جامعة الإمام عبدالرحمن بن فيصل
IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY

Kingdom of Saudi Arabia
Ministry of Education
Imam Abdulrahman bin Faisal University
Computer Science department
College of Science and Humanities

CS 411 – Software Engineering
Term 1 – 2022/2023

Software Requirements Specification
For

CSHJ

Version 1.0

CIS Year 4, G5

Dr. Norah Alnaim

1 October, 2022

Software Requirements Specification (SRS) was prepared and provided as a deliverable for Software Engineering, CS411, Term 1, and it will be used by Administration, Faculty Member, Student, Security Member. This document is based in part on the IEEE Recommended Practice for Software Requirement Specification (SRS) Descriptions.

Team Members:

#	Student Name	ID
1	**May Mohammed AlOtaibi**	**2200004606**
2	**Reem Shaker Almualem**	**2190000429**
3	**Warood Khalid Alzayer**	**2190004986**
4	**Ghala Mohammed Alkhaldi**	**2200003157**
5	**Fida Mohammed Alelou**	**2200003041**

Table of Content

Revision History

Name	Date	Reason For Changes	Version
All members	Sep 24, 2022	Prepared initial version	0.1
All members	Sep 25, 2022	Updated section 1,2	0.2
All members	Sep 26, 2022	Updated section 3	0.3
All members	Sep 27, 2022	Updated section 4	0.4
All members	Sep 28, 2022	Updated section 5,6	0.5
All members	Sep 29, 2022	Complete review - Final version	1.0

Table of Tables

Table of Figures

1. Introduction

In this document which is Software Requirement Specification (SRS) all requirements and specifications that belong to the **CSHJ** system will be specified. The document has been prepared by following the IEEE Recommended Practice for Software Requirement Specification (SRS). In this section, the purpose of the document as well as the scope, definition, acronyms, and abbreviation will be discussed and defined. Lastly, the references that are used in this document will be addressed.

1.1 Purpose

This document aims to specify the requirements and specifications of the system in detail which will help to reduce the workload in the development stage. In this report, the product perspective and functions, interfaces, and functional and nonfunctional requirements and specifications of the system will be discussed and described. Moreover, the intended audience of the system, which are the development team, the project supervisor, and the stakeholders (clients).

- **Development Team**

This report will help reduce the workload on the developers to understand the needs and requirements in detail so they can develop and implement a correct system that meets the stakeholders' requirements.

- **Project Supervisor**

This report is going to be reviewed and checked by the supervisor to make sure that everything is as the clients want and need. Also, will give feedback and recommendations if something needs to be improved.

- **Stakeholders (clients)**

This report will help the clients to ensure that the team understands their requirements, needs, and standards correctly, also they will be able to see the big picture of the system so they will be able to change some of the requirements if they want to, before moving to the next stage.

1.2 Scope

CSHJ is an artificial intelligence approach-based system, as well as a system of systems. It is an artificial intelligence approach-based system because it uses the location of the students when they attend the class, as well as verifies the students when they enter the College of Science and Humanities. It is also considered a system of systems platform because it takes the features of the People soft, Blackboard, and My IAU and puts them in one place which is the **CSHJ** application. Furthermore, the users of the system which are students, faculty members, security members, and administration should download the application on their devices in order to take advantage of all features in the application. Because some features work only by

downloading the application. This system will manage and ease the workload of the users by gathering the features of many systems in one single system, the users then will not get confused and use many systems.

The users can sign up to the system by using the academic ID or the academic email, a strong password, and then determine which type of users they are, whether they are students, faculty members, security members, or from the administration. A verification email will be sent to the user's email to verify the account for authentication which will give more security. Moreover, users can use the touch ID or face ID for more privacy and security. Based on the user type, the user will be redirected to the suitable interface.

Figure 1 Users verification

- **The Functionalities of the Administration**

There will be a section for adding and deleting students' regulations and rules, as well as a section for adding new events, and clubs' details, a section for receiving official excuses, and a section for sending notifications to students and other users which include the admins, faculty members, and security members.

