EPOKA UNIVERSITY

FACULTY OF ARCHITECTURE AND ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

TestMe Requirements Specification

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Project name: TestMe

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1. Executive Summary

1.1 Project Overview

TestMe is a new project that concerns online examination. The project will consist of a java application and a webpage that advertises it. The program can be used by anyone who is interested in boosting their academic career and skills.

The application will include exams of different subjects during a specified time frame. This way anyone can get a certification of any specific topic without the need of any previous university diploma. With just some simple configuration, teachers can create an exam using multiple choice questions or open questions.

Purpose and Scope of this Specification

Nowadays, everything and everyone is constantly online. People find it easier and more comfortable to sort things out through technology. Because of this and because of how covid19 has impacted our everyday life, we thought of the idea of a program that enables the online examination.

The purpose of our project is to test the subject knowledge of the students. It will conduct digital exams and will make the evaluation of the students' academic knowledge easier. With some simple configuration, teachers & professors can create an exam using multiple choice questions or open questions. This method eliminates the drawbacks in the traditional mode of the pen-and-paper examination. People can conduct exams anytime, anywhere, while preserving the exam's credibility and integrity.

This project has many benefits as further mentioned:

THE BENEFITS:

1. Automatic evaluation – the process of evaluation is easier and faster because it is automated. Students like it better because they do not have to wait too long for the results. Teachers prefer it too, because it is less time consuming than the traditional way.
2. Cost effective – When taking conventional exams, there is a higher consumption of question papers and answer sheets than online examination. Thus, online exams reduce these expenses.
3. Respects social distancing (covid-19) – we are living through a pandemic and everything is unpredictable. Online exams prevent the spread of the virus and protect our lives.
4. It is more secure – since the exam is stored in a database there is no chance for a paper leakage. Also the system will store the exam directly and it can be visible only to the student who took it in anytime.
5. Motivation – each time a student correctly completes more than 85% of the exam, they are awarded with a certificate. We want this certificate to be a source of motivation for every learner. Studies show that when certificates are removed from the learning platform, exam results drop by almost 50%.

2. Product/Service Description

2.1 Product Context

The project will offer an online examination program where students can take exams and a web page which will offer information about the program. The program will have three types of users: teacher, student and administrator. The teacher will be able to declare the right answers of a test so that the evaluation can be automatically done. The students will be able to take exams and the administrator will be able to handle any inconvenience. The website will contain information about the program, the exams, exam's date, the students' certificates, and information about teachers. People can log in and get updates on the exams.

This online examination program will offer students from all over the world the chance to take exams just by sitting in front of the computer. It aims for the students to increase their knowledge by learning from their mistakes. The certificate is also added as a way to motivate the student. We expect that the student will take the examination more seriously if we put a 'price' such as a certificate of achievement.

2.2 User Characteristics

The users of the application will be: Teacher, Student and Admin.

TEACHER :

- **Teachers can log in to the application as a 'teacher'.**
- **Teachers can enter the teacher management section.**
- **Teachers can enter the questions in the question banks.**
- **Teachers have to determine the correct answers of the test.**
- **Teachers can have access to the students' scores.**
- **Teachers can evaluate open questions.**
- **Teachers can see the students' examination time in the teacher management page.**

STUDENT :

- **Students can log in to the application as a 'student'.**
- **Students have to decide in which profile they are interested in taking the exam (social exam, science exam).**
- **Students can start the exam when they click the start button.**
- **Students can take the exam within the given time.**
- **After the end of the exam the students will know if they earn a certificate or not.**
- **The students can see their scores and where they answered the questions wrong.**

ADMIN :

- **Admins can log in to the application as an 'admin'.**
- **Admins have access to the data of registered teachers and students.**
- **Admins have access to students' results.**
- **Admins are responsible for the certificates granted in each subject.**

2.3 Assumptions

1. It is assumed that all the students who decide to take the exam have a digital device as PC, laptop, tablet, phone or else.
2. It is assumed that all the students have an internet connection when completing the exam, if not they cannot login, sign up or access the exam. If there is an internet disconnection during the completion of the exam, the exam session is ended and scores will not be saved.
3. It is assumed that the admin, teacher and students will have an email.
4. It is assumed that when registering as an administrator, teacher and student, the information fulfilled is true and valid information.
5. It is assumed that the admin will review and decide if a teacher qualifies for being a part of the program.
6. It is assumed that the questions will be prepared from the teacher.
7. It is assumed that the student will not cheat during the exam, as during an online exam there is no vigilance to supervise/monitor the exam.
8. It is assumed that the teacher and students are in agreement about the entering of the personal information for the registration.
9. It is assumed that the student has knowledge of the program only working and being dependent on the internet connectivity.
10. It is assumed that people who wish to access the website will know how to find the website.
11. It is assumed that people who access the website will be capable of using the website as the website will be friendly to use, will have an easy design, will make the navigation intuitive and will contain the proper information for users to find what they are looking for.
12. It is assumed that the program and website will respect the privacy and confidentiality of the personal data the user inputs.

2.4 Constraints

The primary constraints of this project:

1. The users (admin, teacher, and student) should have strong and fast access to the internet.
2. The program and website will be user friendly meaning the interface should be easy to use and to load.
3. There will be a variety of exams in the program.
4. When uploading images for respective exam questions, the size of the image should not exceed the specific size supported by the program.
5. The program and website will be user friendly meaning the interface should be easy to use and to load.
6. The student can have an exam an unlimited number of times, unless it is declared by an administrator that he/she will not be able to take the exam anymore.
7. The exam will be on for a limited time, so the program should display the remaining time for the student to finish the exam.

