UE21CS352B - Object Oriented Analysis & Design using Java

Mini Project Report

"Computer Based Test Management System"

Submitted by:

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Problem Statement:

Design and develop a comprehensive Computer-Based Test Management System that facilitates the creation, scheduling, and administration of online tests/assessments. The system should cater to the needs of three distinct user roles: Students, Teachers, and Administrators. The primary objectives of the system are:

- **Student Module:**
    - **Enable students to view available and previously taken tests.**
    - **Provide a user-friendly interface for taking online tests.**
    - **Allow students to review their previous test submissions and challenge the evaluation if necessary.**
    - **Display a leaderboard to foster healthy competition and motivation among students.**
- **Teacher Module:**
    - **Empower teachers to create, update, and delete test questions and assemble comprehensive tests.**
    - **Facilitate the uploading of test questions.**
    - **Enable teachers to review and respond to student-initiated challenges regarding test evaluations.**
    - **Access the leaderboard for monitoring student performance.**
- **Administrator Module:**
    - **Grant administrators the authority to approve and schedule tests created by teachers.**
    - **Enable administrators to view comprehensive test statistics and analytics for performance monitoring and decision-making.**
    - **Implement a secure login/signup facility for students and teachers to access the system.**
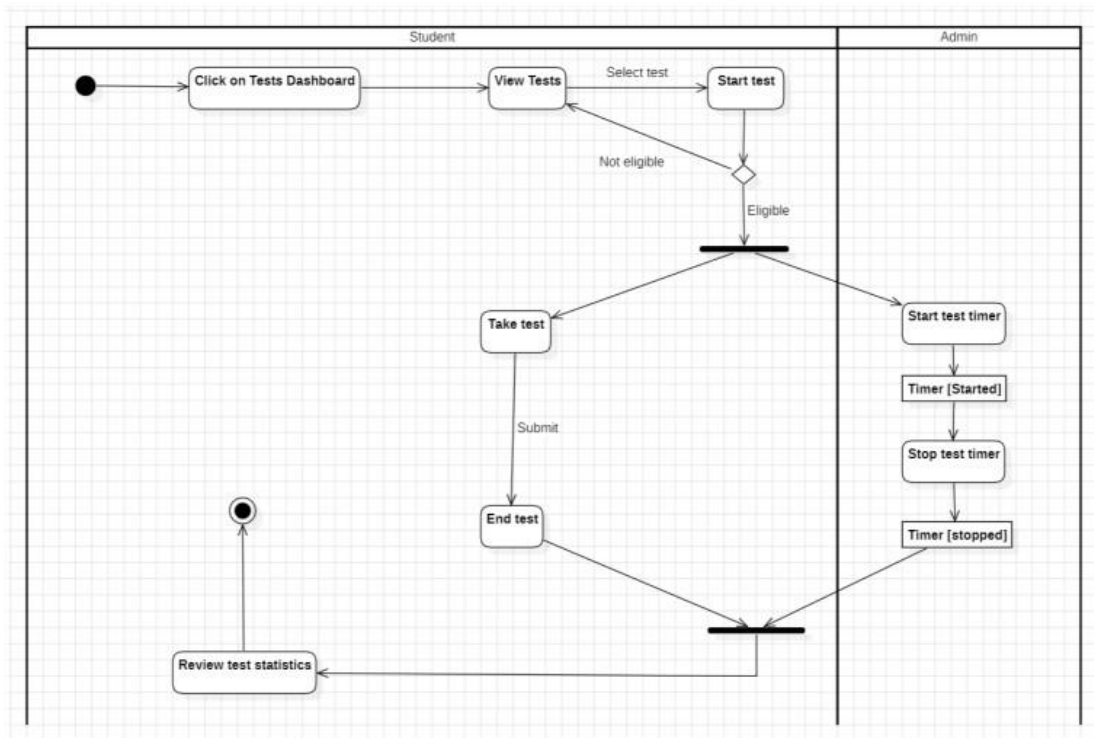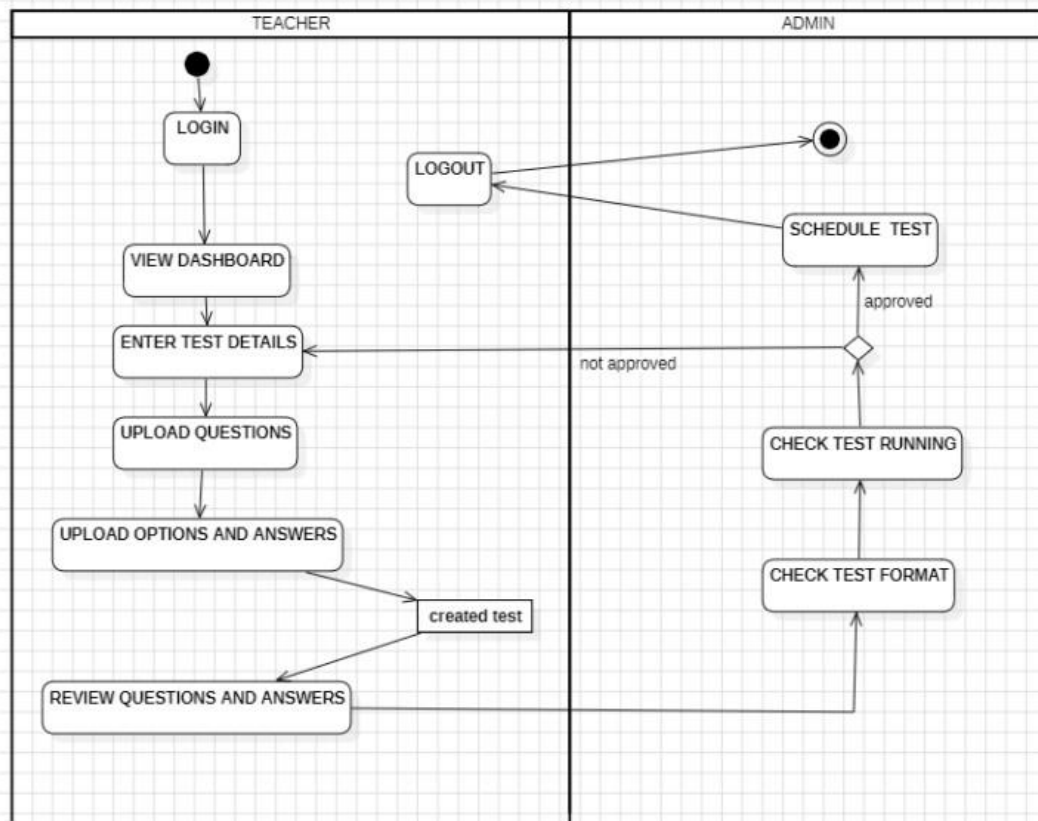
Models:

