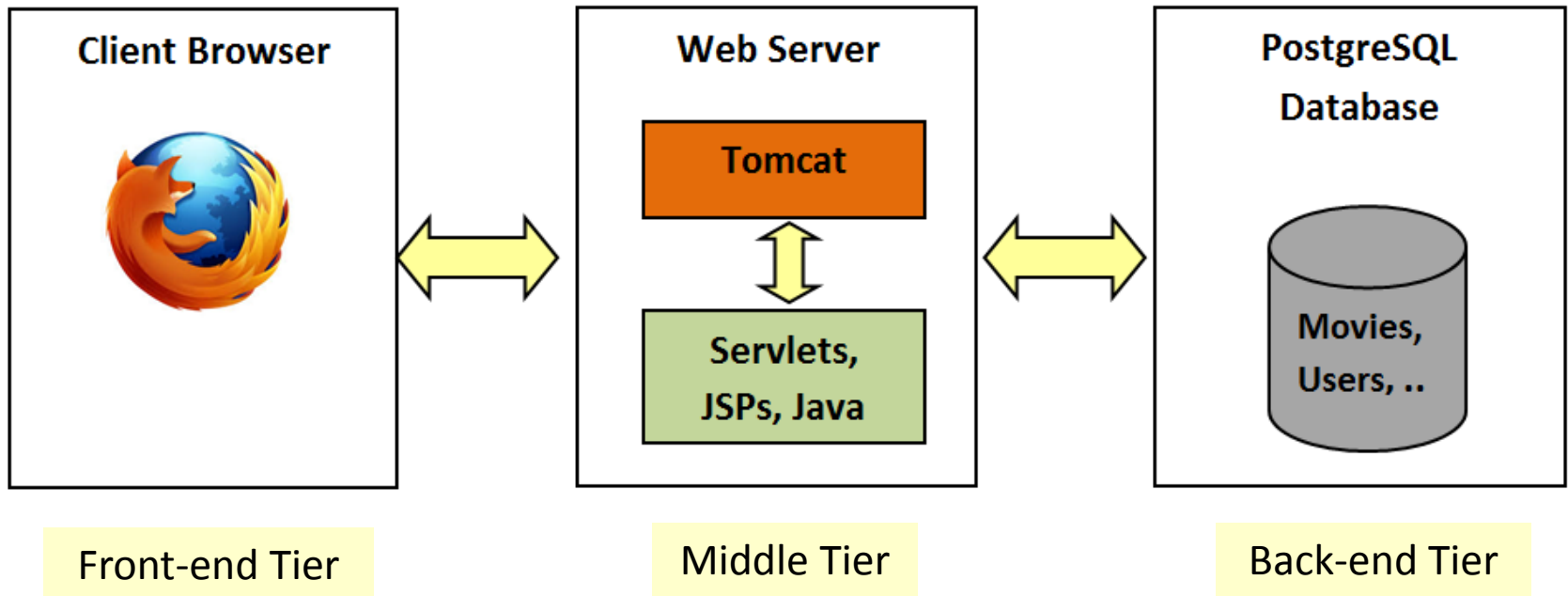# 15-415 Database Applications
Recitation 9

Project 3: CMUQFlix

CMUQ's Movies Recommendation System

Project Objective

1. Set up a front-end website with PostgreSQL back-end

2. Allow users to login, "like" movies, and get personalized movies recommendations

Three-Tier Architecture of CMUQFlix

Client Browser

Web Server

Tomcat

Servlets, JSPs, Java

PostgreSQL Database

Movies, Users, ..

Front-end Tier

Middle Tier

Back-end Tier

HTML Forms

HTML Forms

- HTML forms are a common way for
  - Getting user input at the front-end tier
  - Communicating data from 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 user input (GET/POST)

Apache Tomcat

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

- Unlike web-servers that run on a default port number 80, Tomcat runs on port number 8080

Installing Tomcat

- Login to your VM (root@andrewid-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 andrewid-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

What are Servlets?

- A servlet is primarily Java code that executes some application logic and produces HTML output

- A servlet can:
  - Interact with databases (using JDBC)
  - Dynamically generate custom HTML pages
  - 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_** methods

- The web-server (i.e. Tomcat) invokes **_service_** to distinguish the type of HTTP request (Get/Post)

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)

Request and Response Classes

- Class HttpServletRequest provides methods :
  - getParameter, getParameterNames, getParameterValues, getCookies, getSession

- Class HttpServletResponse provides methods:
  - addCookie, getOutputStream, getWriter, setContentType

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

JavaServer Pages (JSPs)

What are JSPs?

- A JavaServer Page (JSP) is primarily HTML that embeds java code to perform some application logic

- JSPs serve the same purposes as servlets

Servlets vs. JSPs

- Use servlets for:
  - Simple HTML
  - Complex application logic

- Use JSPs for:
  - Complex HTML
  - Simple application logic