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# **Graduation Project Report to obtain bachelor's degree in computer science**

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## **(Exam Digital Entry Card)**

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## **ABSTRACT**

The exam entry card is a digital card issued by the official app of the university. It helps the student to know the details of the exam and prevents some errors from occurring. The student enters the exam while he/she is deprived, or enters another exam that is not his/her exam, and this may cause stress and anxiety for the student and teachers . The student also loses a large part of the exam time. It helps the exam supervisor to make sure that the student is not deprived and that there are no other problems.

This report will be about analysis and design of the system, based on Unified Modeling Language. So, we will discuss several UML diagrams (use case diagram, activity diagram, and class diagram) in order to conceive the proposed application.

Interfaces and implementation tools of Exam Digital Entry Card will be given at the end of the report.

# Table of Contents

<b>Chapter1.....</b>	<b>[7]</b>
1.1 <b>Introduction .....</b>	<b>[8]</b>
1.2 <b>Goals and motivations.....</b>	<b>[8]</b>
1.3 <b>Contributions .....</b>	<b>[8]</b>
1.4 <b>Importance of EDEC.....</b>	<b>[9]</b>
1.5 <b>Report Organization.....</b>	<b>[11]</b>
1.6 <b>Conclusion .....</b>	<b>[11]</b>
<b>Chapter2.....</b>	<b>[12]</b>
2.1 <b>Introduction .....</b>	<b>[13]</b>
2.2 <b>The importance of the application to people.....</b>	<b>[13]</b>
2.3 <b>Similar applications.....</b>	<b>[14]</b>
2.4 <b>The importance of application and benefits.....</b>	<b>[15]</b>
2.5 <b>Conclusion.....</b>	<b>[15]</b>
<b>Chapter 3.....</b>	<b>[16]</b>
3.1 <b>Introduction.....</b>	<b>[17]</b>
3.2 <b>Requirement gathering.....</b>	<b>[17]</b>
3.2.1 <b>Functional requirements.....</b>	<b>[17]</b>
3.2.2 <b>Non-Functional requirements .....</b>	<b>[18]</b>
3.3 <b>Existing methodologies.....</b>	<b>[18]</b>
3.4 <b>The Boehm-Waterfall methodology.....</b>	<b>[18]</b>
3.5 <b>Why choose Waterfall model .....</b>	<b>[19]</b>
3.6 <b>Unified Modeling Language.....</b>	<b>[20]</b>
3.7 <b>use Case diagram.....</b>	<b>[20]</b>
3.8 <b>Activity diagram.....</b>	<b>[23]</b>

<b>3.9 Class diagram.....</b>	<b>[25]</b>
<b>Chapter 4.....</b>	<b>[27]</b>
<b>4.1 Introduction.....</b>	<b>[28]</b>
<b>4.2 Implementation tools .....</b>	<b>[28]</b>
<b>4.2.1 Android Studio .....</b>	<b>[28]</b>
<b>4.2.2 Java .....</b>	<b>[28]</b>
<b>4.2.3 SQLite .....</b>	<b>[29]</b>
<b>4.3 Interfaces .....</b>	<b>[29]</b>
<b>4.4 Conclusion .....</b>	<b>[40]</b>
<b>Chapter 5.....</b>	<b>[41]</b>
<b>5.1 Conclusion .....</b>	<b>[42]</b>
<b>5.2 Perspectives .....</b>	<b>[42]</b>
<b>References.....</b>	<b>[43]</b>

## List of Figures

<b>Figure 2.1</b>	<b>The importance of student and exam information card .....</b>	<b>[9]</b>
<b>Figure 2.2</b>	<b>The importance of Exam Entry Card .....</b>	<b>[10]</b>
<b>Figure 3.1</b>	<b>Waterfall model .....</b>	<b>[19]</b>
<b>Figure 3.2</b>	<b>Use case diagram for student page .....</b>	<b>[21]</b>
<b>Figure 3.3</b>	<b>Use case diagram for teacher page .....</b>	<b>[22]</b>
<b>Figure 3.4</b>	<b>activity diagram for students .....</b>	<b>[23]</b>
<b>Figure 3.5</b>	<b>activity diagram for teachers .....</b>	<b>[24]</b>
<b>Figure 3.6</b>	<b>class diagram of the system .....</b>	<b>[25]</b>
<b>Figure 4.1</b>	<b>Student Login Page .....</b>	<b>[30]</b>
<b>Figure 4.2</b>	<b>Academic Page.....</b>	<b>[31]</b>
<b>Figure 4.3</b>	<b>Exam Card Page (regular student).....</b>	<b>[32]</b>
<b>Figure 4.4</b>	<b>Exam Card Page (deprived student) .....</b>	<b>[33]</b>
<b>Figure 4.5</b>	<b>Feedback Page (successful scan) .....</b>	<b>[34]</b>
<b>Figure 4.6</b>	<b>Feedback Page (failed scan) .....</b>	<b>[35]</b>
<b>Figure 4.7</b>	<b>Teacher Login Page .....</b>	<b>[36]</b>
<b>Figure 4.8</b>	<b>Teacher academic section .....</b>	<b>[37]</b>
<b>Figure 4.9</b>	<b>Teacher courses page .....</b>	<b>[38]</b>
<b>Figure 4.10</b>	<b>Attendance List Page .....</b>	<b>[39]</b>
<b>Figure 4.11</b>	<b>QR Code Page.....</b>	<b>[40]</b>

# **Chapter 1**

# **Introduction**

## **1.1 Introduction**

In this chapter, we will present the problem we want to solve through this project and our project goals and motivations, and we make an initial assessment of our project. Then, we give the report organization. Finally, we conclude this chapter.

## **1.2 Goals and motivations**

Since we were asked to look for the idea of the graduation project, we directly reflected on the problems that the students face when attending for the exams. In fact, not only the students who are affected, also the teachers. These problems include: not knowing the exam hall number, forgetting the exam time, the student forgets the university card, some students don't know the subject name of the exam and the ramification number, etc . Besides, the fact that there is no application that solves these issues, made us think about creating an electronic card named Exam Entry Card. We hope after developing the Exam Entry Card no student will face these issues, which causes stress and disturbance for both students and teachers. The objective of the graduation project is to minimize these problems and meet these needs and also how can we implement it in modern technology using the latest programming languages and tools.

## **1.3 Contributions**

The contributions of this first part of the graduation project are:

- Issue a digital entry card for each exam containing all required information.
- Facilitate the process of verifying students' attendance for the exam.
- We choose what equipment we will use to create the Exam Card.
- Select the languages and tools we will use to develop the application.
- We designed the system and defined how it works.
- Models will be described mostly using standardized language modeling (UML) standards.

## 1.4 Importance of Exam Digital Entry Card

First, we made a simple questionnaire and shared it to students ,and asked them if they want a service that summarizes the information required to enter each exam.

Do you think a student electronic card that contains( student name, ID, academic status, subject name, hall number, exam time, supervisor name) is useful and solves many problems

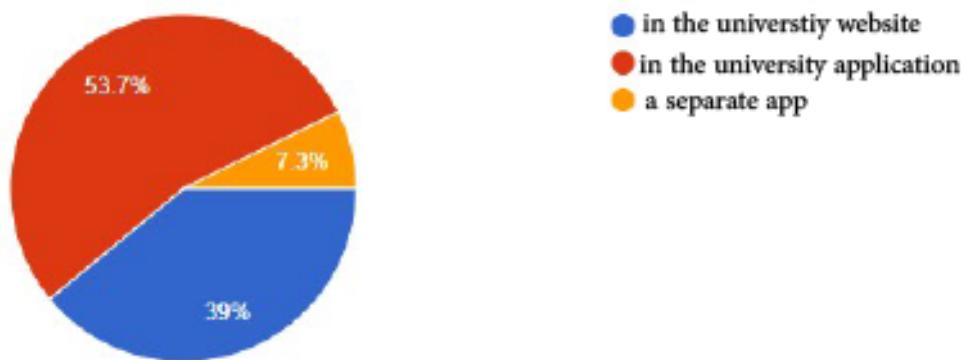


**Figure 1.1** The importance of information of student and exam card

As shown in figure (1.1) more than 82% of students say yes, they think this card will help to solve many problems

Do you prefer this card to be an additional feature in the university website or in the university application

responses 41



**Figure 1.2** The importance of Exam Entry Card

Then, we asked about the type of service for the card, if they preferred it to be as an application or a website, and we received these answers. The result was presented in figure (1.2). So, more than 53% of students prefer it to be in an application.

