Client-Server Web Architecture

- Client browser sends request for page to server
  - May contain form data and other information
- Server sends response page and sends to client
- May need to generate response page dynamically
  - Form parameters
  - Previous requests (such as items purchased so far)
  - Information in database

Focus of this course

Form Handling

- Form data appended to request string

Generates the request:
http://localhost:8080/WidgetSite/receipt.jsp?quantity=3
Form Handling

Server must:
- Listen on port for requests
- Parse request to determine values of parameters
- Generate 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
<HTML>
<HEAD><TITLE>cgi-bin response</TITLE></HEAD>
<BODY>
<P>Thank you for your order of <%= request.getParameter("quantity") %> widgets!</P>
</BODY>
</HTML>
```

Control-View Architecture

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

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 series of requests and responses
- No easy way to associate steps if multiple clients

Who submitted this request?
Session Handling

• Assign each new client a **unique ID** 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

• Database driver provides access to databases
• **JDBC**: classes to query/manipulate database
• Efficiency issues
  – Prepared statements
  – Connection pooling

Web Site Security

• **Encryption** with SSL/TLS
• **Certificates** for authenticating servers
• **Security roles** for authenticating clients

Tools We will be Using

• Jakarta Tomcat web container
• Java programming language
• NetBeans IDE
• MySQL database server
All are **free downloads** (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

• Short programming assignments in core areas
  – Java Server Pages
  – Validation/redirection servlets
  – Session handling
• Web Site Project
  – 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 group project