Design Document

Group 3

CS401-02

https://github.com/chenAndrew4/CS401ClassEnrollmentSystem

Revision History

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10/16	1.0	Initial Version	Anthony Kungo
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1. System Overview

The College Class Enrollment System is a Java application that enables students to enroll in courses, faculty to manage class rosters, and administrators to control course assignments and generate reports. The system is file-based, using the file system for data persistence, and it's designed as a standalone application accessible via a Java GUI (Java Swing).

2. Design Goals

- **Modularity**: Each functional unit (e.g., user management, course registration) is encapsulated in separate classes.
- **Data Integrity**: Immediate data persistence to ensure accuracy and reliability of student and course data.
- **Role-based Access Control**: Restrict access based on user roles (Student, Faculty,

Administrator).

- **Concurrency Management**: Ensuring thread-safe operations in multi-user environments.

3. Detailed Class Designs

3.1 User Class

- **Description**: The base class representing a generic user.
- **Attributes**:
    - private String userID: Unique identifier for each user.
    - private String username: The user’s username.
    - private String firstName: The user’s first name.
    - private String lastName: The user’s last name.
    - private String password: Hashed password for secure authentication.
    - private Institutions institutionID: The id of the user’s institution.
    - private String address: User’s Address
    - private String phone: User’s Phone Number
    - private Department department: The department of the user.
    - private AccountType accountType: The type of the user’s account.
    - private String sessionToken: The token for the user’s data.
    - private Date date: Admission date.
    - private GenderIdentity genderIdentity: The user’s gender.
    - private boolean isAuthenticated: Tracks if the user is logged in.

- **Methods**:
  - public boolean equals(Object o): returns true if the user is the same as the object.
  - public int hashCode(): returns an int that represents the object.
  - public String toString(): returns a String containing user info.
  - Getters and setters for all attributes.

3.2 Student Class (Extends User)

- **Attributes**:
  - private Grade grade: Grade for the student.
  - private List<CourseSection> enrolledCourses: List of courses the student is currently enrolled in.
  - private List<CourseSection> waitlistedCourses: List of courses where the student is on the waitlist.
  - private List<FinishedCourse> finishedCourses: List of courses the student has finished.
- **Methods**:
  - public void addFinishedCourse(FinishedCourse finishCourse): adds finished course to FinishedCourse List.
  - Getters and Setters for the 3 Lists and Grade attributes.

3.3 Faculty Class (Extends User)

- **Attributes**:
  - private List<CourseSection> assignedCourses: List of courses taught by the

    faculty member.
    - private List<Schedule> teachingSchedule: List of faculty's schedule
- **Methods**:
    - public List<String> viewClassRoster(String sectionID): Returns the roster for a specific course.
    - public boolean updateSyllabus(CourseSection section, String newSyllabus): Allows the faculty to upload or update a syllabus. It is true or false depending on if the faculty member has that class.
    - Getters and Setters for assignedCourses and Schedule.

3.4 Administrator Class (Extends User)

- **Attributes:**
    - private List<User> managedUsers : list of all users who are managed.
- **Methods**:
    - public boolean addStudent(Student student): Adds a student to managedUsers.
    - public boolean addFaculty(Faculty faculty): Adds a faculty member to managedUsers.
    - public String toString(): Returns String of Admin info
    - Getter and Setter for managedUsers.

3.5 Course Class (implements Serializable)

- **Attributes:**

    - private String courseID: Unique identifier for the course. This ID is used throughout the system to uniquely reference a course.
    - private String name: The course's name, providing a human-readable label for the course (e.g., "Introduction to Computer Science").
    - private String description: A detailed description of the course, outlining its objectives, content, and any relevant information for students.
    - private Institutions institutionID: The id of the institution.
    - private LevelType level: Represents the level of the course (e.g., lower-division or upper-division).
    - private AcademicProgramType academicProgram: Indicates the academic program type (e.g., Undergraduate Matriculated, Non-Matriculated).
    - private Float units: The number of units or credits the course is worth.
    - private Department department: Department the course is in.
    - private List<String> prerequisites: List of prerequisites.
    - private List<CourseSection> sections: List of sections.
- **Methods:**
    - Getters and Setters for all attributes.
    - public String toString(): returns String with Course info.

3.6 CourseSection Class (implements Serializable)

- **Attributes:**
    - private String sectionID: Unique identifier for each section.
    - private int enrollmentLimit: Max number of enrollments for a section.

    - private String waitlistID: Section’s waitlist ID.
    - private ClassRoster classRoster: Students enrolled in section.
    - private GradingType grading: Specifies the grading policy for the course (e.g., Credit/No Credit or Graded).
    - private InstructionModeType instructionMode: Specifies how the course is delivered (e.g., In-Person, Hybrid, Online).
    - private String scheduleID: ID for the schedule of this course.
    - Private String notes: any additional information.
- **Methods:**
    - public boolean isFullyEnrolled(): Checks if enrollmentLimit is reached.
    - public String toString(): returns String with CourseSection information.
    - Getters and Setters for all attributes.

3.7 FinishedCourse Class

- **Attributes:**
    - private String courseID: ID of finishedCourse.
    - private String sectionID: SectionID of finished Course
    - private String facultyID: ID of faculty member
    - private Grade grade: Grade for this course
- **Methods:**
    - public boolean equals(Object o): returns true if the user is the same as the object.
    - public int hashCode(): returns an int that represents the object.
    - public String toString(): returns a String containing Course info.

    - Getters and setters for all attributes.

3.8 Schedule Class (implements Serializable)

- **Attributes**:
    - private final String scheduleID: Unique identifier for the schedule.
    - private String courseID: Unique identifier for the course.
    - private String sectionID: Unique identifier for the schedule.
    - private Term term: Course semester or quarter
    - private Days[] days: Days the course meets
    - private Date endDate: End date of the schedule
    - private Date startDate: Start date of the schedule
    - private Time startTime: Start time of the course
    - private Time endTime: End time of the course
    - private Building building: Building location
    - private Campus campus: Campus location
    - private Room room: Room location
    - private String facultyID: ID of faculty member
- **Methods**:
    - public boolean doesThisScheduleConflict(Schedule otherSchedule): Checks for schedule conflicts.
    - public boolean isDateWithinSchedule(Date selectedDate): Check if the selected date falls within the schedule's start and end dates
    - public String toString(): returns String with Schedule information

    - Getters and setters for all attributes.

3.9 DataManager Classes

3.9.1 CoursesDataManager Class

- **Attributes:**
    - private static Log log: Login
    - private static CoursesDataManager instance; instance for singleton pattern.
    - private static final String FILE_PREFIX = ServerManager.DB_FILE_PATH_PREFIX
    - private static final String FILE_SUFFIX = ServerManager.COURSES_DB_FILE_PATH_SUFFIX;
    - private final Map<Institutions, Map<String, Course>> institutionCourses: Courses at an Institution
    - private final Map<Institutions, Boolean> modified: Track modified institutions
- **Methods:**
    - public static synchronized CoursesDataManager getInstance(): get instance of this class.
    - private synchronized void ensureCoursesLoaded(Institutions institution);
    - public synchronized Course getCourseByCourseID(Institutions institutionID, String courseID): return Course based on its ID.
    - public synchronized Course getCourseBySectionID(Institutions institutionID, String sectionID): return Course based on its SectionID.

- public synchronized Set<String> getCourseIDsByInstitution(Institutions institution): returns copy of CourseIDs from an Institution
- public synchronized Set<String> getSectionIDsByInstitution(Institutions institution): returns copy of SectionIDs from an Institution
- public synchronized CourseSection getSectionById(Institutions institution, String sectionID): return CourseSection by its SectionID.
- public synchronized void saveAllCourses(): saves all Courses.
- public synchronized void saveCoursesByInstitution(Institutions institutionID, Map<String, Course> courses): saves all Courses in a specific school.
- public synchronized void loadAllCourses(): reads values.
- public synchronized Map<String, Course> loadCoursesByInstitution(Institutions institutionID): returns Map of Courses in a specific school.

3.9.2 DataSaveManager Class

- **Attributes:**
  - **private static DataSaveManager instance: instance for singleton pattern.**
  - **private final List<Runnable> saveTasks: List of Runnable tasks.**
- **Methods:**
  - public static synchronized DataSaveManager getInstance(): returns an instance of the class.
  - public synchronized void registerSaveTask(Runnable saveTask): adds the saveTask to the saveTasks List.
  - public synchronized void saveAll(): runs all saveTasks.

3.9.3 ScheduleDataManager Class

- **Attributes:**
  - private static Log log: Login
  - private static ScheduleDataManager instance;
  - private static final String FILE_PREFIX = ServerManager.DB_FILE_PATH_PREFIX;
  - private static final String FILE_SUFFIX = ServerManager.SCHEDULES_DB_FILE_PATH_SUFFIX;
  - private final Map<Institutions, Map<String, Schedule>> institutionSchedules: Schedules for an Institution
  - private final Map<Institutions, Boolean> modified: Track modified institutions
- **Methods:**
  - public static synchronized ScheduleDataManager getInstance();
  - private synchronized void ensureSchedulesLoaded(Institutions institution);
  - public synchronized void saveAllSchedules(): saves all Schedules.
  - public synchronized void saveSchedulesByInstitution(Institutions institutionID, Map<String, Schedule> schedules): saves Schedules based on a specific school.
  - public synchronized void loadAllSchedules(): loads all schedules from disk.
  - public synchronized Map<String, Schedule> loadSchedulesByInstitution(Institutions institutionID): Loads Schedules for a specific Institution.

- public synchronized boolean addOrUpdateSchedule(Institutions institutionID, String scheduleID, Schedule schedule): returns true if schedule was updated, false otherwise.
- public synchronized Schedule getSchedule(Institutions institutionID, String scheduleID);
- public synchronized Map<String, Schedule> getAllSchedules(Institutions institutionID): returns a new Map of all Schedules for an institution.
- public synchronized boolean deleteSchedule(Institutions institutionID, String scheduleID): returns true if a Schedule was deleted, false otherwise.
- public synchronized boolean deleteAllSchedules(Institutions institutionID)
- public synchronized Set<String> getScheduleIDsByInstitution(Institutions institutionID): returns Schedule info from an Institution.

3.9.4 ServerLogDataManager Class

- **Attributes:**
  - private static Log mainLog: Log
  - private static ServerLogDataManager instance;
  - private final Map<Institutions, Map<Class<?>, List<String>>> institutionLogs: Internal storage for logs by institution and class type
  - private final Map<Institutions, Map<Class<?>, Boolean>> modified: Tracks modifications
  - private static final String LOG_FILE_PATH_SUFFIX = ServerManager.LOGS_FILE_PATH_SUFFIX;

    - private static final DateTimeFormatter DATE_TIME_FORMATTER = DateTimeFormatter.ofPattern("yyyy-MM-dd HH:mm:ss:SS");
- **Methods:**
    - public static synchronized ServerLogDataManager getInstance();
    - public synchronized void addLog(Institutions institution, Class<?> logClass, String logEntry): Add a log entry to the map.
    - public synchronized List<String> getAllLogs(Institutions institution): Retrieve all logs for an Institution
    - public synchronized List<String> getLogsByType(Institutions institution, Class<?> logClass): Retrieve logs by class type for an institution
    - public synchronized List<String> getLogsByContent(Institutions institution, String content): Retrieve logs by content for an institution
    - public synchronized List<String> getLogsByDate(String date): Retrieve logs by Date
    - public synchronized List<String> getLogsByInstitutionIDAndDate(Institutions institution, String date): Retrieve logs by institution and date
    - public synchronized List<String> getLogsByTimeRange(Institutions institution, String startTime, String endTime): Retrieve logs for an institution between two times
    - public synchronized void saveAllLogs(): Save all logs to files.
    - private synchronized void saveLogsByInstitutionAndType(Institutions institution, Class<?> logClass, List<String> logs): Save logs for a specific institution and class type

    - public synchronized void loadAllLogs(): Load all logs from files.