2.5 Dependencies

Dependencies that affect the requirements:

1. Accounts of admin, student, teacher must have different login credentials or else the registration will not take place.
2. The teacher has to be accepted by the admin, based whether they have a valid qualification or not.
3. The student can only take exams which are available on the program.
4. The certificate can be achieved depending on the exam's score the student has.
5. The program and website can function depending on the internet connection the users have.

3. Requirements

Functional Requirements

Req#	Requirement	Comments			
BR_01	The online examination program, once opened, should have two options: 1. Log in 2. Sign up	The two options are available for whoever is registered in the 'TestMe' program (log in) and for who is not (sing up).			
SIGN UP					
BR_02	The sign up option will allow the first time user to create an account as a student or as a teacher.	The sign up for students can be completed with the completion of a form: name, surname, email, password, and phone number. Once signed up, the student can always log in through this account.			
BR_03	The sign up option for the teacher	The sign up for teachers can be completed with the filling of a form: name, surname, email, password, phone number, position, and CV. This sign up form will go through the admin to get his/her approval. After the approval, the teacher can always log in through this account.			
LOG IN					

BR_04	The online examination program should have **teacher** login.	The log in teacher will include: teacher username and teacher password. After entering the username and password, the teacher logs in the teacher management section.			
BR_05	The online examination program should have **student** login.	The log in student will include: student username and password. After entering the username and password, the student logs in to the examination page.			
BR_06	The online examination program should have **admin** login.	The log in admin will include: admin username and password. The admin will enter the BTS page (Behind The Scene). He will have access to: teacher's data and student's data.			
Behind The Scene BTS section					
BR_07	The online examination program should have a Behind The Scene section.	BTS includes:list of teachers and students, data of teachers and students, student's scores and examination time.	2		

BR_08	The Behind the Scene page should include: Certificate of Achievement page (CoA).	CoA should include certificates for each kind of exam subject the program will have. If the student meets the condition for a certificate, a certificate will automatically be generated after the results have been shown.	3		
BR_09	Once the student starts the exam, the examination process begins.	After choosing the desired subject,the student is asked for the confirmation of the subject. Then, the student starts the exam and the timer is set. If the student does not complete the exam during the required time, the session times out.			
BR_10	After the examination process ends, the result will appear on the screen.	When the student wants to finish the exam, he/she is asked for confirmation. After the confirmation, the exam will be closed and on the screen the student will see his/her score.			
BR_11	After the results are shown, the students will receive the certificate or not.	Those who have completed 85% of the exam correctly will receive the certificate of achievement.			
Review Section					
BR_12	The online examination program should include a 'Review' section.	After the exam is finished, the students may have access to the review section. This section will contain: the questions and answers of the student's exam, and his/her score.			

Teacher Management Section					
BR_13	The teacher management section will include: 1. the examination marking 2. the students' scores and examination time.	The teacher should declare the correct answers of the exam before the exam is available to the students. This way the program will automatically evaluate the exam. In addition, the teacher can see listed all the students' scores and examination time in the teacher management page.			
BR_14	The online examination program should handle more than one exam at a time.	This said, multiple students can attend an exam at the same time without having any problems.			
Website					
BR_15	The website will represent the idea of the online examination program.	The website will promote and increase the downloads of the app.			
BR_16	The website should contain a login and sign up form.	Admins can login to the website and modify exam rankings, exam dates. Visitors can sign up and create an account so that they can receive updates regarding the exams.			

BR_17	The website should include a calendar with the exam dates.	For those who are not logged in/registered, only half of the calendar will be visible. Visitors have to log in/sign up in order to be able to see the full calendar. This will make sure that all the students will be informed of the exam's timetable.			
BR_18	The website will contain a review section.	The visitor can see the reviews that students have written about the program. The review section will build credibility to the visitors, so that they know our program is trustworthy. The visitor needs to have an account in order to leave a review.			
BR_19	The website should contain a gallery section.	The gallery section will contain all the types certificates our program will offer based on different subjects. The certificates will motivate students to take the exams and get higher scores.			
BR_20	The website will contain an about us section.	There will be displayed general information about the TestMe app and why people should choose to use the TestMe app. Also there will be a			
		presentation of the TestMe team.			
BR_21	The website will contain a presentation of Teachers and Professors.	There will be displayed the team of TestMe app with a picture and a short introduction of the teachers.			

BR_22	The website will contain a page about exams.	It will show which subjects will be available as exams in the TestMe app and a short description of which topics will be included.			
BR_23	The website will contain a link for the TestMe app.	The link will redirect to a download page for the TestMe app.			
BR_24	The website will contain a subscription form.	Those who would like to subscribe will receive continuous news about TestMe.			

3.1 Non-Functional Requirements

3.2.1 Product Requirements

3.1.1 User Interface Requirements

- Interface should be user friendly.
- Interface shouldn't have very much graphics, but graphics appealing to the eye.
- Interfaces shouldn't have hidden buttons, and should be easy to use from people who are not familiar with it.
- Interfaces should produce relevant error messages, when needed.

3.1.2 Usability

- The software should be easy to learn, user friendly and self-explanatory. No special instruction is needed since all users are familiar with how to use browsers in general.
- The software will allow the user to access from any device and achieve their goals quickly.
- The users can return to the interface after some time and start efficiently working with it.
- In the event of possible errors, the software will provide some message on the screen. ● In the event of irrelevant movement, the software will provide a warning message.

