



System Analysis and Design Document for CBT Application

Maryam SHEFIU

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PART A: SUMMARY

Computer-Based Testing Application

Project Sponsor: Mr Taiwo

Business Need: This project has been proposed to deal with the challenges of manually administering tests and accessing students within the allocated time due to the increased number of students.

Functionality:

- Registration of students and lecturers
- User management
- Setting questions
- Taking the test according to the duration and number of questions specified by the lecturers
- Result management

Expected Value:

- Streamlined user management
- Enhanced result handling.
- Efficient administration of tests

Special Issues or Constraints:

- Budget constraints
- Time constraints
- User Training
- Resistance to change

PART B: INTERFACE DESIGN

UI Mock Up Screens

Login Page

The mockup shows a login interface with a dark blue sidebar on the left and a white main content area on the right. The sidebar contains the Pan-Atlantic University logo and the text 'Computer-Based Testing Application'. The main content area has a 'Login' heading, input fields for 'Email Address' and 'Password', a 'Login' button, and links for 'Sign Up' and 'Forgot Password?'. The 'Sign Up' link is underlined and includes the text '(for admin only)'.

PAN-ATLANTIC UNIVERSITY

Computer-Based Testing Application

Login

Email Address

Password

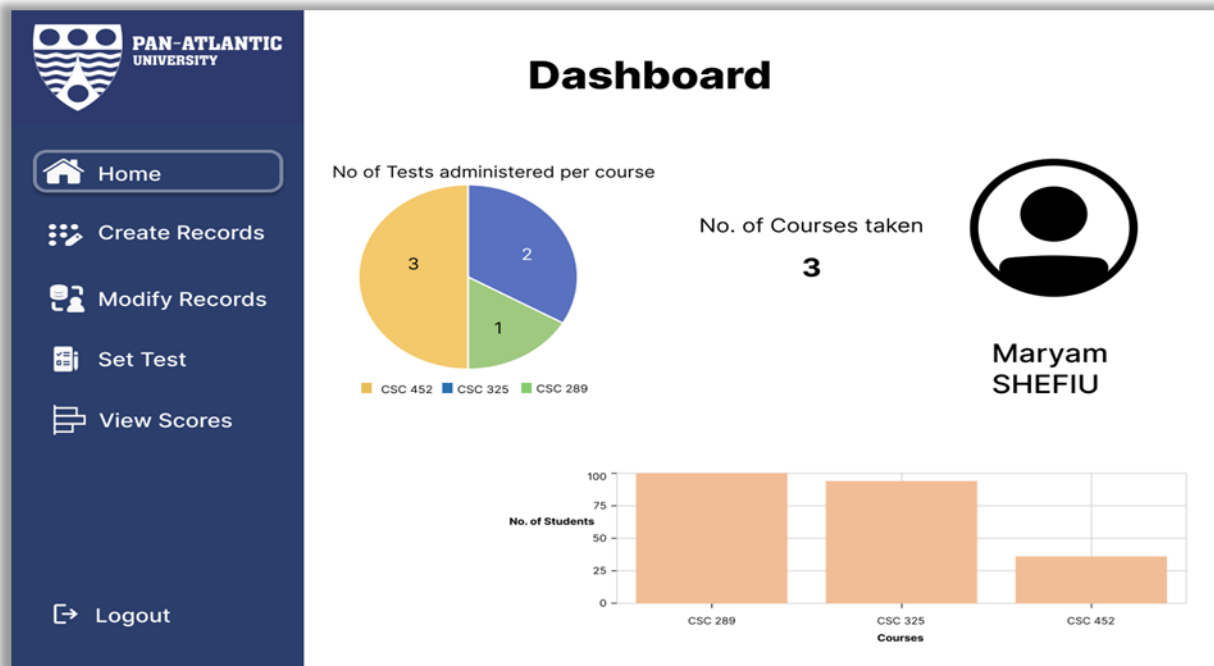
Login

[Don't have an account? Sign Up \(for admin only\)](#)


OR

[Forgot Password?](#)

Lecturer's Home Page



Student Registration (Individual) Page


PAN-ATLANTIC UNIVERSITY


[Home](#)
[Create Records](#)
[Modify Records](#)
[Set Test](#)
[View Scores](#)
[Logout](#)

Student Registration

Matriculation Number

Name

Gender ☐ Male ☐ Female

Date of Birth 


Email Address

Department

Level

Submit

Student Registration (Bulk)
Page

**PAN-ATLANTIC
UNIVERSITY**

[Home](#)

[Create Records](#)

[Modify Records](#)

[Set Test](#)

[View Scores](#)

[Logout](#)


Student Registration

Select File [Browse](#)

Matric No	Name	Gender	DOB	Email	Department	Level

[Upload](#)[Clear](#)

Lecturer Registration (Individual) Page

**PAN-ATLANTIC
UNIVERSITY**

[Home](#)
[Create Records](#)
[Modify Records](#)
[Set Test](#)
[View Scores](#)

[Logout](#)

Lecturer Registration

Staff ID

Name

Gender

☐ Male


☐ Female

Email Address

Department

Phone Number

Lecturer Registration (Bulk) Page

**PAN-ATLANTIC
UNIVERSITY**

[Home](#)
[Create Records](#)
[Modify Records](#)
[Set Test](#)
[View Scores](#)


[Logout](#)

Lecturer Registration

Select File

Staff ID	Name	Gender	Email	Department	Phone No

Modify Records Page

**PAN-ATLANTIC
UNIVERSITY**

[Home](#)
[Create Records](#)
[Modify Records](#)
[Set Test](#)
[View Scores](#)

[Logout](#)


Modify Records

Matriculation Number [Search](#)

Name

Gender

Date of birth




Email Address

Department

Level

[Update](#) [Clear](#) [Delete](#)

Set Test Page

**PAN-ATLANTIC
UNIVERSITY**


[Home](#)
[Create Records](#)
[Modify Records](#)
[Set Test](#)
[View Scores](#)


[Logout](#)


Set Test

Details

No of questions Timer

Hours 

Minutes 

Seconds 

Questions

Question

Option A


Option B

Option C

Option D

[+ Add Question](#)

View Scores Page

**PAN-ATLANTIC
UNIVERSITY**

[Home](#)
[Create Records](#)
[Modify Records](#)
[Set Test](#)
[View Scores](#)

[Logout](#)


View Scores

Test ID [View](#)

Test ID	Mat No	Name	Course	Score

[Save](#)[Clear](#)

Student Homepage

**PAN-ATLANTIC
UNIVERSITY**

[Home](#)
[View Scripts](#)


[Logout](#)

Welcome

Enter Test ID to continue

[Start](#)
**Maryam
SHEFIU**

View Scripts

**PAN-ATLANTIC**
UNIVERSITY

[Home](#)
[View Scripts](#)

[Logout](#)