3.9.5 SessionDataManager Class

- **Attributes:**
    - private static Log log = Log.getInstance(ServerGUI.logTextArea);
    - private static SessionDataManager instance;
    - private final Map<String, String> sessionData;
    - private static final String SESSION_FILE_PATH = ServerManager.SESSION_FILE_PATH;
- **Methods:**
    - public static synchronized SessionDataManager getInstance();
    - public synchronized void saveSessionData(): Save session data to a file
    - private synchronized void loadSessionData(): Load session data from a file
    - public synchronized String getSessionData(String userId): retrieve session data for a user.
    - public synchronized void addOrUpdateSession(String userId, String sessionInfo): Add or update a session for a user
    - public synchronized void removeSession(String userId): Remove a session for a user
    - public synchronized Map<String, String> getAllSessionData(): Retrieve all session data
    - public synchronized void toLog();

3.9.6 UserDataManager Class

- **Attributes:**
  - private static Log log;
  - private static UserDataManager instance;
  - private static final String FILE_PREFIX = ServerManager.DB_FILE_PATH_PREFIX;
  - private static final String FILE_SUFFIX = ServerManager.USERS_DB_FILE_PATH_SUFFIX;
  - private final Map<Institutions, Boolean> imported;
  - private final Map<Institutions, Boolean> modified;
  - private final Map<Institutions, Map<String, User>> userMap;
- **Methods:**
  - public static synchronized UserDataManager getInstance();
  - private synchronized void isImported(Institutions institutionID);
  - public synchronized boolean addUserByInstitution(Institutions institutionID, User user);
  - public synchronized User getUserByInstitution(Institutions institutionID, String userId);
  - private User returnUser(Institutions institutionID, User u);
  - public synchronized User getUserByInstitutionAndUserName(Institutions institutionID, String username);
  - public synchronized Map<String, User> getUsersByInstitution(Institutions institutionID);

- public synchronized boolean removeUserByInstitution(Institutions institutionID, String userId);
- public synchronized boolean updateUserByInstitutions(Institutions institutionID, User user);
- public synchronized Set<String> getUserIDsByInstitution(Institutions institutionID);
- public synchronized void saveAllUsers();
- private synchronized void saveUsersByInstitution(Institutions institutionID, Map<String, User> users);
- private synchronized Map<String, User> loadUsersByInstitution(Institutions institutionID);
- public synchronized void commitDBByInstitution(Institutions institutionID);
- public synchronized void deleteDB();

3.9.7 WaitlistDataManager Class

- **Attributes:**
  - private static Log log;
  - private static WaitlistDataManager instance;
  - private static final String FILE_PREFIX = ServerManager.DB_FILE_PATH_PREFIX;
  - private static final String FILE_SUFFIX = ServerManager.WAITLISTS_DB_FILE_PATH_SUFFIX;
  - private final Map<Institutions, Map<String, WaitList>> institutionWaitlists: In-memory storage for waitlists grouped by institution

    - private final Map<Institutions, Boolean> modified: Map to track modified state for each institution
- **Methods:**
    - public static synchronized WaitlistDataManager getInstance();
    - public synchronized void saveAllWaitlists(): Save all waitlists to disk
    - public synchronized void saveWaitlistsByInstitution(Institutions institutionID, Map<String, WaitList> waitlists): Save waitlists for a specific institution
    - public synchronized void loadAllWaitlists(): Load all waitlists from disk into memory
    - public synchronized Map<String, WaitList> loadWaitlistsByInstitution(Institutions institutionID): Load waitlists for a specific institution from disk
    - public synchronized boolean addOrUpdateWaitlist(Institutions institutionID, String sectionID, WaitList waitlist): Add or Update a waitlist
    - public synchronized WaitList getWaitlist(Institutions institutionID, String sectionID): Get a specific waitlist (Defensive Copy)
    - public synchronized Map<String, WaitList> getAllWaitlists(Institutions institutionID): Get all waitlists for an institution (Unmodifiable Map)
    - public synchronized Set<String> getWaitlistIDsByInstitution(Institutions institutionID): Get a set of all waitlist IDs for an institution
    - public synchronized WaitList getWaitlistByWaitlistID(String waitlistID): Get a waitlist by waitlist ID across all institutions

    - public synchronized boolean removeWaitlist(Institutions institutionID, String sectionID): Remove a specific waitlist
    - public synchronized boolean removeAllWaitlists(Institutions institutionID): Remove all waitlists for an institution

3.10 Enums

3.10.1 Building Enum

- **Description**: Represents various campus locations.
- **Values**:
    - MEIKLEJOHN_HALL(List.of(Room.values())),
    - LIBRARY(List.of(Room.ROOM1, Room.ROOM2, Room.ROOM3))
    - SCIENCE_BUILDING(List.of(Room.values())) // All rooms available
    - STUDENT_UNION(List.of(Room.ROOM1, Room.ROOM5, Room.ROOM10))
    - ENGINEERING_HALL(List.of(Room.values()))
    - ARTS_BUILDING(List.of(Room.ROOM1, Room.ROOM2, Room.ROOM3, Room.ROOM4))
    - SPORTS_COMPLEX(List.of(Room.values()))
    - BEHAVIORAL_SCIENCES(List.of(Room.ROOM1, Room.ROOM2, Room.ROOM3))
    - BUSINESS_HALL(List.of(Room.ROOM1, Room.ROOM2))

3.10.2 Campus Enum

- **Description**: Represents different CSU campuses.
- **Values**:
    - HAYWARD("Hayward Campus")
    - CONCORD("Concord Campus")
    - ONLINE("Online Campus")
    - MAIN_CAMPUS,
    - SOUTH_CAMPUS,
    - FULLERTON_MAIN;

3.10.3 Room Enum

- **Description**: Represents rooms numbered from Room1 to Room50.
- **Values**:
    - ROOM1, ROOM2, ..., ROOM50

3.11 Client Class

- **Attributes:**
    - private static Client instance;
- **Methods:**
    - public <T extends BaseResponse, R> void sendRequest(BaseRequest request, ResponseCallback<T, R> callback): Sends a request to server, starts on success

3.12 Server Class

- **Attributes:**

    - private ServerManager serverManager;
    - private ExecutorService pool;
    - private Log log;
    - private ServerGUI gui;
    - private ServerSocket serverSocket;
- **Methods:**
    - public void start(): Starts the server.
    - public void end(): Closes the server.

3.13 BaseRequest Class (extends Message)

- **Attributes:**
    - private Institutions institutionID;
    - private String sessionToken;
    - private boolean isAuthenticated;
- **Methods:**
    - Getters for all attributes.

3.14 BaseResponse Class (extends Message)

- **Attributes:**
    - **private String message;**
- **Methods:**
    - **Getter and Setter for message**

3.15 Base Structure of Client Handlers

- **Methods:**
    - **public void handleFunction(Parameters include a JPanel and BaseDashboardGUI as well as information specific to the function): Creates a new Request for the Client to send.**
        - **public Void onSuccess(FunctionResponse functionResponse): Creates JOptionPane to show success.**
        - **public void onFailure(String reason): Create JOptionPane to show failure.**

3.16 Base Structure of Server Handlers

- **Methods:**
    - **public static FunctionResponse handleFunction(BaseRequest request): Creates a new Function specific request based on the BaseRequest and will see if the request can be sought through. If yes, return a success message and vice versa.**

4. File Storage and Data Management

4.1 Data Persistence

Data will be stored in separate files for each entity (e.g., users.db, courses.db, schedules.db, waitlists.db). Each file will be formatted to ensure easy parsing and loading of data:

4.1.1 User Class

Table Fields in users.db

Field	Description
userID	Unique identifier for user
firstName	User's first name
lastName	User's last name
password	Hashed password
role	User role (e.g., Student)
isAuthenticated	Indicates login status
sessionToken	Session info

4.1.2 Student Class (Extends User)

Table Fields in users.db

Field	Description
	Reference to `User`
enrolledCourses	Course IDs (semicolon-separated if multiple)
waitlistedCourses	Waitlisted course IDs (semicolon-separated)
finishedCourses	Finished courses

4.1.3 Faculty Class

Table Fields in users.db

Field	Description
userID	Reference to `User`

Field	**Description**
assignedCourses	List of course IDs (semicolon-separated)

4.1.4 Administrator Class

Table Fields in users.db

Field	**Description**
userID	Unique identifier for each administrator (inherited from User)
firstName	First name of the administrator
lastName	Last name of the administrator
password	Hashed password for secure access
role	Set to "Admin" for all administrator records
permissions	Comma-separated list of specific permissions

4.1.5 Course Class

Table Fields in courses.db

Field	**Description**
courseID	Unique identifier for each course
name	Name of the course
description	Course description
enrollmentLimit	Maximum enrollment
prerequisites	Prerequisite course IDs (semicolon-separated)

4.1.6 Schedule Class

Table Fields in schedules.db

Field	**Description**
classID	Course reference
days	Days of the week (semicolon-separated)
startTime	Start time of class
endTime	End time of class

Here's a detailed design for a Waitlist class in the College Class Enrollment System, including the file structure, fields, save/load functions, and corresponding test cases. The Waitlist class is responsible for managing students who are waiting to enroll in a course that is currently full.

4.1.7 Waitlist Class

Table Fields in courses.db

Field	Description
courseID	Unique identifier for the course associated with this waitlist
studentIDs	List of student IDs on the waitlist for the course (semicolon-separated)
maxWaitlist	Maximum number of students that can be on the waitlist

Explanation of Methods

1. **saveWaitlist**: Writes the waitlist information for each course to a row in Waitlist.csv. Each row includes courseID, studentIDs (semicolon-separated), and maxWaitlist.
2. **loadWaitlist**: Reads from Waitlist.csv to load the waitlist for a specific course.
3. **addStudent**: Adds a student ID to the waitlist if the maxWaitlist limit has not been reached.
4. **removeStudent**: Removes a student ID from the waitlist if they drop their spot or are promoted to enrollment.
5. **getWaitlistPosition**: Returns the position of a specific student in the waitlist.

This setup ensures that the Waitlist class efficiently handles students waiting to enroll in full courses, with clear and consistent storage and retrieval operations, and robust test cases to verify functionality.

4.2 Data Serialization

- **Process**: Each entity will be serialized to a JSON-like format or CSV for easy export and import.
- **Storage**: Each entity class (e.g., User, Course) will implement methods to convert data to and from storage format.

5. System Processes

5.1 Registration Process

1. **Course Selection**: Student selects a course from the catalog.
2. **Prerequisite Check**: RegistrationManager validates prerequisites.
3. **Schedule Conflict Check**: Confirms there are no conflicts with existing schedules.
4. **Enrollment or Waitlisting**: Enrolls student if space is available, or adds them to the waitlist if full.

