

University Management System

Introduction

The University Management System is designed to facilitate the administration and management of university operations. To secure sensitive data and functionalities, the system implements role-based access control with two primary roles:

- **ADMIN:** Users with this role have full access to the system.
- **USER:** Users with this role, i.e. students and faculties, have read-only access.

Authentication mechanisms are in place to ensure that users can only access functionalities permitted by their roles. Upon logging into the system, users are presented with interfaces and options relevant to their assigned role.

Modules and Features

Subject Management

The **Subject Management** module allows administrators to manage the various subjects offered by the university. It supports adding new subjects, editing existing ones, and deleting subjects that are no longer offered. Subjects are the elements upon which courses are built.

Features

- **ADMIN Features:**
 - **Add Subject:** Create new subjects with a unique code and name.
 - **Edit Subject:** Modify details of existing subjects.
 - **Delete Subject:** Remove subjects from the system.
 - **View Subjects:** List all subjects with their details.
- **USER Features:**
 - **View Subjects:** Access a list of all subjects and view their details.

Data Attributes

- **Subject Name:** The name of the subject (e.g., Mathematics).
- **Subject Code:** A unique identifier for the subject (e.g., MATH001).

Functionality

- Ensure that subject codes are unique to prevent duplication.
 - Validation to check that required fields are not empty.
 - Provide search functionality to find subjects quickly.
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Course Management

The **Course Management** module enables administrators to manage course details, including scheduling, capacity, and assigned faculty. Courses are specific classes offered under a subject.

Features

- **ADMIN Features:**
 - **Add Course:** Create new courses with detailed information.
 - **Edit Course:** Update course details such as timing or location.
 - **Delete Course:** Remove courses from the system.
 - **View Courses:** Display a list of courses with essential details.
 - **Assign Faculty:** Assign a teacher to the course.
 - **Manage Enrollments:** View and manage students enrolled in the course.
- **USER Features:**
 - **View Courses:** Access comprehensive information about courses.
 - **View Enrollments:** Faculty can view courses they teach; students can view courses they are enrolled in.

Data Attributes

- **Course Name:** A descriptive name of the course.
- **Course Code:** A unique identifier for the course (e.g., 001).
- **Subject Name:** The subject to which the course belongs.
- **Section Number:** The specific section identifier (e.g., Section 1).
- **Teacher Name:** The faculty assigned to teach the course.
- **Capacity:** The maximum number of students allowed.
- **Lecture Time:** Scheduled days and times for the course lectures.
- **Final Exam Date/Time:** The date and time of the final examination.
- **Location:** The venue for lectures (e.g., Room 101).

Functionality

- Prevent over-enrollment beyond course capacity.
- Conflict detection for scheduling (e.g., overlapping lecture times).
- Update student records when courses are added or removed.

Student Management

The **Student Management** module handles all operations related to student information. It allows the university to maintain up-to-date records for each student, including personal details, academic progress, and enrollment status.

Features

- **ADMIN Features:**
 - **Add Student:** Register new students with all necessary details. (with default password and unique student id as username)
 - **Edit Student:** Update student information such as address or contact details.

- **Delete Student:** Remove student records when necessary.
- **View Student Profile:** Access detailed information about a student.
- **Manage Enrollments:** Enroll students in courses and manage their schedules.
- **Academic Progress Tracking:** Monitor grades and graduation progress.
- **Tuition Management:** Record and manage tuition fees. Tuition fee for undergrad students is \$5000, graduate students \$4000 per semester.
- **USER Features (for students):**
 - **View Profile:** Access their own personal and academic information.
 - **Edit Profile:** Access to edit the password. Upload a picture to change their profile photo.
 - **View Enrolled Courses:** See the list of courses they are enrolled in.
 - **View Grades:** Check academic performance records per semester.
 - **View Tuition Status:** Review tuition fee information and payment status.
- **USER Features (for faculty):**
 - **View Student Information:** View name & ID of students enrolled in their course

