through the `log()` method of the **GenericServlet** class.
- The `log()` method also assists in debugging and can viewed record in a server
- **Syntax:** `public void log (String msg [, Throwable t])`
- **Ex:**

...

```
log("Servlet is not found ");  
response.sendError(response.SC_INTERNAL_SERVER_ERROR, "The requested  
page [" + page + "] not found.");
```

...

- **A log file locate at**
 - **C:\Documents and Settings\LoggedUser\Application Data\NetBeans\7.4\apache-tomcat-7.0.41.0_base\logs\localhost.yyyy-mm-dd.log**
 - **C:\Users\LoggedUser\AppData\Roaming\NetBeans\7.4\apache-tomcat-7.0.41.0_base\work\Catalina\logs\localhost.yyyy-mm-dd.log**

Error Handling in Servlet

Logging Error

```

LogServlet.java x
Source History
16  * @author Trong Khanh
17  */
18  public class LogServlet extends HttpServlet {
19      /**...*/
29  protected void processRequest(HttpServletRequest request, HttpServletResponse response)
30      throws ServletException, IOException {
31      response.setContentType("text/html;charset=UTF-8");
32      PrintWriter out = response.getWriter();
33      try {
34          /* TODO output your page here. You may use following sample code */
35          out.println("<!DOCTYPE html>");
36          out.println("<html>");
37          out.println("<head>");
38          out.println("<title>Log</title>");
39          out.println("</head>");
40          out.println("<body>");
41          out.println("<h1>Log Servlet Server Demo</h1>");
42          try {
43              int a = Integer.parseInt("aaaa");
44          } catch (NumberFormatException ex) {
45              log("Errors occur in processing...", ex.getCause());
46          }
47          out.println("</body>");
48          out.println("</html>");
49      } finally {
50          out.close();
51      }
52  }
    
```

Error Handling in Servlet

Logging Error

Output

Apache Tomcat 7.0.27.0 x

Apache Tomcat 7.0.27.0 Log x

AJDay3_7 (run-deploy) x

```
thg 10 30, 2013 8:22:17 SA org.apache.catalina.core.ApplicationContext log
SEVERE: LogServlet: Errors occur in processing...
```

Lister - [c:\Documents and Settings\Trong Khanh\Application Data\NetBeans\7.2.1\apache-tomcat-7.0.27.0_base\logs\localhost.2013-10-30.log]

File Edit Options Help

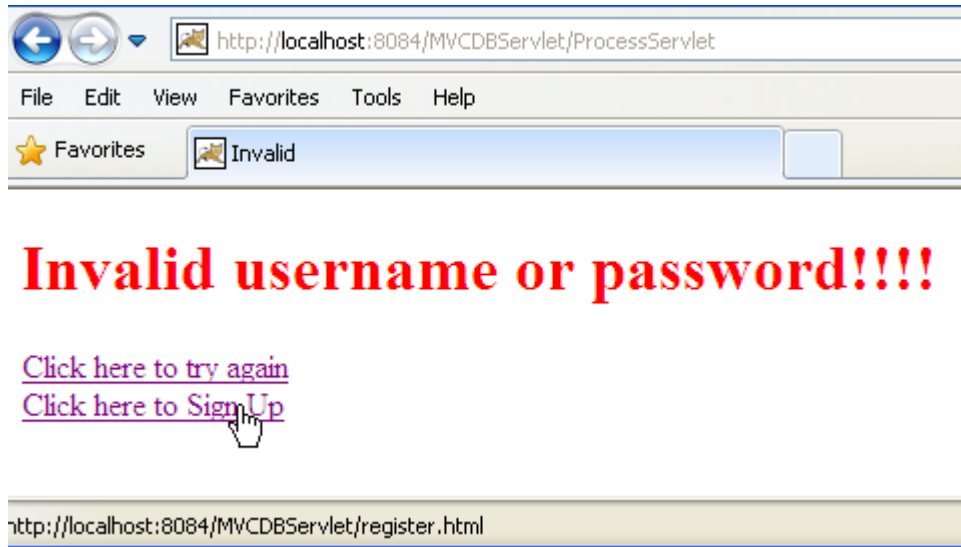
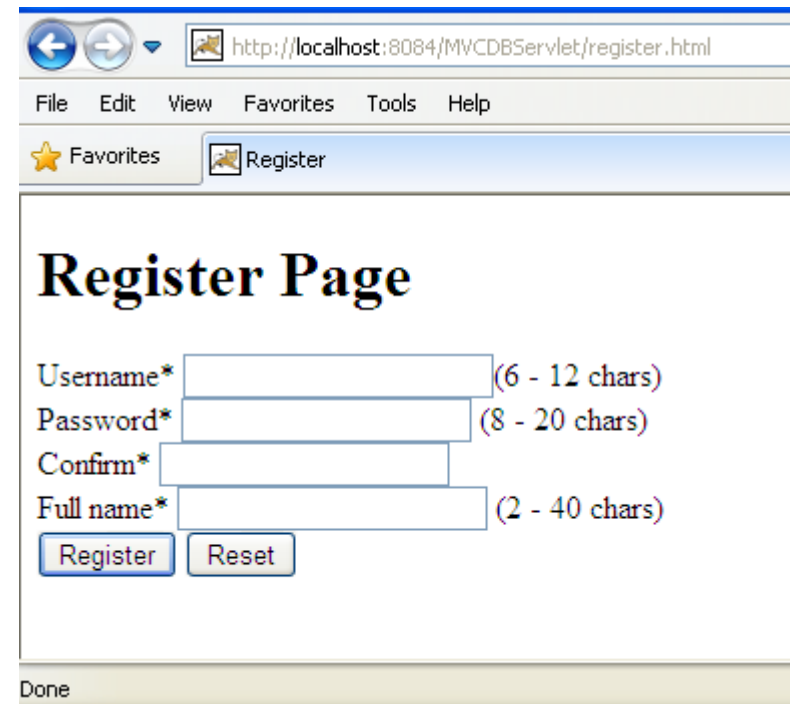
```
thg 10 30, 2013 8:22:17 SA org.apache.catalina.core.ApplicationContext log
SEVERE: LogServlet: Errors occur in processing...
```

c:\Documents and Settings\Trong Khanh\Application Data\NetBeans\7.2.1\apache-tomcat-7.0.27.0_base\logs

| Name | Ext | Size | ↓Date |
|-----------------------------------|-----|--------|------------------|
| ⬆ [..] | | <DIR> | 30/10/2013 08:23 |
| 📄 localhost_access_log.2013-10-30 | txt | 127 | 30/10/2013 08:23 |
| 📄 localhost.2013-10-30 | log | 1.166 | 30/10/2013 08:22 |
| 📄 manager.2013-10-30 | log | 10.655 | 30/10/2013 08:22 |
| 📄 catalina.2013-10-30 | log | 6.253 | 30/10/2013 08:21 |
| 📄 host-manager.2013-10-30 | log | 0 | 30/10/2013 07:54 |

How to write CRUD Web Application

Register Functions

Register Page

Username* (6 - 12 chars)

Password* (8 - 20 chars)

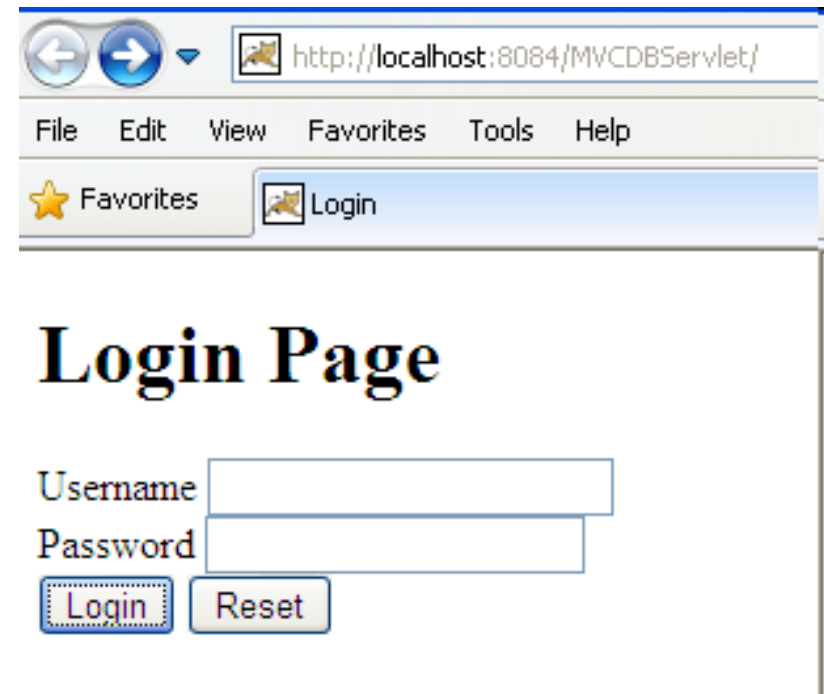
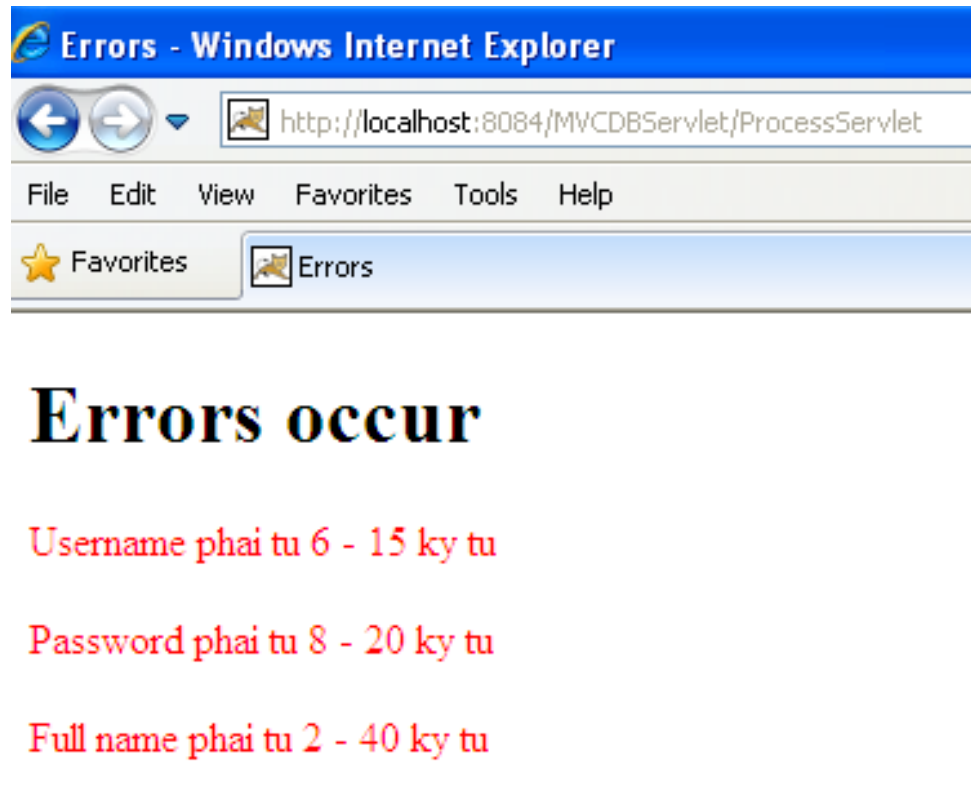
Confirm*

Full name* (2 - 40 chars)

Done

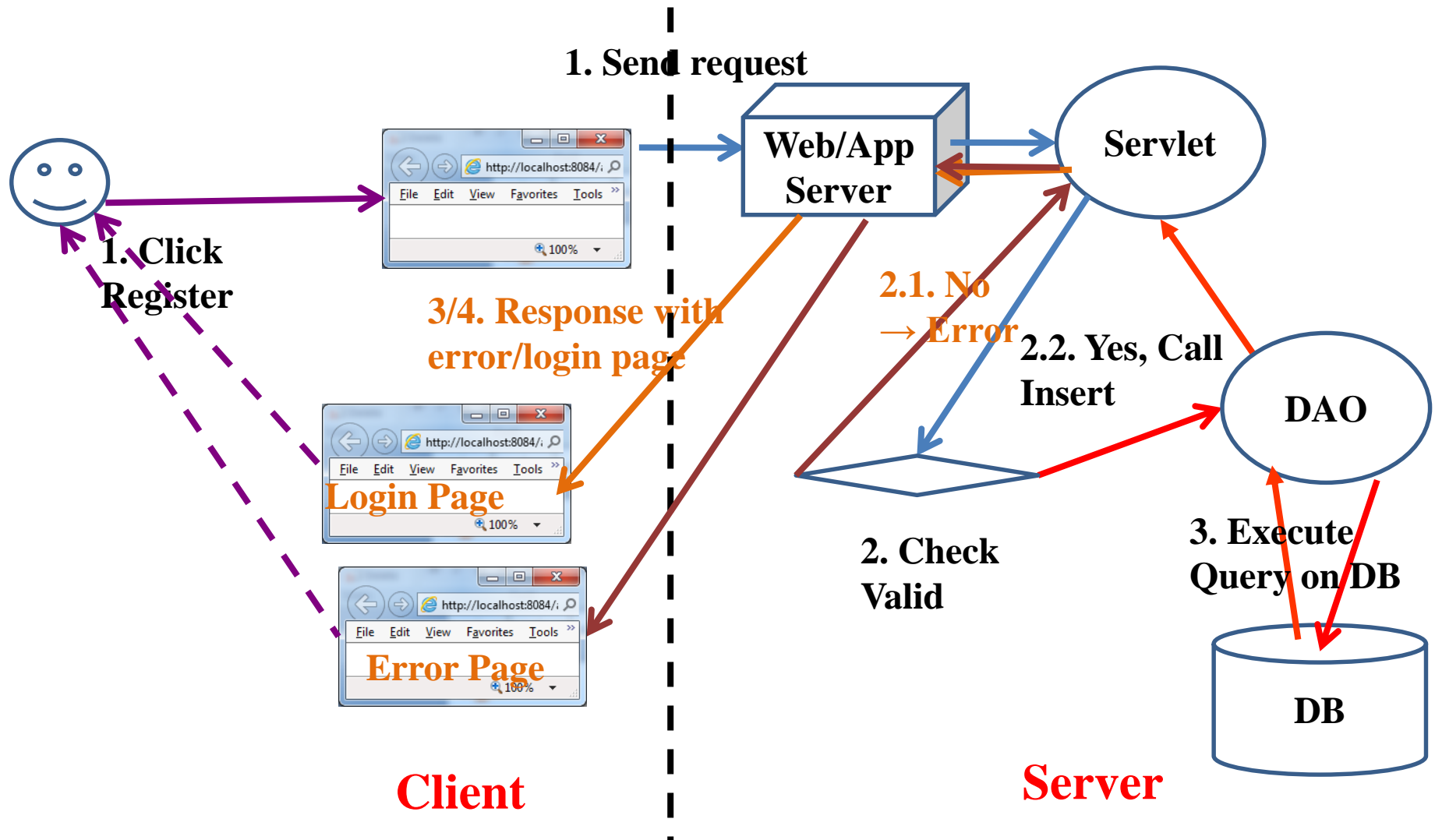
How to write CRUD Web Application

Validation



How to write CRUD Web Application

Interactive Server Model



Summary

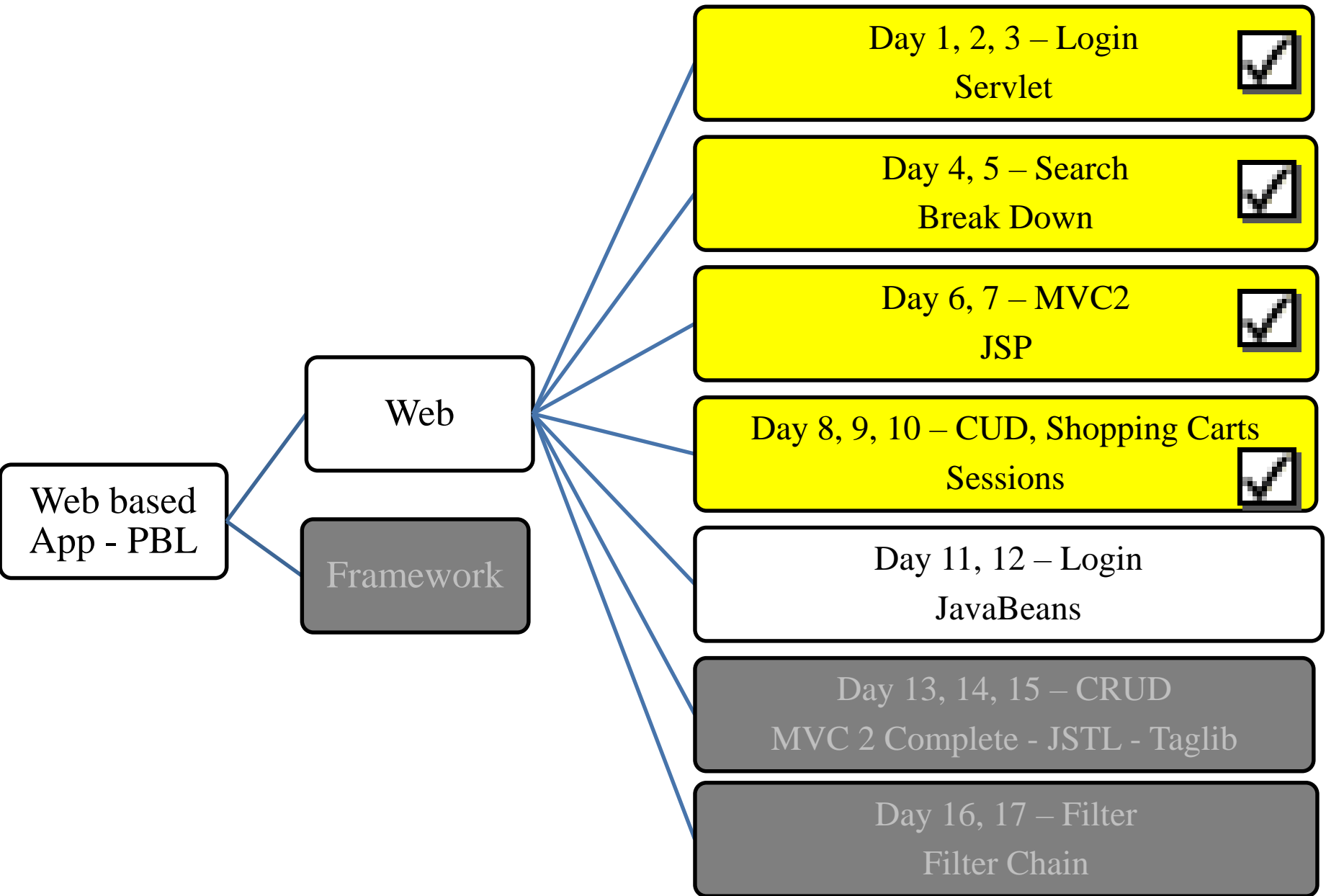
- **How to write CRUD Web Application**
 - Session Tracking Techniques
 - Manipulate DB Techniques in Web Application
 - Break down structure component in building web application
- **Techniques: Error Handling in Servlets**
 - Reporting Errors
 - Logging Errors
 - Users Errors vs. System Errors

Q&A

Next Lecture

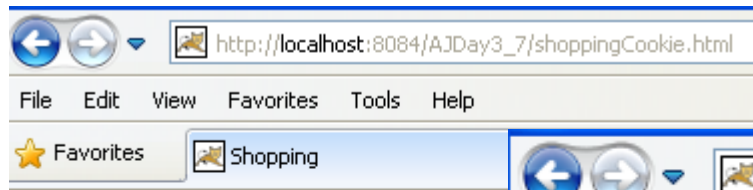
- **JSP Standard Actions**
 - JavaBeans
 - Standard Actions
- **Dispatcher Mechanism**
 - Including, Forwarding, and Parameters
 - Vs. Dispatcher in Servlets
- **EL – Expression Languages**
 - What is EL?
 - How to use EL in JSP?