5.2 Waitlist Management Process

1. **Adding to Waitlist**: If a course is full, RegistrationManager places the student in the course waitlist.
2. **Notification of Available Slot**: WaitList notifies the next student in the queue when a spot opens.

6. Detailed GUI Design

6.1 Login Screen

Layout: BorderLayout

- **North**: **JLabel** - Displays the system logo or title.
- **Center**: **JPanel** with **GridLayout** - Contains form fields for login.
    - **JLabel**: "Username"
    - **JTextField**: Username input
    - **JLabel**: "Password"
    - **JPasswordField**: Password input
    - **JLabel**: "Role"
    - **JComboBox**: Role selection (Student, Faculty, Admin)
- **South**: **JPanel** with **FlowLayout** - Contains action buttons.
    - **JButton**: "Login"
    - **JButton**: "Reset"

Additional Elements

- **JOptionPane** for error messages (e.g., incorrect credentials or role not selected).

Methods

- private boolean validatePassword(String password): Validate password with regex
- private void setStatusMessage(String message, Color color): Format and display status message
- private String formatMessage(String message, int maxWordsPerLine): Format message into lines with a max word count per line

- Getters and Setters for Institution, Username/Password Field, and Status Label

6.2 Role-Based Dashboards

6.2.1 Student Dashboard

Layout: BorderLayout

- **North**: **JToolBar** - Quick access buttons.
    - **JButton**: "View Course Catalog"
    - **JButton**: "View Schedule"
    - **JButton**: "Logout"
- **West**: **JTabbedPane** - Tabs for "Enrolled Courses" and "Waitlisted Courses".
    - **JList** (within **JScrollPane**): Displays a list of enrolled courses or waitlisted courses.
- **Center**: **JPanel** with **BorderLayout** - Displays course details.
    - **Center (Nested JPanel with GridLayout)**:
        - **JLabel**: "Course Name"
        - **JTextArea**: Displays selected course information.
        - **JButton**: "Register"
        - **JButton**: "Drop Course"
- **South**: **JProgressBar** - Indicates processing of registration or drop.

Additional Elements

- **JTable** (within **JScrollPane**) for schedule view with day/time, course name, and location.

- **JOptionPane** for registration confirmation and waitlist notifications.

Methods

- private void initializeMainOptions(): Creates panels for Student functions.
- public void goBackToMainOptions(): Goes back to Student functions.
- public void replaceOptionPanel(JPanel newPanel): Puts a new panel when needed.
- private void handleManageCourses(): Calls ManageCourseGui to allow Search, Enroll, and Drop Course.
- private void handleWaitlist(): Calls ManageWaitlistGui to allow Search, Enroll, and Drop Waitlist.
- private void handleViewGrades(): Calls a panel for grades.
- private void handleViewSchedule(): Calls GetScheduleHandler to show current Schedule.
- private void handleNotification(): Calls a panel for notifications.
- private void handleLogout(): Exits System.

6.2.2 Faculty Dashboard

Layout: BorderLayout

- **North**: **JToolBar** - Quick access buttons.
  - **JButton**: "View Class Roster"
  - **JButton**: "Update Syllabus"

    - **JButton**: "Logout"
- **West**: **JTabbedPane** - Tabs for "Assigned Courses" and "Student Roster".
    - **JList** (within **JScrollPane**): Displays a list of assigned courses.
- **Center**: **JPanel** with **BorderLayout** - Displays roster or syllabus.
    - **Center (Nested JPanel with GridLayout)**:
        - **JTable** (within **JScrollPane**): Shows student roster for the selected course.
        - **JButton**: "Download Roster"
        - **JFileChooser**: For uploading syllabus files.

Additional Elements

- **JOptionPane** for syllabus upload success or error messages.
- **JSpinner** for setting specific enrollment limits in specific courses if applicable.

Methods

- private void initializeMainOptions(): Creates panels for Student functions.
- public void goBackToMainOptions(): Goes back to Student functions.
- public void replaceOptionPanel(JPanel newPanel): Puts a new panel when needed.
- private void handleManageAssignedCourses(): Calls ManageAssignedCoursesGUI to show assigned Courses.
- private void handleViewWaitlist(): Calls ViewWaitlistGUI to show waitlists.
- private void handleGradeSubmissions(): Creates a panel for Grade Submissions.
- private void handleViewSchedules(): Calls ViewSchedulesGUI to show schedule.

- private void handleCommunication(): Creates a panel for communication.
- private void handleLogout(): Exits System.

6.2.3 Admin Dashboard

Layout: BorderLayout

- **North**: **JToolBar** - Admin actions.
    - **JButton**: "Create Course"
    - **JButton**: "Assign Instructor"
    - **JButton**: "Generate Report"
    - **JButton**: "Logout"
- **Center**: **JTabbedPane** - Tabs for "Course Management" and "User Management".
    - **Course Management Tab**:
        - **JTable** (within **JScrollPane**): List of courses with edit options.
        - **JPanel** with **GridLayout**: Course creation/edit form.
            - **JTextField**: Course ID, Course Name
            - **JComboBox**: Instructor assignment
            - **JSpinner**: Enrollment limit
            - **JButton**: "Save Course"
            - **JButton**: "Delete Course"
    - **User Management Tab**:
        - **JTable** (within **JScrollPane**): List of users (students, faculty, admin).

Additional Elements

- **JOptionPane** for course creation and deletion confirmations.
- **JFileChooser** for importing/exporting data.

Methods

- private void initializeMainOptions(): Creates panels for Student functions.
- public void goBackToMainOptions(): Goes back to Student functions.
- public void replaceOptionPanel(JPanel newPanel): Puts a new panel when needed.
- private void handleManageUsers(): Creates AdminManageUsersGUI to show Users.
- private void handleManageCourses(): Creates AdminManageCoursesGUI to show all Courses.
- private void handleViewReports(): Creates ReportsGUI to manage reports.
- private void handleSystemSettings(): Creates SystemSettingsGUI to manage settings.
- private void handleEnroll(): Creates AdminManageEnrollmentGUI to manage student enrollment.
- private void handleWaitlists(): Creates AdminManageWaitlistGUI to manage waitlists.
- private void handleSchedules(): Creates AdminManageSchedulesGUI to manage schedules.

- private void handleNotifications(): Creates AdminManageNotificationsGUI to manage notifications.
- private void handleLogout(): Exits System.

6.3 Course Catalog Screen

Layout: BorderLayout

- **North**: **JTextField** for the search bar and **JComboBox** for department filters.
- **Center**: **JList** (within **JScrollPane**) - Displays filtered list of available courses.
- **South**: **JPanel** with **FlowLayout** - Action buttons.
  - **JButton**: "View Details"
  - **JButton**: "Register"
  - **JButton**: "Back"

Additional Elements

- **JOptionPane** for registration success and error messages.
- **JTextArea** in **BorderLayout (East)** for course description details.

6.4 Schedule Viewer

Layout: BorderLayout

- **North**: **JPanel** with **GridLayout** - Date filters.
  - **JLabel**: "Start Date"
  - **JSpinner**: Start date picker

    - **JLabel**: "End Date"
    - **JSpinner**: End date picker
    - **JButton**: "Filter by Date"
- **Center**: **JTable** (within **JScrollPane**) - Displays schedule with day/time, course name, and location.

Additional Elements

- **JOptionPane** for conflict notifications.
- **JProgressBar** to show loading or filtering progress.

6.5 Waitlist Viewer (Admin and Faculty)

Layout: BorderLayout

- **North**: **JPanel** - Heading and filter options.
    - **JLabel**: "Waitlist for Course"
    - **JComboBox**: Course selection for viewing the waitlist.
- **Center**: **JTable** (within **JScrollPane**) - Displays waitlisted students.
- **South**: **JPanel** with **FlowLayout** - Action buttons.
    - **JButton**: "Notify Student"
    - **JButton**: "Promote from Waitlist"
    - **JButton**: "Back"

Additional Elements

- **JOptionPane** for notification and promotion confirmations.

- **JProgressBar** for waitlist processing.

7. Detailed Test Plan

7.1.1 Authentication and Access Control

- **Test Case 1**: Verify successful login with correct username/password.
    - **Expected Result**: User is redirected to the dashboard based on role.
- **Test Case 2**: Attempt login with incorrect password.
    - **Expected Result**: Display error message for invalid credentials.
- **Test Case 3**: Attempt login without selecting a role.
    - **Expected Result**: Display warning to select a role.
- **Test Case 4**: Test role-based access (Student can only access student features, etc.)
    - **Expected Result**: Each user role has access only to their specific dashboard.

7.1.2 Student Course Registration

- **Test Case 1**: Register for a course with no prerequisites.
    - **Expected Result**: Student is successfully registered.
- **Test Case 2**: Register for a course with prerequisites met.
    - **Expected Result**: Registration succeeds, and the course is added to the student's schedule.
- **Test Case 3**: Register for a course with unmet prerequisites.
    - **Expected Result**: Display an error message about unmet prerequisites.

- **Test Case 4**: Register for a course that is fully enrolled.
    - **Expected Result**: Student is added to the waitlist, and a message is displayed.

7.1.3 Drop Course

- **Test Case 1**: Drop an enrolled course.
    - **Expected Result**: Course is removed from student's enrolled list and waitlist is updated.
- **Test Case 2**: Attempt to drop a course that the student is not enrolled in.
    - **Expected Result**: Display an error message stating that the student is not enrolled in the course.

7.1.4 Schedule Conflict Detection

- **Test Case 1**: Register for overlapping courses.
    - **Expected Result**: Display conflict message and deny registration.
- **Test Case 2**: Register for non-overlapping courses.
    - **Expected Result**: Registration succeeds without conflict.

7.1.5 Faculty Course Management

- **Test Case 1**: View class roster for an assigned course.
    - **Expected Result**: Roster displays with all enrolled students.
- **Test Case 2**: Update syllabus for an assigned course.
    - **Expected Result**: Syllabus is successfully updated.
- **Test Case 3**: Attempt to view a course roster for a course not assigned to the faculty

member.

  - **Expected Result**: Display error indicating unauthorized access.

7.1.6 Admin Course Management

- **Test Case 1**: Create a new course.
  - **Expected Result**: Course is added to the course list and available in the catalog.
- **Test Case 2**: Delete an existing course.
  - **Expected Result**: Course is removed from the course list and is no longer available for registration.
- **Test Case 3**: Assign a faculty member to a course.
  - **Expected Result**: Faculty is successfully assigned, and the course appears on their dashboard.

7.1.7 File Data Persistence

- **Test Case 1**: Register for a course and verify data is saved.
  - **Expected Result**: Registered course data is saved to the file system.
- **Test Case 2**: Drop a course and verify data is saved.
  - **Expected Result**: Updated course data reflects in the file.
- **Test Case 3**: Restart application and verify data consistency.
  - **Expected Result**: All data is loaded correctly from files.

7.1.8 Waitlist Management

- **Test Case 1**: Add a student to a waitlisted course.

    - **Expected Result**: Student appears in the waitlist for the course.
- **Test Case 2**: Remove a student from a waitlist.
    - **Expected Result**: Student is removed, and the next student in the queue is promoted.
- **Test Case 3**: Promote a waitlisted student to enroll when a slot opens.
    - **Expected Result**: Student is moved from waitlist to enrolled.

