



## College of Computer and Information Sciences University of Hail Project

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### Section 171

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# **1. Business Requirement Specification**

## **1.1 Project description:**

Every university should have apps to serve an important role and that role is making an app to serve any visitor who would like to know any information about the university or a specific college in the university or even any news it has. And also have a use for any student or a faculty member or anyone who works in the university for that matter, and helps with the easy to automate tasks and make them fully or partially automated. By building the necessary designs and architectural designs to be able to build a prototype and a working system, to then building a completely working system.

## **1.2 Intended Users:**

As mentioned previously, the system is going to be used by many types of users, Students, Faculty, Employees, and Academic Advisers. Students can access their GPA, schedule, and update their information. Faculty can mark attendants. Guests are able to view the university's news announcements and apply for the university. We covered that topic in depth in section 2.3.

## **1.3 Software and Services:**

For documentation, we used Google Docs. Because it gives multiple users the ability to work simultaneously on one document.

For Graphic design, we used two services, the first is Affinity photo. It is a Compositing application that gives the user the ability to edit photos and make graphic designs. The second service is called Figma. It is a website that allows the user to make complex designs.

For building UML designs we used Lucidchart because it gives us the ability to make the charts and diagrams we need in a fast and easy way.

For building the prototype we used Adobe XD because it is a powerful program that has the tools to turn any idea into a fully working application.

## 1.4 Team members

Choosing the right people for the right job and the needed roles is an important element of a successful project. So that is why our team has talented people who are professional in their fields. Our team members are:

Member name	Role	Skills
<b>Abdulrazaq Al-Thuwaini</b>	Scrum Master	Computer Science student. Skilled in HTML, CSS, Java, User interface and Graphic Design.
<b>Omar Al-Khuwaytim</b>	Product Owner	Computer Science student. Has experience in unity, Java, and C.
<b>Abdulelah Al-Jarboa</b>	Programmer and Graphic Designer	Java, C++, android studio, Dart language, and flutter framework, Figma designer.
<b>Abdulaziz Al-Ghamdi</b>	Programmer And Writer	Computer Science student. Has experience in unity Java, C, power point.
<b>Ebraheem Al-Dakheel</b>	Programmer	He Is experienced in HTML, CSS, JavaScript, React (front-end), and Node.js (database)

## 1.5 Business project intention:

The University of Hail already has all its services on its website. Their intention is to make the user experience as easy as possible for everyone, so by making smartphone applications, they give everyone the ability to use their systems at any time and anywhere. And by doing that they are making things more automated, and that will not only help with the pandemic that is happening right now, but it will make the university receive fewer visitors and that will lead to a more efficient workflow.

## **1.6 Business requirement Specification:**

The university of Hail wants a system that gives everyone the ability to see everything about the university right from their phones.

The required systems are going to be divided into two different applications. The first application is going to be used by everybody Visiter, Students, Faculty, Employees, and Academic Advisors. And it is going to have the following functionality: A student admission page that is going to enable new students to apply for the university, a news and announcements section that is going to have the University Admission, available job possession, and Scholarship requirements and announcements. And an about us page that shows the university's visions, goals, organizational structure, and competition. And the last feature in this section is going to be a contact us a field that is going to contain the following functionality contact numbers, live chat support and a ticket system, the university's Twitter, and a contact bridge to the university administration.

The second application is going to be accessed only by Students, Faculty, Employees, and Academic Advisers. And each one of those people is going to have different functionalities from each other. For example, students are going to be able to view their grades, GPA, and attendance. On the other hand, faculty can mark attendance and employees can see their vacation balance. So each role has a different use from the platform, to have access to the platform you have to be signed in. And the only way to have an account is to be in one of the previously mentioned roles

## **2 Software Development Life Cycle:**

In our workflow, we wanted a fast and easy way to work and adapt to changes. And to get as much feedback from the client as possible to deliver the best product we can. To achieve that we needed a method to provide these requirements, so we opted to use the Scrum method. So highlights of this method are:

- The ability to do just enough research and planning to start.
- The ability to deliver small prototypes in a short period of time.
- The flexibility provided when it comes to required changes
- The ability to take feedback from the client as we work

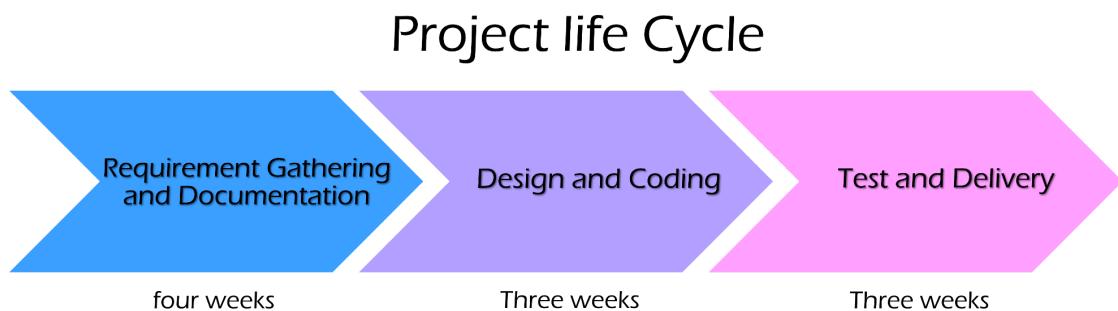
The meeting is an important element of any project. The Scrum method gives us the ability to do small fast standup meetings, to discuss our daily progress, what we are currently working on, and the challenges we are facing. This gives us the capability to point our strengths and weaknesses, and are we following our schedule or not.

The project is going to take ten weeks to complete, which includes research, software specification, software development, software validation, and software delivery.

Software specification: This is the stage where we sit with the client to specify and gather the requirement that is necessary to produce the intended product. And this includes writing the necessary documents, the project life cycle, and the Phases.

Software development: is the stage where we design the user interface, build the user experience, and make the client vision come to reality.

Software validation: this is the stage to ensure that we met the client's requirements.



**Figure 2.1.1: Project Life Cycle**

The first phase was requirement gathering, it involved researching which took a week to finish. Gathering the User Requirements and writing the Business Requirement Specification also took a week to complete. System Requirement Specification took a week to complete. Reviewing the documents took a week to complete. So it took us four weeks to finish the first phase.

## Phase one life Cycle

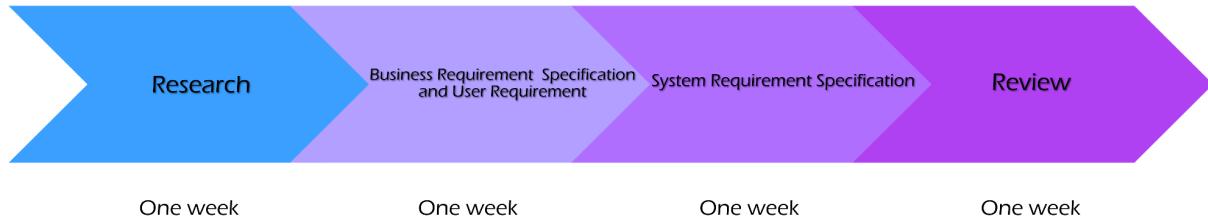


Figure 2.1.2: Phase one life Cycle

### **Doing research:**

It involved researching and learning about the compatriots, gathering the System requirement and Business Requirement Specification requirements, functional and non-functional requirements, and the needed elements for building the user interface.

### **user requirements and user stories:**

meeting different users and asking them about what features do they want to add to the system and documenting as user stories.

### **System requirement specification and business requirement specification:**

writing the System requirement specification and business requirement specification

### **User interface:**

building a concept of the user interface, the sitemaps, and wireframe.

### **Sprint Backlog:**

Sprint Backlog: We divided the work into four Sprint

- 1- Research 1 week
- 2- writing Business Requirement specification and User Requirement and Stories 1 week
- 3- writing System Requirement specification and User Interface concepts 1 week
- 4 - Review

## **Research sprints:**

	Description	Duration in days
Task 1	research competitors	1.5 days
Task 2	Gather user stories	0.5 days
Task 3	Gather user requirements	0.5 days
Task 4	Gather system requirement specification	2 days
Task 5	Gather business requirement specification	2 days
Task 6	Gather user interface ideas	0.5 days

## **Business Requirement Specification sprints:**

	Description	Duration in days
Task 1	Write Business Requirement Specification	5 days
Task 2	Write User Requirements	1 day
Task 3	Write User Stories	1 day

## **System Requirement Specification sprints:**

	Description	Duration in days
Task 1	Write System Requirement Specification	5 days
Task 2	Building a User Interface concept	2 days

The second phase contained Designing and Implementation. We designed the user interface and user experience. This took a week to finish. built a working prototype of the required systems This took 2 weeks to finish. And checking and Reviewing the designs

and prototypes. This took 1 week to complete. This phase took three weeks to complete. The next page is going to show a figure representing the tasks in the second phase.

## Phase Two life Cycle



Figure 2.1.3: Phase two life Cycle

### **Architecture Design:**

We showed and talked about: system boundaries which put a clear line for the system, sequence diagram and flow chart, classes diagram, and Use case diagram.

### **user interface & User experience:**

We showed how our final interface design (figure 9.4) looks compared to our initial design

### **Implementation & Integration:**

We used Adobe XD for prototyping and Flutter framework for the implementation

### **sprint Backlog:**

Sprint Backlog: We divided the work into four Sprint

- 1-Designing - 1 week
- 2-Implementing - 1 week
- 3-Testing - 1 week

4-Review - 1 week

### **Designing sprints:**

	Description	Duration in days
Task 1	Achieve design of Home Page	1.5 days
Task 2	Achieve design of News Page	1 day
Task 3	Achieve design of Article Page	1 day
Task 4	Achieve design of Announcements Page	1 day
Task 5	Achieve design of Academic Calendar Page	1.5 day
Task 6	Achieve design of Services Page	1 day

### **Implementation Sprints:**

	Description	Duration in days
Task 1	Finish implementing Home Page in Adobe Xd	2 days
Task 2	Finish implementing News Page in Adobe Xd	2 days
Task 3	Finish implementing Article Page in Adobe Xd	0.5 day
Task 4	Finish implementing Announcements Page in Adobe Xd	0.5 day
Task 5	Finish implementing Academic Calendar Page in Adobe Xd	1 day
Task 6	Finish implementing Services Page in Adobe Xd	1 day

### **Testing Sprints:**

	Description	Duration in days
Task 1	Testing The Home Page and Its components	1 day

Task 2	Testing The News Page	0.5 day
Task 3	Testing The Article Page	0.5 day
Task 4	Testing The Announcements Page	1 day
Task 5	Testing The Academic Calendar Page and its integration	2 days
Task 6	Testing The Services Page and its integration with the second app	2 days

The last phase included Testing the system and delivering the final product. We tested many aspects of the system, first bugs and glitches, second security, and lastly connected components. Each of these tests took a week to check.

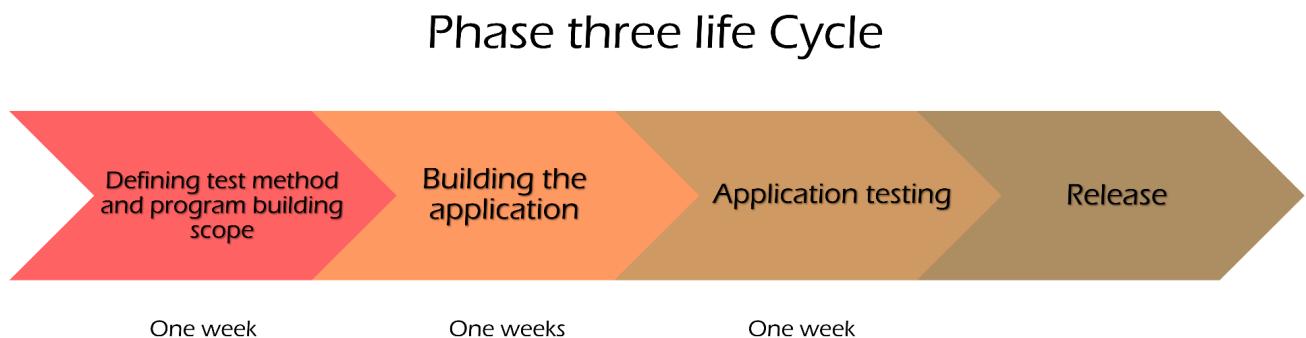


Figure 2.1.4: Phase Three life Cycle

## Scope

We defined the scope and what is inside and outside it, the quality objective, and the roles and responsibilities.

## Test Methodology

We talked about the methodology we used, test levels, and project tasks.

## Resource and Environmental needs

Lastly we covered the tools we needed for building the application testing, and the testing environments.

## **Test Method and Program Building Scope Sprints:**

	Description	Duration in days
Task 1	Defining what is in and out of the scope	0.5 days
Task 2	Defining Quality Objective	0.5 days
Task 3	Defining Roles and Responsibilities	2 days
Task 4	Choosing a test methodology	2 days
Task 5	Defining resources	2 days
Task 6	Defining Environmental needs	1 day

## **Building the Application Sprints:**

	Description	Duration in days
Task 1	Sectioning the pages	1 day
Task 2	Building buttons and sliding menus	1 day
Task 3	Building sliding bar for News and Announcements	0.5 days
Task 4	Building the home page	1 day
Task 5	Building the News and Announcements pages	2 days
Task 6	Building the Calendar page	1.5 day

## **Application Test Sprints:**

	Description	Duration in days
Task 1	Testing all functions	4 days
Task 2	Testing the Home page	1 day
Task 3	Testing the News and Announcements pages	1 day

Task 4	Testing the calendar page	1 day
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### 3. System Requirement Specification Introduction

#### 3.1 Purpose

Making an application nowadays is a must for any school or a university because it will help them with the new students that are thinking about enrolling in that school or university. And show them all the information they need and also ease the whole university experience for the faculty and the students by giving them everything they need with a press of a button.

