



Epoka e-Learner Requirements Specification

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CEN 302 – Software Engineering

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1. Executive Summary

1.1 Project Overview

Having to study remotely has made the use of online learning platforms an absolute necessity. Epoka university offers well-organized structures for this purpose however since all of the school-related activities are carried out online some deficiencies are made evident. The biggest problem being the use of too many platforms across all courses. This including Google Classroom, Epoka LMS, EIS, and Epoka official site.

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What this project aims, is to create an improved learning experience for Epoka University students, based on the already existing online platforms that the university uses. We intend on creating a mobile application to facilitate the student experience. Our application will offer a space where students can access all the necessary information during their studies and also create a communication channel between them and the professors. One of the goals is to make this interaction easier for a smoother learning experience.

1.2 Purpose and Scope of this Specification

The purpose of this project is to create a mobile application that will be an extension of Epoka Interactive System. This will provide students with the utilities that EIS offers. At the same time some of the information offered from Epoka's official site will be included. The students will also be able to access their courses and lectures which will be updated by the professors.

In scope:

- Creating a simple and efficient user experience for the users of this application (Students and Lecturers).
- Updating the legislation accordingly to guarantee the privacy and data safety of its users.

Out of Scope:

- Managing and having access to student data as they are considered confidential information.
- Creating an actual connection to EIS. The project will be working with static data which will be used as test data to check the quality and functionality of the application. So, an actual connection could only be made by the university officially once the project is complete.

2. Product/Service Description

2.1 Product Context

This product will have the same functionalities as EIS and Epoka LMS to get the necessary student information and the lectures for each course.

2.2 User Characteristics

Users include:

1. Students:

- Views courses, lectures, grades, attendance, finances.
- Gets a specific timetable view based on year, department, and group.
- Can request documents.
- Can view events or news relating to the university.
- Can select courses.
- Can make posts on their course page.
- Can view or request transportation (request was made available past year because of the pandemic, not sure if it will be a permanent feature).
- Can communicate with the professors through private comments.

2. Lecturers/Professors:

- Views and edits courses, lectures, attendance.
- Gets a timetable view.
- Can view events or news relating to the university.

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- Can view or request transportation (request was made available past year because of the pandemic, not sure if it will be a permanent feature).
- Can communicate with the students through private comments.

3. Advisor:

- Has the same privileges as the professor.
- Can see more information about the students including their GPA.
- Can make course approvals.

All users will be logged in with Epoka email account. Lecturers who were once students will be logged in with their new Epoka email account and this account will have lecture privileges. The advisor will be a professor with that same account, they will just be granted more privileges. All account emails will be retrieved from the database on Firebase so there is no need to check for specific Epoka email accounts.

2.3 Assumptions

The application will need a persistent network connection. Users will also need a mobile device to run this application on. They need to be using either iOS or Android.

2.4 Constraints

- Mobile-based frameworks and programming languages.
- Security concerns. Considering there will be a lot of personal information on the users, security is a main priority.
- Memory space.

2.5 Dependencies

- Most of the updates will be made by the professors, so students will rely heavily on them for their grades, attendance etc.
- Other updates will be made by the university staff which will be represented in the database.
- We need a simple user interface(prototype) to start testing the connection.

1. Requirements

1.1 Functional Requirements

EL_GR => E-Learner General Requirements

EL_SR => E-Learner Student Requirements

EL_PR => E-Learner Professor Requirements

EL_AR => E-Learner Advisor Requirements

Req#	Requirement	Comments	Priority	Date Rvwd	SME Reviewed / Approved
EL_GR_01	Users have different privileges but same base view.		3	20/04/21	

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EL_GR_02	Users should be able to log in and log out, no sign up available.		1	20/04/21	
EL_GR_03	After leaving the app users should not be logged out.		1	20/04/21	
EL_GR_04	Each user has their own profile, they cannot edit their profile data.	Same data as their Epoka email account.	1	20/04/21	
EL_GR_05	Users can access emergency tab.		1	20/04/21	
EL_GR_06	Users can see all of the events which will be updated in real time.		3	20/04/21	
EL_GR_07	Users can access the full timetable.		2	20/04/21	
EL_GR_08	Grade and GPA will be calculated automatically.		1	20/04/21	
EL_AR_01	Advisors can confirm course selection.		1	20/04/21	
EL_AR_02	Advisors can confirm students eligible for GP.		2	20/04/21	
EL_AR_03	Advisors cannot edit student's information.		1	20/04/21	
EL_PR_01	Professors cannot create courses. Courses are created automatically with data from the course selection.		1	20/04/21	
EL_SR_01	Students can access only selected courses.		1	20/04/21	
EL_GR_09	All users can access the timetable.		3	21/06/21	
EL_GR_10	All users can access the transport timetable.		3	21/06/21	/

1.2 Non-Functional Requirements

1.2.1 User Interface Requirements

In addition to functions required, describe the characteristics of each interface between the product and its users (e.g., required screen formats/organization, report layouts, menu structures, error and other messages, or function keys).

1. Firstly, there is the login in view containing fields for username and password, show password, forgot password button and continue with Gmail button.
2. After logging in the opening view will be the same for each user. There are two options so far. Having a feed for the news, a bottom navigation bar and a sidebar menu which contains all of the necessary tabs (courses, attendance etc). Or having small box like components with all of that information. More information on the views will be given in the sketches.

1.2.2 Usability

7. Learnability:

- The application should be easy to use. A lot of the functionalities are similar to platforms that the students are already familiar with, like Epoka LMS, EIS and Google Classroom, so the users won't need specific training.
- When first logging in to the app there will be tips to guide the users through the app.
- In case of error message, the cause for the error will be displayed.

13.2.3 Performance

8. Depends on the user's internet connection speed and strength.
9. Depends on the hardware that the user uses to access the application.
10. It also depends on the number of users that can access the application at the same time.

3.2.3.1 Capacity

The database will be working with static data. The first tests will be done with a small amount of users, then later on we will increase the number of users close to the actual number of students and academic staff that will be using the application. Firebase can offer up to an unlimited number of users and connections.

3.2.3.2 Availability

11. Application should be available at all times.
12. It will be only for the intended users (students and professors of Epoka).
- There should be as little downtime as possible, even outside of working hours, as students need to be able to access the application at all times.
14. Accessible at any geographical location.
15. In case of planned downtime due to maintenance the users should be notified beforehand.

3.2.3.3 Latency

- Depends on the internet connection strength which is not covered by the system.
- Depends on the size of the database.
- Latency for documents to be uploaded.
- App should open for at most 1.5 s.

1.2.4 Manageability/Maintainability

3.2.4.1 Monitoring

- When user enters correct credentials, they are logged in. If not, an error message will be displayed telling them that either their password or username was not correct. There will be an option in case password is forgotten. It will be reset using email.
- App performance monitoring will be done through app statistics and user ratings.

3.2.4.2 Maintenance

- Updates should be documented while preserving system integrity.
- Users will be informed in case of errors or downtime due to maintenance.

3.2.4.3 Operations

16. The users require login at any time.
17. Each user will have different accessibilities based on their needs. They are explained more in detail in the requirements specification.

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18. Different types of users will be able to access some of the same tabs (timetable, calendar, library etc).
19. Each user should have access to notifications based on updates or recent posts.

1.2.5 System Interface/Integration

3.2.5.1 Network and Hardware Interfaces

The application will run on mobile phones (Android and iOS). It can run on most phones without a problem, the mobile phone is the only hardware required.