7.1.9 GUI Validation

7.2.1 Login Functionality

- **Test:** Valid credentials, invalid credentials, empty fields, role selection.
    - **Expected Results:** Appropriate dashboard loads, error dialogs display as needed.

7.2.1 Course Registration

- **Test:** Register with prerequisites met, unmet, and course full.
    - **Expected Results:** Course adds to schedule, prerequisite or full course messages display.

7.2.2 Drop Course

- **Test:** Drop course, check waitlist updates.
    - **Expected Results:** Course removed from schedule, waitlist adjusts if applicable.

7.2.3 Schedule Conflicts

- **Test:** Register for overlapping/non-overlapping courses.
    - **Expected Results:** Conflict message or success registration.

7.2.4 Syllabus Management

- **Test:** Upload syllabus file for course, download roster.
    - **Expected Results:** Syllabus uploads and replaces correctly, roster downloads as expected.

7.2.5 Data Persistence

- **Test:** Register/drop course, verify file saves, reload data.
    - **Expected Results:** All data persists and loads accurately.

7.2.6 Waitlist Management

- **Test:** Add/remove students from waitlist, promote students.
    - **Expected Results:** Waitlist updates correctly, promotions succeed.

7.2.7 GUI Responsiveness

- **Test:** All buttons, dropdowns, and input fields.
    - **Expected Results:** All components respond as expected, providing appropriate feedback.

7.3.1 User Class

- **Test Case 1:** Verify that User.csv includes a new row with the correct information after saving.
    - **Expected Results:** The correct information is shown after saving.
- **Test Case 2:** Confirm that loadUser returns the correct User object for an existing userID.
    - **Expected Results:** The correct User is returned.
- **Test Case 3:** Ensure isAuthenticated reflects login/logout status accurately.
    - **Expected Results:** The correct information is shown after authentication.

7.3.2 Student Class

- **Test Case 1:** Ensure a new entry in Student.csv with the correct course IDs.
    - **Expected Results:** The correct information is shown after saving.
- **Test Case 2:** Validate that loadStudent correctly restores a Student object.
    - **Expected Results:** The correct information is loaded.
- **Test Case 3:** Confirm enrolledCourses and waitlistedCourses lists match data in Student.csv.
    - **Expected Results:** The correct information matches.

7.3.3 Faculty Class

- **Test Case 1:** Confirm data in Faculty.csv after saving a faculty member.
    - **Expected Results:** The correct information is shown after saving.

- **Test Case 2:** Verify that loadFaculty retrieves the correct courses for a faculty member.
    - **Expected Results:** The correct information is loaded.
- **Test Case 3:** Check assignedCourses reflects correctly after updating in Faculty.csv.
    - **Expected Results:** The correct information matches.

7.3.4 Administrator Class

- **Test Case 1:** Save a new administrator entry to Administrator.csv.
    - **Expected Results:** A new row is added in Administrator.csv with the correct userID, firstName, lastName, password, role, and permissions.
- **Test Case 2:** Load an existing administrator from Administrator.csv.
    - **Expected Results:** The correct Administrator object is returned based on the provided userID.
- **Test Case 3:** Update the list of permissions for an administrator.
    - **Expected Results:** The permissions list in the Administrator object is updated correctly, and when saved, Administrator.csv reflects the updated permissions.
- **Test Case 4:** Remove an administrator's entry from Administrator.csv.
    - **Expected Results:** The Administrator.csv file no longer contains the deleted administrator's userID.
- **Test Case 5:** Convert an Administrator object to JSON format.
    - **Expected Results:** The JSON object correctly represents the administrator's details, including permissions.

7.3.5 Course Class

- **Test Case 1:** Verify Course.csv correctly saves course attributes.
  - **Expected Results:** The correct information is shown after saving.
- **Test Case 2:** Ensure loadCourse retrieves the course data accurately.
  - **Expected Results:** The correct data is loaded.
- **Test Case 3:** Confirm enrollmentLimit matches value stored in Course.csv.
  - **Expected Results:** The correct information is shown after matching.

7.3.6 Schedule Class

- **Test Case 1:** Check that Schedule.csv saves each field correctly.
  - **Expected Results:** The correct information is shown after saving.
- **Test Case 2:** Ensure loadSchedule accurately returns schedule data.
  - **Expected Results:** The correct data is loaded.
- **Test Case 3:** Verify start and end times conform to expected format.
  - **Expected Results:** The correct information is shown after matching.

7.3.7 Waitlist Class

- **Test Case 1:** Save a new waitlist entry to Waitlist.csv.
  - **Expected Results:** A new row is added in Waitlist.csv with the correct courseID, studentIDs, and maxWaitlist values.
- **Test Case 2:** Load an existing waitlist from Waitlist.csv.
  - **Expected Results:** The correct Waitlist object is returned for a given courseID.

- **Test Case 3:** Add a student to the waitlist if it has not reached its maximum capacity.
    - **Expected Results:** The student ID is added to studentIDs, and the method returns true.
- **Test Case 4:** Attempt to add a student when the waitlist is full.
    - **Expected Results:** The method returns false.
- **Test Case 5:** Remove a student from the waitlist if they decide not to wait or are enrolled.
    - **Expected Results:** The student ID is removed from studentIDs, and the method returns true.
- **Test Case 6:** Attempt to remove a student who is not on the waitlist.
    - **Expected Results:** The method returns false.
- **Test Case 7:** Remove a student from the waitlist if they decide not to wait or are enrolled.
    - **Expected Results:** The student ID is removed from studentIDs, and the method returns true.
- **Test Case 8:** Attempt to remove a student who is not on the waitlist.
    - **Expected Results:** The method returns false.
- **Test Case 9:** Retrieve the position of a specific student on the waitlist.
    - **Expected Results:** The correct 1-based position of the student is returned.
- **Test Case 10:** Attempt to get the position of a student who is not on the waitlist.
    - **Expected Results:** The method returns -1 or an indication of non-existence.

8. Use Cases

8.1 System Login

Use Case ID: UC-SL-001

Use Case Name: Logging in to the system
Relevant Requirements: 3.1.3.1, 3.1.3.2
Primary Actor: Student, Administrator, Faculty

Pre-conditions:

- User has login information

Post-conditions:

- User is logged in

Basic Flow or Main Scenario:

1. User enters username, password, and school code
    - Students will then have access to their class schedule, and will be able to enroll/drop classes.
    - Administrators will be able to access courses, classes, student information, and student enrollment.
    - Faculty will be able to update their course and class information, and submit grades.

Extensions or Alternate Flows:

- None

Exceptions:

- Username doesn't exist
- Password doesn't match given username
- School code is wrong

Related Use Cases:

- Student Course Registration
- Faculty Grade Submission
- Administrator Course Management
- Student Course Drop
- Administrator Creates Schedule
- User Management

8.2 Student Course Registration

Use Case ID: UC-SCR-001
Use Case Name: Register for a Course
Relevant Requirements: 3.1.3.1, 3.1.3.2, 3.1.3.4
Primary Actor: Student

Pre-conditions:

- Student is logged into the system
- Student has met all prerequisites for the desired course
- The course has available slots

Post-conditions:

- Student is enrolled in the course
- Course enrollment count is updated
- Student's schedule is updated

Basic Flow or Main Scenario:

1. Student navigates to the course registration page
2. Student searches for the desired course
3. System displays course details and availability
4. Student selects the course and clicks "Register"
5. System checks for schedule conflicts and prerequisites
6. System enrolls the student in the course
7. System displays confirmation message
8. System updates student's schedule and course enrollment count

Extensions or Alternate Flows:

- 4a. Course is full:
    1. System adds student to the course waitlist
    2. System displays waitlist confirmation
- 5a. Schedule conflict detected:
    1. System displays conflict warning
    2. Student can choose to cancel registration or proceed with conflict

Exceptions:

- Student does not meet course prerequisites
- System experiences a file I/O error during enrollment update

Related Use Cases:

- View Course Catalog
- Student Course Drop
- System Login

8.3 Faculty Grade Submission

Use Case ID: UC-FGS-001
Use Case Name: Submit Student Grades

Relevant Requirements: 3.1.4.2, 3.1.4.3
Primary Actor: Faculty

Pre-conditions:

- Faculty is logged into the system
- Faculty is assigned to the course
- The grading period is open

Post-conditions:

- Student grades are recorded in the system
- Grade submission is marked as complete for the course

Basic Flow or Main Scenario:

1. Faculty navigates to the grade submission page
2. System displays list of assigned courses
3. Faculty selects a course
4. System displays the class roster with grade input fields
5. Faculty enters grades for each student
6. Faculty submits the completed grade sheet
7. System validates the entered grades
8. System saves the grades and marks submission as complete
9. System displays confirmation message

Extensions or Alternate Flows:

- 6a. Faculty saves grades as draft:
    1. System saves current progress without finalizing
    2. Faculty can return later to complete submission
- 7a. Invalid grade detected:
    1. System highlights invalid entries
    2. Faculty corrects errors and resubmits

Exceptions:

- System experiences a file I/O error during grade saving
- Grading period closes before submission is complete

Related Use Cases:

- View Class Roster
- Update Course Syllabus
- System Login

8.4 Administrator Course Management

Use Case ID: UC-ACM-001
Use Case Name: Create New Course
Relevant Requirements: 3.1.2.1, 3.1.2.2, 3.1.2.4
Primary Actor: Administrator

Pre-conditions:

- Administrator is logged into the system
- The course does not already exist in the catalog

Post-conditions:

- New course is added to the course catalog
- Course is available for student registration (if set as active)

Basic Flow or Main Scenario:

1. Administrator navigates to the course management page
2. Administrator selects "Create New Course" option
3. System displays course creation form
4. Administrator enters course details (code, name, description, credits, prerequisites)
5. Administrator sets maximum enrollment capacity
6. Administrator sets course status (active/inactive)
7. Administrator submits the new course information
8. System validates the entered information
9. System adds the new course to the catalog
10. System displays confirmation message

Extensions or Alternate Flows:

- 8a. Duplicate course code detected:
    1. System displays warning message
    2. Administrator can modify code or cancel creation
- 6a. Administrator sets course as inactive:
    1. Course is added to catalog but not available for registration

Exceptions:

- System experiences a file I/O error during course creation
- Invalid data format detected during validation

Related Use Cases:

- Edit Existing Course
- Set Course Prerequisites

- System Login

8.5 Student Course Drop

Use Case ID: UC-SCD-001
Use Case Name: Student Drops Course
Relevant Requirements: 3.1.1.5, 3.1.3.3, 3.1.4.2
Primary Actor: Student

Pre Conditions:

- Student is logged into system
- Student is in the course

Post Condition:

- Student is dropped from course
- Related Faculty is notified of student dropped
- System updates the number of students in course

Basic Flow or Main Scenario:

1. Student navigates to drop course page
2. Student chooses the course to drops and submits
3. Student is dropped from said course
4. Related faculty is notified of the student dropping the course
5. System updates to account for the dropped student
6. Display confirmation message

Extension or Alternate Flows:

- Detected that the student will go below full-time
    1. Warning message will appear on screen
    2. Will ask for another confirmation to drop course

Exceptions:

- File I/O error when updating file for course and student

Related Use Case:

- Student Course Registration
- Student Waitlist
- System Login

8.6 Administrator Creates Schedule

Use Case ID: UC-ACS-001
Use Case Name: Administrator creates a schedule
Relevant Requirements: 3.1.3.4, 3.1.3.5
Primary Actor: Administrator