View Scripts

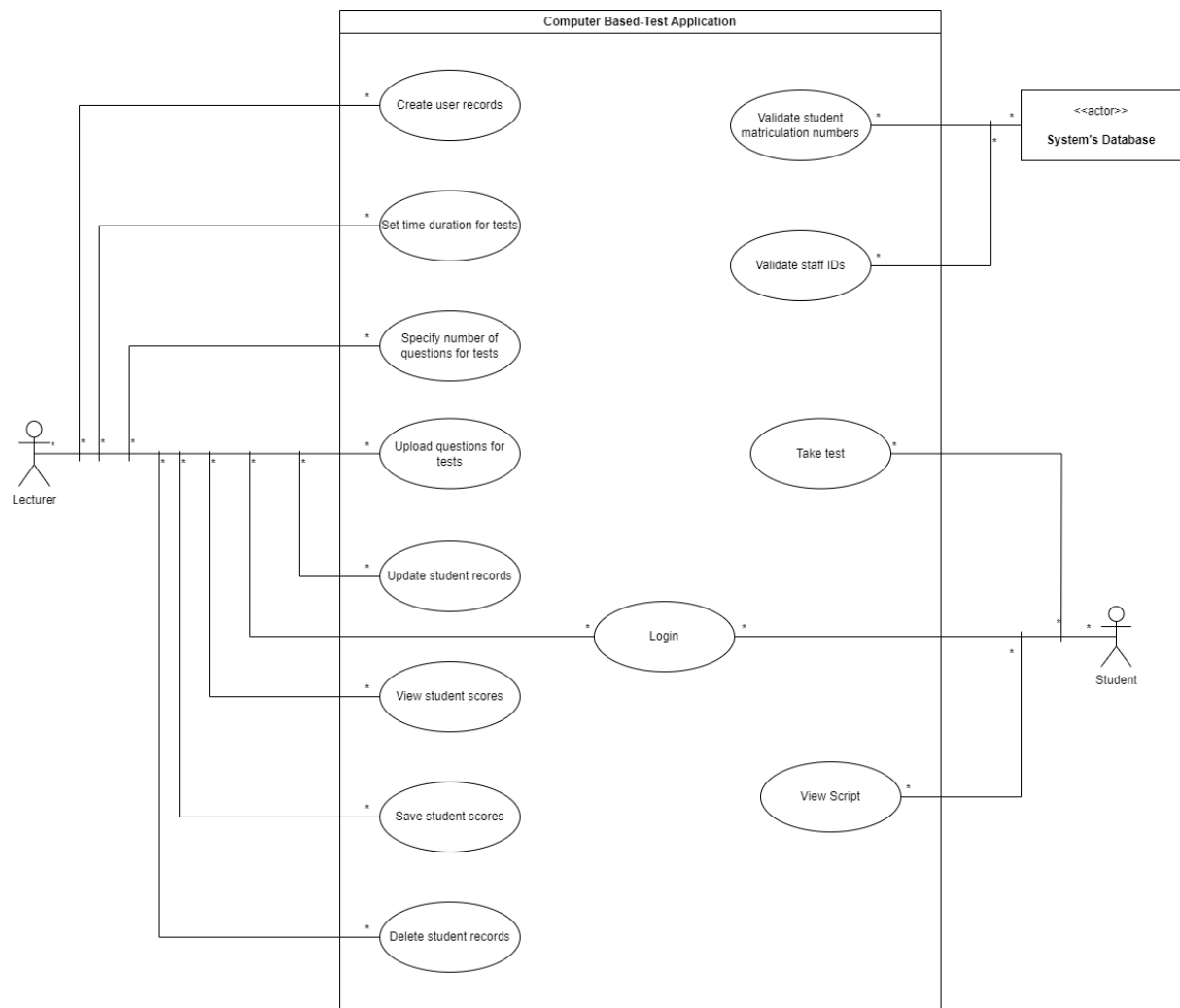
Test ID

Search

PrintClear

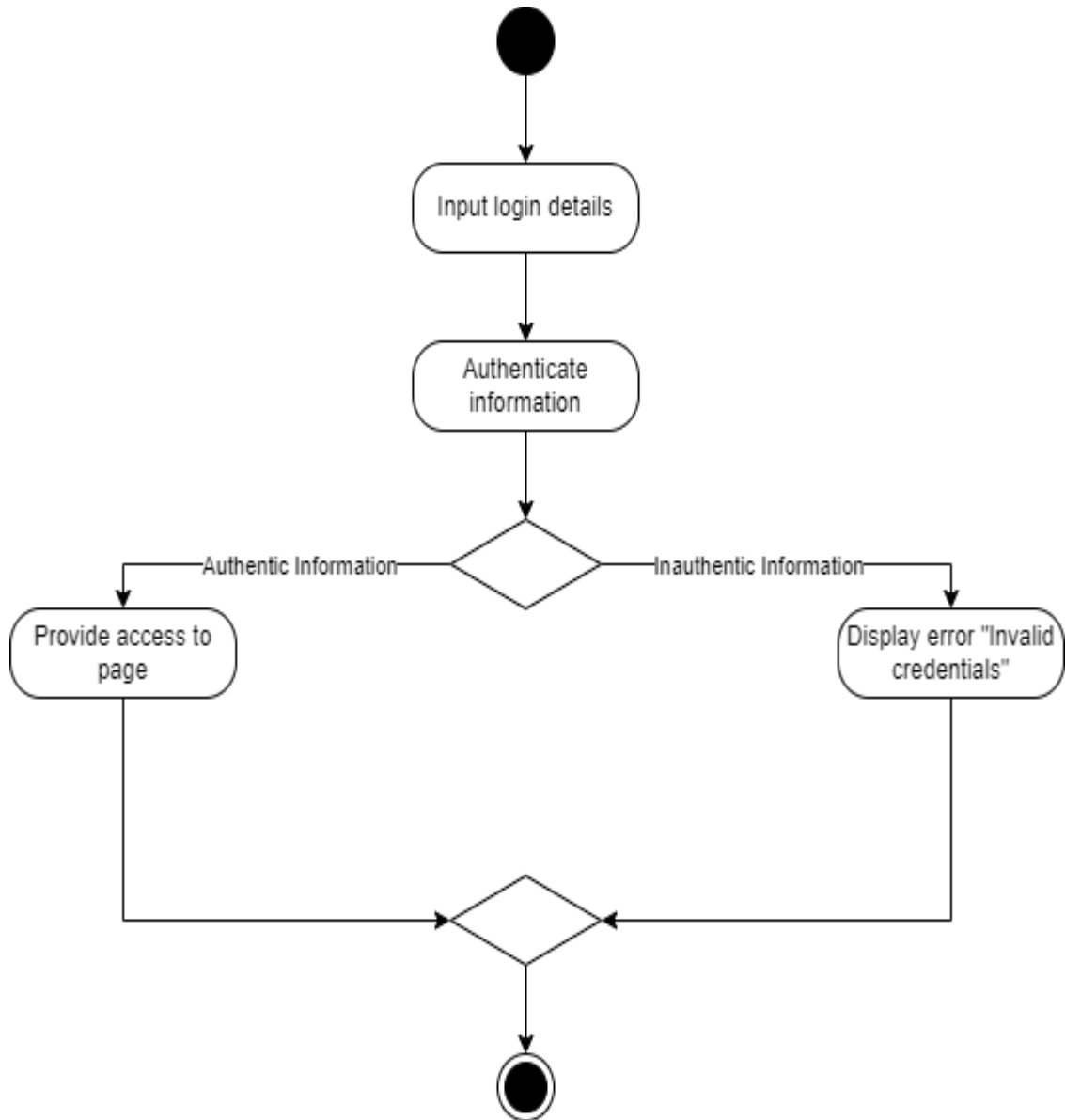
PART C: FUNCTIONAL MODELS

Use-Case Diagram

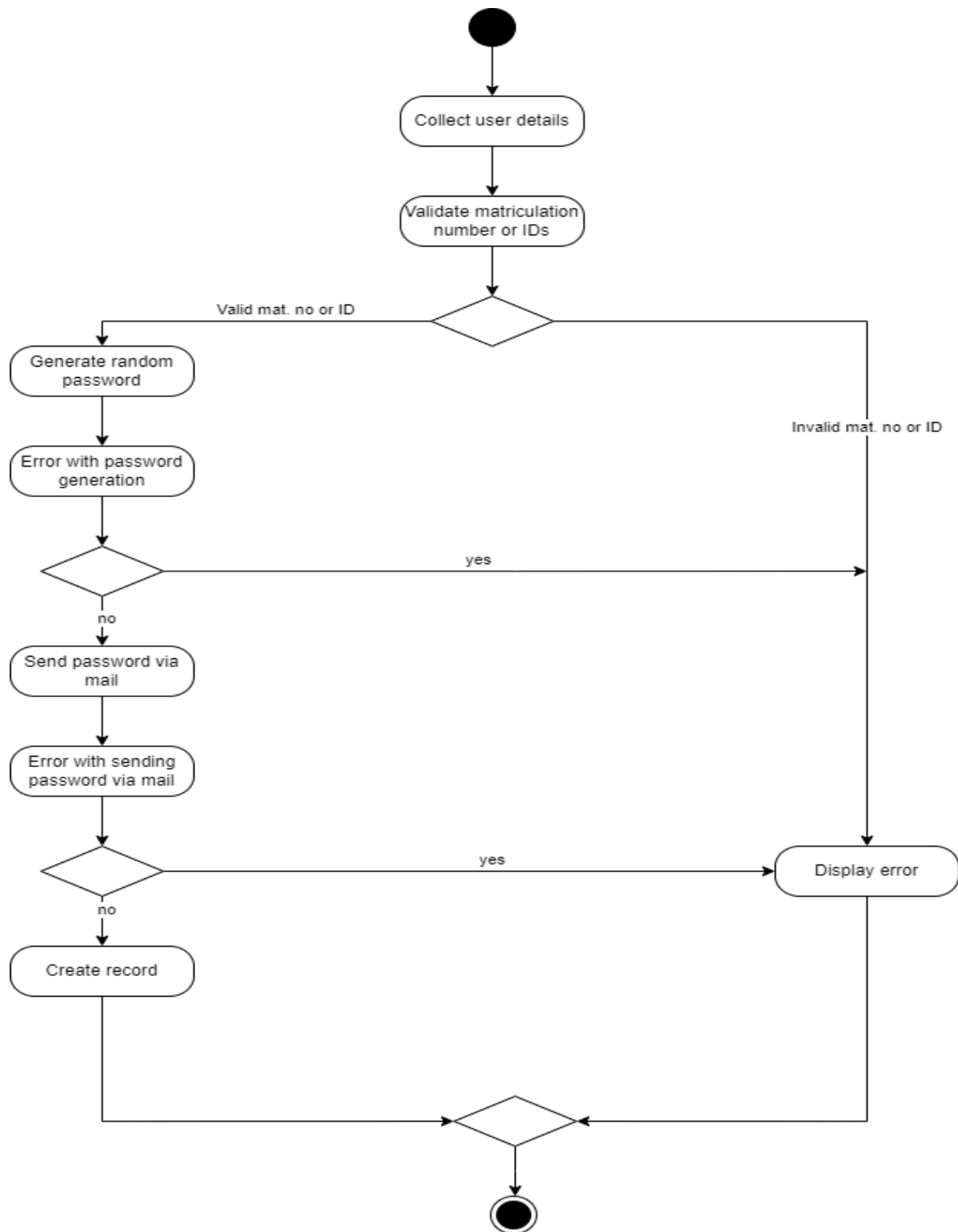


Activity Diagrams

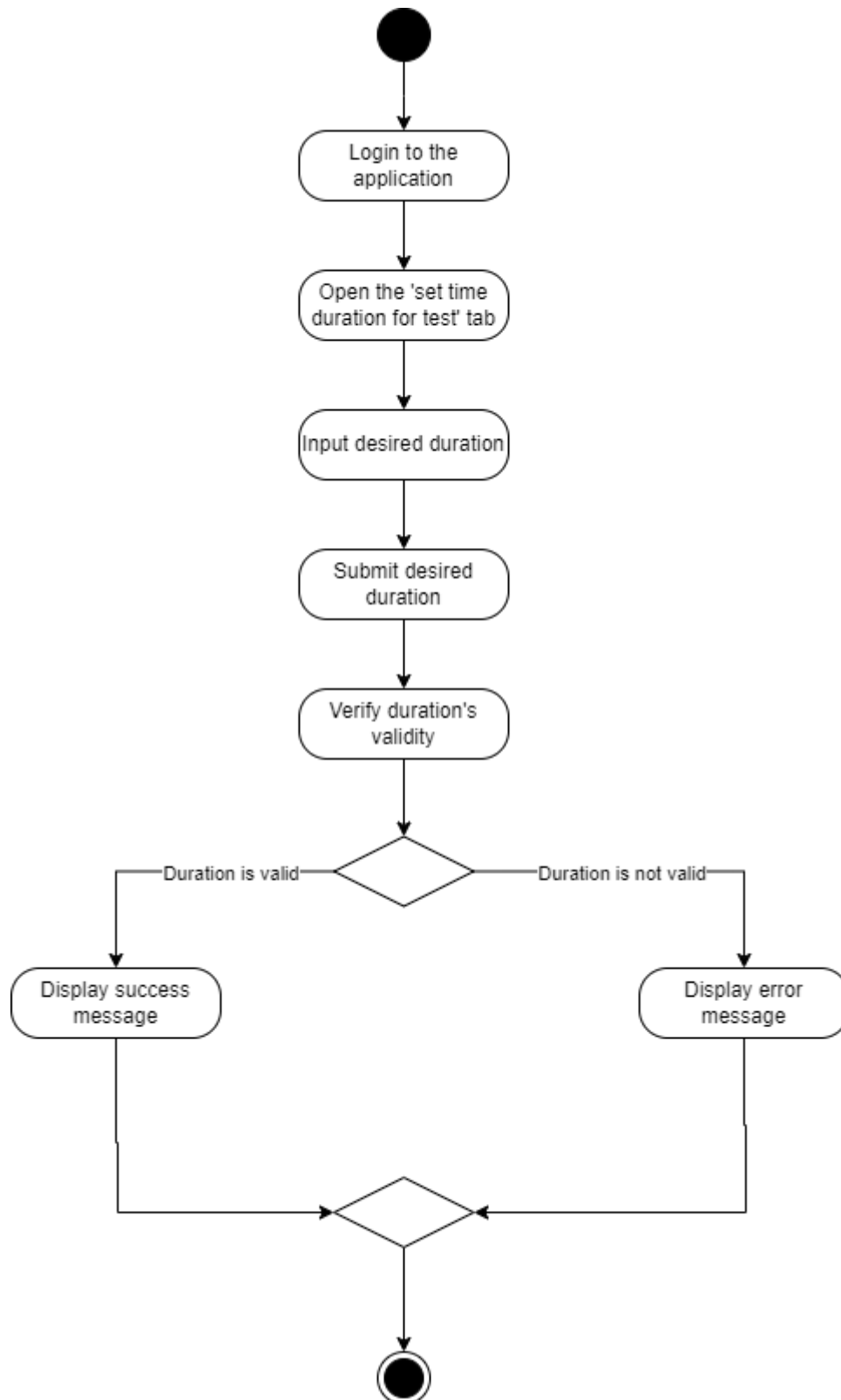
