

15-415
Database Applications
Recitation 7

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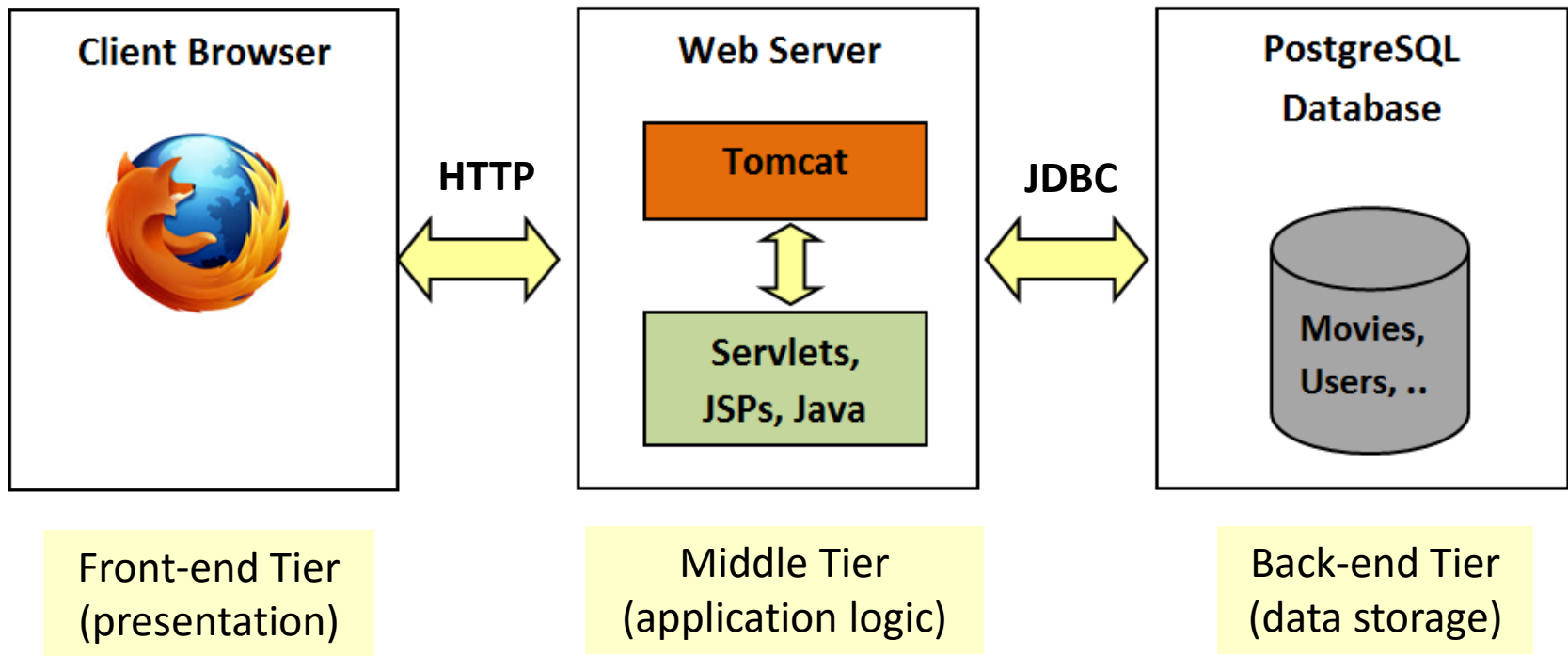
Project 2

- CMUQFlix!
- A Movie Recommendation System

Project 2 Objectives

- Set up a front-end website with PostgreSQL as the back-end
- Allow users to **login**, **“like”** movies, and get **personalized movies recommendations**

Three-Tier Architecture of CMUQFlix



Front-End Tier: HTML Forms

- HTML forms are a common way for
 - Getting user input at the front-end tier
 - Communicating the given input to the middle tier
- HTML forms are defined using the *FORM* tag
- FORM tag has three important attributes:
 - *NAME*: form name
 - *ACTION*: URI of the page to which the form is submitted
 - *METHOD*: method used to submit the form (Get^{*}/Post^{**})

* A **Get** request *gets* (or retrieves) information (e.g. image, HTML page) from a server.

** A **Post** request posts (or sends) data from the client (e.g. usernames, passwords) to a server.

Front-End Tier: HTML Forms

- Three important tags used to get user input:

INPUT, ***SELECT***, and ***TEXTAREA***

- ***INPUT*** is used to render text fields and buttons:

```
<INPUT TYPE="text" NAME="username" VALUE="John Brown">
```

```
<INPUT TYPE="password" NAME="password" VALUE="123456">
```

```
<INPUT TYPE="reset" VALUE="Reset Fields">
```

```
<INPUT TYPE="submit" VALUE="Submit Form">
```

John Brown

.....

Reset Fields Submit Form

Back-End Tier

- PostgreSQL:
 - We already know this very well!

Middle Tier: *Apache Tomcat*

- **Apache Tomcat** is an **open-source web server** developed by the Apache Software Foundation (ASF)
- Apache Tomcat is a servlet container i.e. it can invoke and execute servlets and JSPs (we'll see what these are in a bit)
- Unlike web-servers that run on a TCP port number 80, **Tomcat runs on port number 8080**

Installing Tomcat

- Login to your VM (<andrew_id>@<andrew_id>-db.qatar.cmu.local)
- Install JDK 7 (`apt-get install openjdk-7-jdk`)
- Install Tomcat 7 (`apt-get install tomcat7 tomcat7-admin`)
- Check that Tomcat is running
 - Type `service tomcat7 status`, or
 - Browse to <andrew_id>-db.qatar.cmu.local:8080
- Manually start/stop/restart Tomcat
(`service tomcat7 start/stop/restart`)
- Deploy your application “cmuqflix” in Tomcat’s webapp
(`cp cmuqflix /var/lib/tomcat7/webapps`)
- View Tomcat’s log files (for debug info.)
(`cd /var/log/tomcat7; cat *;`)

Java Servlets

- A servlet is primarily **Java code** that executes some application logic and produces **HTML output**
- A servlet can:
 - Interact with databases (using *JDBC*)
 - Generate custom HTML pages (as output)
 - Maintain session information for each client

Creating a Servlet

- A web-based servlet must:
 - Extend the *HTTPServlet* abstract class
 - Override the *doGet* and/or *doPost* functions
(to respond to get and post HTTP requests)
- The web-server (i.e. **Tomcat**) transparently invokes a **Service** to determine the type of HTTP request made

Methods defined in the HttpServlet Abstract Class*

```
void doGet ( HttpServletRequest request, HttpServletResponse response )
```

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

```
void Service( HttpServletRequest request, HttpServletResponse response )
```

* Note that all the above functions can throw ServletException and IOException

Request and Response Classes

- Class **HttpServletRequest** provides methods :
 - *getParameter, getParameterNames, getParameterValues, getCookies, getSession*
- Class **HttpServletResponse** provides methods:
 - *addCookie, getOutputStream, getWriter, setContentType*

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Integrating a Servlet with Tomcat

- Define the new servlet (e.g., `newservlet.java`) under *cmuqflix/WEB-INF/src*
- Compile `newservlet.java`
`javac -cp /usr/share/tomcat7/lib/servlet-api.jar newservlet.java`
- Copy `newservlet.class` to *cmuqflix/WEB-INF/classes*
- Define the new servlet in *cmuqflix/WEB-INF/web.xml*