## **1.5 Report Organization**

The rest of the report is organized as follows:

- The second chapter introduces the background of the project and some context of the problem and why we should solve it, and we will describe the approach we use to solve the problem.
- Chapter 3 introduces functional and non-functional requirements and contains the analysis and design phases using UML Diagrams.
- Chapter 4 covers the implementation tools that will be used and provides the interfaces of the proposed application.
- Chapter 5 summarizes our project, and presents the future works.

## **1.6 Conclusion**

In this chapter, we defined our goals and contributions, and then we presented an initial assessment which proved the importance of our project. Chapter two will examine relevant literature to achieve our goals and introduce the project background.

# **Chapter 2**

## **project**

## **background**

## **2.1 Introduction**

In this chapter, we will introduce the importance of the application to the student, and talk about applications that are either similar or do not fully meet someone's purpose, also Exam Entry Card application benefits.

## **2.2 The importance of the Exam Entry Card for students and teachers.**

Entry of the student to the exam depends on the teacher's knowledge of the student's information, academic level, academic status, and other important information based on which the teacher allows a student to enter the exam or not.

In some cases, it may happen that the student enters the exam and solves the exam, and after that, and of course, after it is too late, the student realizes that he is deprived of this course, and of course the occurrence of such situations may affect the student's psyche. Here are some things that happen during the examination period, which may cause disturbance and anxiety for the student and teacher as well:

- Overcrowding and disorganization.
- The student does not know the exam location.
- The student forgets the university card.
- Entering the wrong exam hall.
- The observer is not aware of the academic status of a student.

The importance of this card deals in solving such problems and saving time and effort for both the student and the teachers.

## **2.3 Similar applications**

### **2.3.1 Tawakkalna App**

An application developed by The Saudi Data and Artificial Intelligence Authority (SDAIA) provides a digital ID card that is approved by Qiyas Center and can be used to enter the Center's exams. Services in Tawakalna:

- show the health status
- check the vaccines that has been taken
- digital identities that allows users to preview their official documents [1].

### **2.3.2 The digital university identity service for students**

Is a service provided by universities in the university application, in order to be an alternative to the traditional student card. Shaqra university provided an app for students that displays their academic information, it provides:

- Electronic university ID.
- The academic record.
- Courses results.
- The absence record.
- Monthly reward.

### **2.3.3 Tetamman App**

Is provided under the supervision of the Ministry of Health in the Kingdom of Saudi Arabia,Saudi Arabia as an extension of its mission to develop health care standards Provided and services. It Provides protection and health care in relation to the Coronavirus [2].

### **2.3.4 Biometric Attendance Systems**

A biometric attendance system utilizes a fingerprint to allow employees to clock in and out of their office. The fingerprints of every employee has its unique coordinates which is scanned and then mapped using various system coordinates. If the coordinates of an employee's finger are matched to those of the preceding image, only then is the entry counted [3].

## **2.4 Exam Entry Card application benefits**

- Facilitate the student's entry to the exam.
- Save effort and time.
- Organizing student entry and avoiding overcrowding.
- Replace the use of papers in checking students' attendance.
- The psychological comfort of the student and the reduction of fear and tension.
- Reducing the occurrence of errors (such as entering the exam while the student is deprived of the course).

## **2.5 Conclusion**

In chapter 2 we presented the importance of summarizing the student and the exam information in a card, the similar applications, and Exam Entry Card application benefits. Chapter 3 will be about analyzing and designing the system.

# **Chapter 3**

## **Analysis and**

## **Design of Exam**

## **Digital Entry Card**

### **3.1 Introduction**

Based on user requirements and the results of the analysis of the existing application or systems, a new system must be designed. This is the most crucial phase in the development of a system or an application. In this chapter we will present functional and non-functional requirements, methodologies, use case diagrams, activity diagrams and class diagrams.

### **3.2 Requirement gathering**

Requirements analysis process is an important stage in the system development. It determines the functions of the whole system integrity and stability. Software requirements analysis is an ongoing process of understanding and progressive refinement. Through requirements analysis, functions of the Exam Digital Entry Card will be designed as below.

#### **3.2.1 Functional requirements**

Functional requirements specify the function that a system or system component must perform. In other words, how the system should react to particular inputs, and how the system should behave in particular situations [4] .

The student can do the following functions:

- Ensure all information related to the exam through the exam entry card before the exam time.
- Be sure to scan the QR code.

The teacher can perform these function:

- Display the list of exam attendance.

### **3.2.2 Non-functional requirements**

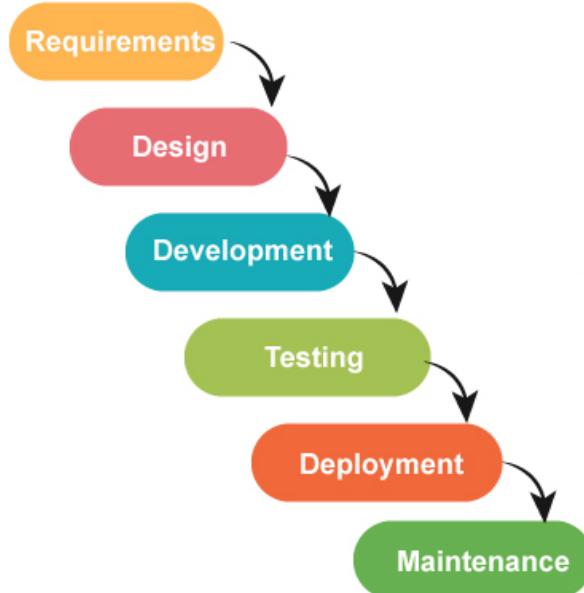
Non-functional requirements are restrictions on the services or functions provided by the system. These include time constraints, constraints on the development process and constraints imposed by standards. Non-functional requirements often apply to the system as a whole, rather than to individual system features or services. The main drawback we can mention is: After the notification notice, the user can delete or update this notification only by the application.

## **3.3 Existing methodologies**

There are many established software engineering methodologies. This section concentrates on some existing software engineering methodologies, specifically the Boehm-Waterfall and the Feature driven development.

## **3.4 The Boehm-Waterfall methodology**

The Boehm-Waterfall software engineering methodology waterfall is one of the best known examples of a software engineering methodology. The Boehm-Waterfall software engineering methodology is composed into the stages of system requirements, software requirements, preliminary and detailed design, implementation, testing, operations, and maintenance. At each stage is a validation step. In the Boehm-Waterfall software engineering methodology, as often quoted and viewed, the process flows from stage to stage like water over a fall. However, in the original description of the Boehm-Waterfall software engineering methodology, there is an interactive backstep between each stage. Thus the Boehm-Waterfall is a combination of a sequential methodology with an interactive backstep. However, in engineering practice, the term waterfall is used as a generic name to any sequential software engineering methodology [5] .



**Figure 3.1** Waterfall model

### 3.5 Why choose Waterfall model

Waterfall methodology is ideal for projects with well understood technology , fixed and clear, and documented requirements, well-defined technical tools, architectures and infrastructures, and a short life cycle. A Waterfall approach can actually provide a more predictable end result for budget, timeline, and scope. When compared with other methodologies, Waterfall focuses most on a clear, defined set of steps. One of the defining steps of Waterfall is committing to an end product, goal, or deliverable at the beginning, and teams should avoid deviating from that commitment.

