Server-side Web Development and Programming

Lecture 1: Course Introduction and Overview

Client-Server Web Architecture
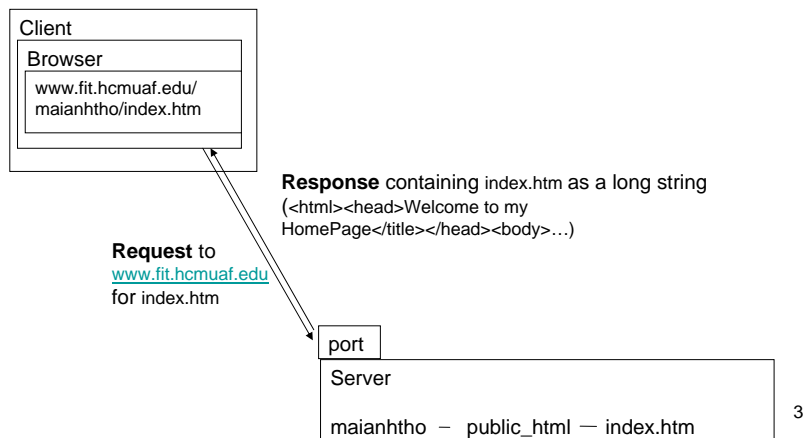
- Client browser sends <u>request</u> for page to server
  - May contain form data and other information

- Server sends <u>response</u> page and sends to client
- May need to <u>generate</u> response page dynamically
  - Form parameters
  - Previous requests (such as items purchased so far)
  - Information in database

Focus of this course

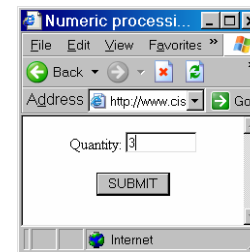
Client-Server Web Architecture

- Client browser sends <u>request</u> for page to server
- Server sends <u>response</u> page and sends to client

Client
Browser
www.fit.hcmuaf.edu/
maianhtho/index.htm

Response containing index.htm as a long string
(<html><head>Welcome to my
HomePage</title></head><body>…)

Request to
www.fit.hcmuaf.edu
for index.htm

port
Server

maianhtho – public_html – index.htm

Form Handling

- Form data <u>appended</u> to request string

```
<FORM NAME="purchaseform"
 METHOD=GET
 ACTION= http://localhost:8080/WidgetSite/receipt.jsp >
Quantity: <INPUT TYPE="text" SIZE="8" NAME="quantity" />
<BR /><BR />
<INPUT TYPE="submit" VALUE="SUBMIT">
</FORM>
```

Generates the request:

http://localhost:8080/WidgetSite/receipt.jsp?quantity=3

Form Handling

Server must:

- Listen on port for requests
- <u>Parse</u> request to determine values of parameters
- <u>Generate</u> appropriate response page based on parameter values
- Send response page back to client

Course Topics

- Server-side Web Containers
- Java Server Pages
- Web Site Architecture
- Session Handling
- Database Manipulation
- Security

Web Containers

- Program running continuously on server
- Runs code to handle requests and generate responses
- Handles other important functions:
  - Session tracking
  - Database access
  - Email generation
  - Security and encryption

Server Pages

- Perl/cgi-bin approach:
  Generate response page one character at a time
- Server page approach:
  Create html "template" with "spaces" to be filled in

```
<HTML>
<HEAD><TITLE>cgi-bin
response</TITLE></HEAD>
<BODY>
<P>
Thank you for your order of
insert value of quantity here
widgets!
</P>
</BODY>
</HTML>
```

# Java Server Pages

```
<HTML>
<HEAD><TITLE>cgi-bin
response</TITLE></HEAD>
<BODY>
<P>
Thank you for your order of
<%= request.getParameter("quantity") %>
widgets!
</P>
</BODY>
</HTML>
```