- **The Functionalities of the Faculty Members**

For the faculty members, there will be a section for reviewing the attendance as well as the absence of the students after the automatic attendance, also a section for adding and deleting notifications and classes schedule and times. Moreover, a section for providing students with certificates of thanks through the platform.

- **The Functionalities of Security Members**

For the security members, there will be a section for giving the students infractions when they violate the rules, as well as ensuring that the students from the college.

❖ **The Functionalities of Students**

For the students, there will be a section for reviewing the attendance for each course, they will be able to inform the faculty members if they will not attend the class through a chatbot. Students will be able to submit an official excuse through this platform. Also, there will be a section for evaluating the faculty members after the classes as well as there will be a section for taking notes in the class and they will be saved automatically. Through this platform, students will be able to raise an objection to any violation. In the section related to the clubs, students will be able to enroll in any of the college clubs.

For all users, there will be a section called a notification stream, which includes the most recent news of the college, as well as the events and any other announcements related to the College of Science and Humanities. Furthermore, there will be some slight differences according to each user .

1.3 Definitions, Acronyms, and Abbreviations

.

Acronyms	*Definitions*
CSHJ	**College of Science and Humanities in Jubail**
ID	**Identification**
SRS	**Software Requirements Specification**
IEEE	**The Institute of Electrical and Electronic Engineering.**
IAU	**Imam Abdulrahman Bin Faisal University**
PC	**personal computer**
OS	**Operating System.**

Table 1 Acronyms and its definition

Terminology	*Definitions*
Interface	Is a group of related methods with empty bodies. [2]
Software	Is a set of instructions, data or programs used to operate computers and execute specific tasks. [1]
Database	organized collection of structured information.
User	The person, or persons, who operate or interact directly with the product. The user(s) and the customer(s) are often not the same person(s). [3]
Systems of Systems	Consist of several different software systems
Artificial Intelligence	A significant field of computer science concerned with creating intelligent machines capable of doing activities that normally need human intellect.[4]

Table 2 Definitions, Acronyms, and Abbreviations

1.4 References

[1] (SearchAppArchitecture, 2021)

[2] (Oracle, 1995,2021)

[3] "IEEE Recommended Practice for Software Requirements Specifications," in IEEE Std 830-1998 , vol., no., pp.1-40, 20 Oct. 1998, doi: 10.1109/IEEESTD.1998.88286.

[4] Burns, E., Laskowski, N., & Tucci, L. (2021, July 1). What is Artificial Intelligence (AI)? - ai definition and how it works. SearchEnterpriseAI. Retrieved October 4, 2021, from https://searchenterpriseai.techtarget.com/definition/AI-Artificial-Intelligence.

[5] Somerville, Ian, "Software Engineering", Addison Wesley (10thedition): 2016,ISBN:10:1-292-09613-6, ISBN-13:978-1-292-09613-1.

[6] *What is meant by application usability?* [Online]. Available: https://www.modernanalyst.com/Careers/InterviewQuestions/tabid/128/ID/2190/What-is-meant-by-application-usability.aspx. [Accessed: 01-Oct-2022].

[7] "What is application security?: Vmware glossary," *VMware*, 28-Sep-2022. [Online]. Available: https://www.vmware.com/topics/glossary/content/application-security.html. [Accessed: 01-Oct-2022].

[8] J. Tuikkala, "How to improve the performance of your web application," *Vaadin*, 25-Mar-2021. [Online]. Available: https://vaadin.com/blog/how-to-improve-the-performance-of-your-web-application. [Accessed: 01-Oct-2022].

[9] C. L. N. Krüger, "HOW TO WRITE A software requirements specification (SRS document)," *Perforce Software*. [Online]. Available: https://www.perforce.com/blog/alm/how-write-software-requirements-specification-srs-document. [Accessed: 01-Oct-2022].

[10] Editor, "Functional and nonfunctional requirements: Specification and types," *AltexSoft*, 18-Oct-2019. [Online]. Available: https://www.altexsoft.com/blog/business/functional-and-non-functional-requirements-specification-and-types/. [Accessed: 01-Oct-2022].