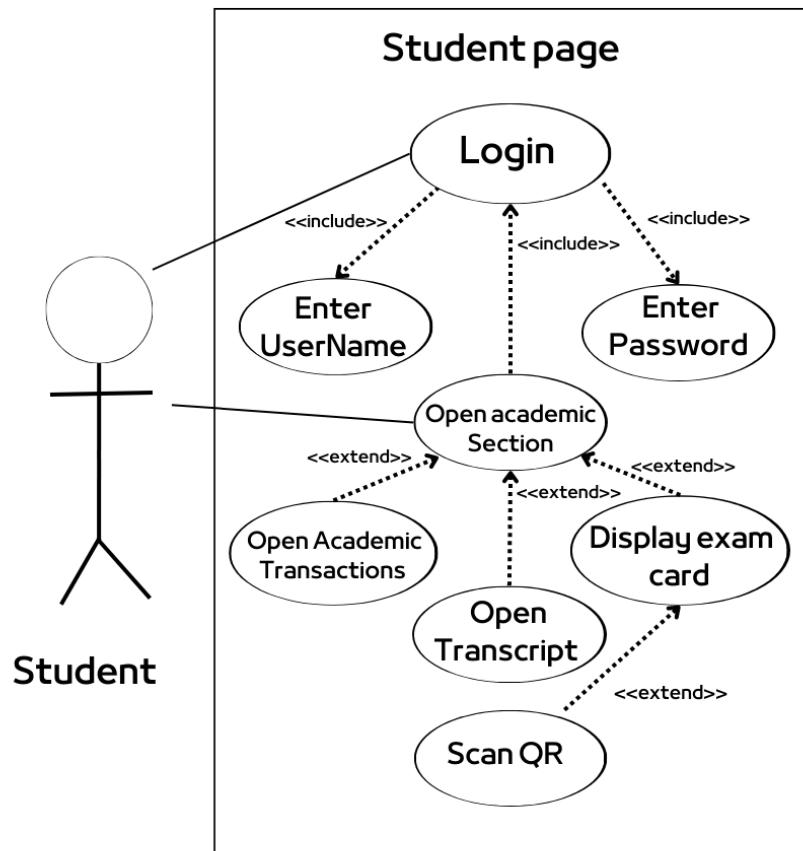
### **3.6 Unified Modeling Language**

The Unified Modeling Language (UML) is a language used in the field of software engineering that represents the components of the Object-Oriented Programming concepts. It is a visual modeling language for modeling system requirements, describing designs and depicting implementation details [6].

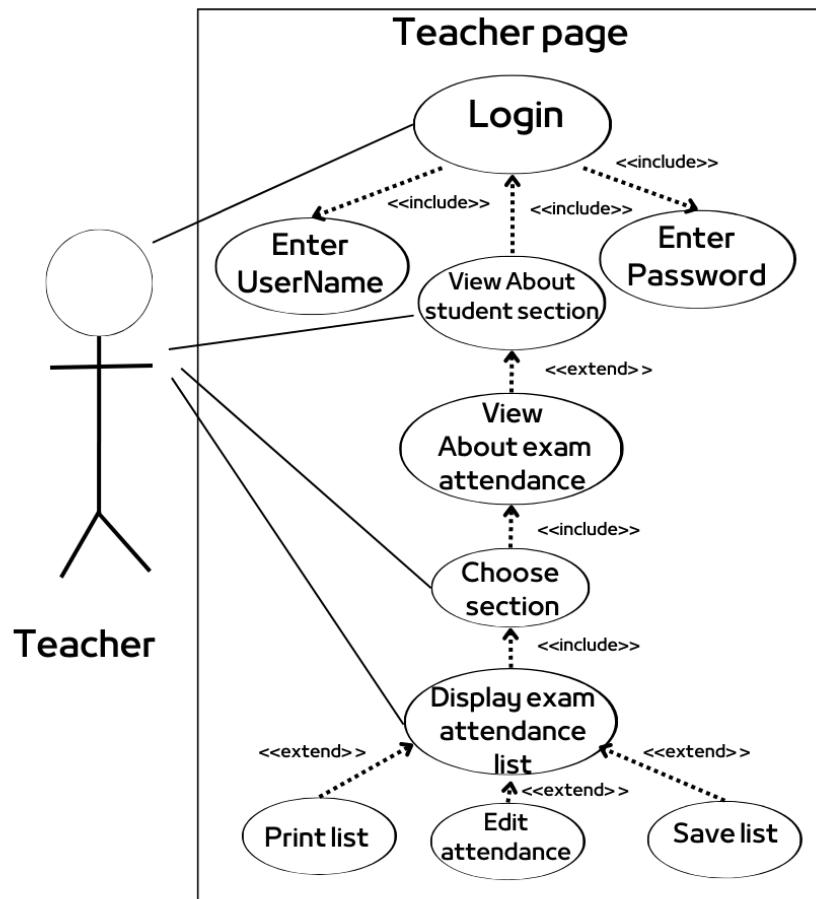
A UML diagram is a partial graphical representation (view) of a model of a system. The UML diagram contains graphical elements (symbols) - UML nodes connected with edges (also known as paths or flows) - that represent elements in the UML model of the designed system. The UML model of the system might also contain other documentation such as use cases written as template texts.

### **3.7 use Case diagram**

A UML use case diagram is the primary form of system/software requirements for a new software program underdeveloped. Use cases are a simple and powerful way to express the functional requirements, or behaviors, of a system. Use cases specify the expected behavior (what), and not the exact method of making it happen (how). Use cases once specified can be denoted both textual and visual representation [7].



