



College Management System

Final Report

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INTRODUCTION

1.1 MOTIVATION :

Since the start of the civilization and education is essential.

In general, they are all closely related to a person's life goals and future well-being. Some of the other most common reasons why education is so important are as follows:

Education allows people to improve their communication skills by teaching them how to read, write, speak, and listen.

Education fosters critical thinking skills.

This is essential for teaching someone how to use logic when making decisions and interacting with others.

Education helps people meet basic job requirements and increases their chances of getting better jobs.

Education promotes gender equality and aids in the empowerment of girls and women. So, the education would be strengthened by the addition of some new methods.

Educational software has been used for a long time as an instructional aid all over the world, and several positive effects have been achieved in the learning process through its use.

Technology development leads us into a situation when students can use always available educational software in classrooms, instead of textbooks. educational software retains its previous purpose; however, current advancement conditions for appropriate educational software to become an integral part of classroom learning. The online methods help a lot whenever many reasons could happen, such as: Weather disasters, health issues, and it also saves our time and keeps us out of crowds.

1.2 Problem Statement :

College management is the collaborative effort of a group of people and resources to plan, organise, strategize, and implement structures to run an educational system.

Enrolment, admissions, students, faculty, attendance, scheduling, grades, and the institution are all managed by the college management system.

The college management system is intended to automate all processes. It automatically generates reports on all elements for data-driven decision-making.

In general, a college information management system assists educational institutions by automating routine administrative tasks. It's known as a "college management system".

The issues that should be addressed are reducing manual registration and avoiding crowding with advisors. To keep all the students' data online to make it easier to check for what subjects they have passed in, the total credit hours for each student after completing every semester, the GPA for each semester, and the CGPA.

1.3 Goals of the Project :

The main idea is to apply a proper process to the system to make it easier for students, admins, and professors.

Our project involves: Creating an account or logging in if you already have an account. Creating a student semester page which contains subjects with their credit hours, residual credit hours, GPA of every semester he completed and the CGPA. Registering for subjects that are available in the current semester after checking the prerequisites and the subject list.

All these activities are added, removed, or updated by the administrator.

1.4 Currently available solutions :

We got some of the applications for college management systems and this is a list of some applications available in world.

1. AASTMT Student Portal
2. PHAROS
3. SSP

1. AASTMT Student Portal

This application gives the student the ability to view all of his/her grades, schedules, courses details and New Student Identity which helps the students in all their college needs without the need of interference of the college officials.

Receive notifications when results appear ,registration confirmed or cancelled and from your DR's and TA's and for withdrawal warnings

2. STUDENT PHAROS PRINT APP

The Pharos Print app allows registered credit students to submit documents from an Android device to the Harper College open labs or library.

3. SSP

Created by clinical and cultural experts, the My SSP app helps international and domestic students succeed by providing access to Morneau Shepell's Student Support Program (SSP). Students can access the program anytime, anywhere 24/7, to connect with a Student Support Advisor who speaks their language, understands their culture, and can work with them to succeed while studying abroad or at home.

1.5 Features Matrix :

Features	College management system	AAST	Pharos	SSP
Register	✓	✗	✗	✗
Login	✓	✓	✓	✓
Academic registration	✓	✓	✓	✓
Timetables	✓	✓	✓	✓
Available courses	✓	✓	✓	✓
Section availability	✓	✓	✓	✗
Basic data	✓	✓	✓	✓
Department	✓	✓	✓	✓
Period (Semester)	✓	✓	✓	✓
Total achievements	✓	✓	✓	✓

GPA	✓	✓	✓	✓
Half load, Overload	✓	✗	✗	✗
Registered sections	✓	✓	✓	✗
Attendance	✓	✗	✓	✓
Admin control	✓	✓	✓	✓

1.6 Software development methodology : The term “Software Development

Methodology” refers to planning and controlling the process of developing a software system. Since nowadays most of the software system may fail to meet the customer’s needs in a specific period, depending on a Software Development Methodology increases the rate of processing software systems. It helps the customer notified by the latest updates of the system and make sure it matches his/her needs or not and provides better estimates as well. On the other hand, it organizes tasks for the software teams to be understandable and finished quickly and efficiently. Therefore, it is Fig 1. Feature matrix 9 essential to use a Software Development Methodology for the sake of our project to gain the best improvements in each task. When the idea of the project came to our team leader, the number of our group member was seven. Everyone in the group is passionate about one of the fields that might be beneficial to our software application. However, our team needed a Software Development Methodology to plan the whole flow of the system. Therefore, our team decided to use Scrum Agile Methodology. Scrum is considered one of the types of Agile Methodology that aims to organize software developers as a team to achieve a certain goal. The goal of Scrum is to perform at a high-performing level of software systems. Scrum’s idea is simple, the process starts with a wish list of requirements or features, and this list is called “product backlog”. Scrum depends on an agile software development concept called “Sprints”. Sprints are short, time boxed period when a scrum team works together to complete a certain amount of work.

A single sprint usually lasts from one week to one month to complete from the product backlog.

By the end of each sprint, there is a sprint review to see how far the productivity of a certain sprint improves and meets the desires and the requirements of the customer, and the team starts a new sprint. The team decided to use Scrum Agile Methodology because it matches what our team is looking for. At first, the requirements were changeable and unstable. Therefore, the idea of sprints helped us in progress. In addition, the number of team required for Scrum is from four to nine members which matches our team perfectly. Our team needed to pass through all software life cycle in each sprint and a fast-developed output, and any sequential software methodology would be a wrong choice and it wouldn’t help our team to develop the system in a certain time. Therefore, Scrum’s sprints were

clear to make our tasks more organized and performed faster. On the other hand, we seek to improve the quality of the system, and Scrum would help our team to develop our system efficiently.



At that moment, our team began to use Scrum to be our main Software Development Methodology.

Since our team is still improving in certain fields and taking advanced courses, the sprints include certain tasks to each member in the team to finish certain number of advanced courses. By the end of each sprint, there was a meeting to ensure that everything concerning the sprint is finished to begin another sprint with a different goal.

During completing sprints, there was a weekly meeting done by the team leader to answer certain questions about the progress of the sprints in the previous days. During the implementation, the sprints will include taking specific features from the product backlog and each member in the team will begin to develop and implement the sprint in a certain period.

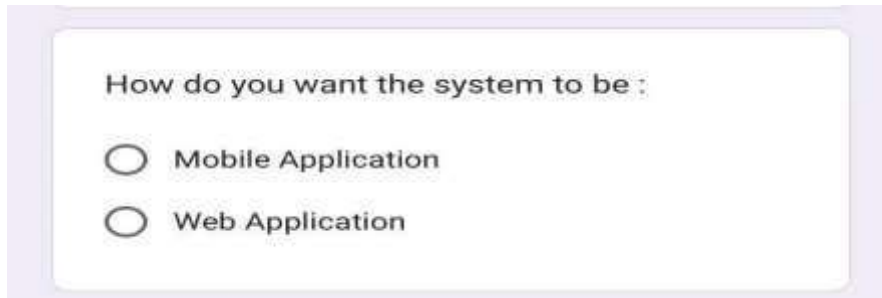
REQUIREMENTS ANALYSIS

2.1 Surveys, Questionnaires, Interviews, etc. :

A student registration system depends on the main stakeholders who are the users, since we are doing the system to facilitate their experience with college, making an online survey is essential for gathering data and collecting requirements from the user to reach customer satisfaction and it's the easiest way to reach out to everyone. furthermore, making a survey is useful in sorting requirements according to customer's needs.

Questions:

1)



How do you want the system to be :

☐ Mobile Application

☐ Web Application

2)

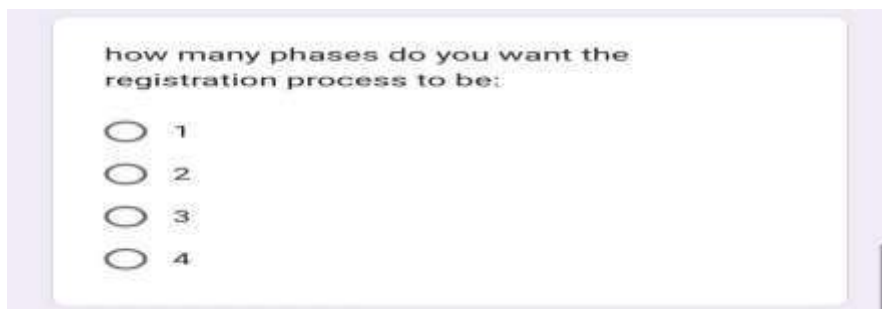


Do you want to see a description for each course :

☐ yes

☐ No

3)



how many phases do you want the registration process to be:

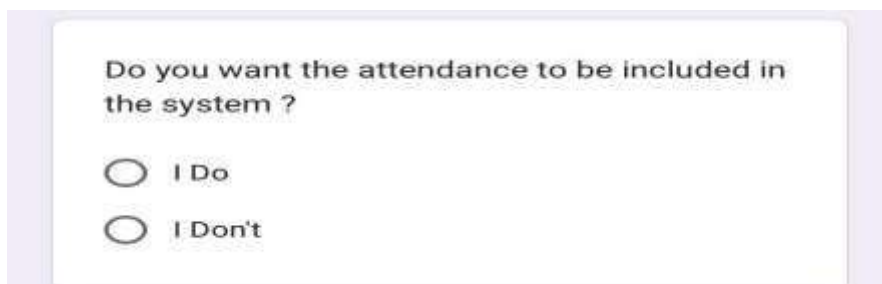
☐ 1

☐ 2

☐ 3

☐ 4

4)



Do you want the attendance to be included in the system ?

☐ I Do

☐ I Don't

5)

Do you even want a system or do you prefer the traditional way ?

- ☐ I want a system
- ☐ I prefer the traditional way

6)

Do you want to see the prerequisites of each course ?

- ☐ I want to see
- ☐ No that's alot

7)

Do you want to see the space availability when registering sections :

- ☐ I want
- ☐ I Don't

8)

If you want to register in a section that is full ,
Do you want to be added to a waiting list ?

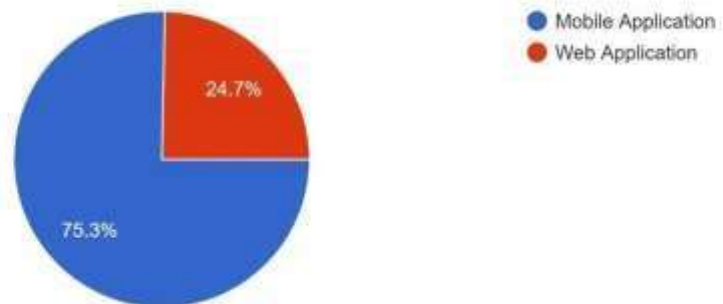
☐ I want

☐ I don't

2.2 results represented as pie charts :

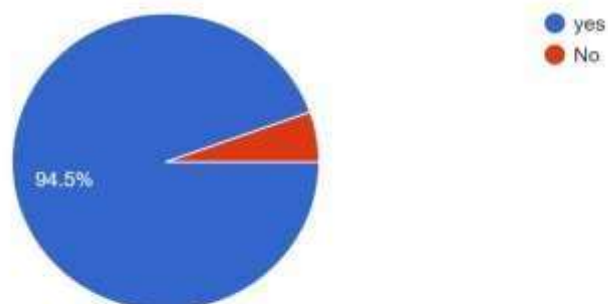
1.

How do you want the system to be :
73 responses



2.

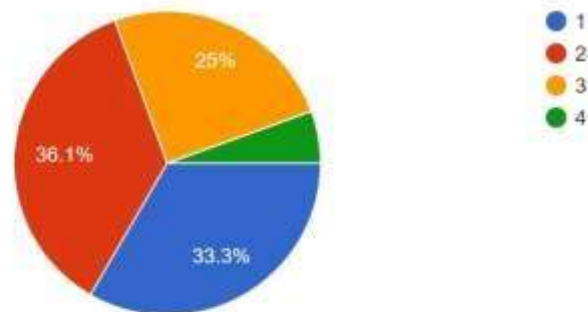
Do you want to see a description for each course :
73 responses



3.

how many phases do you want the registration process to be:

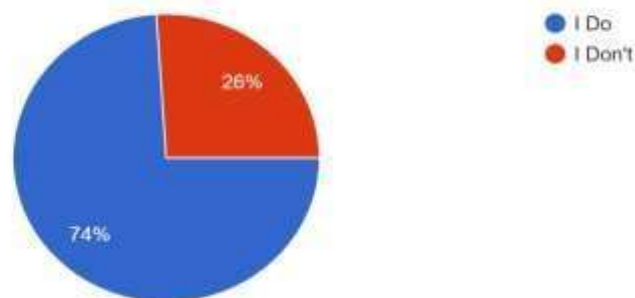
72 responses



4.

Do you want the attendance to be included in the system ?

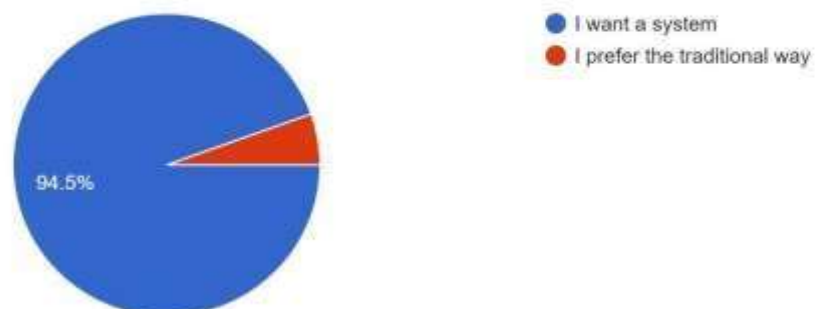
73 responses



5.

Do you even want a system or do you prefer the traditional way ?

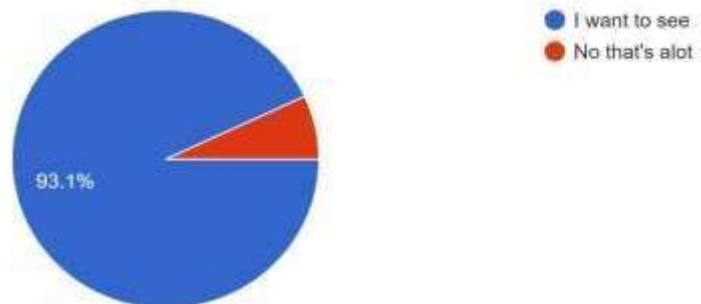
73 responses



6.

Do you want to see the prerequisites of each course ?

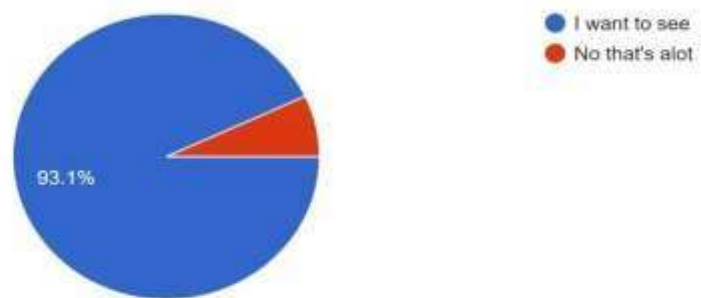
72 responses



7.

Do you want to see the prerequisites of each course ?

72 responses



8.

Do you want to see the space availability when registering sections :

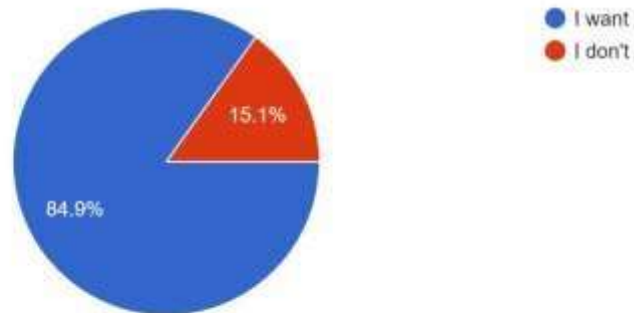
73 responses



10.

If you want to register in a section that is full , Do you want to be added to a waiting list ?

73 responses



2.3discussion of results :

1)

Our operating system will run on mobile devices to insure immediacy and more accessibility

How do you want the system to be :

☐ Mobile Application

☐ Web Application

75% chose (mobile app)

2)

Our mobile application will allow its user to view a detailed description for each course available

Do you want to see a description for each course :

☐ yes

☐ No

94% chose (yes)

3)

The registration process will be separated into two phases



how many phases do you want the registration process to be:

☐ 1

☐ 2

☐ 3

☐ 4

33% chose (1)

36% chose (2)

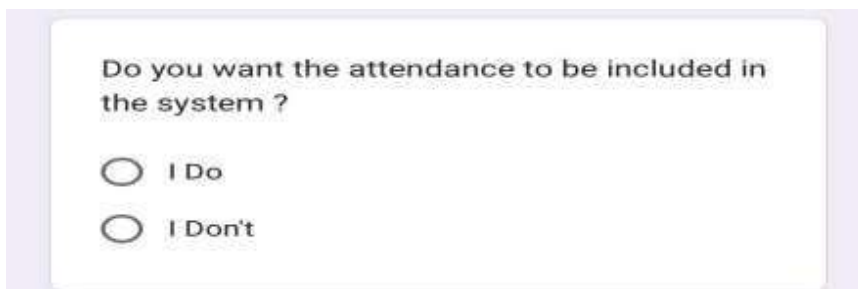
25% chose (3)

6% chose (4)

Based on choices The registration process will be two phases

4)

Our system will include monitoring and analysing all students' attendance to help them stay on track and maintain a focus towards their studies.



Do you want the attendance to be included in the system ?

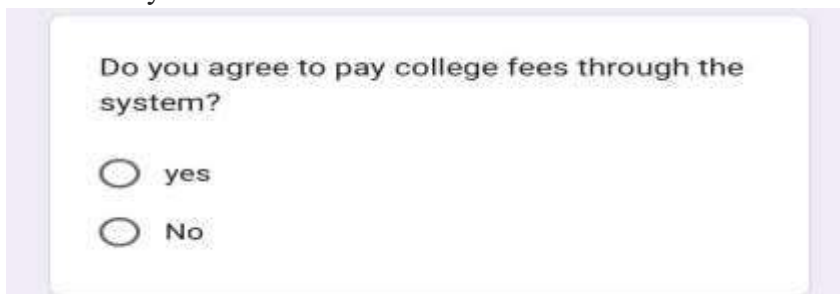
☐ I Do

☐ I Don't

74% chose (I do)

5)

Students will be able to easily pay their college fees through our application for more conveniency.



Do you agree to pay college fees through the system?

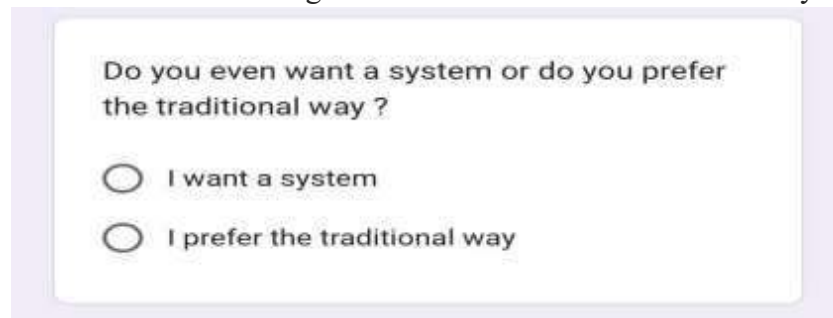
☐ yes

☐ No

75% chose (yes)

6)

Based on the results we collected we concluded that creating such system will be beneficial and less time consuming for students unlike the traditional way



Do you even want a system or do you prefer the traditional way ?