3.2.5.2 Systems Interfaces

The professor interface can make assignment posts where the student interface will be able to upload the document to be saved to a firebase storage. The professor interface can make a post where the student interface can comment on, increasing the communication. The student interface can make the same thing.

1.2.6 Security

3.2.6.1 Protection

Specify the factors that will protect the system from malicious or accidental access, modification, disclosure, destruction, or misuse. For example:

20. Activity and error logging.
21. Password encryption.
22. Users will be logged using their Epoka mail.
23. Professors can only access the grades and attendance of students for their courses.
24. Advisors will have some more privileges like the students' GPA and some of their general personal information.
25. Other personal student information like the ones required on the documents given by registrar's office can be accessed only by them. It will be protected in the database.

3.2.6.2 Authorization and Authentication

- Single-factor authentication.
- Username and password login or login with Gmail, only with Epoka emails.
- In case of password change, the new password can be set via email.
- Each category of user is authorized with their specific accessibilities.

1.2.7 Data Management

All the information that will be dealt with in this application, is specific to students and professors. So, the attributes will be specific to the users.

1.2.8 Standards Compliance

Considering the personal and sensitive information this application will handle, it is necessary that it will comply to a set of regulations that protect these data. To protect the privacy of the users, the application will comply with EU's GDPR (General Data Protection Regulation) which addresses data protection, transfers and privacy.

1.2.9 Portability

The application can be used on a mobile phone (Android iOS) that has an internet connection.

3.3 Domain Requirements

- Users can access the lecture and transport timetables.
- They can access general information about each faculty and department.
- They can access the library system.

3. System Design

3.1 User Scenarios

1. User Scenario 1 – finance approval
 - a.
 - b. Student makes payment.
 - c. Finance makes approval.
 - d. Changes are made in the system.
 - i. Semester fee is considered paid. It shows in the finance section.
 - ii. Courses are approved by finance. It shows in course selection.
 - iii. Documents are approved by finance. It shows in the document request section.
2. User Scenario 2 – course selection / approval
 - a. Finance approves the courses.
 - b. Students select the courses they will take for the semester.
 - c. If the selection is correct then they receive advisor approval.
3. User Scenario 3 – document request
 - a. Students select document type, number of copies and add notes(optional).
 - b. Students select submit button.
 - c. If they have made the payment, they will receive finance approval.
 - d. Once they have the approval, they will receive a notification that the payment is approved.
 - e. They receive registrar approval.
 - f. When the documents are ready, they will get a notification (and/or email) that the documents are ready to pick up.
4. User Scenario 4 – making post
 - a. Users click on post section in the tab of the specific course.
 - b. Users click on the add button to add any type of file.
 - c. After finishing writing the post, they click on the post button.
 - d. After the post is made other users can comment on the post. They cannot add files in the comments.
5. User Scenario 5 – submitting grades
 - a. Professors add type of grade.
 - b. They add weight of grade.
 - c. They add the grade, class average is calculated automatically.
 - d. They add date and of the grade.
 - e. Course progress bar is updated automatically.
 - f. After changes are saved, the grades will appear to the students on the grades section and on the course section (only the current average).
6. User Scenario 6 – submitting attendance
 - a. Professors add attendance week.

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- b. Professors add lecture topic.
 - c. They add the attended hours and date and time.
 - d. Once changes are saved the attendance shows to the student on the attendance tab and on the specific course tab (the current attendance).
7. User Scenario 7 – login
- a. Any user might login.
 - b. The user enters email.
 - c. The user enters password.
 - d. If the show button is pressed, they can see the hidden password.
 - e. If they click on the show button again, then the password is hidden.
 - f. If the credentials are ok the user logs in.
 - g. If the credentials are not ok, nothing happens, the user cannot login.
8. User Scenario 8 – logout
- a. Any user can logout.
 - b. If they click on the logout button on the bottom of the left-hand side menu, they will be logged out.
 - c. The login screen shows up again.
9. User Scenario 9 – change theme
- a. Any user can change the theme.
 - b. If the user clicks on the button at the top of the page, the theme of the app changes, from light mode to dark mode and vice-versa.
 - c. Every page of the application changes theme.
10. User Scenario 10 – view timetable
- a. Any user can view the timetable.
 - b. If the user clicks on the timetable button, they will be redirected to the timetable web view of the official Epoka University web-page.
11. User Scenario 11 – view transport timetable
- a. Any user can view the transport timetable.
 - b. If the user clicks on the transport button, they will be redirected to the transport timetable web view of the official Epoka University web-page.

Use cases

UC_01	Login
Summary	Every user enters his credentials to log in the account
Actor	Professor, Student, Advisor
Description	Users can log into their account if they enter the right credentials.
Precondition	Every user should be previously register by university.
Alternatives	If the credentials are wrong the user is asked to enter the right credentials.

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Post Condition	Users are logged into their account.
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UC_02	Logout
Summary	Every user has the right to log out from the account.
Actor	Professor, Student, Advisor
Description	Users can log out from the account by clicking a button.
Precondition	Every user should be previously logged in.
Alternatives	An alternative to not logging out is staying logged in.
Post Condition	Users are logged out of their account.

UC_03	Change theme
Summary	Every user may change the theme of the application.
Actor	Professor, Student, Advisor
Description	Users can click on a button to change the theme from dark to light and the other way around.
Precondition	Each user should be previously logged in.
Alternatives	User does not change the theme.
Post Condition	The theme is changed.

UC_04	View user profile
Summary	Every user may view its profile.
Actor	Professor, Student, Advisor
Description	Users can click on a button to change the theme from dark to light and the other way around.
Precondition	Each user should be previously logged in.
Alternatives	User clicks another button and is redirected in another page.
Post Condition	User checks its data in the profile page.

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UC_05	View courses
Summary	Students has a view of the courses that he/she has selected.
Actor	Student
Description	Students when open the courses page may view their course selections and the approval of the adviser.
Precondition	Students should be previously logged in.
Alternatives	Student clicks another button and is redirected in another page.
Post Condition	Students get information about the courses and the advisor approval.

UC_06	View grades
Summary	Students and advisor have a different view of the grades page.
Actor	Student, Adviser
Description	Students when open the courses page may view their grades for each course that they have taken and the weight of every exam or assignment. The advisor may see the grades of each student.
Precondition	Each user should be previously logged in.
Alternatives	User clicks another button and is redirected in another page.
Post Condition	User gets information about the grades or enters grades to the system.

UC_07	View attendance
Summary	Students and professors have different usage of the attendance page.
Actor	Student, Professor
Description	Students when open the courses page may view their attendance for each course and for their

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	lessons. When the professor opens the page he may
Precondition	Each user should be previously logged in.
Alternatives	User clicks another button and is redirected in another page.
Post Condition	User gets information about the attendances or enters attendances to the system.

UC_09	View finance
Summary	Student may view their finance status for the rest of the semester.
Actor	Student
Description	Students when open the finance page may view the amount of money they have paid and the amount they still have to pay.
Precondition	Students should be previously logged in.
Alternatives	User clicks another button and is redirected in another page.
Post Condition	User gets information about the finances and the payments he/she still has to make.

UC_10	View timetable
Summary	Users access the webpage of the university about the timetable inside the app.
Actor	Student, Professor
Description	Students and professors when open the timetable page are connected to the web of the university and may access every faculty and professor name they want.
Precondition	Users should be previously logged in.
Alternatives	User clicks another button and is redirected in another page.