- USE CASE DIAGRAM :

COMPUTER BASED TEST MANAGEMENT SYSTEM
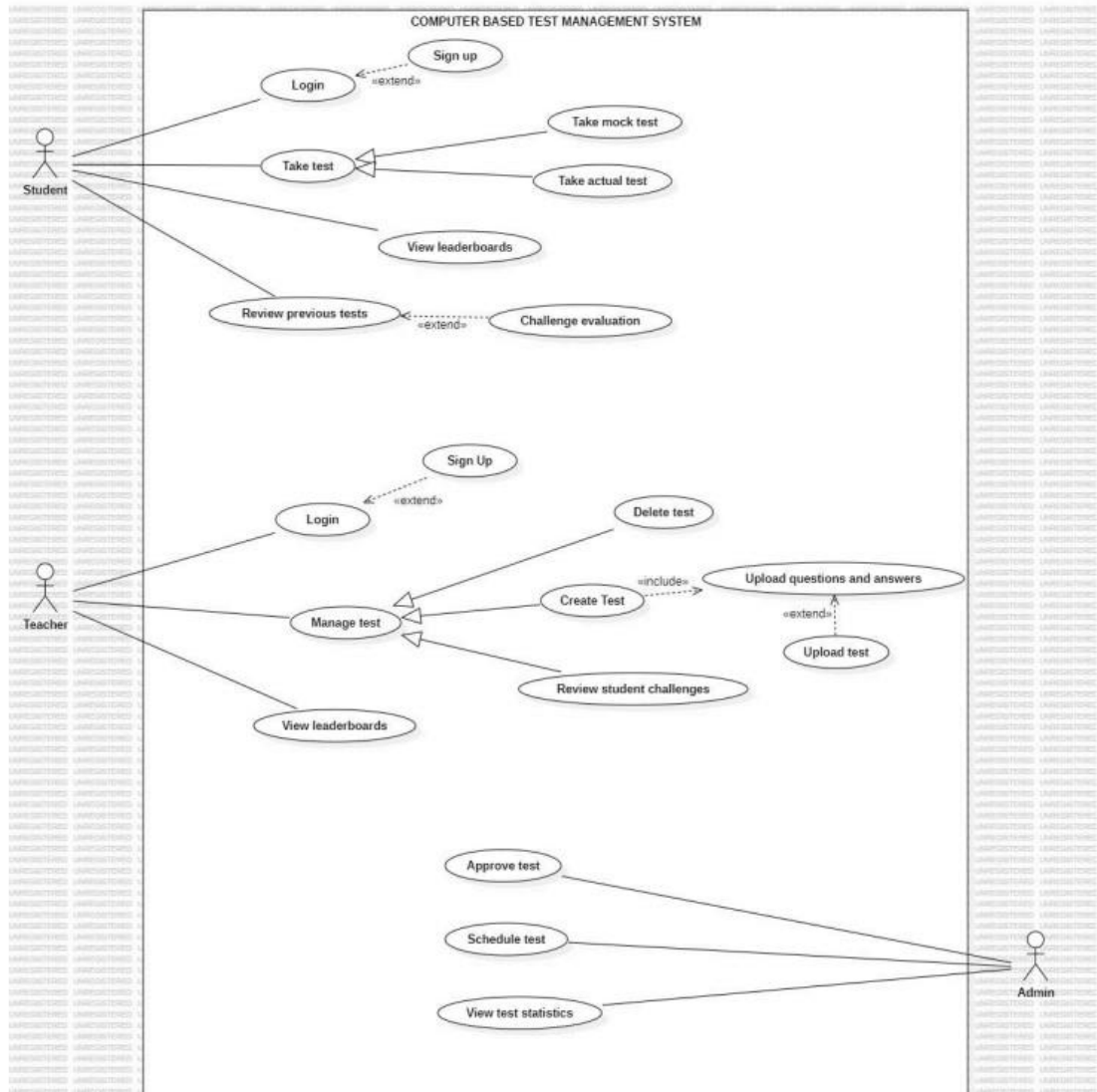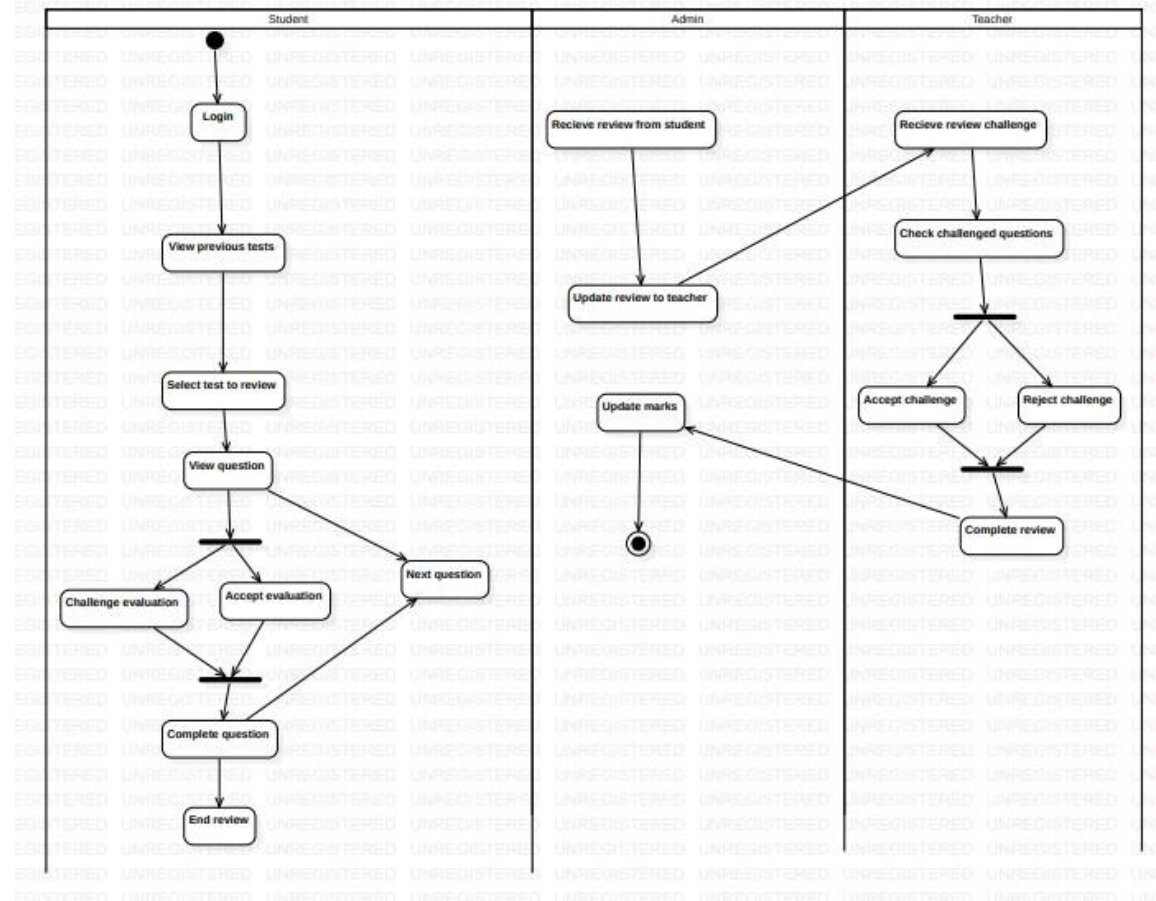