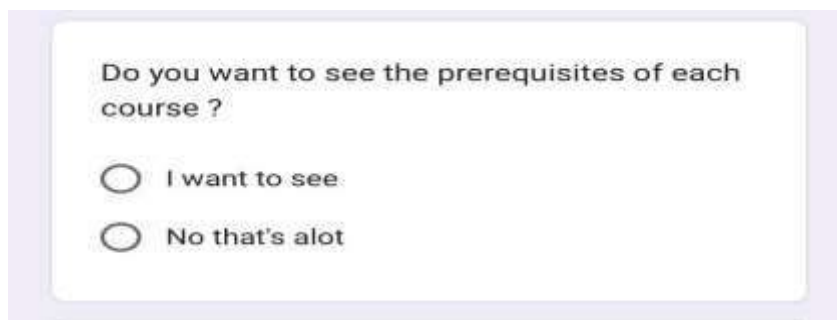
☐ I want a system

☐ I prefer the traditional way

94% chose (I want a system)

7)

The application will provide a list of all the prerequisites of each course if there is any



Do you want to see the prerequisites of each course ?

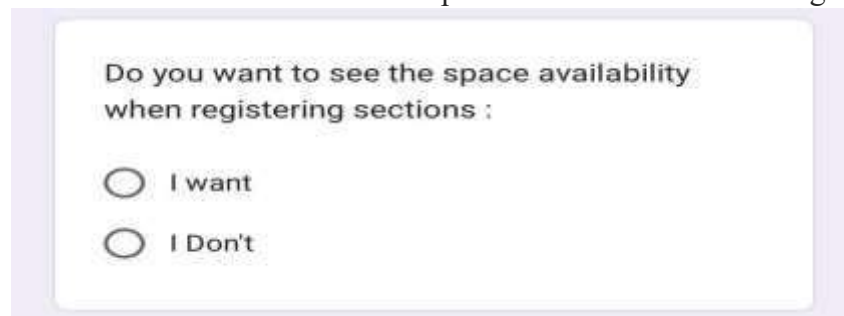
☐ I want to see

☐ No that's alot

93% chose (I want to see)

8)

Students can check the available space of each section when registering their tutorials



Do you want to see the space availability when registering sections :

☐ I want

☐ I Don't

84% chose (I want to see)

9)

If there is no space availability in a certain section, the student will be added to a waitlist until another student in the class drops or a seat opens up

If you want to register in a section that is full ,
Do you want to be added to a waiting list ?

☐ I want

☐ I don't

84% chose (I want)

2.4 Functional Requirements

The major goals of our project were:

1. Make it easier for students for registering courses.
2. Creating an account or logging in if you already have an account.
3. Creating a profile for each student which contains his name, ID, passed subjects with their credit hours, residual credit hours, GPA of every semester he completed and the CGPA.
4. Registering for subjects that are available in the current semester after checking the prerequisites and the subject list.
5. All these activities are added, removed, or updated by the administrator.

2.4.1 Student Functional requirements:

Requirements	Description	Priority
1.1 Register	-Students register to create an account on CMS. -Students fill a form to provide their data to create an account (Email, Name, Unique Username, Password, Confirm Password, Birthdate, phone number).	High
1.2 Log in	-Students who have accounts can log in directly. -They can reset their passwords.	High
1.3 Courses registration	-Students should register for the courses they need in every semester. -Students should check for the course prerequisites.	High

1.4 Sections registration	-Students should register for the available sections with the time they have scheduled their schedule.	High
1.5 Add, edit basic data	-If a student needs to change some of his data.	Medium
1.6 View grades, GPA, assignments	-Students can check for their grades and GPA for every semester and the CGPA.	High
1.7 View schedules	-After academic registration every student should have their own schedule.	High
1.8 View Available courses	-This section is for students who want to add and delete some of their registered courses ,so they can see other available courses to register in.	High
1.9 Edit, Delete courses	-If a student changes their mind they can delete and edit.	Medium
1.10 Delete sections	-If a student changes their mind they can delete and edit.	Medium
1.11 View profile	-Every student has their own profile which includes all their data.	High
1.12 View total achievements	-Every student has their total achievements for every semester.	High
1.15 View attendance	-Checking for their attendance to prevent the attendance warning.	High
1.16 Log out	-After finishing their needs, they can log out and resign in another time.	High

2.4.2 Admin functional requirements:

Requirements	Description	Priority
4.1 Log in	-Admin is logged in by entering username or email and password. -Admin can reset their password.	High

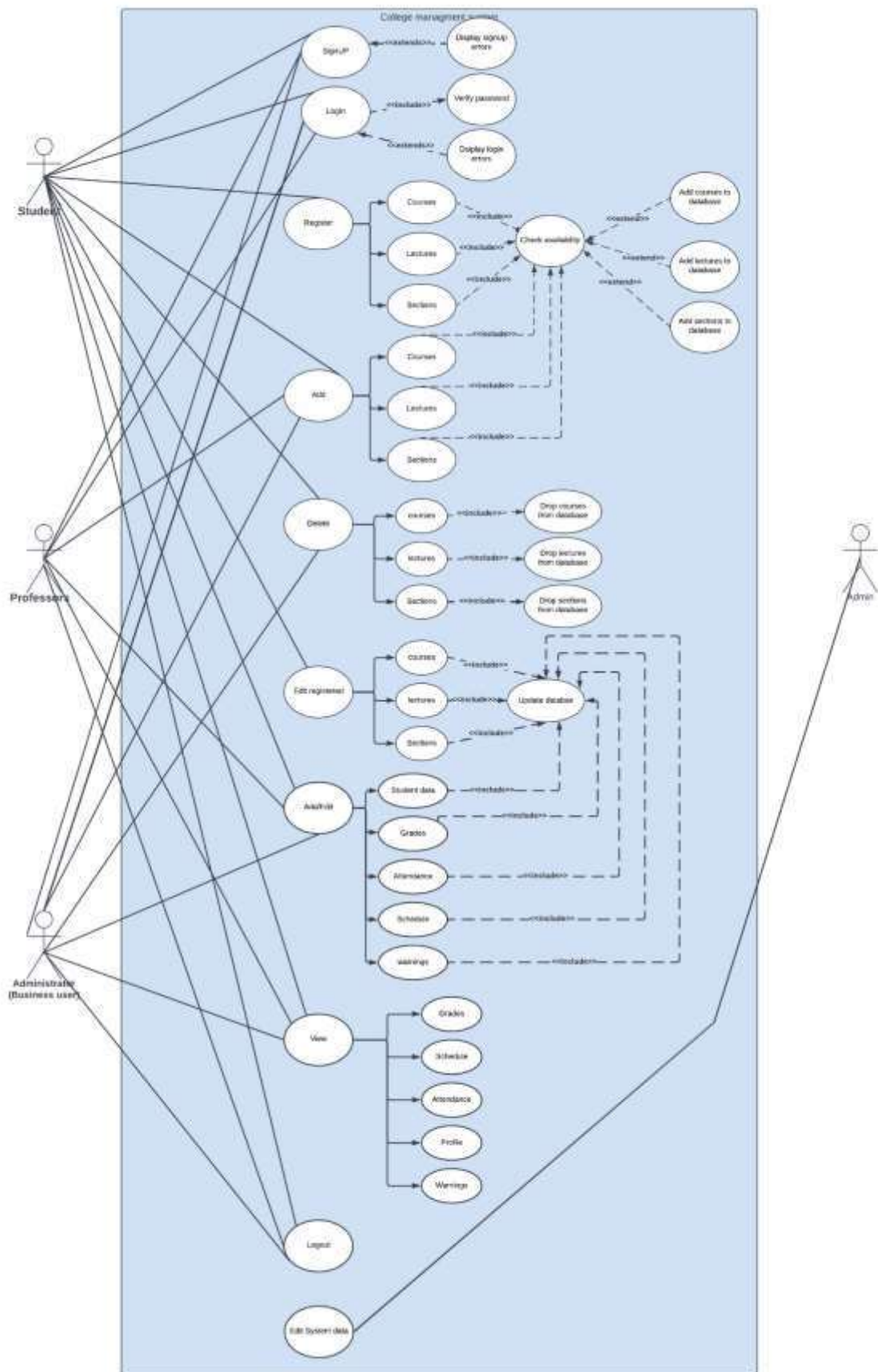
4.2 Add student	-Admin can add new students and their data.	High
4.4 Delete student	-Admin can delete students.	High
4.5 Add stuff	-Admin can add new stuff and their data.	High
4.6 Delete stuff	-Admin can delete stuff.	High
4.7 Add course	-Admin can add courses and their description.	High
4.8 Edit course	-Admin can edit course and their description.	High
4.9 Delete course	-Admin can delete courses.	High
4.10 Add section	-Admin can add sections.	High
4.11 Edit Section	-Admin can edit sections.	High
4.12 Delete Section	-Admin can delete sections.	High
4.13 Add schedule	-Admin can add schedules.	Medium
4.14 Number of users	-Admin can display the number of Normal Users in the system.	High
4.15 Creating new accounts	-Admin can create user account. -Admin can create business user account. -Admin can create another admin account.	High
4.16 Add/Edit/Delete warning	-Admin can add,edit and delete warnings	High
4.17 Add/Edit/Delete grades	-Admin can add,edit and delete grades	High
4. Logout	-Admin can logout from the app.	High

2.5 Non-functional Requirements:

Requirements	Description
5.1 Performance	-Should be fast and server update take few seconds.

5.2 Reliability	-Data integrity.
5.3 Availability	-Available for 24/7.
5.4 Portability	- IOS & android (flutter).
5.5 Usability	-Easy to learn and remember.
5.6 Privacy	-Profile data will be private for users.
5.7 Maintainability	-Update data base, content and new versions.
5.8 Scalability	-New users' system should expanded.
5.9 Recoverability	-App should be recover from failure or crash and resume normal operation.
5.10 Ethical	- We guarantee that the system will benefit society and will not cause harm to users.
5.11 Supportability	-Serviceability of a software system is the ability of a service expert to install the software system in a real-time environment, monitor the system while it is running, identify any technical issues in the system and provide a solution to resolve the issue.