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Post Condition	User gets information about the timetable and the courses.
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UC_11	View transport timetable
Summary	Users access the webpage of the university about the transport timetable inside the app.
Actor	Student, Professor
Description	Students and professors when open the transport page are connected to the web of the university and may access every route they want and see the time of buses.
Precondition	Users should be previously logged in.
Alternatives	User clicks another button and is redirected in another page.
Post Condition	User gets information about the time and stations of the buses.

UC_12	Enter grades
Summary	Professor goes to the grades page to enter students' grades. Professor is the only user who can access this page.
Actor	Professor
Description	Professor has the list of the students and for each student has the ability to change and add the weights, the grades for finals, midterms, projects, assignments, etc.
Precondition	Professor should be previously logged in.
Alternatives	User clicks another button and is redirected in another page.
Post Condition	Grades are entered in the system and each student may see them in their grades page.

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UC_13	Enter attendance
Summary	Professor goes to the attendance page to enter students' attendances. Professor is the only user who can access this page.
Actor	Professor
Description	Professor has the list of the students and for each student has the ability to change and add the attendances for each lesson and student.
Precondition	Professor should be previously logged in.
Alternatives	User clicks another button and is redirected in another page.
Post Condition	Attendances are entered in the system and each student may see them in their attendance page.

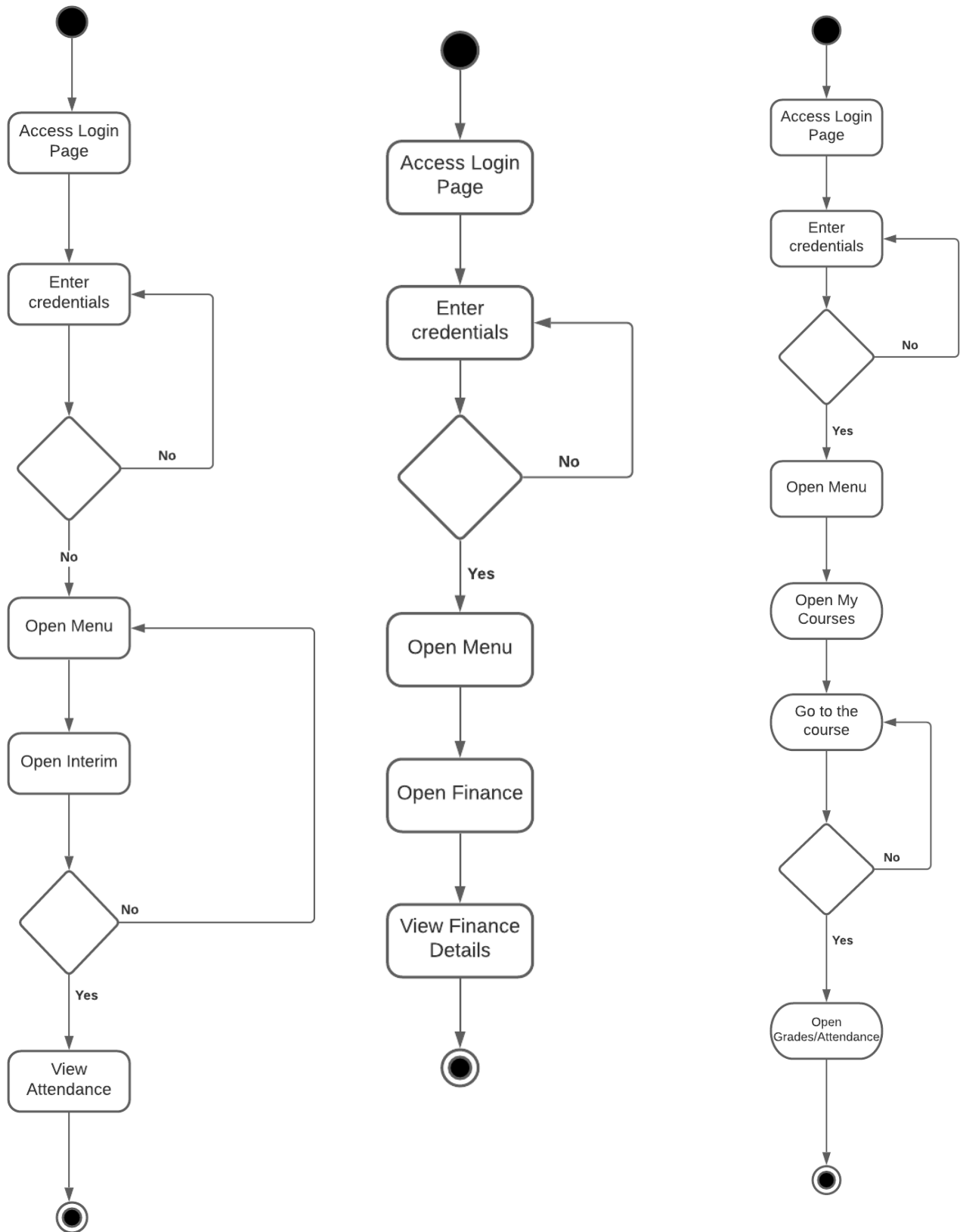
UC_14	Approve courses
Summary	Advisor has a view of the courses that every student has selected.
Actor	Advisor
Description	Advisor when opens the courses page may view the students' course selections and the buttons to approve these courses for each student or not.
Precondition	Advisor should be previously logged in.
Alternatives	Advisor clicks another button and is redirected in another page.
Post Condition	Students may view the course approval into their course page.

