15-415 Database Applications
Recitation 10

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
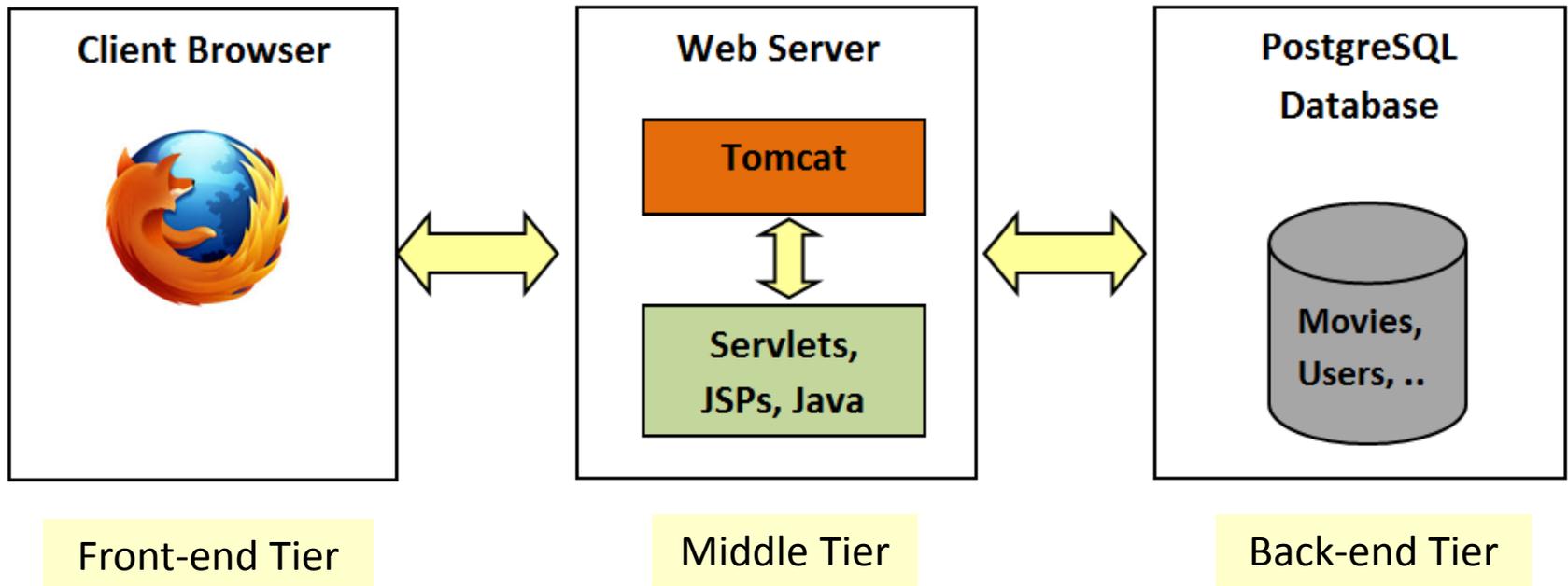
Last Recitation

✓ CMUQFlix

- Movie recommendation website
- Adopts a three-tier architecture with front-end, middle, and back-end tiers

✓ HTML Forms

- Used for getting user input

✓ GET vs. POST Requests

- Used for requesting HTML pages from a web server
- Differ in the way user data is passed to the web server

✓ Tomcat

- An open-source web server
- Serves static and dynamic HTML pages requested via GET/POST requests
- Acts as a servlet container i.e. can invoke servlets/JSPs to generate dynamic HTML

Last Recitation (contd.)

✓Java Servlets

- Java classes used to generate dynamic HTML
    ▪ They process received user input and output the appropriate HTML
- Can manage sessions and embed cookies
    ▪ More on this shortly
- Used for complex computation and simple HTML

✓JavaServer Pages (JSPs)

- Static HTML pages that embed Java code
    ▪ They process received user input using Java code and output the HTML
- Used for complex HTML and simple computation

Today

- ✓ Cookie management
- ✓ Communication between the middle & back-end tiers

What are Cookies?

- Cookies are used for:
  - Uniquely identifying users
    - E.g. a website can display the username of a returning user
  - Storing and retrieving user preferences
    - E.g. a website can remember language preference per user

- POP Quiz:
  - Aren't IP addresses sufficient to identify users?
    - **No**.. Clients can posses different IPs at different times and many clients may share the same IP
  - Can't program variables store user preferences?
    - **No**.. Variables can retain their stored values across different sessions

Cookie Management (contd.)

- Cookies from different websites are stored and managed by a user's web browser

- Browsers typically
  - Limit a cookie size to 4K
  - Store a minimum of 20 cookies/website
  - Store a maximum of 300 cookies/user
  - Delete cookies at the end of a browsing session* (i.e. until the user closes the web browser)
  - Store the domain that embedded a cookie

Note: To make cookies persist beyond the current browsing session, a web-server must call the *setMaxAge* method that sets the cookie's lifetime in seconds

Cookie Creation Example

```java
public class Login extends HttpServlet
{
    public void doGet(HttpServletRequest request, HttpServletResponse response)
                                        throws ServletException, IOException

    {
        boolean newUser = true;
        Cookie unameCookie = null;

        String username = request.getParameter("username");
        String password = request.getParameter("password");

        /* Returns an array of all the cookies every sent by the
           domain (eg. andrewid-db.qatar.cmu.local) to the user */
        Cookie allCookies[] = request.getCookies();

        /* Check if a username cookie has already been sent by the
           server. If so, do not create and send such a cookie */
        if(allCookies != null && allCookies.length != 0)
        {
            for (Cookie c : allCookies)
            {
                if(c.getName().equals("username"))
                {
                    newUser = false;
                    unameCookie = c;
                }
            }
        }

        /* Create a new username cookie to store the username */
        if((newUser == true) && (username.length() != 0))
        {
            unameCookie = new Cookie("username", username);
            unameCookie.setMaxAge(86400); /* one day in s */

            /* addCookie must precede getWriter!!!*/
            response.addCookie(unameCookie);
        }

        /* Append the desired HTML body to the response  */
        response.setContentType("text/html");
        PrintWriter outstream = response.getWriter();
```

List and traverse existing cookies

Create and send a new cookie

*For more information about cookies, study Java's Cookie API

Middle to Back-End Communication

- Copy JDBC41 Postgresql Driver, Version 9.3-1101 to cmuqflix/WEB-INF/lib

- Copy DBConnection.java from Recitation 4 to cmuq/WEB-INF/src

- Modify the package name to local.cmu.qatar.db

- Compile DBConnection.java and copy DBConnection.class to cmuq/WEB-INF/classes/local/cmu/qatar/db/