2.6 Use case diagram:

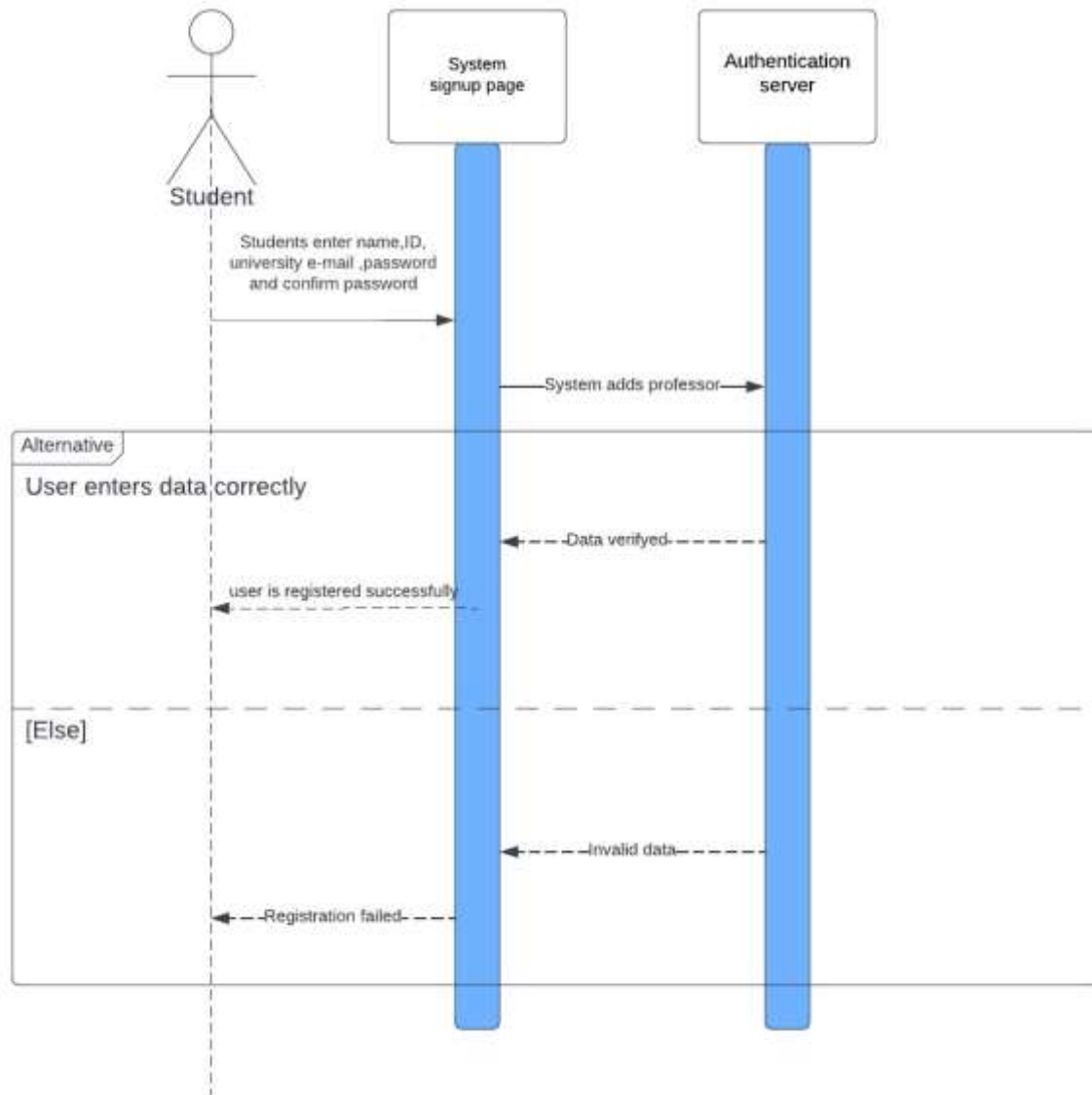


III. Design

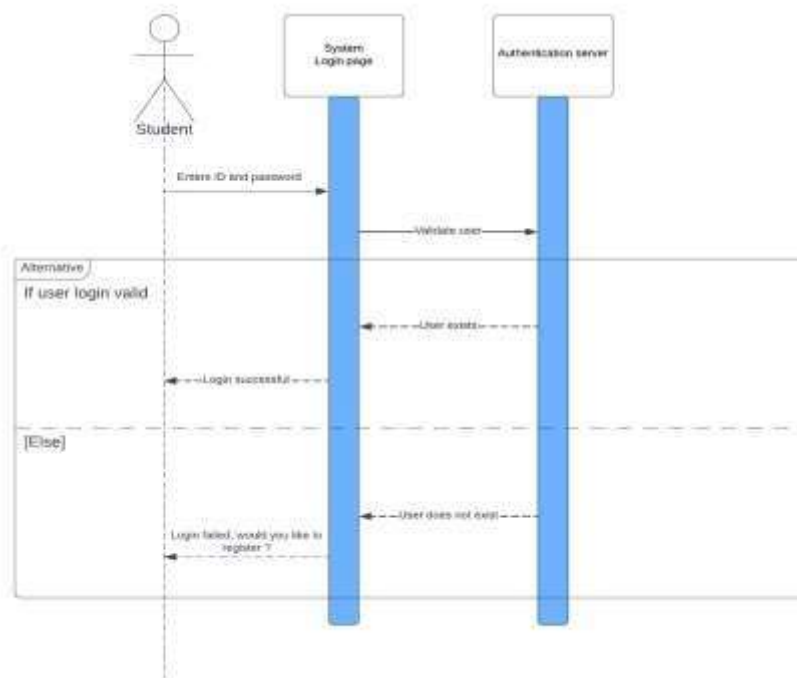
3.1 Sequence Diagrams

3.1.1 Student:

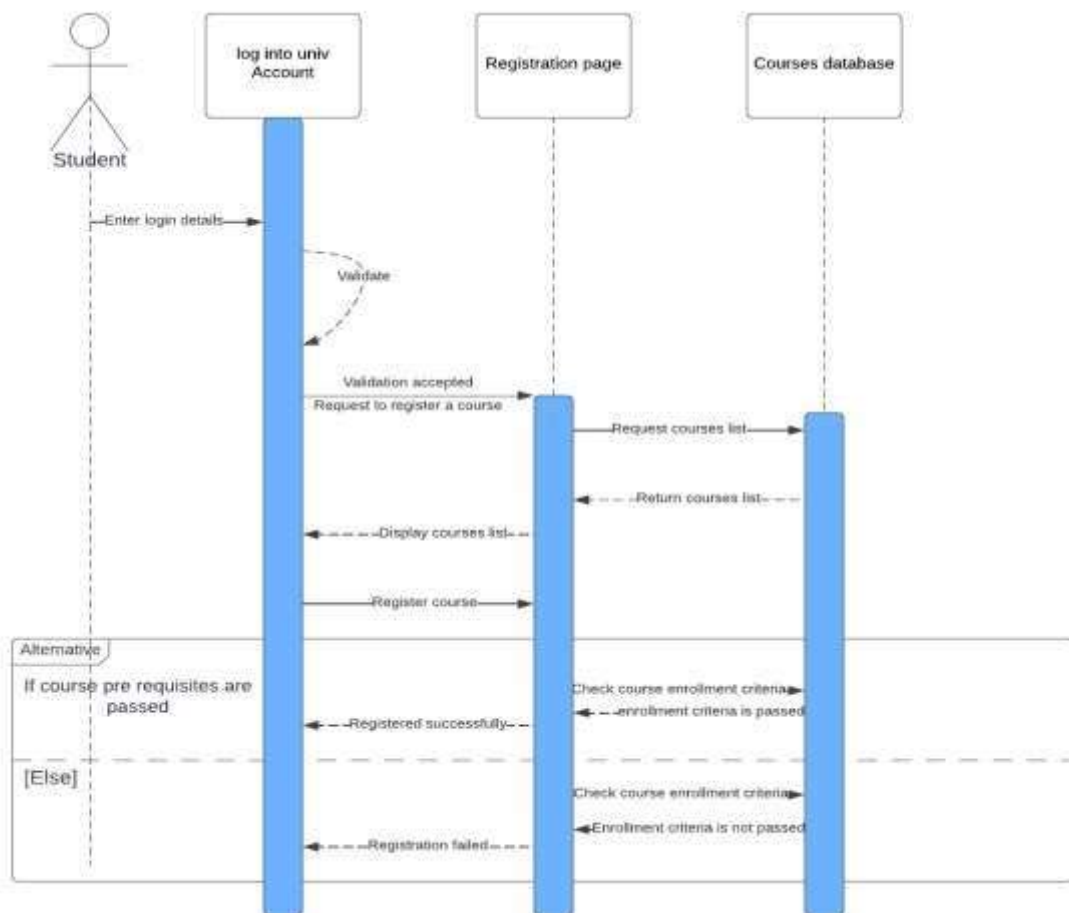
1.Sign -up



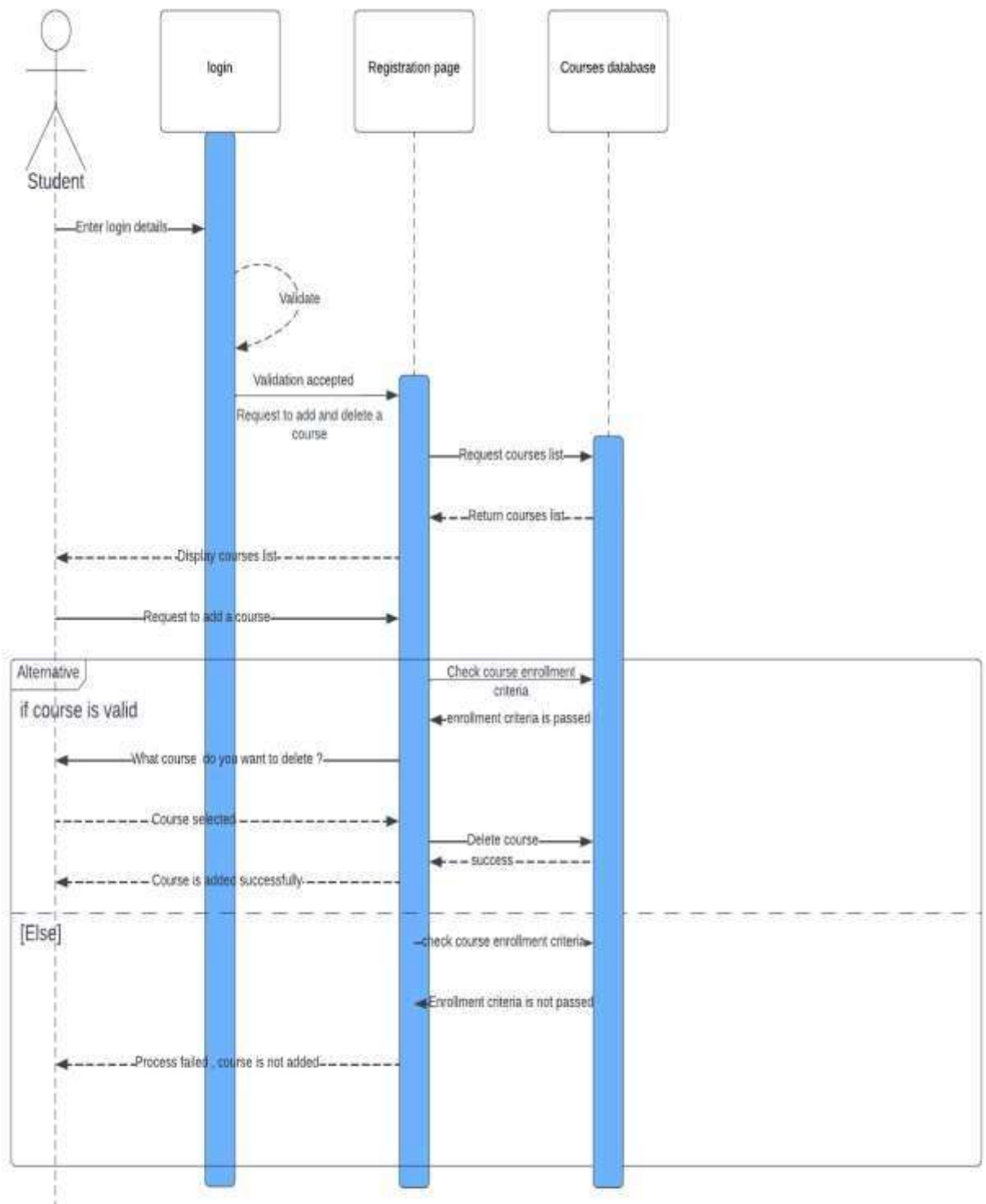
2. Login



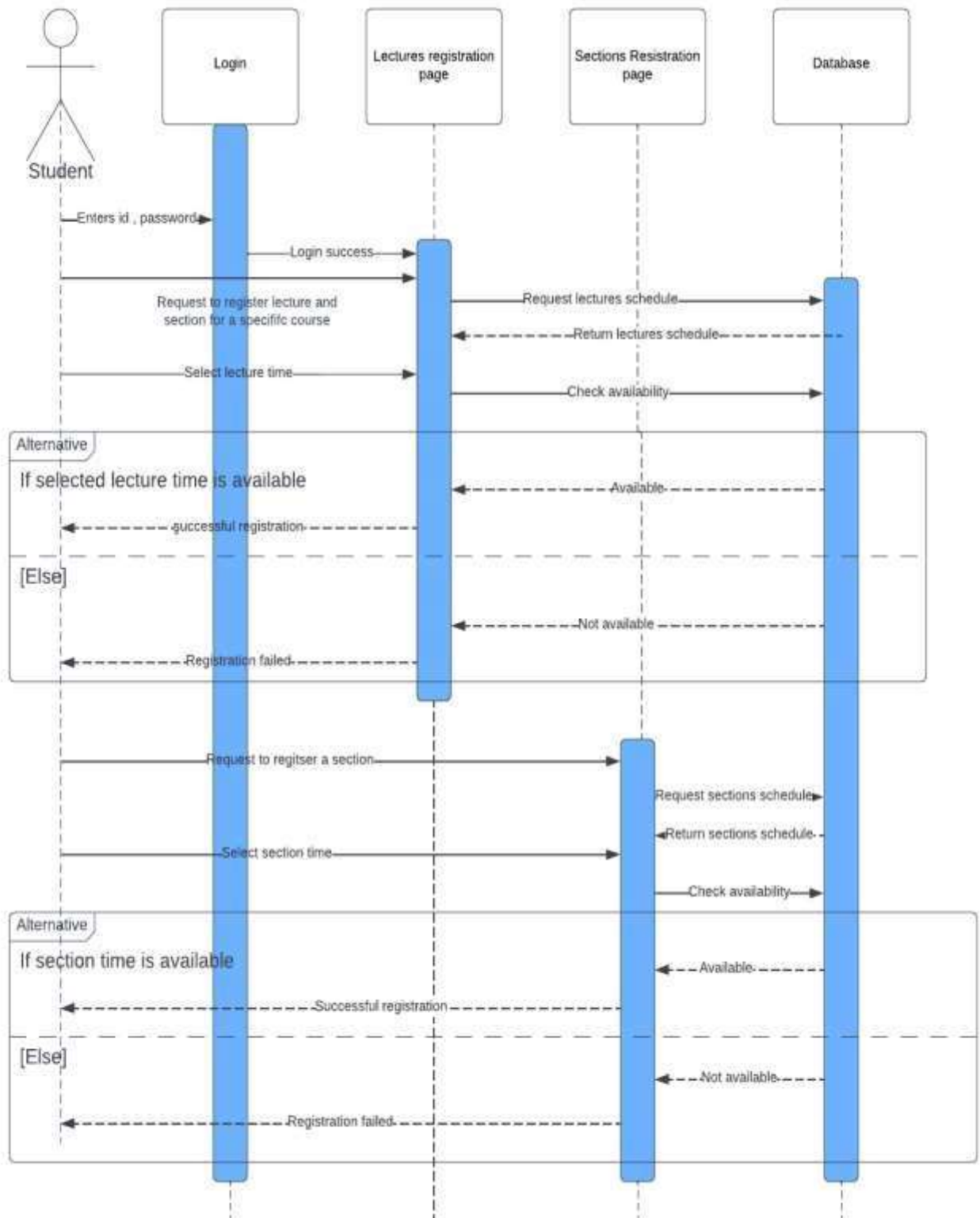
3. Course Registration



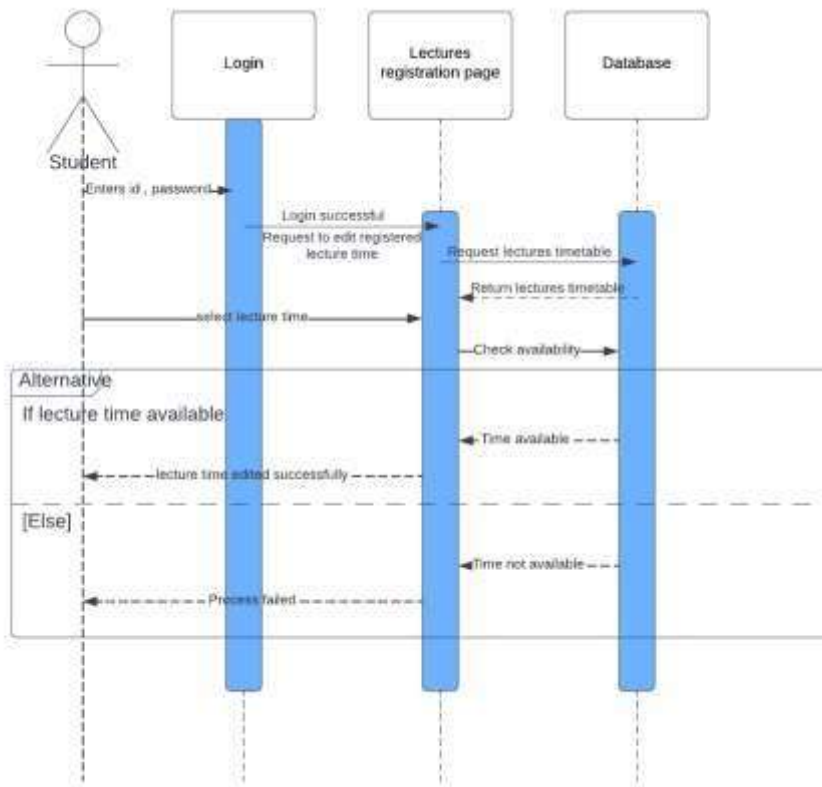
4. Add-Delete courses



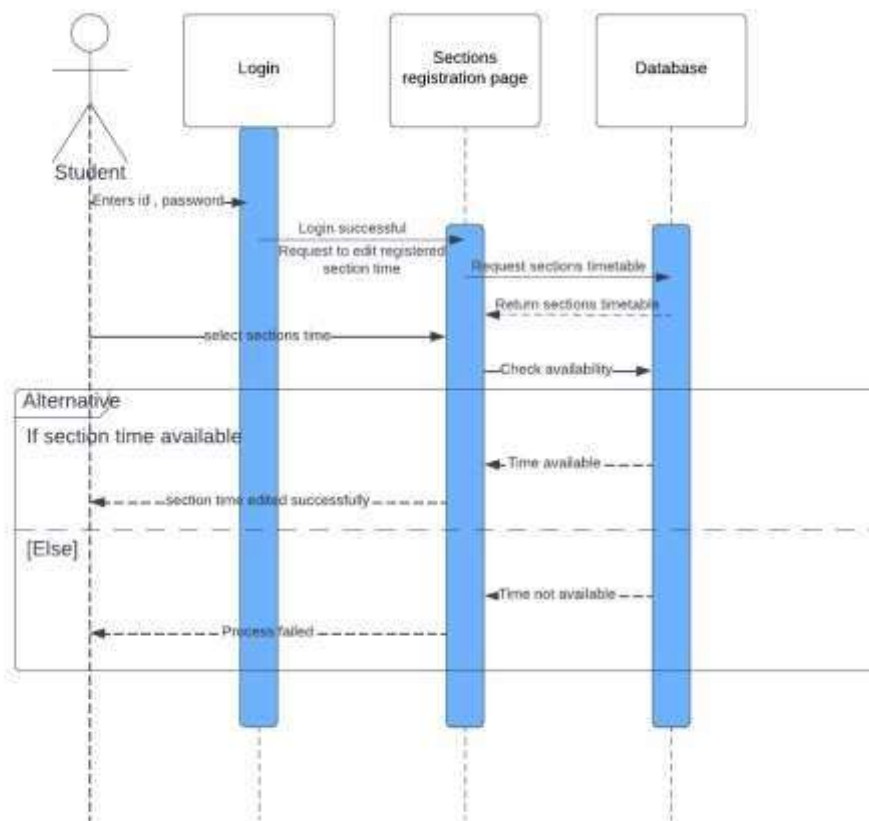
5. Lectures/Sections registration



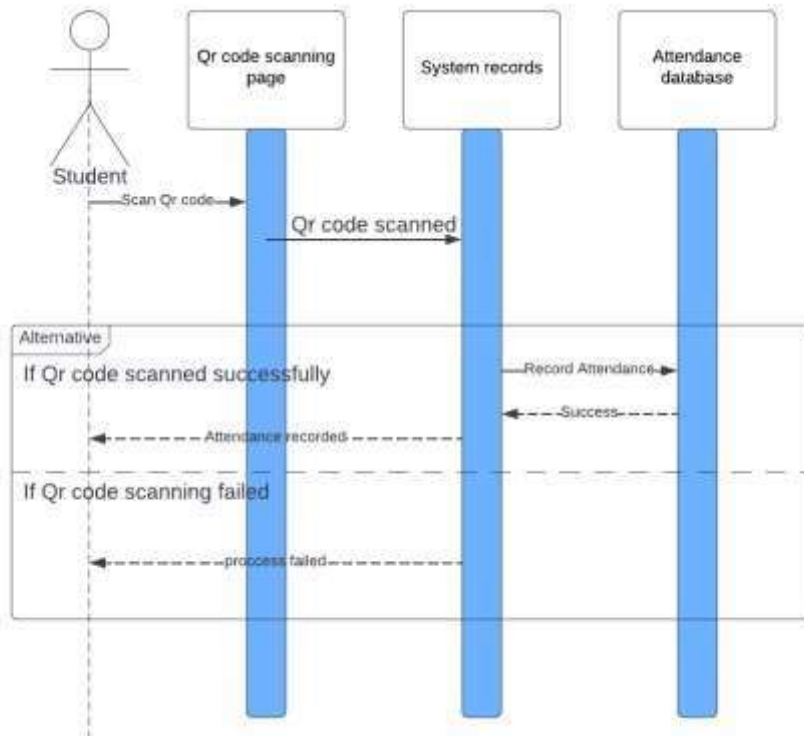