3.1.3 Performance

- Application performance is highly reliant on:
  -The Network

  Inconsistent bandwidth, variable contention, and increased latency will all degrade device performance drastically.One of the biggest success risks for most companies is the inconsistency of network access. - Application Design

  From the specifications process onwards, performance objectives must be explicitly established.

  Application efficiency is often hampered by inadequate code algorithms at the application layer, SQL queries, and a badly designed network infrastructure.

-Lack of testing

Output is impacted by insufficient testing of the application in the current manufacturing context and under differing conditions. It is better and less costly to avoid a crisis in the first place than it is to repair it when it has already happened.

-User Behavior

Understanding operation flows is important for avoiding output bottlenecks at the busiest times of the year.

-Lack of Monitoring

Another thing that affects application functionality is the inability to get a full image of application quality, functionality, and real-time use.

-The number of active users

3.1.3.1 Capacity

- Web and desktop applications are going to be stored on a server, which is going to need to have a maximum of ...MB.
- The database would have a modest level in complexity.
- The program should support use of multiple users at the same time.
- The application is supposed to operate effectively for all active users.
- Throughput - The number of transactions is directly dependent on the number of users.

3.1.3.2 Availability

- The application will be available at all times.
- Web application will be available at all times.
- It is going to cover any geographical area.
- It is possible that the application will be taken down just for a short period of time in order to upgrade it or to fix unexpected errors.

3.1.3.3 Latency

- The application's latency depends on:
- -Internet connection strength.
- -Size of database (since it may take some time to process and return information, accessing stored data may increase latency)
- -Application should open for at most 2 sec.
- -All modules of the application should load for at most 200 ms

3.1.4 Manageability/Maintainability

3.1.4.1 Monitoring

Since this type of examination occurs online, it is not necessary to use paper and pen. The online examination program includes the utilization of a computer device through which the student can take the examination.There is the possibility of cheating in each type of examination including the online one. That is why it is important to include some detection and control to prevent it. One way, which we will use, will be the student to authenticate himself before starting the examination. This will happen by using a password type of verification.

3.1.4.2 Maintenance

While taking an examination, the student could face difficulties. If the internet connection is missing, the online examination cannot be performed. The student would need to restart the browser and attempt the exam again. The timer continues to count down towards the maximum time specified. A course administrator or offering facilitator may need to reset the test for that student.

3.1.4.3 Operations

- Take an exam (by the student)
- Give personal information for registration (by the student and teacher)
- Add, delete, modify, view questions (by the teacher)
- Declare right answers (by the teacher)
- Add or remove teachers (by the administrator)

3.1.5 System Interface/Integration

The database management system is on of the most important feature in our project and it may get crashed at any certain time due to virus,operating system failure or any other reason.The only one to manage it should be the person developing it,so no other can modify data on it.If the the failure of the database happens, it is required to take the database backup.

3.1.5.1 Network and Hardware Interfaces

- **Hardware interfaces**

Server side hardware

1. Hardware recommended by all the software needed.
2. Communication hardware to serve client requests.

Client side hardware

1. Hardware recommended by respective client's operating system and web browser.
2. Communication hardware to communicate the server.

- **Software Interface**

Server side software

1. Web server software, WAMP 2. Server side scripting tools: PHP
3. Database tools: MySQL.

Client side hardware

1. Web browser supporting JavaScript, refer Browser Compatibility 2.3.1

3.1.5.2 Systems Interfaces

The database access is only possible to people authorized as administrators. If any student or teacher needs access to do any of the changes they might as well ask administrators to do it by sending them the data they wish to change.

3.1.6 Security

3.1.6.1 Protection

The program will be implemented by using Java. Java security includes a large set of APIs, tools, and implementations of commonly-used security algorithms, mechanisms, and protocols. The Java security APIs span a wide range of areas, including cryptography, public key infrastructure, secure communication, authentication, and access control.
The website part: will have security provided by HTTPS (Hypertext Transfer Protocol Secure). HTTPS prevents interceptions and interruptions from occurring while the content is in transit. In addition it is necessary to acquire a SSL certificate.

3.1.6.2 Authorization and Authentication

Java Authentication And Authorization Service (JAAS) is used, which enables you to authenticate users and securely determine who is currently executing Java code, and authorize users to ensure that they have the access control rights, or permissions, required to do the actions performed.

The website part: Web API assumes that authentication happens in the host. For web-hosting, the host is IIS, which uses HTTP modules for authentication.

3.1.7 Data Management

- The teacher should have a profile with what he/she is specialised into and an academic background to make sure that the student knows what he/she is about to get tested .
- The teacher can decide if he/she wants to give prior information about the exam that the student will participate in.
- The students have no access to the exam questions.
- The students will have no information about the other students on the exam like how many students are there or their names.
- The students have rights to redo the exam and get a better score or even a certificate if they haven't got one for trying the first time.

3.1.8 Standards Compliance

The exams will have its own rules and regulations that have to be followed by teachers and students determined by the administrator in order to have no problems with the program and its functionality.

3.1.9 Portability

The website is built by using PHP (it has support to run on any platform provided by the required compilers are available). Database will be implemented by using MySQL which also has extensive support over many popular architectures and operating systems.

3.1.10 Other Non-Functional Requirements

Please provide all necessary non-functional requirements, similar to the requirements explained in the lesson slides or in the textbook.

3.2 Domain Requirements

Everything related to the domain that might be needed in the project shall be mentioned here. Sometimes the domain Requirements might be thought of as part of either functional or non-functional requirements.