3.2 UML Diagrams

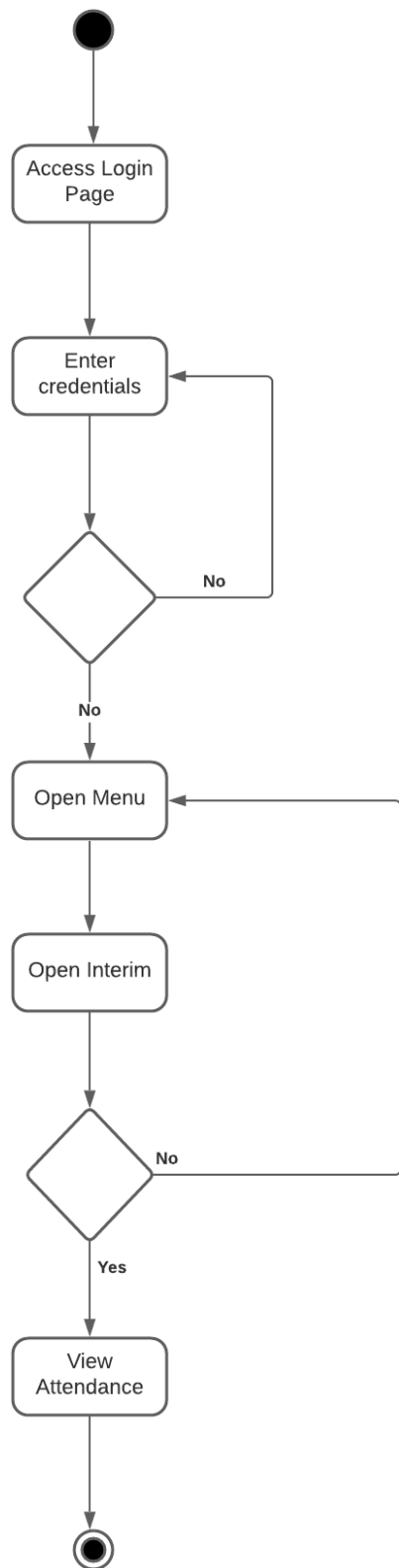
3.2.1 Use Case Diagram



3.2.2 Activity Diagram

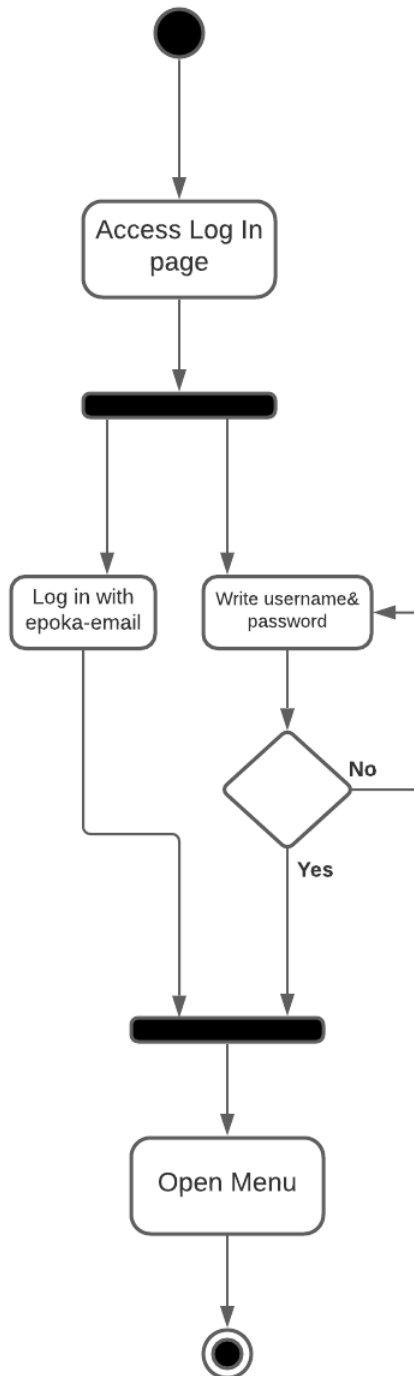


Attendance Activity Diagram



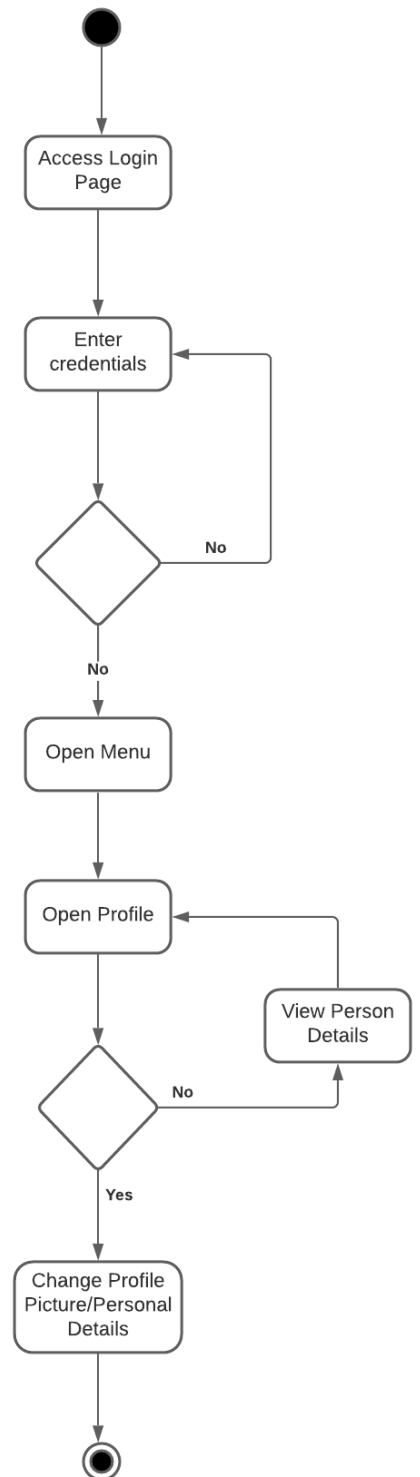
Grades Activity Diagram