**Figure 3.2** Use case diagram for student page

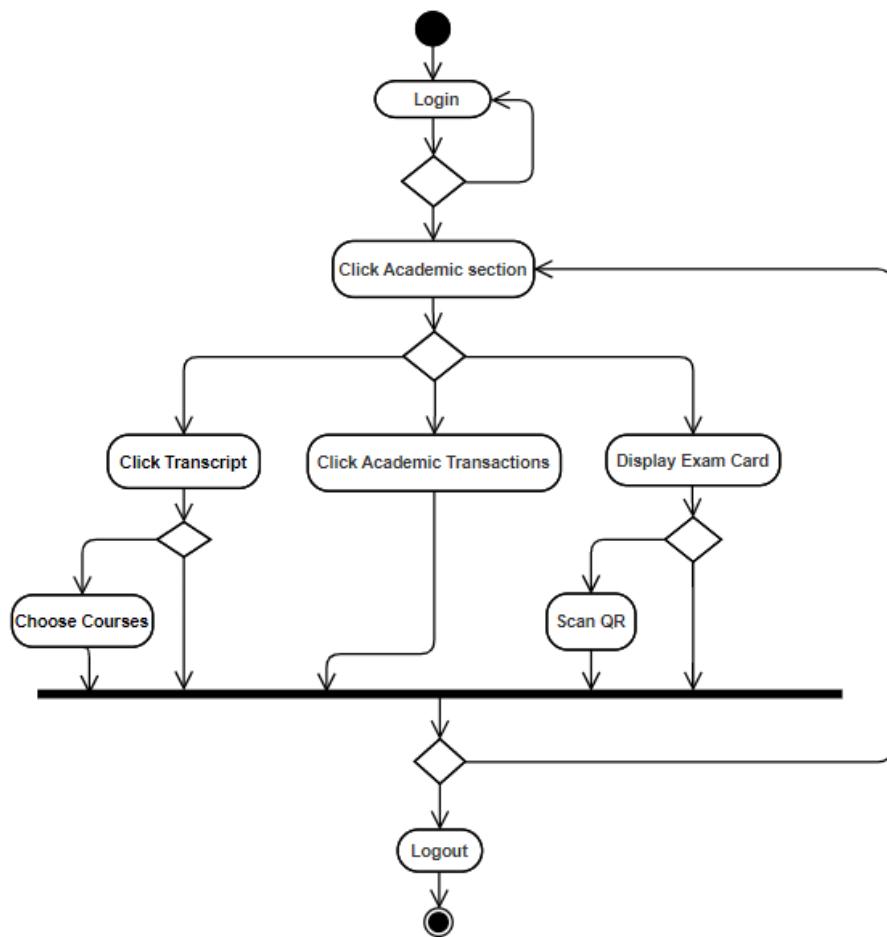


**Figure 3.3** Use case diagram for teacher page

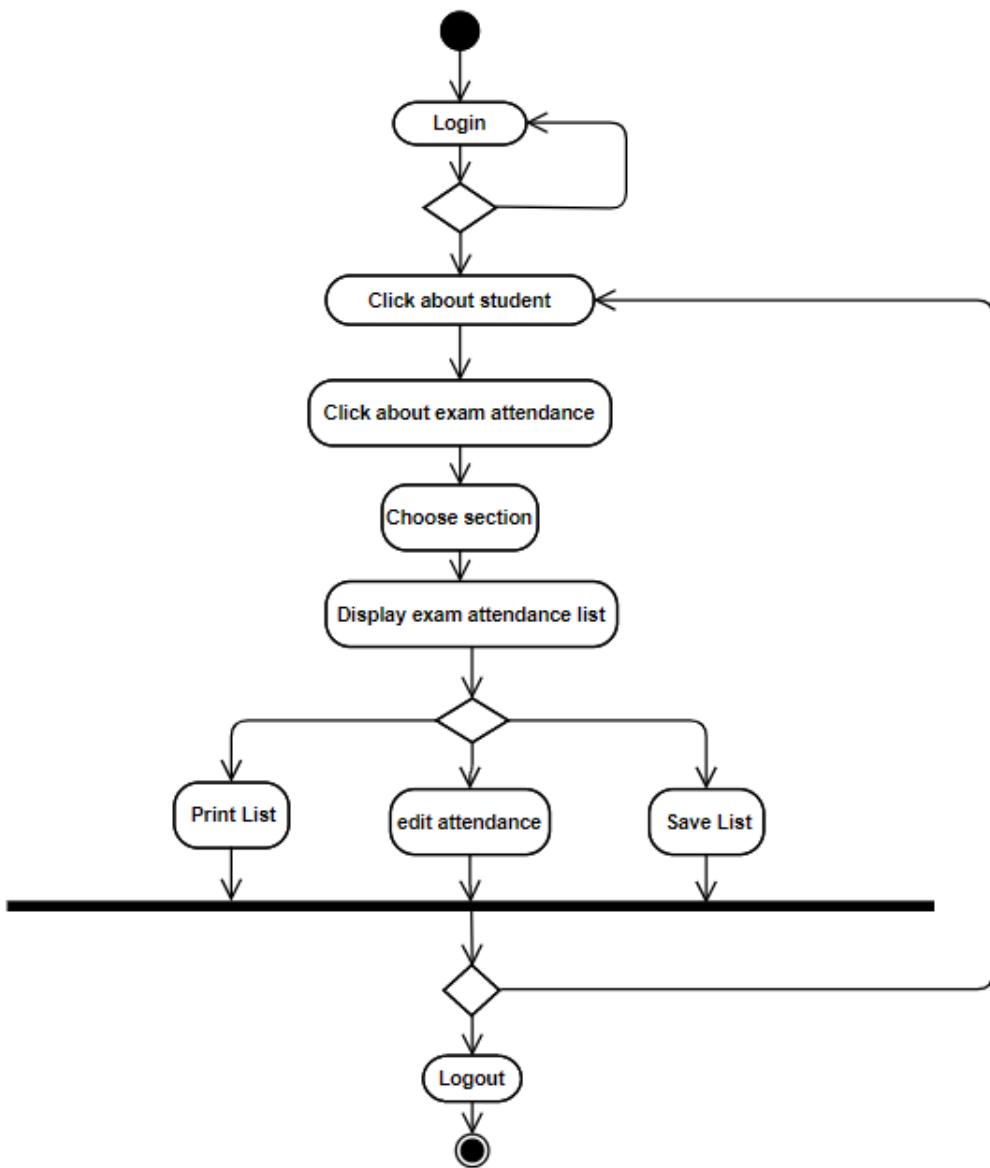
### 3.8 Activity diagram

An activity shows the flow of control among the activities. An activity node is a group of actions or sub activities. Activities are shown on activity diagrams [8].

In the following activity diagrams, we suppose that both student and teacher have an account , and here we will discuss the part that we added to the university app, which is the exam entry card and the list showing students' attendance for the exam.



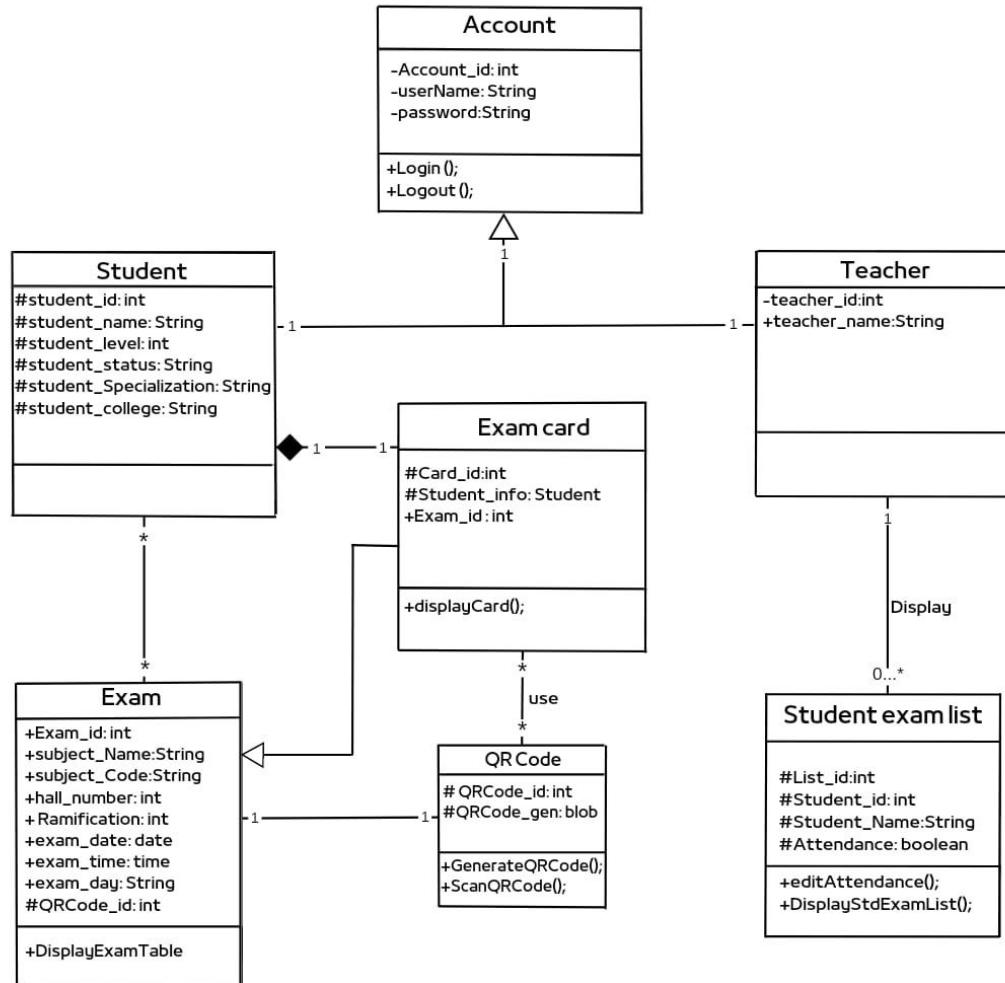
**Figure 3.4** activity diagram for students