The product includes two applications for the hail university, one is for general use only and it does not have student or faculty member-specific information

And the second is for students and faculty members to use exclusively and give each a service that concerns that user.

#### 3.2 Document Conventions

Bold, Times New Roman, 18	Heading
Bold, Times New Roman, 15	Subheading
Times New Roman, 13	Text

#### 3.3 Intended Audience and Reading Suggestions:

The University portal will be accessible for anyone who wishes to get a general idea about the university, be it the university's events, advertisements, competitions or to contact the university's management. However, the electronic services will be limited only to students and faculty of Hail University as it will require a sign-in username and password which will be provided by the admission and registration deanship.

### **3.4 Project Scope:**

The scope of the application is to ease learning about the university and receiving updates. Also, the electronic services will help manage the faculty and students whether it's inquiries of any kind or requesting registration, vacation, and so on.

## **4. Overall Description**

### **4.1 Product Perspective**

This project includes two applications:

1. A mobile application that works as a university portal that provides inquiries services linked to the admission and registration system, human resources system, and electronic services of the university agency for Postgraduate Studies and Scientific Research according to the conditions mentioned below. The application's main goal is to give a general picture of the university to anyone interested whether it be students, faculty, or the general population.
2. A mobile electronic services application for students and faculty of the university with a number of services such as course registration, deleting classes, viewing semester schedule for students, or could be viewing vacation balance, promotion request, and many other services that will be discussed later. This application aims to ease certain processes for the intended audience.

### **4.2 Product Features**

The features will be broken down into two, one for the first application which is the general application and the second one is the application only for faculty members and students.

First application features (more in-depth in section 4)

- News and Announcements
- About us
- Contact us

Second application features (more in-depth in section 4)

- Profile

Which include: Update Phone Number, Update Email, Update English Name...etc

- Services

Which include: Registration, View Attendance, View Grades, View Curriculum, View Academic Record...etc

- Search

Which is useful to search for a specific feature

### **4.3 Operating Environment**

The application will have two versions one for iOS and one for Android and with that, we need to make an application that will run smoothly on both platforms.

The needed environment for ios is ios 9 and for Android is Android 8.0 so the application can be used by all users for the most part and at the same time make it safe and compatible.

For the hardware, the minimum requirement for android phones is a quad-core processor with 4GB of RAM or higher, and for IOS An A9 chip or higher.

### **4.4 Design and Implementation Constraints**

One of the most important implementation constraints for us as developers is the linking between the application and the services provided by the university and making them work fast and efficiently in an application and at the same time making the application easy to use and informative.

We also have to make the application secure and work with the university systems in a way that limits any malicious attack or miss-use of the information in the application and make sure that the app is not the weak link so that it could be used in any attack or a breach in the university.

## 4.5 User Documentation

The application will be easy to use but of course, will have a dedicated tab for help so that any user will have answers to any question they have, and if they still having trouble they can use the “Live Chat” feature to talk to a person who can help them in their inquiry.

## 4.6 Assumptions and Dependencies

The following are the main assumptions and dependencies:

- The IT department of the university has all the available hardware required to support the intended user load
- All the upstream systems including the product database provide the response within agreed SLAs to ensure the optimal performance
- The app is only for mobile devices and will not work for tablets

## 4.7 User Stores

number	Description	Priority for 1 to 10
1	As a [student], I [want to Browse profile], [so that I can see my personal profile ]	10
2	As a [student], I [want to see my grades], [so that I know my grades]	10
3	As a [student], I [want to Study schedule review ], [so that I know my Study schedule to attend]	8
4	As a [student], I [want to Link the schedule to electronic notifications ], [so that I remember the date of the lecture]	5
5	As a [student], I [want to review my academic record], [so that I can see my academic record ]	10
6	As a [student], I [want to review my study plan], [so that I can see my study	10

	plan]	
7	As a [student], I [want to View attendance and absence records], [so that I can know how many classes I was absent ]	10
8	As a [faculty member], I [want to Browse profile], [so that I can see my personal profile]	8
9	As a [faculty member], I [want to Study schedule review ], [so that I know my Study schedule to attend]	10
10	As a [faculty member], I [want to Link the schedule to electronic notifications ], [so that I remember the date of the lecture]	5
11	As a [faculty member], I [want to Keep records of who is attendance], [so that I can know who is attending and who is absent]	7
12	As a [faculty member], I [want to Browse my salary review], [so that I can see my salary]	7
13	As a [faculty member], I [want to see my Salary identification statement], [so that I can print Salary identification statement]	8
14	As a [employee], I [want to Browse profile], [so that I can see my personal profile ]	6
15	As a [employees], I [want to see my Salary identification statement], [so that I can print Salary identification statement]	7
16	As a [employee], I [want to Browse the balance of my vacation], [so that I can see my vacation balance]	10
17	As a [anyone], they [want to see and follow their paperwork ], [so that anyone they can know where is their paperwork at]	9
18	As a [anyone], they [want to see the general information about the university ], [so that they can general information about the university]	10
19	As a [anyone], they [want to see the latest knows about the university ], [so that they can the latest knows about the university]	5
20	As a [anyone], they [want to see the latest events], [so that they can the know the events ]	8

21	As a [anyone], they [want to see the announcement from the university ], [so that they can know the latest the announcement from the university]	6
22	As a [anyone], they [want to see the competitions from the university ], [so that they can know if the university is suitable for them]	5
23	As a [anyone], they [want to find the university's Twitter ], [so that they can follow the university's latest news ]	3
24	As a [anyone], they [want to know how to contact the university's management ], [so that they can contact the university's management ]	10

## 5. System features

We have two applications one will be for general purposes and the other will be for the university E-servers.

### App-1

#### 5.1 General information about the university

##### 5.1.1 Description and Priority

It is a panel at the bottom of the screen that will display general information about the university. It has a low priority.

##### 5.1.2 Stimulus/Response Sequences

Clicking the button that says “General info” on the main page then the page will pop up.

##### 5.1.3 Functional Requirements

REQ-1: Internet connection

#### 5.2 University news

##### 5.2.1 Description and Priority

It is a panel at the bottom of the screen that will display the top news about the university, it has a low priority.

#### 5.2.2 Functional Requirements

REQ-1: Internet connection

### 5.3 Events

#### 5.3.1 Description and Priority

it is a page that shows the latest events, It has a low priority

#### 5.3.2 Functional Requirements

REQ-1: Internet connection

### 5.4 Announcements

#### 5.4.1 Description and Priority

A panel that displays the most recent announcement. It has a low priority.

#### 5.4.2 Stimulus/Response Sequences

Clicking the button that says “Announcements” on the main page then the page will pop up.

#### 5.4.3 Functional Requirements

REQ-1: Internet connection

### 5.5 Competitions

#### 5.5.1 Description and Priority

Showing any new competitions that are to begin or already started and how to apply and what are the rules, it has a low priority.

### **5.5.2 Stimulus/Response Sequences**

Clicking the button that says “Competitions” on the main page then the page will pop up.

### **5.5.3 Functional Requirements**

REQ-1: Internet connection

## **5.6 University Twitter**

### **5.6.1 Description and Priority**

A panel that will display the latest tweets of the university’s Twitter account. It has a low priority.

### **5.6.2 Stimulus/Response Sequences**

Clicking the button that says “University Twitter” on the main page then the page will pop up.

### **5.6.3 Functional Requirements**

REQ-1: Internet connection.

REQ-2: University Twitter account.

## **5.7 Connecting with the management of the university**

### **5.7.1 Description and Priority**

It will be in the contact us section form where you will be able to choose a category and then will be sent to homes that will be able to help you. It has a high priority.

### **5.7.2 Stimulus/Response Sequences**

Clicking the button that says “Contact us” on the main page then the page will pop up.

### **5.7.3 Functional Requirements**

REQ-1: must have an account.

## **5.8 Academic plan display**

### **5.8.1 Description and Priority**

It is a section where you will find an academic plan for any college, it has a medium priority.

### **5.8.2 Stimulus/Response Sequences**

Clicking the button that says “Academic plan” on the main page then the page will pop up.

### **5.8.3 Functional Requirements**

REQ-1: Internet connection.

## **App-2**

### **Authorization level common**

## **5.9 Sign-in**

### **5.9.1 Description and Priority**

The ability to enter your personal account. It has a high priority.

### **5.9.2 Stimulus/Response Sequences**

By opening the app it will be the first page.

### **5.9.3 Functional Requirements**

REQ-1: database

REQ-2: matched username and password to an account in the database

## **5.10 Log-out**

### 5.10.1 Description and Priority

The ability to exit your personal account. It has a high priority.

### 5.10.2 Stimulus/Response Sequences

It will be a button in the top left of any page.

### 5.10.3 Functional Requirements

REQ-1: need to be signed-in.

## **5.11 Personal profile display**

### 5.11.1 Description and Priority

It is a page that shows all user information such as name, age, academic number, etc

It has a medium priority.

### 5.11.2 Stimulus/Response Sequences

Clicking the button that says “Profile display” then the page will pop up.

### 5.11.3 Functional Requirements

REQ-1: the user must be signed-in.

## **5.12 Preview attendance sheet (or record )**

### 5.12.1 Description and Priority

It is a page that will show the subject that the student has currently in this semester and when he click on each one of them it will show all lectures that its status is not null and for faculty and employee it shows a sheet has the days of the week and the attendees status (attended or absent), it has a high priority.

### **5.12.2 Stimulus/Response Sequences**

Clicking the button that says “Attendance” then the page will pop up.

### **5.12.3 Functional Requirements**

REQ-1:must be signed-in

## **Authorization level students**

### **5.13 Add subject**

#### **5.13.1 Description and Priority**

The ability to add a subject to the student schedule, it has a high priority.

#### **5.13.2 Stimulus/Response Sequences**

Clicking the button that says “Add subject” then the page will pop up.

#### **5.13.3 Functional Requirements**

REQ-1: Must be at the beginning of the semester

REQ-2: Must have finished all subject prerequisites

REQ-3: The total of subjects hours in a single semester must be between 12 and 19 hours

REQ-4: The user must be signed-in.

### **5.14 Remove subject**

#### **5.14.1 Description and Priority**

The ability to remove a subject from the current semester.

#### **5.14.2 Stimulus/Response Sequences**

Clicking the button that says “Remove subject” then the page will pop up.

#### **5.14.3 Functional Requirements**

REQ-1:the hours in the schedule must be above the minimum limit after removal

REQ-2: must be in a time window that the university decided

REQ-3:the user must be signed-in.

## **5.15 Grads display**

### 5.15.1 Description and Priority

It is a page that contains all subjects that the student has in the current semester, it will display the subject's name and its grade and in the button, it will show the current semester and the total GPA. It has a high priority.

### 5.15.2 Stimulus/Response Sequences

Clicking the button that says “Grads” then the page will pop up.

### 5.15.3 Functional Requirements

REQ-1: the user must be signed-in.

REQ-2: at least one subject in the current semester is assigned with a grade.

## **5.16 Student schedule display**

### 5.16.1 Description and Priority

It is a schedule that contains the time of lectures from the current semester.

### 5.16.2 Stimulus/Response Sequences

Clicking the button that says “Schedule” then the page will pop up.

### 5.16.3 Functional Requirements

REQ-1: the user must be signed-in.

REQ-2: must have subjects registered in the current semester.

## **5.17 Linking the schedule with E-Notifications**

### **5.17.1 Description and Priority**

The application will send a notification on the smartphone to remind the student of the class before it starts.

### **5.17.2 Functional Requirements**

REQ-1: the user must be signed-in.

REQ-2: must have subjects registered in the current semester.

## **5.18 Academic records display**

### **5.18.1 Description and Priority**

Showing all the information about the student from the courses that the student had finished and the grades that he got in each one and the number of hours that were taken

### **5.18.2 Stimulus/Response Sequences**

Clicking the button that says “Academic records” then the page will pop up.

### **5.18.3 Functional Requirements**

REQ-1: the user must be signed-in.

REQ-2: must have finished at least one semester.

## **Authorization level faculty and employee**

## **5.19 Registering attendance**

### **5.19.1 Description and Priority**

It is the ability to fill a sheet that has both days and dates. Each professor can register attendance to the student that he teaches in the current semester. It has a high priority.

### **5.19.2 Stimulus/Response Sequences**

Clicking the button that says “Registering attendance” then the page will pop up.

### 5.19.3 Functional Requirements

REQ-1: the user must be signed-in.

REQ-2: must be teaching the subject this semester.

REQ-3: the student must be registered in this subject this semester with the same faculty user

## **5.20 Preview salaries**

### 5.20.1 Description and Priority

The ability to view your salary and bonuses.

### 5.20.2 Stimulus/Response Sequences

Clicking the button that says “Preview salaries” then the page will pop up.

### 5.20.3 Functional Requirements

REQ-1:the user must be signed-in.

## **5.21 Salary identification statement**

### 5.21.1 Description and Priority

It is the ability to print an official document that states the employee’s salary.

### 5.21.2 Stimulus/Response Sequences

Clicking the button that says “Salary identification statement” then the page will pop up.

### 5.21.3 Functional Requirements

REQ-1: the user must be signed-in.