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Control-View Architecture

- Different user input might require <u>different</u> response pages
  - Different types of request
  - Errors/missing field values, etc.
- <u>Servlets</u>:
  Code to <u>determine</u> and <u>redirect to</u> appropriate response JSP

request → **Control servlet** → JSP, JSP, JSP — JSPs for **views**
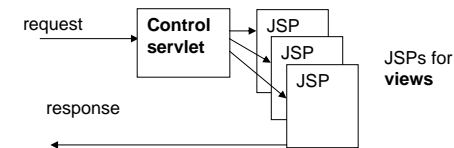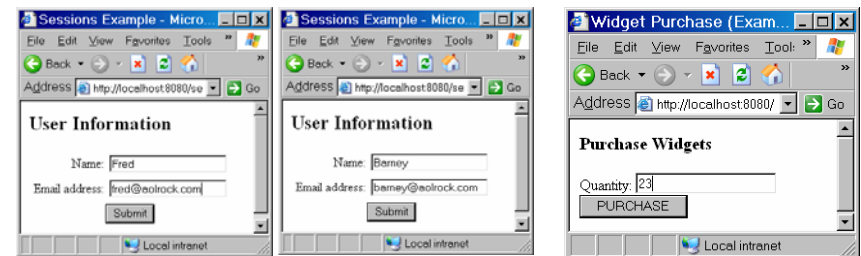
response

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User-friendly Error Handling

- Tell user what went wrong
- Don't force re-entry of information
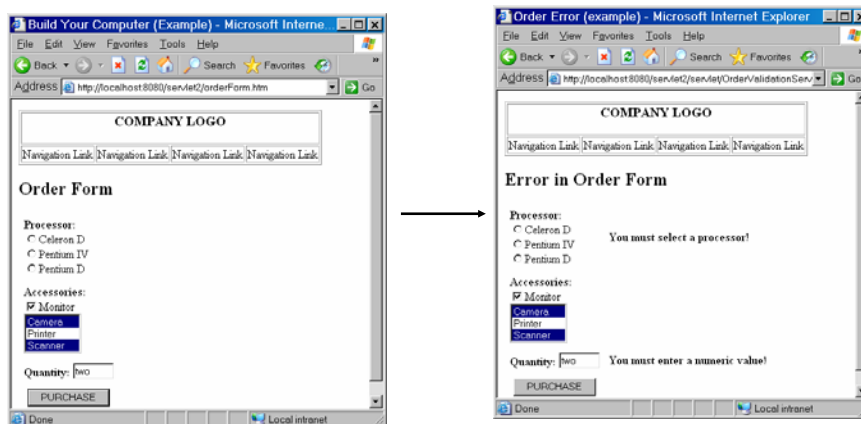
Session Handling

- Most web transactions are sessions consisting of <u>series</u> of requests and responses
- No easy way to <u>associate</u> steps if multiple clients


Who submitted this request?

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Session Handling

- Assign each new client a <u>unique ID</u> at the start of a session
- Client/server pass that ID back and forth with each request/response
- Data for that client (such as "shopping cart") associated with ID on server

Database Manipulation

- <u>Database driver</u> provides access to databases
- <u>JDBC</u>: classes to query/manipulate database
- Efficiency issues
  - <u>Prepared statements</u>
  - <u>Connection pooling</u>
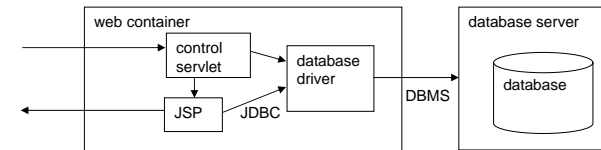
Web Site Security

- <u>Encryption</u> with SSL/TLS
- <u>Certificates</u> for authenticating servers
- <u>Security roles</u> for authenticating clients

Tools We will be Using

- Jakarta Tomcat web container
- Java programming language
- NetBeans IDE
- MySQL database server

All are <u>free downloads</u> (see Chapters 2 and 3)

Background Knowledge

- Java or C++
  - May want to get Java reference
  - Sun reference page
- Basic html (including forms and tables)
  - May want reference
  - Chapter 4 of text

Assignments

- <u>Short</u> programming assignments in core areas
  - Java Server Pages
  - Validation/redirection servlets
  - Session handling
- <u>Web Site Project</u>
  - Multi-page web site in area of your choice
  - Includes server pages, servlets, and session handling
  - Should include at least one other advanced capability
    - Database access
    - Security
  - Can be <u>group project</u>