Activity Diagram for 'Login' Use Case



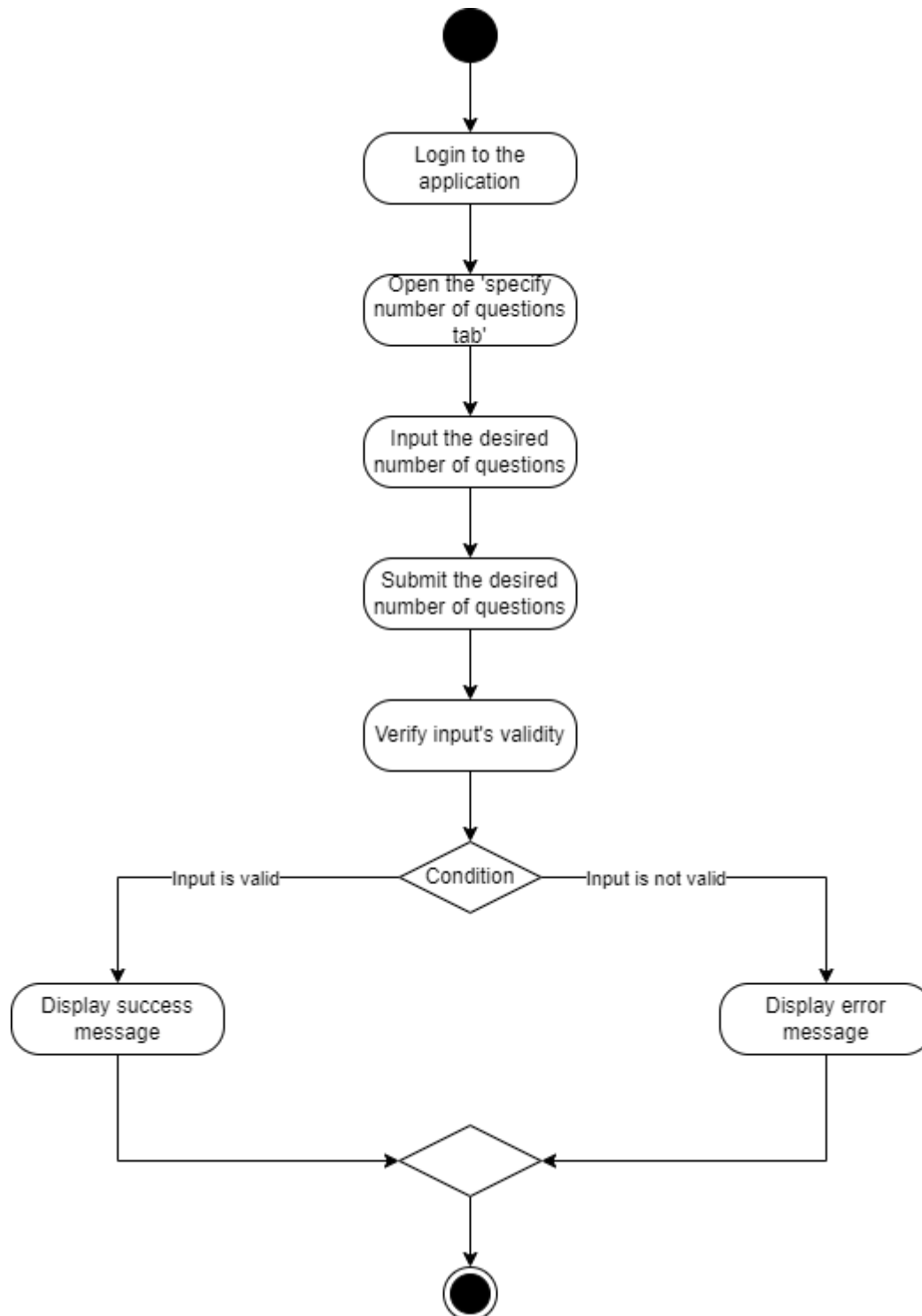
Activity Diagram for 'Create User Records' Use Case



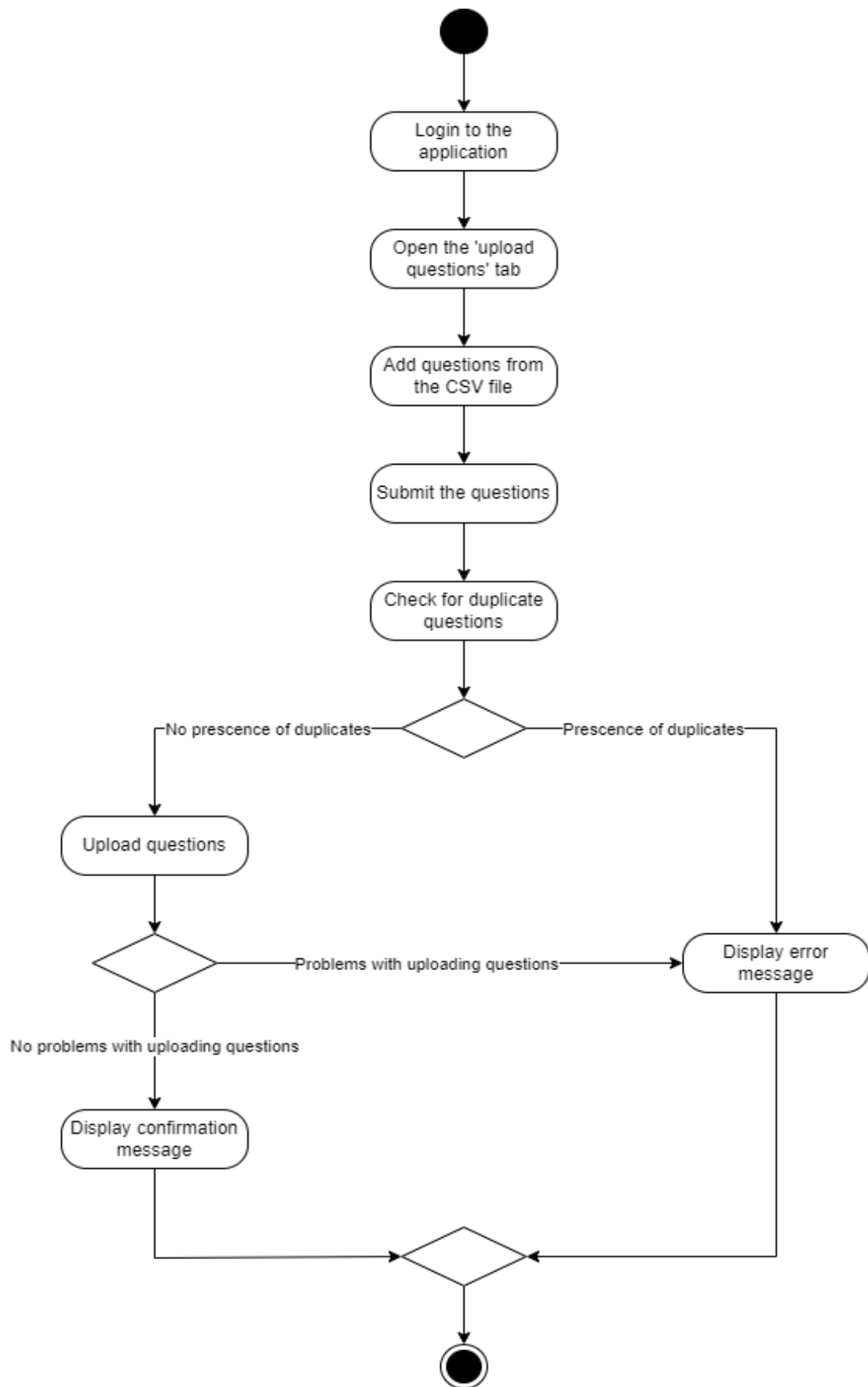
Activity Diagram for 'Set time duration for tests' Use Case