6. Edit lectures time



7. Edit sections time

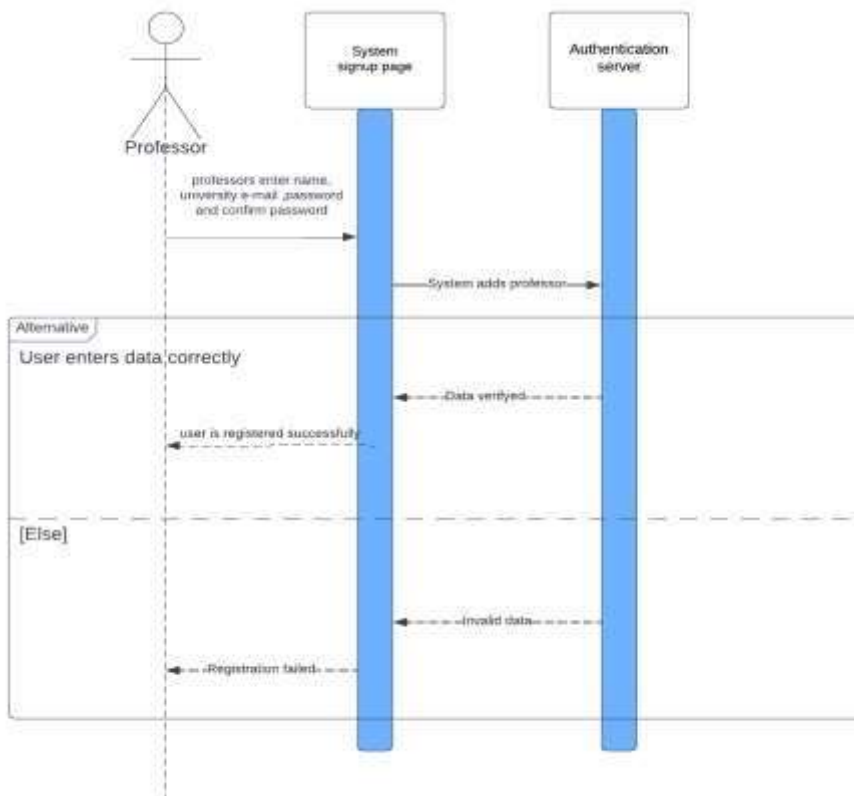


8. Attendance

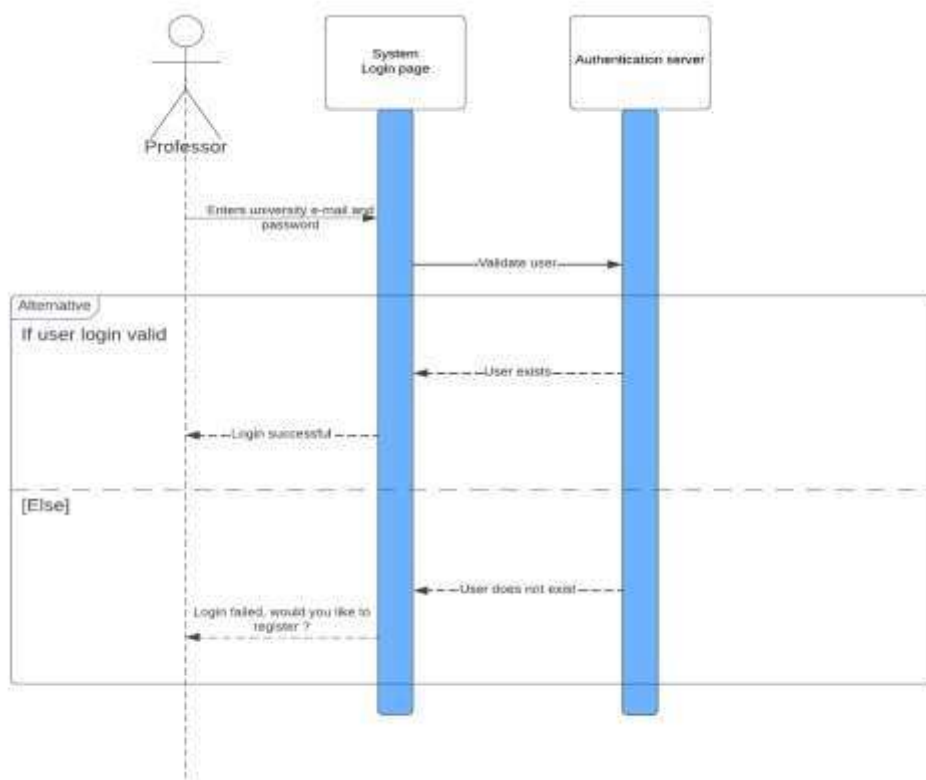


3.1.2 Professor

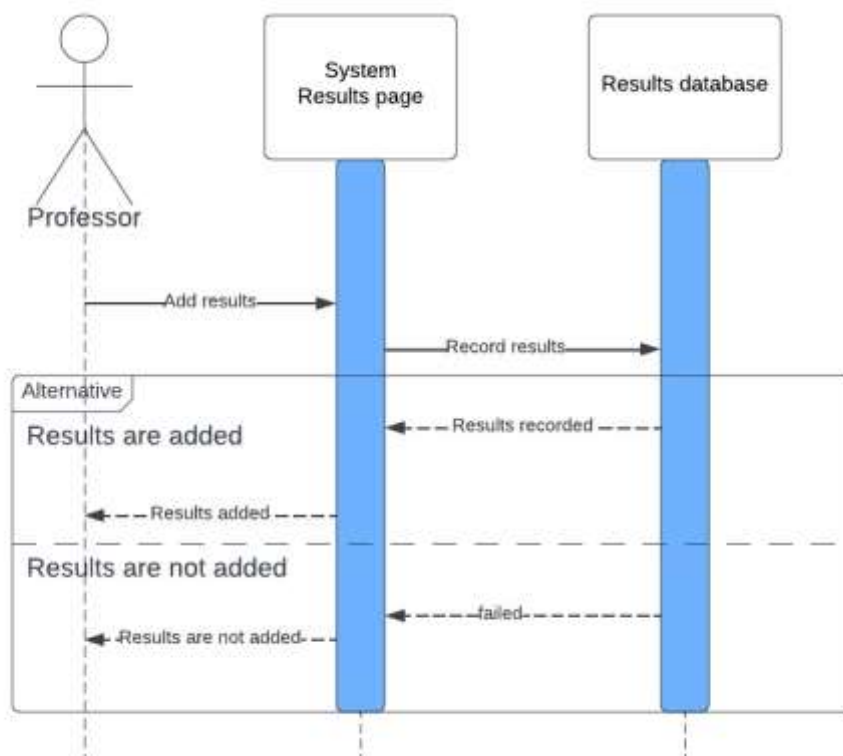
1. Sign-up



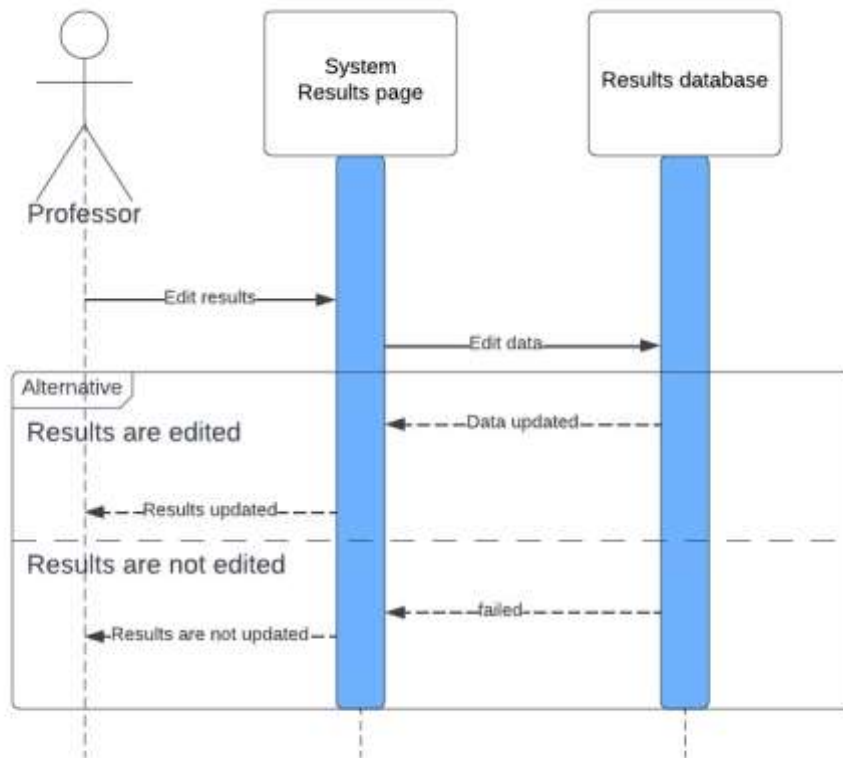
2. Login



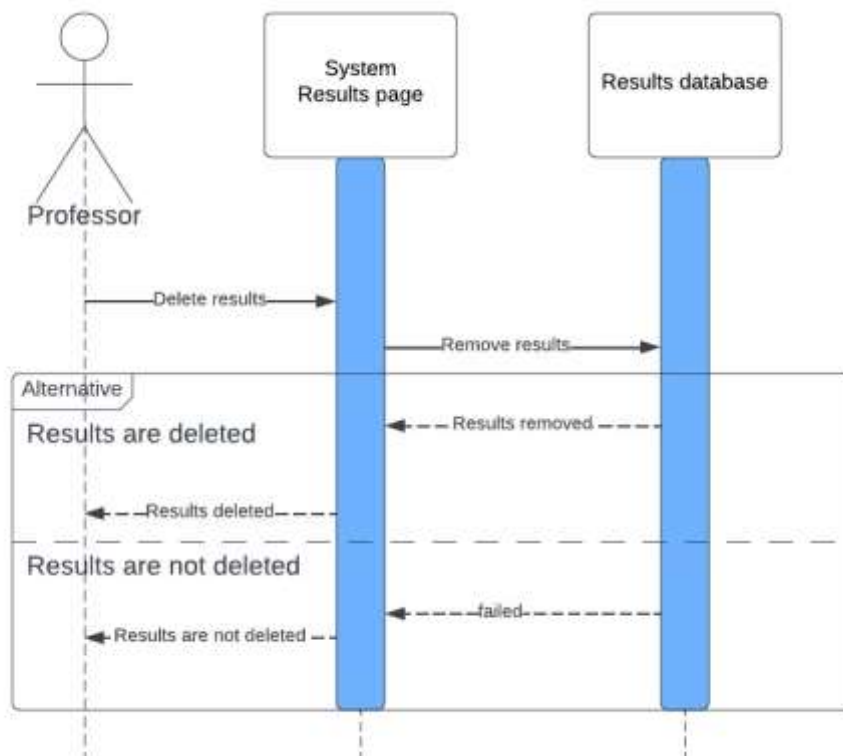
3. Add results



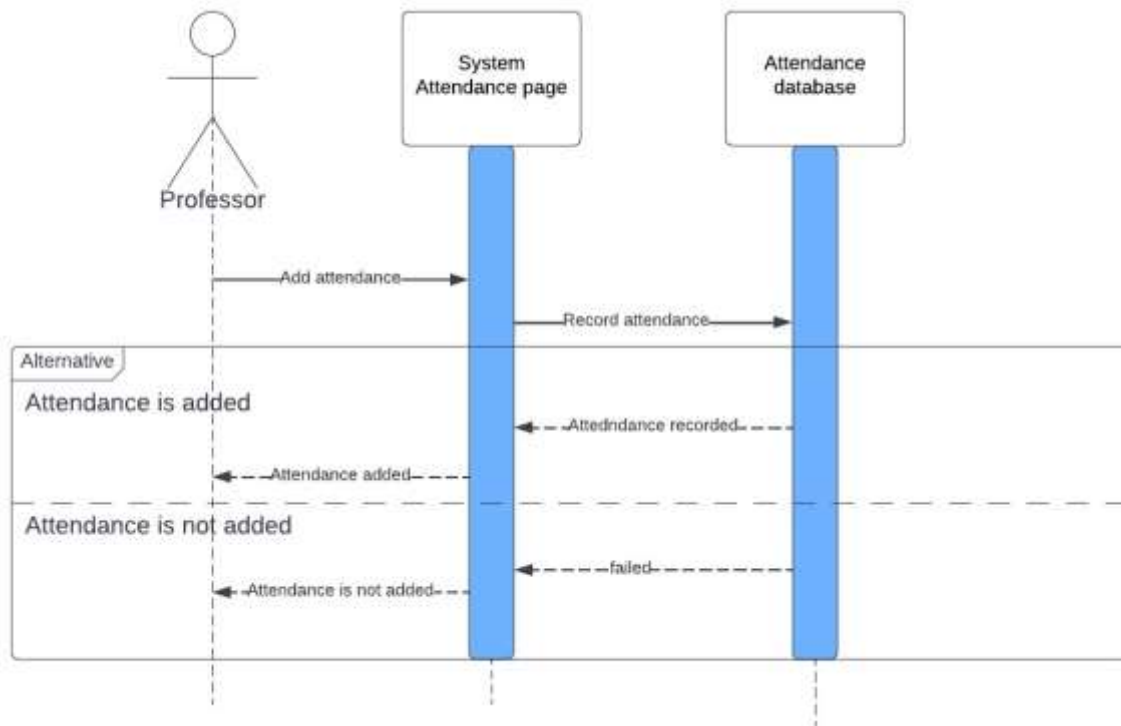
4. Edit results



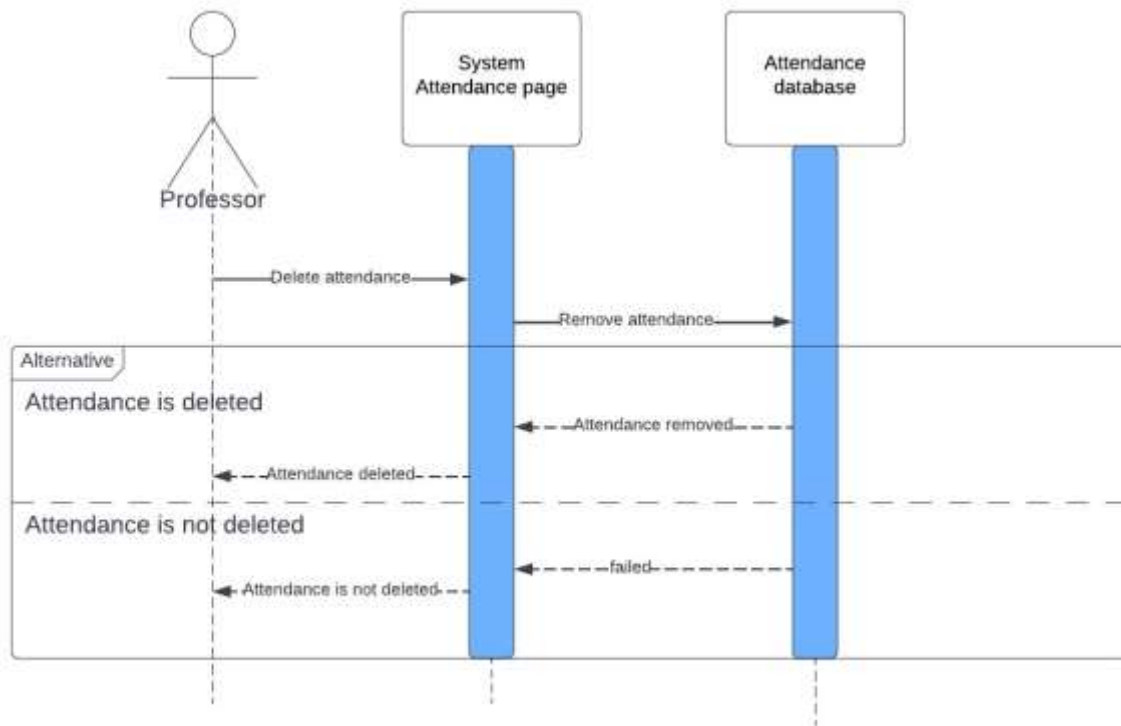
5. Delete results



6. Add attendance

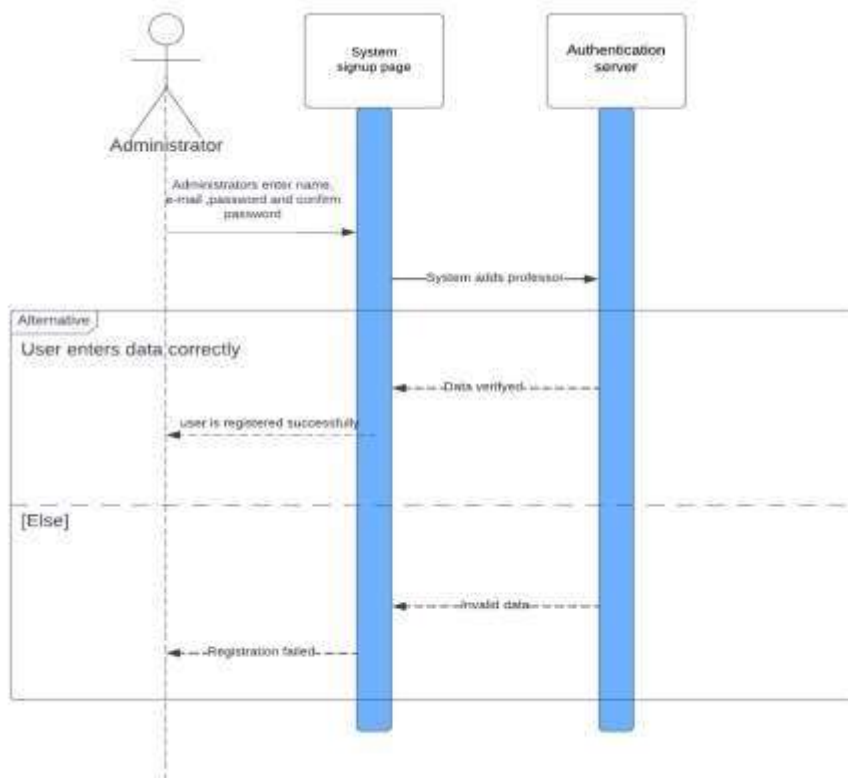