**Figure 3.5** activity diagram for teachers

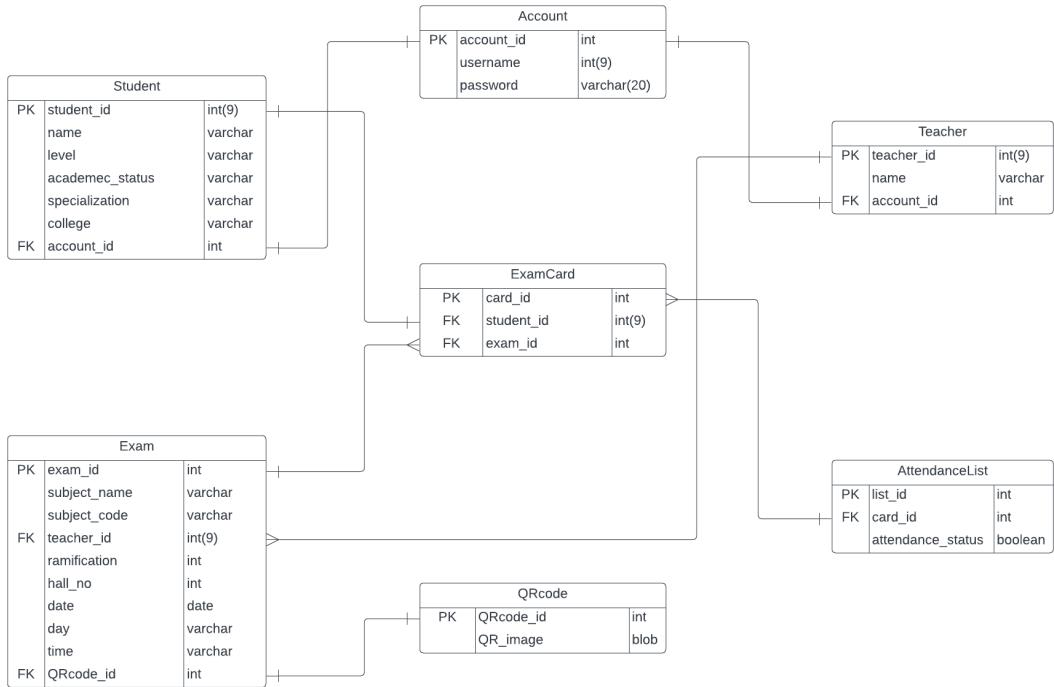
### 3.9 Class diagram

A class diagram in the Unified Modeling Language(UML) is an important diagram for object-oriented methodologies. It shows the static structure of the system by illustrating the system's classes, their attributes, operations (or methods), and the relationships among objects [9].



**Figure 3.6** class diagram of the system

## 3.10 Physical Data Model



## 3.8 Conclusion

In this chapter we adopted the waterfall methodology to analyze and design our application. For this reason, we presented a use case, class diagram, and activity diagram of the project. We will present in chapter 4 interfaces and implementation tools.

# **Chapter 4**

# **Implementation**

## **Tools &**

## **Interfaces**

## **4.1 Introduction**

In this chapter, we will show the tools that will be implemented, and we will display images of the interfaces used in our project, and their available options.

## **4.2 Implementation tools**

We will use the Android Studio program and Java in the implementation of the project, and MySQL program we will use to implement the database of our project.

### **4.2.1 Android Studio**

In order to write an Android application, we are going to need a development environment. Google provides a powerful and sophisticated development environment, the Android Studio. Android Studio is the official Integrated Development Environment (IDE) for Android app development. Based on the powerful code editor and developer tools from IntelliJ IDEA , Android Studio offers even more features that enhance your productivity when building Android apps. It includes everything you need to begin developing Android apps. Included in the download kit, are the Software Development Kit (SDK), with all the Android libraries we may need, and the infrastructure to download the many Android emulator instances, so that we can initially run our application, without needing a real device [10] [11].

### **4.2.2 Java**

Java is an object-oriented programming language developed by Sun Microsystems, a company best known for its high-end UNIX workstations. Modeled after C++, the Java language was designed to be small, simple, and portable across platforms and operating systems, both at the source and at the binary level [12].

### **4.2.3 SQLite**

SQLite is an embedded, relational database management system (RDBMS). SQLite is referred to as embedded because it is provided in the form of a library that is linked into applications. As such, there is no standalone database server running in the background. All database operations are handled internally within the application through calls to functions contained in the SQLite library.[13].

### **4.2.3 Firebase**

Firebase realtime database is a cloud-hosted database. The data is organized and stored as JSON. Any change in data is synchronized to all devices in milliseconds. Even when the internet connection is not available, the realtime database SDK stores data in disk, so when connectivity is retrieved the synchronization takes place again [14].

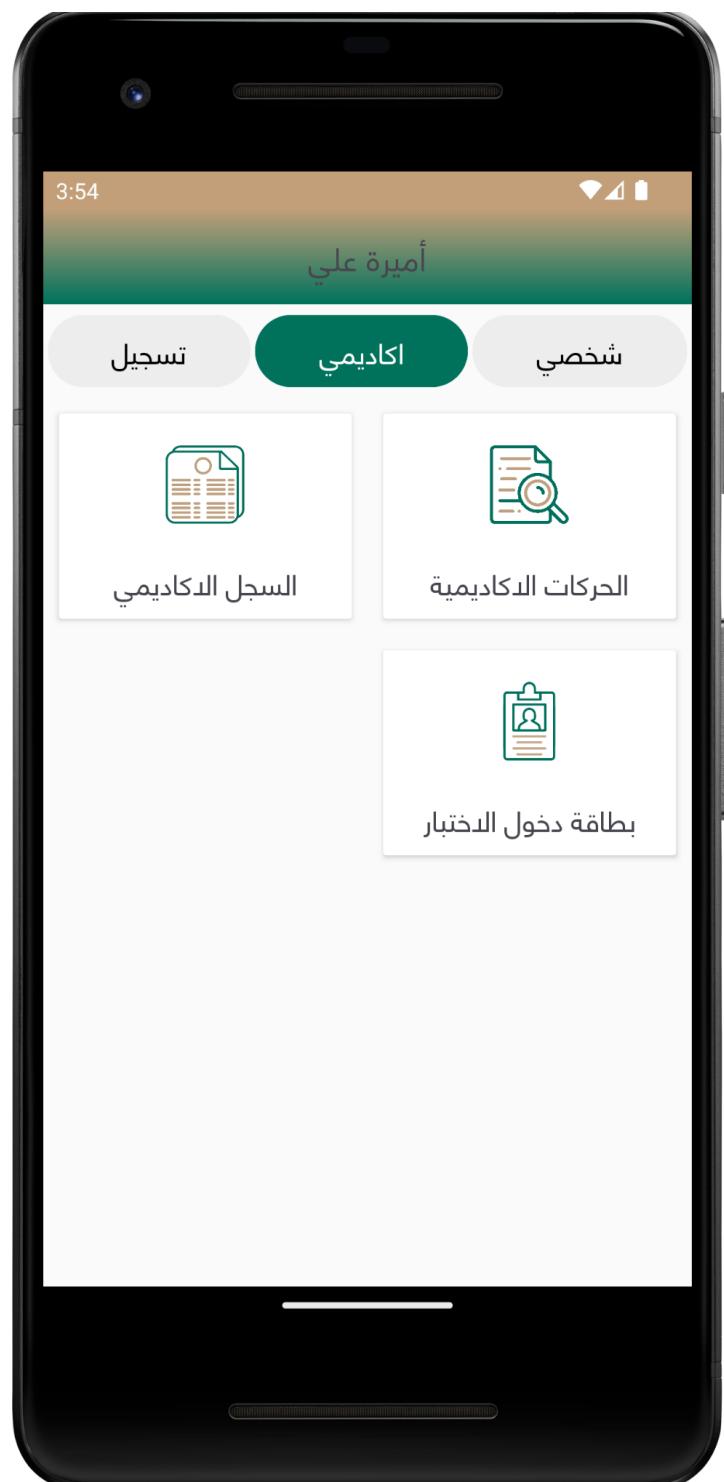
## **4.3 Interfaces**

In general, interfaces are where the interactions between system components happen. Interfaces refer to how the system looks, works and interacts with users [15].