- CLASS DIAGRAM :
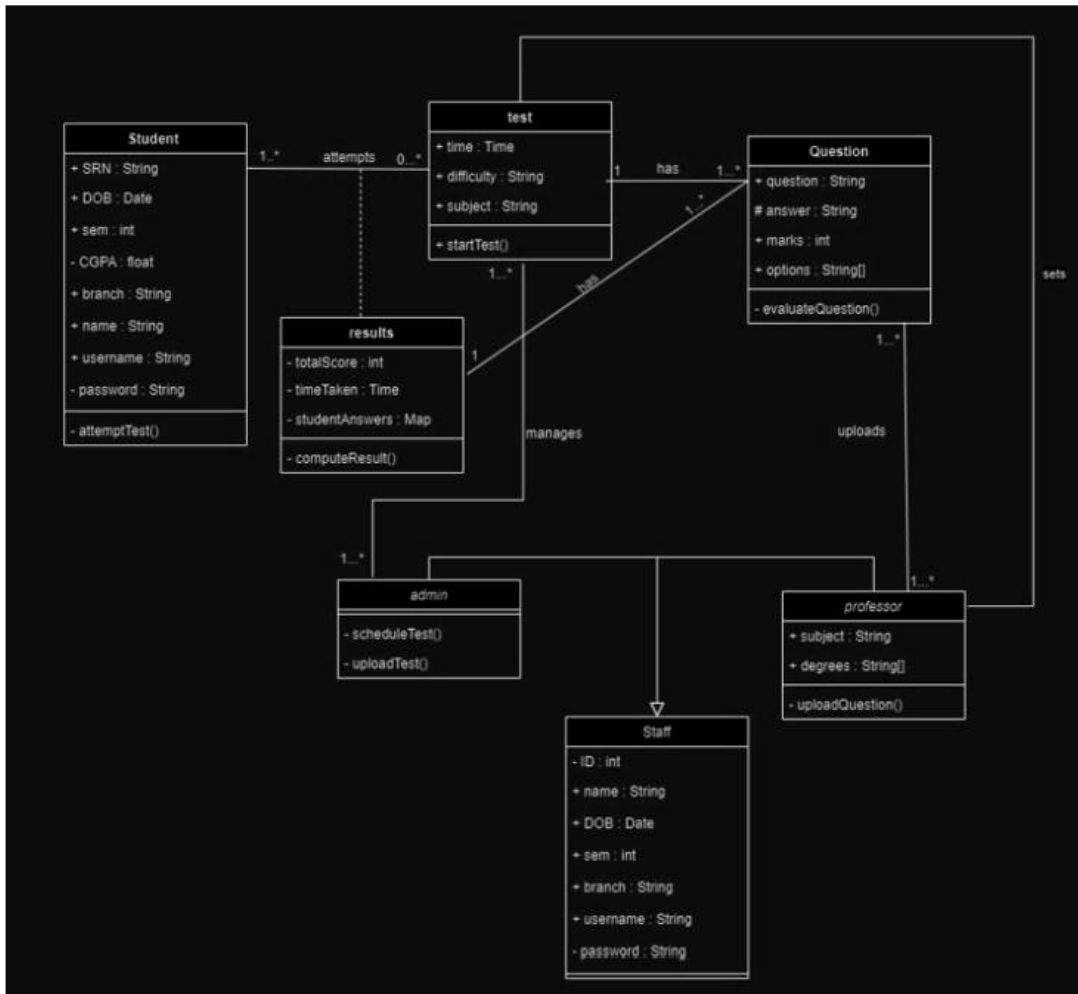
Activity Diagrams:
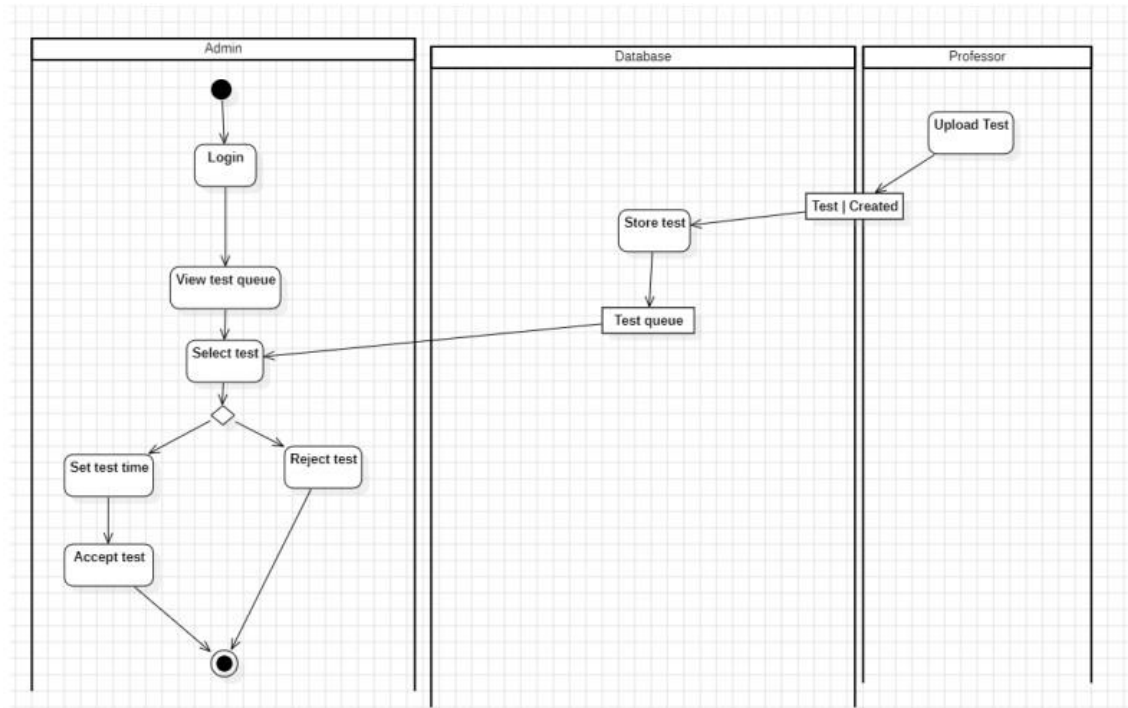
1) Activity Diagram for Taking Test