4. User Scenarios/Use Cases

Scenario 1:

- The teacher logs in the program.
- The teacher adds questions to the new exam.
- The teacher declares the right answers to the questions.
- The teacher views all the questions.
- If the teacher thinks the exam is ready, he/she publishes it.

Scenario 2:

- The teacher logs in the program.
- The teacher edits the questions of an existing exam.
- The teacher declares the right answers to the questions.
- The teacher views all the questions.
- If the teacher thinks the exam is ready, he/she publishes it.

Scenario 3:

- Teacher logs in the program.
- Teacher deletes the questions which are thought to be unsuitable for the exam.
- Teacher views all the questions.
- If the teacher thinks the exam is ready, he/she publishes it.

Scenario 4:

- The teacher tries to log in the program.
- The teacher inputs an incorrect email or password.
- The teacher receives a message on the screen: “Your email or password is incorrect.”. ● The log in cannot be done.

Scenario 5:

- The student logs in the program.
- He/She chooses which exam to take.
- The student starts the exam.
- The student completes the exam within the exam hours.
- The student’s score appears on the screen.
- The student receives a score which does not fulfill the requirements for the certification exam. ● The student does not receive the certificate.

Scenario 6:

- The student logs in the program.
- He/She chooses which exam to take.
- The student starts the exam.
- The student completes the exam within the exam hours.
- The student’s score appears on the screen.

- The student receives a score which fulfills the requirements for the certification exam. ● The student receives the certificate.

Scenario 7:

- The student logs in the program.
- He/She chooses which exam to take.
- The student starts the exam.
- The student does not complete the exam within the exam hours.
- The student's score appears on the screen.
- The student receives a score which fulfills the requirements for the certification exam.
- The student receives the certificate.

Scenario 8:

- The student logs in the program.
- He/She chooses which exam to take.
- The student starts the exam.
- The student does not complete the exam within the exam hours.
- The student's score appears on the screen.
- The student receives a score which does not fulfill the requirements for the certification exam.
- The student does not receive the certificate.

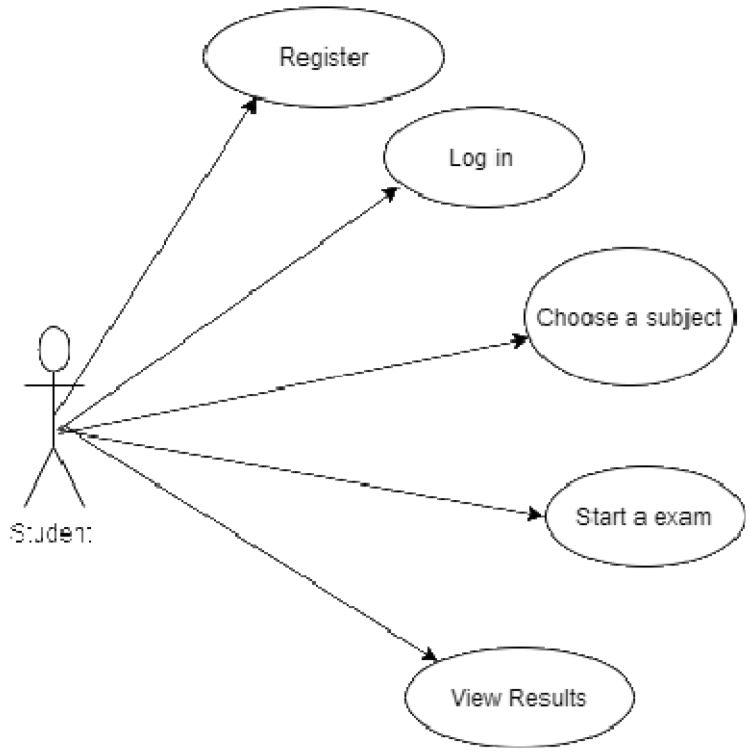
Scenario 9:

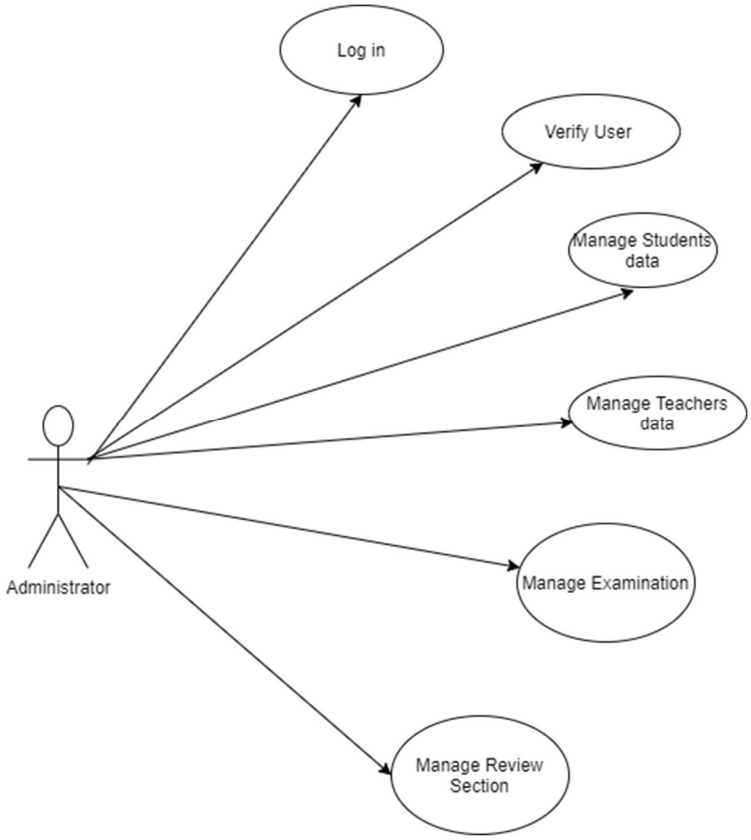
- The student tries to log in the program.
- The student inputs an incorrect email or password.
- The student receives a message on the screen: "Your email or password is incorrect."
- The log in cannot be done.