Next Lecture



Appendix

Shopping Cart using Cookies



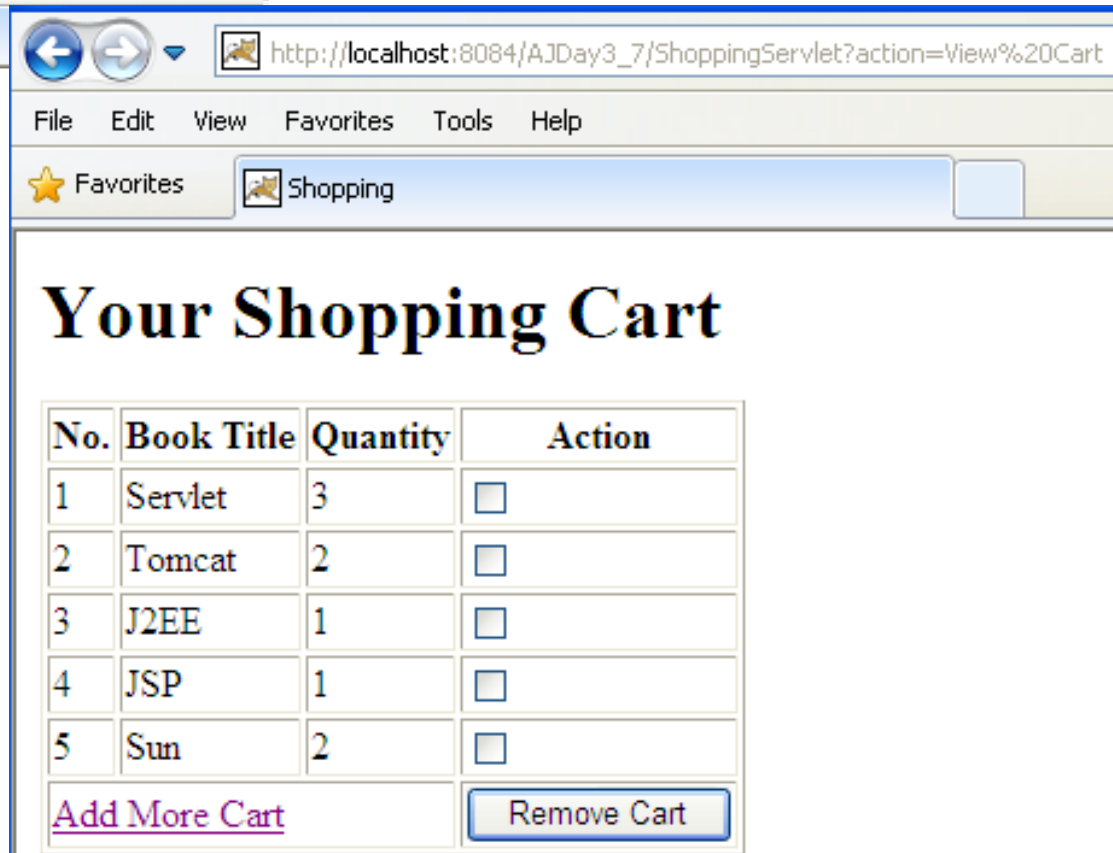
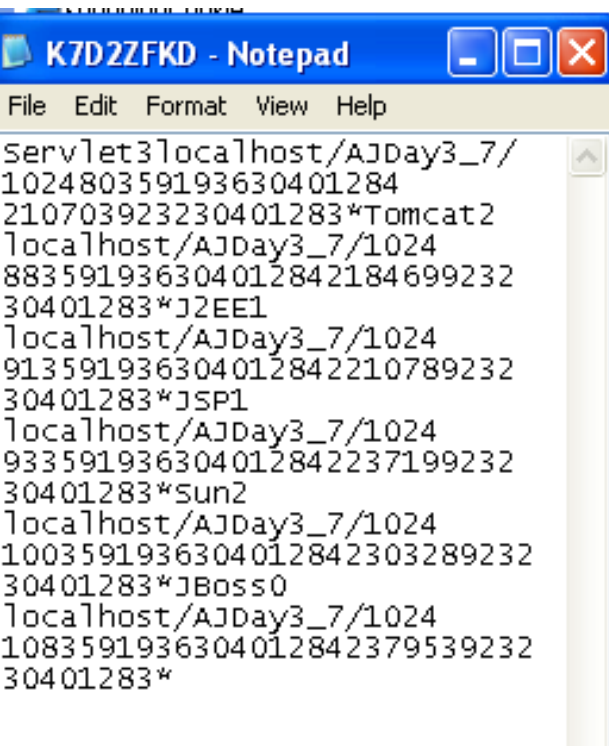
Shopping Cart

Please, choose the book

Servlet

Add To Cart

View Cart



Appendix

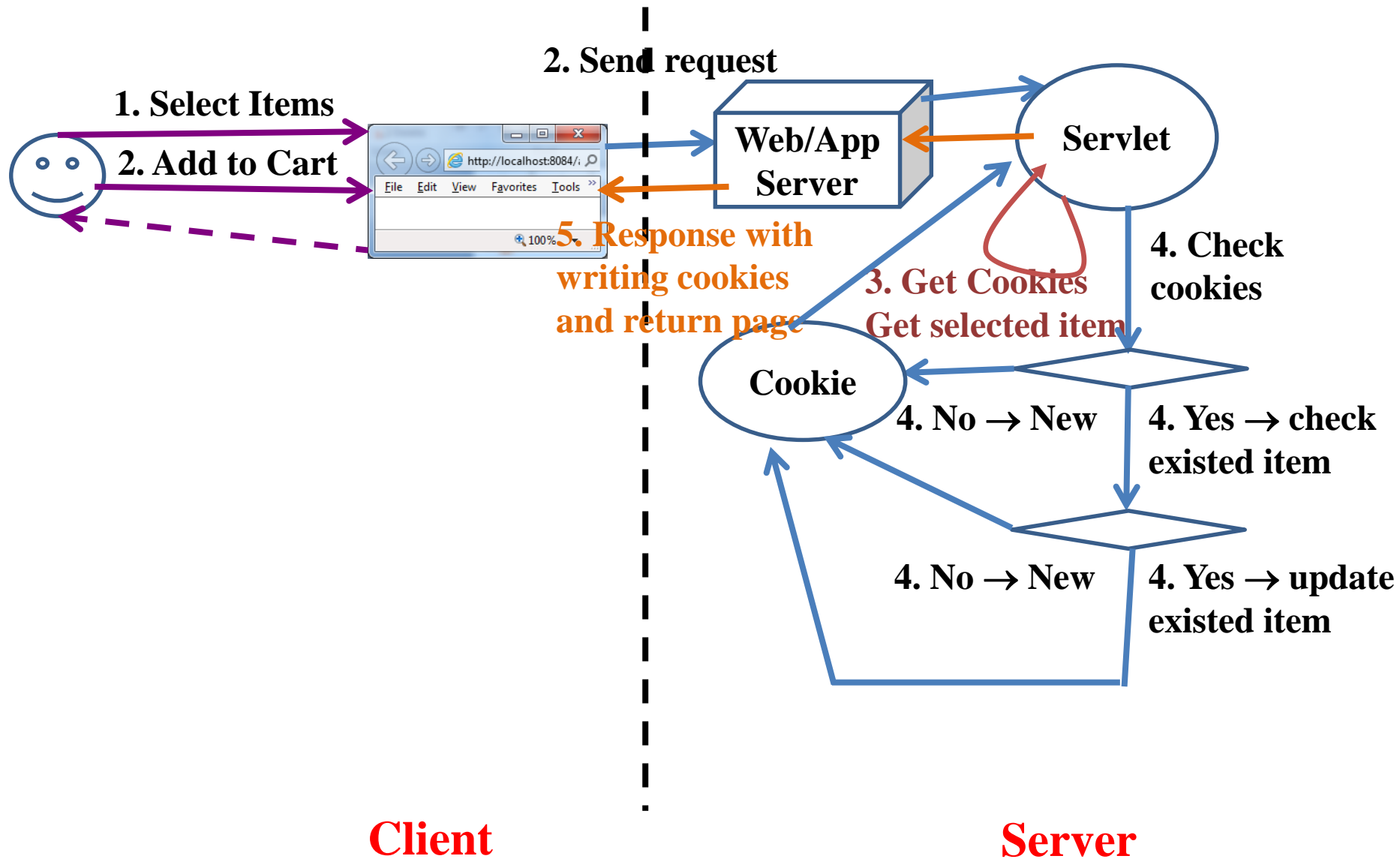
Shopping Cart using Cookies

```

shoppingCookie.html x
Preview
5  <!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
6  <html>
7  <head>
8      <title>Shopping</title>
9      <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
10 </head>
11 <body>
12     <h1>Shopping Cart</h1>
13     <form action="ShoppingServlet">
14         Please, choose the book <br/>
15         <select name="bookList">
16             <option>Servlet</option>
17             <option>JSP</option>
18             <option>EJB</option>
19             <option>J2EE</option>
20             <option>Tomcat</option>
21             <option>JBoss</option>
22             <option>Sun</option>
23         </select><br/>
24         <input type="submit" value="Add To Cart" name="action" />
25         <input type="submit" value="View Cart" name="action" />
26     </form>
27 </body>
28 </html>
  
```

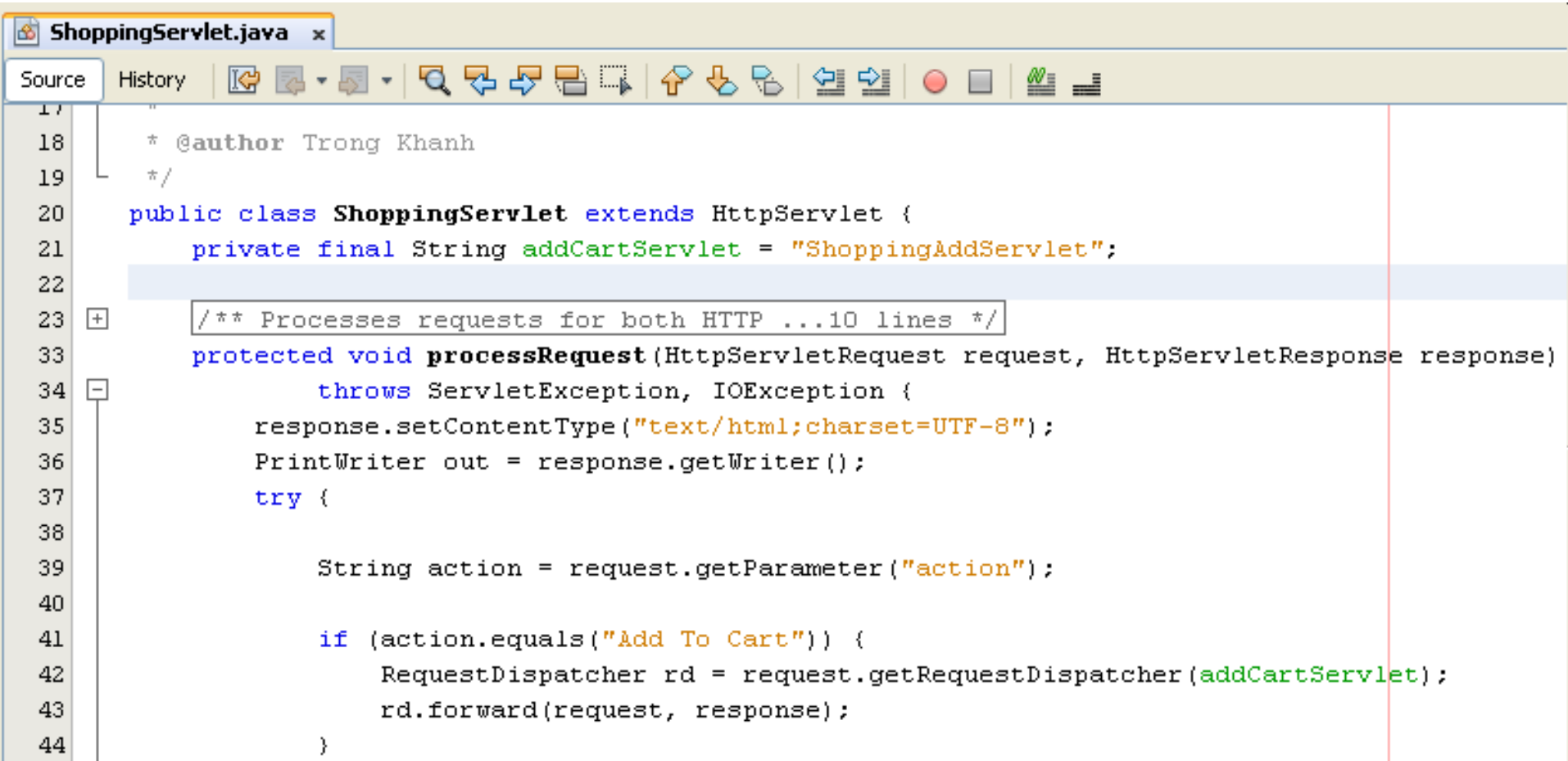
Appendix

Interactive Server Model



Appendix

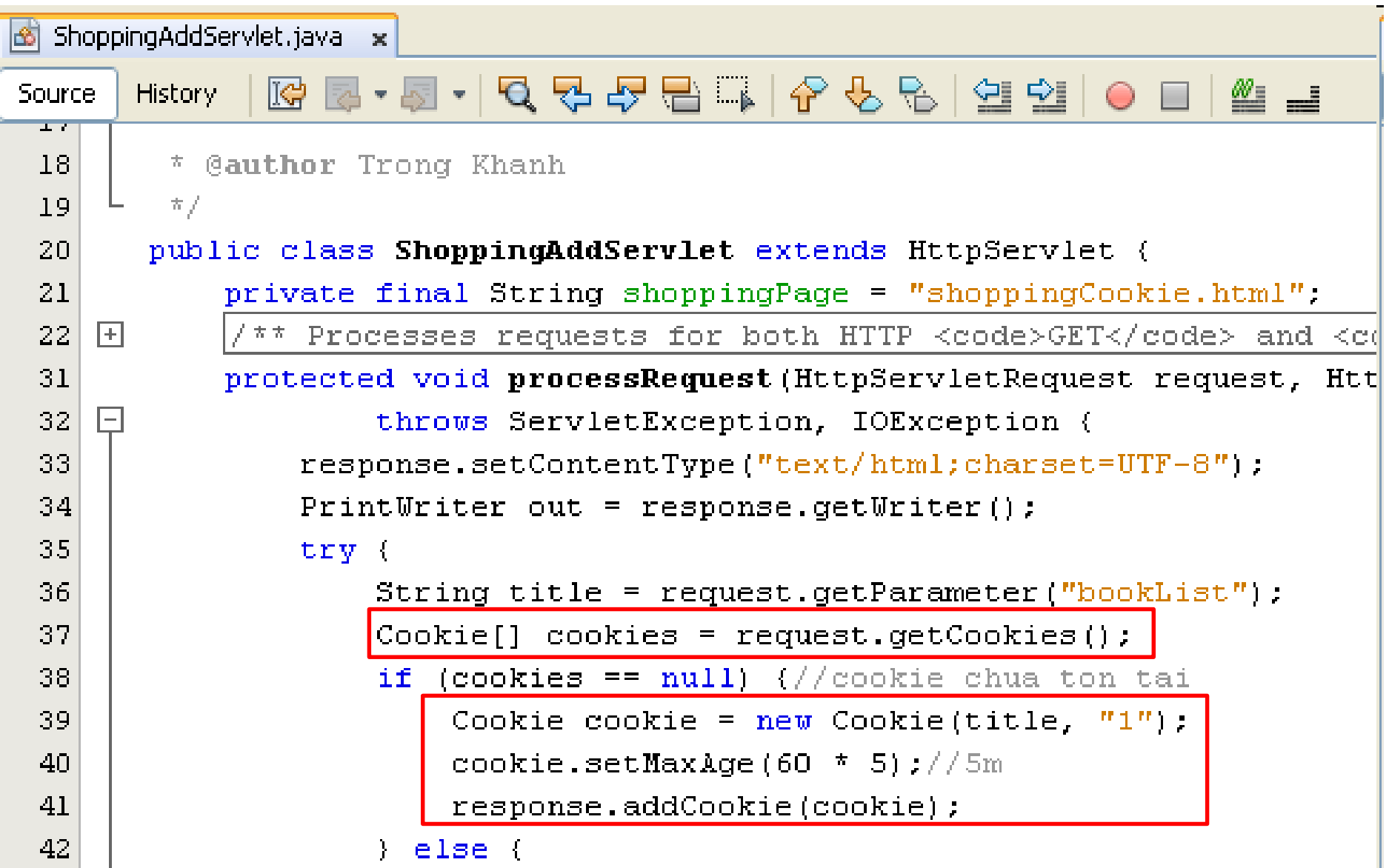
Shopping Cart using Cookies



```
ShoppingServlet.java x
Source History
17
18  * @author Trong Khanh
19  */
20  public class ShoppingServlet extends HttpServlet {
21      private final String addCartServlet = "ShoppingAddServlet";
22
23      /** Processes requests for both HTTP ...10 lines */
24
25      protected void processRequest(HttpServletRequest request, HttpServletResponse response)
26          throws ServletException, IOException {
27          response.setContentType("text/html;charset=UTF-8");
28          PrintWriter out = response.getWriter();
29          try {
30
31              String action = request.getParameter("action");
32
33              if (action.equals("Add To Cart")) {
34                  RequestDispatcher rd = request.getRequestDispatcher(addCartServlet);
35                  rd.forward(request, response);
36              }
37          }
38      }
39  }
```

Appendix

Shopping Cart using Cookies



```

ShoppingAddServlet.java x
Source History
17
18 * @author Trong Khanh
19 */
20 public class ShoppingAddServlet extends HttpServlet {
21     private final String shoppingPage = "shoppingCookie.html";
22     /** Processes requests for both HTTP <code>GET</code> and <code>POST</code>
31     protected void processRequest(HttpServletRequest request, HttpServletResponse response)
32         throws ServletException, IOException {
33         response.setContentType("text/html;charset=UTF-8");
34         PrintWriter out = response.getWriter();
35         try {
36             String title = request.getParameter("bookList");
37             Cookie[] cookies = request.getCookies();
38             if (cookies == null) { //cookie chua ton tai
39                 Cookie cookie = new Cookie(title, "1");
40                 cookie.setMaxAge(60 * 5); //5m
41                 response.addCookie(cookie);
42             } else {