Finance Activity Diagram

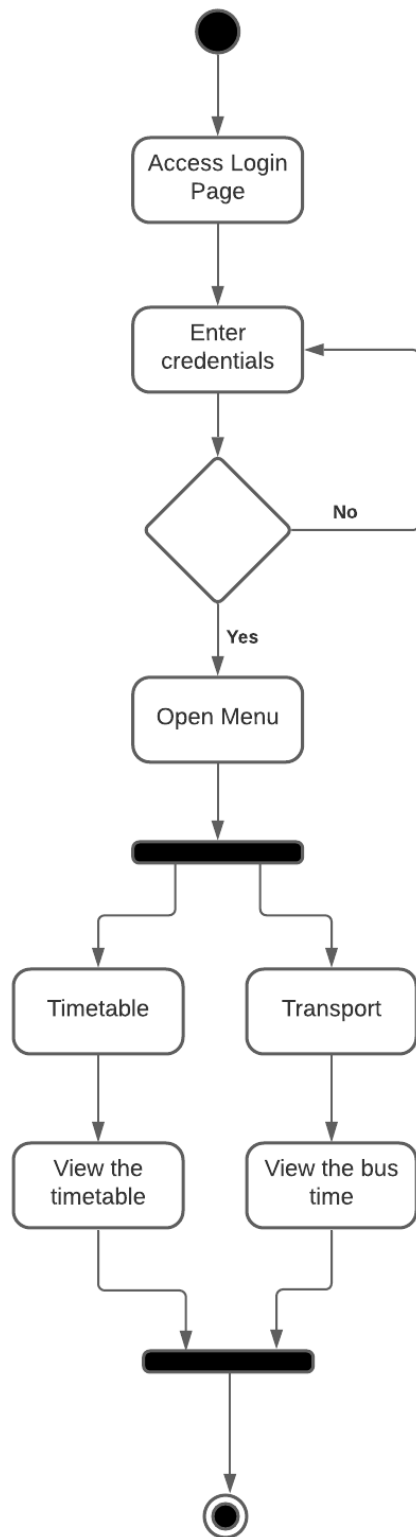


Login Activity Diagram

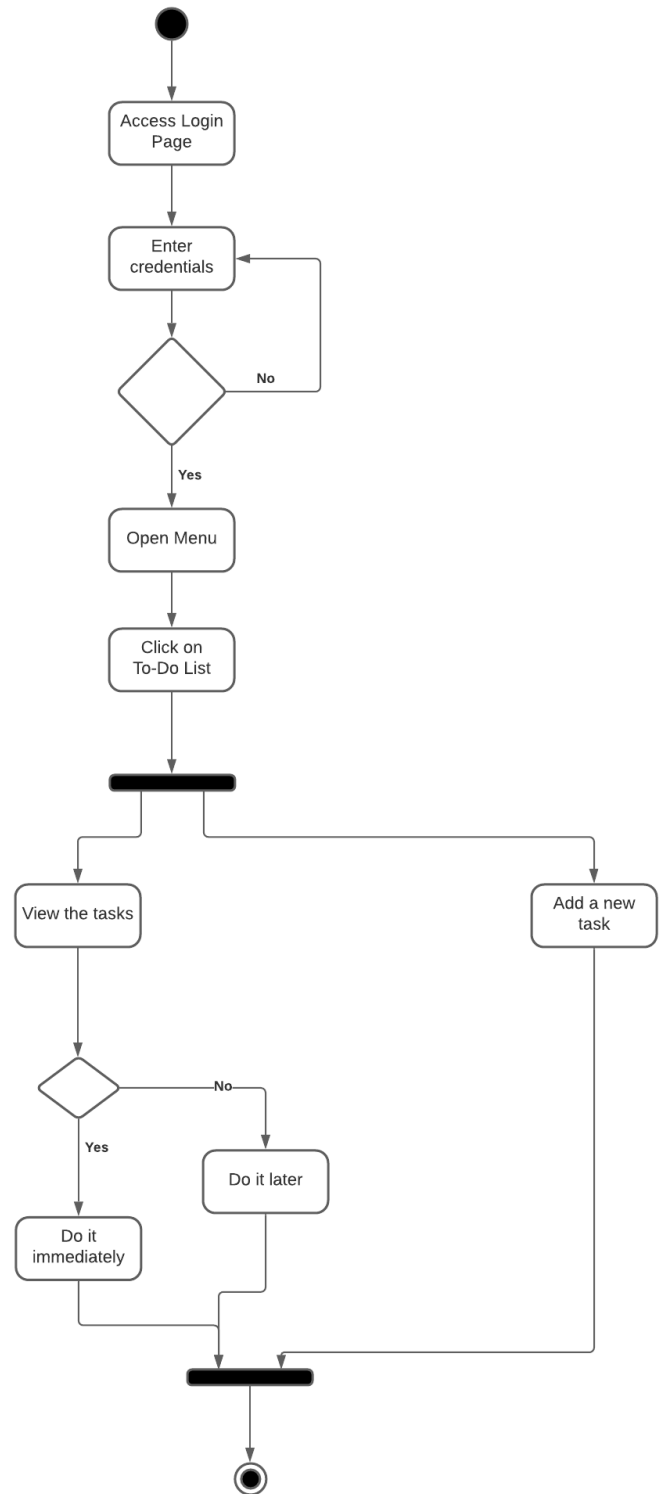
Course Activity Diagram



Profile Activity Diagram

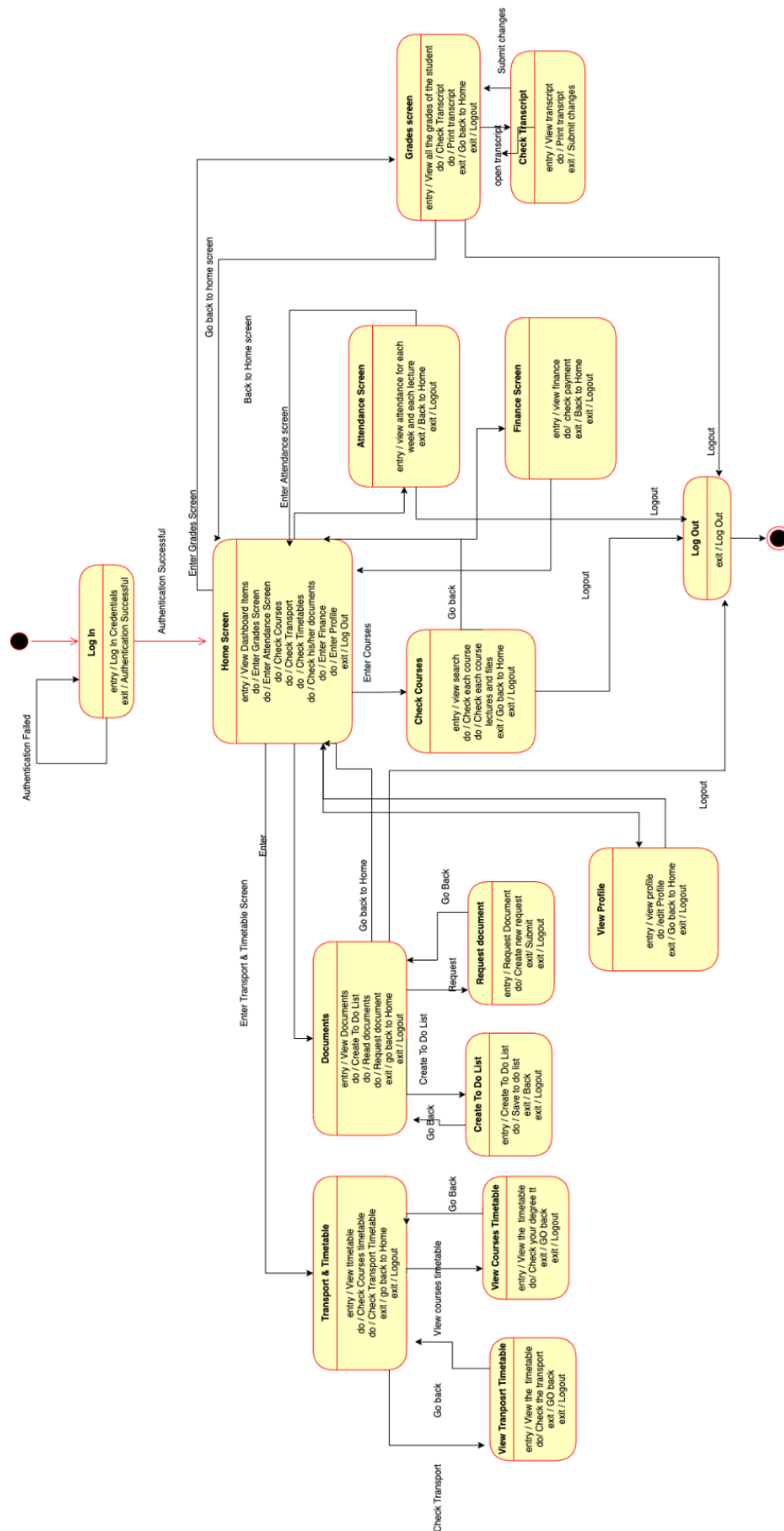


Timetable/ Transport Activity Diagram