2. Overall description

This section includes a general overview of the CSHJ system as well as an explanation of the system's fundamental operations. The context, scope, what is outside the system, and what engages with it are also defined.

2.1 Product perspective

CSHJ is an Artificial Intelligence approach-based system, and systems of systems designed specifically for college students to be an integrated platform that provides services that facilitate student attendance, show them their latest classes and display all clubs and events within the college. As well as display the violations committed by the student inside the university campus. Figure 1 shows the general structure of the system. There are interfaces linked to a single database. The software's end users will be administrators and students, and it is accessed only by faculty and college security administrators as per their powers.

- Students have the authority to review attendance for each course so they can write a comment to a faculty member if they do not attend for any reason. Also, if students are media leaders, they will be given the authority to add advertisements for student activities or events. In addition, they can rate the teacher and take notes on each lecture given by a faculty member. The system also gives the authority to raise an objection to any violation attributed to the students by the college security personnel. It also allows students to apply for the activities and initiatives offered by the college for registration. Moreover, students can submit ideas for initiatives reviewed by the concerned department and processed and responded to through the system by accepting or rejecting the initiative.

- Admin has considerable powers according to their job position. A faculty member can review attendance and absence after automatic monitoring. Also, open discussion spaces and download necessary resources for quick student access. In addition to providing certificates of thanks to students through the system. On the other hand, the security members have the authority to give infractions to the students and ensure that the students belong to the college when they enter the building. Administratively, they have considerable powers, such as publishing midterm exam schedules, publishing the dates of events such as competitions and camps, documenting the progress of student clubs, and finally, honoring students and providing them with certificates of thanks.

Figure 2 Product perspective

2.2 Product functions

The **CSHJ** application provides many different functions for each user. The following are the application functions delivers:

- Each user will have his account in the program after following the following steps:
  - All users must be registered in the system. Unregistered users cannot benefit from the application.
  - Log in using the university email and user password.
  - An email will be sent to confirm its entry into the system.
  - The program can activate the facial recognition service to facilitate entry after registration.
- Students have authority to:
  - Review attendance for each course
  - Add advertisements for student activities or events
  - Raise an objection to any violation attributed to the students by the college security members
  - Submit ideas for initiatives
  - Share notifications but only with other students that exist in the same registered class
  - Raise an excuse for absence to the administrators
- Security members have authority to:
  - Give infractions to the students
  - Ensure that the students belong to the college when they enter the building.
- Faculty members have authority to:
  - Review attendance and absence after automatic monitoring
  - Open discussion spaces
  - Download necessary resources for quick student access.
  - Provide certificates of thanks to students
  - View students' grades for each course.
- Administrators have authority to:
  - Publishing midterm exam schedules
  - Publishing the dates of events such as competitions and camps
  - Documenting the progress of student clubs
  - Honoring students.