```

Appendix

Shopping Cart using Cookies

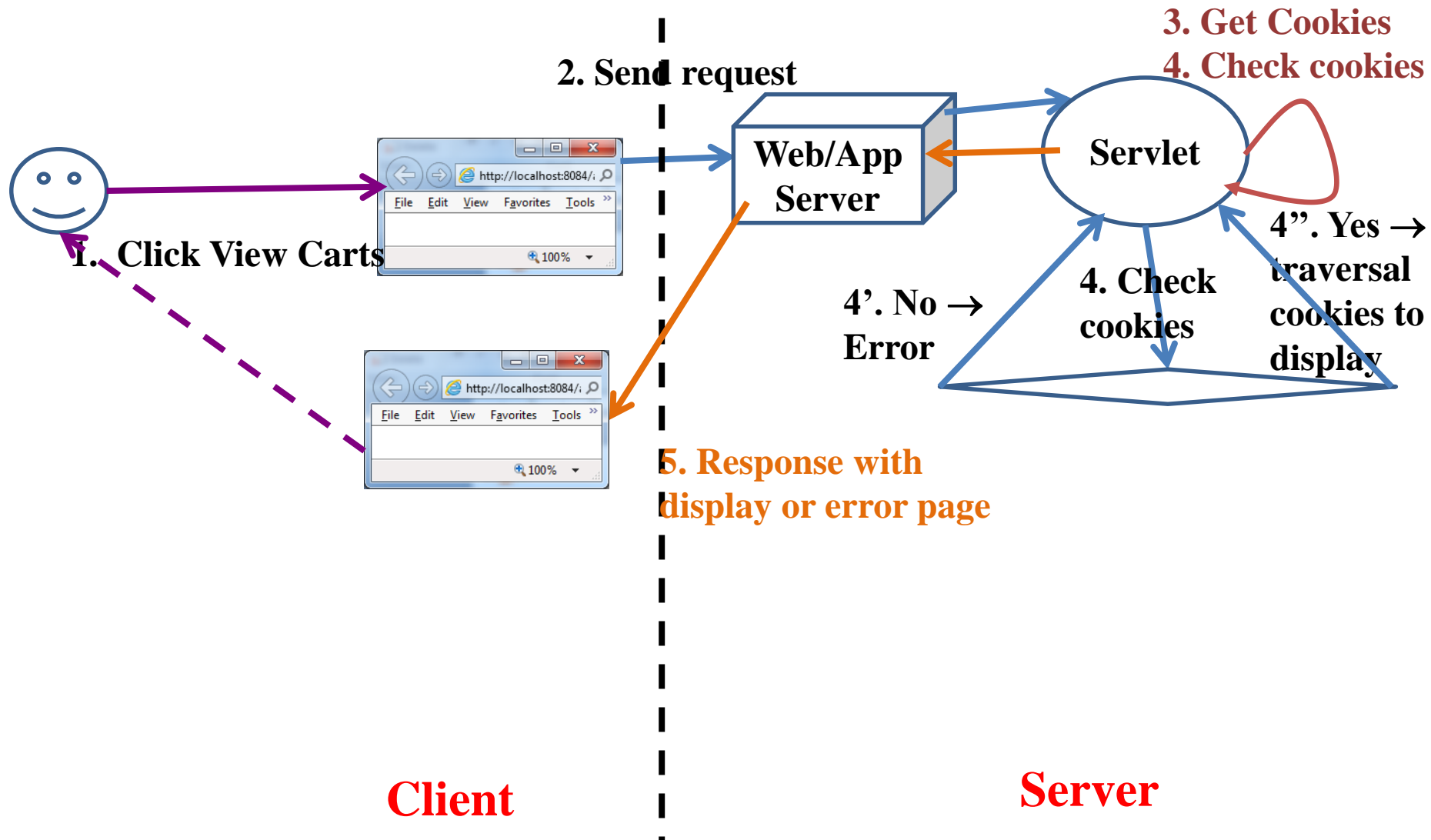
```

42     } else {
43         boolean bFound = false;
44         //find the exist title in the cart
45         for (int i = 0; i < cookies.length; i++) {
46             if (cookies[i].getName().equals(title)) {
47                 bFound = true;
48                 String value = cookies[i].getValue();
49                 int quantity = Integer.parseInt(value) + 1;
50                 Cookie cookie = new Cookie(title, String.valueOf(quantity));
51                 cookie.setMaxAge(60 * 5); //5m
52                 response.addCookie(cookie); //override
53                 break;
54             }
55         }
56         if (!bFound) {
57             Cookie cookie = new Cookie(title, "1");
58             cookie.setMaxAge(60 * 5); //5m
59             response.addCookie(cookie);
60         }
61     }
62
63     response.sendRedirect(shoppingPage);
64 } finally {
65     out.close();
66 }
67 }

```

Appendix

Interactive Server Model



Appendix

Shopping Cart using Cookies

ShoppingServlet.java x

Source History

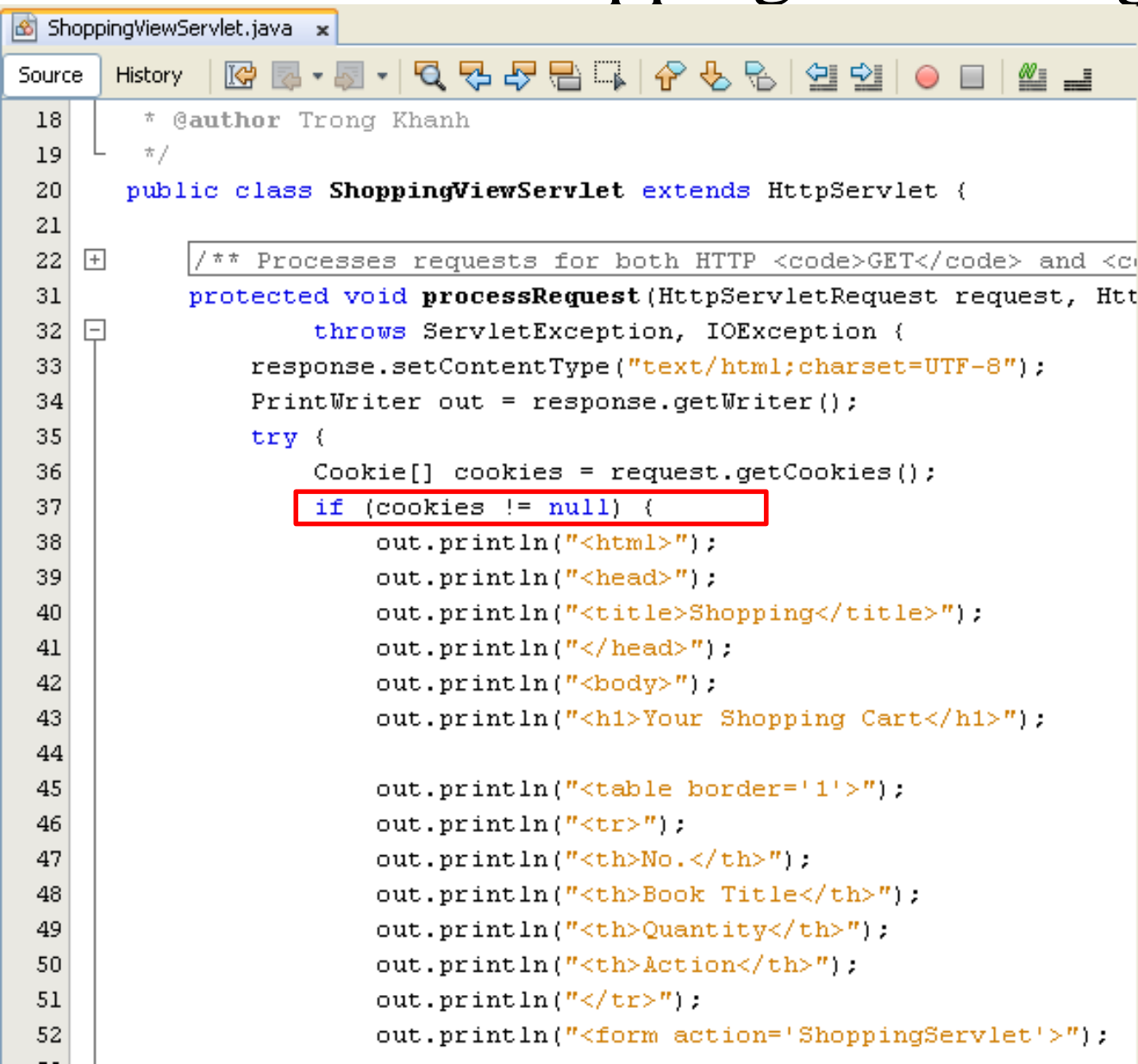
```

18  * @author Trong Khanh
19  */
20  public class ShoppingServlet extends HttpServlet {
21      private final String addCartServlet = "ShoppingAddServlet";
22      private final String viewCartServlet = "ShoppingViewServlet";
23
24      /** Processes requests for both HTTP ...10 lines */
34  protected void processRequest(HttpServletRequest request, HttpServletResponse resp
35      throws ServletException, IOException {
36      response.setContentType("text/html;charset=UTF-8");
37      PrintWriter out = response.getWriter();
38      try {
39
40          String action = request.getParameter("action");
41
42          if (action.equals("Add To Cart")) {
43              RequestDispatcher rd = request.getRequestDispatcher(addCartServlet);
44              rd.forward(request, response);
45          } else if (action.equals("View Cart")) {
46              RequestDispatcher rd = request.getRequestDispatcher(viewCartServlet);
47              rd.forward(request, response);
48          }

```


Appendix

Shopping Cart using Cookies



```

ShoppingViewServlet.java x
Source History
18  * @author Trong Khanh
19  */
20  public class ShoppingViewServlet extends HttpServlet {
21
22  /** Processes requests for both HTTP <code>GET</code> and <code>POST</code>
31  protected void processRequest(HttpServletRequest request, HttpServletResponse response)
32  throws ServletException, IOException {
33      response.setContentType("text/html;charset=UTF-8");
34      PrintWriter out = response.getWriter();
35      try {
36          Cookie[] cookies = request.getCookies();
37          if (cookies != null) {
38              out.println("<html>");
39              out.println("<head>");
40              out.println("<title>Shopping</title>");
41              out.println("</head>");
42              out.println("<body>");
43              out.println("<h1>Your Shopping Cart</h1>");
44
45              out.println("<table border='1'>");
46              out.println("<tr>");
47              out.println("<th>No.</th>");
48              out.println("<th>Book Title</th>");
49              out.println("<th>Quantity</th>");
50              out.println("<th>Action</th>");
51              out.println("</tr>");
52              out.println("<form action='ShoppingServlet'>");

```

Appendix

Shopping Cart using Cookies

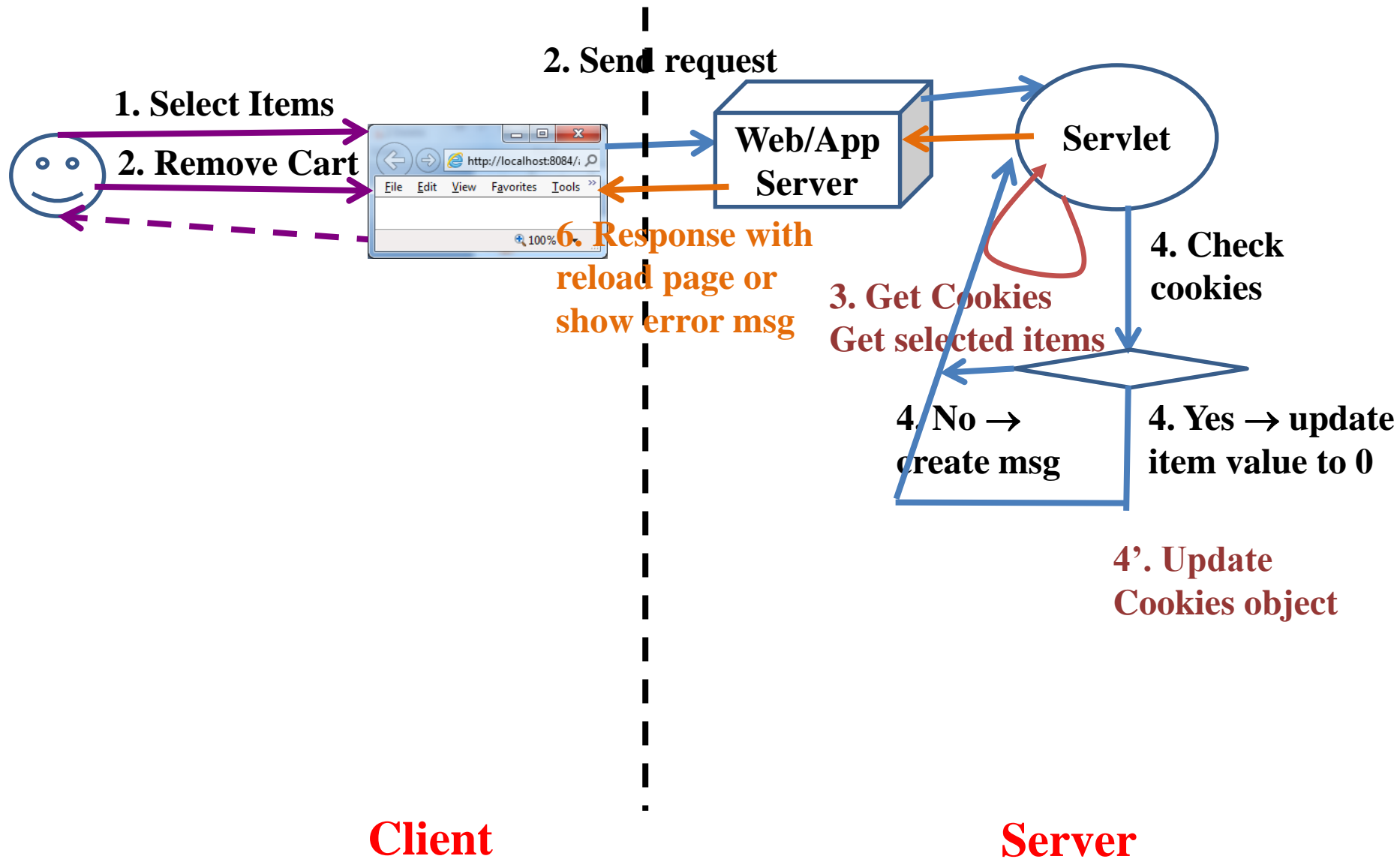
```

53
54     int count = 1;
55     for (int i = 0; i < cookies.length; i++) {
56         int tmp = Integer.parseInt(cookies[i].getValue());
57         if (tmp > 0) {
58             out.println("<tr>");
59             out.println("<td>" + count++ + "</td>");
60             out.println("<td>" + cookies[i].getName() + "</td>");
61             out.println("<td>" + cookies[i].getValue() + "</td>");
62             out.println("<td><input type='checkbox' name='rmv' value='"
63                 + cookies[i].getName() + "' /></td>");
64             out.println("</tr>");
65         }
66     }
67
68     out.println("<tr>");
69     out.println("<td colspan='3'><a href='shoppingCookie.html'>Add More Cart</a></td>");
70     out.println("<td><input type='submit' value='Remove Cart' name='action' /></td>");
71     out.println("</tr>");
72     out.println("</form>");
73     out.println("</table>");
74
75     out.println("</body>");
76     out.println("</html>");
77     return;
78 }
79 out.println("<h2>Cart is removed or No items in cart</h2>");
80 } finally {
81     out.close();
82 }
83

```

Appendix

Interactive Server Model



Appendix

Shopping Cart using Cookies

ShoppingServlet.java

```

18  * @author Trong Khanh
19  */
20  public class ShoppingServlet extends HttpServlet {
21      private final String addCartServlet = "ShoppingAddServlet";
22      private final String viewCartServlet = "ShoppingViewServlet";
23      private final String removeCartServlet = "ShoppingRemoveServlet";
24      /** Processes requests for both HTTP ...10 lines */
34      protected void processRequest(HttpServletRequest request, HttpServletResponse response)
35          throws ServletException, IOException {
36          response.setContentType("text/html;charset=UTF-8");
37          PrintWriter out = response.getWriter();
38          try {
39
40              String action = request.getParameter("action");
41
42              if (action.equals("Add To Cart")) {
43                  RequestDispatcher rd = request.getRequestDispatcher(addCartServlet);
44                  rd.forward(request, response);
45              } else if (action.equals("View Cart")) {
46                  RequestDispatcher rd = request.getRequestDispatcher(viewCartServlet);
47                  rd.forward(request, response);
48              } else if (action.equals("Remove Cart")) {
49                  RequestDispatcher rd = request.getRequestDispatcher(removeCartServlet);
50                  rd.forward(request, response);
51              } else {
52                  //To Do Code
53              }
54          } finally {
55              out.close();
56          }
57      }

```

Appendix

Shopping Cart using Cookies

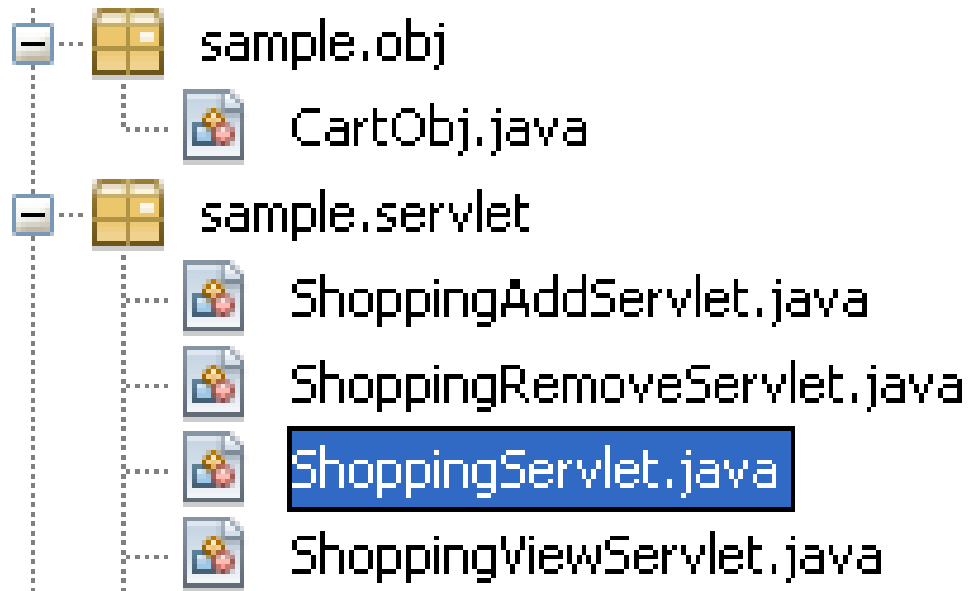
```

ShoppingRemoveServlet.java x
Source History
18 * @author Trong Khanh
19 */
20 public class ShoppingRemoveServlet extends HttpServlet {
21
22     /** Processes requests for both HTTP <code>GET</code> and <code>POST</code>
31     protected void processRequest(HttpServletRequest request, HttpServletResponse
32         throws ServletException, IOException {
33         response.setContentType("text/html;charset=UTF-8");
34         PrintWriter out = response.getWriter();
35         try {
36             Cookie[] cookies = request.getCookies();
37             if (cookies != null) {
38                 String[] list = request.getParameterValues("rmv");
39                 if (list != null) {
40                     for (int i = 0; i < list.length; i++) {
41                         String tmp = list[i];
42                         for (int j = 0; j < cookies.length; j++) {
43                             if (cookies[j].getName().equals(tmp)) {
44                                 cookies[j].setValue("0");
45                                 cookies[j].setMaxAge(60 * 5);
46                                 response.addCookie(cookies[j]);
47                                 break;
48                             }
49                         } //for j
50                     } //for i
51                 } //end if list
52                 String urlRewriting = "ShoppingServlet?action=View Cart";
53                 response.sendRedirect(urlRewriting);
54             } else {
55                 out.println("<h2>Cart is removed!!!!</h2>");
56             }
57         }
58     }
59 }

```

Sessions & Listeners

Shopping Cart using Cookies – Example



Appendix

Request and Context Listeners

| Listener Interface Name | Applies to | Function |
|---------------------------------|--------------------|---|
| ServletRequestListener | Request objects | Responds to the life and death of each request. |
| ServletContextListener | The context object | Responds to the life and death of the context for a web application. |
| ServletRequestAttributeListener | Request objects | Responds to any change to the set of attributes attached to a request object. |
| ServletContextAttributeListener | The context object | Responds to any change to the set of attributes attached to the context object. |

- There are **two things** that need to do to **set up a listener** in a web application:
 - **Write a class** that **implements** the **appropriate listener interface**.
 - **Register** the **class name** in the **web application deployment descriptor**, web.xml.