Pre Conditions:

- Administrator is logged into the system

Post Condition:

- A schedule is created for one particular course

Basic Flow or Main Scenario:

1. Administrator logs into the system
2. Administrator clicks on 'Create a schedule' button
3. Administrator selects a course to apply the schedule to
4. Administrator selects the days of the week and time slots
5. Administrator clicks 'Finish'
6. System adds the schedule for the course into the database

Extension or Alternate Flows:

- Detected that there exists a schedule for that particular course
    1. Warning message will appear on screen
    2. Will suggest to modify the existing schedule

Exceptions:

- File I/O error when updating file for schedule

Related Use Case:

- Student Course Registration
- Student Waitlist
- System Login

8.7 User Management

Use Case ID: UC-UM-001
Use Case Name: Administrator creates, deletes, or modifies a user
Relevant Requirements: 3.1.1.1
Primary Actor: Administrator

Pre Conditions:

- Administrator is logged into the system

Post Condition:

- A user is created, deleted, or modified

Basic Flow or Main Scenario:

1. Administrator logs into the system
2. To create a user:
    a. Administrator clicks on ‘Add user’ button
    b. Administrator fills out a basic form containing the following fields
        i. Username
        ii. Password
        iii. Institution Code
        iv. Drop down: Student or Administrator
    c. Administrator clicks ‘Finish’
    d. System adds the user into the database
3. To edit a user:
    a. Administrator clicks on ‘Edit user’ button
    b. Administrator can modify the following fields
        i. Username
        ii. Password
        iii. Institution Code
        iv. Drop down: Student or Administrator
    c. Administrator clicks ‘Finish’
    d. System reinserts the user into the database
4. To delete a user:
    a. Administrator clicks on ‘Remove user’ button
    b. Administrator selects the username(s) to delete
    c. System removes the user(s) from the database

Extension or Alternate Flows:

- Detected that there are empty fields for adding or modifying users
    - Warning message will appear on screen
- Detected that there are no users selected to delete
    - Warning message will appear on screen
- Detected that the only administrator account is being deleted
    - Error message will appear on the screen. You cannot delete the only registered administrator account.

Exceptions:

- File I/O error when updating a user

Related Use Case:

- System Login

8.8 View Class Roster

Use Case ID: UC-VCR-001 Use Case Name: View Class Roster Relevant Requirements: 3.1.4.3 Primary Actor: Faculty

Pre-conditions:

- Faculty is logged into the system
- Faculty is assigned to at least one course

Post-conditions:

- Class roster is displayed for the selected course

Basic Flow or Main Scenario:

1. Faculty navigates to the "My Courses" section
2. System displays a list of courses assigned to the faculty
3. Faculty selects a specific course
4. System retrieves the class roster from the course data file
5. System displays the roster with student names, IDs, and enrollment status

Extensions or Alternate Flows:

- 2a. No courses assigned:
    1. System displays message indicating no courses are currently assigned
- 5a. Faculty requests to export roster:
    1. System provides option to export as CSV or plain text file
    2. Faculty selects format and initiates export
    3. System generates and saves the exported file

Exceptions:

- System cannot access course data file
- Course assignment data is corrupted or incomplete

Related Use Cases:

- Submit Student Grades
- Generate Course Report

8.10 Update Course Syllabus

Use Case ID: UC-UCS-001 Use Case Name: Update Course Syllabus Relevant Requirements: 3.1.4.4 Primary Actor: Faculty

Pre-conditions:

- Faculty is logged into the system
- Faculty is assigned to the course
- Course exists in the system

Post-conditions:

- Course syllabus is updated in the system
- Update timestamp is recorded

Basic Flow or Main Scenario:

1. Faculty navigates to course management section
2. System displays list of assigned courses
3. Faculty selects a course to update
4. System loads current syllabus content
5. Faculty modifies syllabus content
6. Faculty submits updated syllabus
7. System validates the content
8. System saves the updated syllabus
9. System confirms successful update

Extensions or Alternate Flows:

- 5a. Faculty saves draft:
    1. System saves current progress without publishing
    2. Faculty can return later to complete updates
- 7a. Content exceeds size limit:
    1. System displays warning
    2. Faculty must reduce content before submitting

Exceptions:

- File system error during save operation
- Concurrent update attempt by another user

Related Use Cases:

- View Class Roster
- Create New Course

8.11 View Course Catalog

Use Case ID: UC-VCC-001 Use Case Name: View Course Catalog Relevant Requirements: 3.1.3.1 Primary Actor: Student

Pre-conditions:

- User is logged into the system
- Course catalog data is available

Post-conditions:

- Course catalog is displayed to the user

Basic Flow or Main Scenario:

1. User navigates to the course catalog section
2. System retrieves course catalog data
3. System displays list of all available courses
4. User can scroll through the catalog
5. System provides filtering and sorting options

Extensions or Alternate Flows:

- 3a. User applies filters:
    1. User selects filtering criteria (department, course level, etc.)
    2. System updates display with filtered results
- 3b. User uses search function:
    1. User enters search terms
    2. System displays matching courses

Exceptions:

- Course catalog data is unavailable
- System encounters error while filtering/sorting

Related Use Cases:

- Register Course
- Search Courses

8.12 Generate Enrollment Report

Use Case ID: UC-GER-001 Use Case Name: Generate Enrollment Report Relevant Requirements: 3.1.6.1, 3.1.6.2, 3.1.6.3, 3.1.6.5 Primary Actor: Administrator

Pre-conditions:

- Administrator is logged into the system
- Enrollment data is available in the system

Post-conditions:

- Requested report is generated and available for viewing/export

Basic Flow or Main Scenario:

1. Administrator navigates to the reporting section
2. System displays available report types
3. Administrator selects "Enrollment Report"
4. Administrator configures report parameters (term, department, etc.)
5. Administrator selects report format (CSV, plain text)
6. System generates the report
7. System displays report preview
8. Administrator can export or print the report

Extensions or Alternate Flows:

- 4a. Administrator selects historical data:
    1. System retrieves archived enrollment data
    2. Report includes historical trends
- 6a. Report generation takes longer than expected:
    1. System displays progress indicator
    2. Administrator can cancel report generation

Exceptions:

- Required data files are corrupted or unavailable
- System lacks sufficient memory to generate large reports

Related Use Cases:

- View Class Roster
- Generate Waitlist Report

8.13 Search Courses

Use Case ID: UC-SC-001 Use Case Name: Search Courses Relevant Requirements: 3.1.2.3 Primary Actor: Student/Faculty/Administrator

Pre-conditions:

- User is logged into the system

- Course catalog is available

Post-conditions:

- Search results are displayed to the user

Basic Flow or Main Scenario:

1. User navigates to course search function
2. System displays search interface with various criteria options
3. User enters search criteria (course code, name, department)
4. User initiates search
5. System queries course catalog data
6. System displays matching courses
7. User can select a course for more details

Extensions or Alternate Flows:

- 6a. No courses match criteria:
    1. System displays "No results found" message
    2. Suggests broadening search criteria
- 6b. Too many results:
    1. System suggests refining search criteria
    2. Provides option to view all results

Exceptions:

- Search function fails due to data access error
- Invalid search criteria format

Related Use Cases:

- View Course Catalog
- Register Course

8.14 View Waitlist

Use Case ID: UC-VW-001 Use Case Name: Administrator View Waitlist
Relevant Requirements: 3.1.5.4 Primary Actor: Administrator

Pre-conditions:

- Administrator is logged into the system
- At least one course has an active waitlist

Post-conditions:

- Waitlist information is displayed to the administrator

Basic Flow or Main Scenario:

1. Administrator navigates to the waitlist management section
2. System displays a list of courses with active waitlists
3. Administrator selects a specific course
4. System retrieves the waitlist data for the selected course
5. System displays detailed waitlist information including:
    - Student names and IDs
    - Timestamp of waitlist entry
    - Current position in waitlist

Extensions or Alternate Flows:

- 2a. No active waitlists:
    1. System displays message indicating no current waitlists
- 3a. Administrator applies filters:
    1. Administrator selects filtering criteria (e.g., department, course level)
    2. System updates display with filtered results

Exceptions:

- System cannot access waitlist data file
- Waitlist data is corrupted or incomplete

Related Use Cases:

- Generate Waitlist Report
- Modify Course Waitlist

8.15 Generate Waitlist Report

Use Case ID: UC-GWR-001 Use Case Name: Generate Waitlist Report Relevant Requirements: 3.1.6.2, 3.1.6.3 Primary Actor: Administrator

Pre-conditions:

- Administrator is logged into the system
- Waitlist data is available in the system

Post-conditions:

- Waitlist report is generated and available for export

Basic Flow or Main Scenario:

1. Administrator navigates to the reporting section

2. System displays available report types
3. Administrator selects "Waitlist Report"
4. Administrator configures report parameters:
    - Time period
    - Specific courses or departments
    - Include historical waitlist movement
5. Administrator selects output format (CSV, plain text)
6. System generates the report
7. System displays report preview
8. Administrator exports or prints the report

Extensions or Alternate Flows:

- 6a. Large report generation:
    1. System displays progress bar
    2. Administrator can cancel report generation
- 7a. Administrator requests data visualization:
    1. System generates graphs showing waitlist trends
    2. Graphs are included in the exported report

Exceptions:

- Report generation fails due to data access error
- Insufficient system resources for large reports

Related Use Cases:

- View Waitlist
- Generate Enrollment Report

8.16 Modify Course Waitlist

Use Case ID: UC-MCW-001 Use Case Name: Modify Course Waitlist Relevant Requirements: 3.1.5.5 Primary Actor: Administrator

Pre-conditions:

- Administrator is logged into the system
- Course waitlist exists
- Student records are accessible

Post-conditions:

- Course waitlist is updated
- Affected students are notified of changes

Basic Flow or Main Scenario:

1. Administrator navigates to waitlist management section
2. System displays list of courses with waitlists
3. Administrator selects a course
4. System displays current waitlist for the course
5. Administrator chooses to add or remove a student
6. If adding: a. Administrator searches for student by ID or name b. System verifies student eligibility c. Administrator selects position for new entry
7. If removing: a. Administrator selects student from waitlist b. Administrator confirms removal
8. System updates waitlist
9. System generates notifications for affected students

Extensions or Alternate Flows:

- 6b. Student already on waitlist:
    1. System displays warning message
    2. Administrator can cancel or move student
- 7a. Administrator moves student position:
    1. Administrator selects new position
    2. System reorders waitlist accordingly

Exceptions:

- Student record not found
- System fails to update waitlist file

Related Use Cases:

- View Waitlist
- Generate Waitlist Report

8.17 View Personal Waitlist Position

Use Case ID: UC-VWP-001 Use Case Name: View Personal Waitlist Position Relevant Requirements: 3.1.5.2 Primary Actor: Student

Pre-conditions:

- Student is logged into the system
- Student is on at least one course waitlist

Post-conditions:

- Student views their current waitlist positions

Basic Flow or Main Scenario:

1. Student navigates to "My Waitlists" section
2. System retrieves student's waitlist data
3. System displays list of courses where student is waitlisted:
    - Course name and code
    - Current position on waitlist
    - Estimated time/chance of enrollment
    - Option to remove self from waitlist
4. Student can select a specific course for more details
5. System displays detailed waitlist information for selected course

Extensions or Alternate Flows:

- 2a. No active waitlists:
    1. System displays message indicating student is not on any waitlists
    2. Provides link to course registration
- 4a. Student removes self from waitlist:
    1. System prompts for confirmation
    2. Upon confirmation, removes student and updates waitlist

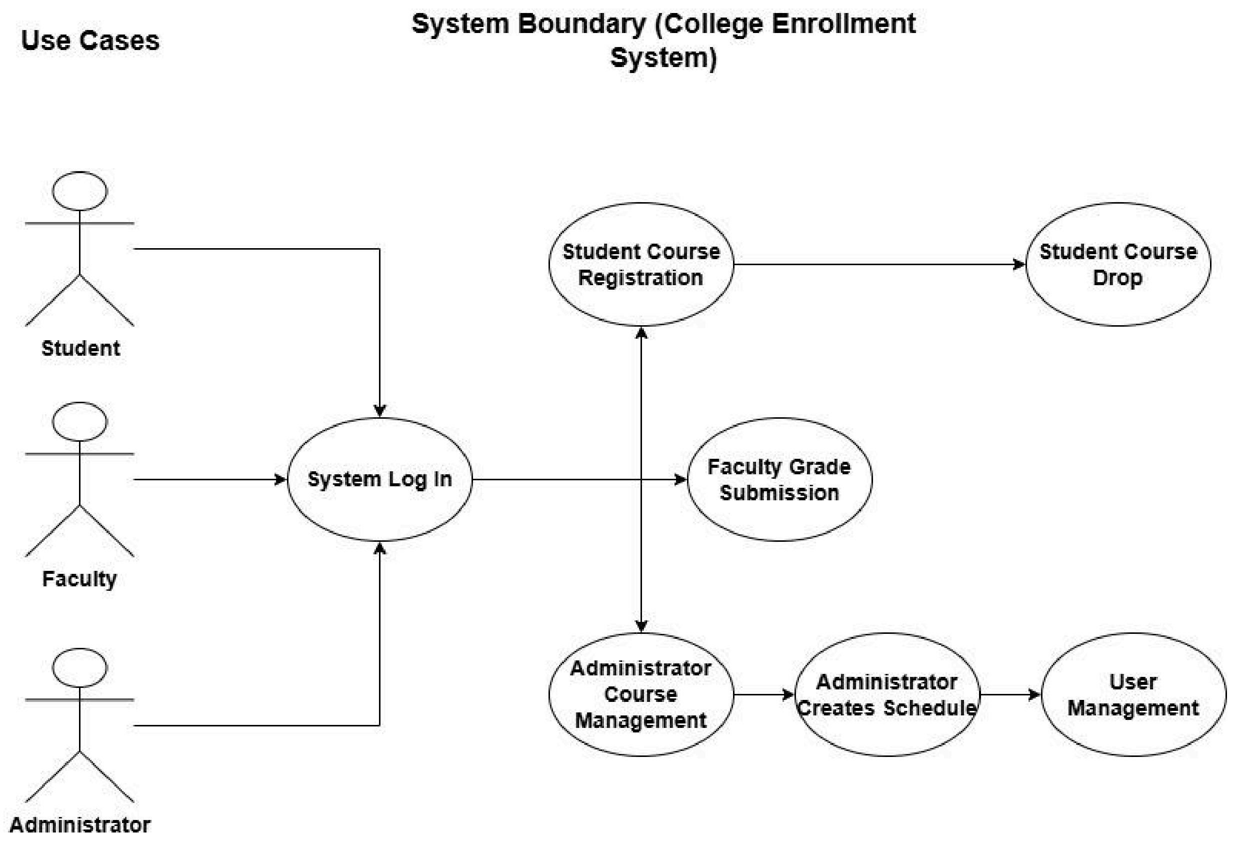
Exceptions:

- System cannot access waitlist data
- Waitlist position calculation error

Related Use Cases:

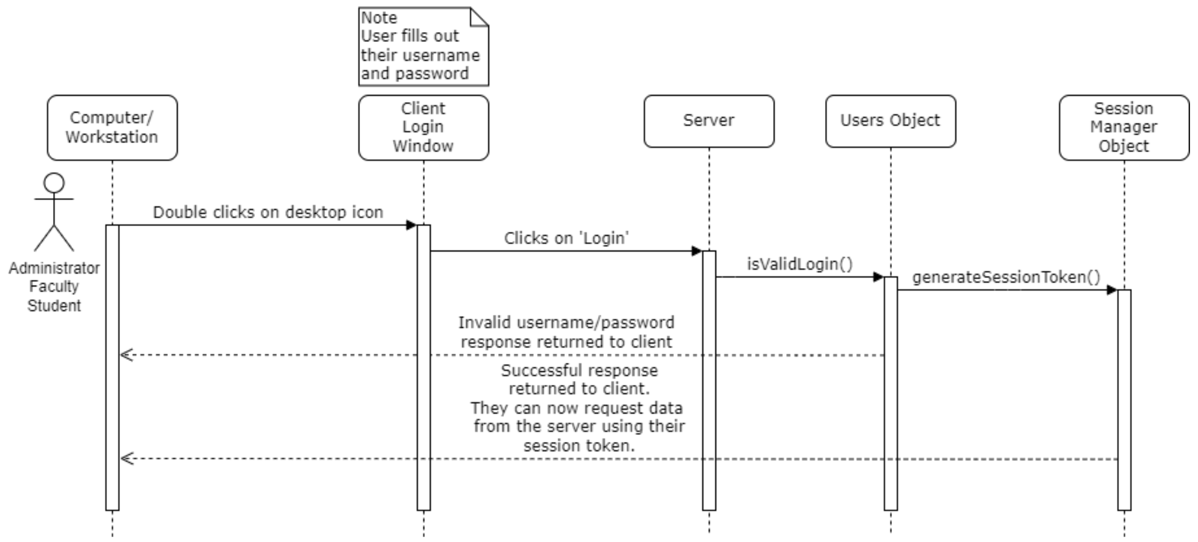
- Register for a Course
- View Course Catalog

8.2 Use Case Diagram

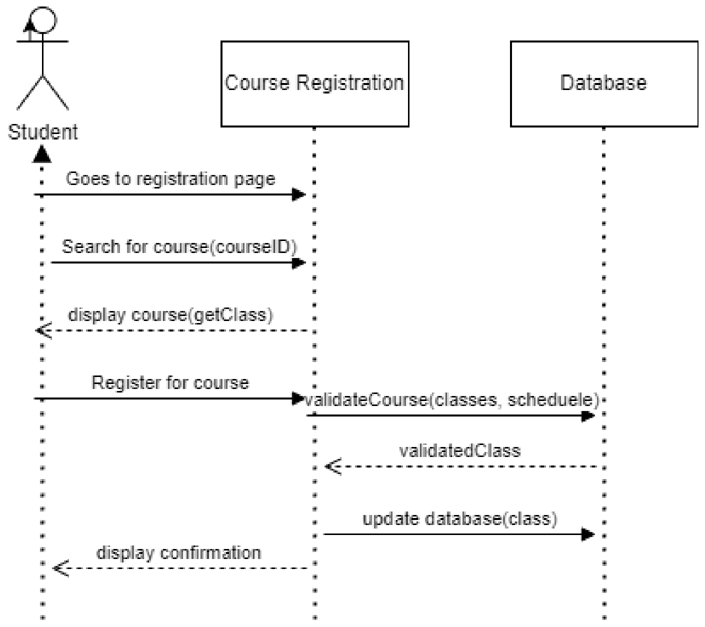

Use Cases
System Boundary (College Enrollment System)
Student
Faculty
Administrator
System Log In
Student Course Registration
Student Course Drop
Faculty Grade Submission
Administrator Course Management
Administrator Creates Schedule
User Management

9. Sequence Diagrams

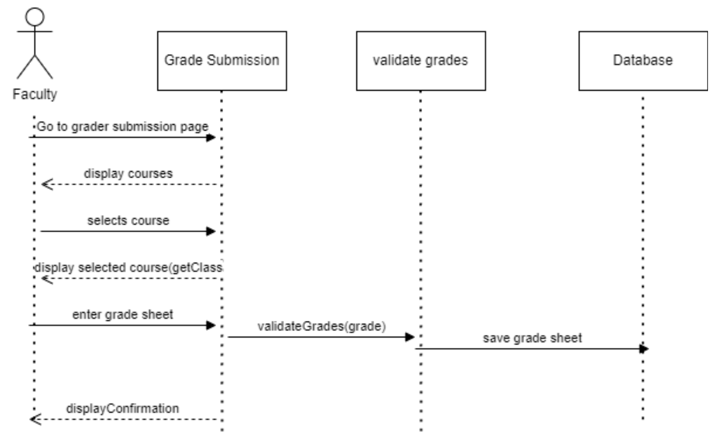
9.1 System Login


Note
User fills out their username and password
Computer/ Workstation
Client Login Window
Server
Users Object
Session Manager Object
Administrator
Faculty
Student
Double clicks on desktop icon
Clicks on 'Login'
isValidLogin()
generateSessionToken()
Invalid username/password response returned to client
Successful response returned to client. They can now request data from the server using their session token.