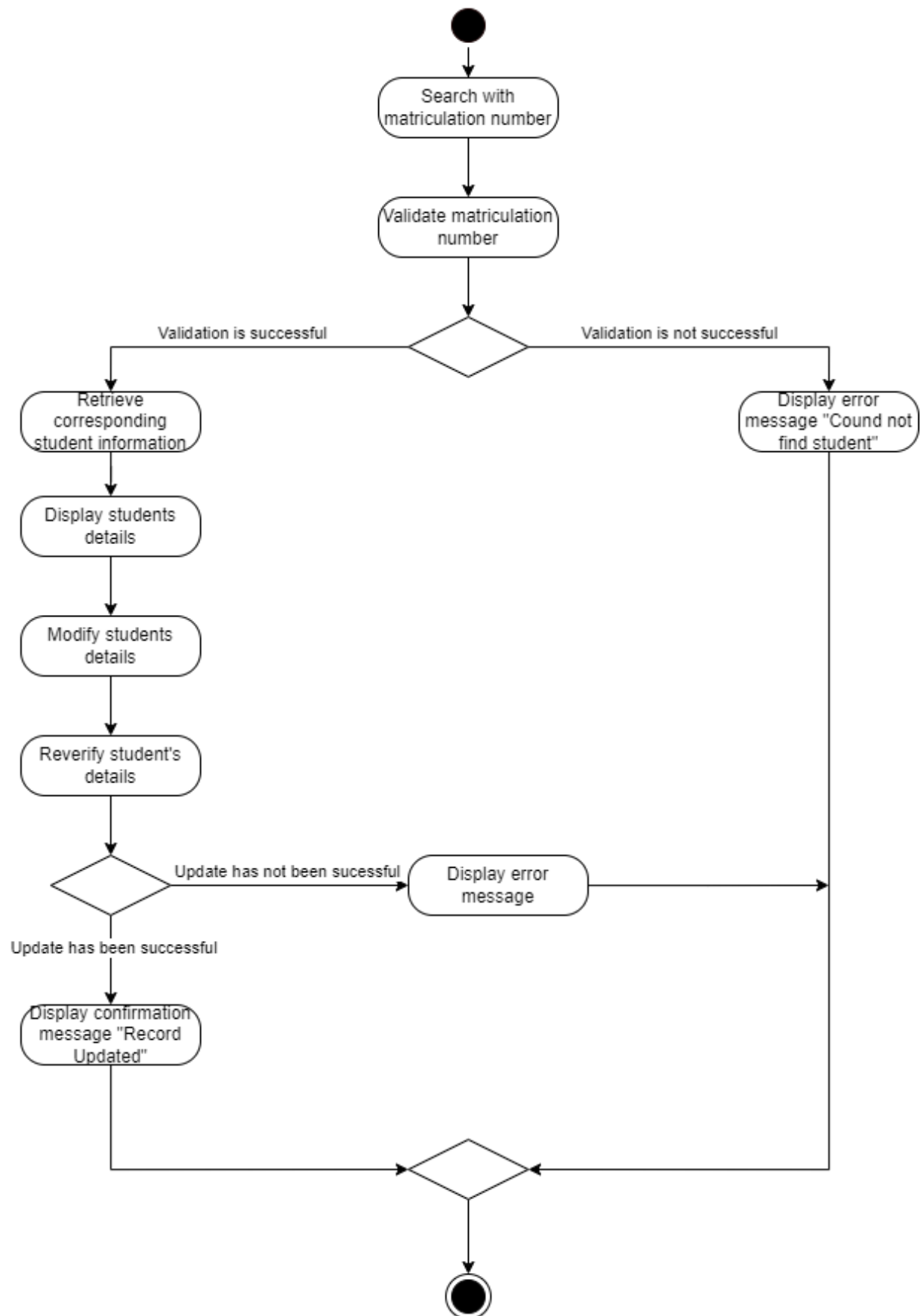
Activity Diagram for 'Specify Number of Questions for tests' Use Case



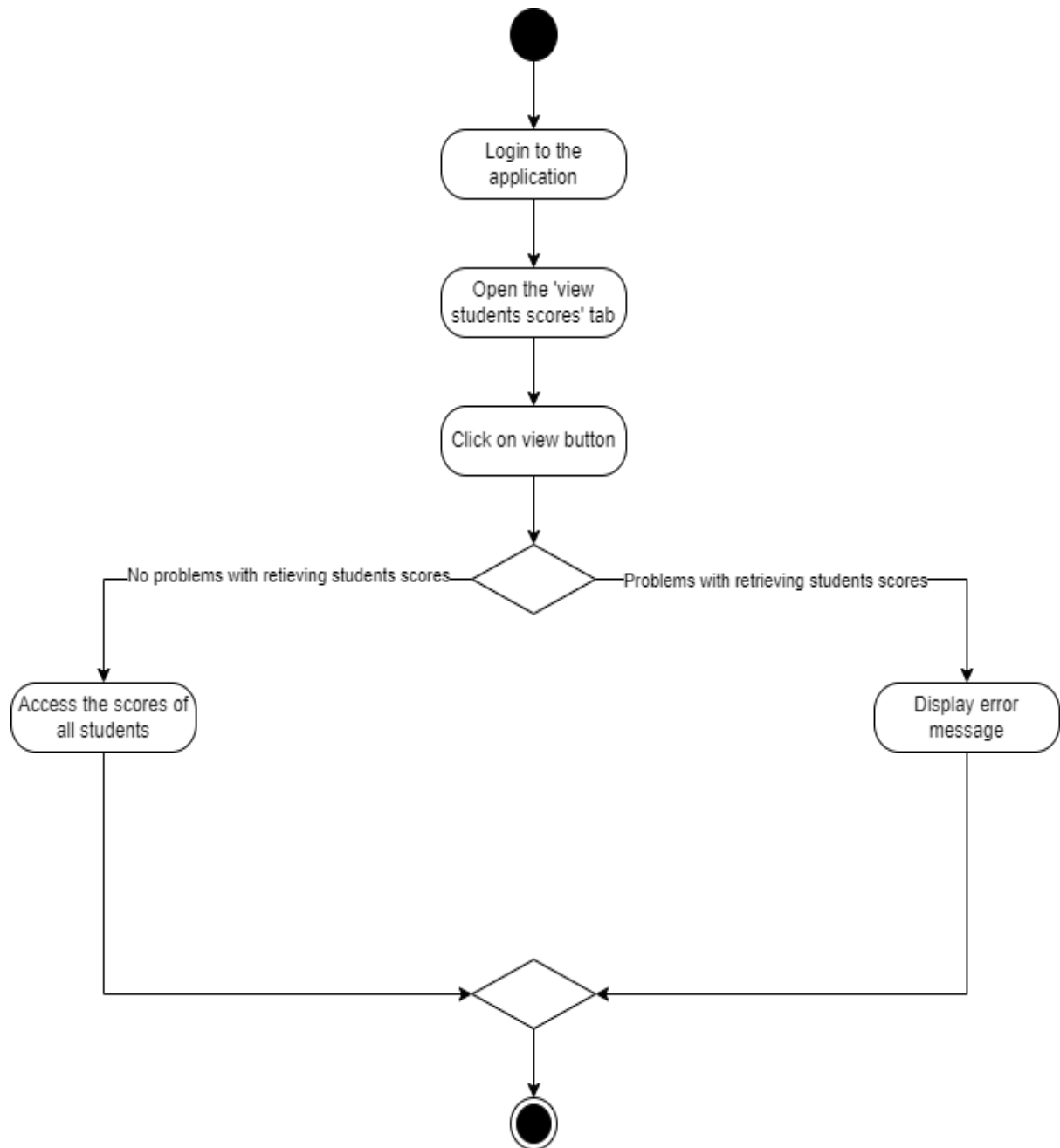
Activity Diagram for 'Upload Questions for tests' Use Case