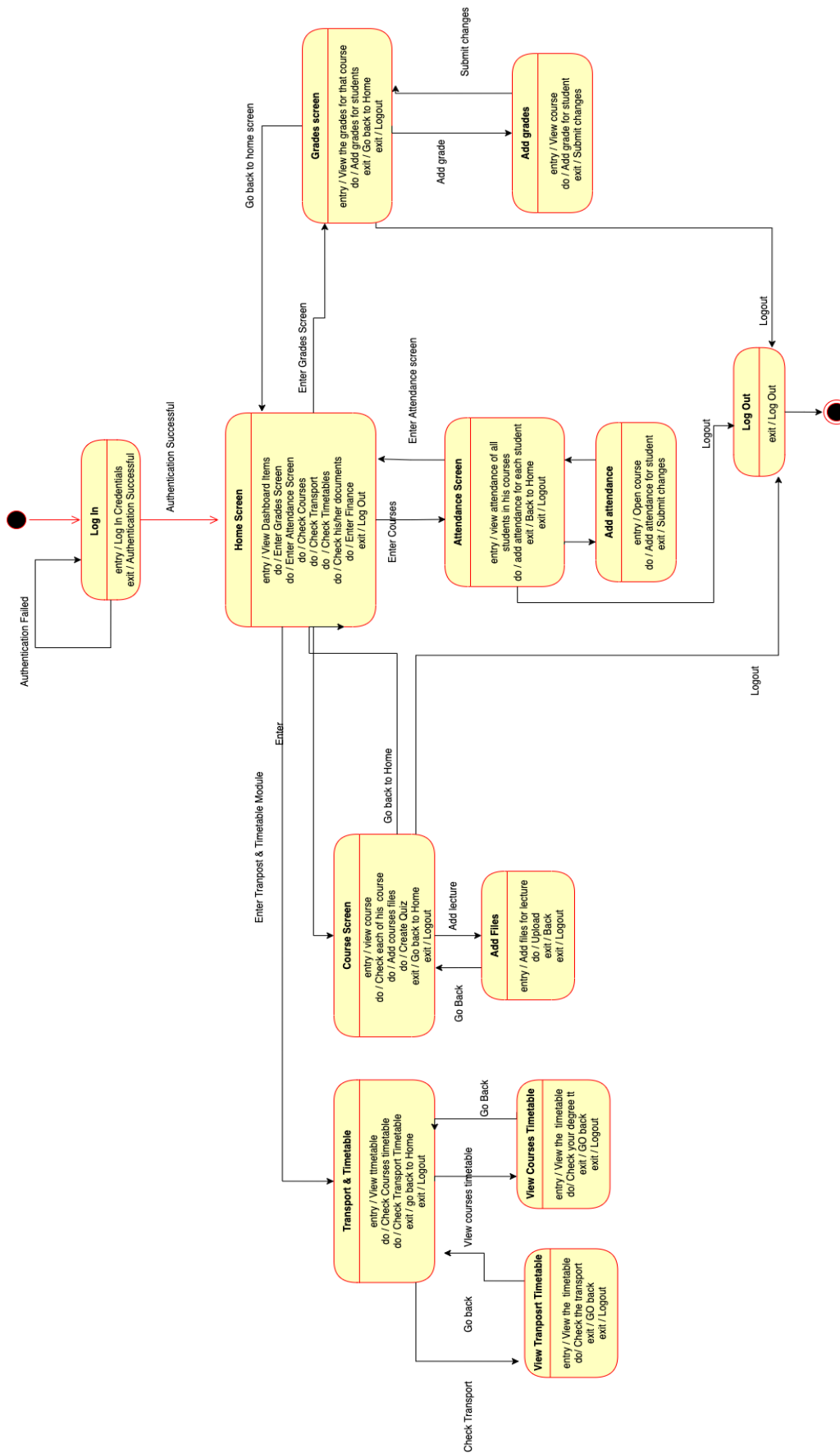
To-Do List Activity Diagram

3.2.3 State Diagram

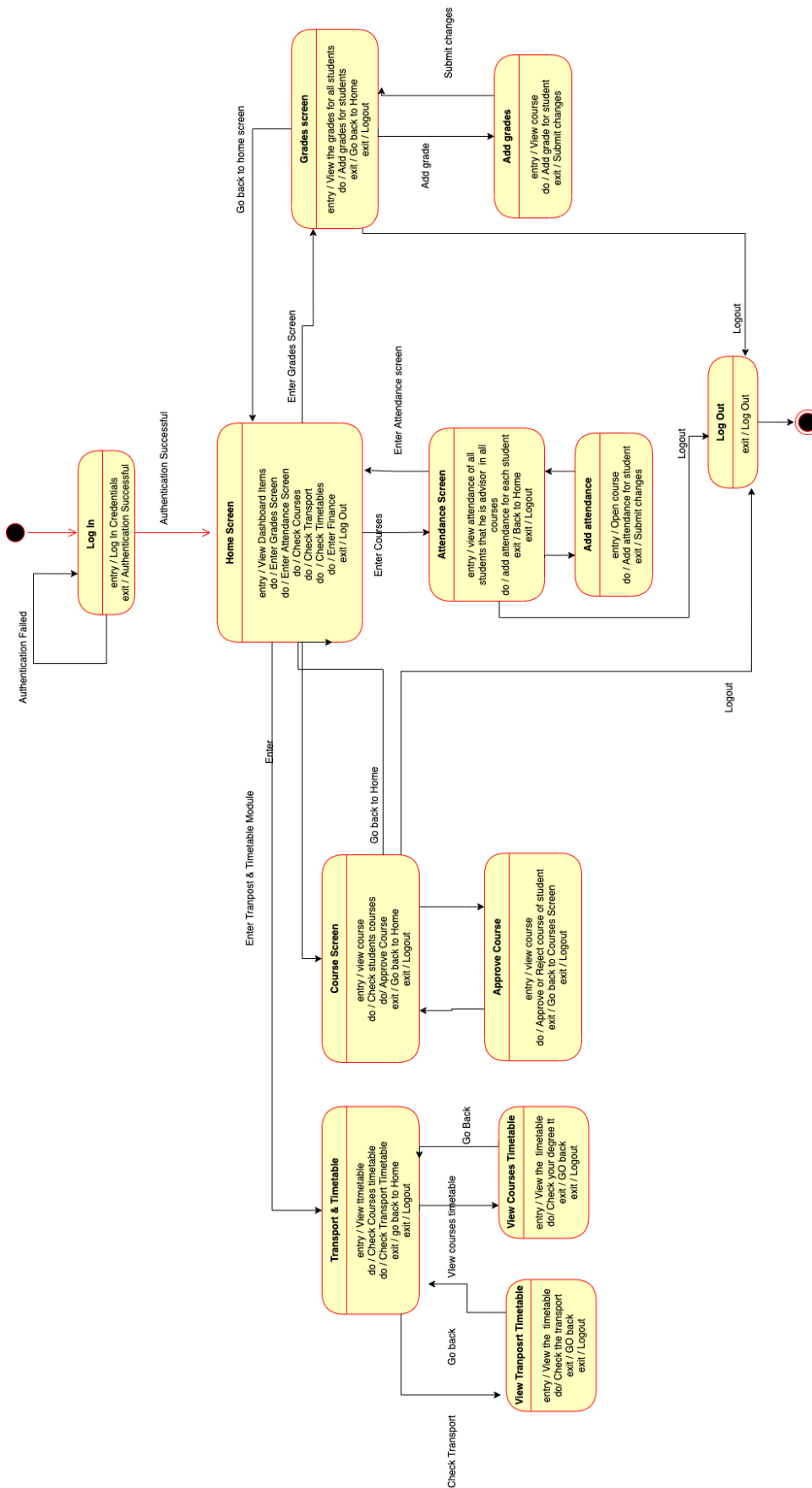


Student State Diagram

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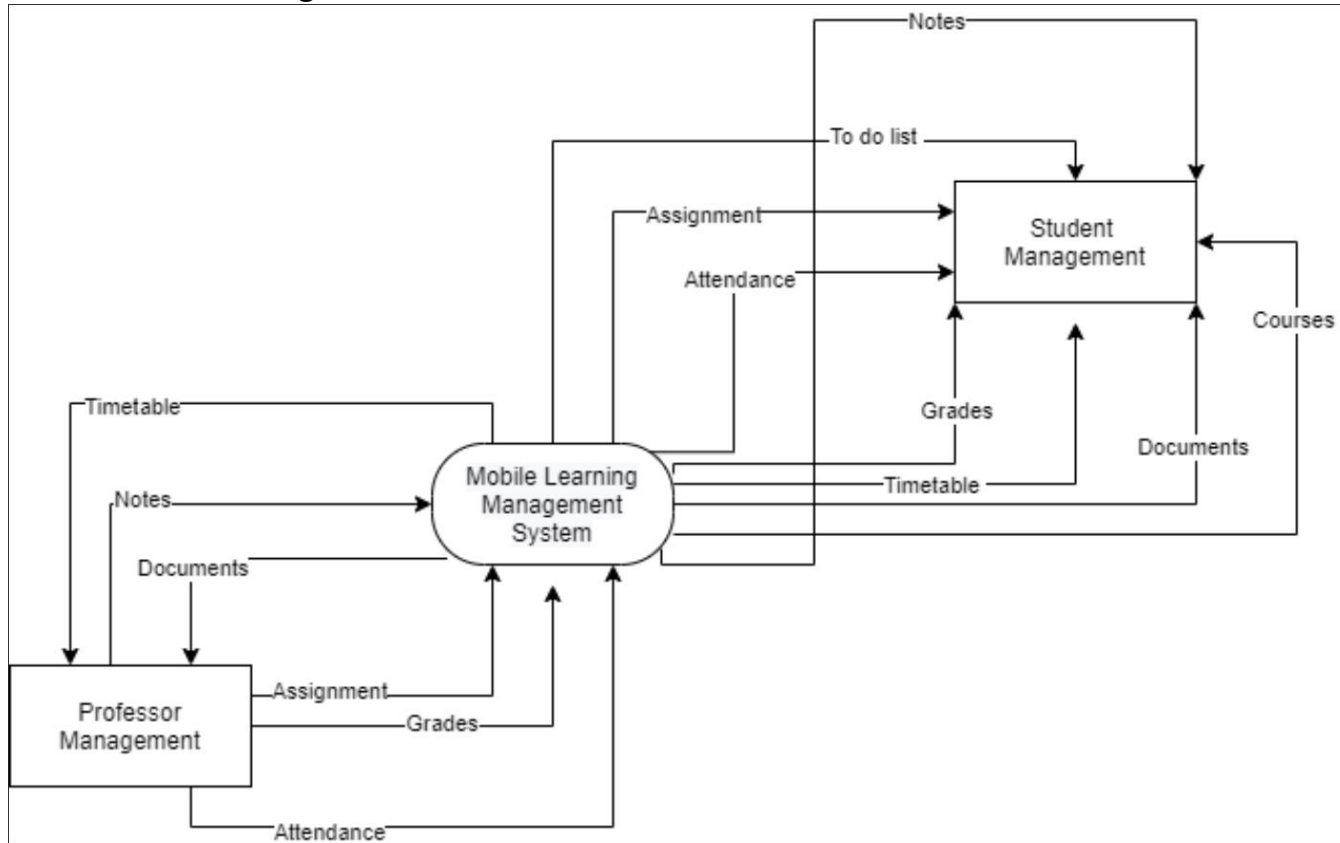


