

Object Oriented Software Design Group Project RAD Report

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Brief Description of the Project

In this project, we're embarking on the creation of a robust Java-based course registration system for a university department. Our primary focus is to provide a seamless registration process for both students and advisors, with the potential for future expansion to accommodate roles like department heads or administrators.

We're developing a variety of classes, including Course, Student, Advisor, and more. These classes are not mere data containers; they come equipped with meaningful methods to enforce the department's business logic. We'll use inheritance and encapsulation to improve code flexibility, with clear aggregation relationships between classes to define how they interact.

Additionally, the clean separation of domain logic from the user interface is another key aspect of our design, with a dedicated controller class ensuring a clear boundary between the two.

In essence, this project is all about building an adaptable and secure course registration system that adheres to the department's rules, incorporates object-oriented principles to make the code maintainable and efficient, and ensures smooth academic record management for both students and advisors. It's a comprehensive solution that addresses the core needs of the department and sets the stage for potential future enhancements.

Project will include enabling students to access their course schedules after registration, restricting the selection of conflicting courses, allowing students eligible for the final project to choose it, and providing advisors with the capability to view students' course schedules.

The project must be implemented in Python programming language

Glossary

- **Student:** A registered student in the department.
- **Advisor:** Academic advisors helping students choose their courses.
- **Course:** An instructional module provided by the department.
- **Course Section:** Particular example of a semester-long course offered.
- **Grade:** A student's academic assessment for a particular course.
- **Registration:** The course enrollment process.
- **Transcript:** A student's academic performance record.
- **Username and Password:** Use data to verify users' identities within the system.

To access the system, users and students enter their passwords and usernames.

- **Login:** The entrance system to Access the functions.

• **GPA (Grade Point Average):** The numerical representation of a student's academic performance.

- **Prerequisite:** This refers to a course and condition of another course that must be completed.

- **Final Project:** A comprehensive, culminating assignment or research endeavor undertaken by students nearing the end of their academic program.

- **NTE:** Non-technical Elective, represents the university's elective courses for all faculties.

• **FTE:** Faculty-technical Elective, represents the university's elective courses for the faculty that you in.

TE: Technical Elective, represents the technical elective courses about your department.

- **Request Course:** The courses a student want to take and sent to his advisor.
- **Enroll Course:** The courses student's advisor approved.
- **Project Assistant:** Lecturer that is responsible for the project of the 4th grade students.
- **Course Conflict:** This course conflict is about when a student tries to take two courses at the same time.
- **Credit:** Represents the importance of a course due to GPA.

Functional and Non-Functional Requirements

Functional Requirements

1. User Login

- The system should allow users to log in with assigned usernames and passwords.
- **Priority:** High
- **Criticality:** Very Critical
- **Risks:** User authentication errors, password security breaches.
- **Reduce risks:** Strong password policies.

2. User Roles

- The system should define different user types (e.g., students and advisors) and manage them with role-based authorizations within the system.
- **Priority:** High
- **Criticality:** High
- **Risks:** Incorrect assignment of user roles or faulty authorizations
- **Reduce risks:** Minimizing errors by establishing well-defined user roles and authorizations.

3. Course Registration

- The system should conduct the course registration process in compliance with the department's rules.
- **Priority:** High
- **Criticality:** High
- **Risks:** Violation of course registration rules
- **Reduce risks:** Designing and verifying the registration process in accordance with department policies.

4. Viewing and Registering for Courses

- Users should be able to view courses and register for them.
- **Priority:** High
- **Criticality:** Medium
- **Risks:** Users registering for the wrong courses or being inadequately informed.
- **Reduce risks:** Minimizing errors by using a user-friendly interface and authentication processes.

5. Course Conflicts

- The system should identify and manage course conflicts, ensuring that students do not register for courses with overlapping schedules.
- **Priority:** High
- **Criticality:** Medium
- **Risks:** Students registering for conflicting courses, leading to scheduling issues.
- **Reduce risks:** Implement a course conflict detection mechanism during the registration process. Provide clear notifications and guidance to users when conflicts are identified. Additionally, offer alternative course suggestions to affected students to mitigate scheduling challenges.