## **5.22 Preview vacation balance**

### **5.22.1 Description and Priority**

The ability to view how many vacation days you have and when it will expire.

### **5.22.2 Stimulus/Response Sequences**

Clicking the button that says “Preview vocation balance” then the page will pop up.

### **5.22.3 Functional Requirements**

REQ-1: the user must be signed-in.

## **Authorization level Admin**

The admin account has access to all features in both student and faculty and employee and an extra two more.

## **5.23 Creating accounts**

### **5.23.1 Description and Priority**

The ability to establish new accounts, it has a high priority.

### **5.23.2 Stimulus/Response Sequences**

Clicking the button that says “XX” then the page will pop up.

### **5.23.3 Functional Requirements**

REQ-1:the user must be signed-in.

## **4.24 Deleting accounts**

### **5.24.1 Description and Priority**

The ability to delete established accounts. It has a high priority.

### **5.24.2 Stimulus/Response Sequences**

Clicking the button that says “Deleting an account” then the page will pop up.

### **5.24.3 Functional Requirements**

REQ-1:the user must be signed-in.

And we are going to implement more futures that had been previously made and provided by The University of Hail using the available API:

1	Scholarship Request	2	Promotion Request to be an Associate Professor
3	Promotion Request to be a Professor	4	Posting Request for a Teaching Associate to be a Lecturer
5	Posting Request for a Lecturer to be an Associate Professor	6	Posting Request for a Lecturer to be an Unaffiliated Associate Professor
7	Request to participate in a conference or symposium	8	Request to participate in an external training course
9	Request to Extend the Scholarship	10	Request a Scientific Trip
11	University change request	12	Major change request
13	Request to transfer a country	14	Request to end a Scholarship
15	Request to postpone a Scholarship	16	Request a training course
17	Request to attend a conference or symposium	18	Request to change language institute
19	Request to change university and major	20	Request to edit the end of the Scholarship
21	Request to continue studying language	22	Request general requests
23	Request a statement about the student	24	Online Studying request
25	Scholarship promotion request	26	Request to cancel a Request

27	Scholarship resume	28	Scholarship Request for an employee
29	expulsion benefit	30	One-way ticket benefit
31	Two-way ticket benefit	32	Return tickets benefit
33	Printing benefit	34	Books and references benefit 1
35	Books and references benefit 2	36	Books and references benefit 3
37	Request to excellence reward for scientific publication	38	Request to scientific call
39	Practical task report	40	Request to enable stars working
41	Request to scientific publication	42	Request to be free from work for scientific purpose
43	Registering subject and assigning a supervisor	44	Creating discussion committees
45	Form for obtaining the approval of the Permanent Committee of Ethics for Scientific Research at the University of Hail	46	Research groups
47	Apply for BADEA	48	Check citation percentage
49	Institutional finance initiative	50	Research proposal arbitration form
51	Request to close a research project	52	Request to extend a research project
53	Request to transfer a research project	54	Request to cancel a research project
55	Master and diploma programs	56	The legal administration system
57	University board system	58	Polarization system

59	Jobs assistant professor, associate professor, and professor
----	--

Table 4.1: shows the functions that are going to be included in the provided API

## 6. Nonfunctional Requirements

### 6.1 Performance Requirements

6.1.1: The system should minimize errors and display clear error messages that inform the user on how to handle them.

6.1.2: Every module's and function's performance must be ideal.

6.1.3: Improve performance by using computers or laptops that have high processor speed and RAM.

### 6.2 Security Requirements

This project's security requirements, including privacy, are critical. The administrator (including the course and system administrators) should provide a high-security interface for users and safeguard their personal information. To meet this requirement, the project team should establish some guidelines, such as a security policy and a system management handbook. Furthermore, using software and hardware to prevent, detect, and correct system errors, such as firewalls and antivirus software, will reduce security risks.

- Login authentication should be used to provide external security.
- There should be adequate security in place to prevent unauthorized users from accessing data.

### 6.3 Software Quality Attributes

#### 6.3.1 Usability:

- End users can place orders in a short period of time by training them to become familiar with the system and designing a user-friendly interface.

### 6.3.2 Availability:

- Users will be able to access the system with or without an internet connection because it will be accessible through the campus's local Internet. (for certain functions)

### 6.3.3 Correctness:

- Validating or testing the system guarantees that the function's output is clean and precise.

### 6.3.4 Portability:

- The software shall be deployed at any machine.

### 6.3.5 Reliability:

- Improving the software's performance will improve the software's stability.
- Backing up data can help to increase the software's reliability.

### 6.3.6 Reusability

- The data and records that are saved will be recovered if they are needed, as long as they are kept in a backup.

### 6.3.7 Design Constraints:

- By adding more features to SIMS, the system will be able to replace the current system.

### 6.3.8 Documentation:

- Documentation will aid in the creation of a knowledge management system by the project team. As a result, it is an unavoidable requirement. The proposal, project report, and other documents are included in the documentation.

### 6.3.9 Quality Control:

- Another important requirement is system quality control. All users should be served quickly and efficiently by the system. The key issues of this requirement are adaptability, availability, flexibility, and reliability. This requirement can be met by developing the system with appropriate software and hardware.



Figure 6.1 shows the non-functional requirements need in the system

## 7. External Interface Requirements

### 7.1 User Interfaces

In this section we are going to show the concept of the user interface that we are going to build the application with. The following sitemaps are going to show the different functions for both applications.

## Applications one's sitemap:



Figure 7.1.1 the sitemap for application one shows the functions that are going to be in the application.

## Application two's sitemap

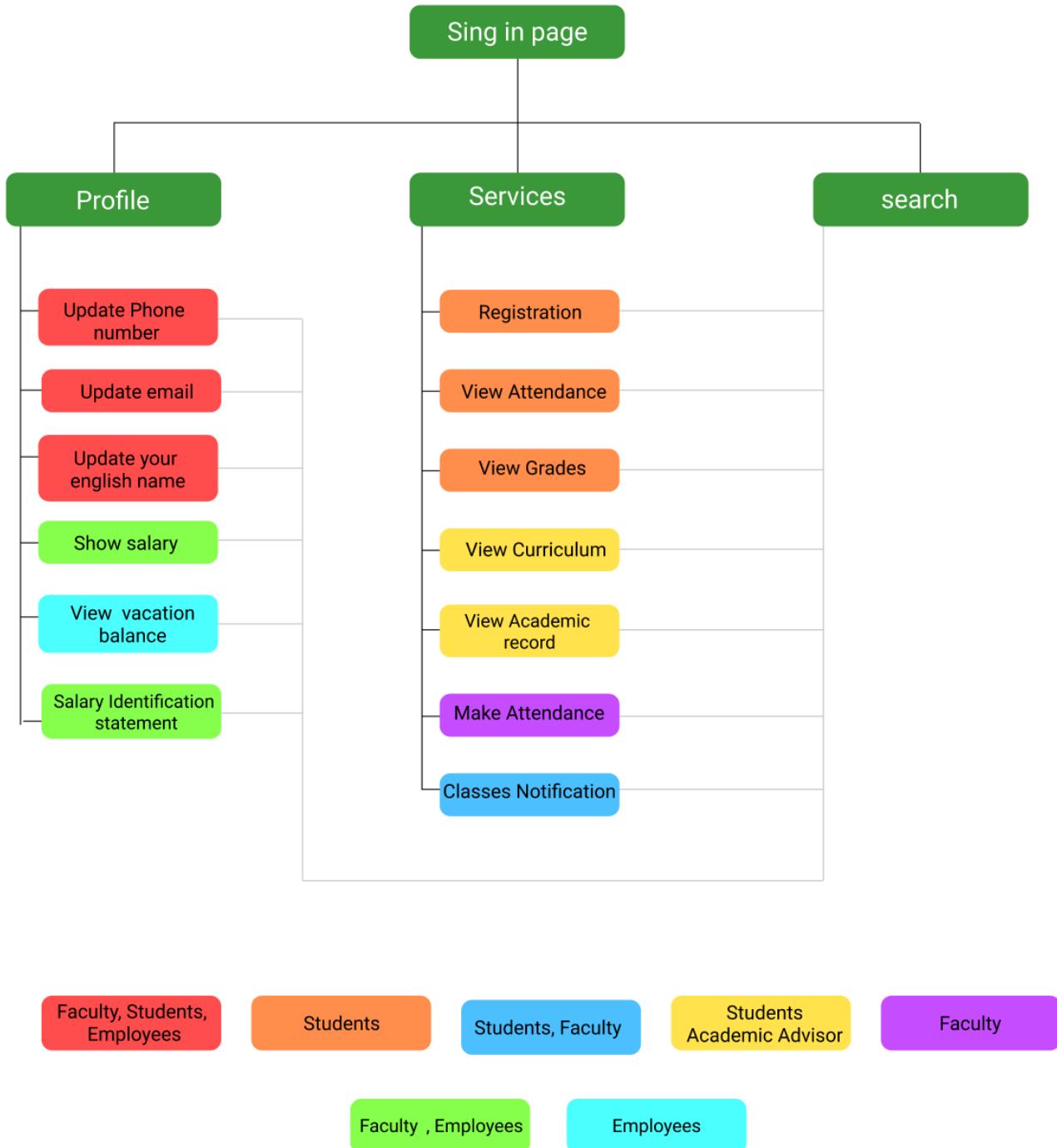


Figure 6.1.2: the sitemap for application one shows the functions that are going to be in the application.

We intend to make a user-friendly and easy-to-use application. So our approach was to make a simple and minimalist user interface that is fast and easy to navigate, we achieved that by using colorful text and buttons that complement the university's color scheme,

sectioning the interface to make clear and distinct sections, and an easy to navigate menus

## Applications one's wireframe:

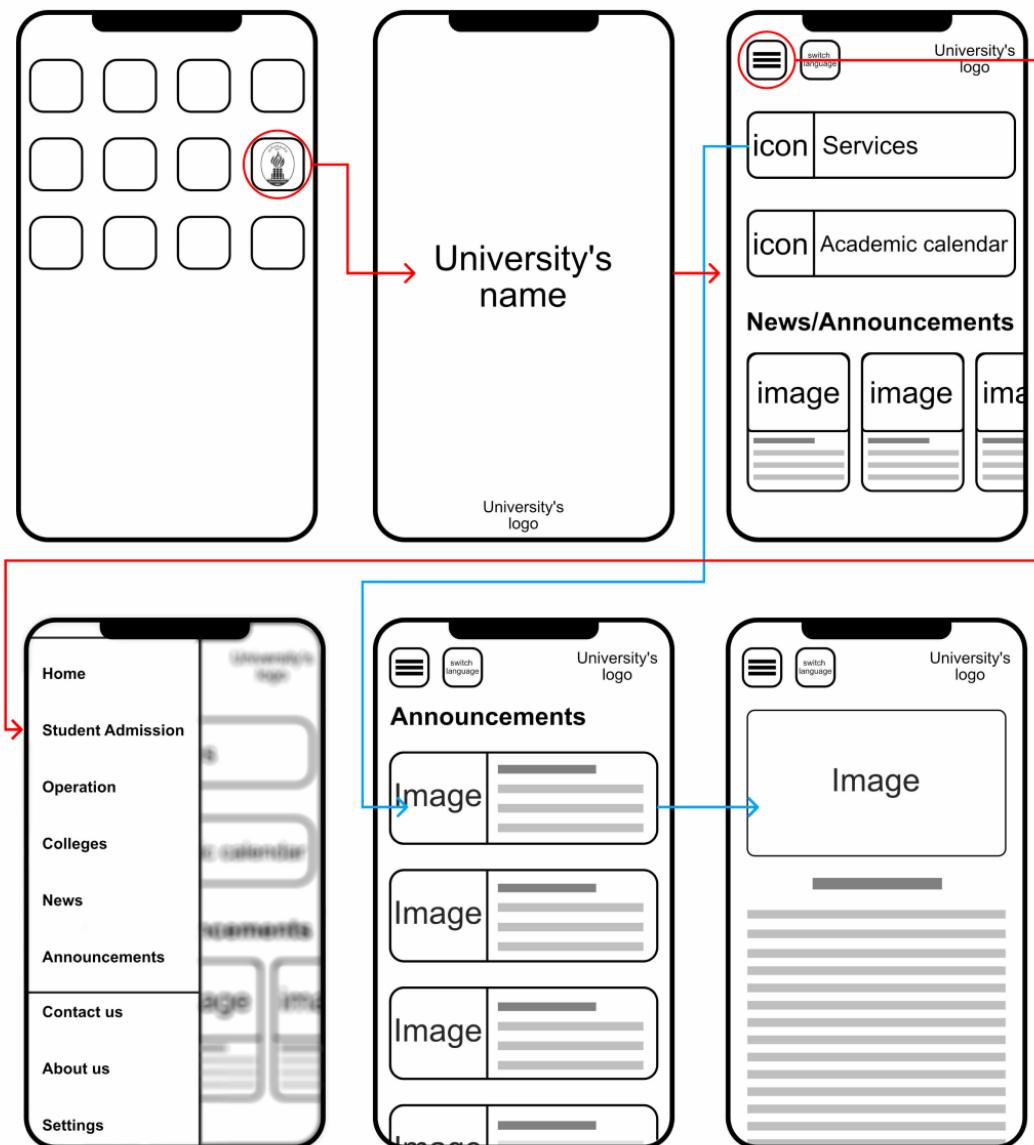


Figure 7.3.1 shows what the first application is going to be. It is subject to changes in the future