<listener>

<listener-class>className</listener-class>

</listener>

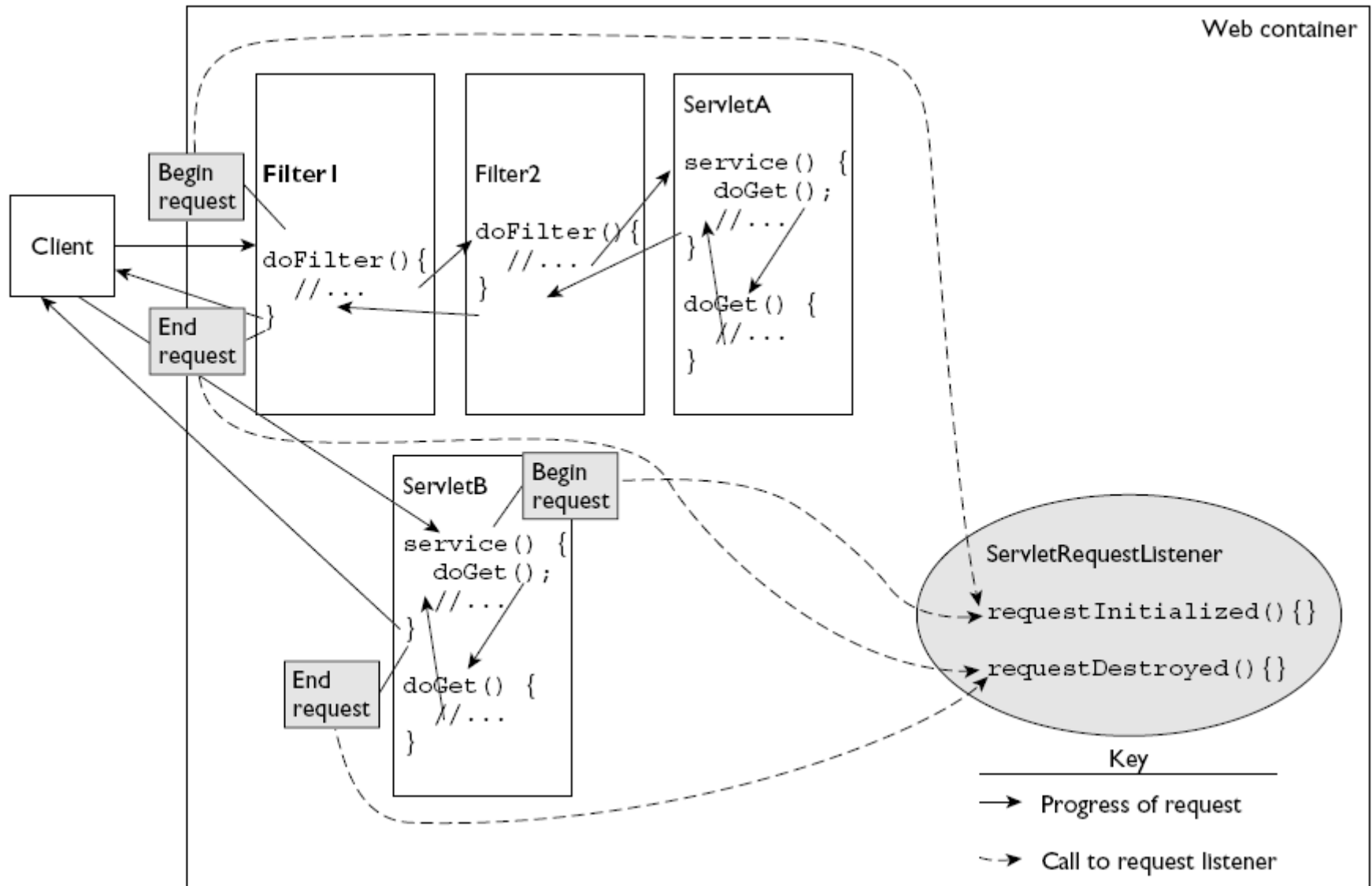
Appendix

Request Listeners

- ServletRequestListener **deals** with the **life cycle** of each **request object**
- A class **implementing** the **ServletRequestListener** interface has 2 methods
 - **requestInitialized()**: is called the **moment** that **any request** in the web container **becomes newly available** (or it is called at the **beginning of any request's scope**)
 - This is at the beginning of a servlet's **service()** method or earlier than that if filter chain is involved
 - **requestDestroyed()**: is called for each request that **comes to an end** – either at the **end of the servlet's service() method** or at the **end of the doFilter()** method for the first filter in a chain
- **Each** of these **ServletRequestListener** methods **accept** a **ServletRequestEvent** as a parameter. This event object has 2 methods
 - **getServletContext()**
 - **getRequest()**

Appendix

Request Listeners

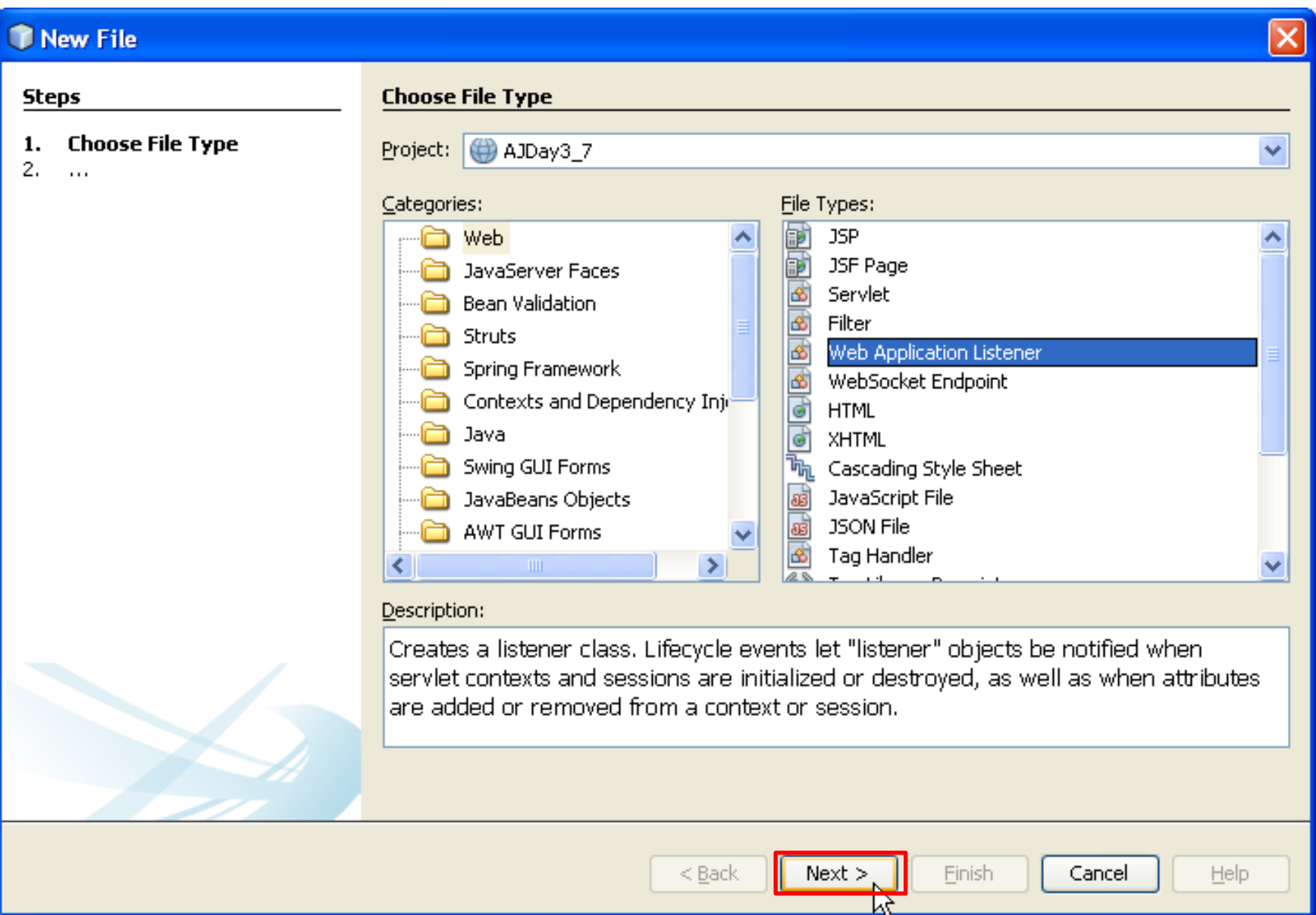


Appendix

Request Attribute Listeners

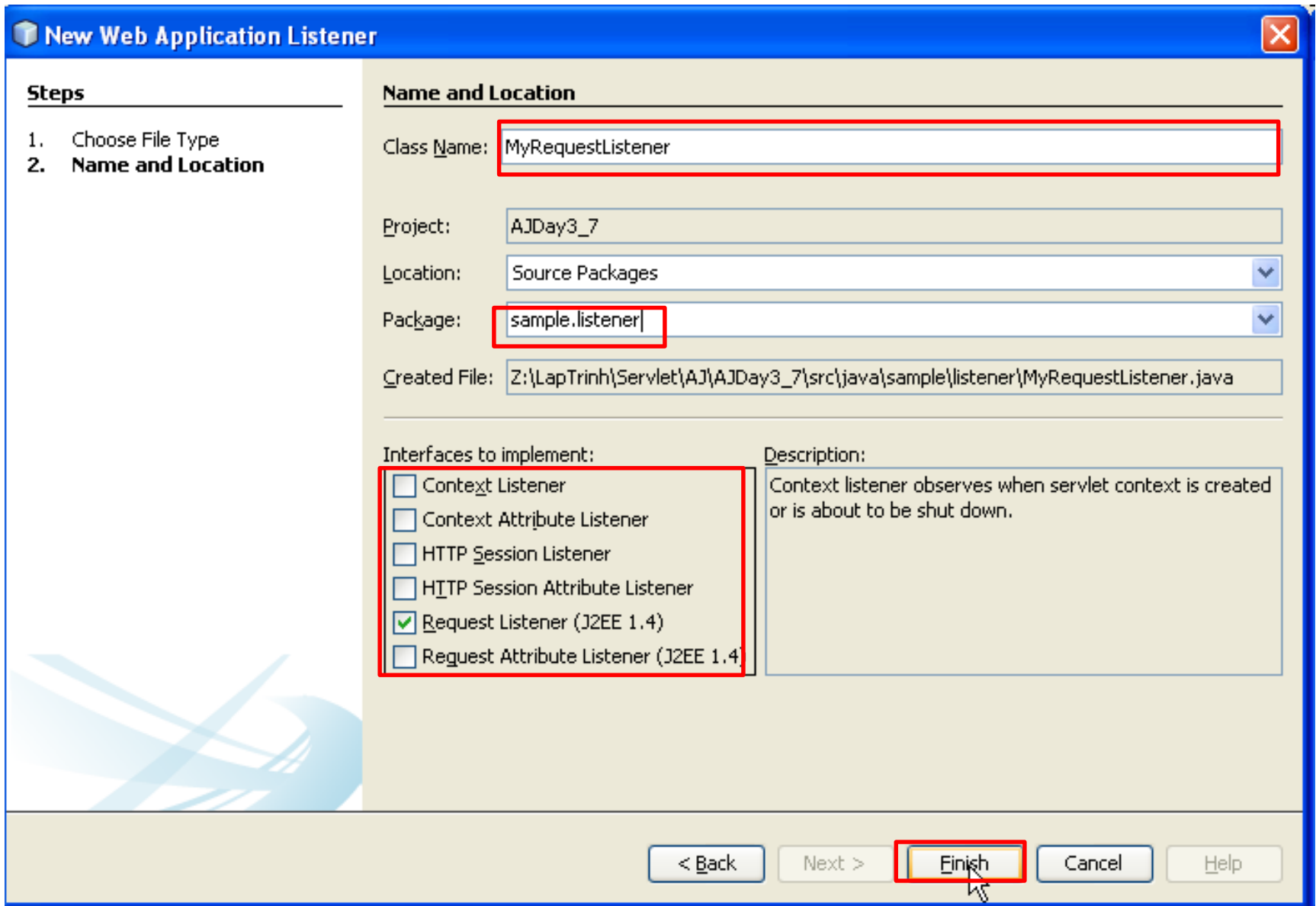
- **ServletRequestAttributeListener** deals with the life cycle of the attributes attached to request objects
- A class implementing the **ServletRequestAttributeListener** interface has 3 methods
 - **attributeAdded()**: is called whenever a new attribute is added to any request
 - **attributeRemoved()**: is called whenever an attribute is removed from a request
 - **attributeReplaced()**: is called whenever an attribute is replaced
- Each of these **ServletRequestAttributeListener** methods **accept** a **ServletRequestAttributeEvent** as a parameter. This event object has 2 methods
 - **getName()**: returns name of attribute
 - **getValue()**: returns old value of attribute
- The **ServletRequestAttributeEvent** inherits from **ServletRequestEvent**
- The “grandparent” of The **ServletRequestEvent** is **java.util.EventObject**
 - The **getSource()** method returns the object that is the source of the event

How to Add Listener to Web Project



Appendix

How to Add Listener to Web Project



New Web Application Listener

Steps

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

Name and Location

Class Name:

Project:

Location:

Package:

Created File:

Interfaces to implement:

- ☐ Context Listener
- ☐ Context Attribute Listener
- ☐ HTTP Session Listener
- ☐ HTTP Session Attribute Listener
- ☒ Request Listener (J2EE 1.4)
- ☐ Request Attribute Listener (J2EE 1.4)

Description:

Context listener observes when servlet context is created or is about to be shut down.

< Back Next > **Finish** Cancel Help


Appendix

Example

MyRequestListener.java

Source

History



```

12
13     * @author Trong Khanh
14     */
15     public class MyRequestListener implements ServletRequestListener {
16
17         public void requestDestroyed(ServletRequestEvent sre) {
18             System.out.println("destroyed in MyRequest is invoked!!!!");
19             sre.getServletRequest().removeAttribute("REQUEST");
20         }
21
22         public void requestInitialized(ServletRequestEvent sre) {
23             System.out.println("context in MyRequest is invoked!!!!");
24             sre.getServletRequest().setAttribute("REQUEST", "ADD");
25         }
26     }

```

web.xml

Source

General

Servlets


Filters

Pages

References

Security

History



```

1     <?xml version="1.0" encoding="UTF-8"?>
2     <web-app version="2.5" xmlns="http://java.sun.com/xml/ns/javaee" xmlns:xsi=
3         <listener>
4             <description>RequestListener</description>
5             <listener-class>sample.listener.MyRequestListener</listener-class>
6         </listener>

```

Appendix

Example

```

MyRequestAttributeListener.java x
15 public class MyRequestAttributeListener implements ServletRequestAttributeListener {
16     public void attributeAdded(ServletRequestAttributeEvent srae) {
17         System.out.println("Add is activated");
18         String name = srae.getName();
19         String oldValue = srae.getValue().toString();
20         String newValue = srae.getServletRequest().getAttribute(name).toString();
21         System.out.println("Name: " + name + " -old: " + oldValue + " -new: " + newValue);
22     }
23     public void attributeRemoved(ServletRequestAttributeEvent srae) {
24         System.out.println("Remove is activated");
25         String name = srae.getName();
26         String oldValue = srae.getValue().toString();
27         System.out.println("Name: " + name + " -old: " + oldValue);
28     }
29     public void attributeReplaced(ServletRequestAttributeEvent srae) {
30         System.out.println("Replace is activated");
31         String name = srae.getName();
32         String oldValue = srae.getValue().toString();
33         String newValue = srae.getServletRequest().getAttribute(name).toString();
34         System.out.println("Name: " + name + " -old: " + oldValue + " -new: " + newValue);
35     }
36 }

26 <listener>
27     <listener-class>sample.listener.MyContextAttributeListener</listener-class>
28 </listener>

```

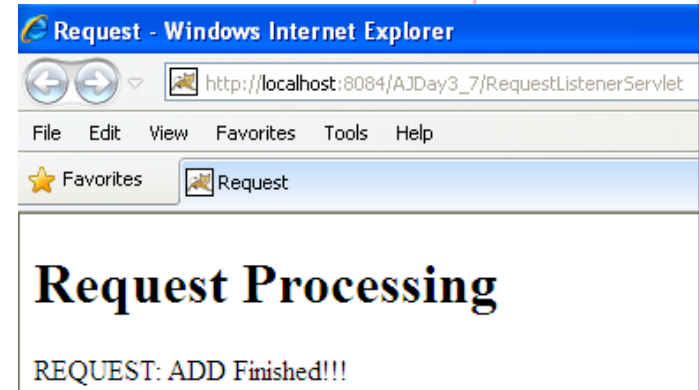
Appendix

Example

```

RequestListenerServlet.java x
[Icons]
28 protected void processRequest(HttpServletRequest request, HttpServletResponse response)
29 throws ServletException, IOException {
30     response.setContentType("text/html;charset=UTF-8");
31     PrintWriter out = response.getWriter();
32     try {
33         out.println("<html>");
34         out.println("<head>");
35         out.println("<title>Request</title>");
36         out.println("</head>");
37         out.println("<body>");
38         out.println("<h1>Request Processing</h1>");
39
40         request.setAttribute("VALUE", "ADD");
41         request.setAttribute("VALUE", "MODIFIED");
42         request.removeAttribute("VALUE");
43
44         out.println("REQUEST: " + request.getAttribute("REQUEST"));
45         out.println("Finished!!!");
46
47         out.println("</body>");
48         out.println("</html>");
49     } finally {
50         out.close();
51     }
52 }

```



Appendix

Example

```

context in MyRequest is invoked!!!!
Add is activated
Name: REQUEST -old: ADD -new: ADD
Replace is activated
Name: org.apache.catalina.ASYNC_SUPPORTED -old: true -new: false
Add is activated
Name: netbeans.monitor.request -old: uri: /AJDay3_7/RequestListenerServlet
method: GET
QueryString: null
Parameters:
Headers:
    Name: accept      Value: */*
    Name: accept-language  Value: vi
    Name: user-agent   Value: Mozilla/4.0 (compatible; MSIE 8.0; W
    Name: accept-encoding  Value: gzip, deflate
    Name: host          Value: localhost:8084
    Name: connection     Value: Keep-Alive
    -new: uri: /AJDay3_7/RequestListenerServlet
method: GET
QueryString: null
Parameters:
Headers:
    Name: accept      Value: */*
    Name: accept-language  Value: vi
    Name: user-agent   Value: Mozilla/4.0 (compatible; MSIE 8.0; W
    Name: accept-encoding  Value: gzip, deflate
    Name: host          Value: localhost:8084
    Name: connection     Value: Keep-Alive
  
```


Appendix

Example

```
Add is activated
Name: netbeans.monitor.monData -old: [MonitorData] -new: [MonitorData]
Add is activated
[Name: netbeans.monitor.response -old: org.netbeans.modules.web.monitor.server
bb5
Add is activated
[Name: netbeans.monitor.filter -old: MonitorFilter(ApplicationFilterConfig[na
ter(ApplicationFilterConfig[name=HTTPMonitorFilter, filterClass=org.netbeans
Add is activated
Name: VALUE -old: ADD -new: ADD
Replace is activated
Name: VALUE -old: ADD -new: MODIFIED
Remove is activated
Name: VALUE -old: MODIFIED
Remove is activated
Name: netbeans.monitor.request -old: uri: /AJDay3_7/RequestListenerServlet
method: GET
QueryString: null
Parameters:
Headers:
    Name: accept      Value: */*
    Name: accept-language  Value: vi
    Name: user-agent   Value: Mozilla/4.0 (compatible; MSIE 8.0; W
    Name: accept-encoding  Value: gzip, deflate
    Name: host          Value: localhost:8084
    Name: connection    Value: Keep-Alive
```

Appendix

Example

-

```
Remove is activated
Name: netbeans.monitor.response -old: org.netbeans.
Remove is activated
Name: netbeans.monitor.filter -old: MonitorFilter{
Remove is activated
Name: netbeans.monitor.monData -old: [MonitorData]
destroyed in MyRequest is invoked!!!!
Remove is activated
Name: REQUEST -old: ADD
```

Appendix

Practices – Example

ReqListener - Windows Internet Explorer

http://localhost:8084/AJDay3_7/

File Edit View Favorites Tools Help

Favorites ReqListener

Request Listener Demo

This form requires a integer.

Input Num

Request_Result - Windows Internet Explorer

http://localhost:8084/AJDay3_7/ListenerServlet?txtNum=5&btAction=Send

File Edit View Favorites Tools Help

Favorites Request_Result

Request Checking

Your input is a number!!!

ReqListener - Windows Internet Explorer

http://localhost:8084/AJDay3_7/

File Edit View Favorites Tools Help

Favorites ReqListener

Request Listener Demo

This form requires a integer.