Data Attributes

- **Name:** Full name of the student.
- **Student ID:** A unique 10-character identifier generated upon registration.
- **Profile Photo:** A picture associated with the student's profile. First, the default photo is shown.
- **Address:** Residential address.
- **Telephone:** Contact number.
- **Tuition:** Tuition fee information and payment status.
- **Registered Courses:** List of courses the student is enrolled in.
- **Email Address:** Official email for communication.
- **Grades:** Academic performance records.
- **Current Semester:** The semester the student is currently enrolled in.
- **Subjects Registered:** The subjects the student is taking.
- **Academic Level:** Undergraduate, graduate, or Ph.D. student.
- **Thesis Title:** For Ph.D. students, the title of their thesis.
- **Progress:** Percentage of the program completed (e.g., 50%).

Functionality

- Generate student IDs automatically upon registration.
 - Provide a semester-wise view of grades and subjects.
 - Calculate academic progress based on completed courses.
 - Allow students to upload profile photos.
 - Enable communication via email integration for notifications.
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Faculty Management

The **Faculty Management** module is designed to handle information related to university faculty members. It maintains profiles of each faculty member, including their qualifications, research interests, and the courses they teach.

Features

- **ADMIN Features:**
 - **Add Faculty Member:** Create new faculty profiles. (with default password and unique email as username)
 - **Edit Faculty Member:** Update faculty information.
 - **Delete Faculty Member:** Remove faculty profiles when necessary.
 - **View Faculty Profile:** Access detailed information about a faculty member.
 - **Assign Courses:** Manage the courses assigned to faculty members.
- **USER Features (Faculty):**
 - **View Profile:** Access and view their own profile information.
 - **Edit Profile:** Access to edit their default password. Upload a picture to change their profile photo.
 - **View Assigned Courses:** See the list of courses they are teaching.
 - **View Student Lists:** Access name & ID of students enrolled in their courses.
- **USER Features (Students):**
 - **View Faculty Profiles:** Access profiles of faculty members teaching their courses (limited to name, email, office location, and research interests).

Data Attributes

- **Name:** Full name of faculty member.
- **Profile Photo:** A picture associated with the student's profile. At first, the default photo is shown.
- **Degree:** Highest degree obtained (e.g., Ph.D., Master's).
- **Research Interest:** Areas of research and expertise.
- **Courses Offered:** List of courses the faculty member teaches.
- **Email:** Official email address and a unique identifier for the faculties.
- **Office Location:** Office address or room number.

Functionality

- Link faculty profiles to the courses they teach.
 - Display research interests for collaboration and student advising.
 - Provide contact information for scheduling and communication.
 - Update course assignments as faculty schedules change.
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Event Management

The **Event Management** module allows the university to organize and manage events such as seminars, workshops, and conferences. It provides functionalities to schedule events, manage participants, and handle registrations.

Features

- **ADMIN Features:**
 - **Add Event:** Create new events with comprehensive details.
 - **Edit Event:** Update event information. Also be able to upload an image as a new header image.
 - **Delete Event:** Remove events from the schedule.
 - **View Events:** Display upcoming events with details.
 - **Manage Registrations:** Track and manage student registrations for events.
- **USER Features:**
 - **View Events:** Access the list of upcoming events and view details.
 - **Register for Events:** Sign up for events they are interested in attending.
 - **View Registered Events:** See the events they have registered for.

Data Attributes

- **Event Name:** The title of the event.
- **Event Code:** A unique identifier for the event (e.g., EV001).
- **Description:** Detailed information about the event.
- **Header Image:** An image representing the event. At First, the default photo is shown.
- **Location:** Venue of the event.
- **Date and Time:** Scheduled date and time.
- **Capacity:** Maximum number of participants.
- **Cost:** Indicates if the event is free or paid; includes the amount if paid.
- **Registered Students:** List of students registered for the event.