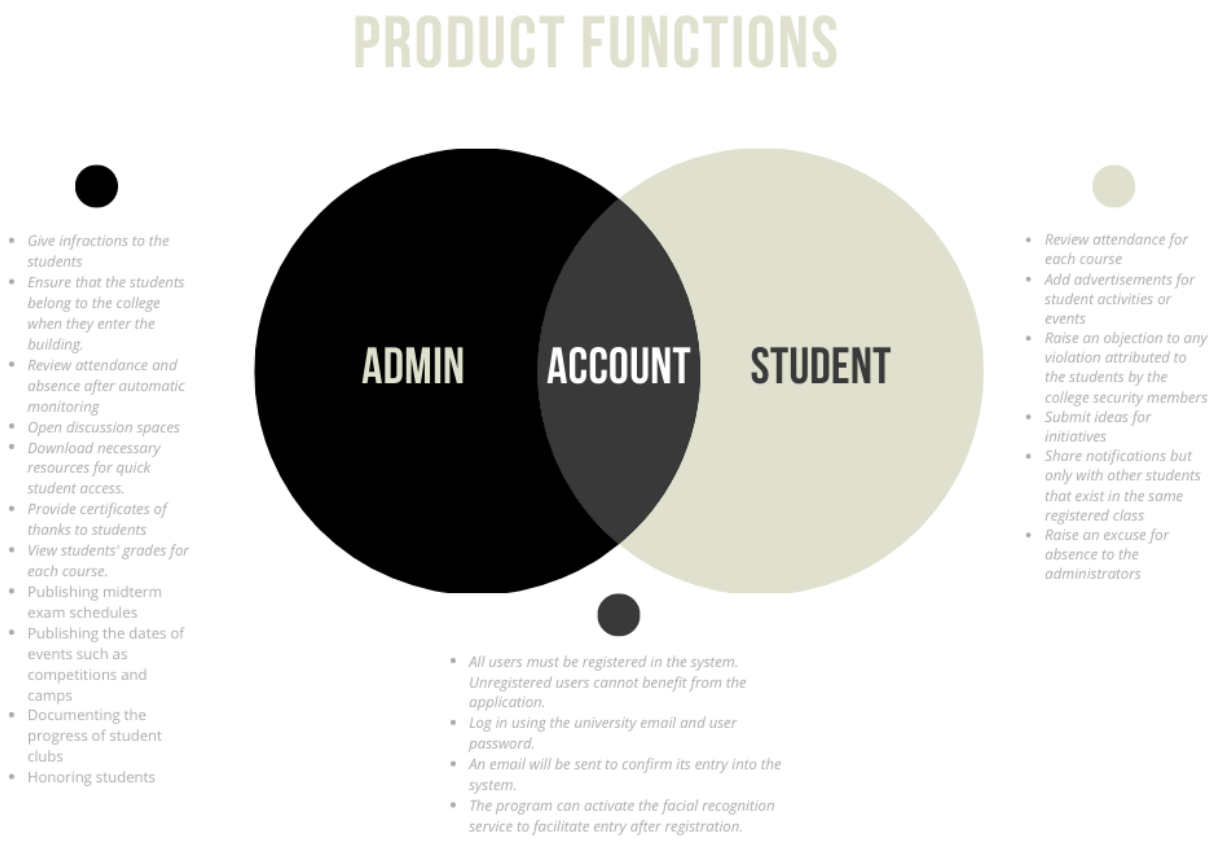

Figure 3 Product Functions

3. Specific requirements

In this section the interface requirements will be clarified, the functional needs of each end-user will be explained, and go into further detail about each interface.

3.1 External interface requirements

The **CSHJ** workflow and the interfaces for each end user are described in this section. Additionally, identify briefly the platforms that are capable of running the platform, hardware interface, and software interface.

3.1.1 System interfaces

The software runs on Chrome, or Safari browsers on Windows or Mac, Also downloaded on IOS or Android.

3.1.2 User interfaces

The system "**CSHJ**", will provide a user-friendly interface that enables every user to use the system's features without issue.CSHJ has four end-users which are the **administration**, **faculty member**, **security member**, and **student**. This section presents some of the user's possible interfaces.

3.1.2.1 Homepage interface

When end users initially use the software, the homepage appears as the first interface. The user will be prompted by the program to select whether they are an administrator, faculty member, student, or security member. Once selecting a choice, they will be forwarded to the appropriate interfaces for each.

3.1.2.2 Sign-up interface

Sign-up Page will appear for the end users who want to register in **CSHJ** software. A new user may sign up for the software by entering the required personal data, including the first and last name, phone number, username, password, city, and birthdate. In addition, the user must choose the job (administration member, faculty member, security member, or student). The relevant interface will then show up. There are some constraints while creating an account in our software shown in the table.

Filed name	Constraints
Username	-Unique.
Password	At least 8- characters. - Include upper and lower letters. -At least one number. At least one symbol characters
Phone number	-Unique.
Date of birth	-The age must be 17 and above.
Email	-Unique -In a standard format.