## Applications two's wireframe:

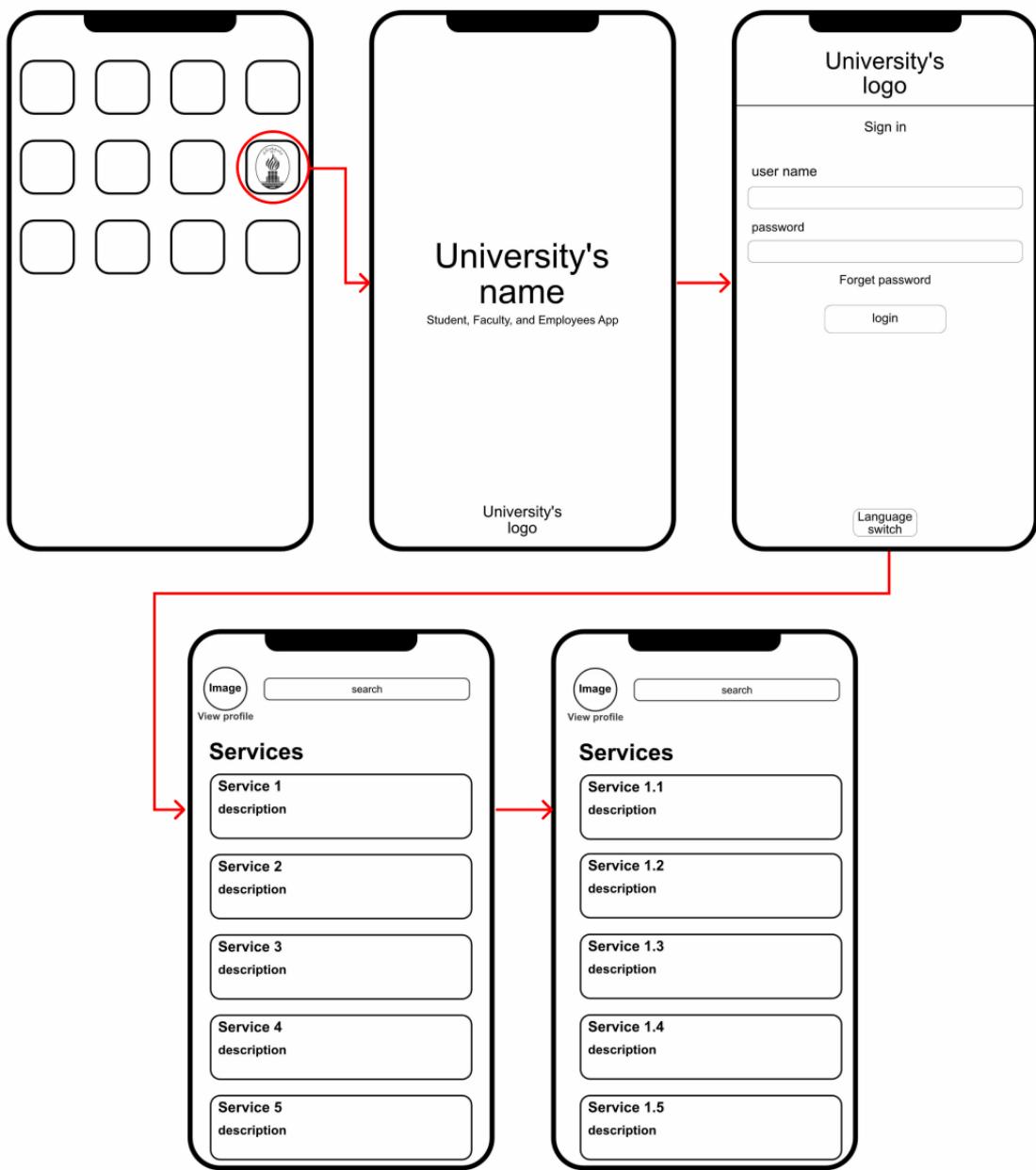


Figure 7.3.2 shows what the first application is going to be. It is subject to changes in the future

## 7.2 Hardware Interfaces

Nowadays the minimum required RAM capacity is 2GB for IOS and Android, but the sweet spot for android is 6GB of RAM, and 4GB for IOS. Even though the minimum amount to run Android is 2GB, but for things to run smoothly it is required to have more than 4GB of RAM. It's important for us not to put time and effort into optimizing the application to run on old unsupported hardware because this may cause:

- Security Breaches:

Overtime hacks can stumble upon some holes or flows they can take advantage of, so sometimes it is better to not support old hardware.

- Hardware Compatibility:

Older generations of some processors and graphic cards a lot of the time, do not support certain recent futures, so compatibility is an issue. And if it can do it, it will be resource-intensive.

So the minimum requirement for android phones is a quad-core processor with 4GB of RAM or higher and for IOS An A9 SOC or higher.

## 7.3 Software Interfaces

In the last four years all phone manufacturers shifted to use taller aspect ratios for their screens, they moved from using 16:9 to 18:9, 19:9, and even 21:9. New applications have to be fixable and heterogeneous to accommodate these different aspect ratios. So restricting the application to the minimum version of an OS will be really important, and the problems we are going to face if we do not stick to it are:

- Security risks:

It will either have security flaws or these flaws will be discovered in the future and it is going to affect the application negatively.

- Future restriction:

Because we are not using the latest update we are restricting ourselves from the new futures that come with new updates.

- Compatibility issues:

Trying to build an application that is trying to support as many devices as possible will only cause complications and problems, so dropping support for older versions of software is necessary.

The minimum required version of Android is Android 8.0 because it supports a wide variety of aspect ratios and it has all the futures needed to build the required application. And the minimum required IOS version is IOS 9 because it got all the previously mentioned futures and it is still supported by Apple.

## 7.4 Communications Interfaces

As was mentioned previously we are going to have two applications. The portion that has the announcement, news, academic calendar operations, colleges, about us, and the contact us pages that are going to be connected to a database on its own. And the student's admission and the services, which are the crucial and the most important functions are going to be implemented via the included API. The live chat, university administration, and complaints tricks are going to have their own servers and database to handle everything without overloading the other servers, and so they can store the previous text messages from both the employee and the customer. And to easily connect the responses to email.

# 8 Architecture Design

## 8.1 System boundaries:

This section draws the different boundaries for the system and discusses each boundary with its corresponding entity. The benefit of this is to have a clear view of the system and the division of each component.

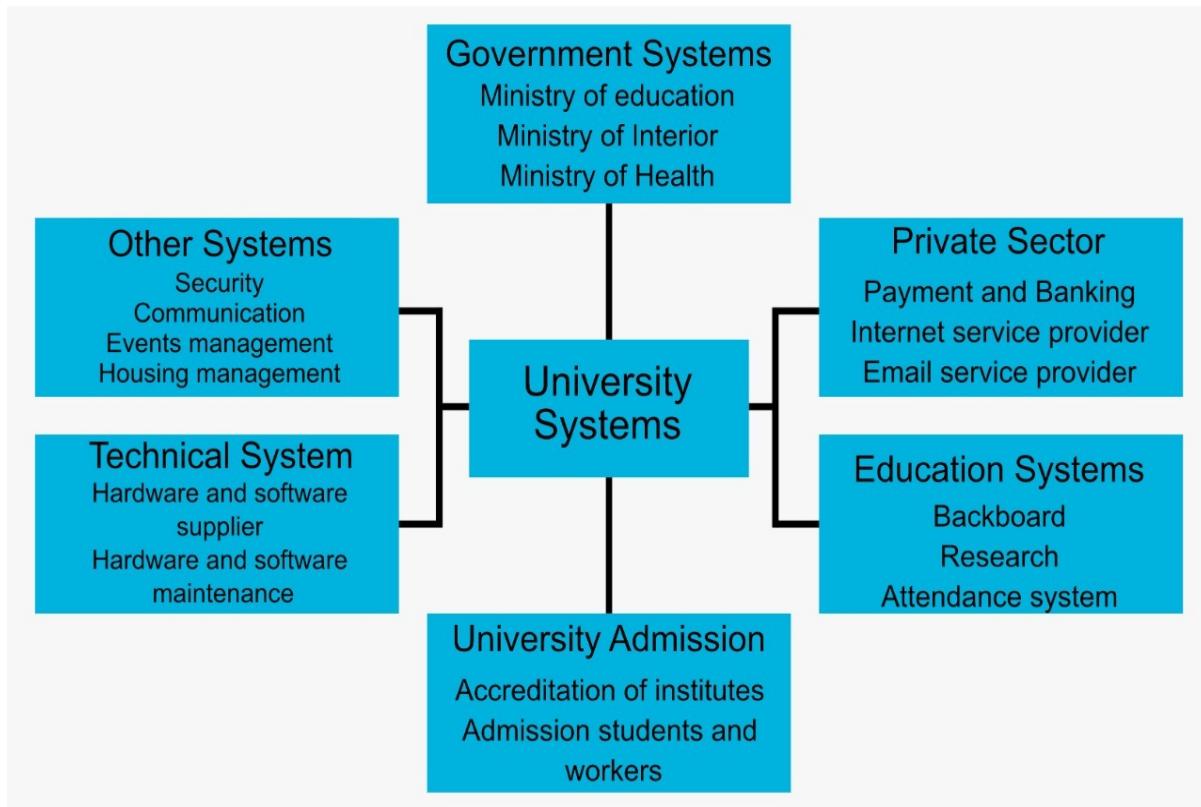


Figure 7.1: the context model shows the boundaries for the university system

### 1. Government Systems:

This system covers mostly different ministries and adapts to their different systems to maintain good communication between the university and the government entities.

- Ministry of education: this entity bounds anything relative to the university's education which varies between grades, courses or many other stuff.

- Ministry of health: this entity bounds anything related to the health of the student or faculty belonging to the university which helps keep the people of the university in a healthy condition and takes measures to make sure of that. As we have seen in the latest COVID-19 pandemic some universities have made sure to take proper care by giving appropriate directions and even providing the vaccine.
- Ministry of Interior: this is to check if the people applying for the university either students or employees, do not have any charges against them.

## **2. Private Sector:**

This covers private university entities:

- Payment and Banking: this entity bounds anything relating to banking and managing the universities resources such as salaries and student rewards.
- Internet Service Provider: this entity bounds anything related to internet connections in the university should it be for the universities local devices or the general's personal use
- Email Service Provider: this entity bounds everything relating to communication between faculty or students via email which will help to clear any

## **3. Education Systems:**

This covers systems that are usually specifically for the students for educational purposes

- Blackboard: a very useful online platform with services for the students and faculty such as having online lectures, online exams, uploading files and so on.
- Research: this area focuses on any research material for students and could also have faculty dissertations and any previous papers.
- Attendance System: a system to record the attendance or absence of students and/or faculty.

## **4. University Admission:**

This is the center of the university and where the management of the colleges is mostly done:

Accreditation of institutes: this is for following the university's curriculum and approvals.

Admission of students and faculty: the process of applying for the university or a college with the university is usually bounded here.

## **5. Technical System:**

Any system linking to software or hardware of the university such as local computers, local routers, and so on:

Hardware and software supplier: the supplier of any needed hardware or software for the university sh

Hardware and software maintenance: the team in charge of maintenance of the software and hardware of the university in the event of any crashes or bugs in the software or and problems with the hardware.

## **6. Other Systems:**

Any other systems that we may need in the application:

- Security: bounding any sensitive information here to prevent any leaks of personal information or any penetrating attacks to the system for any reason.
- Communication: communication systems to connect everything together like computers, services, networks, etc.
- Events management: managing any events in the yearly calendar.
- Housing management: managing the student dorms or the faculty housing.

## 8.2 Sequence Diagram and FlowChart:

This section draws the sequence of actions that need to be done to login into your personal account in **figure 7.1**, And the process flowchart that shows the steps that are going to be involved in the student admission process in **figure 7.2**.