Functionality

- Display events on a calendar view for easy tracking.
 - Limit registrations based on capacity.
 - Send confirmation emails upon registration.
 - Generate attendee lists for event organizers.
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User Interface Design

Overview

The application features an intuitive and consistent user interface designed to facilitate accessibility. The GUI is developed using JavaFX to provide a modern look and feel. The interface adapts based on the user's role, presenting only the functionalities permitted to them.

Authentication and Authorization

- **Login Screen:** Users must log in with their student id and password. Authentication verifies the user's identity and assigns the appropriate role (ADMIN or USER).
- **Role-Based Menus:** After logging in, the navigation menu displays options relevant to the user's role.
 - **ADMIN:** Full menu with access to all modules and functionalities.
 - **USER:** Limited menu with access to view functionalities only.

Navigation

- **Left-Side Menu:** A collapsible menu displaying the main modules:
 - Dashboard
 - Subject Management
 - Course Management
 - Student Management
 - Faculty Management
 - Event Management

Module Interfaces

Dashboard

- **Purpose:** Provide an overview of key metrics and recent activities.
- **Components:**
 - Summaries of total students, courses, faculties, and events.
 - Recent registrations and upcoming events.
 - Notifications and alerts.

Subject Management Interface

- **ADMIN View:**
 - **Listing Page:** Displays all subjects with options to add, edit, or delete.
 - **Detail/Edit Page:** Form to input or update subject information.
- **USER View:**
 - **Listing Page:** Displays all subjects without options for modification.

Course Management Interface

- **ADMIN View:**
 - **Listing Page:** Lists all courses with key details.
 - **Detail/Edit Page:** Contains tabs for course details, enrolled students, and schedule.
 - **Actions:** Add a new course, assign faculty, manage enrollments.
- **USER View (Faculty):**
 - **Listing Page:** Shows courses they teach.
 - **Course Details:** View enrolled students and schedule.
- **USER View (Students):**
 - **Listing Page:** Shows courses they are enrolled in.
 - **Course Details:** View course information and schedule.

Student Management Interface

- **ADMIN View:**
 - **Listing Page:** Shows all students with basic info and search functionality.
 - **Profile Page:** Displays comprehensive student details with tabs for personal info, academic records, tuition, and contact information.
 - **Actions:** Edit profile, manage enrollments, view progress reports.
- **USER View (Students):**
 - **Profile Page:** Access to their own personal and academic information.
 - **Actions:** View progress reports and tuition fee.
- **USER View (Faculty):**
 - **Student Lists:** Access basic academic information of students in their courses.

Faculty Management Interface

- **ADMIN View:**
 - **Listing Page:** Lists all faculty members with their departments.
 - **Profile Page:** Shows faculty details, courses taught, and research interests.
 - **Actions:** Edit profile, assign courses.
- **USER View (Faculty):**
 - **Profile Page:** Access to their own profile details.
 - **Actions:** View assigned courses.
- **USER View (Students):**
 - **Faculty Profiles:** View faculty information relevant to their courses.

Event Management Interface

- **ADMIN View:**
 - **Calendar View:** Visual representation of events over the month.

- **List View:** Detailed list of events with sorting and filtering options.
- **Event Page:** Event details, registered students.
- **Actions:** Add, edit, delete events, manage registrations.
- **USER View (Students and Faculty):**
 - **Calendar View:** View upcoming events.
 - **List View:** Browse events with filtering options.
 - **Event Page:** View event details and register.

User Interaction

- **Responsive Design:** UI elements adjust to various screen sizes and resolutions.
 - **Feedback Mechanisms:** Confirmation dialogs for critical actions, success/error notifications.
 - **Accessibility:** Keyboard navigation, screen reader compatibility, and color contrast considerations.
 - **Role-Based Visibility:** UI components and actions are visible based on the user's role.
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Implementation Phases

Phase 1: GUI Development, Core Functionality, and Authentication

Duration: 3 weeks

- **Develop the GUI:** Create all the interface layouts for each module, incorporating role-based views.
- **Implement Basic Navigation:** Enable users to move between modules seamlessly, with access based on their role.
- **Authentication Mechanism:** Implement login functionality to authenticate users and assign roles.
- **Core Functionality:** Implement one or two key functionalities per module for both ADMIN and USER roles.