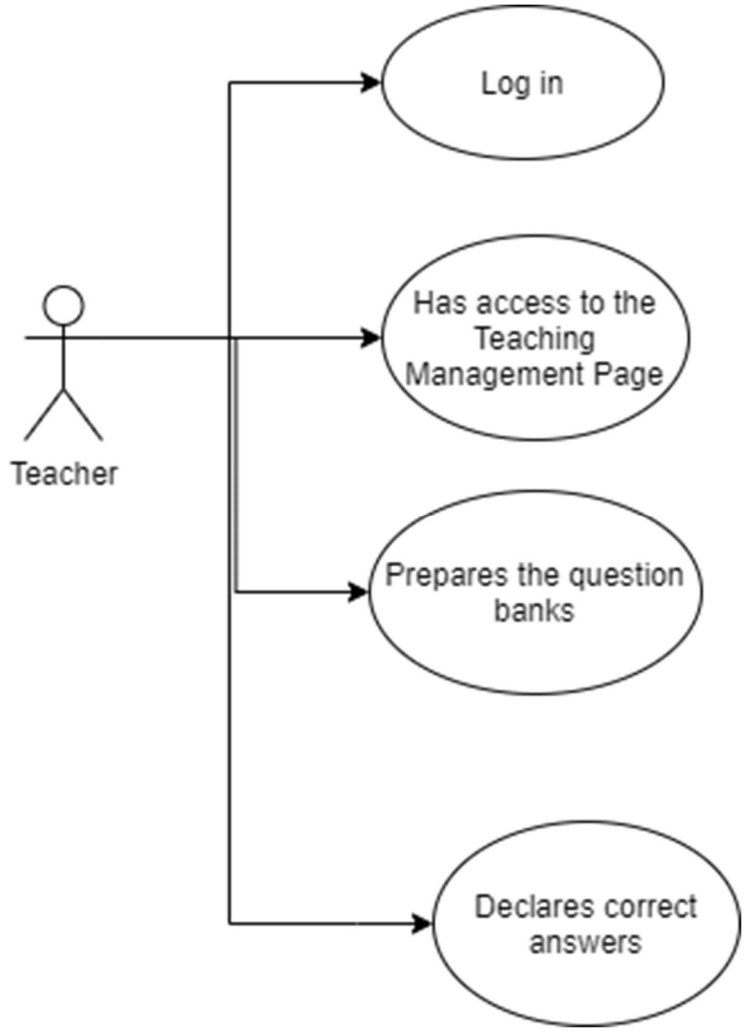
Scenario 10:

- The student does not have an account in the program.
- The student chooses the option to sign up.
- The student fulfills all the data required in the respective fields.
- The student registers his/her account.
- The student continues the login process.