### Applications one's flowchart:

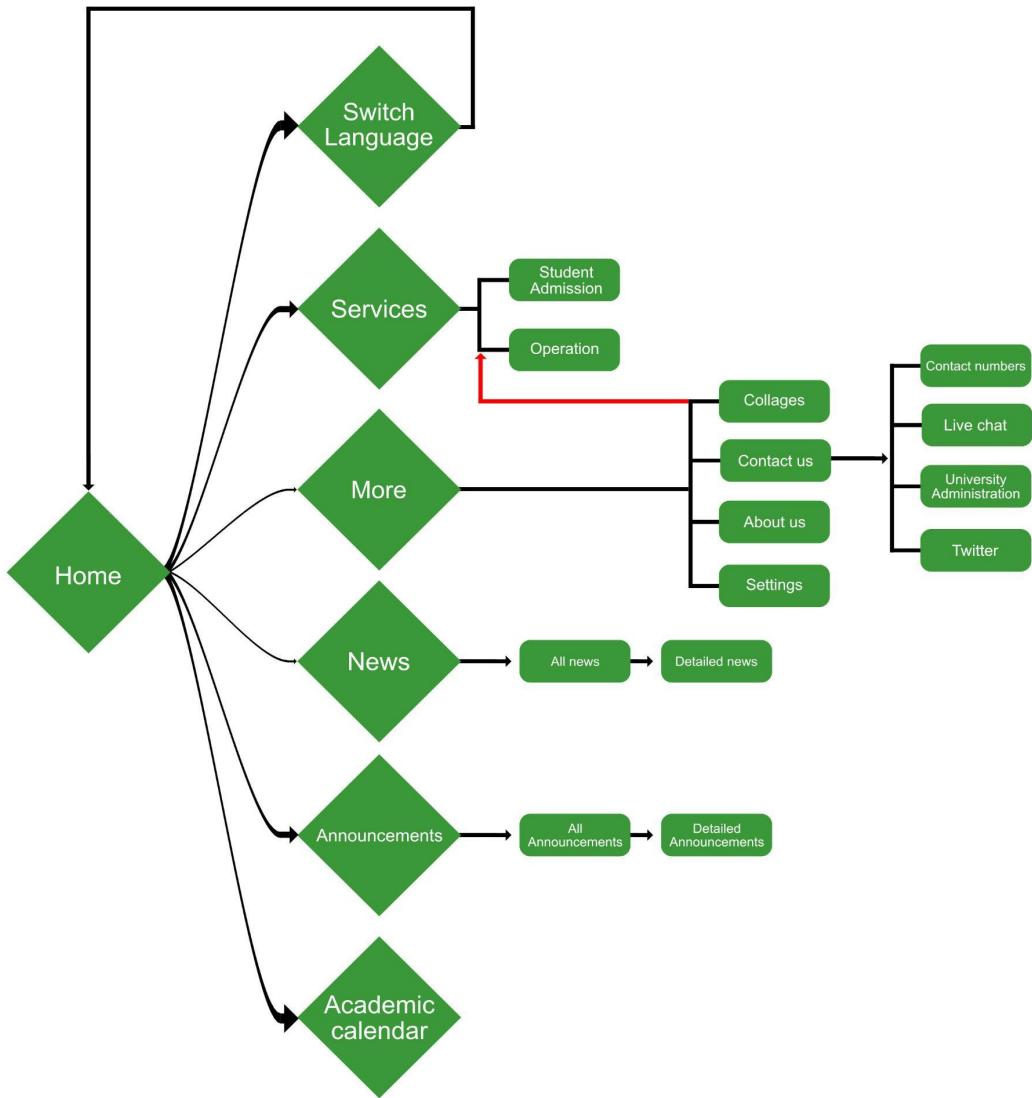


figure 8.2.1 shows how to application first application is going to be navigated and what each page contains

## Applications two's flowchart:

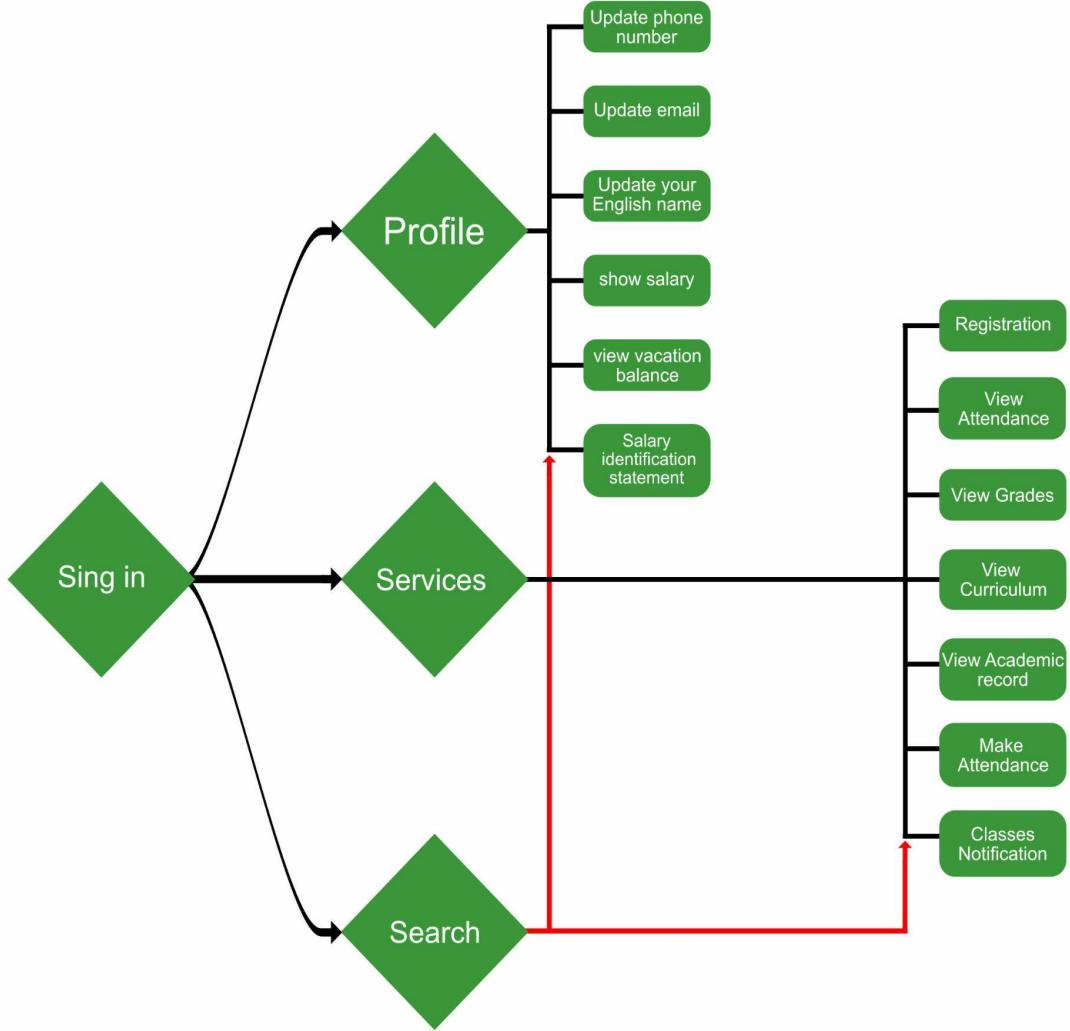


figure 8.2.2 shows how to application first application is going to be navigated and what each page contains

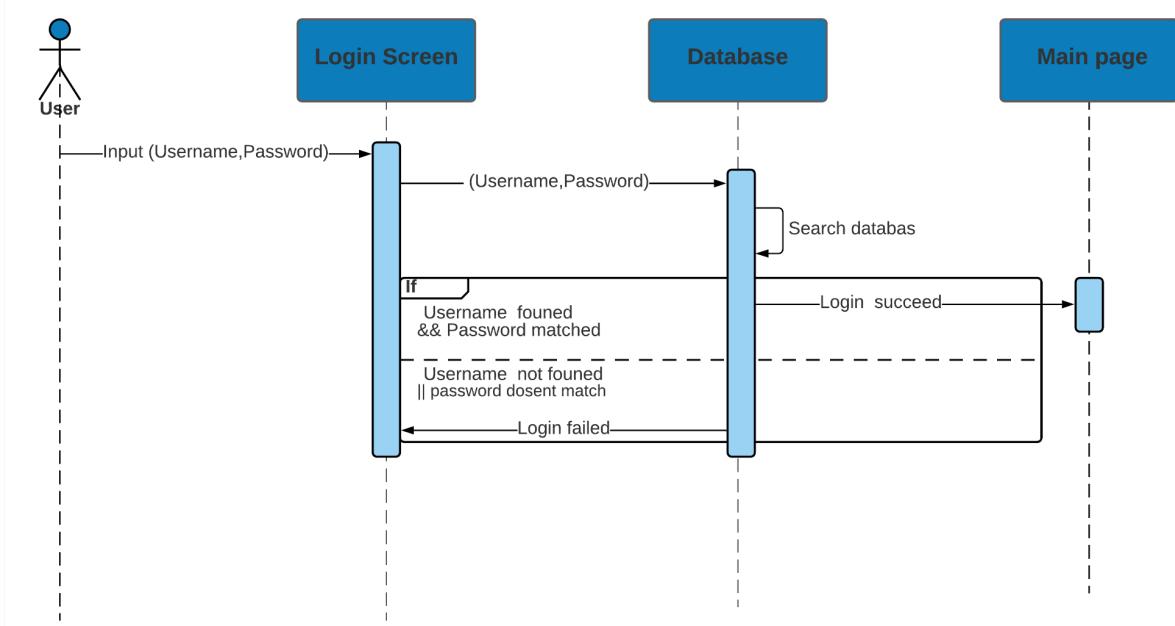


Figure 8.3: the sequence diagram shows the login process for application two

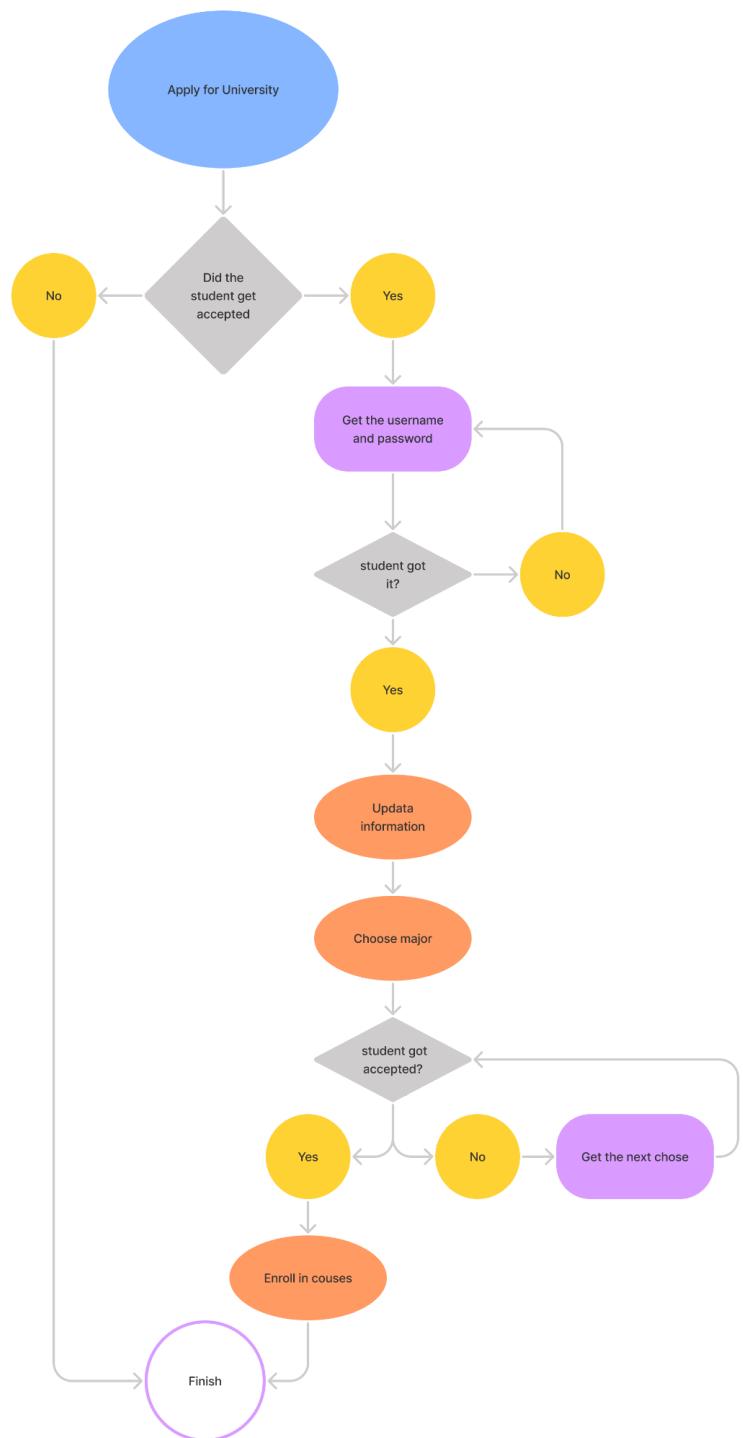


Figure 8.4: shows how the student admission process works.

### **8.3 Class diagram:**

This section will explain the different classes and their relationships. It is important to distinguish between classes because each class represents a user type which has different attributes, methods, and access level as shown in **Figure 8.5.1** for application one and **Figure 8.5.2** for application two. To organize our classes we made a super class so that it will contain all the common attributes and methods as shown in **Figure .5..3** which will make any future changes to the common attributes or methods way easier so that you only need to do it once rather than having to do it to each class individually.



