

Course Registration System Documentation

Project Overview

This **Course Registration System** is designed to manage the process of course registration for students. The system allows students to log in, view available courses, register for courses, and drop courses they are currently enrolled in. The system provides a graphical user interface (GUI) built using Java Swing components. It handles the management of course details, student information, and course registrations while ensuring that students can only register if there are available slots.

Key Features:

1. **Student Registration and Login:** Students can register for the system and log in using their unique student ID and name.
2. **Course Catalog:** The system displays a catalog of available courses, showing details like course code, title, capacity, schedule, and available slots.
3. **Course Registration:** Students can register for a course if there are available slots.
4. **Course Drop:** Students can drop courses they are enrolled in.
5. **Data Persistence:** The system keeps track of students and courses using in-memory data structures such as lists and maps.

Classes

1. Course

The **Course** class represents a course and contains the following attributes:

- **courseCode:** A unique identifier for the course.
- **title:** The name of the course.
- **description:** A brief description of the course content.
- **capacity:** The maximum number of students that can register for the course.
- **schedule:** The timetable for the course (days and times).
- **registeredStudentIDs:** A list of student IDs who are currently registered for the course.

Key Methods:

- **getAvailableSlots():** Returns the number of available slots in the course.

- `registerStudent(String studentID)`: Registers a student for the course if there are available slots and the student is not already registered.
- `removeStudent(String studentID)`: Removes a student from the course's registration list.

2. Student

The `Student` class represents a student and contains the following attributes:

- `studentID`: A unique identifier for the student.
- `name`: The name of the student.
- `registeredCourses`: A list of courses the student is registered for.

Key Methods:

- `registerCourse(Course course)`: Registers a student for a specific course.
- `dropCourse(Course course)`: Drops a student from a specific course.

3. CourseRegistrationSystem (Main Application)

The `CourseRegistrationSystem` class is the main GUI application that manages all interactions between students and courses. It extends `JFrame` and uses Java Swing components for the user interface.

Components:

- **Course Catalog Panel**: Displays a table of courses with details (course code, title, schedule, capacity, and available slots).
- **Student Login and Registration Panel**: Allows students to log in by entering their student ID and name.
- **Course Registration Panel**: After logging in, students can see the available courses and register for them. They can also drop courses from this panel.

Key Methods:

- `initializeCourses()`: Initializes the list of courses available for registration.
- `createCourseCatalogPanel()`: Creates and displays the course catalog in a table format.
- `createStudentPanel()`: Manages the student login and registration panels.
- `handleLogin()`: Manages the login process for students, allowing both registration and login.
- `handleCourseRegistration()`: Allows a student to register for a selected course.
- `handleCourseDrop()`: Allows a student to drop a course they are enrolled in.
- `refreshCourseTable()`: Refreshes the course catalog table to reflect current data.

- `updateCourseComboBox()`: Updates the combo box for course registration with available courses.

User Interface

- The main window contains two tabs:
 1. **Course Catalog**: Displays a table of available courses and allows users to view detailed course information.
 2. **Student Registration**: Handles the student login, course registration, and course dropping functionalities.

Functional Workflow

1. **Login/Registration**:
 - The student enters their ID and name to log in or create a new account.
 - Upon successful login or registration, the student is redirected to the course registration panel.
2. **Course Registration**:
 - In the course registration panel, students can select a course from the available options (those with open slots).
 - Students can register for a course by clicking the "Register Course" button. The system checks for available slots and registers the student accordingly.
3. **Course Drop**:
 - Students can view their registered courses in a table format.
 - To drop a course, the student selects a course from their registered courses list and clicks the "Drop Selected Course" button.

Error Handling

- **Login Errors**: If a student fails to enter both the student ID and name, an error message is displayed.
- **Course Registration Errors**: If there are no available slots in a selected course or if the student is already registered, the system shows an error message.
- **Course Drop Errors**: If the student does not select a course to drop, an error message is shown.