2) Activity Diagram for teacher creating test
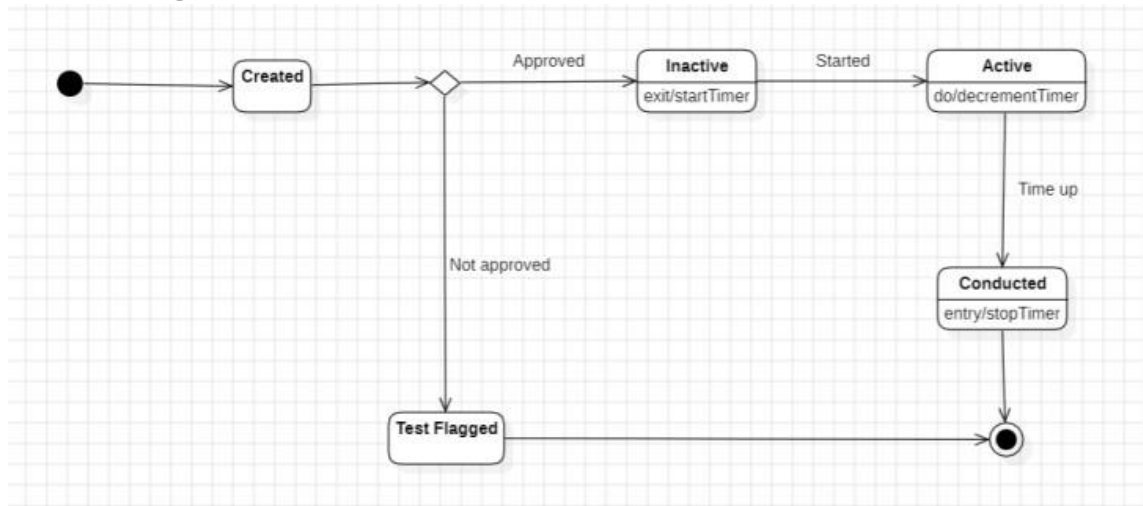
3) Activity Diagram for reviewing test