Figure 8.5.1:Shows application two's user classes

Student	Employee	Faculty	Academic Advisor
ID Phone number Email Home adders GPA courses blackboard University reward Attendance Schedule Exams  UpdatePhoneNumber() GetPhoneNumber() UpdateEmail GetEmail() UpdateAddres() GetAddres() UpdateGPA() GetGPA() EnrollInCouse() ViewAttendance() ViewSchedule() ViewExamsSchedule()	ID Phone number Email Home adders University reward Attendance Schedule salary take a vacation  UpdatePhoneNumber() GetPhoneNumber() UpdateEmail GetEmail() UpdateAddres() GetAddres() ViewAttendance() ViewSchedule() ViewVacationBalance() TakeVacation() Getsalarystatement ()	ID Phone number Email Home adders courses blackboard University reward Attendance Schedule salary vacation balance  UpdatePhoneNumber() GetPhoneNumber() UpdateEmail GetEmail() UpdateAddres() GetAddres() EnrollInCouse() ViewAttendance() ViewSchedule() ViewVacationBalance() TakeVacation() Getsalarystatement ()	ID Phone number Email Home adders blackboard Attendance Schedule salary vacation balance  UpdatePhoneNumber() GetPhoneNumber() UpdateEmail GetEmail() UpdateAddres() GetAddres() ViewAttendance() ViewSchedule() ViewVacationBalance() TakeVacation() Getsalarystatement ()

Figure 8.5.2: Shows application two's user classes

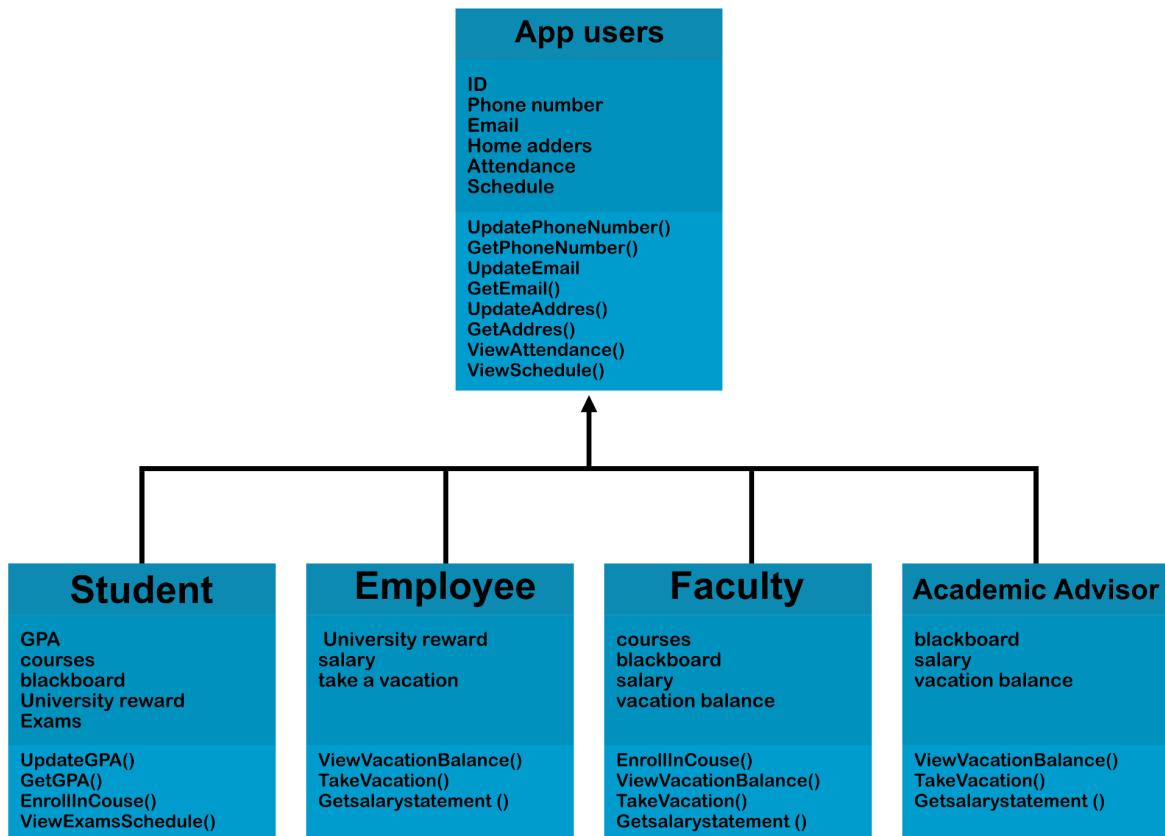


Figure 8.5.3: shows the common variables and functions between the superclass and subclasses

## 8.4 User Classes and Characteristics

The users of the two apps differ but there are some common features everyone could use.  
The first application users and their characteristics

- Visitors: Do not need any specific features and use only general information and they can not alter anything
- Students: Can use both applications, the first for general information and the second for specific information and they can not alter anything
- Faculty Member: also can use both applications, the first for general information and the second for specific information and they can not alter anything
- Application Administrator: who make sure the articles are up to date and working probably

The second application users and their characteristics

- Students: can use it for viewing grades or registering for new courses or viewing the schedule for the week and they have a limit on what they can do
- Faculty Member: can use it for viewing salary or vacation balance or making attendance and they have higher access but still limited
- Application Administrator: has the highest access and can alter or add any new services and can override any application option

The following figure will help in visualizing each class and its characteristics.