Input Num

Request_Result - Windows Internet Explorer

http://localhost:8084/AJDay3_7/ListenerServlet?txtNum=a&btAction=Send

File Edit View Favorites Tools Help

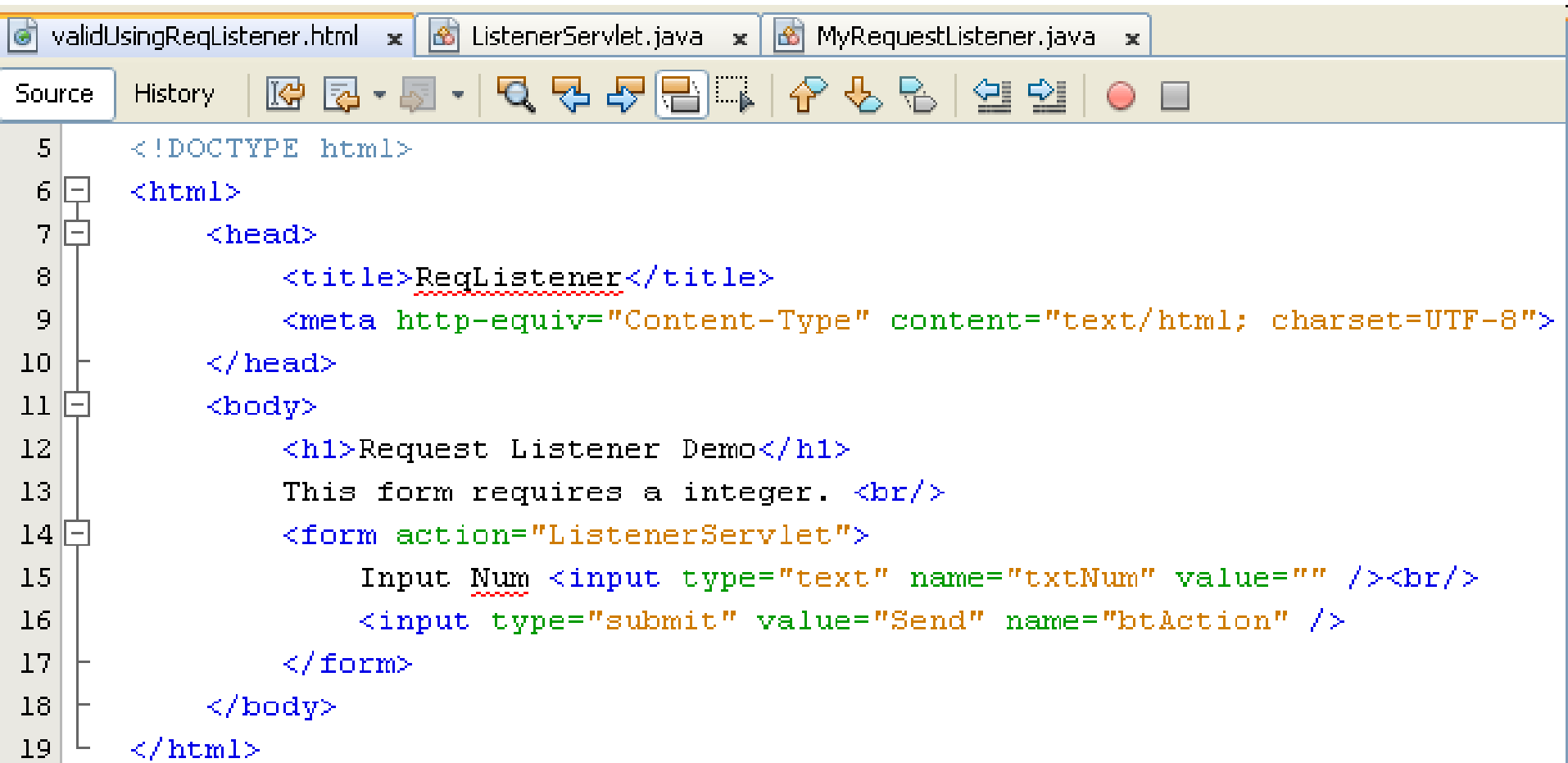
Favorites Request_Result

Request Checking

Your input is not a number

Appendix

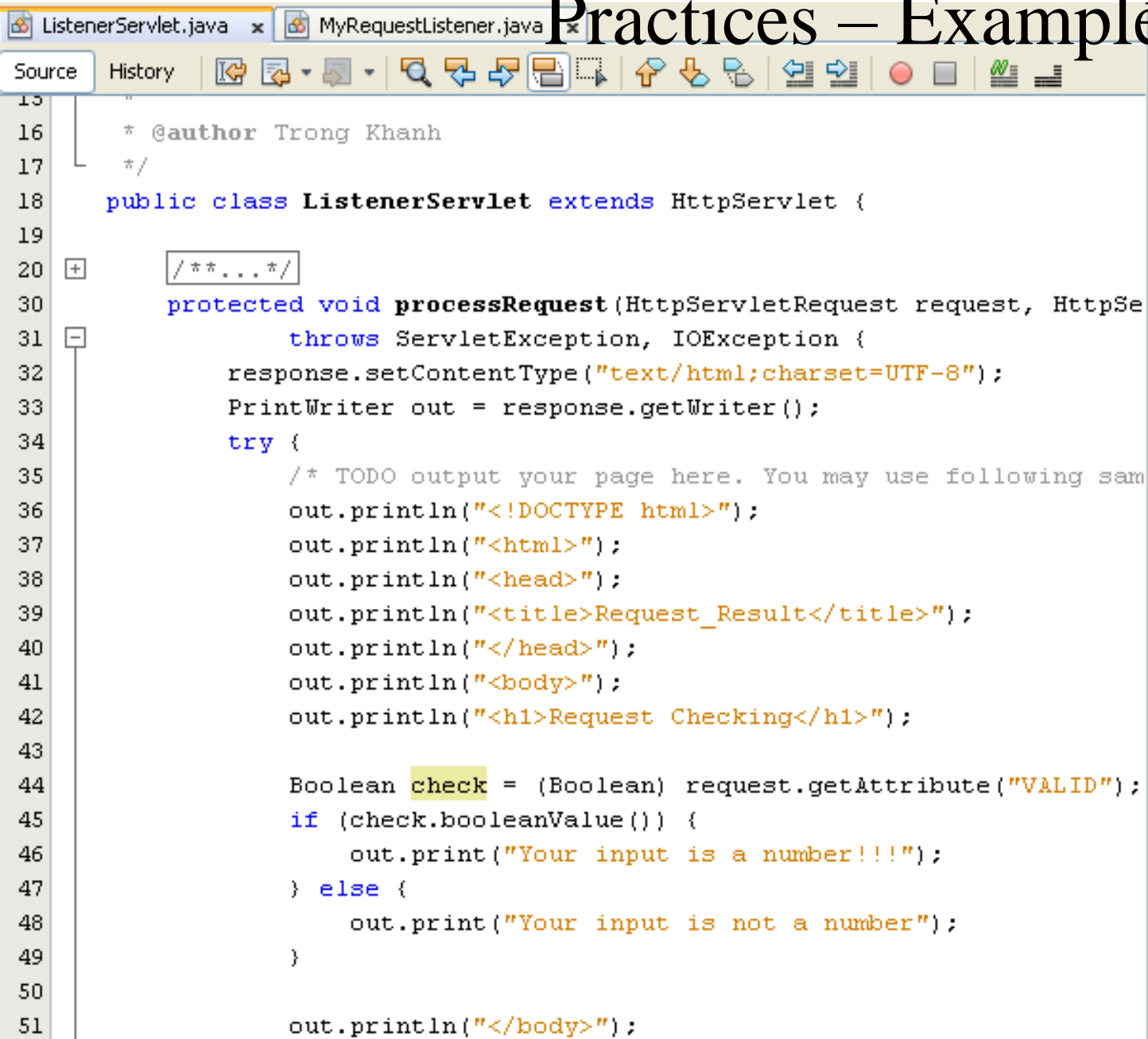
Practices – Example



The screenshot shows an IDE with three tabs: `validUsingReqListener.html`, `ListenerServlet.java`, and `MyRequestListener.java`. The `validUsingReqListener.html` tab is active, displaying an HTML document. The code in the editor is as follows:

```

5  <!DOCTYPE html>
6  <html>
7      <head>
8          <title>ReqListener</title>
9          <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
10     </head>
11     <body>
12         <h1>Request Listener Demo</h1>
13         This form requires a integer. <br/>
14         <form action="ListenerServlet">
15             Input Num <input type="text" name="txtNum" value="" /><br/>
16             <input type="submit" value="Send" name="btAction" />
17         </form>
18     </body>
19 </html>
  
```




```

15
16  * @author Trong Khanh
17  */
18  public class ListenerServlet extends HttpServlet {
19
20      /**...*/
21
22      protected void processRequest(HttpServletRequest request, HttpServletResponse response)
23          throws ServletException, IOException {
24          response.setContentType("text/html;charset=UTF-8");
25          PrintWriter out = response.getWriter();
26          try {
27              /* TODO output your page here. You may use following sample code. */
28              out.println("<!DOCTYPE html>");
29              out.println("<html>");
30              out.println("<head>");
31              out.println("<title>Request_Result</title>");
32              out.println("</head>");
33              out.println("<body>");
34              out.println("<h1>Request Checking</h1>");
35
36              Boolean check = (Boolean) request.getAttribute("VALID");
37              if (check.booleanValue()) {
38                  out.print("Your input is a number!!!");
39              } else {
40                  out.print("Your input is not a number");
41              }
42
43              out.println("</body>");
44          } catch (Exception ex) {
45              out.println("Exception: " + ex.getMessage());
46          }
47      }
48  }
49
50
51

```



















Appendix

Practices – Example


MyRequestListener.java
✕

Source

History

```

12  "
13      * @author Trong Khanh
14      */
15  public class MyRequestListener implements ServletRequestListener {
16
17      public void requestDestroyed(ServletRequestEvent sre) { ... }
18
19      public void requestInitialized(ServletRequestEvent sre) {
20
21          String num = sre.getServletRequest().getParameter("txtNum");
22          Boolean result = true;
23          try {
24              int n = Integer.parseInt(num);
25          } catch (NumberFormatException ex) {
26              result = false;
27          }
28          sre.getServletRequest().setAttribute("VALID", result);
29      }
30  }
31
32  }
  
```

Appendix

Context Listener

- Sessions have 02 listeners:
 - **ServletContextListener**
 - **Receive notifications about changes to the servlet context of the Web application**
 - **contextInitialized()**: gets called before any servlet's **init()** method or any filter's **doFilter()** method
 - **contextDestroyed()**: gets called after the servlet's or filter's **destroy()** method
 - Both of methods get passed a **ServletContextEvent** object that provides the **getServletContext()** method
 - **ServletContextAttributeListener**
 - **Receives a notification about any modifications made to the attribute list on the servlet context of a web application**
 - Has the same trio of methods as **ServletRequestAttributeListener**

Appendix

Example

```

MyContextListener.java x
15  //
16  public class MyContextListener implements ServletContextListener {
17      public void contextInitialized(ServletContextEvent sce) {
18          System.out.println("context in MyContext is invoked!!!!");
19          sce.getServletContext().setAttribute("CONTEXT", "ADD");
20      }
21      public void contextDestroyed(ServletContextEvent sce) {
22          System.out.println("destroyed in MyContext is invoked!!!!");
23          sce.getServletContext().removeAttribute("CONTEXT");
24      }
25  }
    
```

```

web.xml x
General  Servlets  Filters  Pages  References  Security  XML
15  <listener>
16      <listener-class>sample.listener.MyContextListener</listener-class>
17  </listener>
18  <listener>
19      <listener-class>sample.listener.MyContextAttributeListener</listener-class>
20  </listener>
    
```


Appendix

Example

```

MyContextAttributeListener.java x
[Icons]

15  public class MyContextAttributeListener implements ServletContextAttributeListener {
16      [Icon]
17      public void attributeAdded(ServletContextAttributeEvent scab) {
18          System.out.println("Add is activated-");
19          String name = scab.getName();
20          [Warning] String oldValue = scab.getValue().toString();
21          String newValue = scab.getServletContext().getAttribute(name).toString();
22          System.out.println("Name: " + name + "-old: " + oldValue + "-new: " + newValue);
23      }
24      [Icon]
25      public void attributeRemoved(ServletContextAttributeEvent scab) {
26          System.out.println("Remove is activated-");
27          String name = scab.getName();
28          [Warning] String oldValue = scab.getValue().toString();
29          System.out.println("Name: " + name + "-old: " + oldValue);
30      }
31      [Icon]
32      public void attributeReplaced(ServletContextAttributeEvent scab) {
33          System.out.println("Replace is activated-");
34          String name = scab.getName();
35          [Warning] String oldValue = scab.getValue().toString();
36          String newValue = scab.getServletContext().getAttribute(name).toString();
37          System.out.println("Name: " + name + "-old: " + oldValue + "-new: " + newValue);
38      }
39  }

```

```
ContextListenerServlet.java x
protected void processRequest(HttpServletRequest request, HttpServletResponse response)
throws ServletException, IOException {
    response.setContentType("text/html;charset=UTF-8");
    PrintWriter out = response.getWriter();
    try {
        out.println("<html>");
        out.println("<head>");
        out.println("<title>Process</title>");
        out.println("</head>");
        out.println("<body>");
        out.println("<h1>Context Listener Demo</h1>");

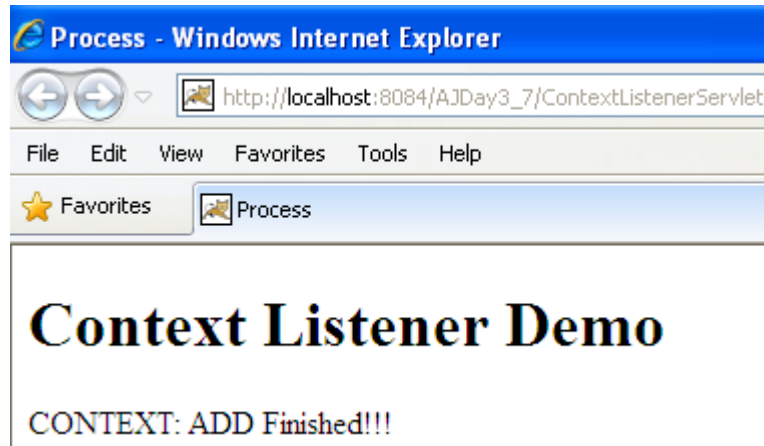
        ServletContext sc = getServletContext();
        sc.setAttribute("VALUE", "ADD");
        sc.setAttribute("VALUE", "MODIFIED");
        sc.removeAttribute("VALUE");

        out.println("CONTEXT: " + sc.getAttribute("CONTEXT"));
        out.println("Finished!!!");

        out.println("</body>");
        out.println("</html>");
    } finally {
        out.close();
    }
}
```

Appendix

Example



```

context in MyContext is invoked!!!!
Add is activated-
Name: CONTEXT-old: ADD-new: ADD
Add is activated-
Name: org.apache.jasper.compiler.TldLocationsCache-old: org.apache.jasper.
Add is activated
Name: VALID -old: false -new: false
Replace is activated
Name: org.apache.catalina.ASYNC_SUPPORTED -old: true -new: false
Add is activated
Name: netbeans.monitor.request -old: uri: /AJDay3_7/ContextListenerServlet
method: GET
QueryString: null
Parameters:
Headers:

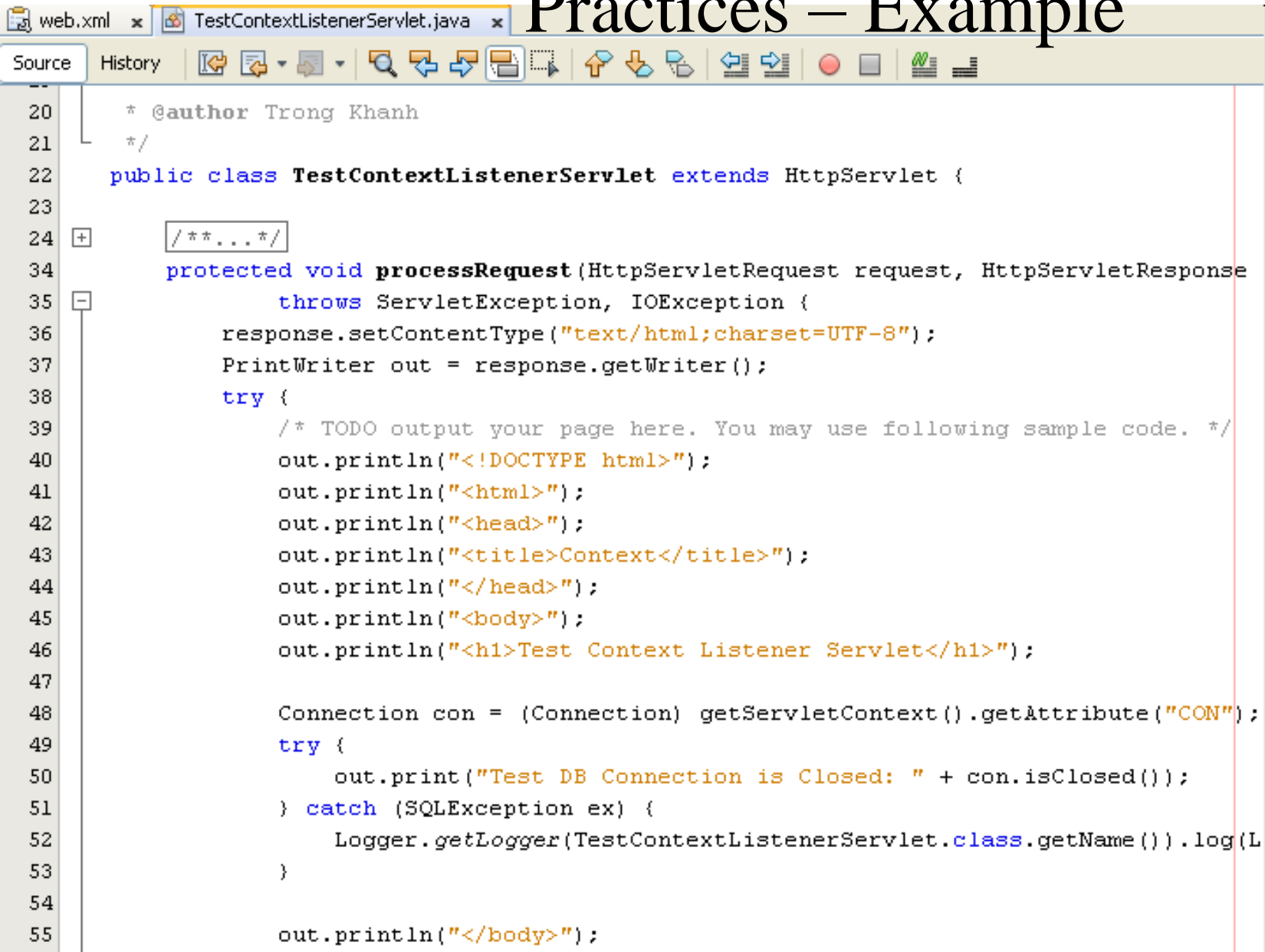
```

Appendix

Practices – Example



Practices – Example



```

web.xml x TestContextListenerServlet.java x
Source History
20  * @author Trong Khanh
21  */
22  public class TestContextListenerServlet extends HttpServlet {
23
24      /**...*/
25
26      protected void processRequest(HttpServletRequest request, HttpServletResponse
27          throws ServletException, IOException {
28          response.setContentType("text/html;charset=UTF-8");
29          PrintWriter out = response.getWriter();
30          try {
31              /* TODO output your page here. You may use following sample code. */
32              out.println("<!DOCTYPE html>");
33              out.println("<html>");
34              out.println("<head>");
35              out.println("<title>Context</title>");
36              out.println("</head>");
37              out.println("<body>");
38              out.println("<h1>Test Context Listener Servlet</h1>");
39
40              Connection con = (Connection) getServletContext().getAttribute("CON");
41              try {
42                  out.print("Test DB Connection is Closed: " + con.isClosed());
43              } catch (SQLException ex) {
44                  Logger.getLogger(TestContextListenerServlet.class.getName()).log(L
45              )
46
47              out.println("</body>");
48
49
50
51
52
53
54
55