Deliverables

- Functional GUI with role-based navigation.
- User authentication system.
- Demonstration of adding and viewing entries in at least two modules as an ADMIN and viewing data as a USER.

Phase 2: Partial System Implementation with Role Management

Duration: 2 weeks

- **Complete Functionality:** Implement at least three sub-systems outlined in the project scope, ensuring role-based access control.
- **Data Integration:** Ensure that actions in one module reflect in others (e.g., enrolling a student update both student and course records), respecting role permissions.
- **Validation and Error Handling:** Implement robust input validation and exception handling, including unauthorized access attempts.

Phase 3: Full System Implementation

Duration: 2 weeks

- Complete development of all module functionalities with full role-based access control.
- Implement data consistency checks and constraints.
- Enhance the user interface with additional features like search, filters, and reports.
- Conduct thorough testing and debugging, focusing on security and access control.

Deliverables

- Fully functional University Management System with role-based access control.
 - User manual and documentation, including role definitions and access rights.
 - Test reports and bug fixes.
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Testing and Validation

Data Import

- **Excel Data Import:** An Excel file contains data for each management system module. The system should read this file and import the data upon launch, ensuring that ADMIN users can see and manage the data, while USERS can view it. Also when the users changes their information, like password, the program should update the excel file.

Scenario: Navigating the University Management System with Roles

1. User Authentication

- Upon launching the University Management System, the user is presented with a login screen.
- The user enters their credentials.
 - **ADMIN Login:** The system authenticates the user as an ADMIN.
 - **USER Login:** The system authenticates the user as a USER.

2. Dashboard Access

- **ADMIN:**

- After logging in, the ADMIN sees a Dashboard with full metrics and recent activities, including options to manage subjects, courses, students, faculty, and events.
- **USER:**
 - The USER sees a Dashboard tailored to their role.
 - **Students:** View their own progress, upcoming courses, and registered events.
 - **Faculty:** View courses they teach, upcoming schedules, and related events.

3. Navigation Menu

- The left-side collapsible menu displays modules relevant to the user's role.
- **ADMIN Menu:**
 - Dashboard
 - Subject Management
 - Course Management
 - Student Management
 - Faculty Management
 - Event Management
- **USER Menu:**
 - Dashboard
 - Course Management (limited to viewing)
 - Event Management (limited to viewing and registering)
 - Profile Management (own profile)

4. Module Access

- **ADMIN:**
 - Has full access to all modules with all functionalities.
 - Can add, edit, delete, and view data in all modules.
- **USER (Students and Faculty):**
 - **Subject Management:** Can view subjects.
 - **Course Management:**
 - **Students:** View enrolled courses and course details.
 - **Faculty:** View courses they teach and related student lists.
 - **Student Management:**
 - **Students:** View their own profile and academic information.
 - **Faculty:** View basic academic information of students in their courses.
 - **Faculty Management:**
 - **Students:** View profiles of faculty teaching their courses.
 - **Faculty:** View and edit their own profile.
 - **Event Management:** View events and register.

5. Attempting Unauthorized Actions

- **USER:**

- If a USER attempts to access an ADMIN function (e.g., adding a course), the system displays an "Access Denied" message.
- The option to perform unauthorized actions is not visible to USERS in the UI.

6. Responsive and Accessible Design

- The user experiences a responsive interface that adjusts to their device.
- Accessibility features ensure that all users can navigate the system effectively.

7. Feedback and Notifications

- When a USER registers for an event, a confirmation message is displayed.
 - Notifications about schedule changes or upcoming events are displayed on the Dashboard.
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