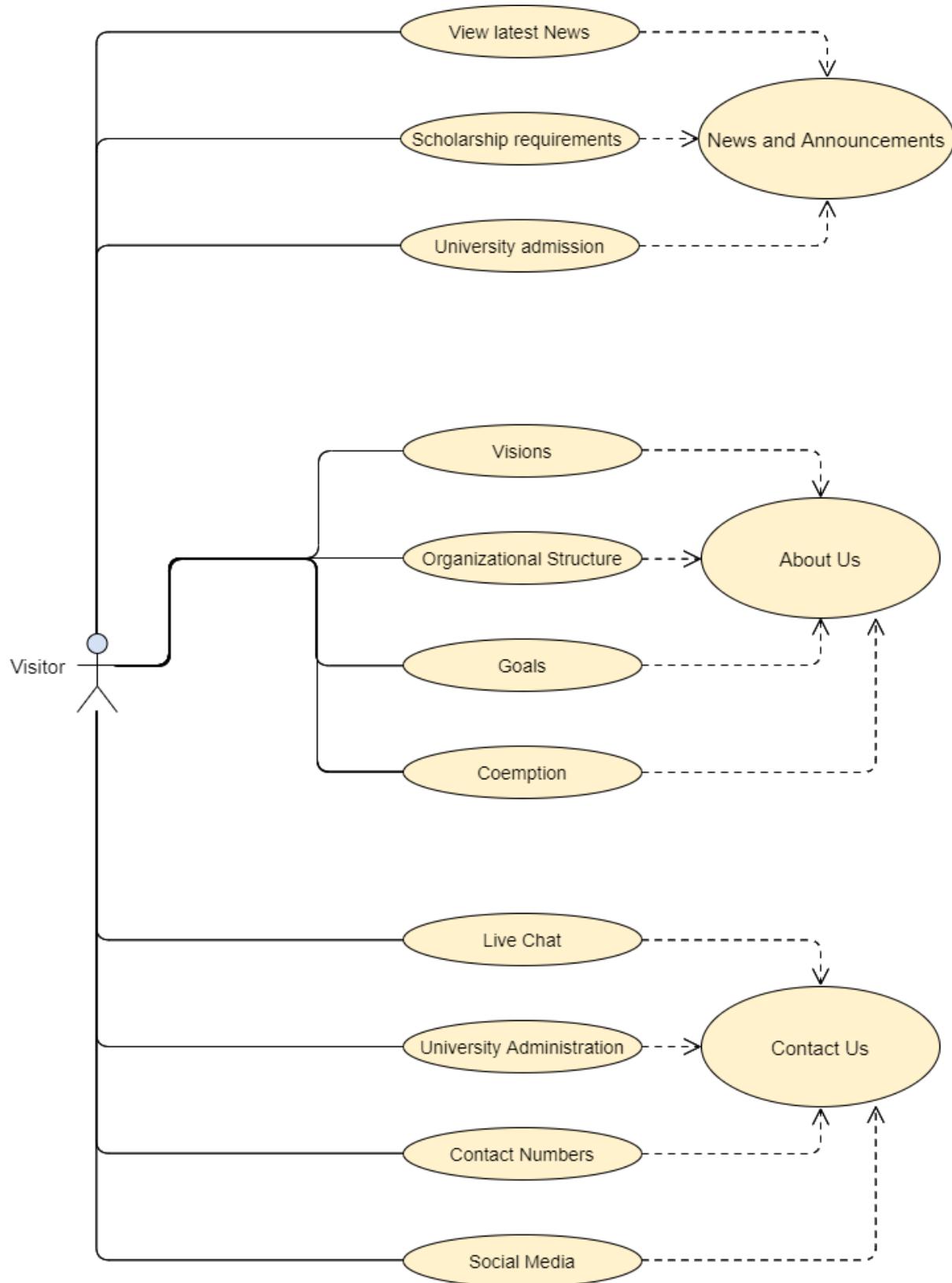


Figure 8.6.1: shows the Visitor Use Case Diagram

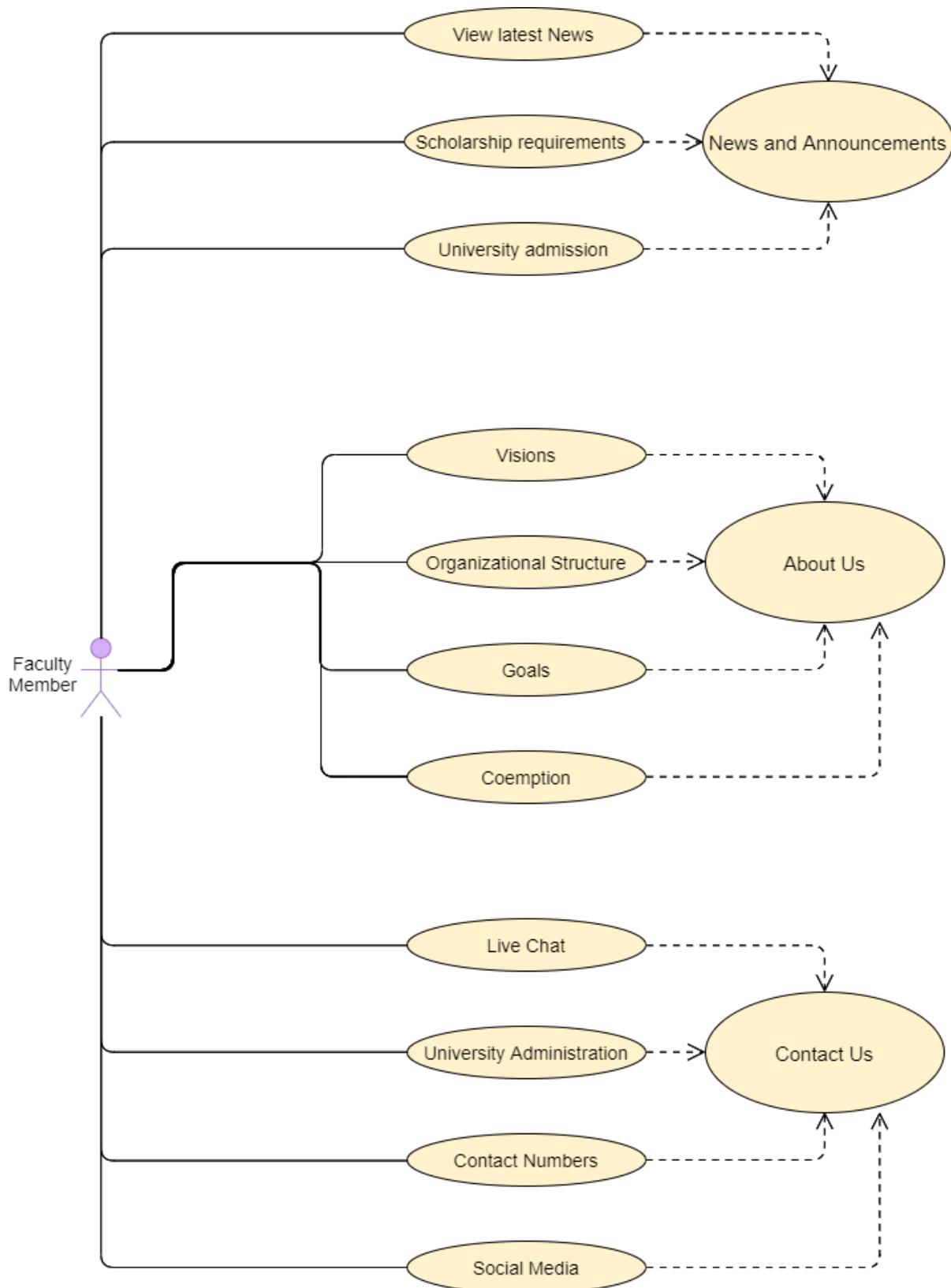


Figure 8.6.2: shows the Faculty Member Use Case Diagram

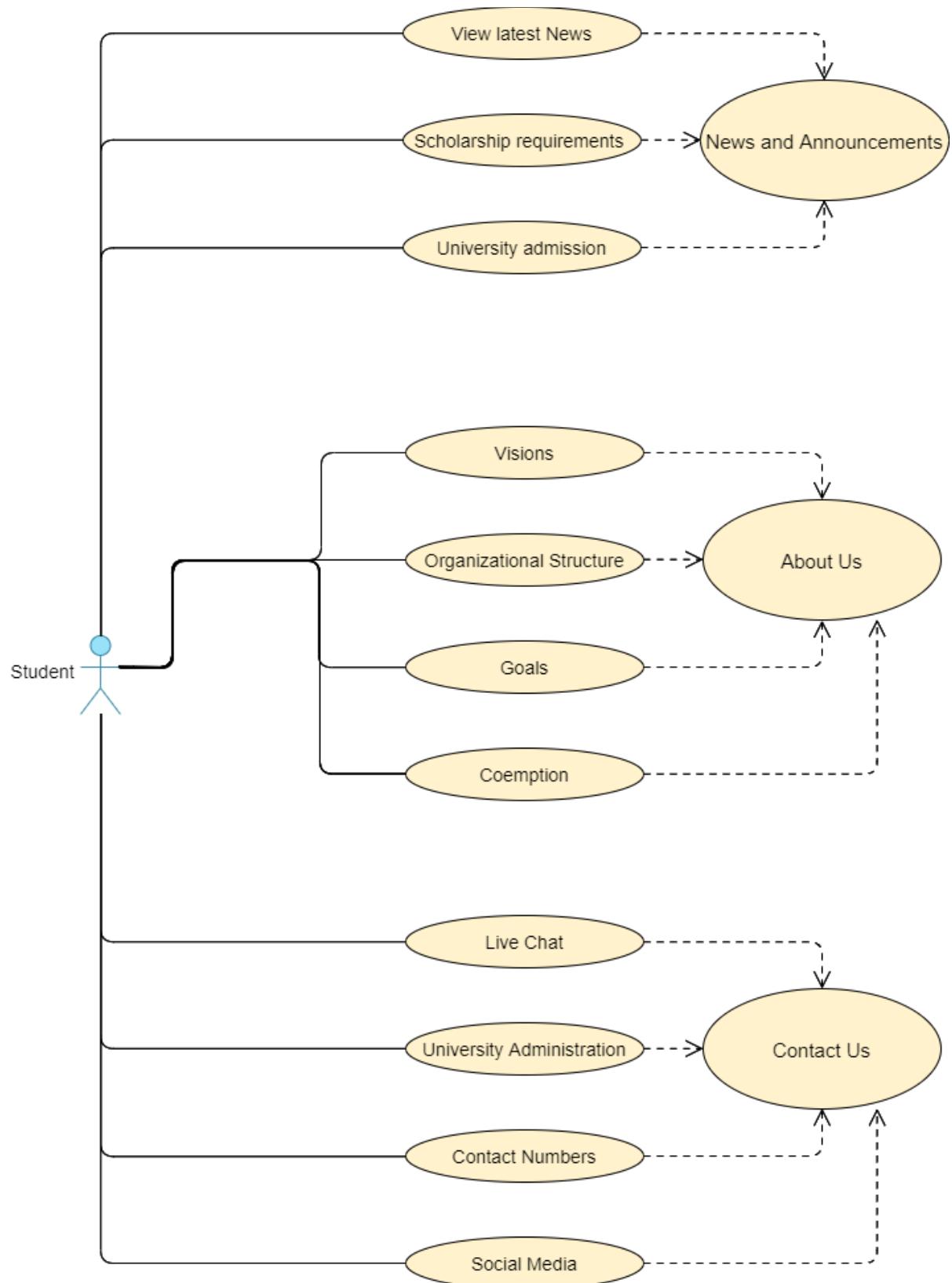


Figure 8.6.3:shows the Student Use Case Diagram

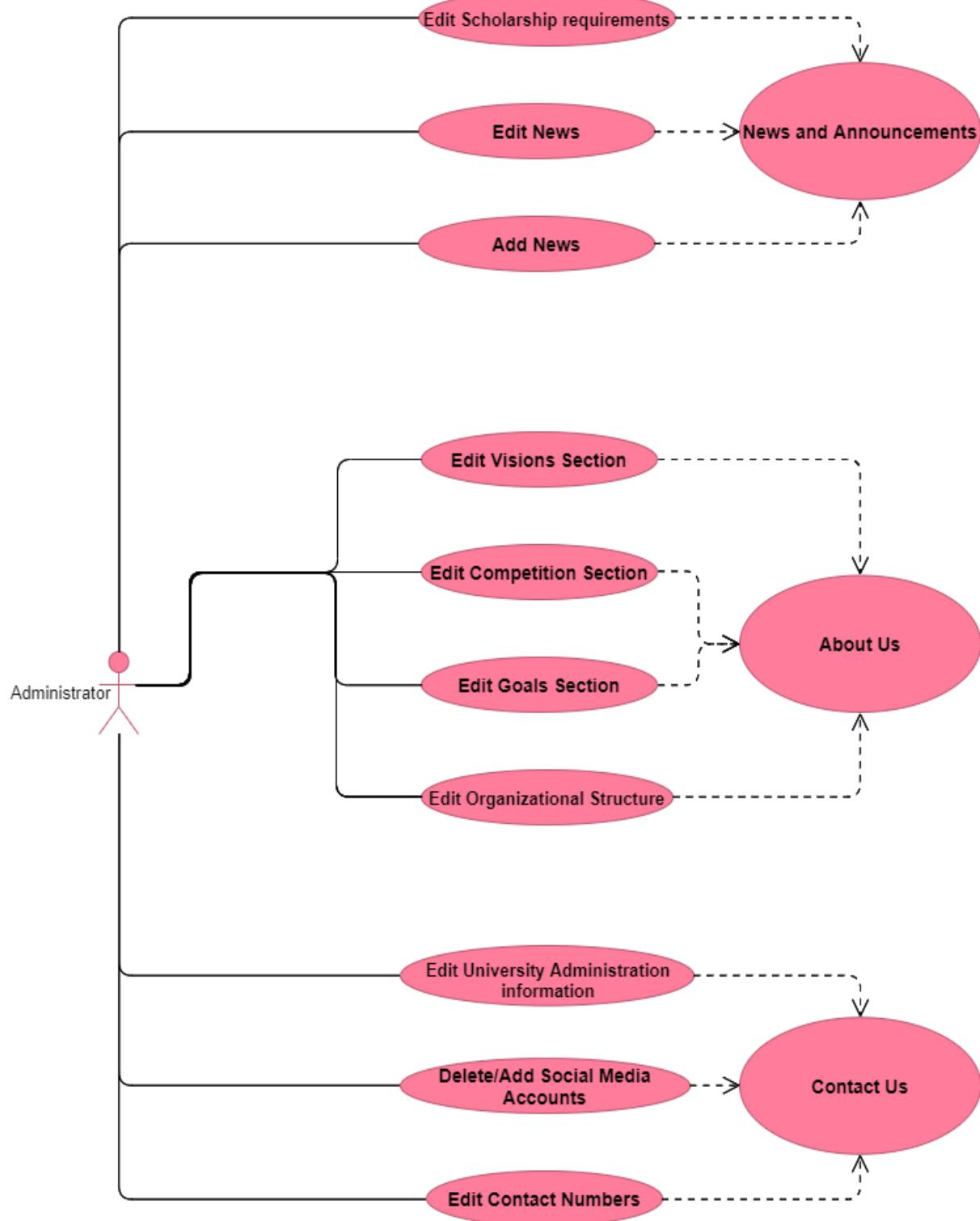


Figure 8.6.4:shows the Administrator Use Case Diagram

## 9 User Interface and Implementation

We got the inspiration for the application design from the university's website. First, we looked at and specified the important and essential aspects of the home page which were: News, Announcements, and their services. And we got the inspiration for the color scheme from their logo, but when we started working on the designs, we had to decide if we wanted the blue to be the dominant color and yellow to be the accent color or the opposite

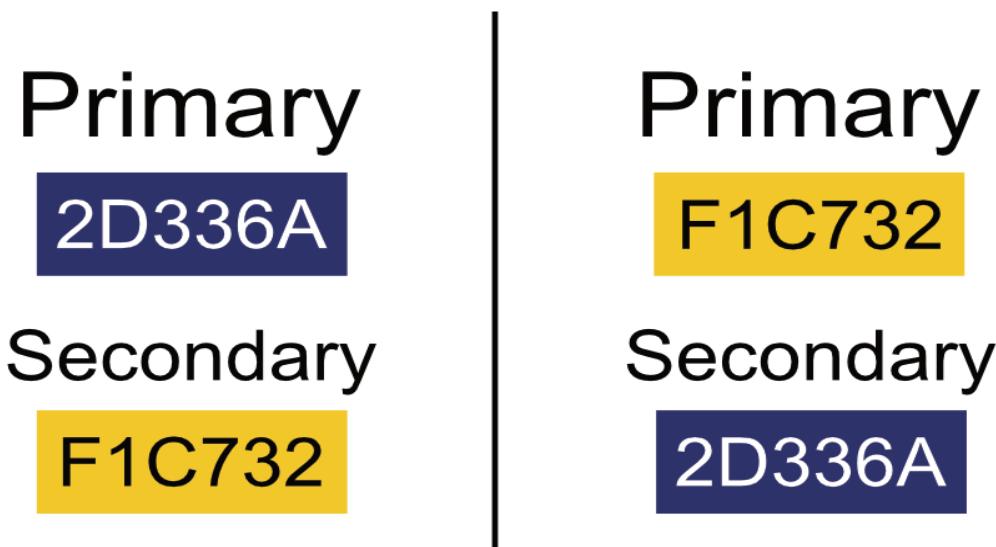


Figure 9.1.1 show the color scheme choices we had while designing the user interface

What we found out was that having yellow as a primary color is not comfortable for the eyes. So we chose blue as the primary color and yellow as the secondary. And we experimented with fonts too, our two final candidates were Courier New and corbel. But we ended up choosing Corbel because the bold font was more suitable for the user interface.



Figure 9.1.2 shows the font choices we had while designing the user interface

## 9.1 User interface Design:

In the phase 1 document, we designed a wireframe for our User interface vision for both University applications. In this section, we are going to show the final user interface designs for those applications.

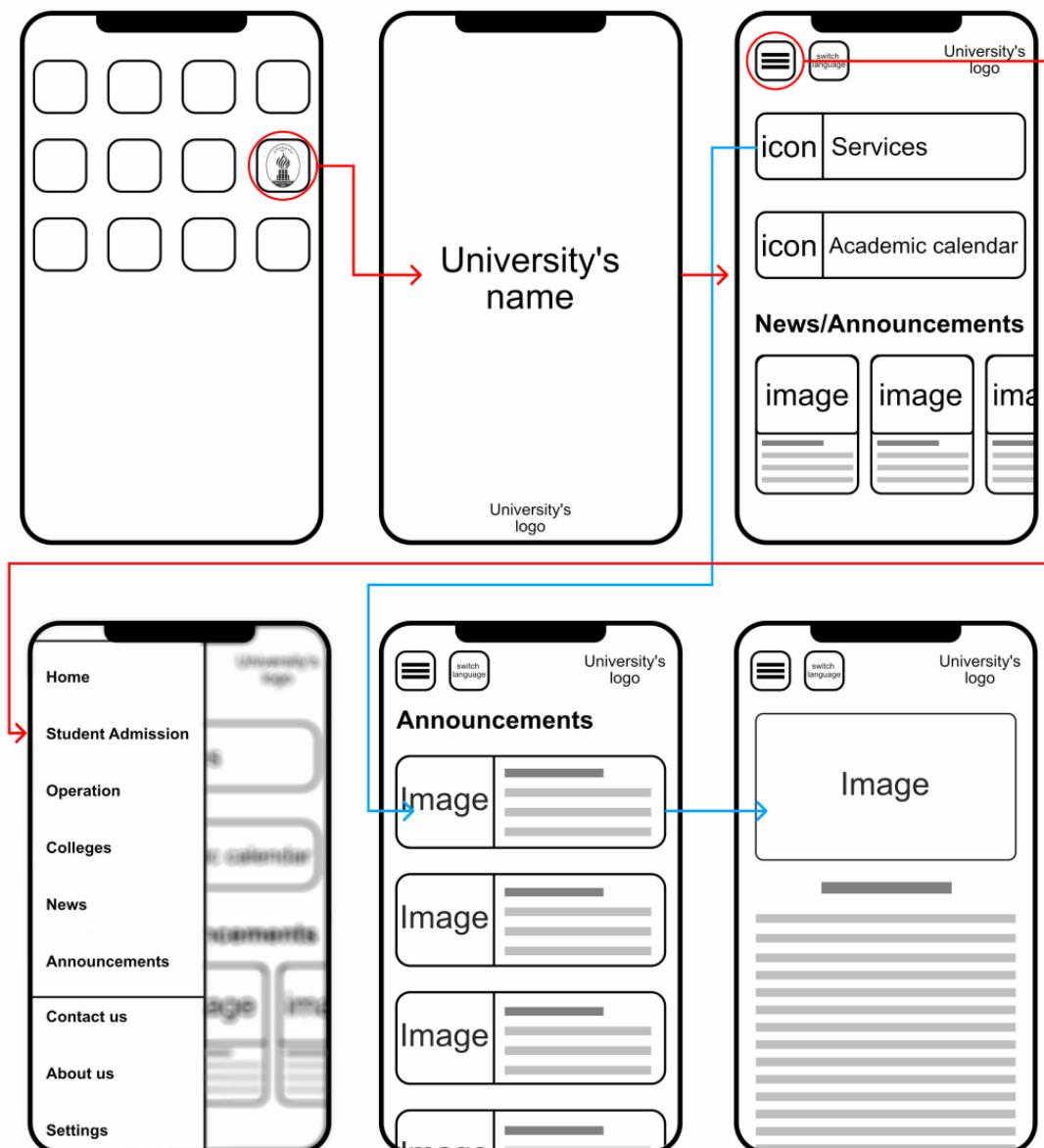


Figure 9.3 shows the wireframe of the first application from the Research and Documentation document



1



## News



## Announcements



3



## News



The Strategic Plan “18-23”  
Holds Its First Meeting  
Under The Chairmanship Of  
The Sector

*Consectetur Adipiscing Elit, Sed Do Eiusmod Tempor Incididunt Ut Labore Et Dolore Magna Aliqua. Elit Eget Gravida Cum Sociis Natoque Penatibus Et Etiam Utramque Id Cuiuslibet Meatus Aliquam Dapibus Ultricies In Iaculis Nunc. Elit Duis Tristique Sollicitudin Nibh Sit Amet Commodo Nulla Facilisis. Et Ultricies Integer Quis Auctor Elit Sed Etiam Tempor Orci Eu Lobortis Elementum. Vel Pretium Lectus Quam Id Leo In. Aliquet Nec Ullamcorper Sit Amet. Risus Nullam Eget Felis. Aenean Libero Fusce Sed Etiam Duis. Malesuada Fames Ac Turpis Egital Sed Tempus. Dictum Fusce Ut Placeat Orci Nulla Pellenentesque Dignissim Enim. Tellus In Metus Vulputate Eu Scelerisque Felis Imperdiet Proin.*

4

5

Figure 9.4 shows the final user interface for application one.