7. Delete attendance

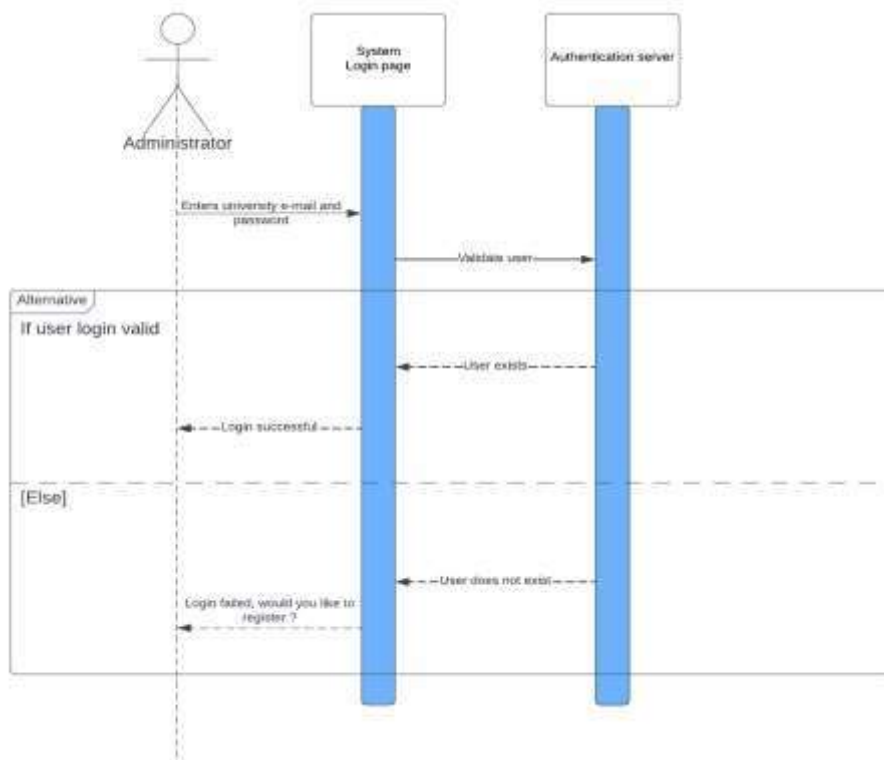


3.1.3 Administrator (Business user)

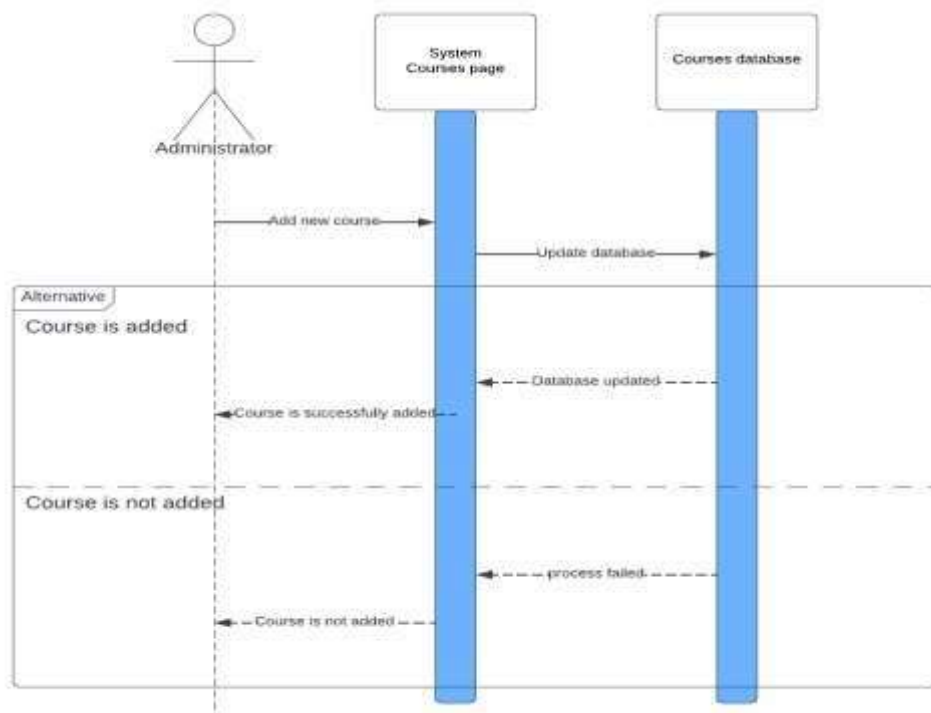
1. Sign-up



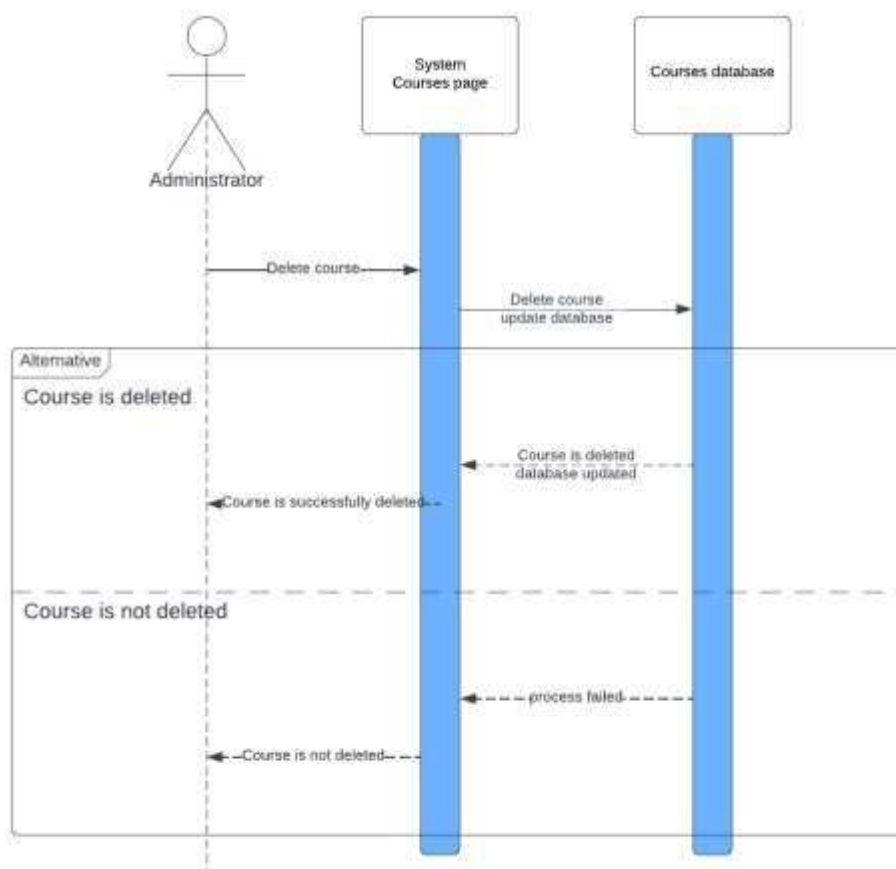
2. Login



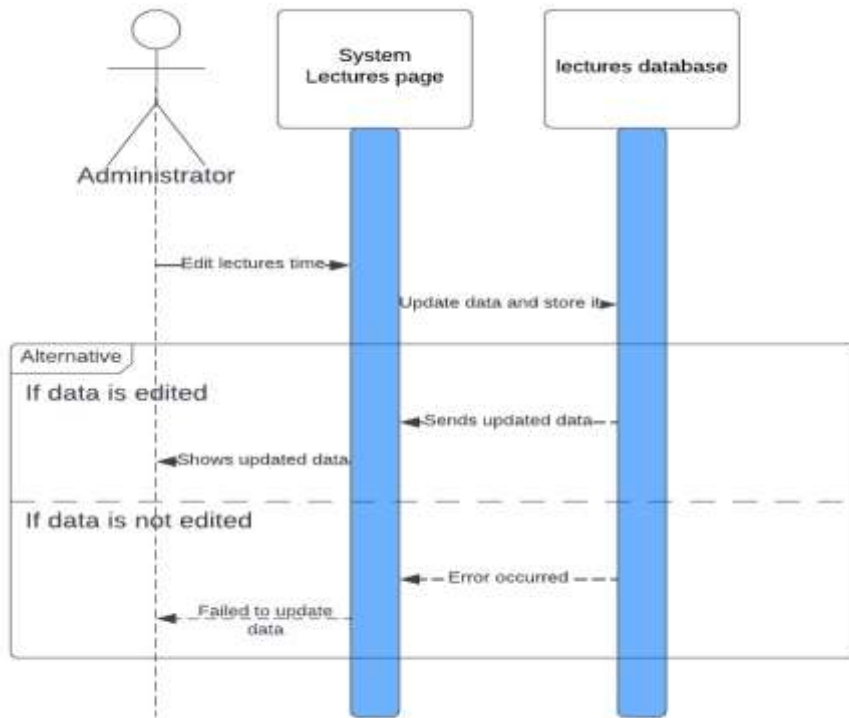
3. Add new course



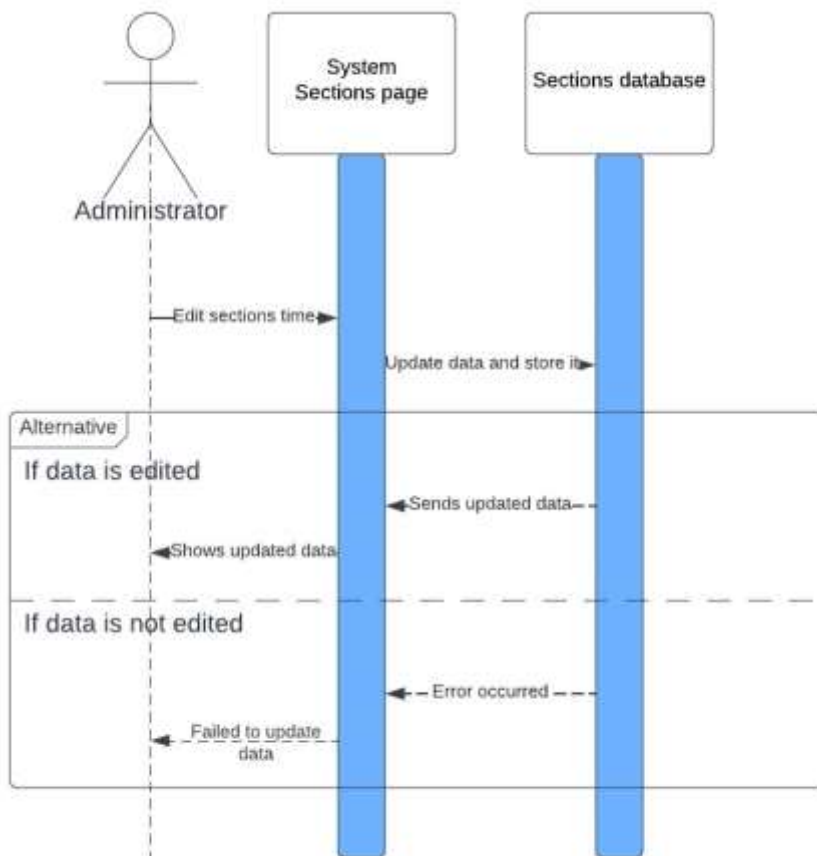
4. Delete existing course



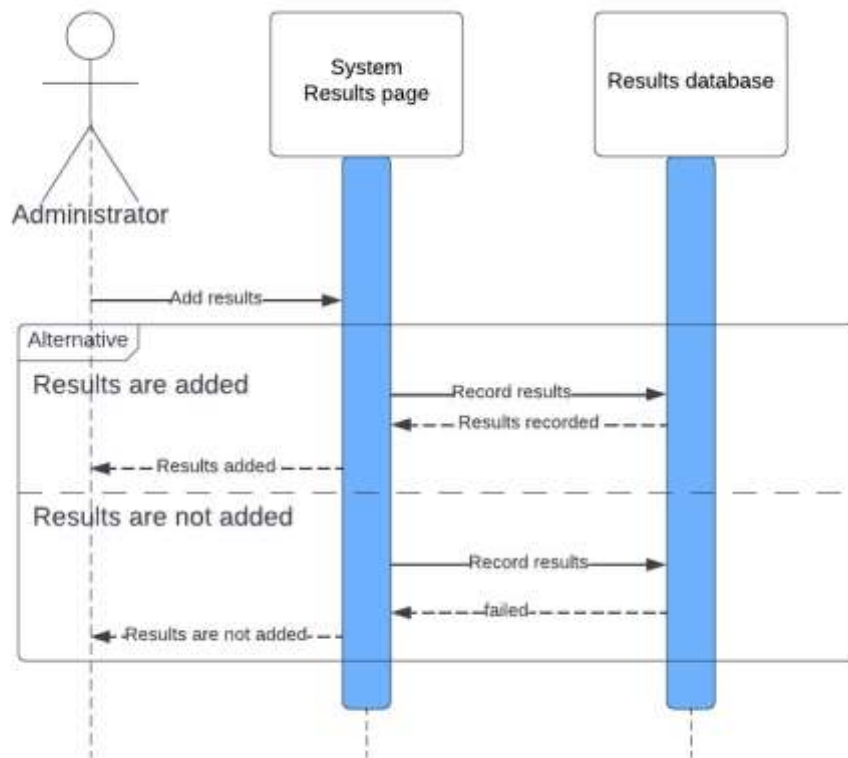
5. Edit lectures time



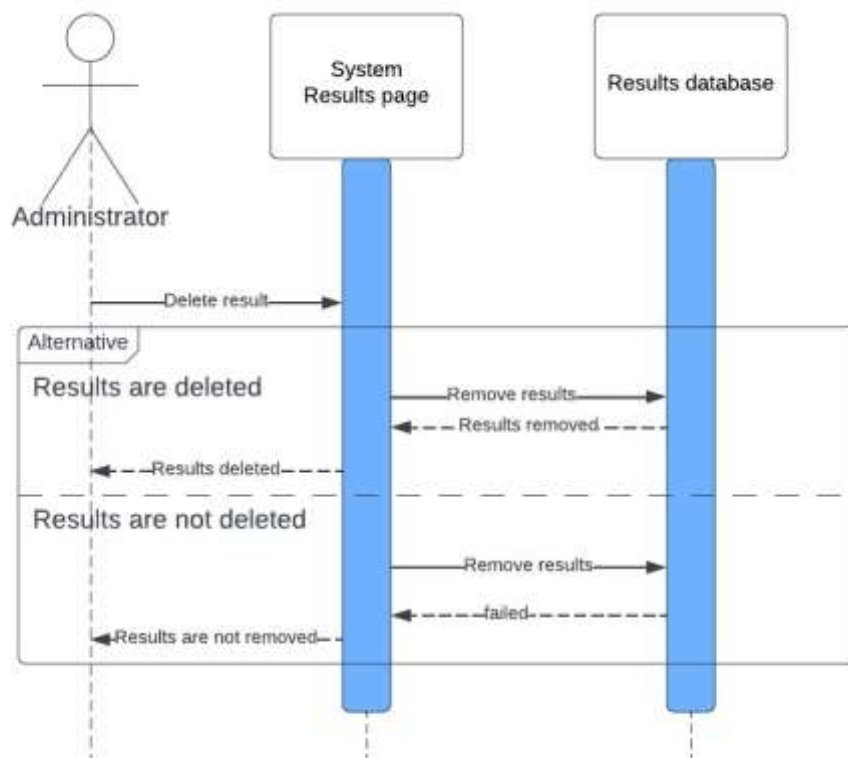
6. Edit sections time



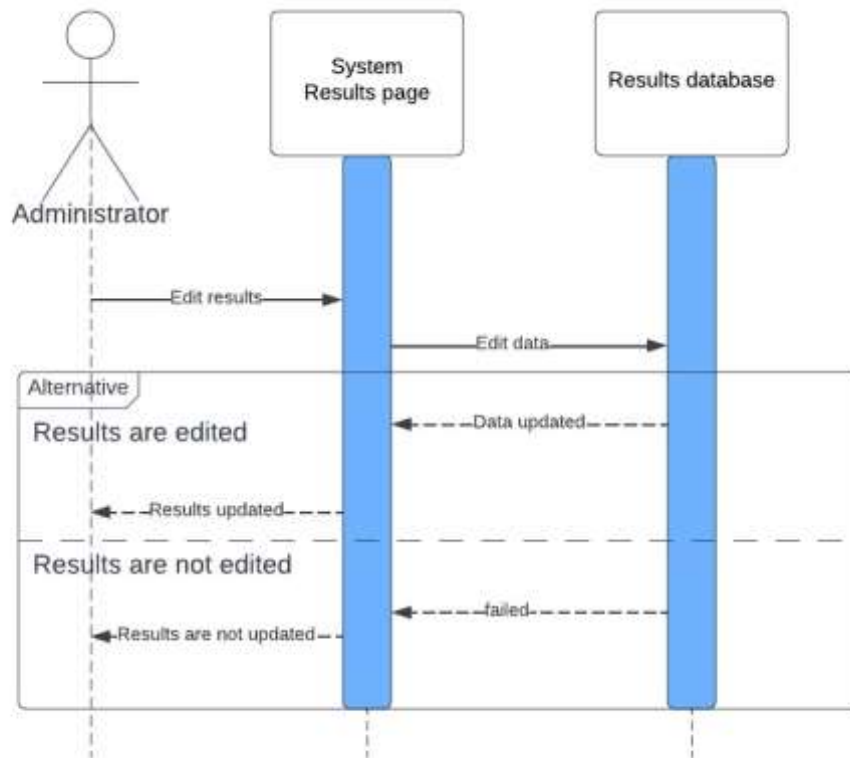
