Lecture 7: HTTP 1.1, JavaServer Pages 2.1, and Java Servlet 2.5

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Computer Science E-259

Last Time

- Namespaces in XML 1.0 (Second Edition)
- SVG 1.1
- XSL (XSL-FO) 1.1
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This Time

- HTTP 1.1
- *n*-Tier Enterprise Applications
- JavaServer Pages 2.1
- Java Servlet 2.5
- Project 3
HTTP 1.1

Overview

- Request Methods
  - GET
  - POST
- TCP Ports
HTTP 1.1

Cookies

```
set-cookie  =  "Set-Cookie:" cookies
cookies     =  1#cookie
cookie      =  NAME "=" VALUE *(";" cookie-av)
NAME        =  attr
VALUE       =  value
cookie-av   =  "Comment" "=" value
|                   "Domain" "=" value
|                   "Max-Age" "=" value
|                   "Path" "=" value
|                   "Secure"
|                   "Version" "=" 1*DIGIT%
```
## Cookies

- `cookie` = "Cookie:" cookie-version 1*(";" | ",") cookie-value
- `cookie-version` = "$Version" = value
- `NAME` = attr
- `VALUE` = value
- `path` = "$Path" = value
- `domain` = "$Domain" = value

Excerpted from RFC 2109: HTTP State Management Mechanism.
\( n \)-Tier Enterprise Applications

\( n = 2 \)

- client tier
  - presents data to user, gathers data from user
- server tier
  - hosts application logic, databases, and data services
**n-Tier Enterprise Applications**

**n = 3**

- **Client Tier**
  - presents data to user, gathers data from user
- **Middle Tier**
  - hosts application logic
- **Back-End Tier**
  - hosts databases and data services
$n$-Tier Enterprise Applications

$n = 5$

- Browser
- Web Server
- Application Server
- Database server
- Email Server
XML

- XML was originally targeted for data publication to the client.
- The rationale was that the client software might know best how to display the data for this particular user.
- Could benefit from the more semantically meaningful and self-expressive capabilities of XML over HTML.
- Very quickly, however, everyone started realizing the potential of XML on the server side as well.
- Today, XML can be deployed at all tiers.
**n-Tier Enterprise Applications**

**XML on the Client**

- If the server communicates to the client self-describing, semantically tagged data in XML, then the client can
  - do more intelligent rendering with the help of stylesheets (e.g., dynamic sorting, searching)
  - present multiple views on the same data
  - take some processing load off the server
  - save many roundtrips to the server by caching data
- Clients can even communicate data to other clients in XML!
XML in the Middle Tier

- Middle-tier applications often intercommunicate by exposing remote objects
  - COM/DCOM objects expose COM interfaces but are bound to Microsoft platforms
  - EJBs expose Java interfaces via RMI but only allow Java clients
  - CORBA uses IDL interfaces and attempts to be platform-neutral
- Content aggregation via XML
  - completely platform neutral
  - easy to use
  - easy to send over the network
**n-Tier Enterprise Applications**

**XML in the Middle Tier**

- Databases
- **<XML/>**
- Legacy
- ERP, Accounting, HR
- Enterprise Data Dictionary
- New App

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XML in the Back-End Tier

- The backend tier usually consists of databases and data services, including
  - relational databases
  - CRM (customer relationship management) applications
  - ERP (enterprise resource planning) applications
  - other legacy applications
- The challenge is to enable middle-tier applications to access information from these data sources
Typical J2EE Architecture

Client

Presentation

Business Logic

Data

Laptop

Computer

PDA

JSP/servlet

Web Server

EJB

EJB Server

DB

XML?

XML?

XML?

XML?

XML?

XML?

XML?

XML?

XML?

XML?
"JavaServer Pages™ is the Java™ 2 Platform, Enterprise Edition (J2EE) technology for building applications for generating dynamic web content, such as HTML, DHTML, XHTML and XML. JSP technology enables the easy authoring of web pages that create dynamic content with maximum power and flexibility."