USE CASES

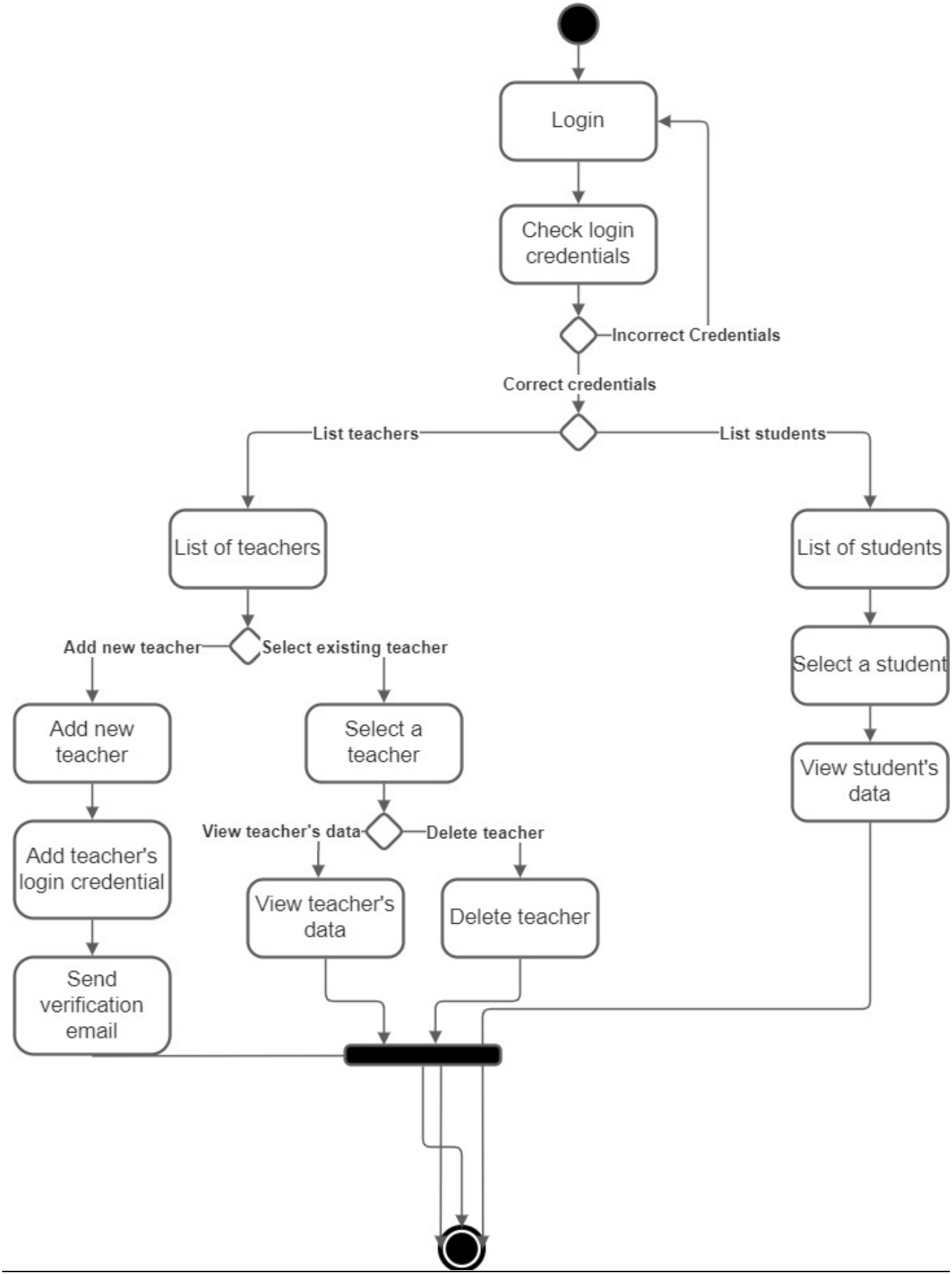



Log in
Verify User
Manage Students data
Manage Teachers data
Administrator
Manage Examination
Manage Review Section