Design number one shows how the popup page is going to look like. Design number two shows how the home page is going to look like. Design number three shows how the menu is going to look like. Design number four shows what the news page is going to look like. Design number five shows what the detailed news page is going to look like.

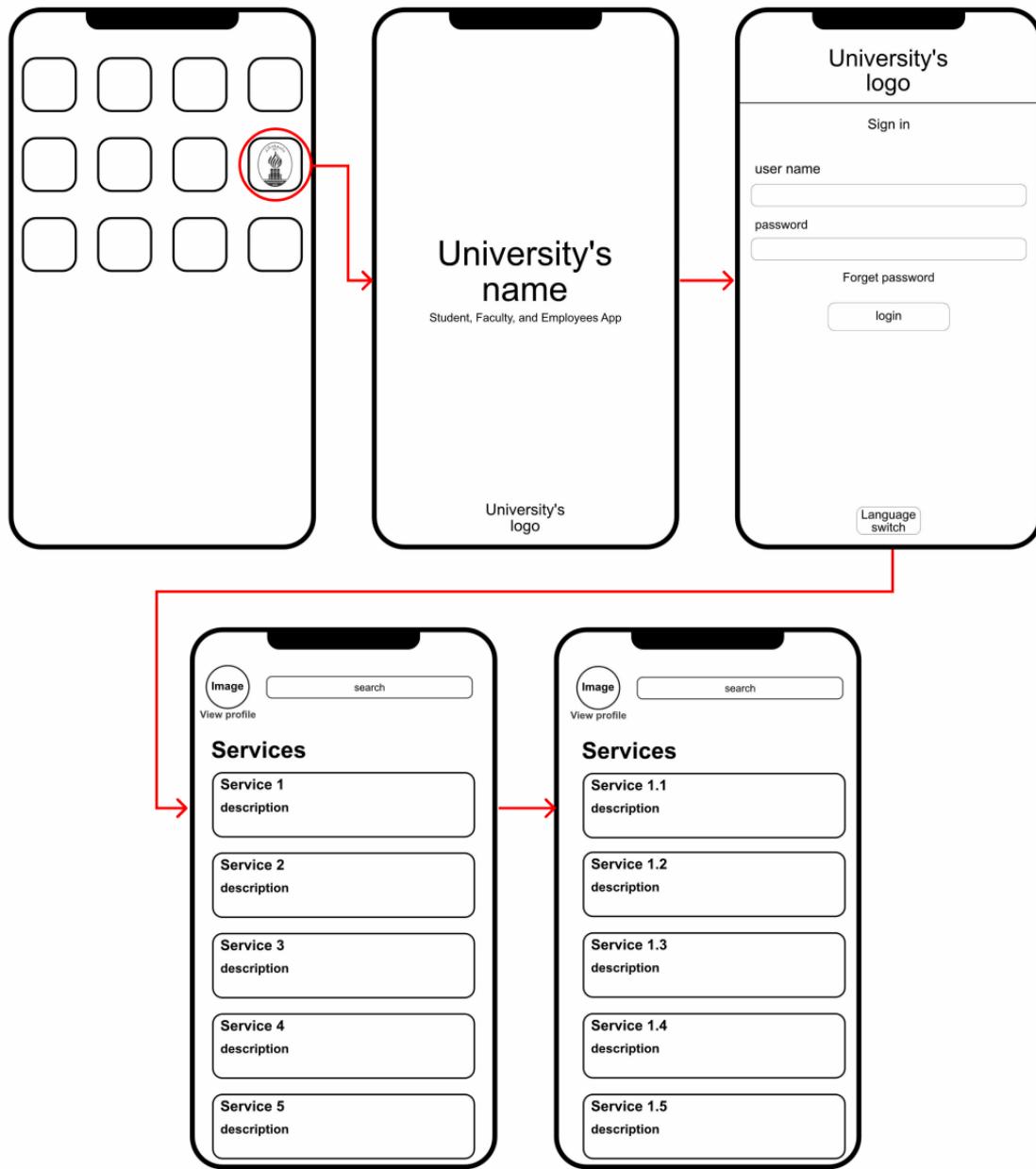
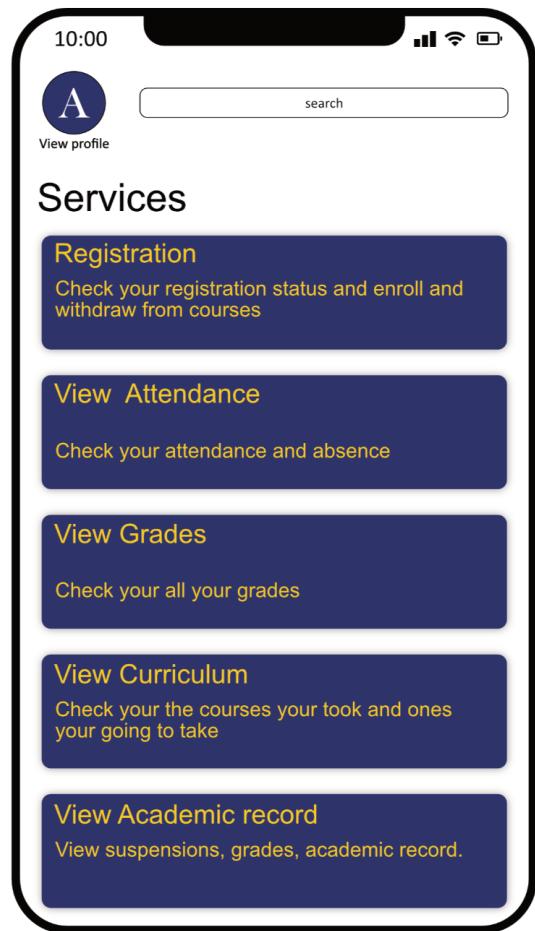
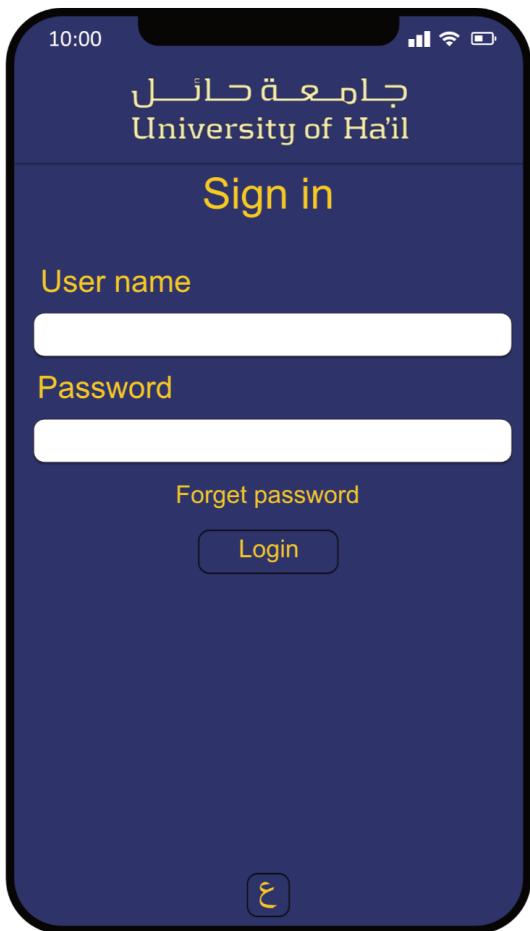


Figure 9.5 shows the wireframe of the second application from the Research and Documentation document



1

2

Figure 9.6: shows the final user interface for the application two

Design number one shows how the sign-in page is going to look like. Design number two shows how the services page is going to look like.

**To Test the Prototype for the first application for yourself just enter the link below:**

<https://xd.adobe.com/view/4894bdf1-227a-441a-ac77-71d08aa10b59-1dc7/?fullscreen>

Ps: Press anywhere inside the prototype to know the available buttons.

## 10 Testing

We used Flutter to build the application for android smartphones and IOS. The Test Plan is designed to guide the scope, approach, resources, and schedule of all testing activities of the project.

The plan identifies the items to be tested, the features to be tested, the types of testing to be performed, the people responsible for testing, the resources and schedule required to complete testing.

### 10.1 Scope

#### 10.1.1 In-Scope

All the features of Ha'il App which were defined in software requirement specification need to be tested

Module Name	Applicable Roles	Description
View latest News	Visitor Faculty Student	<b>Visitor:</b> A Visitor can view the latest news of the university that are linked to the university website <b>Faculty:</b> A Faculty can view the latest news of the university that are linked to the university website <b>Student:</b> A Student can view the latest news of the university that are linked to the university website
University Admission	Visitor	<b>Visitor:</b> A Visitor can view the requirements and apply for the university and the college of his/her choice

Scholarship requirements	Faculty Student	<b>Faculty:</b> A Faculty Member can view the Scholarship requirements and apply for them <b>Student:</b> A Student can view the Scholarship requirements and apply for them
Competitions	Visitor Faculty Student	<b>Visitor:</b> A Visitor can view the competitions of the university and take part in them <b>Faculty:</b> A Faculty can view the competitions of the university <b>Student:</b> A Student can view the competitions of the university and take part in them
Organizational Structure	Visitor Faculty Student	<b>Visitor:</b> A Visitor can view the Organizational Structure of the university <b>Faculty:</b> A Faculty can view the Organizational Structure of the university <b>Student:</b> A Student can view the Organizational Structure of the university
Academic Calendar	Visitor Faculty Student	<b>Visitor:</b> A Visitor can view the Academic Calendar of the university and see the timers for each event <b>Faculty:</b> A Faculty can view the Academic Calendar of the university and see the timers for each event <b>Student:</b> A Student can view the Academic Calendar of the university and see the timers for each event

Services	Faculty Student	By entering the services tap it will take you to the second app (the electronic services application) And ask you for your user name and password <b>Faculty:</b> A Faculty can enter the services tap and be taken to the second app <b>Student:</b> A Student can enter the services tap and be taken to the second app
Edit News	Admin	<b>Admin:</b> An Admin can add and edit and delete news in the app
Edit Competitions	Admin	<b>Admin:</b> An Admin can add and edit and delete Competitions and stop applying to them
Edit Social Media Accounts	Admin	<b>Admin:</b> An Admin can add and edit and delete Social Media Accounts in the app
Edit Academic Calendar	Admin	<b>Admin:</b> An Admin can edit and delete Academic Calendar events and reset timers

### 10.1.2 Out of Scope

These features are not be tested because they are not included in the software requirement specs

- Hardware Interfaces
- Database logical
- App Security and Performance

## **10.2 Quality Objective**

The test objectives are to make sure that the functionality of the app, the project should focus on testing the app functionality such as news and announcements pages working and academic calendar useability and timers verification ...etc. to guarantee all these Functionalities can work normally in a real user environment.

## **10.3 Roles and Responsibilities**

No.	Member	Tasks
1.	Test Manager	Manage the whole project Define project directions Acquire appropriate resources
2.	Tester	Identifying and describing appropriate test techniques/tools/automation architecture Verify and assess the Test Approach Execute the tests, Log results, Report the defects. Outsourced members
3.	Developer in Test	Implement the test cases, test program, test suite, etc.

## **11 Test Methodology**

### **11.1 Test Methodology**

We used Scrum Testing which is a testing done in scrum methodology to verify the software application requirements are met. It involves checking functional parameters like providing the latest news and announcements, showing the calendar, and sliding menus There is no active role of tester in the process so it is usually performed by developers with Unit Test.

### **11.2 Stages of testing**

In the University of Hail Project, there are 3 types of testing that should be conducted.

- **Development testing**, where the system is tested during development to discover bugs and defects
- **Release testing**, where a separate testing team tests a complete version of the system before it is released to users.
- **User testing**, where users or potential users of a system test the system in their own environment.

## 11.3 Suspension Criteria and Resumption Requirements

If the team members report that there are **40%** of test cases **failed**, suspend testing until the development team fixes all the failed cases.

## 11.4 Test Completeness

- **Run** rate is mandatory to be **100%** unless a clear reason is given.
- **Pass** rate is **80%**, achieving the pass rate is **mandatory**

## 11.5 Project task and estimation and schedule

Task	Members	Estimate effort
Create the test specification	Test Designer	70man-hour
Perform Test Execution	Tester, Test Administrator	50man-hour
Test Report	Tester	48 man-hour
<b>Total</b>		260 man-hour

**Schedule to complete these tasks**

## 12 Resource & Environment Needs

### 12.1 Testing Tools

No.	Resources	Descriptions
1.	Workstation computer	A workstation computer that is powerful to be able to run the system smoothly and reliably that runs on windows 10 or up
2.	Integrated Development Environment	So we will be able to write codes and check their correctness
3.	emulator	So we can emulate Android on Windows 10
4.	Android Phones	Android phone that run at least android 8 and up

### 12.2 Test Environment

We used a workstation pc that runs Windows 10 that has an eight core AMD Ryzen 7 5800 Processor, 16GB of RAM, with a Geforce Nvidia RTX 2070 Super to guarantee optimal performance. The IDE we used was Microsoft Visual Studio Code with Android Studio Emulator to run the program in real time. And test the features as we implement them.

After we finished building the Application we proceeded to test it on android, so we installed the application and tested it on the Samsung Galaxy S20 plus, S10, and huawei mate 10,. To see how different versions on Android with different hardware and screen aspect ratios would behave, and what bugs and glitches we will have to fix.