7. Add results



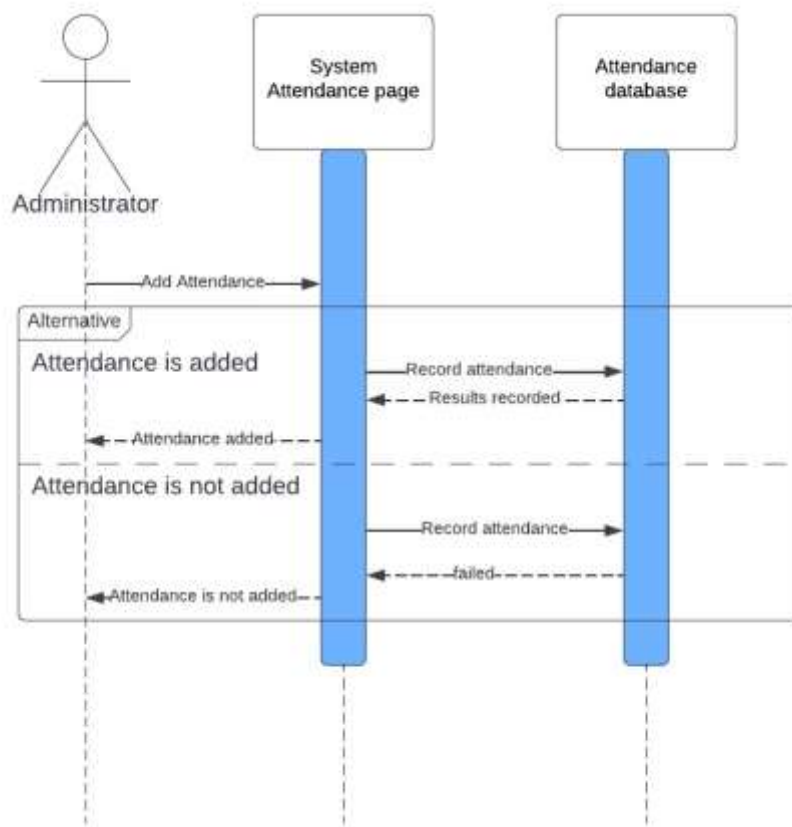
8. Delete results



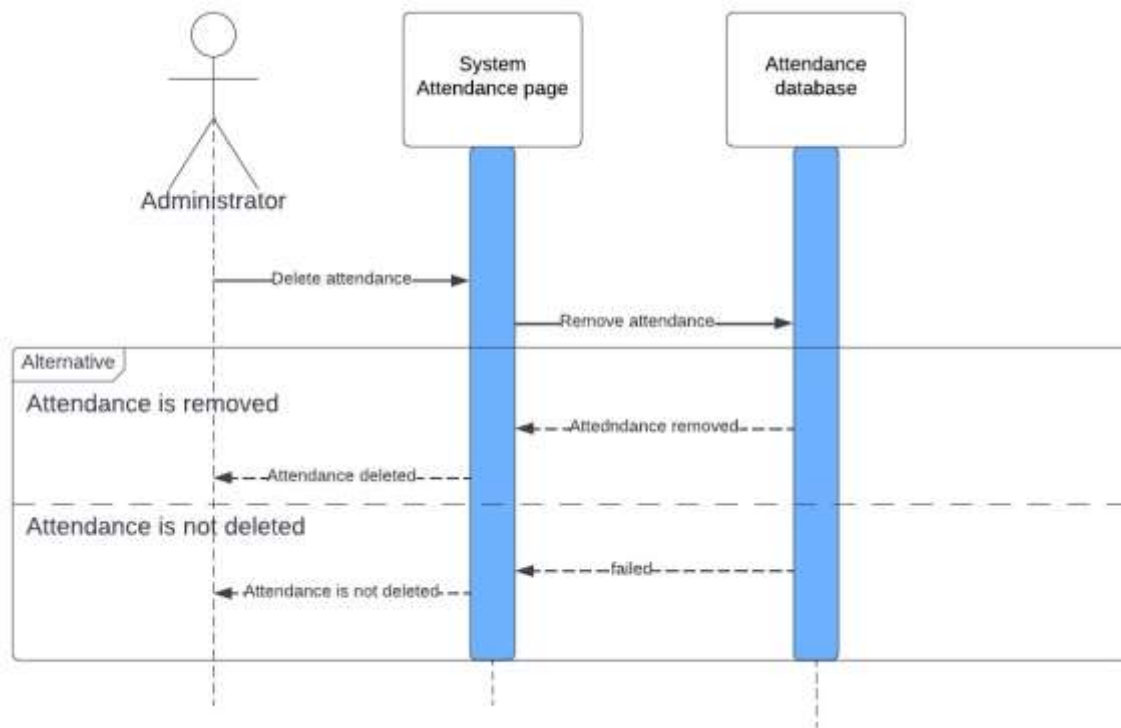
9. Edit results



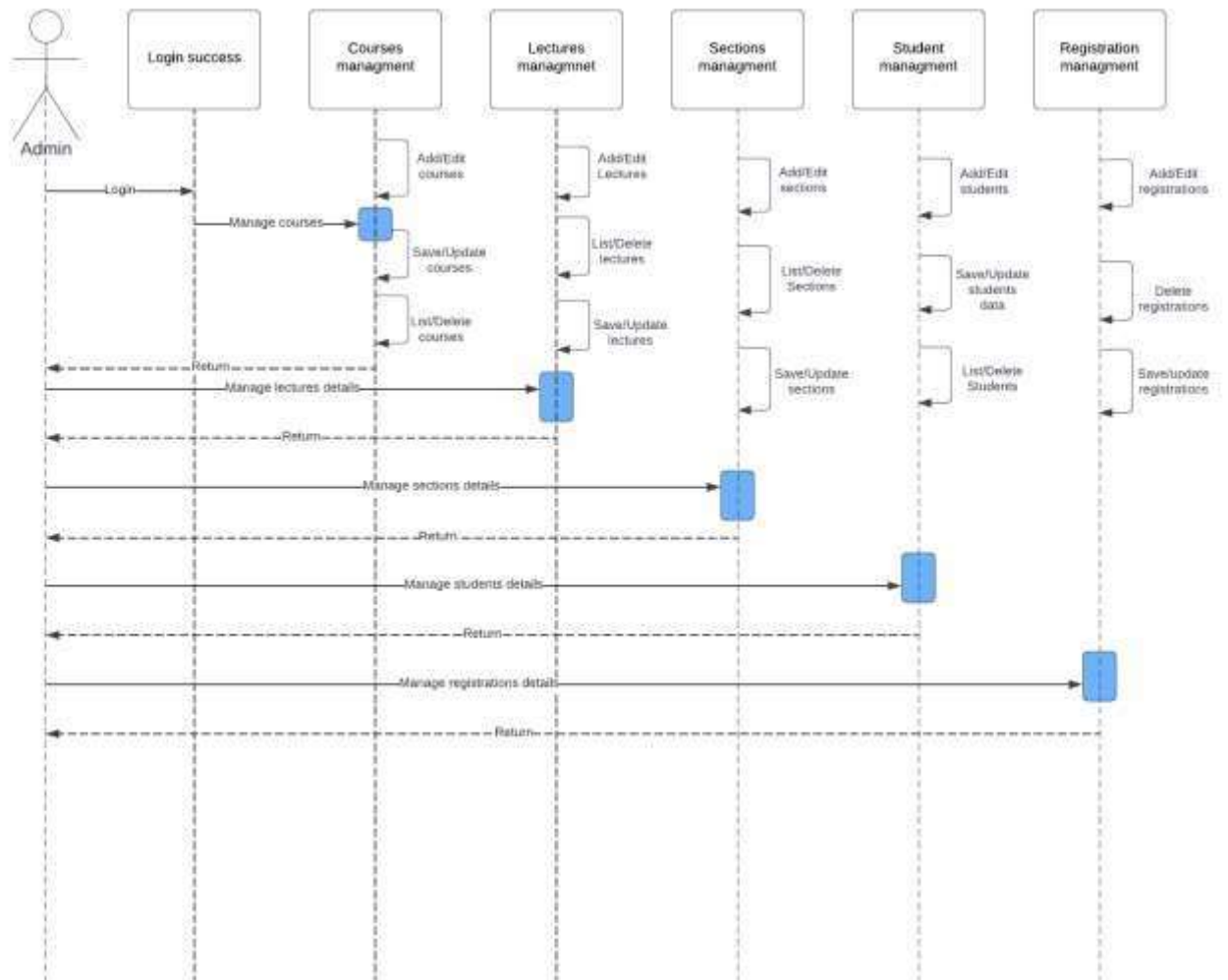
10. Add attendance



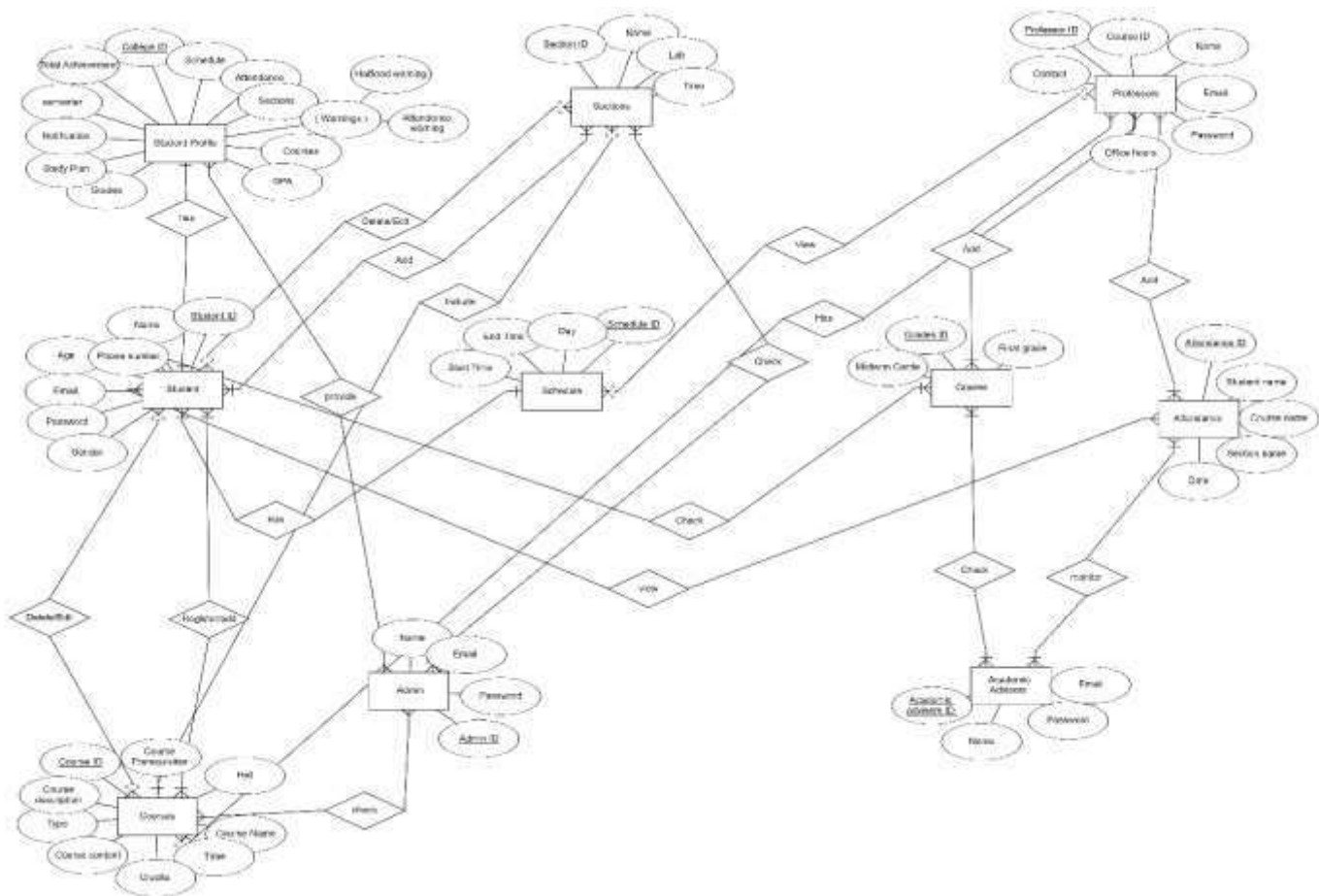
11. Delete attendance



3.1.4 Admin

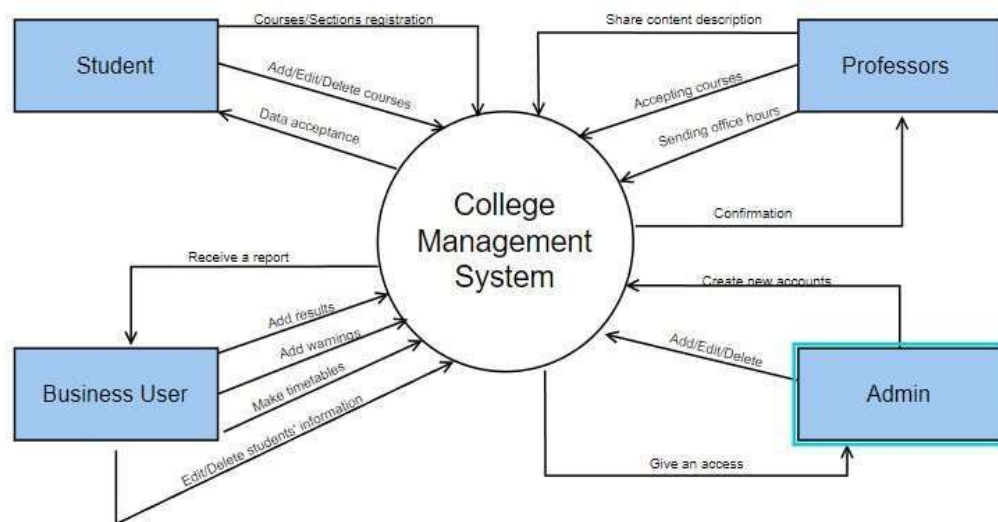


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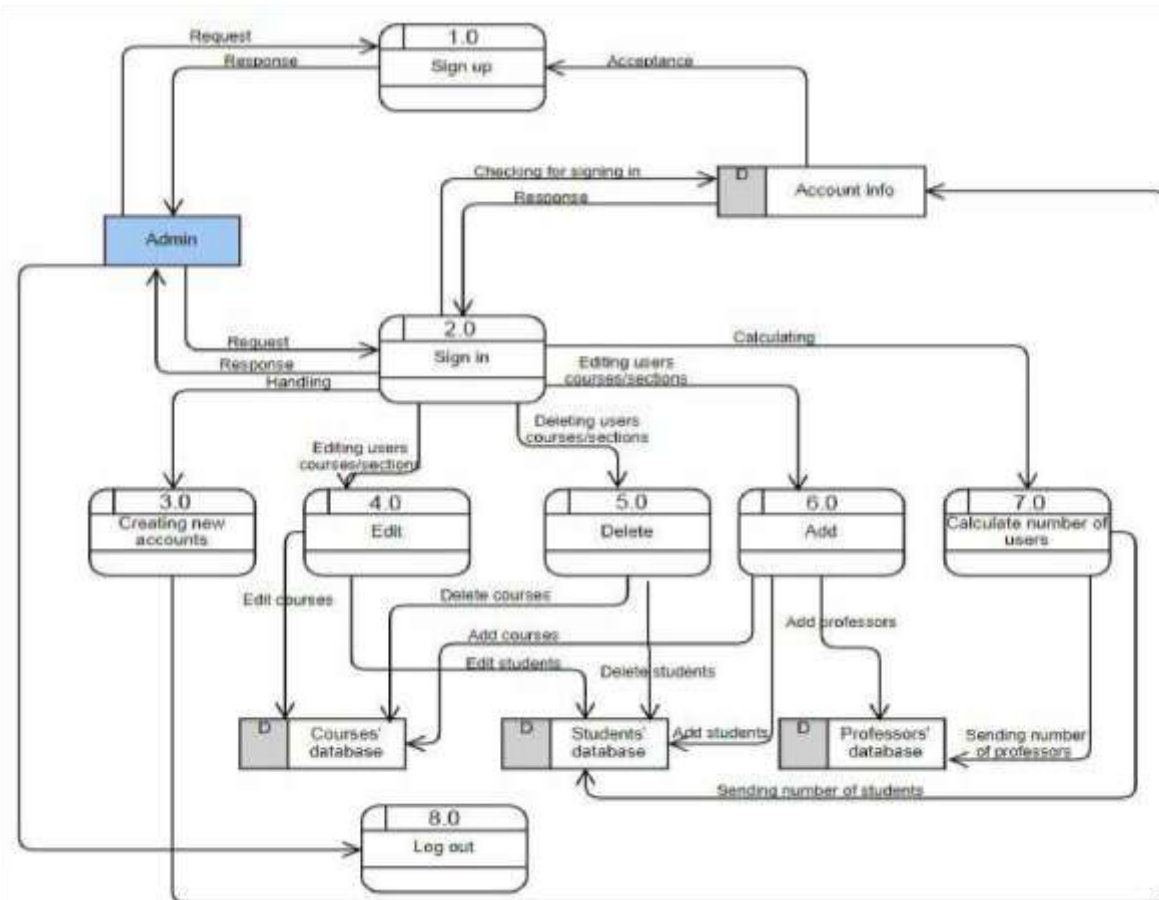


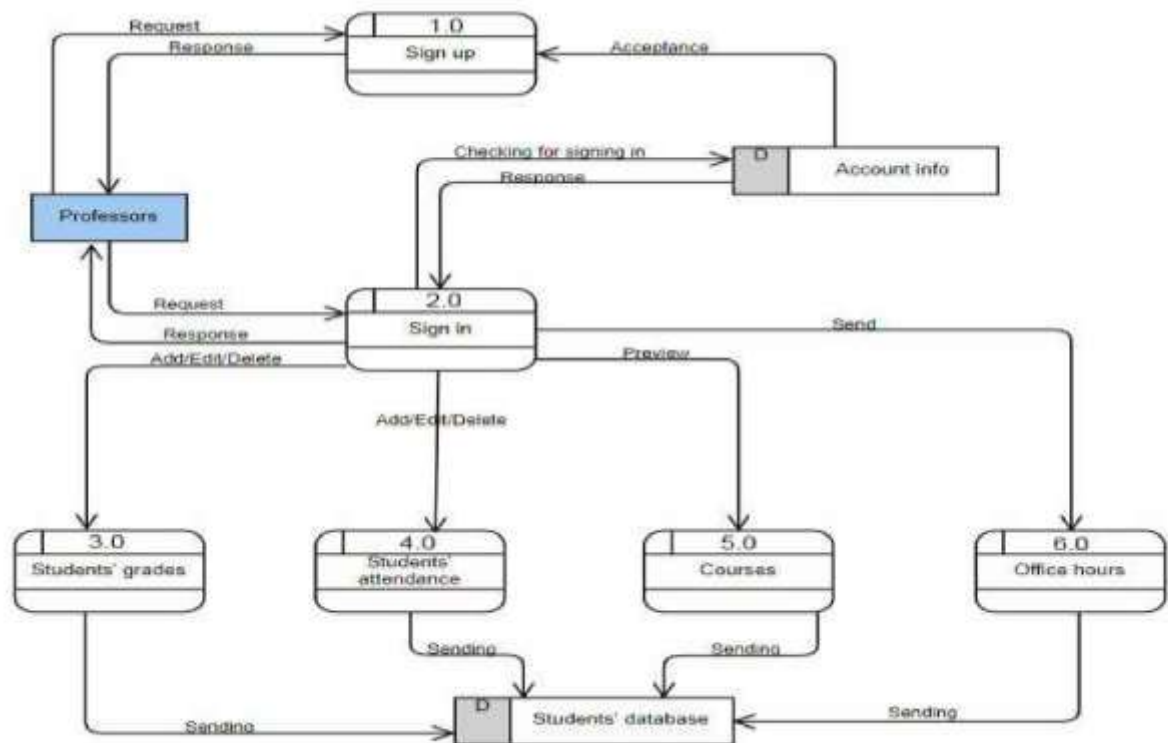
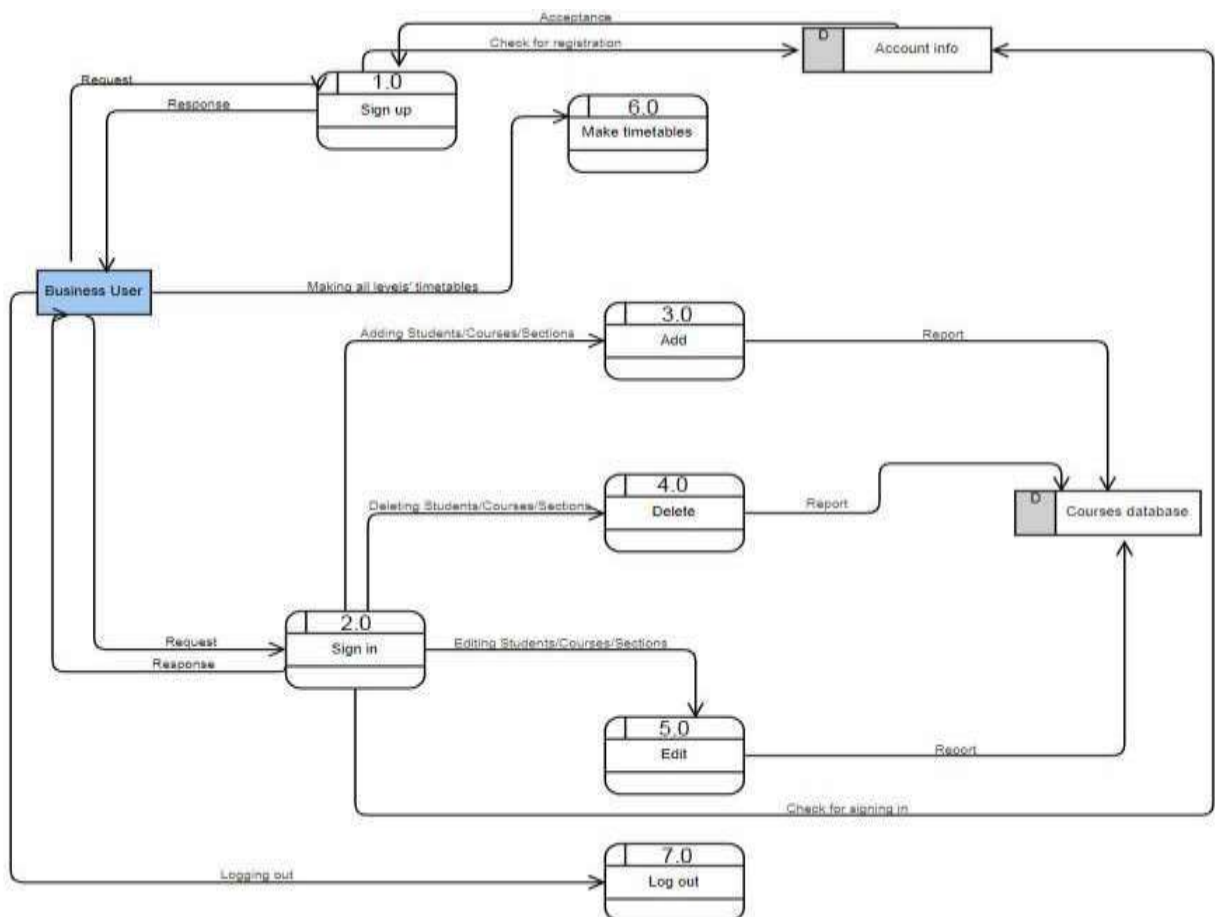
3.3 Data flow diagrams