Table 3 Constraints for register

3.1.2.3 Login interface

To log in, the user must insert the phone number or academic email. Additionally, to increase security and privacy, the user could have Face ID /or Touch ID automatically fill the text boxes. The user devices and the data stored on them are related to this feature. Also In case, the user forgets the academic email or the password, they can retrieve it by phone number. After that, they will access their interface page

3.1.2.4 Administration Page Interface

The interface is accessed only by the administrator and includes all the main privileges that the administrator's ability to do.The Administration will be able to manage accounts and modify personal

information. Ensure the software security is provided by continual maintenance by the developers, and the following are some of the functions that the administrators have.

3.1.2.4.1 Manage the posts

The administration has the ability to manage the posts including:

- Add and delete student regulations and rules.
- Share notifications in the streaming area.
- Edit, delete, and pin all notifications.

3.1.2.4.2 Manage the clubs and the classes

The administration has the ability to manage the clubs and the classes including**:**

- Add student clubs and their details.
- Control the number of students allowed in each club, and accept, or deny students to the clubs.
- Control the number of students allowed in each class.

3.1.2.4.3 Manage the attendance

- The administration has the privilege to accept or deny any excuse to leave presented by the students.

3.1.2.7 Faculty member interface

Only the faculty member has access to this interface. The interface shows the primary abilities of the faculty member for example:

3.1.2.7.1 Sharing notifications

- Share notifications in the streaming area.

A faculty member may inform students of any event, including the exam date, the cancelation of the lecture, and many others.

3.1.2.7.2 Edit notifications

- Edit, delete and pin their own notifications

A faculty member can delete or edit the pre-notifications.

3.1.2.7.3 Classes schedule

- Add class schedule and time.

Each faculty member has the ability to schedule the lectures for students in addition to announcing the hall number.

3.1.2.8 Security member interface

This interface is accessed only by the security members. The interface includes the main privileges that the security members can do. This interface has special privileges that only the security members have like:

3.1.2.8.1 Violation

Security members have the ability to free a violation for a student using the app by scanning a unique barcode for each student.

3.1.2.8.2 Student verification

Student ID verification will be done automatically using the attendance technology. but in case the student doesn't belong to this college a notification will be sent to the security members with the information of the student name,ID and entrance point.

3.1.2.9 Student interface

This interface is accessed only by the students. the interface includes the main privileges that the student can do, join a student club, share a notification, view all notification in the streaming area, view the rules and regulations and other privileges that will be detailed more below:

3.1.2.9.1 Join a student club

In the student interface, students can view all clubs that exist in the college, their details, and then register in the desired club.

3.1.2.9.2 Share a notification

Students can share notifications but only with other students that exist in the same registered class or same academic year.

3.1.2.9.3 Academic schedule

Students can view their academic schedule once they finish registering in all classes. the academic schedule then will automatically be generated to all students.

3.1.2.9.4 Attendance

Students can view and track their attendance for each registered class. The attendance will be taken using the special technology that uses location to determine whether the student attends the class or not. In the case of absence of the student, students then can file their excuse for absence.

3.1.2.9.5 Violation

Students can view and track their violations.

3.1.3 Hardware interfaces

The **CSHJ** software needs devices to run the system such as PC, laptop, tablet or mobile phone. Since the system requires a connection to the internet in order to function properly, the used hardware device needs to be connected to the internet through a Modem, WAN, LAN or Ethernet Cross-Cable especially in the case of using attendance technology.

3.1.4 Software interfaces

The development team of **CSHJ** will need the latest versions of Windows or Mac operating systems, in case of using a PC or laptop, Chrome or Safari will be needed to open the software on the web. Also, in the case of using it on a tablet or a mobile phone, Android or IOS will be needed to download the application from Google play or Appstore. Furthermore, in order to make the application run properly to use the location technology, the end user must allow the use of the location in the software for the application.

3.2 Functional Requirements:

This section presents the requirements that specify all of the **CSHJ** software's fundamental actions.

3.2.1 Login interface

The login interface use-case will be described in the table below.

Actors	Administration, faculty member, security member and student.
Description	The end-user can access by specific and valid academic username and password. after that they will be directed to their appropriate interface.
Data	• Academic username. • Academic password.
Simulate	End-user: accessing the end-user homepage, and then will be able to use the privileges and functionalities provided to them.
Response	End-user will issue a command by clicking on: 1- Login as administrator. 2- Login as a faculty member. 3- Login as a security member. 4- Login as a student.
Comments	In case of invalid username or password an error message will appear.