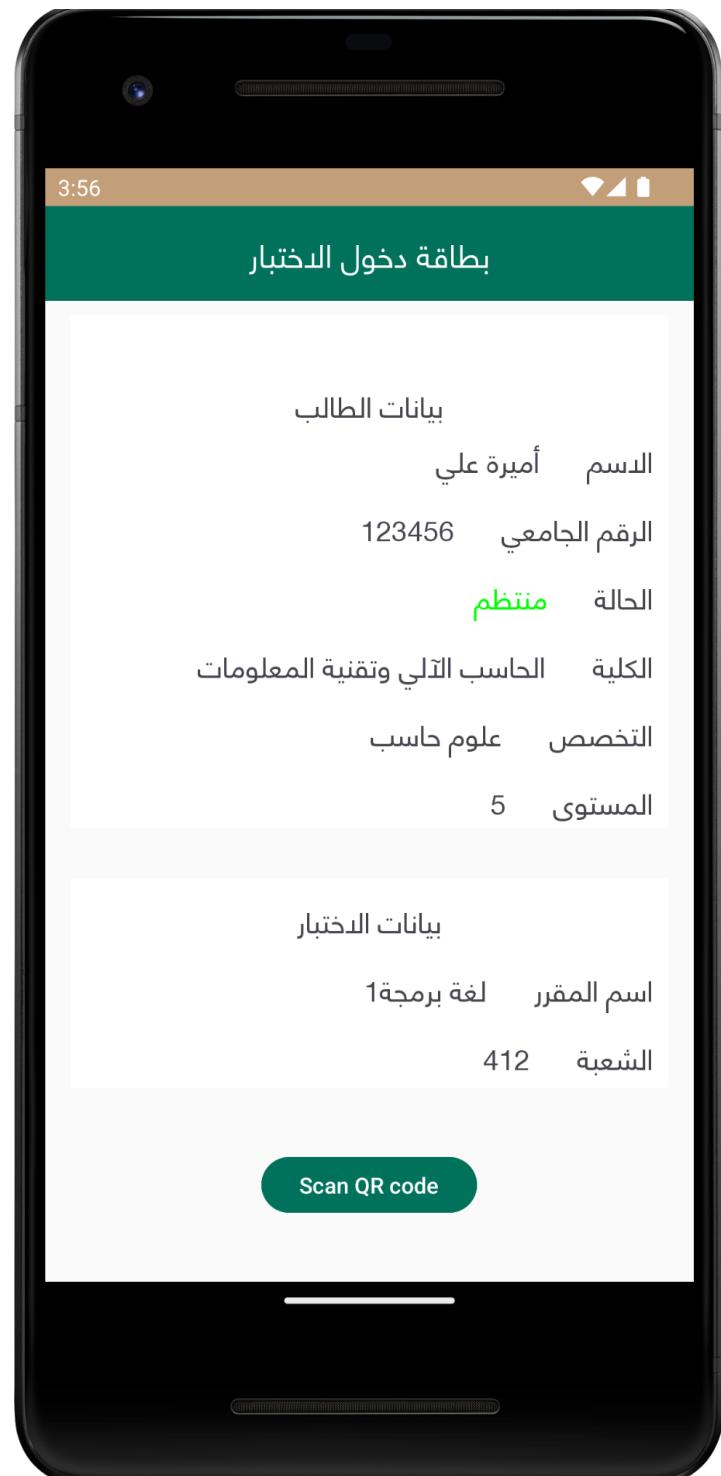
The program used to create the project interfaces is Adobe XD.



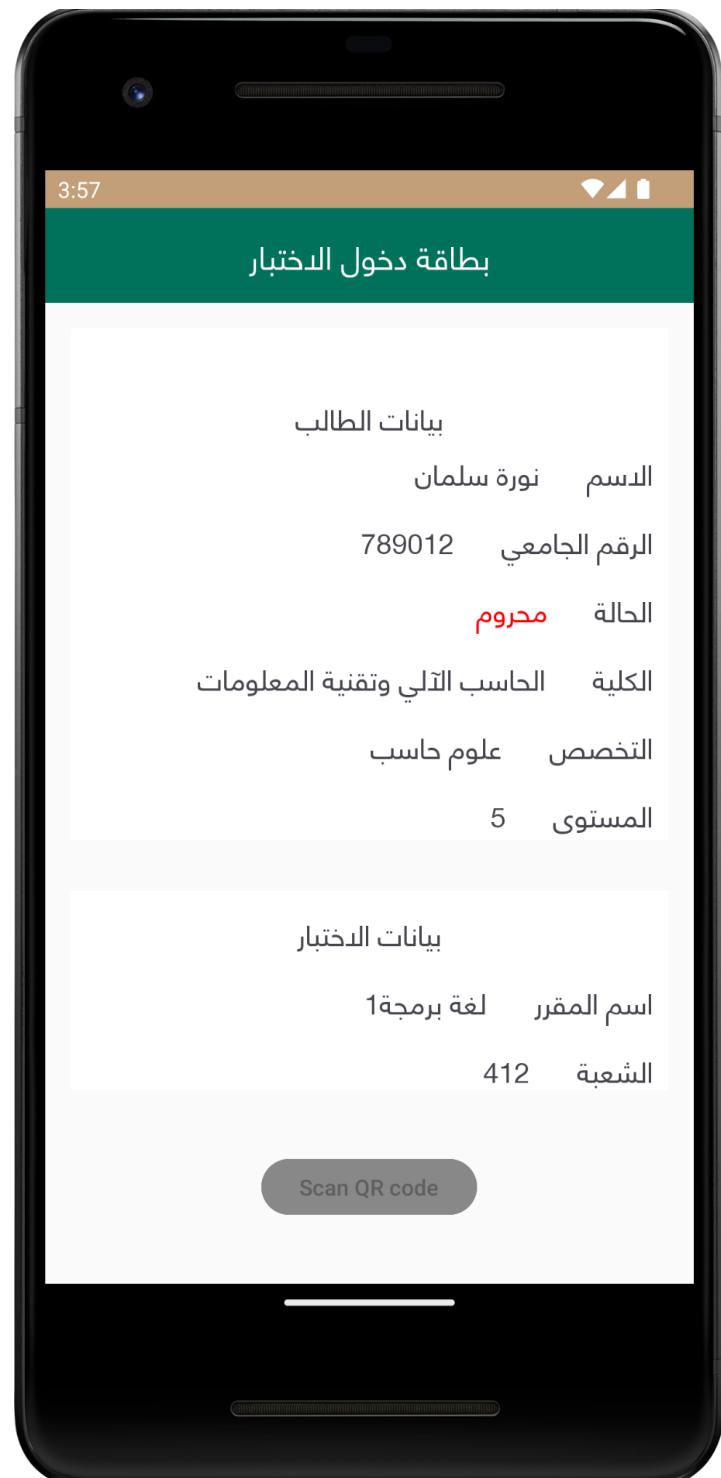
**Figure 4.1** Student Login Page



**Figure 4.2** Student Academic Page



**Figure 4.3** Exam Card Page (regular student)



**Figure 4.4** Exam Card Page (deprived student)



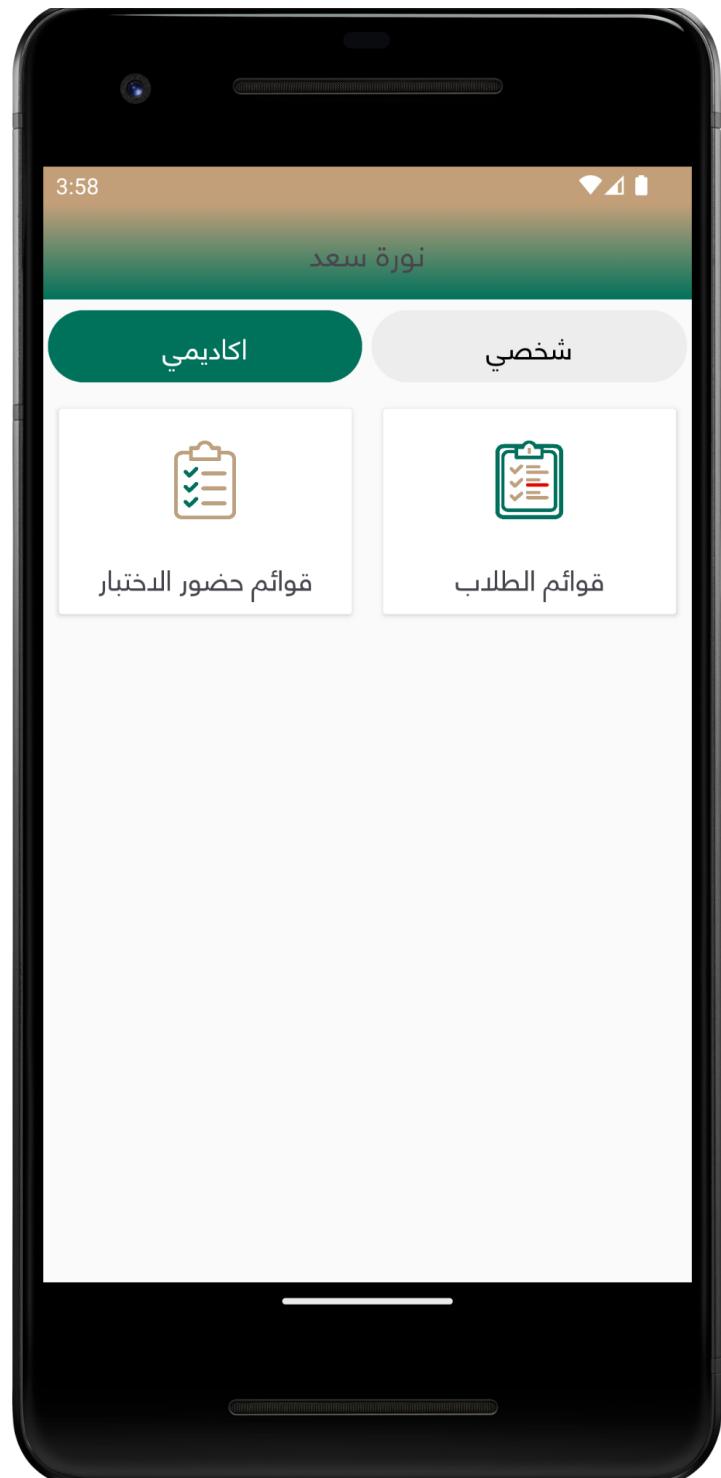
**Figure 4.5** Feedback Page (successful scan)