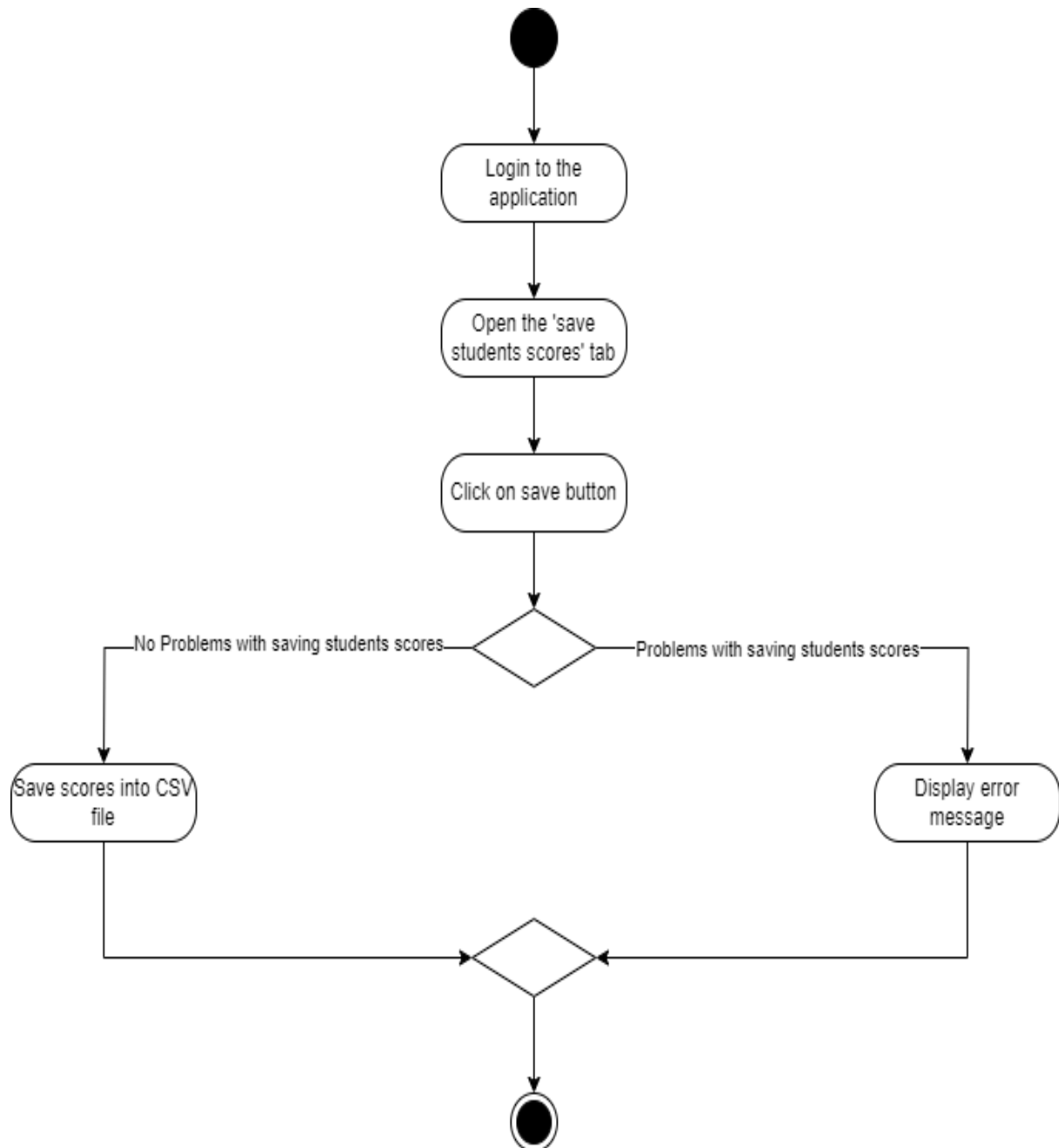
Activity Diagram for 'Update Student Records' Use Case



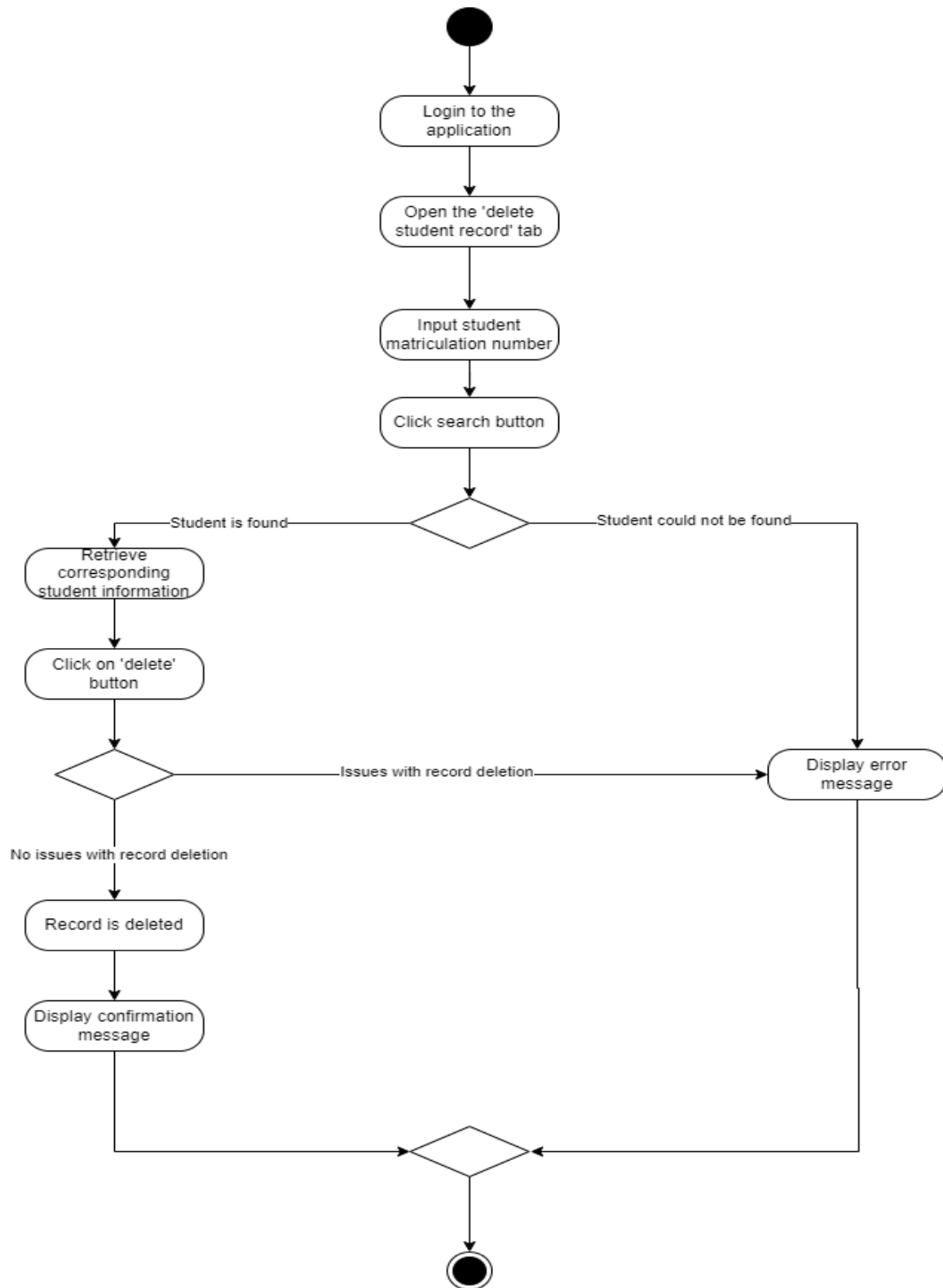
Activity Diagram for 'View Student Scores' Use Case