Table 4 Login interface

3.2.2 Administration

3.2.2.1 Manage the posts

Actors	Administration.
Description	The administration has the ability to manage the posts including: • Add and delete student regulations and rules. • Share notifications in the streaming area. • Edit, delete, and pin all notifications.
Data	• notifications.
Simulate	After accessing the home page the administrator will be able to manage all posts and notifications uploaded in the streaming area.
Response	Administrator will issue a command by clicking on: 1- Add a regulation. 2- Delete a regulation. 3- Share a notification. 4- Edit a notification. 5- Delete a notification. 6- Pin a notification.
Comments	If the end user wasn't an administrator an error message will appear.

Table 5 Manage the posts

3.2.2.2 Manage the clubs and the classes

Actors	Administration
Description	Admins can add new clubs and classes, controlling the number of students and denying or accepting in the club and classes
Data	• Clubs • Classes • Students
Simulate	From the adding clubs icon on the admins system, admins can add new clubs and from adding class icons, admins can add classes. as well as rejecting students and accepting them from the icons on the homepage.

Response	By clicking on the icon, the admin will be able to add and delete, then a message will appear.
Comments	In case of denying the student a message will be sent to her, as well as when she is accepted a message will be sent to her.

Table 6 Manage the clubs and the classes

3.2.2.3 Manage the attendance

Actors	Administration.
Description	admins can accept or reject the official excuses
Data	• Official excuses • Students names • The date
Simulate	Admins will enter the system and by clicking on the icon to see the excuses.
Response	All students' excuses will appear, then admins can accept or deny.
Comments	In case of denying the excuse, a message will be sent to the student as well as accepting

Table 7 Manage the attendance

3.2.3 Faculty member interface

3.2.3.1 Sharing notifications

Actors	Faculty member.
Description	A faculty member may add and delete notifications to inform students of any event, such as classes schedule and times, the exam date, and many others.
Data	• Date and time of the notification.
Simulate	Faculty member: Enter the notification information and then announce it, then the notification will be published to the student of the existence of a new notification, and the student will be able to see it.
Response	Notifications will appear to all students in the streaming area.
Comments	The new notifications will appear in the foreground and also when the notification is read there will be a read sign next to it

Table 8 Sharing notification

3.2.3.2 Edit notifications

Actors	Faculty member.
Description	The faculty member can modify the previous notifications and an alert will be sent to students.
Data	• Previous Notifications
Simulate	The faculty member will access the previous notification by clicking on the edit option.
Response	An updated alert will be sent to notification to students in the streaming area.
Comments	When the notification is modified, a notification of the success of the amendment will appear.

Table 9 Edit notification

3.2.3.3 Classes schedule

Actors	Faculty member.
Description	A faculty member can schedule lectures in terms of time and day as well as the hall number
Data	• Class number (hall number). • Name of the subject. • Day and time of the class.
Simulate	At the beginning of the academic year, each faculty member will schedule the lectures The faculty member has to enter the name and number of the subject, the time, the day and also the number of the hall.
Response	When courses are registered, the timetable (course schedule) will be visible to all students, and students can view the schedule during the whole academic year.
Comments	-

Table 10 Classes schedule

3.2.4 Security member interface

3.2.4.1 Violation

Actors	Security members.
Description	Security members have the ability to free a violation for a student using the app by scanning a unique barcode for each student.
Data	-

Simulate	After accessing the homepage the security member can then go to the violations icon and scan the barcode from the student, write the reason for the violation and then the violation will be automatically uploaded for the student.
Response	Security member will issue a command by clicking on: 1- Add a violation.
Comments	A message will appear when the student has exceeded the number of allowed violations on a specific subject.

Table 11 Violation

3.2.4.2 Student verification

Actors	Security members.
Description	Student ID verification will be done automatically using the attendance technology.
Data	-
Simulate	After accessing the homepage the security member can then go to the student verification icon and view whether all student ID verification is correct or not.
Response	Security member will issue a command by clicking on: 1- view the student entrance point.
Comments	In case the student doesn't belong to this college a notification will be sent to the security members with the information of the student name,ID and entrance point.