Student | Admin | Teacher

Student lane:
- Login
- View previous tests
- Select test to review
- View question
- Challenge evaluation
- Accept evaluation
- Next question
- Complete question
- End review

Admin lane:
- Recieve review from student
- Update review to teacher
- Update marks

Teacher lane:
- Recieve review challenge
- Check challenged questions
- Accept challenge
- Reject challenge
- Complete review

4)Activity Diagram for Admin schedules test
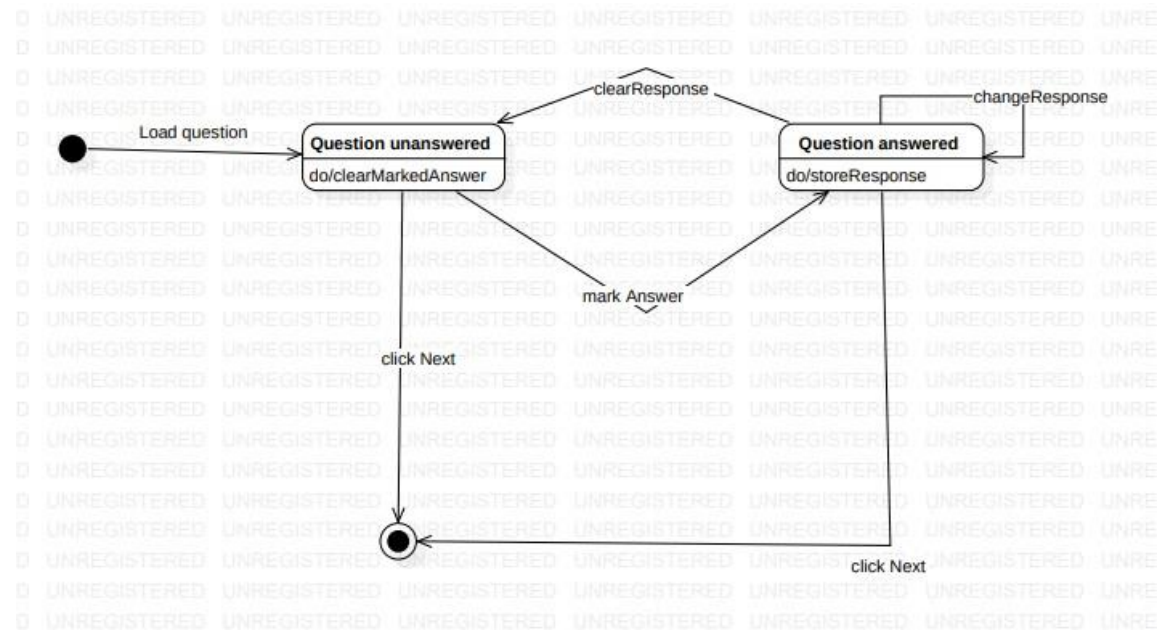
State Diagrams:

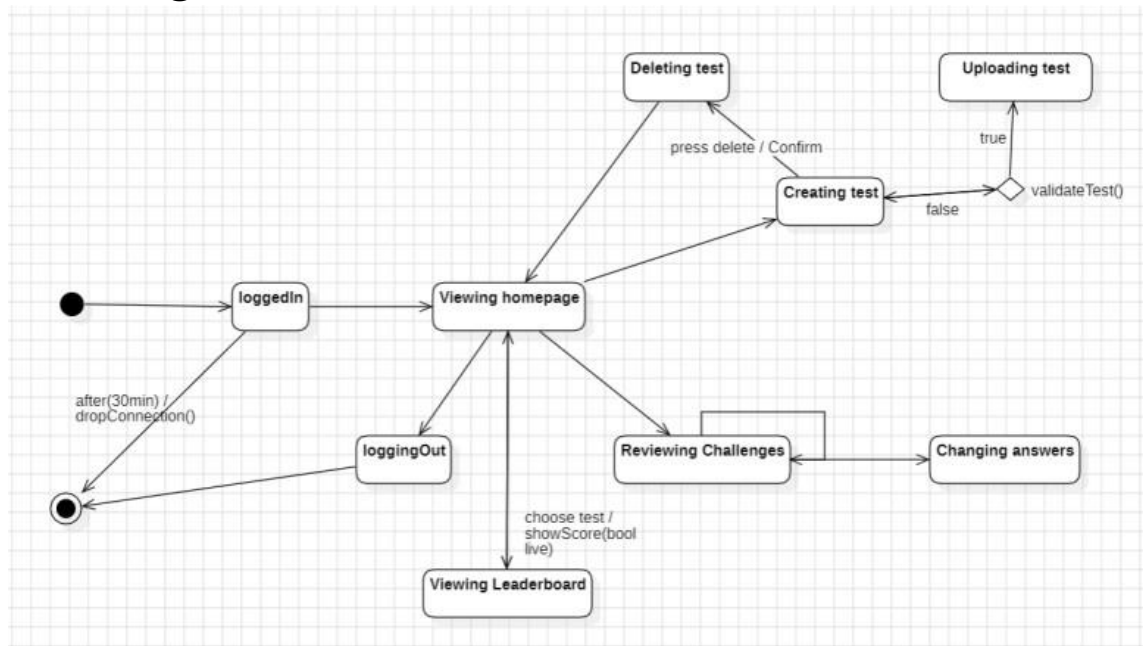## State Diagram for Test Creation:

State diagram for Student:
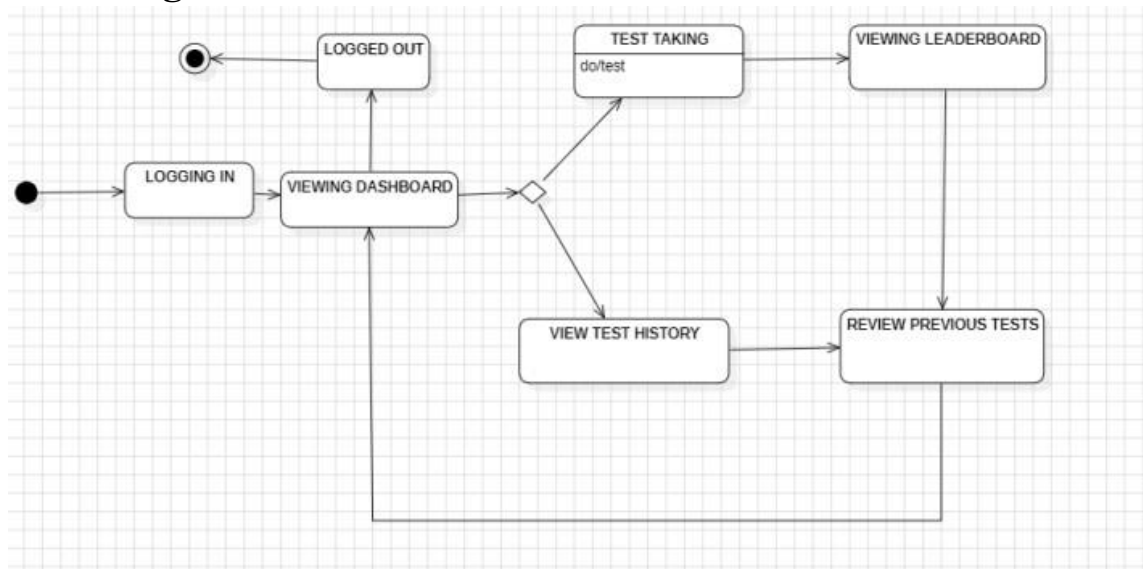
State Diagram for Test taking:

State Diagram for Professor:

Architecture Patterns used:

- **Singleton Pattern (Database Connection):**
  - The Singleton pattern is applied in the database connection module to ensure that only one instance of the database connection is created throughout the application's lifecycle.
  - This ensures efficient resource utilization and prevents multiple connections to the database, which could lead to performance issues.
  - By encapsulating the database connection logic within a Singleton class, we maintain a centralized point of access to the database, enhancing maintainability and scalability.

- **Factory Pattern (Registration Module):**
  - The Factory pattern is utilized in the registration module to facilitate the creation of different types of user objects based on user input.
  - By abstracting the object creation process into a factory class, we promote code flexibility and extensibility.
  - For instance, the registration factory class dynamically creates instances of student or teacher objects based on the user's role selection during the registration process.
  - This decouples the client code from the specific implementations of user objects, allowing for easy addition of new user types in the future.

- **Command Pattern (Admin Module):**
  - The Command pattern is employed in the admin module to encapsulate requests as objects, thereby allowing the parameterization of clients with queues, requests, and operations.
  - Each admin command corresponds to a specific action that an administrator can perform, such as approving tests, scheduling tests, or viewing statistics.
  - By encapsulating these actions within command objects, we promote loose coupling between the invoker (administrator) and the receiver (system components).
  - This enables us to easily extend the system with new admin functionalities without modifying existing code.

Design Principles used:

- **Single Responsibility Principle (SRP):**
  - The SRP is adhered to by designing classes with a single responsibility, focusing on specific use cases or functionalities.
  - For example, separate classes are created for user authentication, test creation, test scheduling, and result generation.
  - This promotes code clarity, maintainability, and reusability, as each class is responsible for a specific task, minimizing the impact of changes and facilitating easier debugging and testing.

- **Open-Closed Principle (OCP):**
  - The OCP is observed by designing abstract classes and interfaces that are open for extension but closed for modification.
  - For instance, the admin module consists of an abstract admin command class that defines the interface for executing admin actions.
  - Concrete command classes extend this abstract class to implement specific admin functionalities.
  - This design allows for the addition of new admin commands without altering existing code, promoting code stability and scalability.

- **Github link:**
https://github.com/SinkableVirus/Online_Test_Management_System
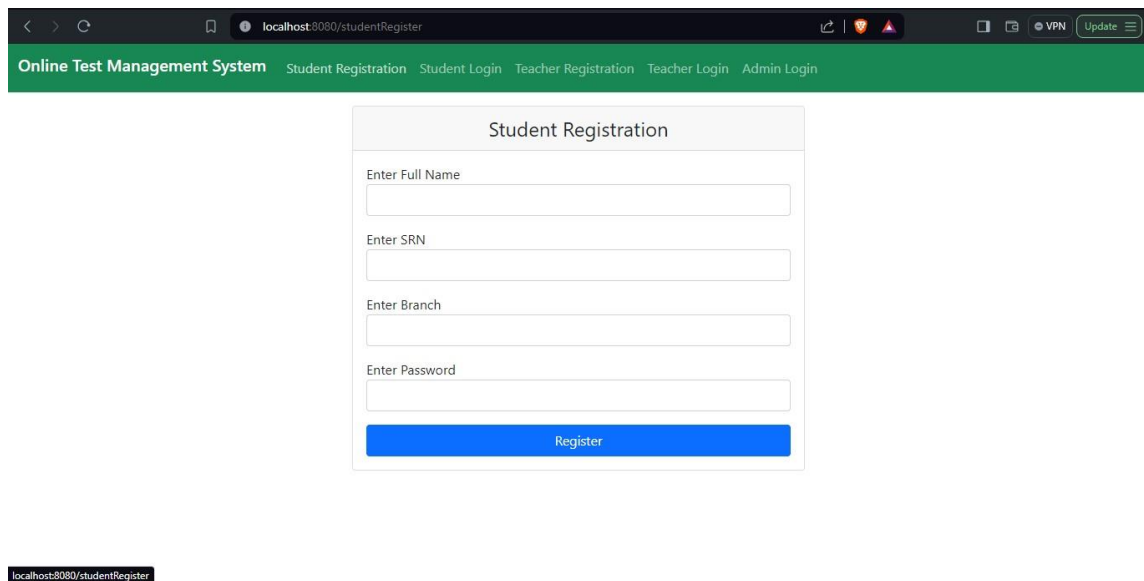
INDIVIDUAL CONTRIBUTIONS :