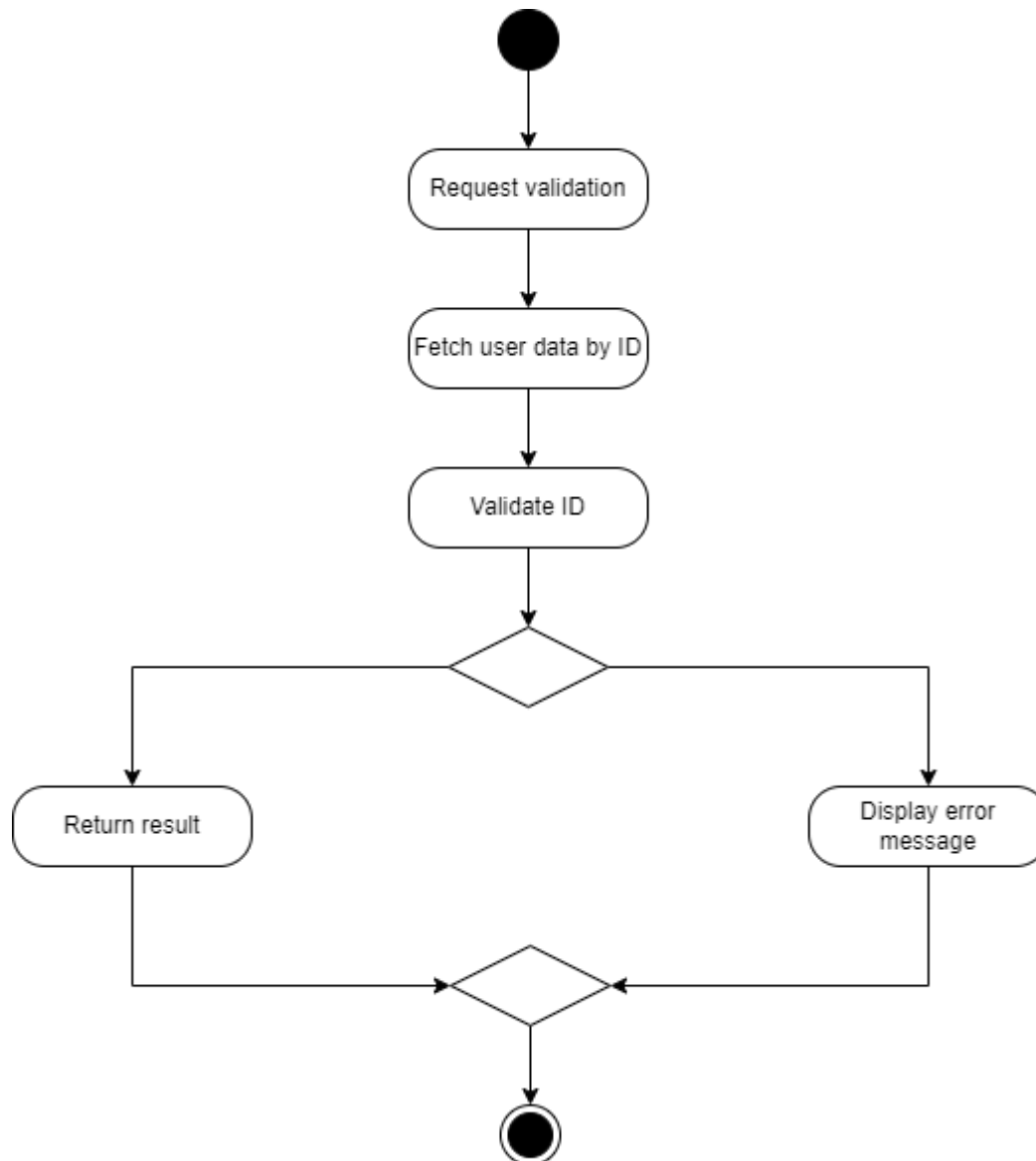
Activity Diagram for 'Save Student Scores' Use Case



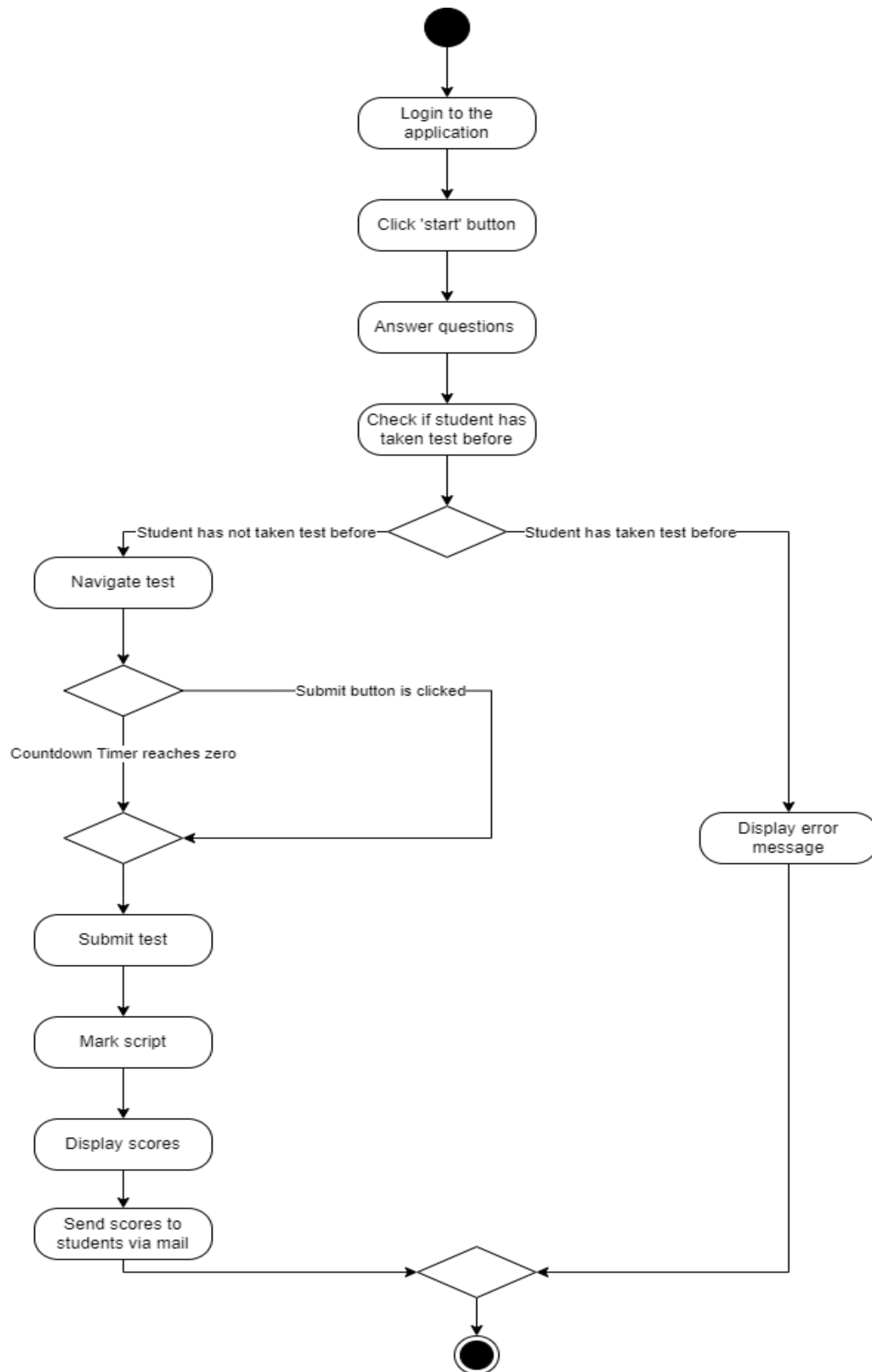
Activity Diagram for 'Delete Student Records' Use Case



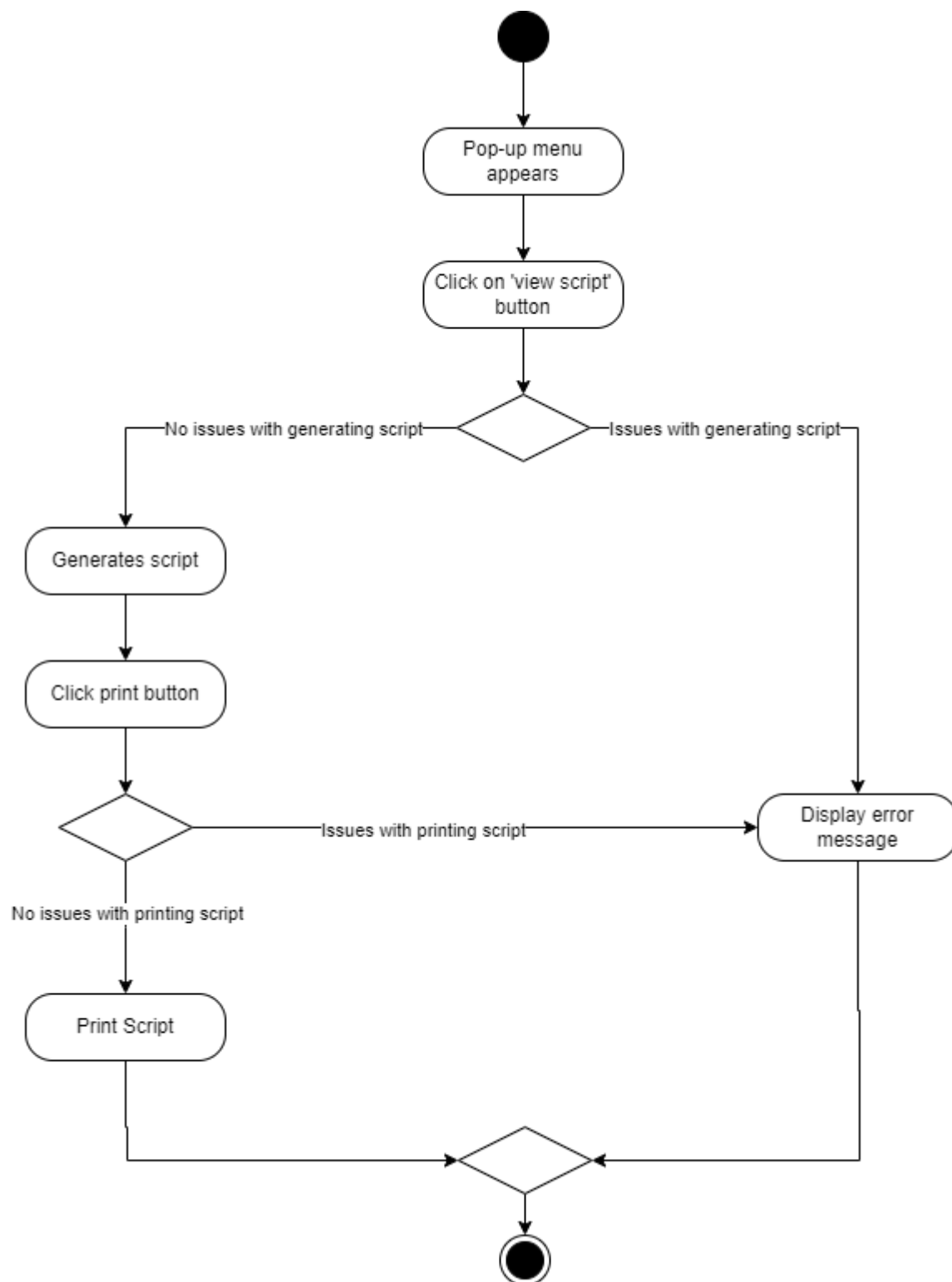
Activity Diagram for 'Validate Users ID' Use Case