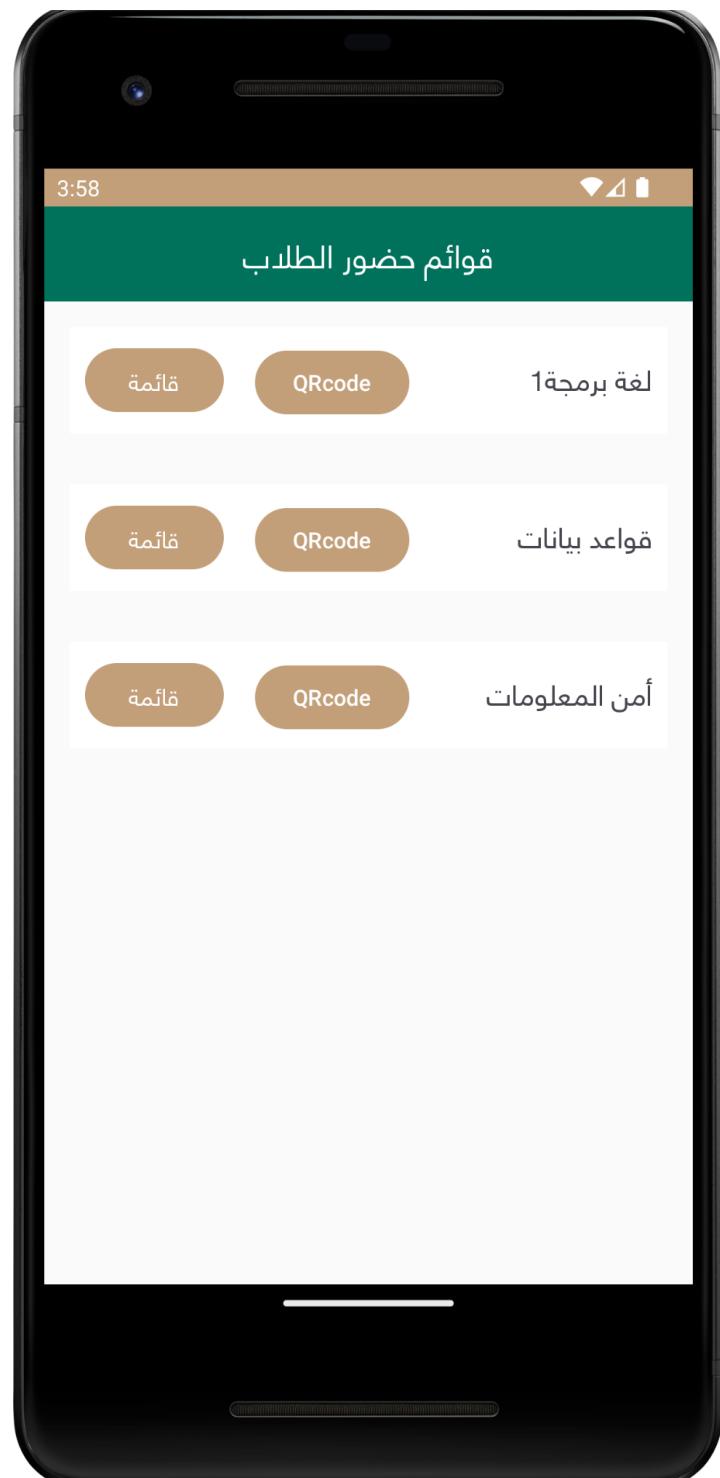
**Figure 4.6** Feedback Page (failed scan)