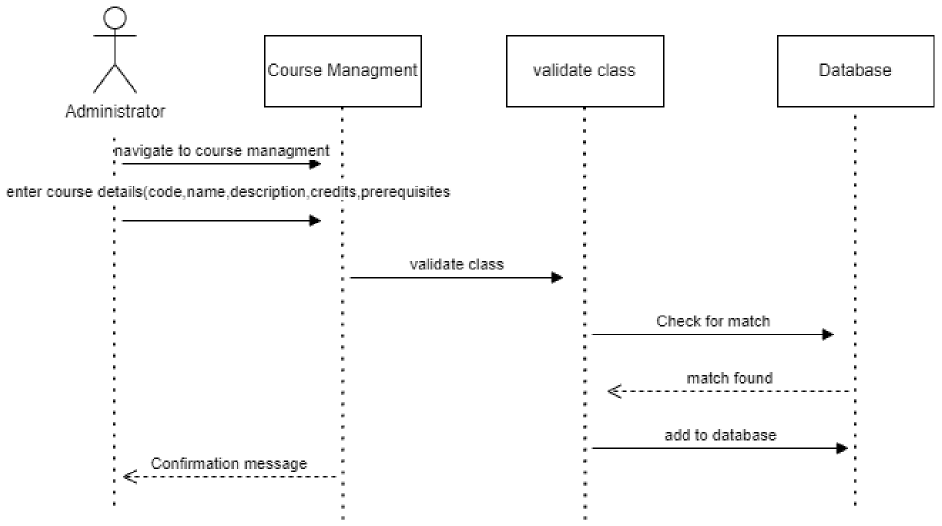
9.2 Student Course Registration



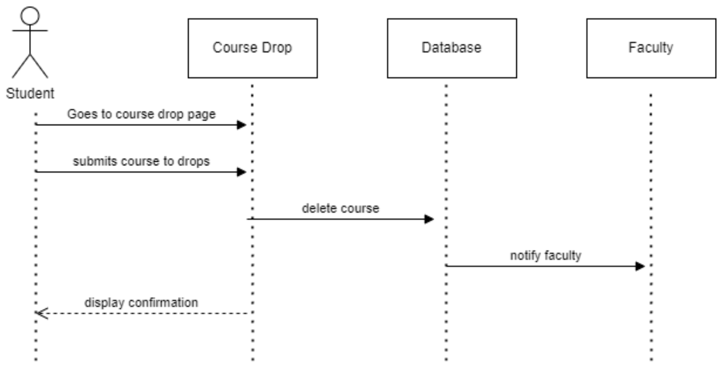
9.3 Faculty Grade Submission



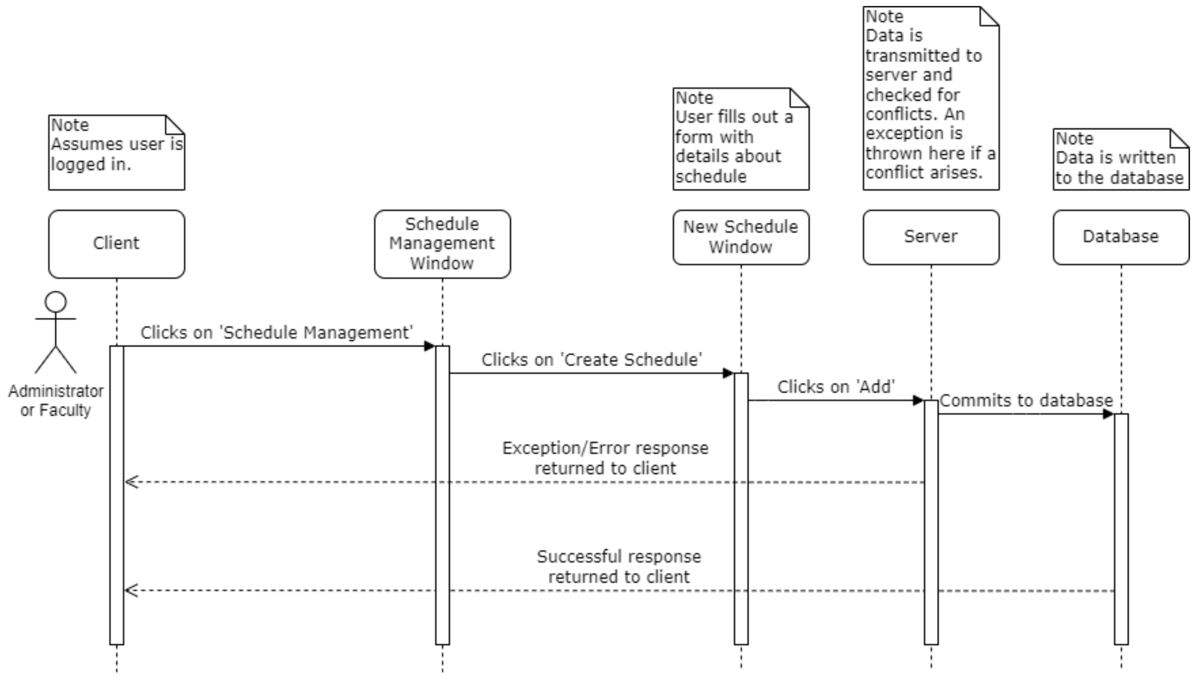
9.4 Administrator Course Management



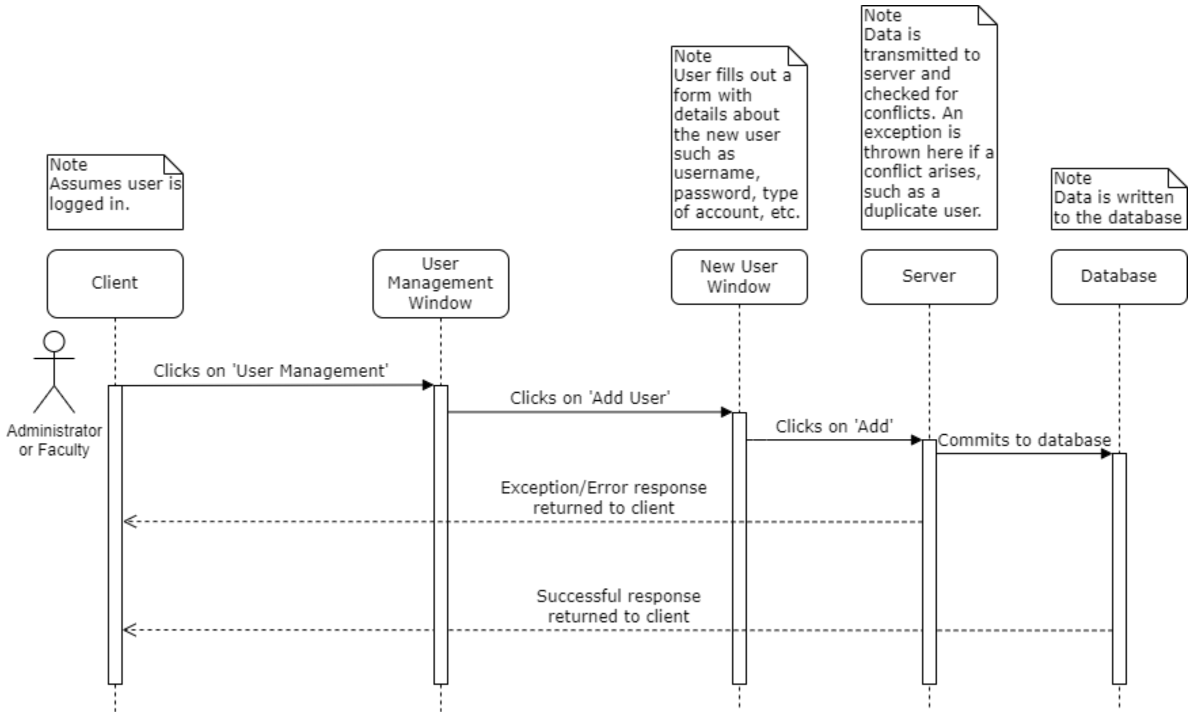
9.5 Student Course Drop



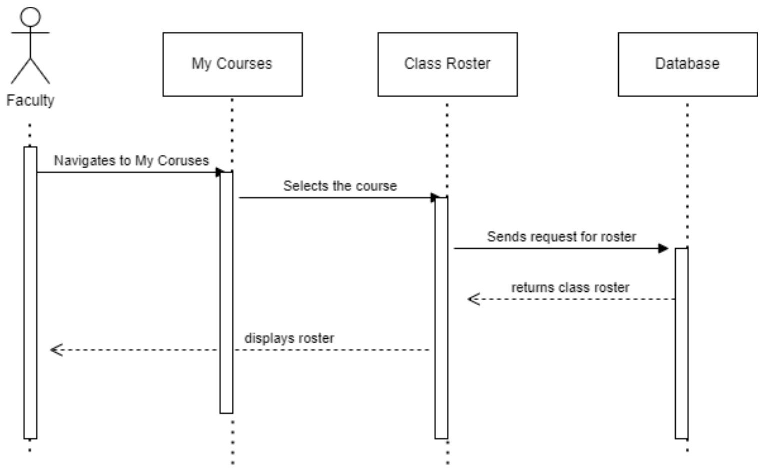
9.6 Administrator Creates Schedule


Note
Assumes user is logged in.
Note
User fills out a form with details about schedule
Note
Data is transmitted to server and checked for conflicts. An exception is thrown here if a conflict arises.
Note
Data is written to the database
Client
Schedule Management Window
New Schedule Window
Server
Database
Administrator or Faculty
Clicks on 'Schedule Management'
Clicks on 'Create Schedule'
Clicks on 'Add'
Commits to database
Exception/Error response returned to client
Successful response returned to client

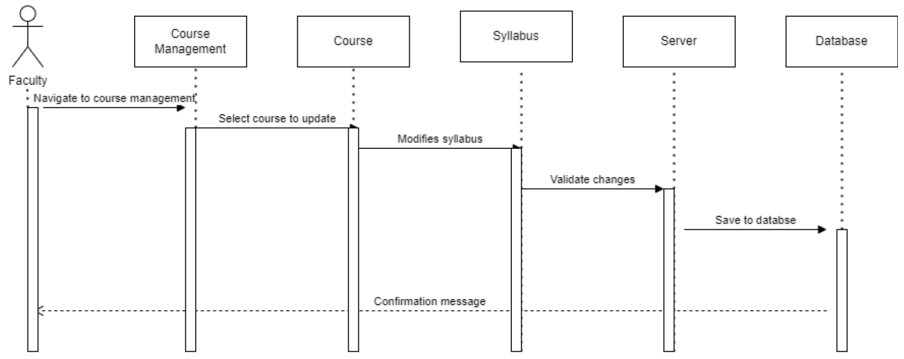
9.7 User Management


Note
Assumes user is logged in.
Note
User fills out a form with details about the new user such as username, password, type of account, etc.
Note
Data is transmitted to server and checked for conflicts. An exception is thrown here if a conflict arises, such as a duplicate user.
Note
Data is written to the database
Client
User Management Window
New User Window
Server
Database
Administrator or Faculty
Clicks on 'User Management'
Clicks on 'Add User'
Clicks on 'Add'
Commits to database
Exception/Error response returned to client
Successful response returned to client