6. Viewing Student Transcripts by Advisors

- Advisors should have the ability to view the academic transcripts of the students they advise.
- **Priority:** High
- **Criticality:** Medium
- **Risks:** Lack of oversight on the academic progress of advised students.
- **Reduce risks:** Develop a feature that allows advisors to easily access and review the academic transcripts, including course history, grades, and overall academic performance. Ensure a user-friendly interface for efficient information retrieval. Implement role-based access controls to restrict unauthorized access to student transcripts, enhancing data security and privacy.

Non-Functional Requirements

1. Performance:

- The performance of the application is crucial, especially to ensure that users can perform operations in the system swiftly. Metrics such as response times, processing speeds, and startup times can be used to measure performance. Techniques like code optimization and database optimization can enhance performance.

2. Portability:

- The application should function seamlessly on different platforms, such as Windows, Linux, macOS. This entails writing platform-independent code, using appropriate tools and frameworks, and avoiding platform-specific code.

3. Availability:

- The availability of the application should be ensured with uninterrupted operation and minimal downtime. Downtime should be maintained at an acceptable level, and backup systems for failovers within a specific time frame may be implemented.

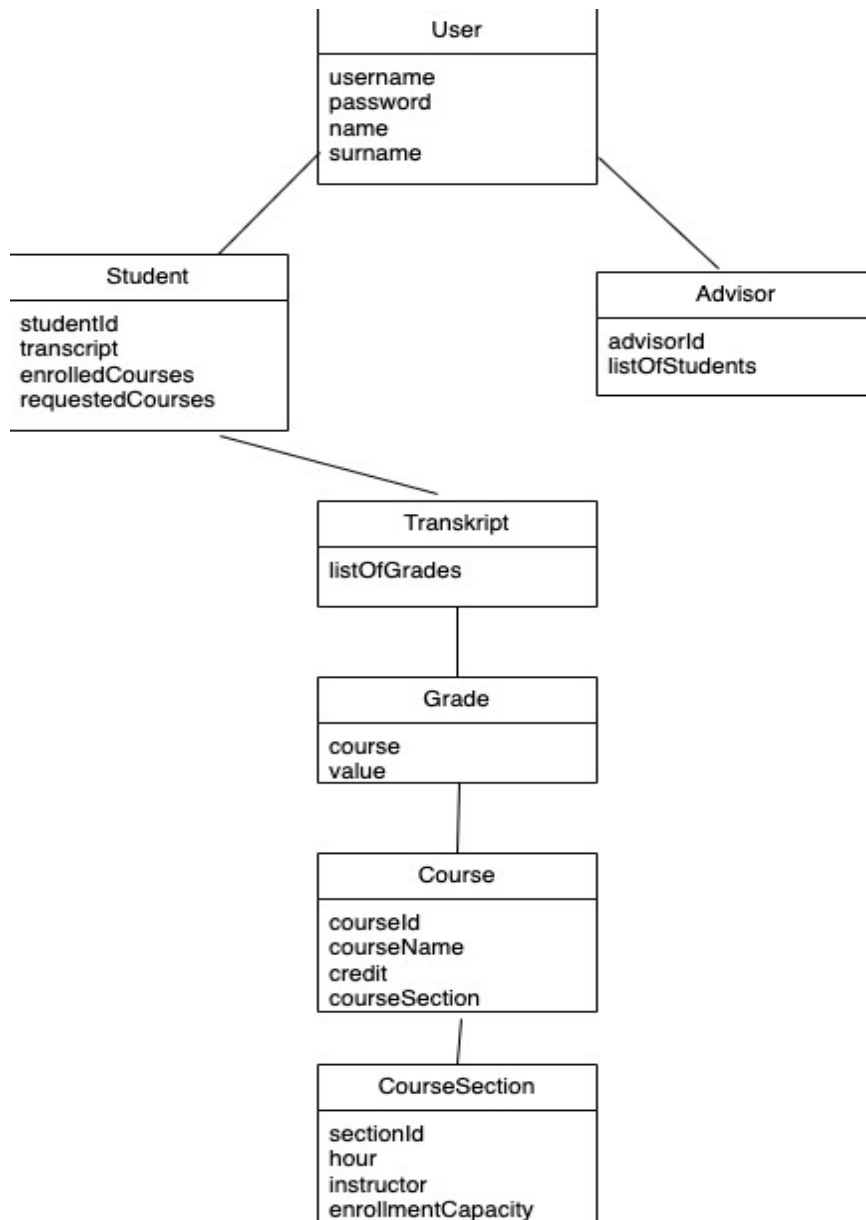
4. Security:

- The application must be protected against unauthorized access and breaches.

5. Maintainability:

- Your code should be sustainable in the long term. Adhere to object-oriented programming (OOP) principles to make your code modular and comprehensible. This enables you to easily expand and reuse your code.

Domain Model



Use Cases

Use Case 1: User Authentication

Use Case Name: User Authentication

Purpose: To allow users to log into the system.

Actors:

- User (Student, Advisor,) **Preconditions:**
- The user must have a valid username and password assigned.

Main Flow:

1. User requests access to the system.
2. The system prompts the user for their username and password.
3. User enters the correct username and password.
4. The system validates the entered username and password.
5. If authentication is successful, the user logs into the system.

Alternative Flows:

- *Step 4:* If the entered username or password is incorrect, the system notifies the user of the incorrect login information and prompts the user to enter the correct details.

Use Case 2: Course Registration

Use Case Name: Course Registration

Purpose: To enable students to register for courses.

Actors:

- Student (Student)
- **Preconditions:**
 - The user must have successfully logged into the system.
 - The user must have a valid student ID.
 - Courses must have available and empty slots.

Main Flow:

1. User requests course registration.
2. The system displays a list of available courses and their vacancies.
3. User selects the desired course to enroll in.
4. The system checks the vacancy status of the selected course.
5. If there are available slots, the system registers the user for the course and updates the vacancy.
6. The system notifies the user of the successful registration.

Alternative Flows:

- *Step 5:* If the course is full, the system informs the user about the full capacity and allows them to choose another course.

Use Case 3: Transcript Display

Use Case Name: Transcript Display

Purpose: To allow students to view their transcripts.

Actors:

- Student (Student) **Preconditions:**

- The user must have successfully logged into the system.

- The user must have a valid student ID.

- The transcript file belonging to the student (e.g., "150119055.json") must be readable.

Main Flow:

1. The system reads the student's transcript file.
2. The user views the existing course and grade information.
3. The system provides options for the user to add or modify course information if needed.
4. The system displays the updated transcript information to the user.

Alternative Flows:

- *Step 3:* The user can add or modify course information as needed. The system can offer verification after each update. If the user declines verification, the system preserves the previous transcript information, canceling the operation.

Use Case 4: Advisor Approval of Course Selection

Use Case Name: Advisor Approval of Course Selection

Purpose: To enable advisors to review and approve/deny students' requested course selections.

Actors:

- User (Student, Advisor,) **Preconditions:**

- The student must have successfully logged into the system.

- The student must have completed the course registration process.

- The advisor must have successfully logged into the system.

Main Flow:

1. The system notifies the advisor that there are pending course selection requests from students.

2. The advisor reviews the list of course selection requests.
3. The advisor selects a student's request to view detailed information about the courses selected.
4. The advisor evaluates the selected courses and decides whether to approve or deny the student's course selection.
5. If approved, the system updates the student's course registration status, and the student is notified of the approval.
6. If denied, the system notifies the student of the denial and may provide reasons for the decision.

Alternative Flows:

- Step 4: If the advisor needs more information, they can request additional details from the student before making a decision.
- Step 5: If denied, the advisor may provide comments or suggestions to guide the student in making appropriate course selections.