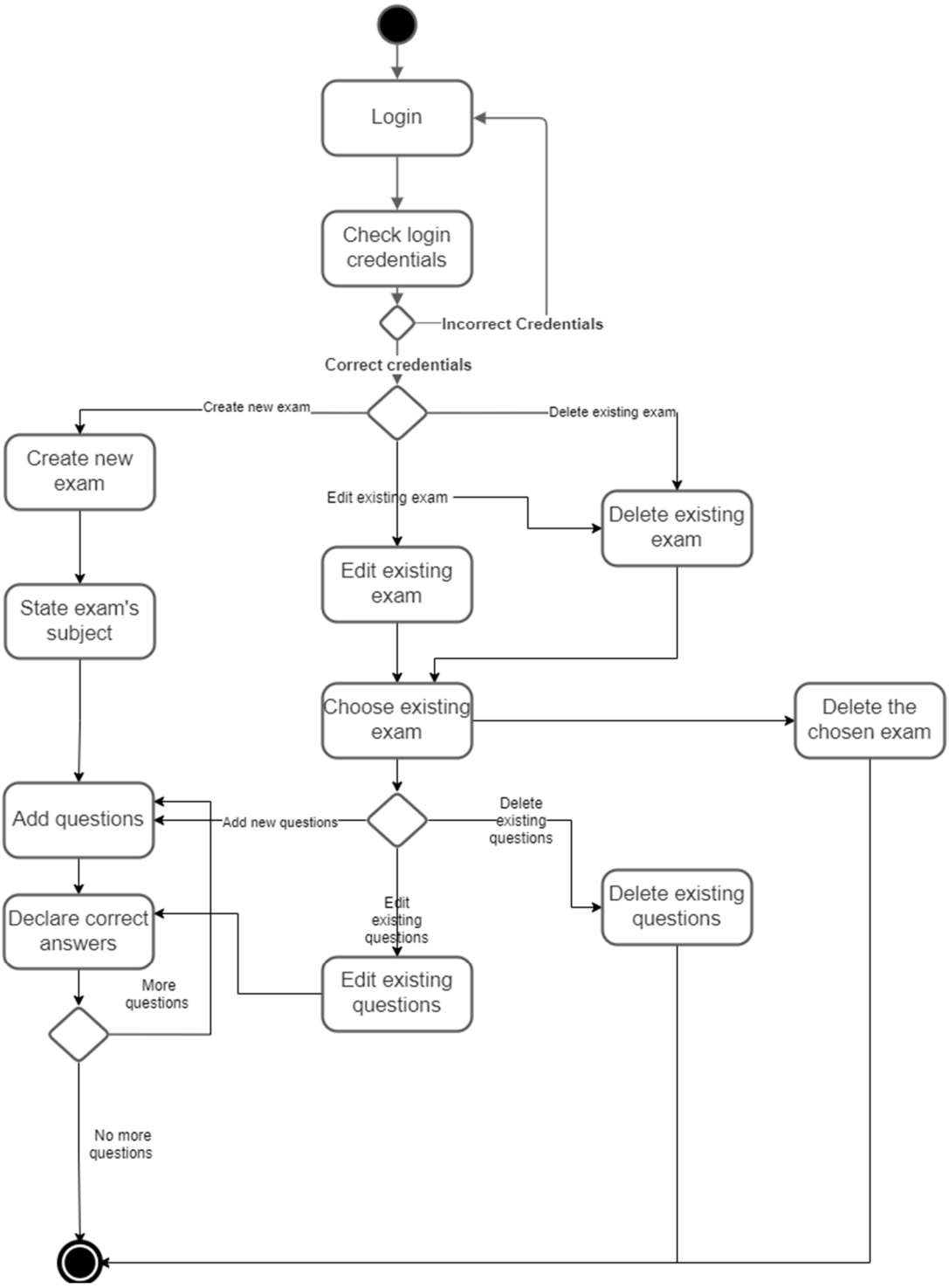


ACTIVITY DIAGRAM

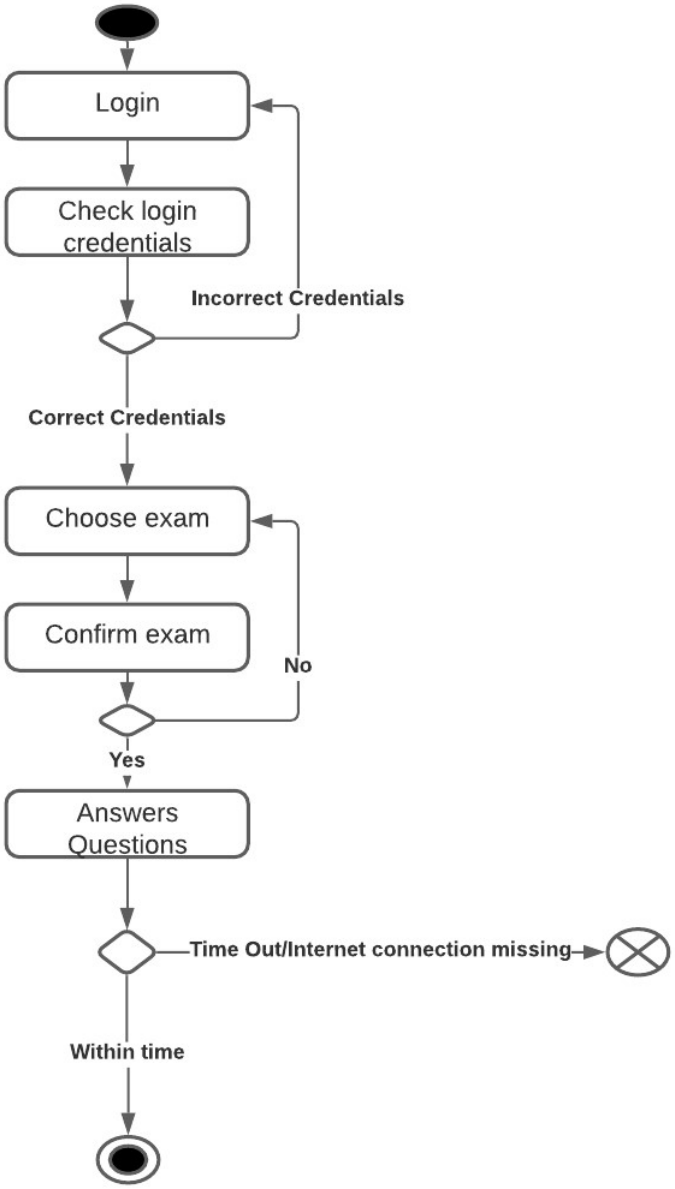
- Admin


Login
Check login credentials
Incorrect Credentials
Correct credentials
List teachers
List students
List of teachers
List of students
Add new teacher
Select existing teacher
Select a student
Add new teacher
Select a teacher
View student's data
View teacher's data
Delete teacher
Add teacher's login credential
View teacher's data
Delete teacher
Send verification email