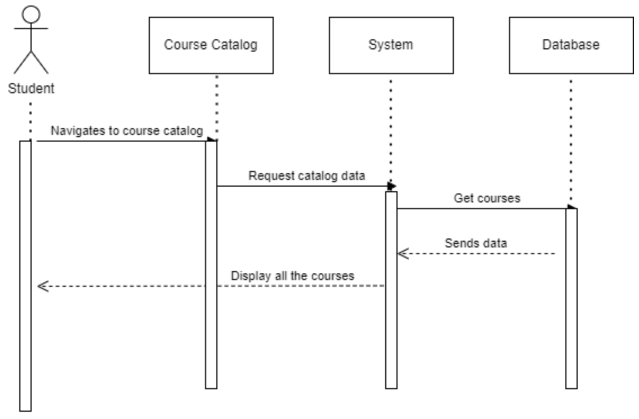
9.8 View Class Roster



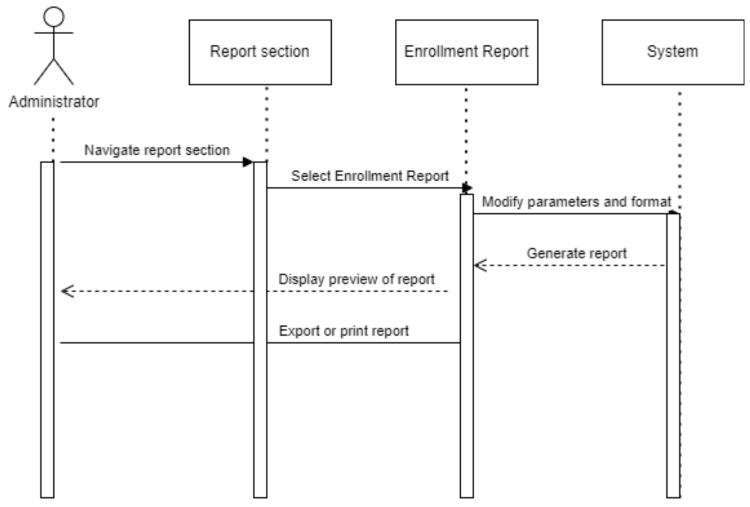
9.9 Update Course Syllabus



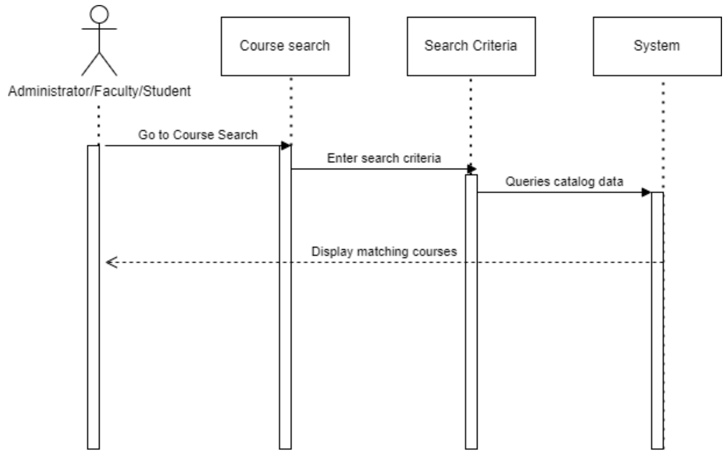
9.10 View Course Catalog



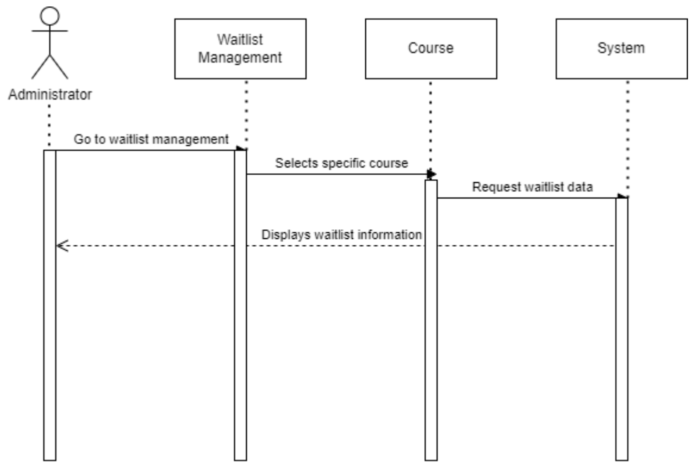
9.11 Generate Enrollment Report



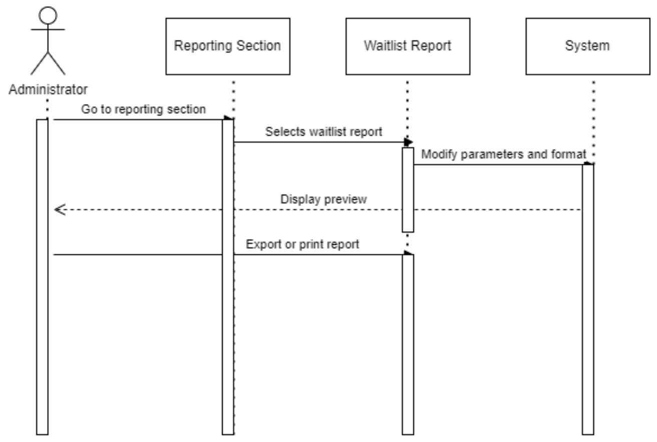
9.12 Search Courses



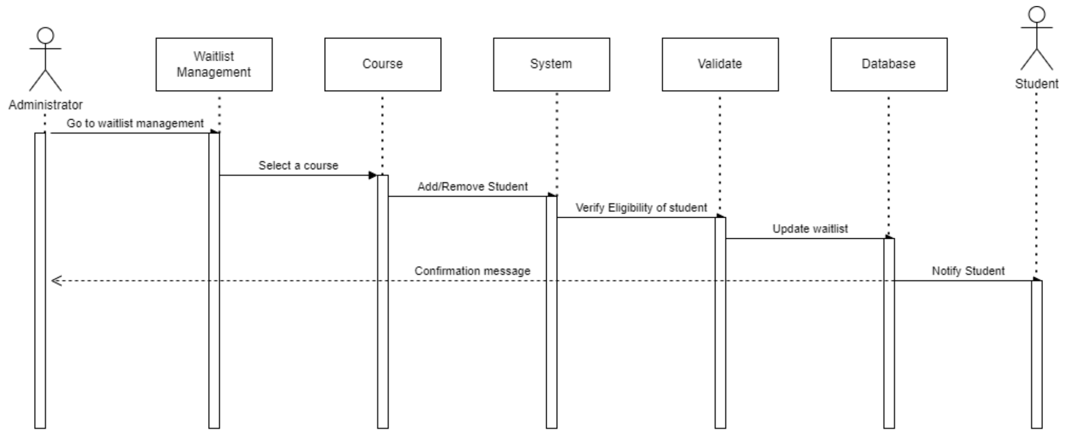
9.13 View Waitlist



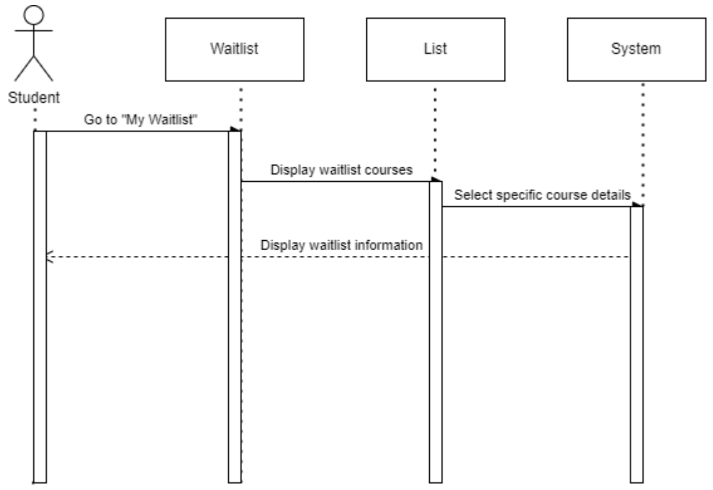
9.14 Generate Waitlist Report



9.15 Modify Course Waitlist



9.16 View Personal Waitlist Position



10. Data Integrity and Security

- **Immediate Persistence**: Data changes are immediately saved to prevent data loss.
- **Encryption**: User passwords will be hashed and salted.
- **Session Management**: Uses SessionManager to track user sessions with expiration times.

11. Concurrency and Synchronization

- **Concurrency**: FileDataManager will use synchronized methods for reading/writing files to prevent data corruption during concurrent access.
- **Multi-threaded Server**: If expanded for network use, the Server class will manage multiple connections using client handlers for each user.

12. Error Handling

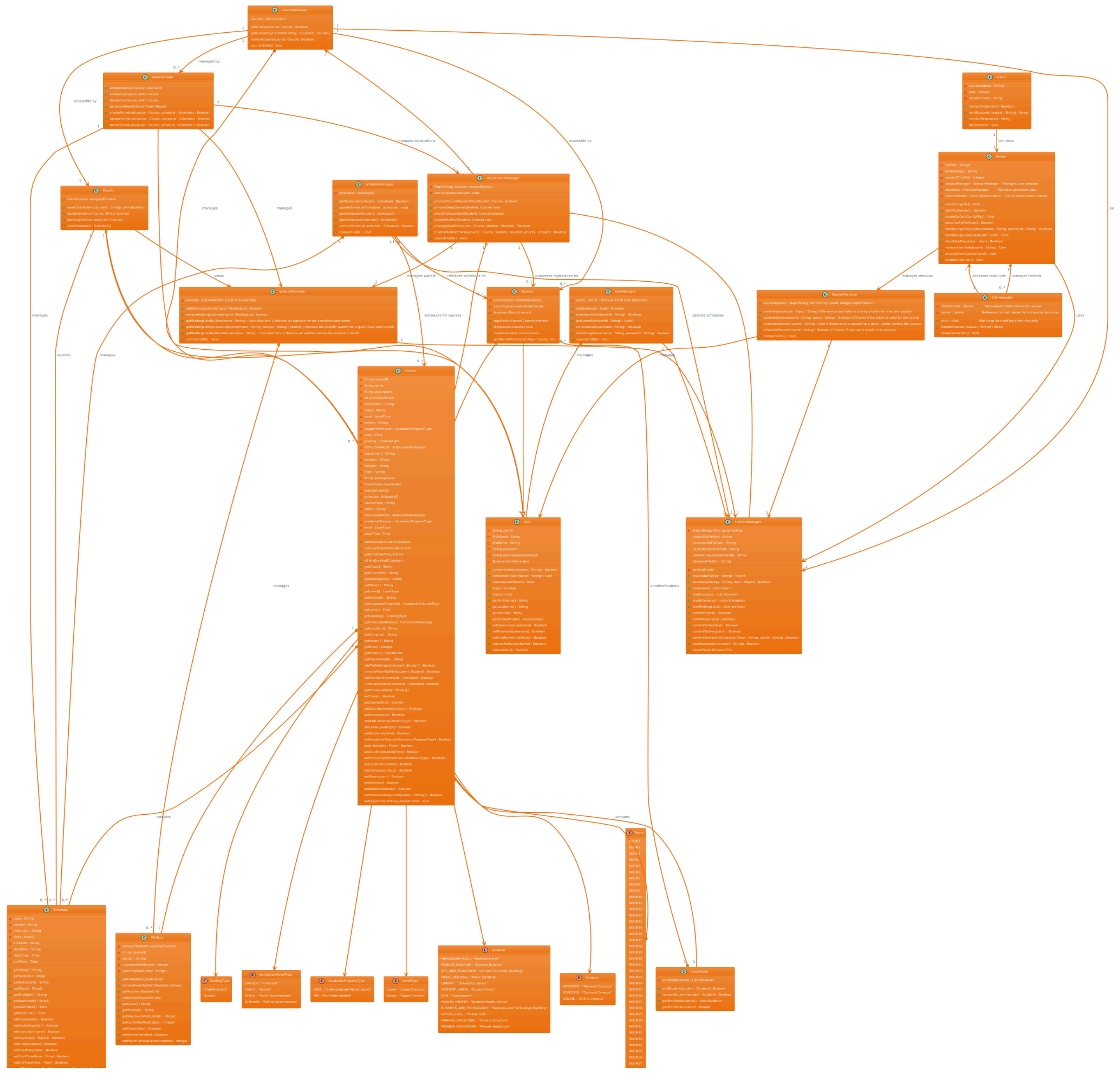
- **File I/O Errors**: Any read/write operations will be enclosed in try-catch blocks, logging errors for system admins.
- **User Feedback**: All errors (e.g., login failures, schedule conflicts) will display user-friendly messages on the GUI.

13. Future Enhancements

- **Network-based Data Storage**: Integration with a central database for remote access.
- **Enhanced Reporting**: Additional reporting features, such as enrollment trends

14. Class UML Diagrams

https://github.com/chenAndrew4/CS401ClassEnrollmentSystem/blob/main/401_UML_00.png


CoursesManager
Administrator
Faculty
ScheduleManager
RegistrationManager
WaitListManager
Student
UserManager
SessionManager
ClientHandler
Client
Server
Course
User
FileDataManager
Schedule
Waitlist
GradingType
InstructionModeType
AcademicProgramType
LevelType
Location
Campus
Room
ClassRoster
managed by
accessible by
manages registrations
manages
views
manages waitlist
retrieves schedules for
processes registration for
schedules for courses
persists schedules
manages sessions
accesses resources
manages threads
connects
teaches
contains
enrolledStudents
uses