Activity Diagram for 'Take Test' Use Case



Activity Diagram for 'View Script' Use Case



Use Case Descriptions

Use Case Description for 'Login' Use Case

Use Case Name	Login	ID	1	Importance Level	High
Primary Actor	User	Use-Case Type		Detail, Essential	
Stakeholders and Interests					
Lecturer – wants to access the application					
Student – wants to access the application					
Brief Description					
This use case describes how the user login to the CBT platform.					
Trigger	User wants to access the application	Type	External		
Relationships					
Association:					
Include:					
Extend:					
Generalisation:					
Normal flow of Events					
1. The user opens the application					
2. The user inputs the login details.					
3. The system authenticates the login information.					
4. The system grants access to the user based on type.					
Sub-Flows					
i. The system authenticates the login information.					
a. If the login information is valid:					
- Proceed to the next event.					
b. If the login information is not valid:					
- The system displays the error message “User Login Details Invalid”.					
ii. The system grants access to the user based on type.					
a. If the user is a student:					
- The system redirects to the student homepage.					
b. If the user is a lecturer:					
- The system redirects to the lecturer homepage.					
Alternate/Exceptional Flows:					
a. The login information is invalid.					

Use Case Description for 'Create User Records' Use Case

Use Case Name	Create Users Records	ID	2	Importance Level	High
Primary Actor	Lecturer	Use-Case Type	Detail, Essential		
Stakeholders and Interests					
Lecturer – wants to be registered on platform Student – wants to be registered on platform					
Brief Description					
This use-case describes how the lecturer creates accounts for students and fellow lecturers on the CBT platform.					
Trigger	Lecturer opens ‘Create Records’ tab	Type	Internal		
Relationships					
Association: Prospective user Include: Validate matriculation number or staff ID Extend: Bulk Upload of records Generalisation(s): i. Create student record ii. Create lecturer record					
Normal flow of Events					
<div>1. The lecturer opens the ‘Create Records’ tab.</div> <div>2. The lecturer collects the essential details of the prospective user.</div> <div>3. The lecturer inputs the essential details of the prospective user.</div> <div>4. For bulk uploads:<div>a. The lecturer uploads the CSV file containing the essential details of the prospective user.</div></div> <div>5. The system’s database validates the matriculation number(s) or staff ID(s).</div> <div>6. The system generates random password(s) for the prospective user(s).</div> <div>7. The system sends the password to the prospective user(s) via mail.</div> <div>8. The system uploads the created record to the record’s database.</div> <div>9. The system displays a confirmation message indicating the record’s creation.</div>					
Sub-Flows					
<div>i. The system’s database validates matriculation number or staff ID for each prospective user.<div>a. If the matriculation number or staff ID is valid:<div>- Proceed to the next event.</div></div><div>b. If the matriculation number or staff ID is not valid:<div>- The system displays an error message.</div></div></div> <div>ii. The system generates a random password for each prospective user.<div>a. If there are issues with password generation:<div>- The prospective user’s record is not created.</div><div>- The system displays an error message.</div></div><div>b. If there are no issues with password generation:<div>- Proceed to the next event.</div></div></div> <div>iii. The system sends each generated password to their corresponding users via mail.<div>a. If there are issues with sending the mail:</div></div>					

<ul style="list-style-type: none"> - The prospective user's record is not created. - The system displays an error message. <p>b. If there are no issues with sending the mail:</p> <ul style="list-style-type: none"> - Proceed to the next event.
Alternate/Exceptional Flows:
<ul style="list-style-type: none"> a. The system's database invalidates the matriculation number or staff ID. b. The system fails to generate a random password. c. The system fails to send the password via mail d. For bulk uploads: <ul style="list-style-type: none"> i. If there are any duplicate records: <ul style="list-style-type: none"> - The system submits only one record. - The system skips the other records.

Use Case Description for 'Set time duration for tests' Use Case

Use Case Name	Set time duration for a Test	ID	3	Importance Level	High
Primary Actor	Lecturer	Use-Case Type	Essential, Detail		
Stakeholders and Interests					
Lecturer – wants to set time duration for a test					
Brief Description					
This use-case describes how the lecturer sets time duration for a test on the CBT platform.					
Trigger	The lecturer opens the ‘set time duration’ tab	Type	Internal		
Relationships					
Association: Test					
Include:					
Extend:					
Generalisation:					
Normal flow of Events					
<div><div>1.</div><div>The lecturer logs in to the platform.</div></div> <div><div>2.</div><div>The lecturer opens the ‘set time duration’ tab.</div></div> <div><div>3.</div><div>The lecturer inputs the desired duration.</div></div> <div><div>4.</div><div>The lecturer clicks the ‘Submit’ button.</div></div> <div><div>5.</div><div>The system verifies the validity of the duration.</div></div> <div><div>6.</div><div>The duration is set.</div></div> <div><div>7.</div><div>The system displays a success message.</div></div>					
Sub-Flows					
<div><div>i.</div><div>The system verifies the validity of the desired duration</div><div><div>a.</div><div>If the duration is valid:</div><div><div>-</div><div>Proceed to the next event.</div></div></div><div><div>b.</div><div>If the duration is not valid:</div><div><div>-</div><div>The duration is not set.</div></div><div><div>-</div><div>The system displays an error message.</div></div></div></div>					
Alternate/Exceptional Flows:					
<div><div>a.</div><div>The desired time duration is invalid.</div></div>					

Use Case Description for 'Specify Number of Questions for tests' Use Case

Use Case Name	Specify Number of Questions for test	ID	4	Importance Level	High
Primary Actor	Lecturer	Use-Case Type		Detail, Essential	
Stakeholders and Interests					
Lecturer – wants to specify the number of questions to be administered in a test.					
Brief Description					
This use-case describes how the lecturer sets the specified number of questions to be administered in a test on the CBT platform.					
Trigger	Lecturer opens the ‘specify number of questions for test’ tab.	Type	Internal		
Relationships					
Association: Test					
Include:					
Extend:					
Generalisation:					
Normal flow of Events					
<div><div>1.</div><div>The lecturer logs in to the platform.</div></div> <div><div>2.</div><div>The lecturer opens the ‘specify number of questions for test’ tab.</div></div> <div><div>3.</div><div>The lecturer inputs the desired number of questions.</div></div> <div><div>4.</div><div>The lecturer clicks on the ‘Submit’ button.</div></div> <div><div>5.</div><div>The system verifies the validity of the entered number.</div></div> <div><div>6.</div><div>The number is set.</div></div> <div><div>7.</div><div>The system displays a success message.</div></div>					
Sub-Flows					
<div><div>i.</div><div><div>The system verifies the validity of the entered number</div><div>The system checks if the entered number is valid:</div><div><div>a.</div><div>If the entered number is valid:</div><div><div>-</div><div>Proceed to the next event.</div></div><div><div>b.</div><div>If the entered number is not valid:</div><div><div>-</div><div>The number is not set.</div></div><div><div>-</div><div>The system displays an error message.</div></div></div></div></div></div>					
Alternate/Exceptional Flows:					
<div><div>a.</div><div>The specified number of questions is invalid.</div></div>					

Use Case Description for 'Upload Questions for tests' Use Case

Use Case Name	Upload questions for test	ID	5	Importance Level	High
Primary Actor	Lecturer	Use-Case Type	Detail, Essential		
Stakeholders and Interests					
Lecturer – wants to upload questions for a test.					
Brief Description					
This use-case describes how the lecturer sets and uploads the questions to be administered in a test on the CBT platform.					
Trigger	Lecturer opens the ‘Upload questions’ tab	Type	Internal		
Relationships					
Association: Test					
Include:					
Extend:					
Generalisation:					
Normal flow of Events					
<div><div>1.</div><div>The lecturer logs in to the application.</div></div> <div><div>2.</div><div>The lecturer opens the ‘Upload questions’ tab.</div></div> <div><div>3.</div><div>The lecturer adds the CSV file.</div></div> <div><div>4.</div><div>The lecturer clicks on the ‘Upload’ button.</div></div> <div><div>5.</div><div>The system checks for duplicate questions.</div></div> <div><div>6.</div><div>The system uploads the questions.</div></div> <div><div>7.</div><div>The system displays a confirmation message indicating the success of the questions upload.</div></div>					
Sub-Flows					
<div><div>i.</div><div><div>The system verifies the absence of duplicate questions.</div><div>The system checks if there are more than one of the same questions:</div><div><div>a.</div><div>If the CSV file contains duplicate questions:</div><div><div>-</div><div>The system picks one of the questions.</div></div><div><div>-</div><div>The system skips the other duplicates.</div></div></div><div><div>b.</div><div>If the CSV file does not contain duplicate questions:</div><div><div>-</div><div>Proceed to the next event.</div></div></div></div></div> <div><div>ii.</div><div><div>The system uploads the question.</div><div><div>a.</div><div>If there are any issues with the questions upload:</div><div><div>-</div><div>The questions are not uploaded.</div></div><div><div>-</div><div>The system displays an error message.</div></div></div><div><div>b.</div><div>If there are no issues with the questions upload:</div><div><div>-</div><div>Proceed to the next event.</div></div></div></div></div>					
Alternate/Exceptional Flows:					
<div><div>a.</div><div>The CSV file contains duplicate questions.</div></div> <div><div>b.</div><div>The questions have issues with uploading.</div></div>					