Table 12 Student verifcation

3.2.5 Student interface

3.2.5.1 Join a student club

Actors	Students
Description	In the students' interface there will be an icon to enroll in the clubs of the college
Data	• Students' full name • ID • Level

Simulate	By clicking to the icon of the clubs, all details will appear and students can enter their names, ID, and level to enroll to the desired club.
Response	When the enrollment was successful a message will appear, and all information will be sent to the administrations .
Comments	If the club is full, a message will appear to inform the students.

Table 13 Join a student club

3.2.5.2 Share a notification

Actors	Student.
Description	Students can share notifications but only with other students that exist in the same registered class or same academic year.
Data	• notification.
Simulate	After accessing the homepage the student can then go to the private streaming area that is specific for a certain class or academic year, and then post any desired notifications to other students.
Response	Students will issue a command by clicking on: 1- Share a notification.
Comments	When trying to post a notification in an unauthorized area an error message will pop.

Table 14 Sharing notification

3.2.5.3 Academic schedule

Actors	Student.
Description	Students can view their academic schedule once they finish registering in all classes. the academic schedule then will automatically be generated to all students.
Data	-
Simulate	After accessing the homepage the student can then go to the academic schedule icon and then view its own schedule based on previous registered classes.
Response	Students will issue a command by clicking on: 1- View academic schedule.

Comments	In case of no classes have been registered an error message will pop with the message of : no registered classes.

Table 15 Academic schedule

3.2.5.4 Attendance

Actors	Students
Description	In the students homepage there will be a section for the attendance, in this section the students can track and check their attendance percentage.
Data	• Class date
Simulate	By clicking on the attendance icon, the student then can see the percentage of the absence in each course, also students can determine a date of any class to check the attendance
Response	The schedule of the attendance will appear.
Comments	If the student crosses the allowed percentage, a warning message will be sent to her.

Table 16 Attendance

3.2.5.5 Violation

Actors	Student.
Description	Students can view and track their violations.
Data	-
Simulate	By clicking on the violations icon, the student then can view all its violations.
Response	Students will issue a command by clicking on: 1- View violations.
Comments	In case the student doesn't have any violation a pop message will appear with the message: no violations existed.

Table 17 Violation

3.2 Non-Functional Requirements:

- The interface should be easy to use and update with fast interaction time.
- The database should be well protected.
- The application should be able to handle all the members of the college including students, faculty members.
- The software should be able to run smoothly even on its peak point.

- Applying the usability of the application, usability is the quality of a system that makes it useful in achieving a user's goals, effective and easy to use, quick to learn, and like-able [6]. it is made of 4 parts which are:

    1- Usefulness – Describes the extent to which the system enables its users to achieve their goals. The end goal of the users can be achieved and there are no missing critical features. All of the requirements are met, at least on the most basic level, even if the users' goals aren't achieved with optimal efficiency. I like to remember this as Goal Completion.

    2- Effectiveness – Describes the extent to which the system is easy to use which is typically measured, quantitatively, in terms of how quickly a user can achieve their specific goals, as well as, doing it without encountering major obstacles or system errors. I like to remember this as Goal Path Optimization.

    3- Learnable – Describes the users' ability to achieve a defined level of competency within a predetermined amount of time. A learnable system may also be described as an intuitive system, taking very little time to master. I like to remember this as Paradigms and Best Practices

    4- Likable – Describes the users' perceptions and opinions about the system overall. I like to remember this as an Emotional Response.

- The used software should be portable, so moving from one OS to another and moving from the application to the website should be easy.
- Privacy and security of the application information should be audited and applied, especially that the software is going to be connected with the college database. Application security is the process of developing, adding, and testing security features within applications to prevent security vulnerabilities against threats such as unauthorized access and modification [7].
- The information in the database should be complete, accurate, updated and consistent to the data.
- Improve the performance by: [8]

    1- Improve the end-user experience by reducing response times.