What is a JSP Page?

“A JSP page is a textual document that describes how to create a response object from a request object for a given protocol. The processing of the JSP page may involve creating and/or using other objects.... HTTP is the default protocol for requests and responses. Additional request/response protocols may be supported by JSP containers.... The default request and response objects are of type HttpServletRequest and HttpServletResponse respectively.”

hello, world

<?xml version="1.0" encoding="iso-8859-1"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">

<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en" lang="en">
  <head>
    <title><% out.print("hello, world"); %></title>
  </head>
  <body>
    <% out.print("hello, world"); %>
  </body>
</html>
JavaServer Pages 2.1

hello, world

<?xml version="1.0" encoding="iso-8859-1"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<jsp:root xmlns="http://java.sun.com/JSP/Page" version="1.2">
  <jsp:directive.page contentType="text/html"/>
  <![CDATA[<?xml version="1.0" encoding="iso-8859-1"?>]]>
  <![CDATA[<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">]]>
  <html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en" lang="en">
    <head>
      <jsp:scriptlet>
        out.print("hello, world");
      </jsp:scriptlet>
    </title>
    </head>
    <body>
      <jsp:scriptlet>
        out.print("hello, world");
      </jsp:scriptlet>
    </body>
  </html>
</jsp:root>
What is a Servlet?

“A servlet is a Java™ technology-based Web component, managed by a container, that generates dynamic content. Like other Java-based components, servlets are platform-independent Java classes that are compiled to platform-neutral byte code that can be loaded dynamically into and run by a Java technology-enabled Web server.”

Excerpted from Java™ Servlet Specification, Version 2.4.
What is a Servlet Container?

“The servlet container is a part of a Web server or application server that provides the network services over which requests and responses are sent, decodes MIME-based requests, and formats MIME-based responses. A servlet container also contains and manages servlets through their lifecycle.”

Excerpted from Java™ Servlet Specification, Version 2.4.
Java Servlet 2.5

Java Servlet Containers

- Apache Tomcat
- BEA WebLogic Server
- IBM WebSphere Application Server
- JBoss Application Server
- Oracle Application Server
- Sun Java System Application Server Platform Edition
- ...

Typical Sequence of Events

1. A client (e.g., a Web browser) accesses a Web server and makes an HTTP request.
2. The request is received by the Web server and handed off to the servlet container. The servlet container can be running in the same process as the host web server, in a different process on the same host, or on a different host from the web server for which it processes requests.
3. The servlet container determines which servlet to invoke based on the configuration of its servlets, and calls it with objects representing the request and response.
4. The servlet uses the request object to find out who the remote user is, what HTTP POST parameters may have been sent as part of this request, and other relevant data. The servlet performs whatever logic it was programmed with, and generates data to send back to the client. It sends this data back to the client via the response object.
5. Once the servlet has finished processing the request, the servlet container ensures that the response is properly flushed, and returns control back to the host Web server.
Java Servlet 2.5

hello, world

javax.servlet.*
javax.servlet.http.*
Java Servlet 2.5

Sessions
Synchronization
Project 3

Content Syndication

Main Entry: syn·di·cate
Pronunciation: 'sin-d&-"kAt
Function: verb
Inflected Form(s): -cat·ed; -cat·ing
Date: 1882
transitive senses
1 : to subject to or manage as a syndicate
2 a : to sell (as a cartoon) to a syndicate or for publication in many newspapers or periodicals at once b : to sell (as a series of television programs) directly to local stations
intransitive senses : to unite to form a syndicate
- syn·di·ca·tion  /"sin-d&-'kA-sh&n/ noun
- syn·di·ca·tor  /'sin-d&-"kA-t&r/ noun
Project 3

Wahoo!

Client Tier

Middle Tier

Back-End Tier

Computer

Login servlet

Prefs servlet

View servlet

UserManager

NewsProvider

User DB

moreover.com
Next Time

XQuery 1.0 and DTD

- XQuery 1.0
- DTD
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