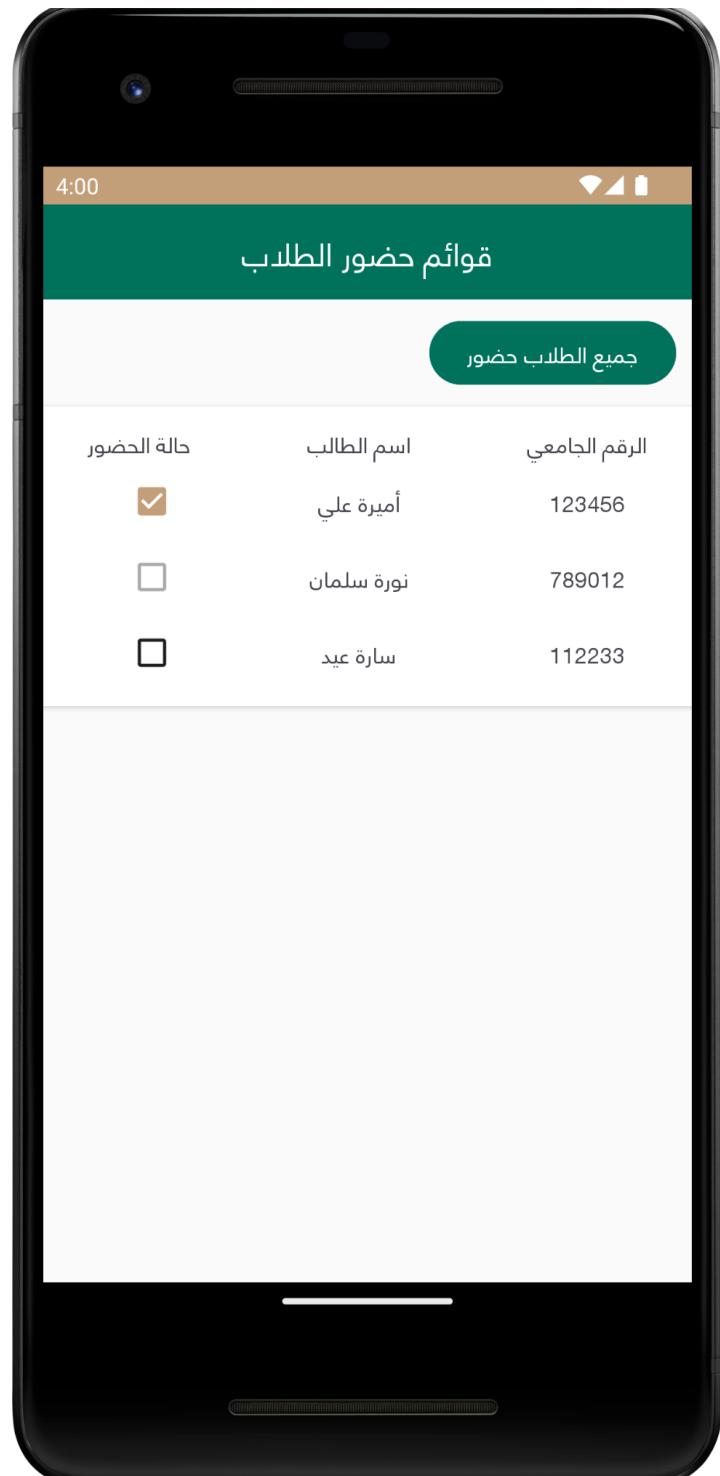
**Figure 4.7** Teacher's Login Page



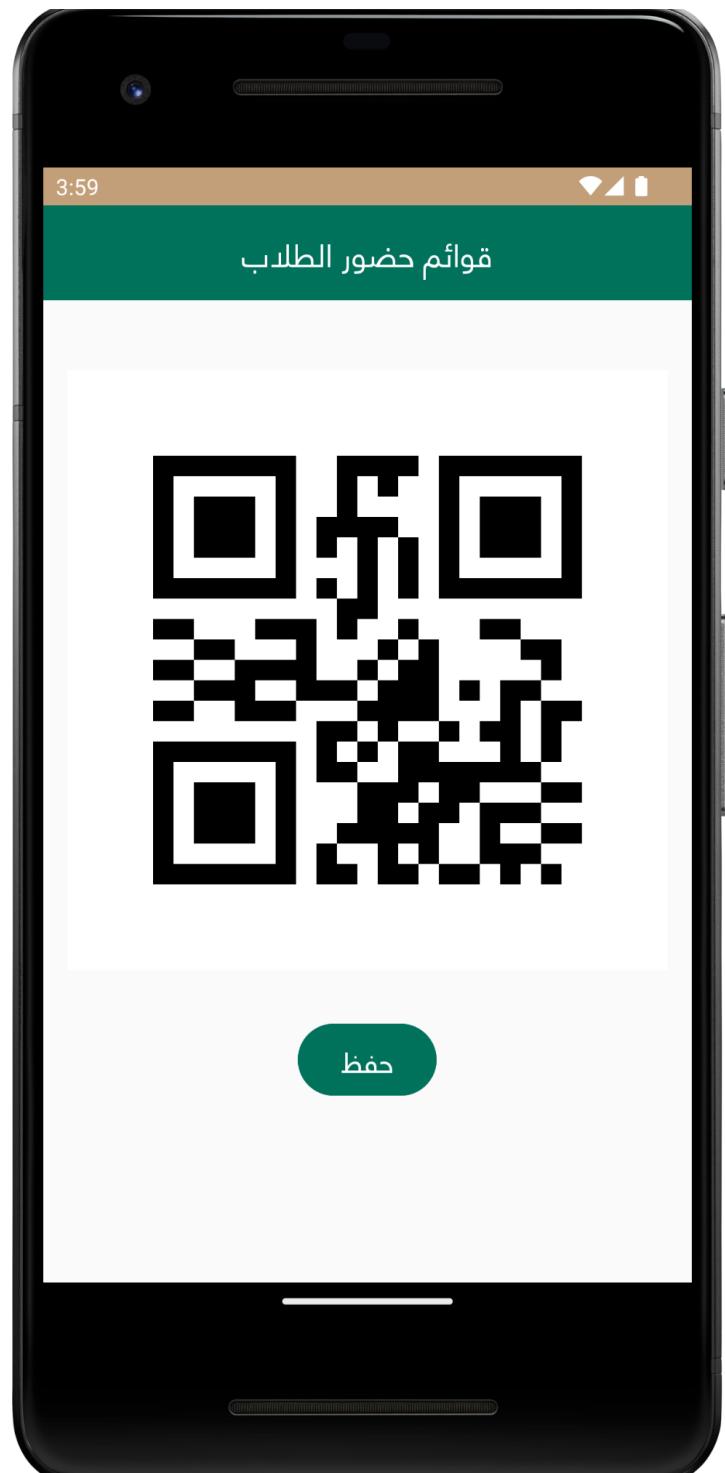
**Figure 4.8** Teacher academic section



**Figure 4.9** Teacher courses page



**Figure 4.10** Attendance List Page



**Figure 4.11** QR code Page

## **4.4 Conclusion**

In this chapter, we presented the tools that we will use to implement the project. We spoke in general about the most prominent features, and presented images of the interfaces used in the project, in addition to the program used in the implementation of the project interfaces.

# **Chapter 5**

# **Conclusion**

**&**

# **Perspectives**

## **5.1 Conclusion**

We talked about the goals and contributions of developing the Exam Entry Card. We illustrated the importance of our project to both students and teachers and how it will provide a smooth and organized environment for attending exams. In fact, the Exam Entry Card saves time and effort, and facilitates procedures. In the part of system analysis and design we chose Waterfall methodology and made use case, activity, class diagrams and the relational database design for our application. We presented the implementation tools which will be used in the development phase. We're using the Android Studio program and Java in the implementation of the project, and MySQL program to implement the database of our project. Finally, we gave the interfaces of our application.

## **5.2 Perspectives**

We hope to take our idea to the next level by:

- Adding the QR code technique for checking students' attendance.
- Putting the student's mobile in silence mode during the exam interval automatically.
- Adding the feature of displaying the attendance list in the teacher account.
- Adding the feature of exam supervisor in the teacher account.
- Expanding the project to be used in the whole university.

# References

- [1] <https://ta.sdaia.gov.sa/>
- [2] <https://www.watan.net.sa/en/469/tetamman>
- [3] Betterplace Website (<https://www.betterplace.co.in/blog/biometric-attendance-systems/>)
- [4] Software Engineering, BY Jibitesh Mishra, chapter 3, page 37.
- [5] The Watersluice, BY Ron Burback, 1998, page 47.
- [6] Unified Modeling Language: Systems Analysis, Design and Development Issues, BY Siau, Keng, Halpin, and Terry, chapter VII, page 107.
- [7] Use Case Modeling, BY Kurt Bittner and Ian Spence, part 1, page 1.
- [8] The Unified Modeling Language Reference Manual, Second Edition, BY James Rumbaugh, chapter 3, page 37.
- [9] UML for Database Design, BY Eric J. Naiburg and Robert A. Maksimchuck, chapter 5, page 76.
- [10] Android programming cookbook Kick-start your Android projects, BY CHRYSSA ALIFERI, chapter 1, page 1.
- [11] Developers Website(<https://developer.android.com/studio/intro>).
- [12] Teach Yourself JAVA in 21 Days, BY Laura Lemay Charlest L. Perkins, page 4.
- [13] iPhone iOS4 Development Essentials - Xcode 4 Edition, BY Neil Smyth - 2014, chapter 23, page 113.
- [14] Firebase Website (<https://firebase.google.com/docs/database>)
- [15] User Interface Design for Virtual Environments: Challenges and Advances, BY Badrul H. Khan, chapter 1, page 3.

## **ABSTRACT**

The exam entry card is a digital card issued by the official app of the university. It helps the student to know the details of the exam and prevents some errors from occurring. The student enters the exam while he/she is deprived, or enters another exam that is not his/her exam, and this may cause stress and anxiety for the student and teachers . The student also loses a large part of the exam time. It helps the exam supervisor to make sure that the student is not deprived and that there are no other problems.

This report will be about analysis and design of the system, based on Unified Modeling Language. So, we will discuss several UML diagrams (use case diagram, activity diagram, and class diagram) in order to conceive the proposed application.

Interfaces and implementation tools of Exam Digital Entry Card will be given at the end of the report.

## **التلخيص**

بطاقة دخول الاختبار هي بطاقة رقمية صادرة عن التطبيق الرسمي للجامعة. وهي تساعد الطالب على معرفة تفاصيل الاختبار وذلك لمنع حدوث بعض الأخطاء. مثل أن يدخل الطالب الاختبار وهو محروم أو يدخل في امتحان آخر ليس امتحانه مما قد يسبب توتر وقلق للطالب والمعملين. كما يخسر الطالب جزءاً كبيراً من وقت الاختبار . و يتأنك مراقب الاختبار من عدم حرمان الطالب وعدم وجود مشاكل أخرى.

سيكون هذا التقرير حول تحليل وتصميم النظام ، بناءً على لغة النمذجة الموحدة. لذلك ، سنناقش العديد من مخططات UML (استخدم مخطط الحالة ومخطط النشاط ومخطط الفصل) من أجل تصور التطبيق المقترن.

سيتم توفير واجهات وأدوات تنفيذ بطاقة الدخول الرقمية للاختبار في نهاية التقرير.