University Database Management System

Desai Sai Pranav
Roll Number: 210050043
Guide: Prof. Bhaskaran Raman
Course Project: University Database Management
IIT Bombay

Project Overview

Spring '24

This project involved the development of a web-based course registration system with secure user authentication and dynamic course management. The system was built using Node.js, Express, and PostgreSQL, with a focus on enhancing user experience and maintaining data integrity.

System Features

Login Form and User Authentication

- Developed a simple HTML login form with radio buttons for user roles, fields for user ID and password.
- Served the form using a Node.js/Express server, handled form submission, and implemented login verification by querying the PostgreSQL database.
- Displayed success or failure messages based on verification results.

JWT-based Authentication and Dashboard Access

- Advanced user authentication by modifying the `/logincheck` endpoint to generate a signed JWT containing the userID and role upon successful login.
- Stored the JWT as a cookie named `jwt` in the client's browser and automatically redirected to `/dashboard.html` after a 10-second delay.
- On accessing the dashboard, verified the stored JWT cookie using Cookie Parser and displayed the user ID and role upon successful verification.
- Prevented unauthorized access by displaying "User Not logged in" if verification fails.

Dynamic Course Management

- Upon login, the dashboard dynamically generated and displayed a list of available courses for the semester.
- Indicated which courses the logged-in student is registered for.
- Provided a registration form for students to enroll in courses, with backend checks for prerequisites and other constraints like section etc.
- Implemented error handling to show appropriate error messages if any constraints fail during registration.

Security Enhancements

- Secured the application against SQL injection attacks by masking user IDs and other sensitive information during background SQL checks at login.
- Implemented measures to prevent race conditions, ensuring accurate course registration even when multiple users attempt to register for limited seats.

Conclusion

The project successfully delivered a robust and secure course registration system. The use of JWT for authentication, along with dynamic course management and stringent security measures, ensures a seamless and safe user experience.