    2- Make your application more future proof.

    3- Save hosting costs.

    4- Reduce your application's CO2 footprint.

4.0 Appendices

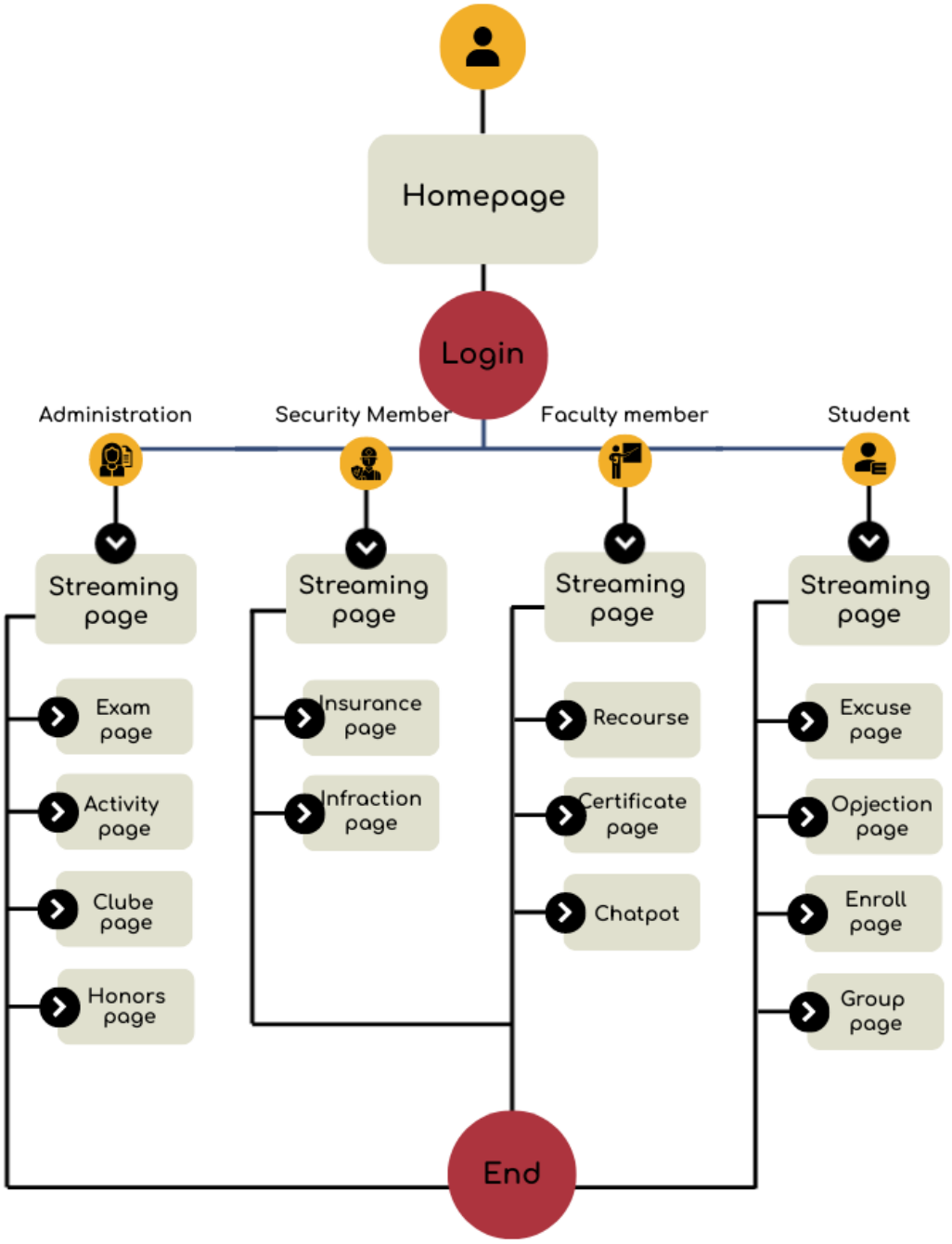

Figure 4 Appendices