Professor State Diagram

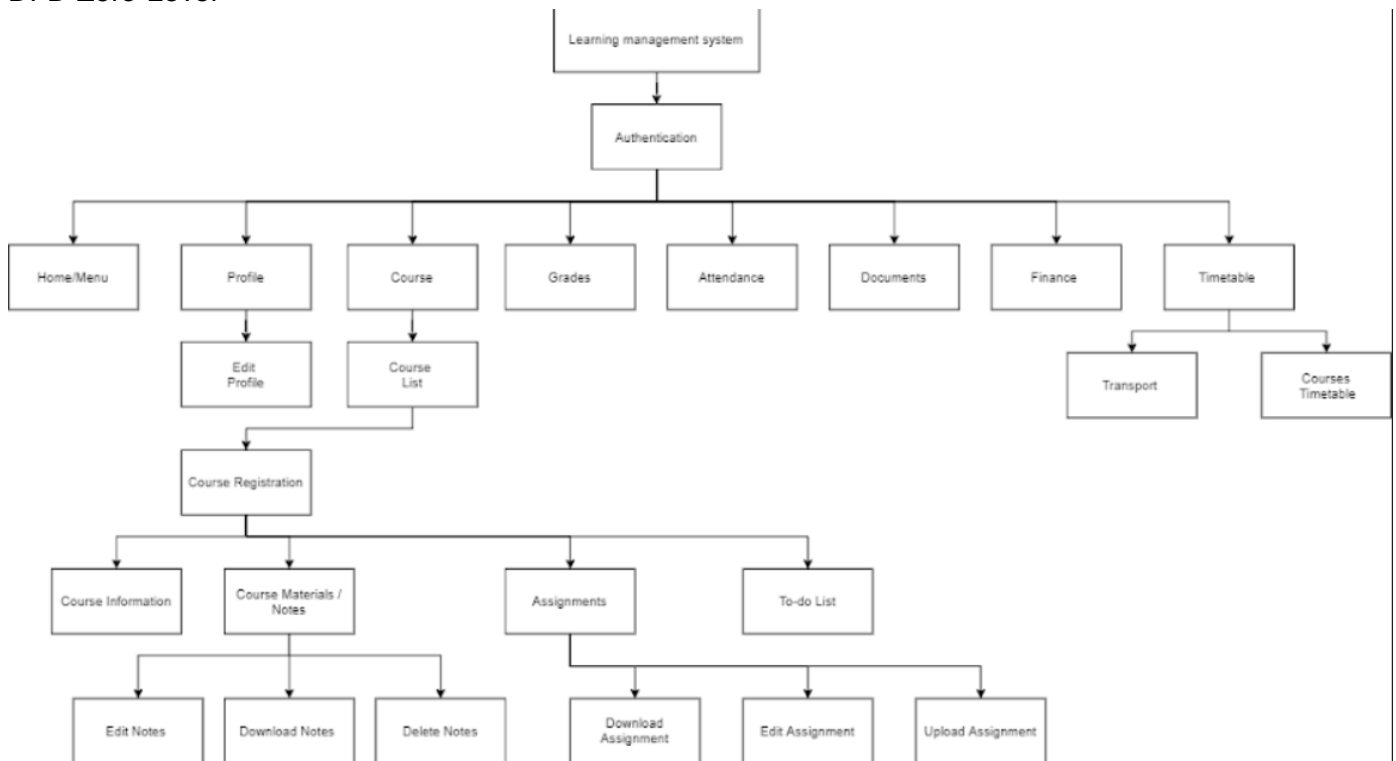


Advisor State Diagram

3.2.4 Data Flow Diagram

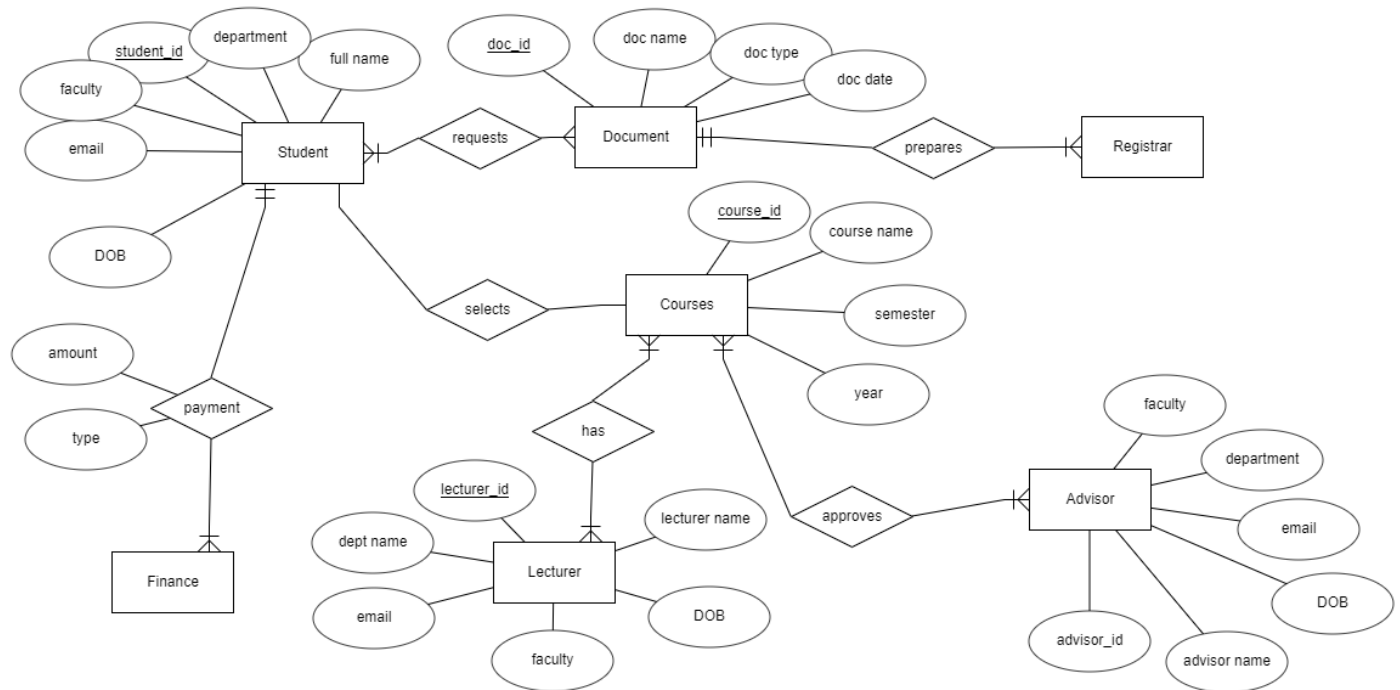


DFD Zero-Level



DFD One-Level

3.2.5 ER Diagram



4. IMPLEMENTATION

4.1 Technologies used

Frontend

The frontend programming language used is Flutter. We used flutter to make the design and graphics of the application. It was used to connect screens and make the application easier to use, to make it more familiar and bring an different approach to the students at first and then to the professor, whose work is made easier because the professor could now enter data and upload from their mobile phone or smart device. Also by flutter we connected the website of Epoka to the application so it would be easier for anyone to access other data that is not part of the app.

Backend

We used Firebase to create the database that saves all the data of the users and also perform user authentication. It is a platform developed by Google for creating mobile and web applications. We decided to use Firebase to stay in the theme of using Google technologies to develop a phone application. It gives the users a responsive experience.

Database

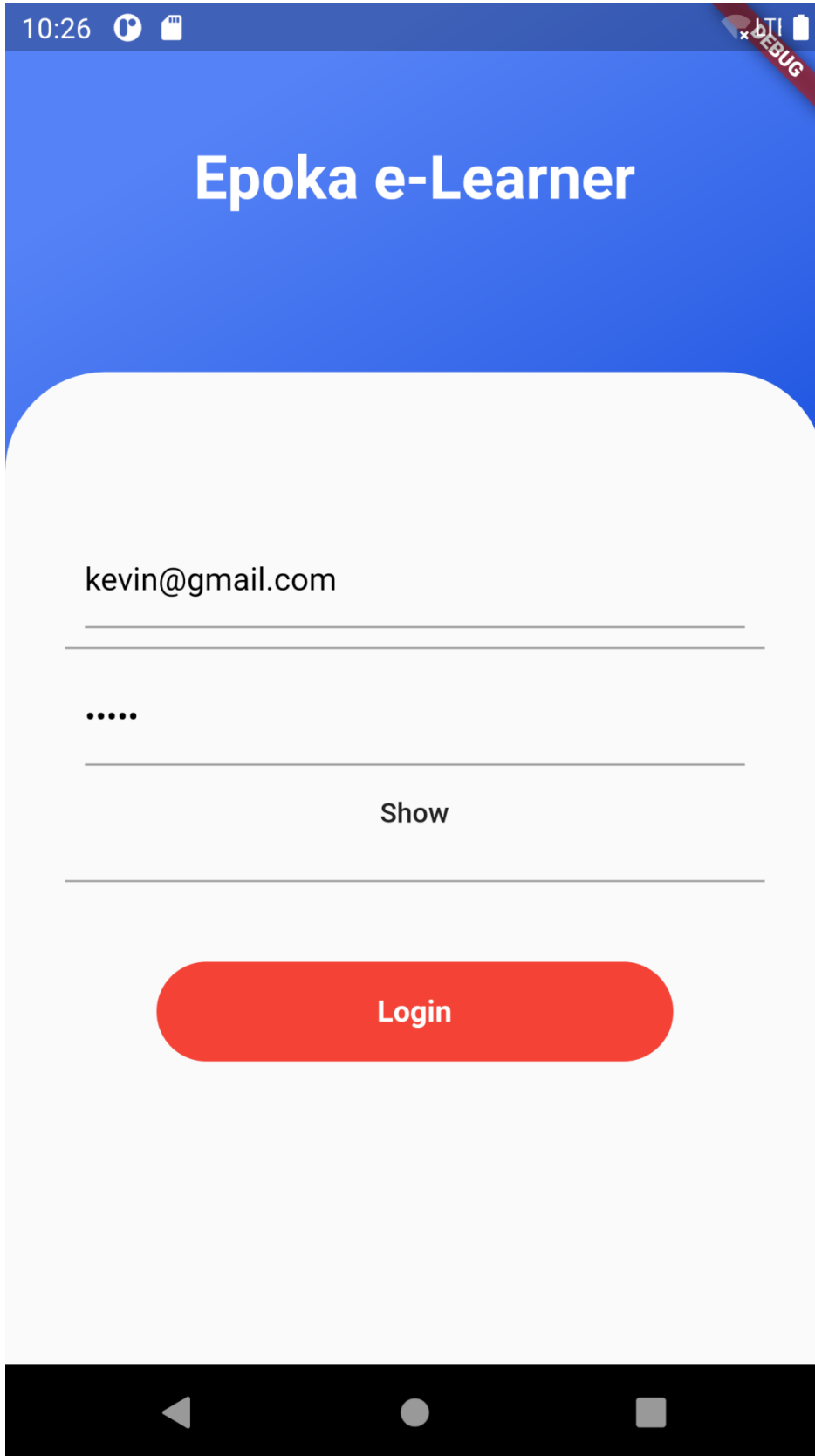
4.2 Installation manual

In order to install the app you need to run the flutter app, in vs code or android studio. You can download an emulator to run the application or run it on your physical device. In both cases once the application is run once, it will be installed on your device. If you are using an emulator just run the application normally. If you are using a physical android device you need to open Settings>About phone>Device Information. Click on Device Information 4 or 5 times consecutively and then you will see that you are now a developer. And in Settings now you will see Developer Options, toggle the button On and USB debugging. Connect the physical device with your computer and you are good to go.

4.3 User manual

The first screen that shows once you open the app is the login screen. There are three types of users: student, professor, and advisor. For the student: username: kevin@gmail.com, password: 12345678. For the professor which is also an advisor: username: advisor@gmail.com, password:12345678. Once you enter the application, it is quite easy to use. Just navigate through the menu tab or the widgets in the home screen.

4.4 Application Screenshots



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