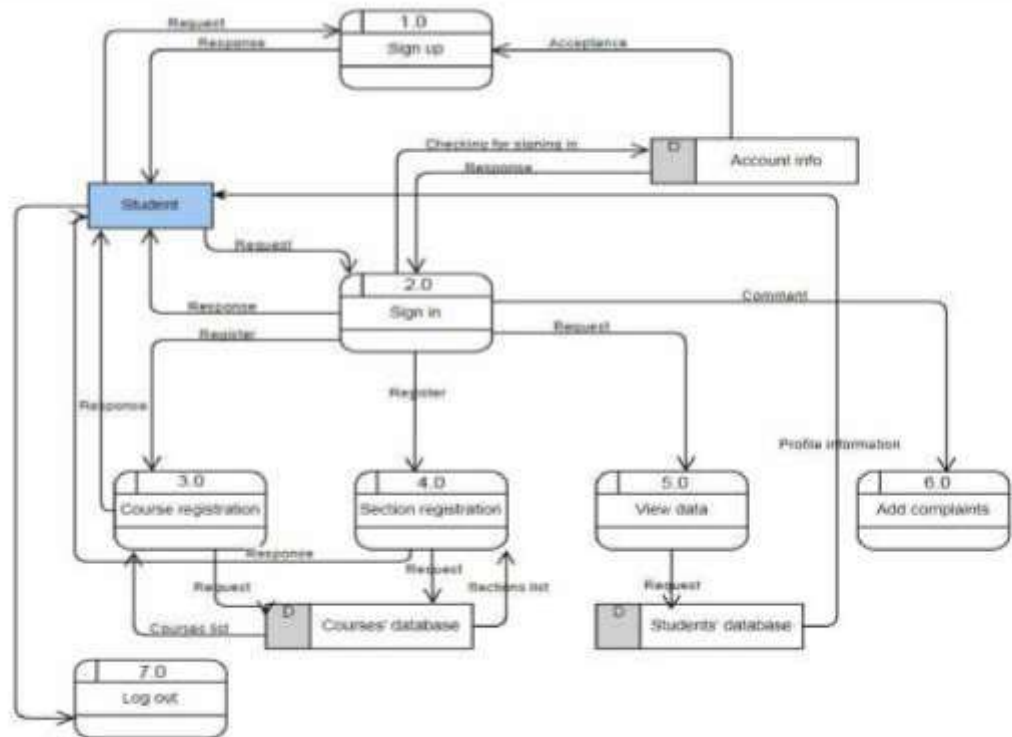
3.3.1 DFD-level 0



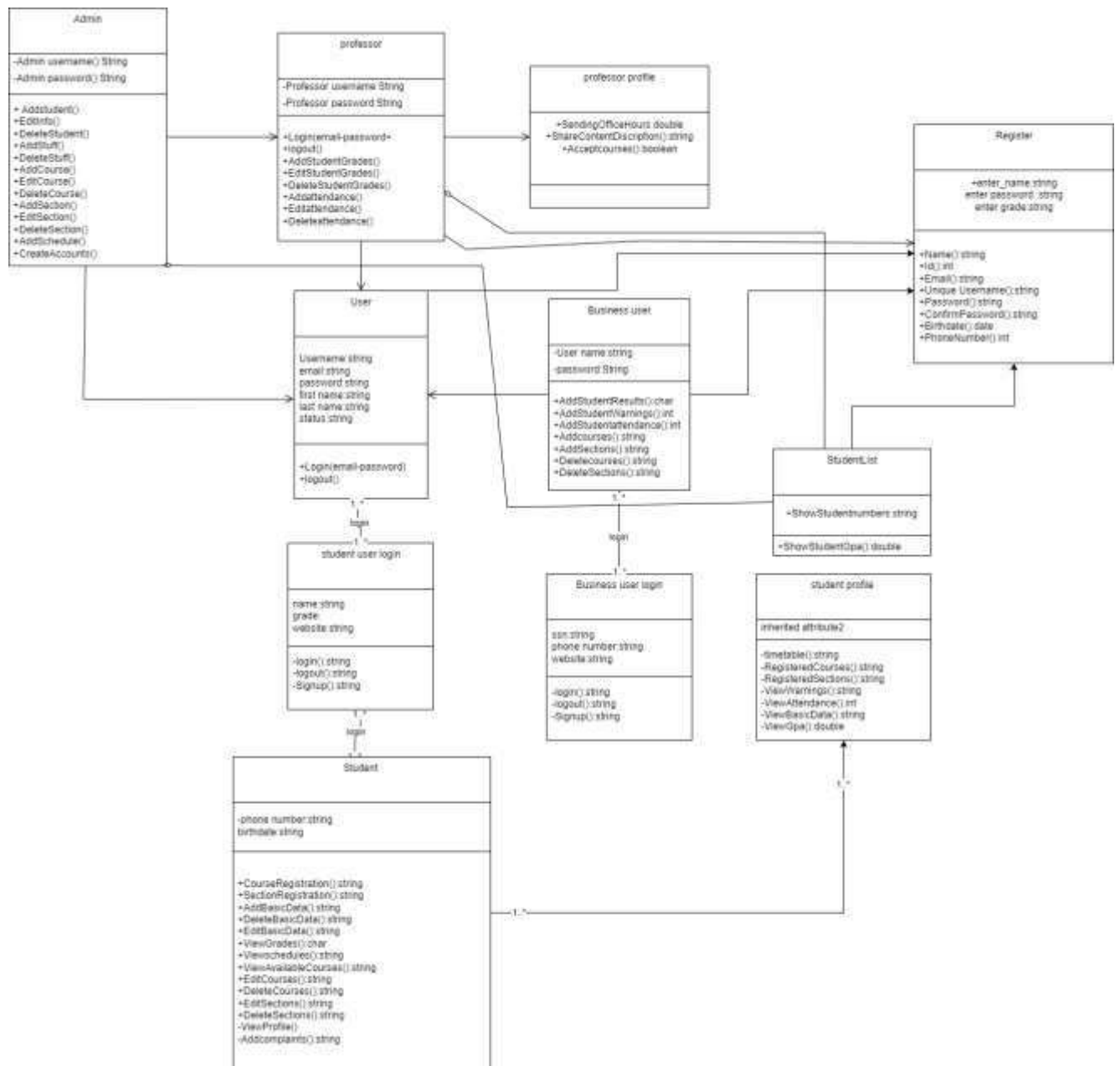
3.3.1 DFD-level 1



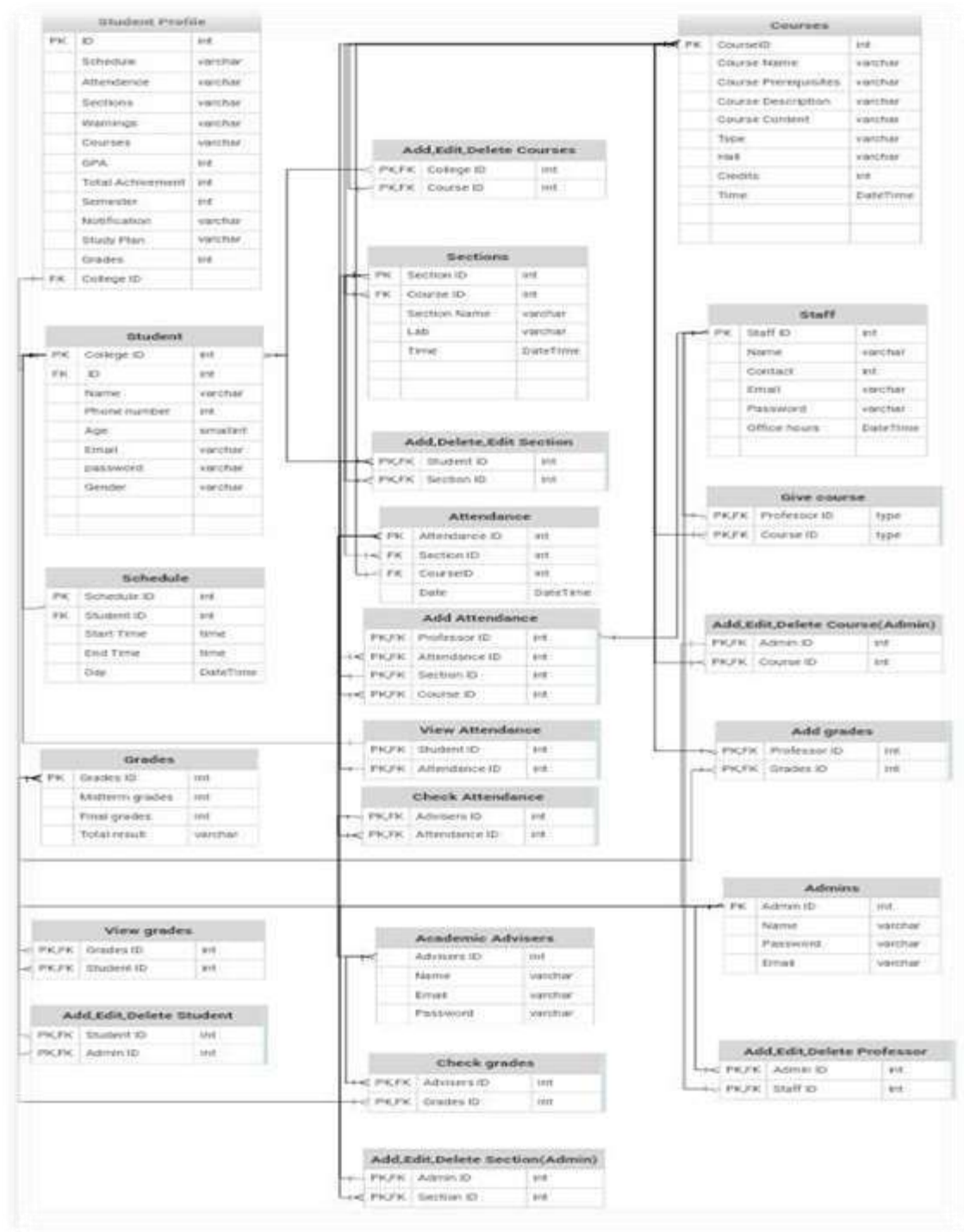




3.5 UML class diagram

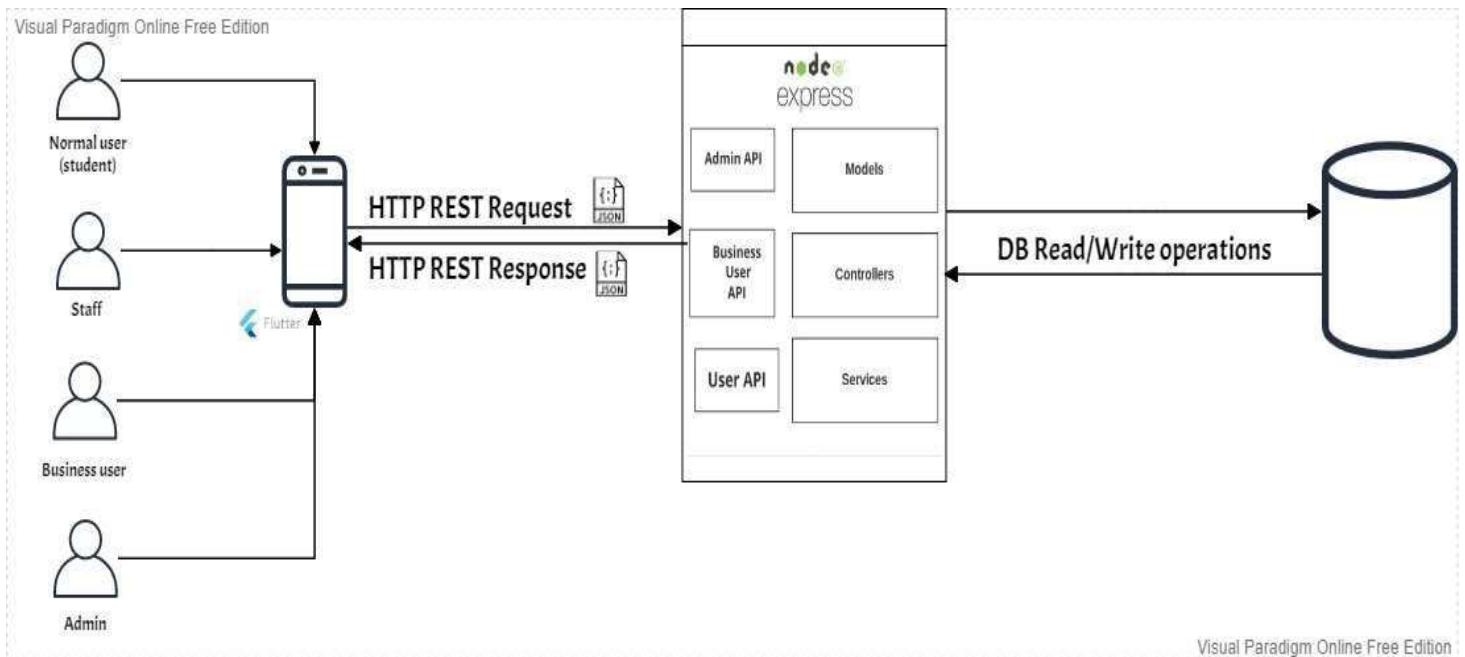


3.6 Data schema diagram



III. Implementation Aspects:

4.1 Overall System Architecture



4.2 Tools, Technologies and/or Programming Languages used

4.3 Technology Stack and tools:

4.3.1 Tech Stack:

4.3.1.1 Flutter (Mobile Application): Flutter is an open-source, cross-platform toolkit used for building apps with the same codebase, Flutter is based on dart and apply the principles of OOP and easy to learn. Flutter the same UI and business logic for all platforms which speeds the process of developing and delivering.

4.3.1.2 Node.js (Backend): Node.js is a single threaded JS environment for backend applications and has a powerful performance for I/O operations where it can handle a large number of simultaneous connections in a non-blocking manner which is good for our project when dealing with large amounts of users. Node.js has NPM (Node Package Manager) which has a set of useful libraries to use.

4.3.1.3 Mongo (Database): We have switched to MongoDB as our chosen database solution for storing project data. MongoDB is a NoSQL document database that offers flexibility and scalability. It integrates seamlessly with Node.js and provides a variety of ORMs (Object-Relational Mappings) in Node.js, making it easy to work with. MongoDB's document-

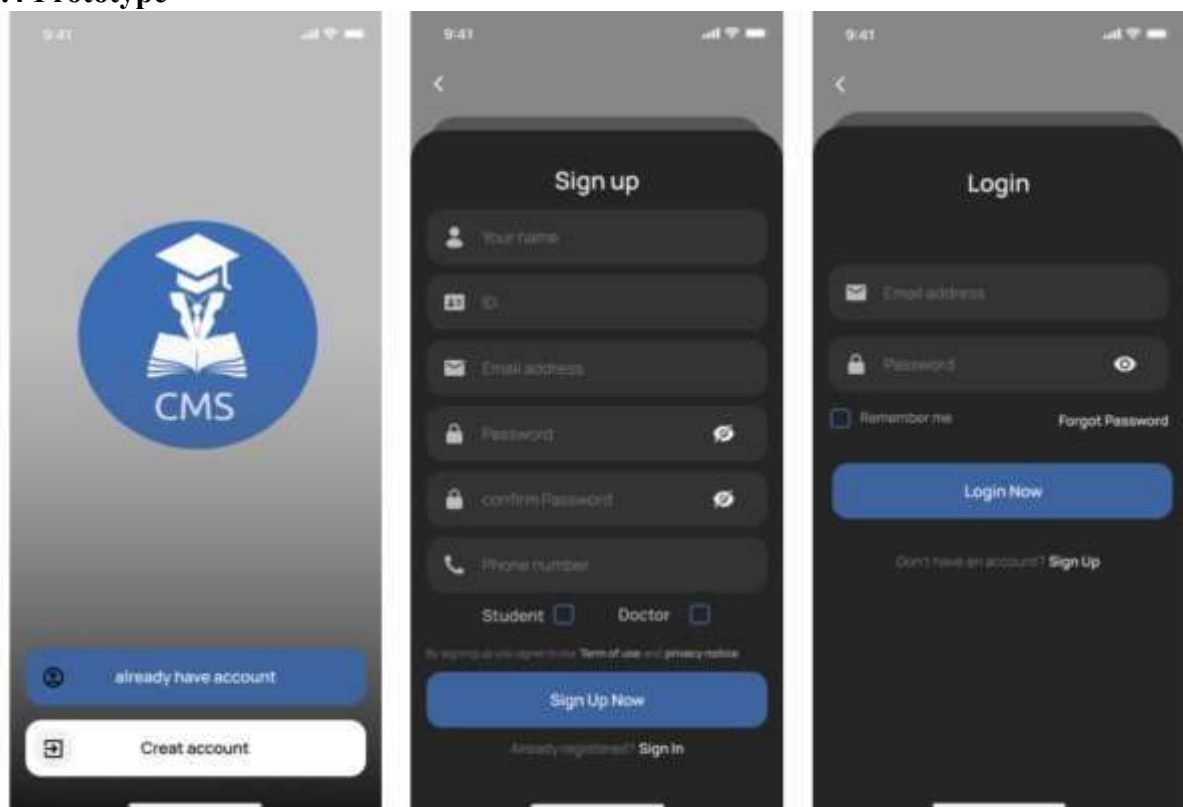
oriented approach allows for the storage of structured and unstructured data, enabling us to adapt to evolving project requirements. Additionally, MongoDB offers powerful features, ensuring high availability and fault tolerance. With MongoDB, we can leverage its rich querying capabilities and dynamic schema to efficiently manage data and support complex data relationships within our project.

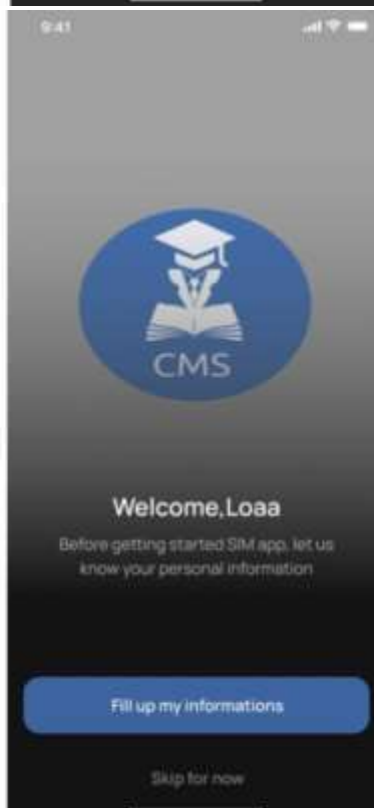
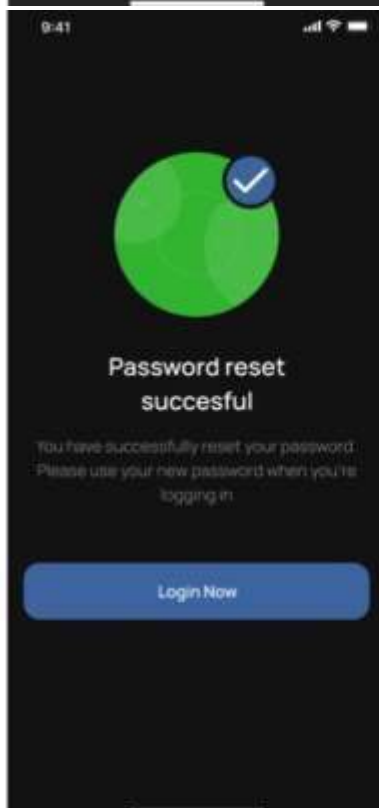
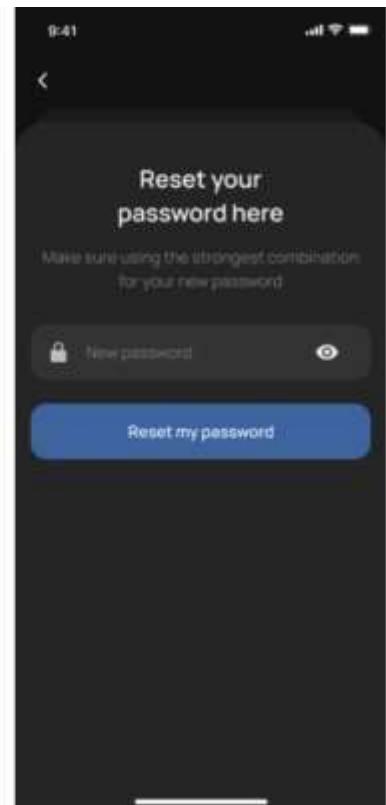
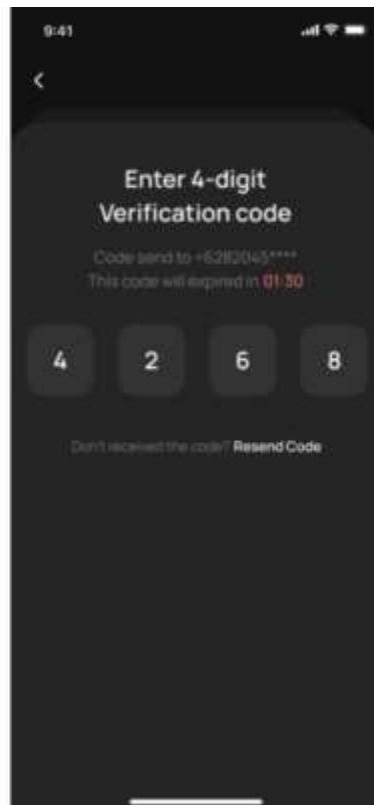
4.3.2 Tools