- Srinivas **-** Teacher Use case
- Srikrishna - Student Use case
- Suvan - Review Use case and Login In Parts
- Suraj - Admin Use case and leaderboard

Screenshots :

STUDENT :

Student Registration :

Student login :

Student dashboard :

Student taking test :

Test history :

REVIEW :
Review Test :

Test Review

Question	Option 1	Option 2	Option 3	Option 4	Marked Answer	Correct Answer	Review Comment
What is the result of "9 + 3 * 2"?	15	18	24	12	a	a	None
Which of the following is a valid way to create an object in Java?	ClassName obj = new ClassName();	ClassName obj = ClassName();	ClassName obj = new ClassName;	None of the above	a	a	None
Which of the following is a Java code editor?	Eclipse	NetBeans	IntelliJ IDEA	All of the above	a	d	scam
What is the purpose of the "static" keyword in Java?	To create a method that can be called without creating an object	To create a variable that is shared among all instances of a class	Both A and B	None of the above	c	c	None
Which of the following is a Java collection interface?	List	Set	Map	All of the above	d	d	None

Save Review Comments

TEACHER :

Teacher Registration :

Teacher Login

Teacher Dashboard :

Teacher uploading test :

Back

Marks: 3

Delete

Question: Enter the question

a)   Enter option A

b)   Enter option B

c)   Enter option C

d)   Enter option D

Correct Option: Enter the correct option

Marks: Enter marks

Add

Submit

Test reviewing for teacher :

Back

Test ID: TEST007

Question 1

What is the result of "9 + 3 * 2"?

a) 15

b) 18

c) 24

d) 12

Student Reviews:

SRN	Review
123	None

Question 2

Which of the following is a valid way to create an object in Java?

a) ClassName obj = new ClassName();

b) ClassName obj = ClassName();

c) ClassName obj = new ClassName;

General Leaderboard :

Specific test Leaderboard :

ADMIN :

Admin login :

Admin Login

Enter Admin ID

Enter Password

Login

Pending tests for admin to approve :

localhost:8080/adminDashboard?adminId=AD001

Pending Tests

Test ID	Teacher ID	Description	Start Time	End Time	Difficulty	Update	Accept
TEST002	T002	Test description 2	2024-04-12 10:00:00	2024-04-12 12:00:00		Update	Accept
TEST004	T002	Test description 4	2024-04-12 11:00:00	2024-04-12 13:00:00		Update	Accept
TEST006	T001	Java Basics Test	2024-04-25 09:00:00	2024-04-25 11:00:00	Medium	Update	Accept
TEST008	T002	Collections and Generics Test	2024-04-29 10:00:00	2024-04-29 12:00:00	Easy	Update	Accept
TEST010	T002	Multithreading Test	2024-05-04 09:00:00	2024-05-04 11:00:00	Hard	Update	Accept
TEST012	T001	JDBC Test	2024-05-08 10:00:00	2024-05-08 12:00:00	Medium	Update	Accept
TEST014	T001	Servlets and JSP Test	2024-05-12 09:00:00	2024-05-12 11:00:00	Easy	Update	Accept

Undo Previous Update

Tests accepted by admin :

Update   Accept

Undo Previous Update

Accepted Tests

Test ID	Teacher ID	Description	Start Time	End Time	Difficulty	Undo
TEST001	T001	Test description 1	2024-04-12 08:00:00	2024-04-12 11:00:00		Undo
TEST003	T001	Test description 3	2024-04-12 09:00:00	2024-04-12 11:00:00		Undo
TEST007	T002	Object-Oriented Programming Test	2024-04-18 13:14:00	2024-04-18 14:00:00	Hard	Undo
TEST009	T002	Exception Handling Test	2024-05-02 14:00:00	2024-05-02 14:02:00	Medium	Undo
TEST011	T001	Input/Output Test	2024-05-06 13:00:00	2024-05-06 15:00:00	Easy	Undo
TEST013	T001	Networking Test	2024-05-10 14:00:00	2024-05-10 16:00:00	Hard	Undo
TEST015	T002	Java EE Test	2024-05-14 13:00:00	2024-05-14 15:00:00	Medium	Undo

Update Form with ID TEST006

Difficulty:

Hard

Start Date and Time:

09 / 07 / 2024, 05 : 10 pm

End Date and Time:

10 / 07 / 2024, 05 : 10 pm

Submit

| TEST006 | T001 | Java Basics Test | 2024-07-09 17:10:00 | 2024-07-10 17:10:00 | Hard | Update | Accept |