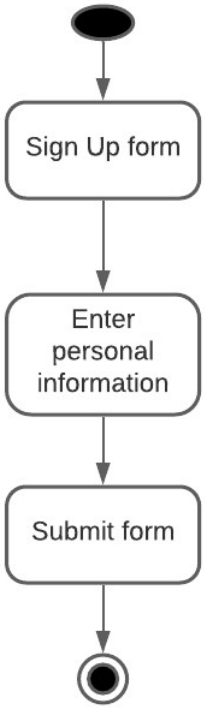
- Teacher



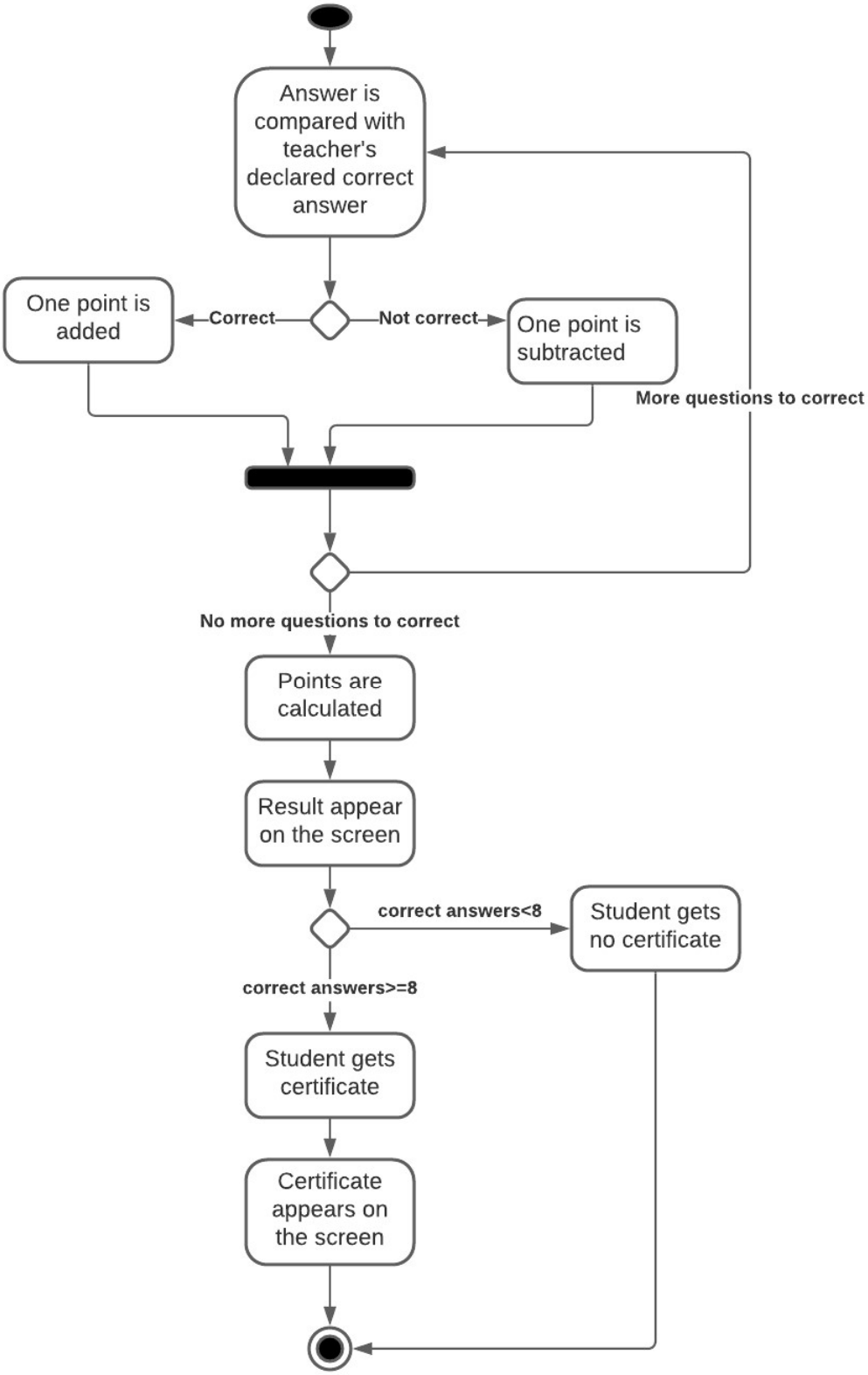
- Student


Login
Check login credentials
Incorrect Credentials
Correct Credentials
Choose exam
Confirm exam
No
Yes
Answers Questions
Time Out/Internet connection missing
Within time

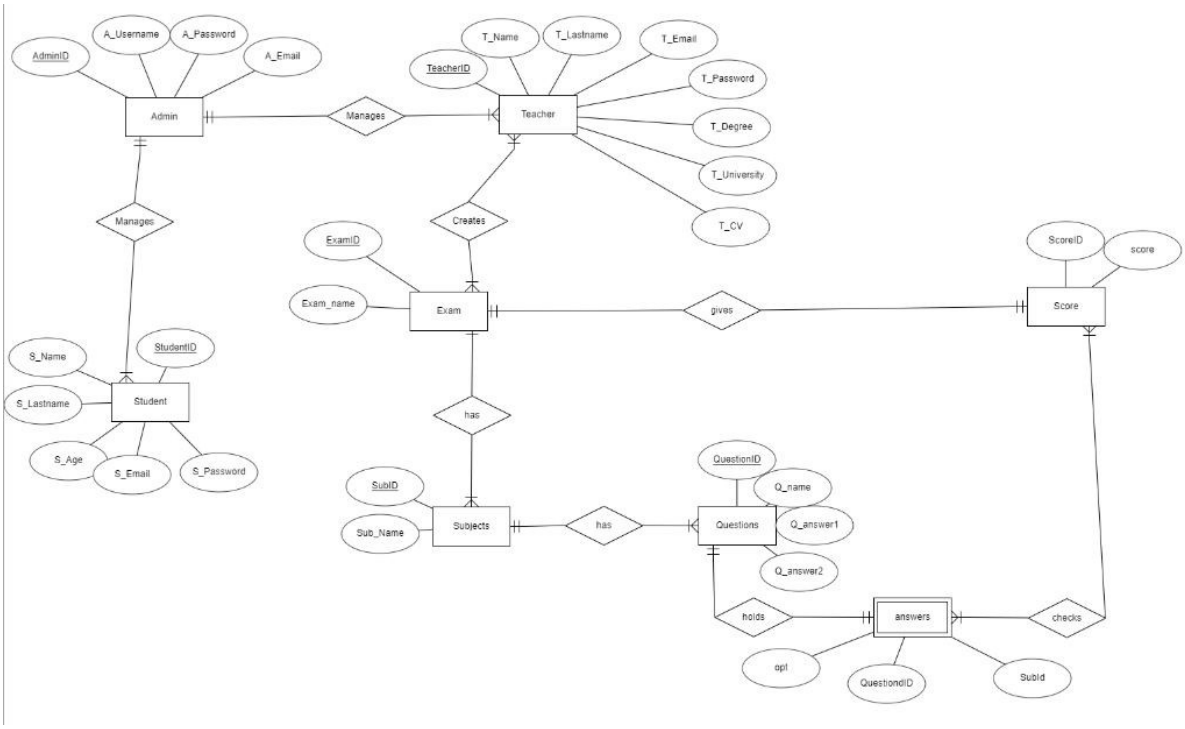
- Student’s sign up



- Exam evaluation


Answer is compared with teacher's declared correct answer
One point is added
Correct
Not correct
One point is subtracted
More questions to correct
No more questions to correct
Points are calculated
Result appear on the screen
correct answers<8
Student gets no certificate
correct answers>=8
Student gets certificate
Certificate appears on the screen

Entity relation Diagram



Relational Schema