Use Case 5: Advisor Monitoring of Student Progress

Use Case Name: Advisor Monitoring of Student Progress

Purpose: To allow advisors to monitor the academic progress of their assigned students.

Actors:

- User (Student, Advisor) **Preconditions:**
 - The advisor must have successfully logged into the system.

Main Flow:

1. The advisor selects the option to view the list of assigned students.
2. The system displays a list of students assigned to the advisor.
3. The advisor selects a specific student to view their academic information.
4. The system presents the academic history, including completed courses, current courses, and grades for the selected student.
5. The advisor may provide feedback or guidance based on the student's academic performance.

Alternative Flows:

- Step 3: The advisor can choose to filter students based on specific criteria, such as those at risk of academic probation or those excelling in their studies.
- Step 5: The advisor can schedule a meeting with the student to discuss academic performance and set goals for improvement if necessary.

Use Case 6: Request Final Project

Use Case Name: Request Final Project

- **Purpose:** To enable a qualified student to request a final project for graduation.
- **Actors:** Student
- **Preconditions:** The student must be logged into the system, have completed the required credits, and reached the eligible semester.

Main Flow:

- The student requests to initiate the final project request process.
- The system checks if the student meets the eligibility criteria (minimum credits, semester).
- If eligible, the system presents the student with a list of available project assistants.
- The student selects a project assistant from the list.
- The system updates the student's final project status and assigns the selected project assistant.

Alternative Flow:

- *Step 2a:* If the student does not meet the eligibility criteria, the system informs the student that they are not eligible for the final project.

Use Case 7: Course Registration Management

Use Case Name: Course Registration Management

- **Purpose:** To enable the student to manage the course registration process.
- **Actors:** Student
- **Preconditions:** The student must have logged into the system.

Main Flow:

1. The student requests access to the course registration screen.
2. The system displays the current list of courses to the student.
3. The student selects the courses they want to register for.

4. The system checks if the selected courses have any schedule conflicts.
5. If there is a conflict, the system notifies the student of the conflicting courses and asks them to choose one.
6. The student selects one course from the conflicting courses.
7. The system submits the selected course for approval to the advisor.

Alternative Flows:

- Step 3: If the student does not select any courses, the system continues to display suitable courses.
- Step 5: If there is no conflict, the system directly submits the course registration to the advisor.

Alternative Flow 1: Conflicting Course Warning:

- Step 4a: If conflicting courses are found, the system notifies the student of the conflicting courses and asks them to choose one.
- Step 4b: The student selects one course from the conflicting courses.

Alternative Flow 2: Repeat Course Registration:

- Step 7a: If the student has selected a conflicting course, the system offers the option to the student to repeat the course registration.
- Step 7b: The student requests to repeat the course registration.
- Step 7c: The system displays the current list of courses to the student.
- Step 7d: The student selects the courses they want to register for.
- Step 7e: The system checks if the selected courses have any schedule conflicts.
- Step 7f: If there is a conflict, the system notifies the student of the conflicting courses and asks them to choose one.
- Step 7g: The student selects one course from the conflicting courses.
- Step 7h: The system submits the selected course for approval to the advisor.

Use Case 8: View Course Schedule Use

Case Name: View Course Schedule

Purpose:

- To allow a student to view their enrolled course schedule.

Actors:

- Student

Preconditions:

- The student must be logged into the system and have enrolled in courses.