```

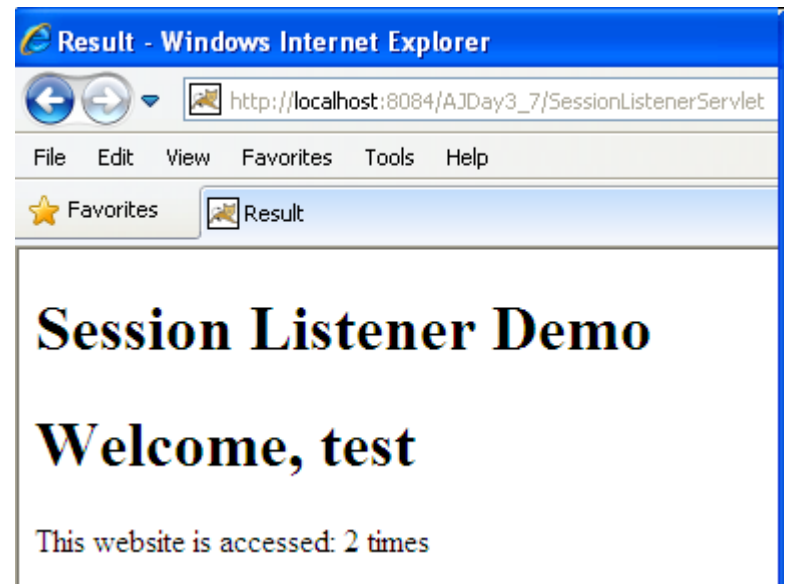
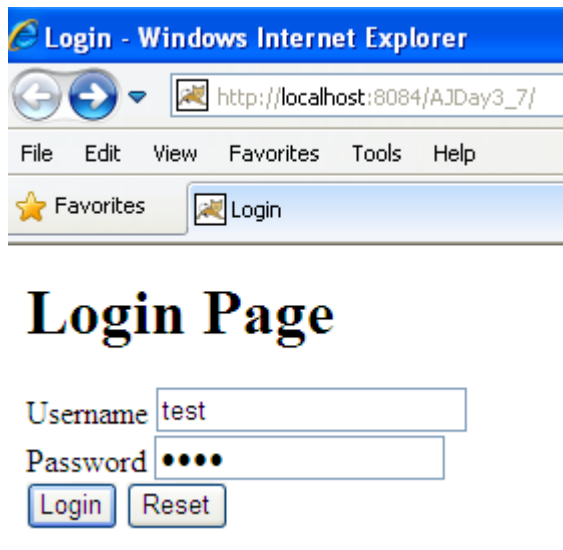
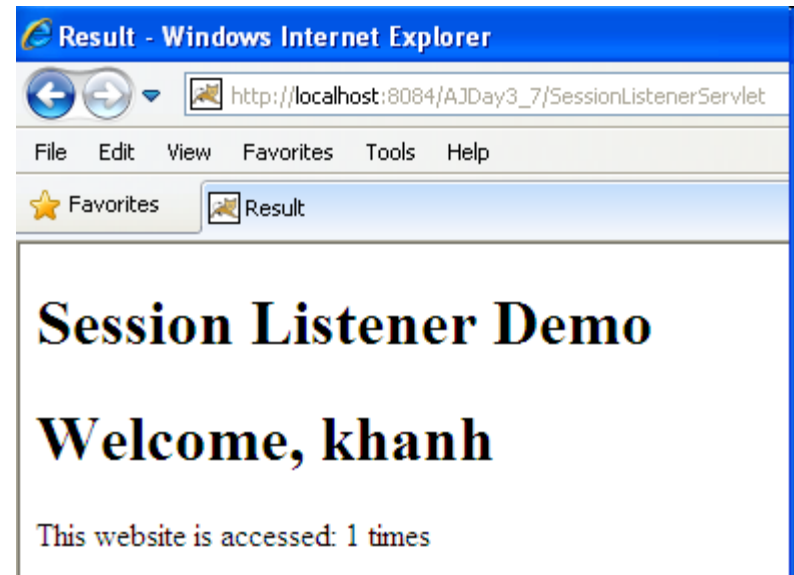
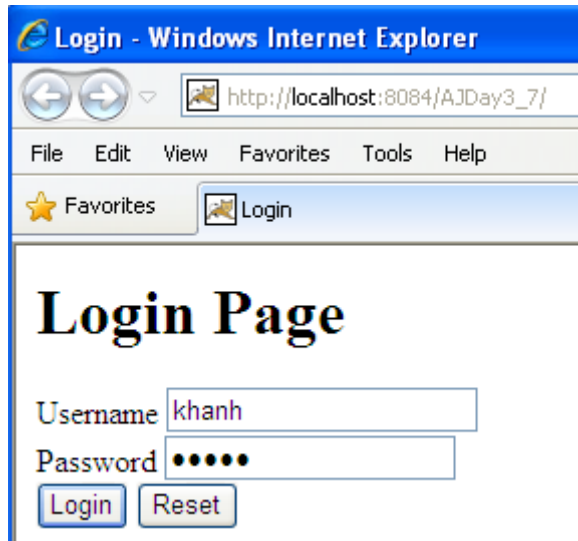
Appendix

Session Listeners Declared in DD

- Have **02** listeners:
 - **HttpSessionListener**
 - Implements the changes to the list of active sessions in Web application
 - **sessionCreated()** method: is called whenever a **new session** is provided (*can say that **after** the **getSession()** method*)
 - **sessionDestroyed()**: is called at the **end of the sessions** (*within the call **invalidate()** or session time out but before the session become invalid*)
 - Both of methods get passed a **HttpSessionEvent** object that provides the **getSession()** method
 - **HttpSessionAttributeListener**
 - Is **called** whenever **some changes** are made to the **attribute** list on the **servlet session** of a Web application
 - Is used to **notify when** an **attribute** has been **added, removed** or **replaced by another attribute**
 - Has the **same trio of** methods as **ServletRequestAttributeListener** that are passed the **HttpSessionBindingEvent** (is inherited from **HttpSessionEvent**)

Appendix

Practices – Example



Appendix

Practices – Example

```
loginCountSession.html x
Source History
5 <!DOCTYPE html>
6 <html>
7   <head>
8     <title>Login</title>
9     <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
10  </head>
11  <body>
12    <h1>Login Page</h1>
13    <form action="SessionListenerServlet" method="POST">
14      Username <input type="text" name="txtUsername" value="" /><br/>
15      Password <input type="password" name="txtPassword" value="" /><br/>
16      <input type="submit" value="Login" name="btAction" />
17      <input type="reset" value="Reset" />
18    </form>
19  </body>
20 </html>
```


Appendix

Practices – Example

```

SessionListenerServlet.java x
Source History
17  * @author Trong Khanh
18  */
19  public class SessionListenerServlet extends HttpServlet {
20
21      /**...*/
31  protected void processRequest(HttpServletRequest request, HttpServletResponse res
32      throws ServletException, IOException {
33      response.setContentType("text/html;charset=UTF-8");
34      PrintWriter out = response.getWriter();
35      try {
36          out.println("<!DOCTYPE html>");
37          out.println("<html>");
38          out.println("<head>");
39          out.println("<title>Result</title>");
40          out.println("</head>");
41          out.println("<body>");
42          out.println("<h1>Session Listener Demo</h1>");
43          String user = request.getParameter("txtUsername");
44          String pass = request.getParameter("txtPassword");
45          if (user.equals(pass)) {
46              HttpSession session = request.getSession();
47              out.println("<h1>Welcome, " + user + "</h1>");
48              Integer count = (Integer) getServletContext().getAttribute("COUNT");
49              out.println("This website is accessed: " + count + " times");
50          } else {
51              out.println("<h1>Invalid username or password</h1>");
52          }
53          out.println("</body>");

```

Appendix

Practices – Example

```

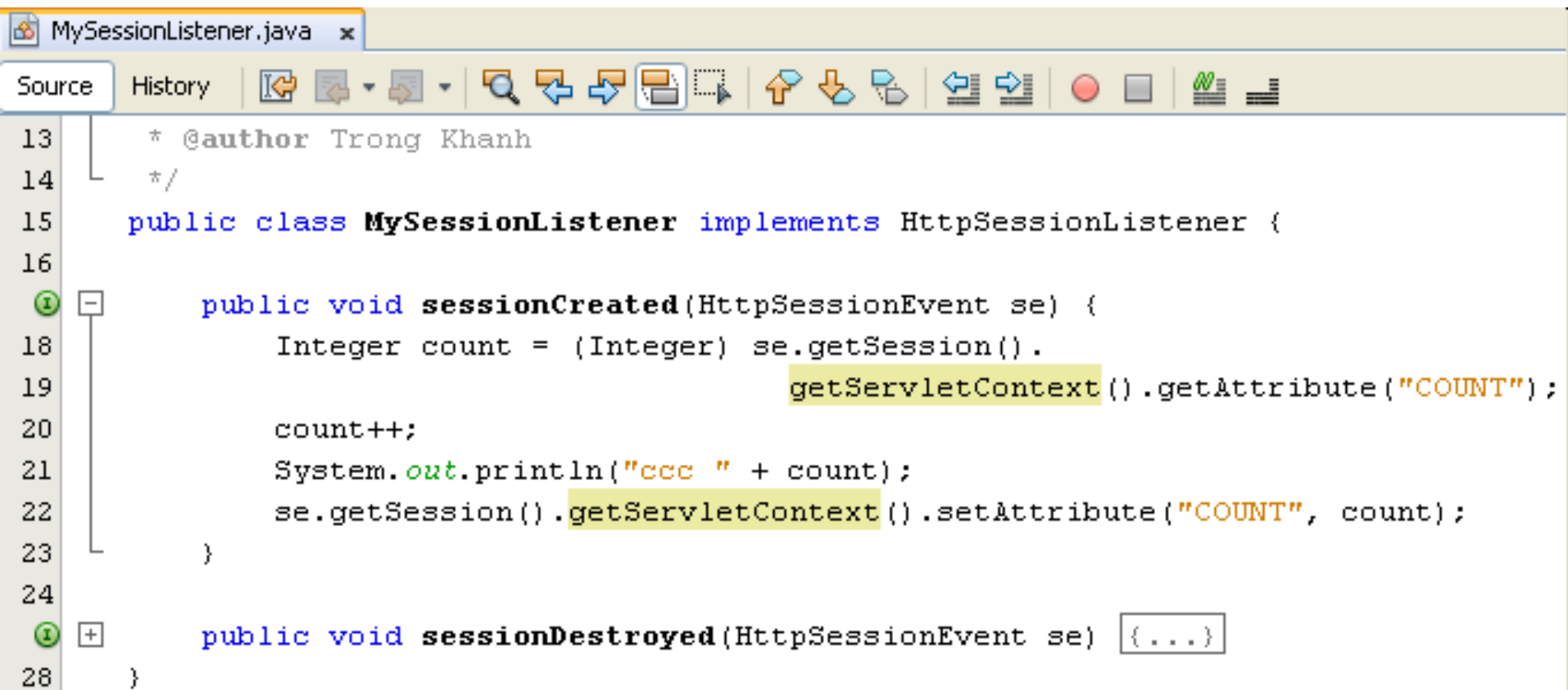
web.xml x
Source General Servlets Filters Pages References Security History
1 <?xml version="1.0" encoding="UTF-8"?>
2 <web-app version="2.5" xmlns="http://java.sun.com/xml/ns/javaee" xmlns:xsi=
3 <listener>
4 <description>ServletContextListener</description>
5 <listener-class>sample.listener.MyContextListener</listener-class>
6 </listener>
7 <listener>
8 <description>HttpSessionListener</description>
9 <listener-class>sample.listener.MySessionListener</listener-class>
10 </listener>
  
```

```

MyContextListener.java x
Source History
15 * @author Trong Khanh
16 */
17 public class MyContextListener implements ServletContextListener {
18
19     public void contextInitialized(ServletContextEvent sce) {
20         sce.getServletContext().setAttribute("COUNT", 0);
21     }
22
23     public void contextDestroyed(ServletContextEvent sce) { ... }
24
25 }
  
```

Appendix

Practices – Example



```

MySessionListener.java x
Source History
13      * @author Trong Khanh
14      */
15      public class MySessionListener implements HttpSessionListener {
16
17          public void sessionCreated(HttpSessionEvent se) {
18              Integer count = (Integer) se.getSession().
19                  getServletContext().getAttribute("COUNT");
20              count++;
21              System.out.println("ccc " + count);
22              se.getSession().getServletContext().setAttribute("COUNT", count);
23          }
24
25          public void sessionDestroyed(HttpSessionEvent se) { ... }
26      }
  
```

Appendix

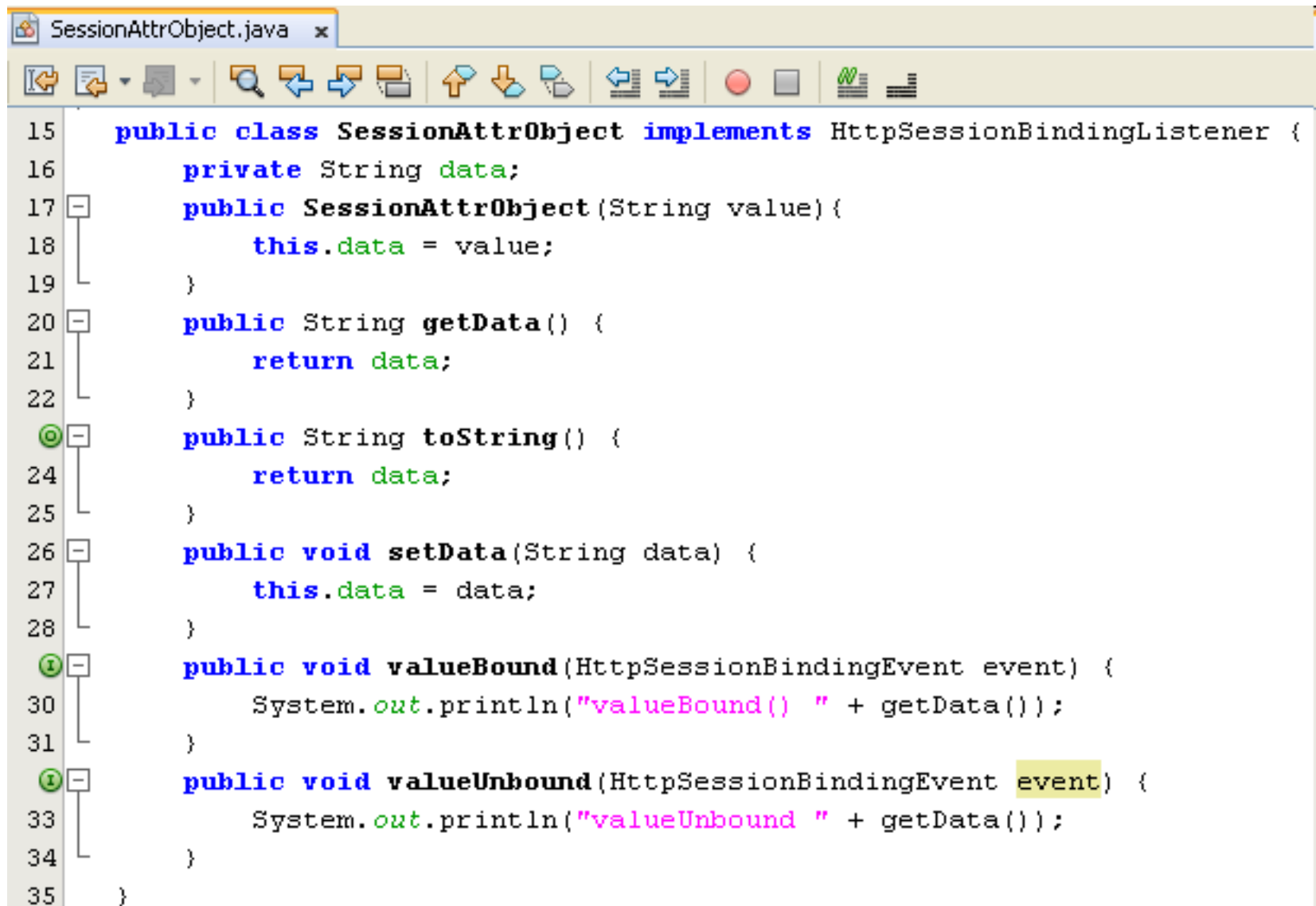
Session Listeners Not Declared in DD

- Have **02** listeners:
 - **HttpSessionBindingListener**
 - **Notifies** the **object** when it is being **bound** to or **unbound** from a **session**
 - This **notification** can be the **result** of a **forced unbinding** of an **attribute** from a **session** by the **programmer**, **invalidation** of the **session** or due to **timing out** of **session**
 - This **implementation** do **not** **require** any **configuration** within the deployment descriptor of the Web application
 - **Notes:** The object data types not implemented in **BindingListener** **don't** **fire any events!**

| Methods | Descriptions |
|---------------------|--|
| valueBound | <ul style="list-style-type: none"> - public void valueBound(HttpSessionBindingEvent se); - Notifies the object in being bound to a session and is responsible for identification of the session |
| valueUnbound | <ul style="list-style-type: none"> - public void valueUnbound(HttpSessionBindingEvent se); - Notifies the object on being unbound from a session and is responsible for identification of the session |

Appendix

Session Listeners Not Declared in DD - Example



```

15  public class SessionAttrObject implements HttpSessionBindingListener {
16      private String data;
17      public SessionAttrObject(String value){
18          this.data = value;
19      }
20      public String getData() {
21          return data;
22      }
23      public String toString() {
24          return data;
25      }
26      public void setData(String data) {
27          this.data = data;
28      }
29      public void valueBound(HttpSessionBindingEvent event) {
30          System.out.println("valueBound() " + getData());
31      }
32      public void valueUnbound(HttpSessionBindingEvent event) {
33          System.out.println("valueUnbound " + getData());
34      }
35  }
  
```

Appendix

Session Listeners Not Declared in DD - Example

```

SessionBindingServlet.java x
40      out.println("<h1>Session Binding Demo</h1>");
41
42      SessionAttrObject bObj1 = new SessionAttrObject("khanh");
43      SessionAttrObject bObj2 = new SessionAttrObject("kieu");
44      HttpSession session = request.getSession();
45      session.setAttribute("BOUND", bObj1);
46      session.setAttribute("BOUND1", bObj2);
47      session.setAttribute("NONBOUND", "NON");
48      session.setAttribute("BOUND", bObj2);
49      session.setAttribute("BOUND", null);
50      session.removeAttribute("BOUND2");
51      session.removeAttribute("NONBOUND");
52      out.println("Finished!!!");
53
54      out.println("</body>");
55      out.println("</html>");
56
57      } finally {

```

```

valueBound()  khanh
valueBound()  kieu
valueBound()  kieu
valueUnbound  khanh
valueUnbound  kieu
valueUnbound  kieu

```

Appendix

Session Listeners Not Declared in DD

- Have **02 listeners** (cont)
 - **HttpSessionActivationListener** (*receives events when a value object is transported across JVMs*).
 - **Stateful** session (activated and passivated)
 - Is **implemented** when a **container migrates** the **session between VM** or **persists sessions** and is **not required** any **configuration within the deployment descriptor**

| Methods | Descriptions |
|-----------------------------|--|
| sessionDidActivate | <ul style="list-style-type: none">- public void sessionDidActivate(HttpSessionEvent se);- Provides notification that the session has just been activated. |
| sessionWillPassivate | <ul style="list-style-type: none">- public void sessionWillPassivate(HttpSessionEvent se);- Provide notification that the session is about to be passivated. |

Appendix

CRUD Function

```

search.jsp x
Source History
4      Author      : kieukhanh
5      --%>
6
7      <%@page import="sample.registration.RegistrationDTO"%>
8      <%@page import="java.util.List"%>
9      <%@page contentType="text/html" pageEncoding="UTF-8"%>
10     <%@taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c"%>
11     <!DOCTYPE html>
12     <html>
13     <head>
14         <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
15         <title>Search</title>
16     </head>
17     <body>
18         <font color="red">
19         <%
20             Cookie[] cookies = request.getCookies();
21             if (cookies != null) {
22                 String username = "";
23                 for (Cookie cookie : cookies) {
24                     String temp = cookie.getName();
25                     if (!temp.equals("JSESSIONID")) {
26                         username = temp;
27                     }
28                 }
29             }
30             <%= username %>
31             Welcome, <%= username %>
32         <%
33         }
34     <%>