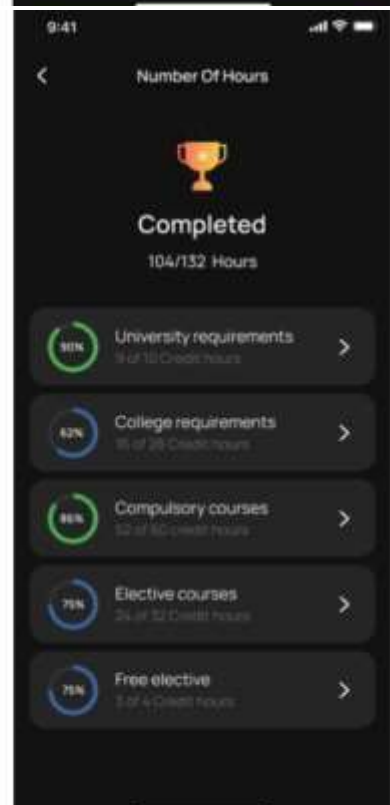
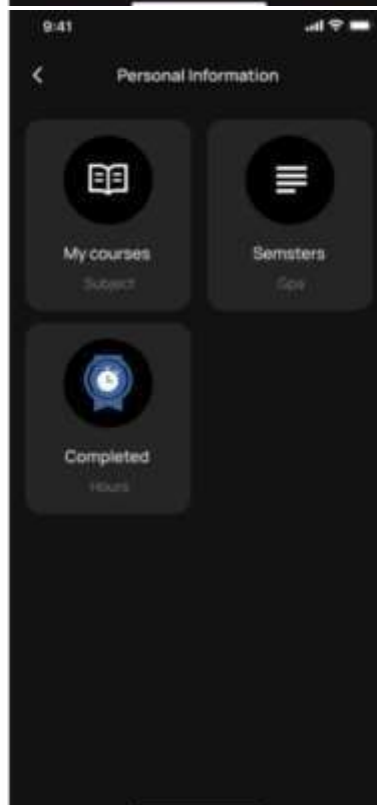
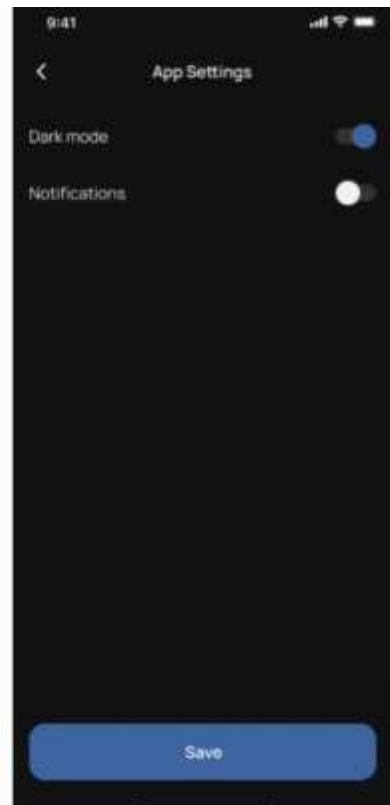
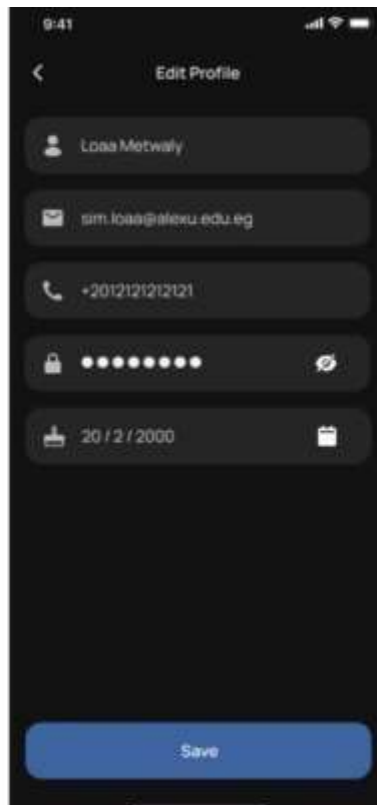
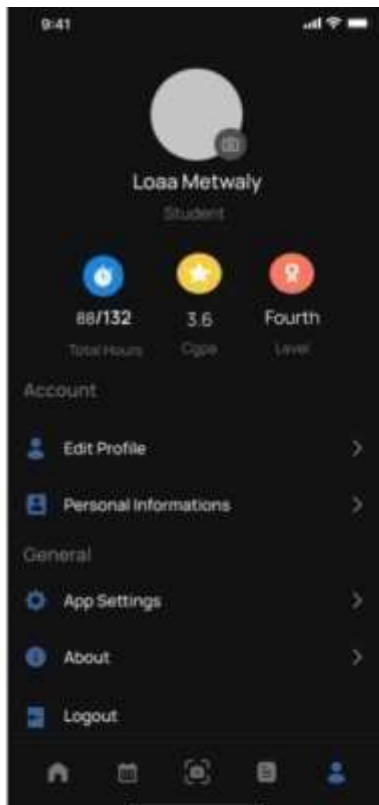
4.3.2.1 Discord: We use discord as a platform for our scrum meetings.

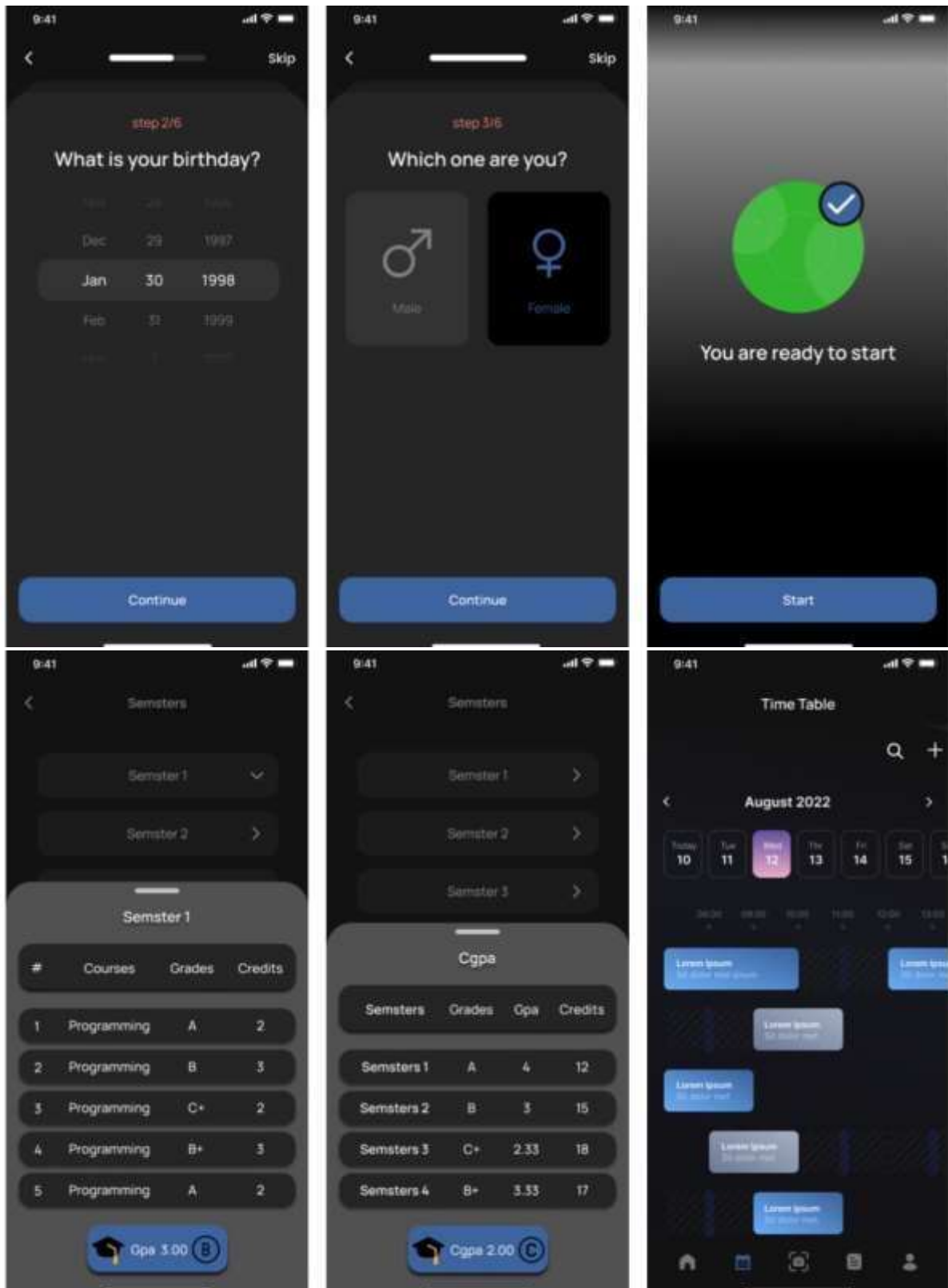
4.3.2.2 Render: We used render for deploying our application, it provides a streamlined and user-friendly deployment process. It abstracts away much of the complexity associated with infrastructure management, making it easy for developers to deploy their applications without worrying about server provisioning, scaling, and load balancing. With Render, you can focus on your application code and let the platform handle the deployment details. It offers a scalable and highly available infrastructure for your applications.

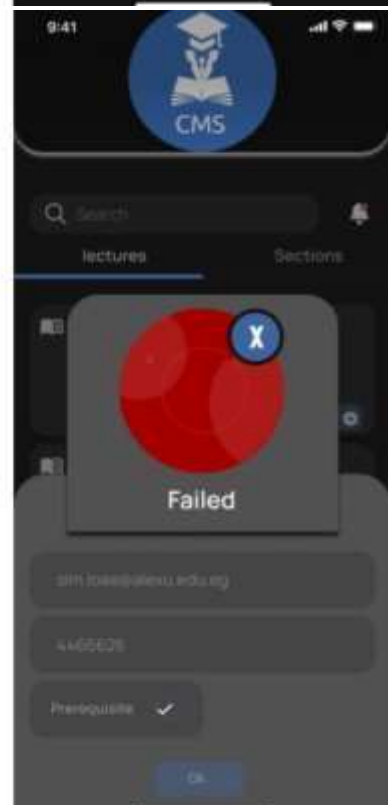
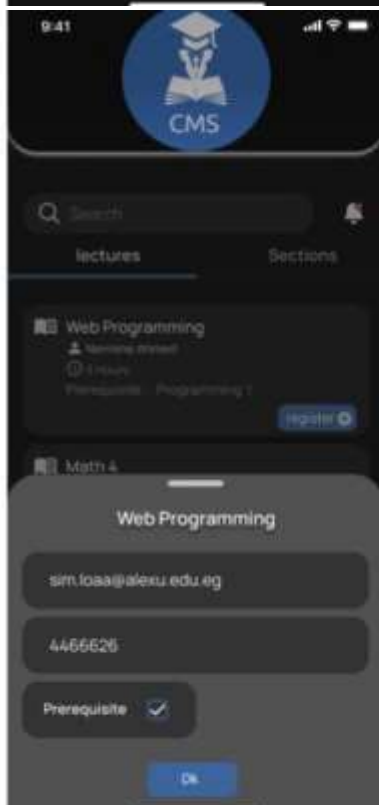
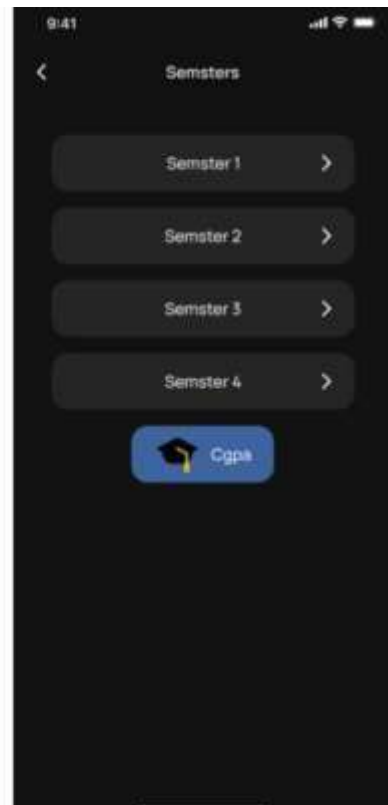
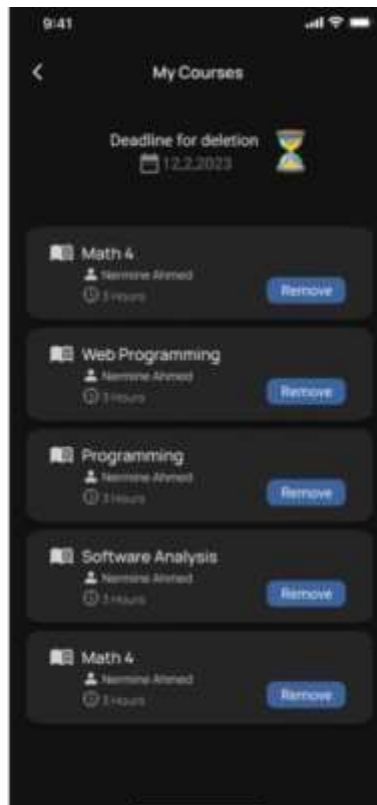
4.4 Prototype

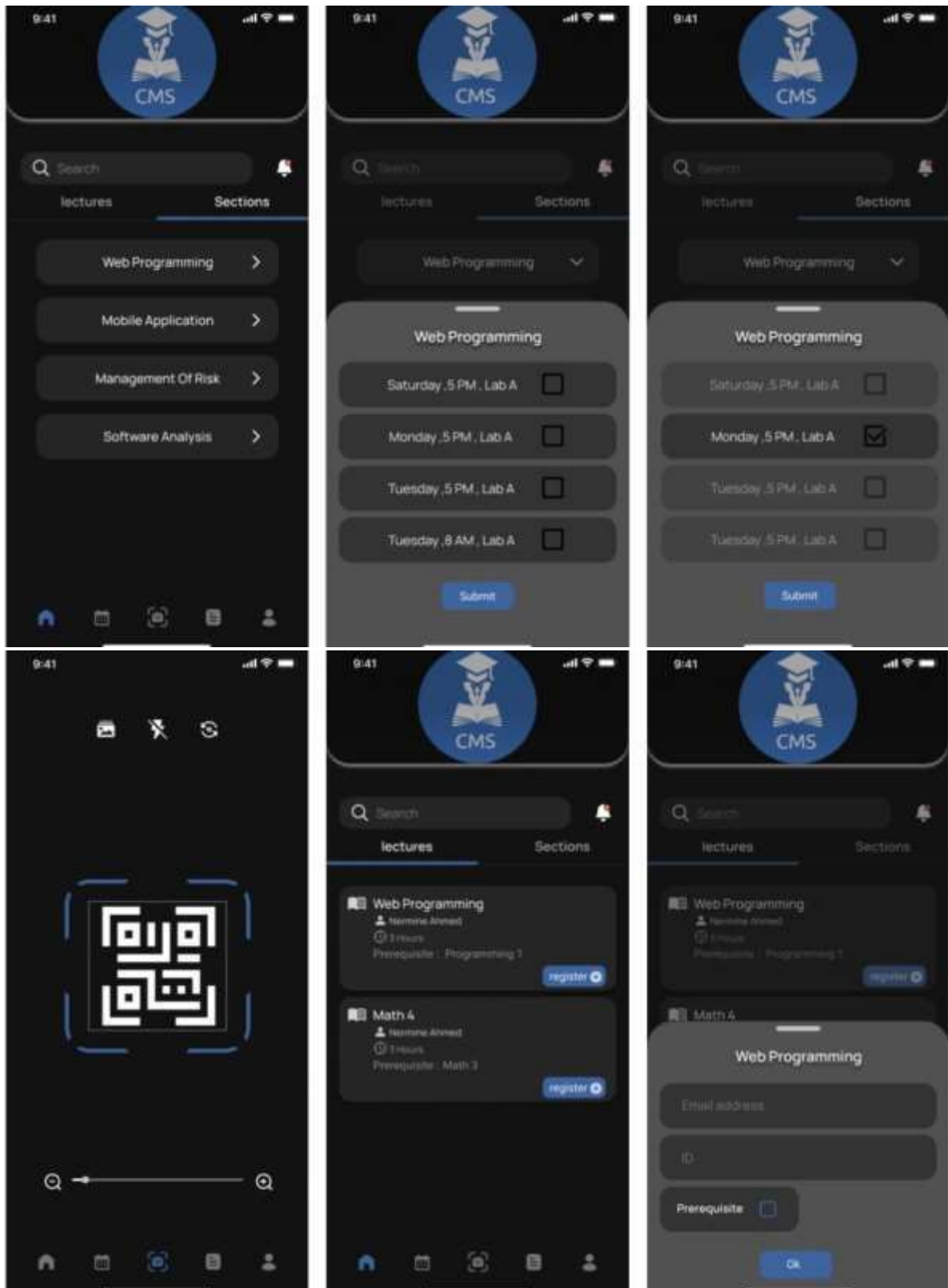


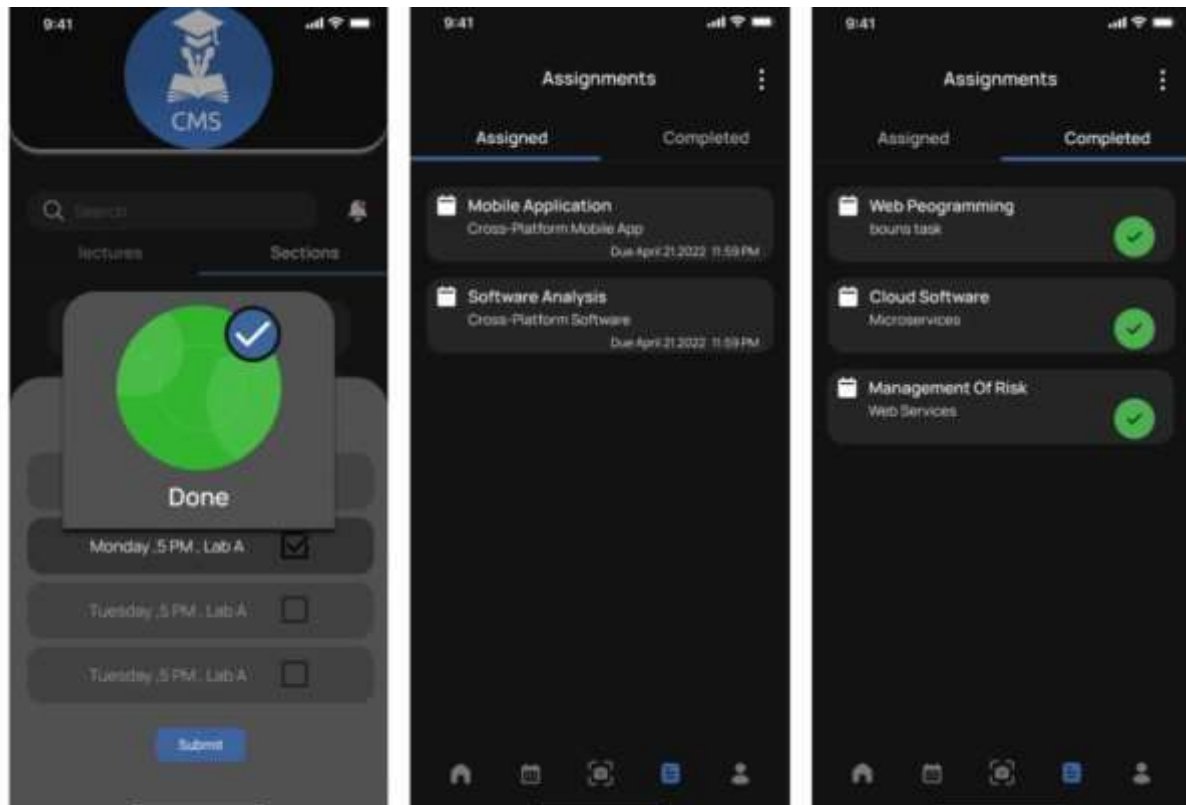












4.5 Future work:

- E-Academic advisor
- Online Payment