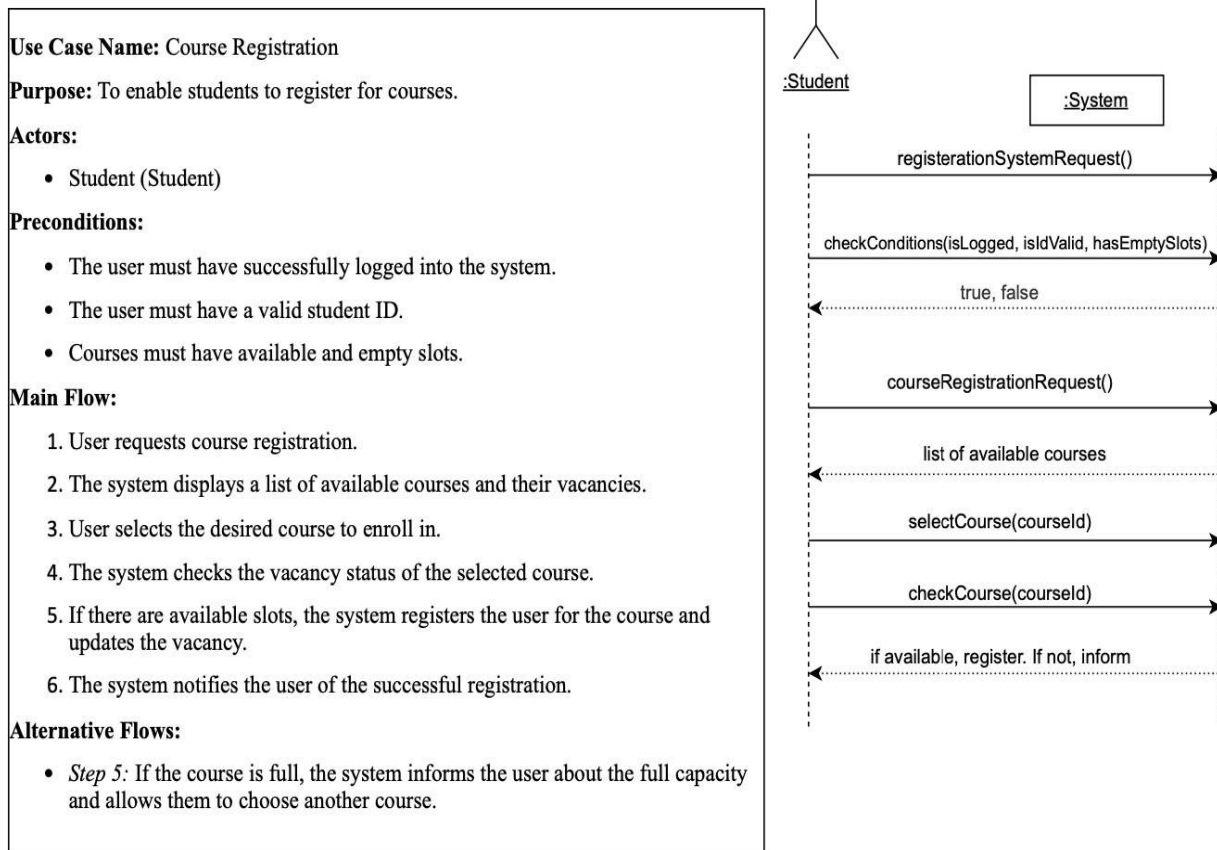
Main Flow:

1. The student requests to view their course schedule.
2. The system retrieves and displays the student's enrolled courses with details such as course ID, course name, instructor, day, and time.

Alternative Flow:

- Step 2a: If the student is not enrolled in any courses, the system informs the student that there is no course schedule available.

System Sequence Diagram (SSD)



Use Case 6: Request Final Project

Use Case Name: Request Final Project

- **Purpose:** To enable a qualified student to request a final project for graduation.
- **Actors:** Student
- **Preconditions:** The student must be logged into the system, have completed the required credits, and reached the eligible semester.

Main Flow:

1. The student requests to initiate the final project request process.
2. The system checks if the student meets the eligibility criteria (minimum credits, semester).
3. If eligible, the system presents the student with a list of available project assistants.
4. The student selects a project assistant from the list.
5. The system updates the student's final project status and assigns the selected project assistant.

Alternative Flow:

- *Step 2a:* If the student does not meet the eligibility criteria, the system informs the student that they are not eligible for the final project.