```


Appendix

CRUD Function

```

35     </font>
36     <h1>Search Page</h1>
37     <form action="SE1162Servlet">
38         Search Value <input type="text" name="txtSearchValue"
39                        value="" /><br/>
40         <input type="submit" value="Search" name="btAction" />
41     </form>
42
43     <br/>
44
45     <%
46         String searchValue = request.getParameter("txtSearchValue");
47
48         if (searchValue != null) {
49             List<RegistrationDTO> result =
50                 (List<RegistrationDTO>)request.getAttribute("SEARCHRESULT");
51
52             if (result != null) {
53                 %>
54                 <table border="1">
55                     <thead>
56                         <tr>
57                             <th>No.</th>
58                             <th>Username</th>
59                             <th>Password</th>
60                             <th>Lastname</th>
61                             <th>Role</th>
62                             <th>Delete</th>
63                             <th>Update</th>
64                         </tr>

```

Appendix

CRUD Function

```

65     </thead>
66     <tbody>
67         <%
68             int count = 0;
69             for (RegistrationDTO dto : result) {
70                 String urlRewriting = "SE1162Servlet?btAction=delete&pk="
71                     + dto.getUsername()
72                     + "&lastSearchValue="
73                     + searchValue;
74             %>
75         <form action="SE1162Servlet">
76             <tr>
77                 <td>
78                     <%= ++count %>
79                 </td>
80                 <td>
81                     <%= dto.getUsername() %>
82                     <input type="hidden" name="txtUsername"
83                         value="<%= dto.getUsername() %>" />
84                 </td>
85                 <td>
86                     <input type="text" name="txtPassword"
87                         value="<%= dto.getPassword() %>" />
88                 </td>
89                 <td>
90                     <%= dto.getLastname() %>
91                 </td>

```

Appendix

CRUD Function

```

92 <td>
93     <input type="checkbox" name="chkRole" value="ADMIN"
94     <%
95         if (dto.isRole()) {
96             %>
97             checked="checked"
98         <%
99             }
100         %>
101     />
102 </td>
103 <td>
104     <a href="<%= urlRewriting %>">Delete</a>
105 </td>
106 <td>
107     <input type="hidden" name="lastSearchValue"
108     value="<%= searchValue %>" />
109     <input type="submit" value="Update" name="btAction" />
110 </td>
111 </tr>
112 </form>
113 <%
114     }
115 %>
116 </tbody>
117 </table>
118
119 <%
120     } else {
121
122         <h2>No record is matched!!!</h2>
123     <%
124         }
125     } //end if search Value
126 %>
127 </body>
128 </html>

```

Appendix

CUD Function

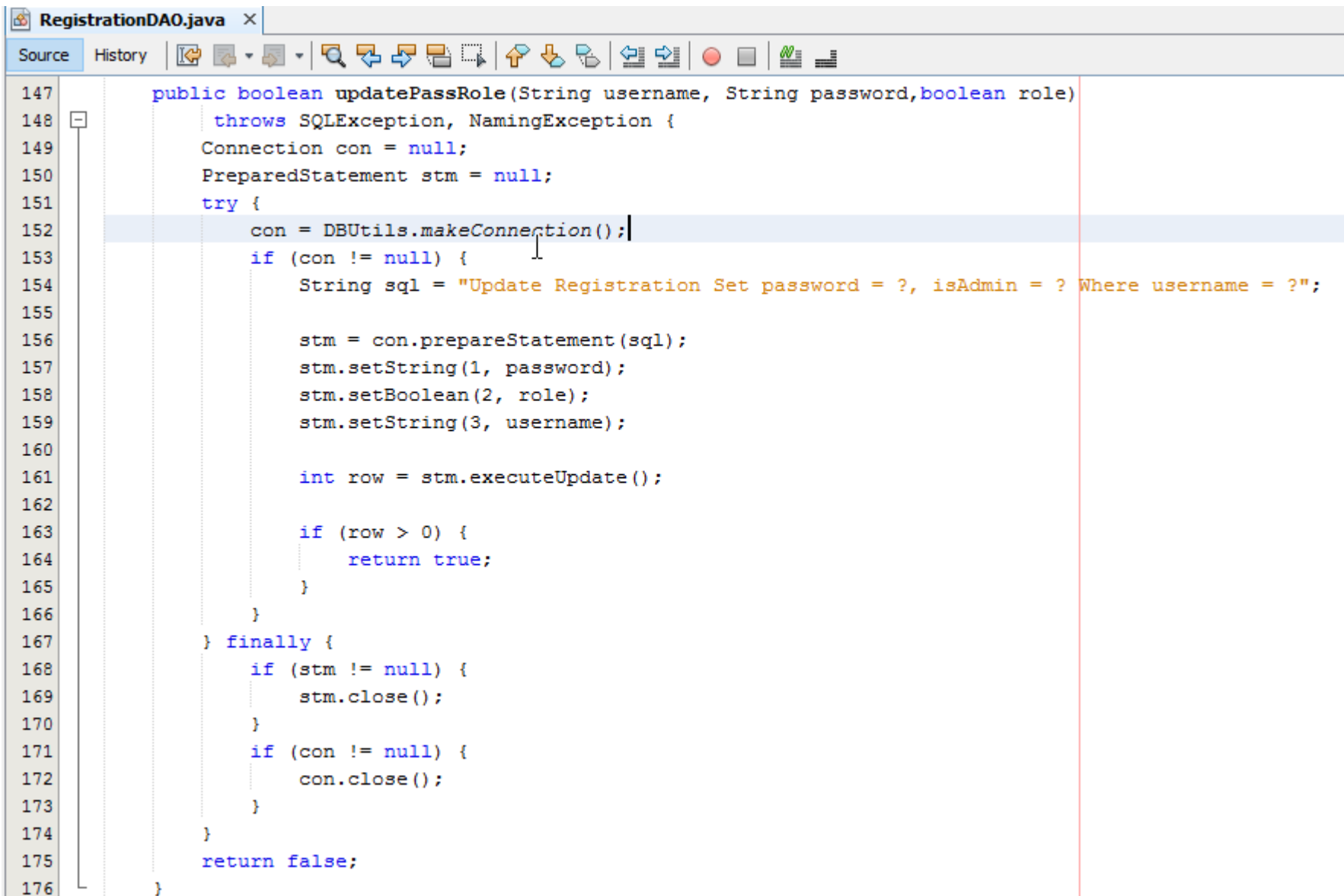
```

RegistrationDAO.java x
Source History
112
113 public boolean deleteRecord(String username)
114     throws SQLException, NamingException {
115     Connection con = null;
116     PreparedStatement stm = null;
117     try {
118         con = DBUtils.makeConnection();
119
120         if (con != null) {
121             String sql = "Delete From Registration Where username = ?";
122
123             stm = con.prepareStatement(sql);
124             stm.setString(1, username);
125
126             int row = stm.executeUpdate();
127
128             if (row > 0) {
129                 return true;
130             }
131         }
132     } finally {
133         if (stm != null) {
134             stm.close();
135         }
136         if (con != null) {
137             con.close();
138         }
139     }
140
141     return false;
142 }

```

Appendix

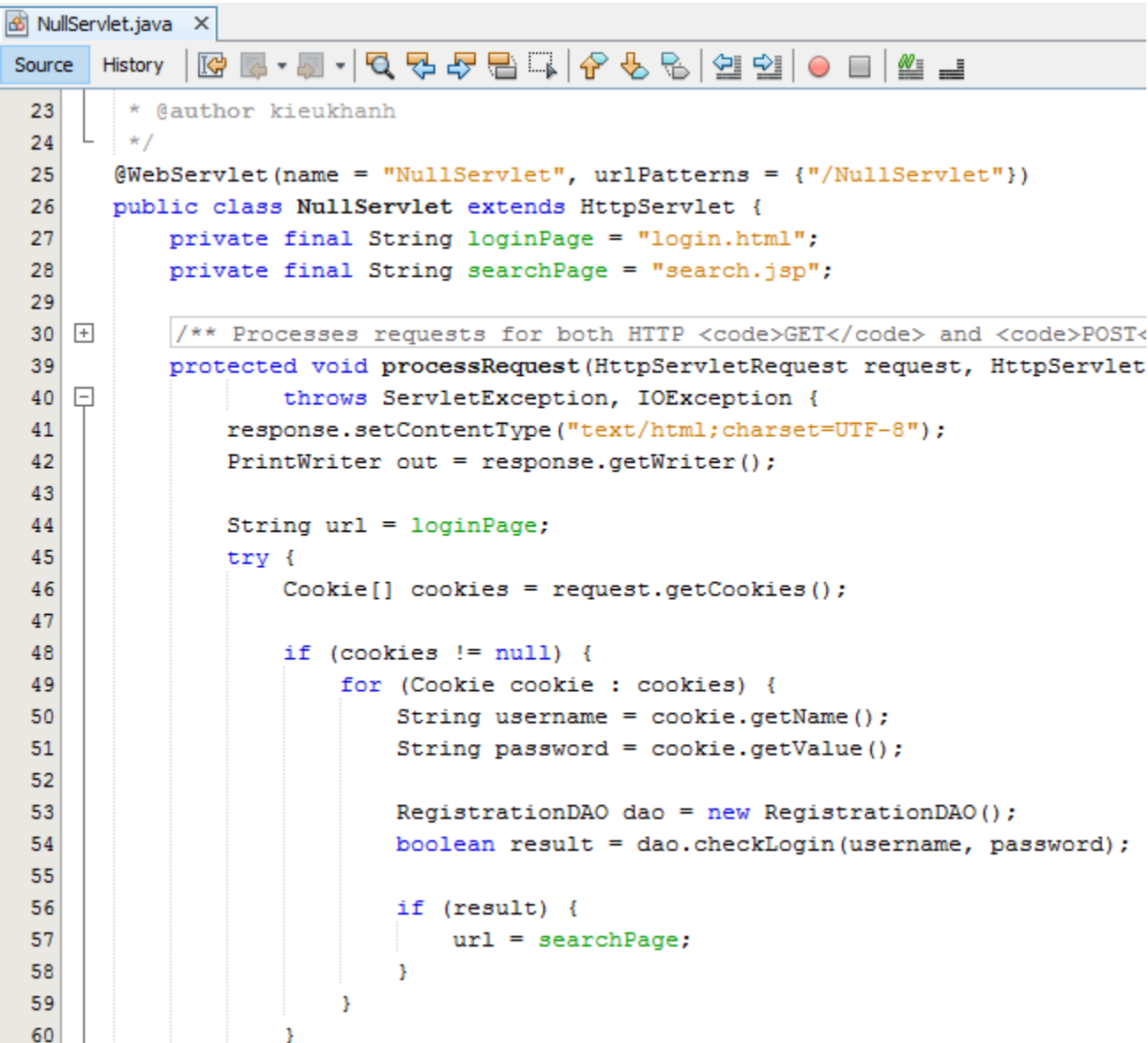
CRUD Function



```
RegistrationDAO.java x
Source History
147 public boolean updatePassRole(String username, String password, boolean role)
148     throws SQLException, NamingException {
149     Connection con = null;
150     PreparedStatement stm = null;
151     try {
152         con = DBUtils.makeConnection();
153         if (con != null) {
154             String sql = "Update Registration Set password = ?, isAdmin = ? Where username = ?";
155
156             stm = con.prepareStatement(sql);
157             stm.setString(1, password);
158             stm.setBoolean(2, role);
159             stm.setString(3, username);
160
161             int row = stm.executeUpdate();
162
163             if (row > 0) {
164                 return true;
165             }
166         }
167     } finally {
168         if (stm != null) {
169             stm.close();
170         }
171         if (con != null) {
172             con.close();
173         }
174     }
175     return false;
176 }
```

Appendix

CRUD Function



```

NullServlet.java x
Source History
23  * @author kieukhanh
24  */
25  @WebServlet(name = "NullServlet", urlPatterns = {"/NullServlet"})
26  public class NullServlet extends HttpServlet {
27      private final String loginPage = "login.html";
28      private final String searchPage = "search.jsp";
29
30      /** Processes requests for both HTTP <code>GET</code> and <code>POST</code>
31      protected void processRequest(HttpServletRequest request, HttpServletResponse
32      throws ServletException, IOException {
33          response.setContentType("text/html;charset=UTF-8");
34          PrintWriter out = response.getWriter();
35
36          String url = loginPage;
37          try {
38              Cookie[] cookies = request.getCookies();
39
40              if (cookies != null) {
41                  for (Cookie cookie : cookies) {
42                      String username = cookie.getName();
43                      String password = cookie.getValue();
44
45                      RegistrationDAO dao = new RegistrationDAO();
46                      boolean result = dao.checkLogin(username, password);
47
48                      if (result) {
49                          url = searchPage;
50                      }
51                  }
52              }
53          }
54      }
55  }
56  }
57  }
58  }
59  }
60  }

```

Appendix

CRUD Function

```
61     } catch (NamingException ex) {  
62         ex.printStackTrace();  
63     } catch (SQLException ex) {  
64         ex.printStackTrace();  
65     } finally {  
66         RequestDispatcher rd = request.getRequestDispatcher(url);  
67         rd.forward(request, response);  
68  
69         out.close();  
70     }  
71 }
```

Appendix

CRUD Function

```

SE1162Servlet.java x
Source History
18  * @author kieukhanh
19  */
20  public class SE1162Servlet extends HttpServlet {
21      private final String loginServlet = "LoginServlet";
22      private final String loginPage = "login.html";
23      private final String searchServlet = "SearchServlet";
24      private final String deleteRecordServlet = "DeleteRecordServlet";
25      private final String updatePassRoleServlet = "UpdatePassRoleServlet";
26      private final String nullServlet = "NullServlet";
27      private final String addItemServlet = "AddItemServlet";
28      private final String viewCartPage = "viewCart.jsp";
29      private final String deleteItemServlet = "DeleteItemServlet";
30      private final String createAccountServlet = "CreateAccountServlet";
31
32      /** Processes requests for both HTTP <code>GET</code> and <code>POST</code>
33      protected void processRequest(HttpServletRequest request, HttpServletResponse
34          throws ServletException, IOException {
35          response.setContentType("text/html;charset=UTF-8");
36          PrintWriter out = response.getWriter();
37
38          String button = request.getParameter("btAction");
39          String url = loginPage;
40          try {
41              if (button == null) {
42                  url = nullServlet;
43              } else if (button.equals("Login")) {
44                  url = loginServlet;
45              } else if (button.equals("Search")) {
46                  url = searchServlet;
47              } else if (button.equals("delete")) {

```


Appendix

CRUD Function

```
56         url = deleteRecordServlet;  
57     } else if (button.equals("Update")) {  
58         url = updatePassRoleServlet;  
59     } else if (button.equals("Add Book To Your Cart")) {  
60         url = addItemServlet;  
61     } else if (button.equals("View Your Cart")) {  
62         url = viewCartPage;  
63     } else if (button.equals("Remove Selected Items")) {  
64         url = deleteItemServlet;  
65     } else if (button.equals("Create New Account")) {  
66         url = createAccountServlet;  
67     }  
68  
69     } finally {  
70         RequestDispatcher rd = request.getRequestDispatcher(url);  
71         rd.forward(request, response);  
72  
73         out.close();  
74     }  
75 }
```

Appendix

CRUD Function

```

DeleteRecordServlet.java x
Source History
21  * @author kieukhanh
22  */
23  @WebServlet(name = "DeleteRecordServlet", urlPatterns = {"/DeleteRecordServlet"}
24  public class DeleteRecordServlet extends HttpServlet {
25      private final String deleteErrPage = "deleteErr.html";
26      /** Processes requests for both HTTP <code>GET</code> and <code>POST</code>
35  protected void processRequest(HttpServletRequest request, HttpServletResponse
36      throws ServletException, IOException {
37      response.setContentType("text/html;charset=UTF-8");
38      PrintWriter out = response.getWriter();
39
40      String urlRewriting = deleteErrPage;
41      try {
42          String username = request.getParameter("pk");
43          String searchValue = request.getParameter("lastSearchValue");
44
45          RegistrationDAO dao = new RegistrationDAO();
46          boolean result = dao.deleteRecord(username);
47
48          if (result) {
49              urlRewriting = "SE1162Servlet?btAction=Search&txtSearchValue="
50              + searchValue;
51          }
52      } catch (NamingException ex) {
53          ex.printStackTrace();
54      } catch (SQLException ex) {
55          ex.printStackTrace();
56      } finally {
57          response.sendRedirect(urlRewriting);
58          out.close();

```

Appendix

CRUD Function

```

UpdatePassRoleServlet.java x
Source History
22  * @author kieuhanh
23  */
24  @WebServlet(name = "UpdatePassRoleServlet", urlPatterns = {"/UpdatePassRoleServlet"})
25  public class UpdatePassRoleServlet extends HttpServlet {
26      private final String updateErrPage = "update.Err.html";
27      /** Processes requests for both HTTP <code>GET</code> and <code>POST</code>
36      protected void processRequest(HttpServletRequest request, HttpServletResponse response)
37          throws ServletException, IOException {
38          response.setContentType("text/html;charset=UTF-8");
39          PrintWriter out = response.getWriter();
40
41          String urlRewriting = updateErrPage;
42          try {
43              String username = request.getParameter("txtUsername");
44              String password = request.getParameter("txtPassword");
45              String admin = request.getParameter("chkRole");
46              boolean role = false;
47              if (admin != null) {
48                  role = true;
49              }
50              String searchValue = request.getParameter("lastSearchValue");
51
52              RegistrationDAO dao = new RegistrationDAO();
53              boolean result = dao.updatePassRole(username, password, role);
54
55              if (result) {
56                  urlRewriting = "SE1162Servlet?btAction=Search&txtSearchValue="
57                      + searchValue;
58              }
59          } catch (NamingException ex) {
60              ex.printStackTrace();
61          } catch (SQLException ex) {
62              ex.printStackTrace();
63          } finally {
64              response.sendRedirect(urlRewriting);
65              out.close();
66          }
67      }

```

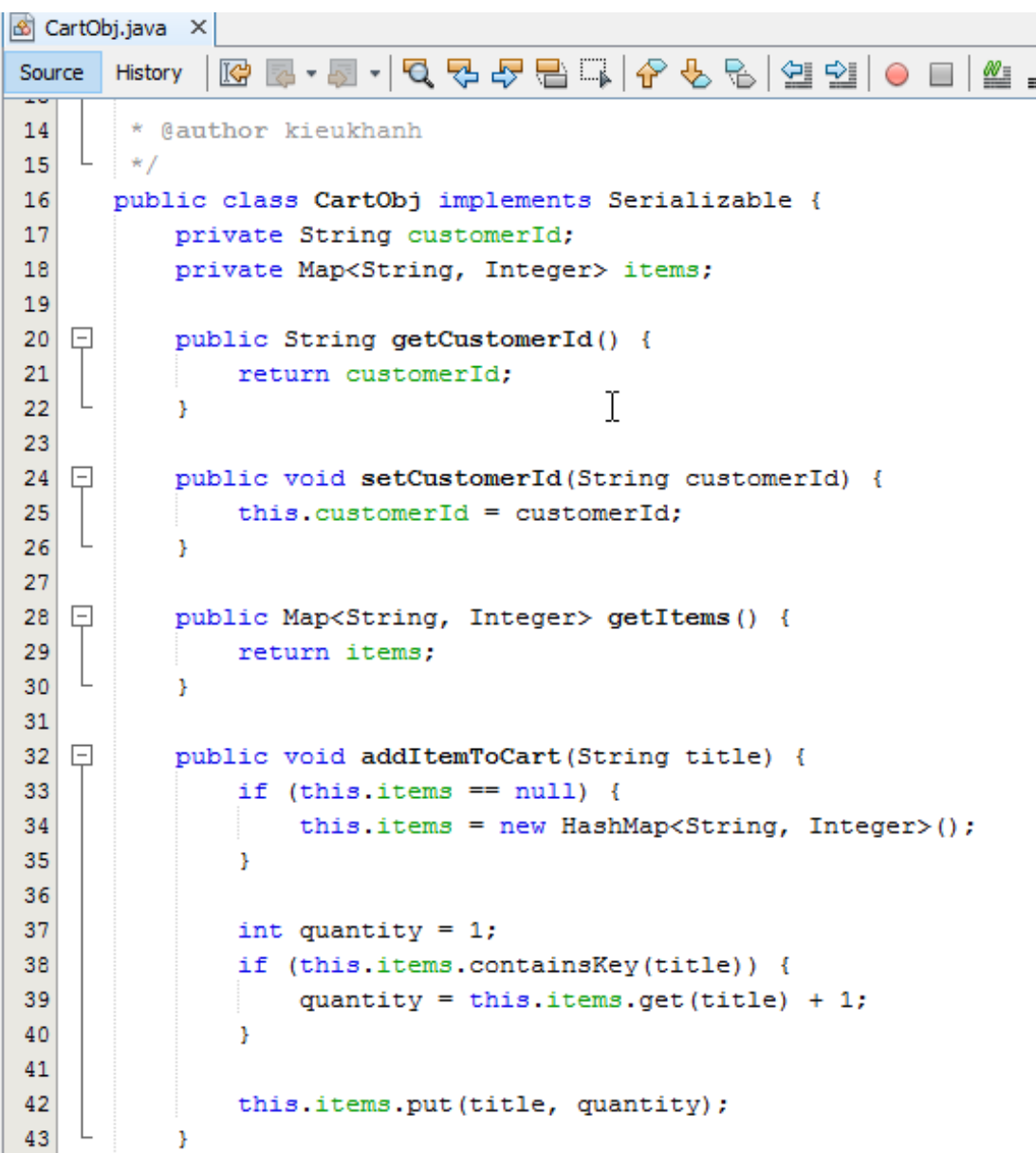
Appendix

CRUD Function

```
bookStore.html x
Source History
1 <!DOCTYPE html>
2 ...5 lines
7 <html>
8   <head>
9     <title>Book Store</title>
10    <meta charset="UTF-8">
11    <meta name="viewport" content="width=device-width, initial-scale=1.0">
12  </head>
13  <body>
14    <h1>Book Store</h1>
15    <form action="SE1162Servlet">
16      Choose book <select name="cboBook">
17        <option>Servlet</option>
18        <option>Tomcat</option>
19        <option>JSP</option>
20        <option>MVC</option>
21        <option>JavaEE</option>
22        <option>EL</option>
23        <option>EJB2</option>
24        <option>EJB3</option>
25        <option>JBoss</option>
26      </select><br/>
27      <input type="submit" value="Add Book To Your Cart" name="btAction" />
28      <input type="submit" value="View Your Cart" name="btAction" />
29    </form>
30  </body>
31 </html>
```

Appendix

CRUD Function



```
14  * @author kieukhanh
15  */
16  public class CartObj implements Serializable {
17      private String customerId;
18      private Map<String, Integer> items;
19
20      public String getCustomerId() {
21          return customerId;
22      }
23
24      public void setCustomerId(String customerId) {
25          this.customerId = customerId;
26      }
27
28      public Map<String, Integer> getItems() {
29          return items;
30      }
31
32      public void addItemToCart(String title) {
33          if (this.items == null) {
34              this.items = new HashMap<String, Integer>();
35          }
36
37          int quantity = 1;
38          if (this.items.containsKey(title)) {
39              quantity = this.items.get(title) + 1;
40          }
41
42          this.items.put(title, quantity);
43      }
```

Appendix

CRUD Function

```
44
45 [- public void removeItemFromCart(String title) {
46     if (this.items == null) {
47         return;
48     }
49
50     if (this.items.containsKey(title)) {
51         this.items.remove(title);
52         if (this.items.isEmpty()) {
53             this.items = null;
54         }
55     }
56 }
57
58
```

Appendix

CRUD Function

```

AddItemServlet.java x
Source History
20  * @author kieukhanh
21  */
22  @WebServlet(name = "AddItemServlet", urlPatterns = {"/AddItemServlet"})
23  public class AddItemServlet extends HttpServlet {
24      private final String shoppingPage = "bookStore.html";
25
26  /** Processes requests for both HTTP <code>GET</code> and <code>POST</code>
35  protected void processRequest(HttpServletRequest request, HttpServletResponse response)
36      throws ServletException, IOException {
37      response.setContentType("text/html;charset=UTF-8");
38      PrintWriter out = response.getWriter();
39      try {
40          HttpSession session = request.getSession();
41
42          CartObj cart = (CartObj)session.getAttribute("CART");
43          if (cart == null) {
44              cart = new CartObj();
45          }
46
47          String title = request.getParameter("cboBook");
48
49          cart.addItemToCart(title);
50
51          session.setAttribute("CART", cart);
52
53          response.sendRedirect(shoppingPage);
54      } finally {
55          out.close();
56      }
57  }

```

Appendix

CRUD Function

```

viewCart.jsp x
Source History
4      Author      : kieukhanh
5      --->
6
7      <%@page import="java.util.Map"%>
8      <%@page import="sample.cart.CartObj"%>
9      <%@page contentType="text/html" pageEncoding="UTF-8"%>
10     <!DOCTYPE html>
11     <html>
12     <head>
13         <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
14         <title>Book Store</title>
15     </head>
16     <body>
17         <h1>Your Cart includes </h1>
18
19         <%
20             if (session != null) {
21                 CartObj cart = (CartObj) session.getAttribute("CART");
22
23                 if (cart != null) {
24                     if (cart.getItems() != null) {
25                         %>
26                         <table border="1">
27                             <thead>
28                                 <tr>
29                                     <th>No.</th>
30                                     <th>Title</th>
31                                     <th>Quantity</th>
32                                     <th>Action</th>
33                                     </tr>

```


Appendix

CRUD Function

```

34 </thead>
35 <tbody>
36 <form action="SE1162Servlet">
37 <%
38     Map<String, Integer> items = cart.getItems();
39     int count = 0;
40     for (Map.Entry item : items.entrySet()) {
41         %>
42     <tr>
43         <td>
44             <%= ++count %>
45         .</td>
46         <td>
47             <%= item.getKey() %>
48         </td>
49         <td>
50             <%= item.getValue() %>
51         </td>
52         <td>
53             <input type="checkbox" name="chkItem" value="<%= item.getKey() %>" />
54         </td>
55     </tr>
56 <%
57     } //end for
58 %>
59 <tr>
60 <td colspan="3">
61     <a href="bookStore.html">Add More Items to Your Cart</a>
62 </td>

```

Appendix

CRUD Function

```

63 <td>
64 <input type="submit" value="Remove Selected Items" name="btAction" />
65 </td>
66 </tr>
67 </form>
68 </tbody>
69 </table>
70
71 <%
72     return;
73     }//end items
74     }//end cart
75     }//end session
76 %>
77
78 <h2>No cart is existed</h2>
79 </body>
80 </html>

```

Appendix

CRUD Function

```

DeleteItemServlet.java x
Source History
20  * @author kieuhanh
21  */
22  @WebServlet(name = "DeleteItemServlet", urlPatterns = {"/DeleteItemServlet"})
23  public class DeleteItemServlet extends HttpServlet {
24
25      /** Processes requests for both HTTP <code>GET</code> and <code>POST</code>
34  protected void processRequest(HttpServletRequest request, HttpServletResponse
35      throws ServletException, IOException {
36      response.setContentType("text/html;charset=UTF-8");
37      PrintWriter out = response.getWriter();
38      try {
39          HttpSession session = request.getSession(false);
40
41          if (session != null) {
42              CartObj cart = (CartObj)session.getAttribute("CART");
43
44              if (cart != null) {
45                  String[] items = request.getParameterValues("chkItem");
46
47                  if (items != null) {
48                      for (String item : items) {
49                          cart.removeItemFromCart(item);
50                      } //end for
51                      session.setAttribute("CART", cart);
52                  } //end if items
53              } //end if cart
54          } //end if session
55
56          String urlRewriting = "SE1162Servlet?btAction=View Your Cart";
57          response.sendRedirect(urlRewriting);

```

Appendix

CRUD Function

```

createNewAccount.html x
Source History
1 <!DOCTYPE html>
2 ...5 lines
7 <html>
8   <head>
9     <title>New Account</title>
10    <meta charset="UTF-8">
11    <meta name="viewport" content="width=device-width, initial-scale=1.0">
12  </head>
13  <body>
14    <h1>Create New Account</h1>
15    <form action="SE1162Servlet" method="POST">
16      Username* <input type="text" name="txtUsername" value="" />(6 - 20 chars)<br/>
17      Password* <input type="password" name="txtPassword" value="" />(6 - 30 chars)<br/>
18      Confirm* <input type="password" name="txtConfirm" value="" /><br/>
19      Full name <input type="text" name="txtFullname" value="" />(2 - 50 chars)<br/>
20      <input type="submit" value="Create New Account" name="btAction" />
21      <input type="reset" value="Reset" />
22    </form>
23  </body>
24 </html>
  
```

Appendix

CRUD Function

RegistrationInsertError.java

Source History

```

11
12  * @author kieukhanh
13  */
14  public class RegistrationInsertError implements Serializable {
15      private String usernameLengthErr;
16      private String passwordLengthErr;
17      private String confirmNotMatch;
18      private String fullNameLengthErr;
19      private String usernameIsExisted;
20      /**...3 lines */
23      public String getUsernameLengthErr() {...3 lines }
26      /**...3 lines */
29      public void setUsernameLengthErr(String usernameLengthErr) {...3 lines }
32      /**...3 lines */
35      public String getPasswordLengthErr() {...3 lines }
38      /**...3 lines */
41      public void setPasswordLengthErr(String passwordLengthErr) {...3 lines }
44      /**...3 lines */
47      public String getConfirmNotMatch() {...3 lines }
50      /**...3 lines */
53      public void setConfirmNotMatch(String confirmNotMatch) {...3 lines }
56      /**...3 lines */
59      public String getFullNameLengthErr() {...3 lines }
62      /**...3 lines */
65      public void setFullNameLengthErr(String fullNameLengthErr) {...3 lines }
68      /**...3 lines */
71      public String getUsernameIsExisted() {...3 lines }
74      /**...3 lines */
77      public void setUsernameIsExisted(String usernameIsExisted) {...3 lines }
80  }
81

```

Appendix

CRUD Function

```

RegistrationDAO.java x
Source History
182 public boolean insertRecord(String username, String password, String lastname, boolean role)
183     throws SQLException, NamingException {
184     Connection con = null;
185     PreparedStatement stm = null;
186     try {
187         con = DBUtils.makeConnection();
188         if (con != null) {
189             String sql = "Insert Into Registration(username, password, lastname, isAdmin)"
190                 + " Values(?, ?, ?, ?)";
191             stm = con.prepareStatement(sql);
192             stm.setString(1, username);
193             stm.setString(2, password);
194             stm.setString(3, lastname);
195             stm.setBoolean(4, role);
196             int row = stm.executeUpdate();
197             if (row > 0) {
198                 return true;
199             }
200         }
201     } finally {
202         if (stm != null) {
203             stm.close();
204         }
205         if (con != null) {
206             con.close();
207         }
208     }
209
210     return false;
211 }
  
```

Appendix

CRUD Function

```

DeleteRecordServlet.java x
Source History
21  * @author kieukhanh
22  */
23  @WebServlet(name = "DeleteRecordServlet", urlPatterns = {"/DeleteRecordServlet"})
24  public class DeleteRecordServlet extends HttpServlet {
25      private final String deleteErrPage = "deleteErr.html";
26      /** Processes requests for both HTTP <code>GET</code> and <code>POST</code> .
35      protected void processRequest(HttpServletRequest request, HttpServletResponse
36          throws ServletException, IOException {
37          response.setContentType("text/html;charset=UTF-8");
38          PrintWriter out = response.getWriter();
39
40          String urlRewriting = deleteErrPage;
41          try {
42              String username = request.getParameter("pk");
43              String searchValue = request.getParameter("lastSearchValue");
44
45              RegistrationDAO dao = new RegistrationDAO();
46              boolean result = dao.deleteRecord(username);
47
48              if (result) {
49                  urlRewriting = "SE1162Servlet?btAction=Search&txtSearchValue="
50                      + searchValue;
51              }
52          } catch (NamingException ex) {
53              ex.printStackTrace();
54          } catch (SQLException ex) {
55              ex.printStackTrace();
56          } finally {
57              response.sendRedirect(urlRewriting);
58              out.close();

```

Appendix

CRUD Function

```

createNewAccount.jsp x
Source History
4      Author      : kieuokhanh
5      --%>
6
7      <%@page import="sample.registration.RegistrationInsertError"%>
8      <%@page contentType="text/html" pageEncoding="UTF-8"%>
9      <%@taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c"%>
10     <!--DOCTYPE html-->
11     <html>
12     <head>
13         <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
14         <title>New Account</title>
15     </head>
16     <body>
17         <h1>Create New Account</h1>
18         <form action="SE1162Servlet" method="POST">
19             Username* <input type="text" name="txtUsername"
20                 value="<%= request.getParameter("txtUsername") %>" />(6 - 20 chars)<br/>
21             <font color="red">
22                 <%
23                     RegistrationInsertError errors =
24                         (RegistrationInsertError) request.getAttribute("INSERTERR");
25
26                     if (errors != null) {
27                         if (errors.getUsernameLengthErr() != null) {
28                             %>
29                             <%= errors.getUsernameLengthErr() %><br/>
30                             <%
31                                 }
32                             }//end if errors
33                 %>

```


Appendix

CRUD Function

```

34     </font>
35     Password* <input type="password" name="txtPassword" value="" />(6 - 30 chars)<br/>
36     <font color="red">
37     <%
38         if (errors != null) {
39             if (errors.getPasswordLengthErr() != null) {
40                 %>
41                 <%= errors.getPasswordLengthErr() %><br/>
42             }
43         }
44         }//end if errors
45     %>
46 </font>
47 Confirm* <input type="password" name="txtConfirm" value="" /><br/>
48 <font color="red">
49 <%
50     if (errors != null) {
51         if (errors.getConfirmNotMatch() != null) {
52             %>
53             <%= errors.getConfirmNotMatch() %><br/>
54         }
55     }
56     }//end if errors
57 %>
58 </font>
59 Full name <input type="text" name="txtFullname"
60         value="<%= request.getParameter("txtFullname") %>" />(2 - 50 chars)<br/>
61 <font color="red">

```

Appendix

CRUD Function

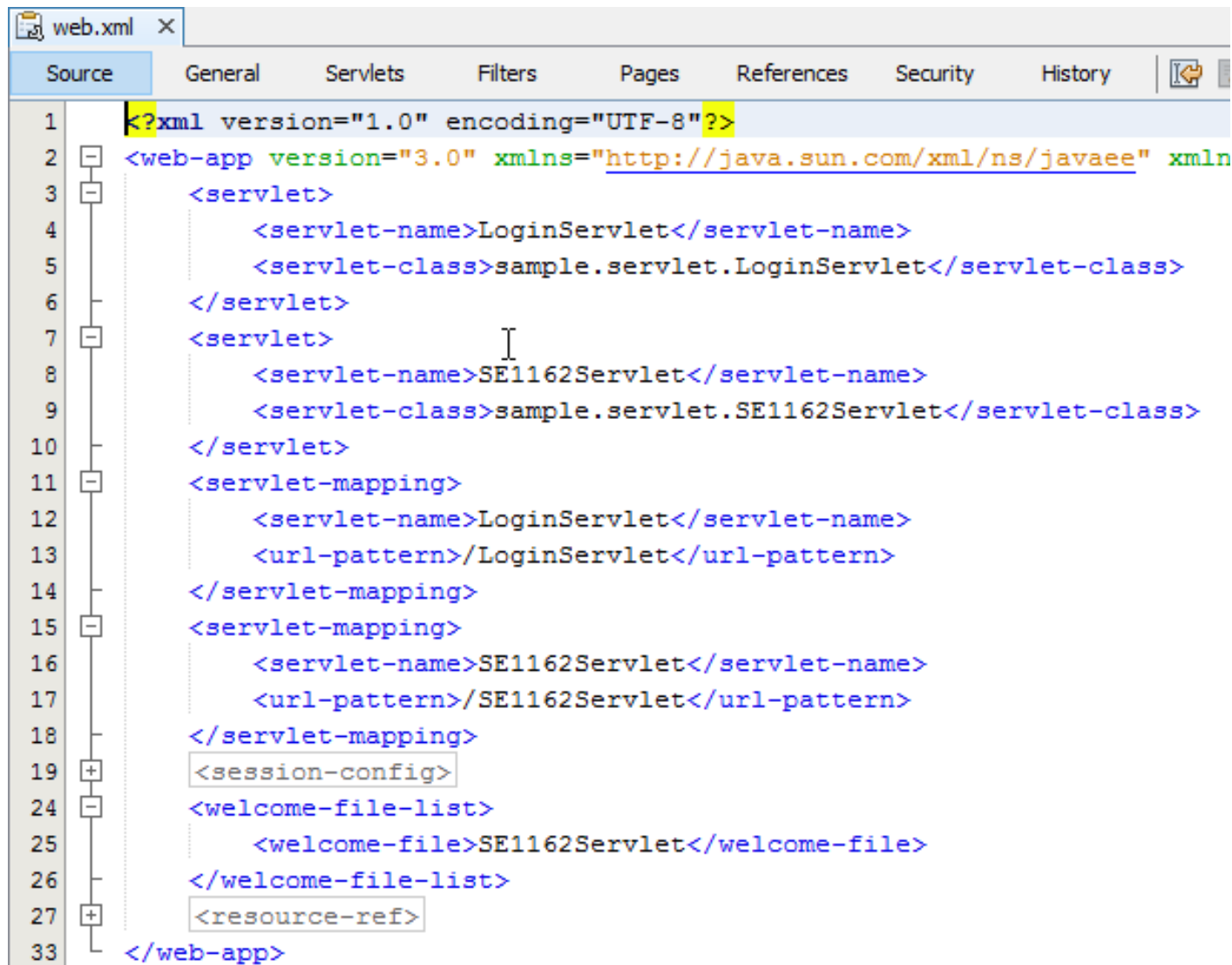
```

62      <%
63          if (errors != null) {
64              if (errors.getFullNameLengthErr() != null) {
65                  %>
66                  <%= errors.getFullNameLengthErr() %><br/>
67      <%
68          }
69      }//end if errors
70      %>
71  </font>
72  <input type="submit" value="Create New Account" name="btAction" />
73  <input type="reset" value="Reset" />
74  </form><br/>
75  <font color="red">
76      <%
77          if (errors != null) {
78              if (errors.getUsernameIsExisted() != null) {
79                  %>
80                  <%= errors.getUsernameIsExisted() %><br/>
81      <%
82          }
83      }//end if errors
84      %>
85  </font>
86  </body>
87  </html>

```

Appendix

CRUD Function



```

1  <?xml version="1.0" encoding="UTF-8"?>
2  <web-app version="3.0" xmlns="http://java.sun.com/xml/ns/javaee" xmlns:
3      <servlet>
4          <servlet-name>LoginServlet</servlet-name>
5          <servlet-class>sample.servlet.LoginServlet</servlet-class>
6      </servlet>
7      <servlet>
8          <servlet-name>SE1162Servlet</servlet-name>
9          <servlet-class>sample.servlet.SE1162Servlet</servlet-class>
10     </servlet>
11     <servlet-mapping>
12         <servlet-name>LoginServlet</servlet-name>
13         <url-pattern>/LoginServlet</url-pattern>
14     </servlet-mapping>
15     <servlet-mapping>
16         <servlet-name>SE1162Servlet</servlet-name>
17         <url-pattern>/SE1162Servlet</url-pattern>
18     </servlet-mapping>
19     <session-config>
24     <welcome-file-list>
25         <welcome-file>SE1162Servlet</welcome-file>
26     </welcome-file-list>
27     <resource-ref>
33 </web-app>
  
```