Use Case Description for 'Update Students Record' Use Case

Use Case Name	Update Student's Records	ID	6	Importance Level	Medium
Primary Actor	Lecturer	Use-Case Type	Detail, Essential		
Stakeholders and Interests					
Student – wants to change their personal information on the CBT platform.					
Brief Description					
This use-case describes how the lecturer updates the personal information of students on the CBT platform.					
Trigger	Student applies for a change in their personal information on the system.	Type	External		
Relationships					
Association: Student					
Include:					
Extend:					
Generalisation:					
Normal flow of Events					
<div><div>1.</div><div>The student applies for a change in their personal information.</div></div> <div><div>2.</div><div>The lecturer is notified of this information via mail.</div></div> <div><div>3.</div><div>The lecturer logs in to the application.</div></div> <div><div>4.</div><div>The lecturer clicks on the 'Update Student's Records' tab.</div></div> <div><div>5.</div><div>The lecturer inputs the student's matriculation number.</div></div> <div><div>6.</div><div>The lecturer clicks the 'Search' button.</div></div> <div><div>7.</div><div>The system validates the matriculation number.</div></div> <div><div>8.</div><div>The system retrieves the corresponding student information.</div></div> <div><div>9.</div><div>The lecturer makes the necessary changes.</div></div> <div><div>10.</div><div>The lecturer clicks the 'Update' button.</div></div> <div><div>11.</div><div>The system reverifies the student's details.</div></div> <div><div>12.</div><div>The system displays a confirmation message signifying "Record Updated".</div></div>					
Sub-Flows					
<div><div>i.</div><div>The system validates the student's matriculation number.</div><div><div>a.</div><div>If the matriculation number is valid:</div><div><div>-</div><div>Proceed to the next event.</div></div></div><div><div>b.</div><div>If the matriculation is not valid:</div><div><div>-</div><div>The system terminates the update process.</div></div><div><div>-</div><div>The system displays the message "Could not find student".</div></div></div><div><div>ii.</div><div>The system updates the student's record.</div><div><div>a.</div><div>If there are no issues with the record update:</div><div><div>-</div><div>Proceed to the next event.</div></div></div><div><div>b.</div><div>If there are issues with the record update:</div><div><div>-</div><div>The system terminates the update process.</div></div><div><div>-</div><div>The system displays an error message.</div></div></div></div></div>					
Alternate/Exceptional Flows:					
<div><div>a.</div><div>The student's matriculation number is invalid.</div></div> <div><div>b.</div><div>The student's record has issues with updating.</div></div>					

Use Case Description for 'View Student Scores' Use Case

Use Case Name	View Students Scores	ID	7	Importance Level	High
Primary Actor	Lecturer	Use-Case Type		Detail, Essential	
Stakeholders and Interests					
Lecturer – wants to view student’s scores.					
Brief Description					
This use-case describes how the lecturer views the student’s scores on the CBT platform.					
Trigger	Lecturer opens the ‘View Students Scores’ tab	Type	Internal		
Relationships					
Association: Student Include: Save student’s scores Extend: Generalisation: View individual student’s scores					
Normal flow of Events					
<div><div>1.</div><div>The lecturer logs in the application.</div></div> <div><div>2.</div><div>The lecturer opens the ‘View Students Scores’ tab.</div></div> <div><div>3.</div><div>The lecturer clicks the ‘View’ button.</div></div> <div><div>4.</div><div>The lecturer accesses the scores of all students.</div></div>					
Sub-Flows					
<div><div>i.</div><div>The ‘View Students Scores’ tab provides the option of viewing individual student’s scores via the entry of their matriculation numbers.<div><div>a.</div><div>If the provided matriculation number is valid:<div><div>-</div><div>The system displays the corresponding student’s scores</div></div><div>b.</div><div>If the provided matriculation number is not valid:<div><div>-</div><div>The system displays an error.</div></div></div></div></div></div></div>					
Alternate/Exceptional Flows:					
<div><div>a.</div><div>The student’s matriculation number is not valid.</div></div> <div><div>b.</div><div>The system is unable to display the scores of all students.</div></div>					

Use Case Description for 'Save Student Scores' Use Case

Use Case Name	Save Students Scores	ID	8	Importance Level	Medium
Primary Actor	Lecturer	Use-Case Type	Essential, Detail		
Stakeholders and Interests					
Lecturer – wants to save students score into a CSV file					
Brief Description					
This use-case describes how the lecturer saves the scores of students into a CSV file.					
Trigger	Lecturer opens the ‘Save Students Score’ tab	Type	Internal		
Relationships					
Association: Students					
Include: View Students Scores					
Extend:					
Generalisation:					
Normal flow of Events					
<div>1. The lecturer logs in to the application.</div> <div>2. The lecturer opens the ‘Save Students Score’ tab.</div> <div>3. The lecturer inputs the test details.</div> <div>4. The system verifies the validity of the test details.</div> <div>5. The system retrieves the scores of the corresponding test details.</div> <div>6. The system displays the students score.</div> <div>7. The lecturer clicks on the ‘Save’ button.</div> <div>8. The system saves the students score into a CSV file.</div>					
Sub-Flows					
<div>i. The system verifies the validity of the test details.</div> <div>a. If the test details are valid:</div> <div>- Proceed to the next event.</div> <div>b. If the test details are not valid:</div> <div>- The system displays an error message.</div> <div>ii. The system saves the students score into a CSV file.</div> <div>a. If there are no issues with saving the students score:</div> <div>- A success message is displayed.</div> <div>b. If there are issues with saving the students score:</div> <div>- The system does not save the students score.</div> <div>- An error message is displayed.</div>					
Alternate/Exceptional Flows:					
<div>a. The system is unable to retrieve the students score.</div> <div>b. The system is unable to save the scores into a CSV file.</div>					

Use Case Description for 'Delete Student Records' Use Case

Use Case Name	Delete Student Records	ID	9	Importance Level	High
Primary Actor	Lecturer	Use-Case Type		Detail, Essential	
Stakeholders and Interests					
Lecturer – wants to delete students record.					
Brief Description					
This use-case describes how the lecturer deletes students record.					
Trigger	Lecturer opens the ‘Delete Student Record’ tab	Type	Internal		
Relationships					
Association: Student					
Include:					
Extend:					
Generalisation:					
Normal flow of Events					
<div>1. The lecturer logs in to the application.</div> <div>2. The lecturer opens the ‘Delete Student Record’ tab.</div> <div>3. The lecturer inputs the student matriculation number.</div> <div>4. The lecturer clicks the ‘Search’ button.</div> <div>5. The system validates the matriculation number.</div> <div>6. The system retrieves the corresponding student information.</div> <div>7. The system displays the student details.</div> <div>8. The lecturer clicks the ‘Delete’ button.</div> <div>9. The system verifies the deletion request.</div> <div>10. The system deletes the record.</div> <div>11. The system displays a confirmation message.</div>					
Sub-Flows					
<div>i. The system validates the matriculation number.</div> <div>a. If the matriculation number is valid:<div>- Proceed to the next event.</div></div> <div>b. If the matriculation number is not valid:<div>- The system displays an error message.</div></div> <div>ii. The system verifies the deletion request.</div> <div>a. If there are no issues with the deletion of student records:<div>- Proceed to the next event.</div></div> <div>b. It there are issues with the deletion of student records:<div>- The system displays an error message.</div></div>					
Alternate/Exceptional Flows:					
<div>a. The student’s matriculation number is invalid.</div> <div>b. The system has issues with deleting a student’s record.</div>					

Use Case Description for 'Validate Users ID' Use Case

Use Case Name	Validate Users ID	ID	10	Importance Level	High
Primary Actor	System's Database	Use-Case Type	Detail, Essential		
Stakeholders and Interests					
System's Database – wants to validate user IDs					
Brief Description					
This use case describes how the system's database validates user ID.					
Trigger	The system's database receives request to validate User ID	Type	Internal		
Relationships					
Association: User					
Include:					
Extend:					
Generalisation:					
Normal flow of Events					
<div><div>1.</div><div>The use case is triggered by a request to validate a user's ID.</div></div> <div><div>2.</div><div>The System's Database fetches the user data associated with the provided ID.</div></div> <div><div>3.</div><div>The System's Database validates the user's ID based on the fetched data.</div></div> <div><div>4.</div><div>The System's Database notifies the result of the validation process.</div></div> <div><div>5.</div><div>The result of the validation is returned to the entity that initiated the request.</div></div>					
Sub-Flows					
<div><div>i.</div><div>The System's Database retrieves the user data associated with the provided ID.<div><div>a.</div><div>If there is a problem with the retrieval:<div><div>-</div><div>The system displays an error message.</div></div></div><div><div>b.</div><div>If there is no problem with the retrieval:<div><div>-</div><div>Proceed to the next event.</div></div></div></div></div></div><div><div>ii.</div><div>The System's Database checks the validity of the user's ID based on the fetched data<div><div>a.</div><div>If the ID is valid:<div><div>-</div><div>Proceed to the next event.</div></div></div><div><div>b.</div><div>If the ID is invalid:<div><div>-</div><div>The system displays an error message.</div></div></div></div></div></div></div></div>					
Alternate/Exceptional Flows:					
<div><div>A.</div><div>The user's ID is invalid.</div></div> <div><div>B.</div><div>The system is unable to retrieve the user data.</div></div>					

Use Case Description for 'Take Test' Use Case

Use Case Name	Take Test	ID	11	Importance Level	High
Primary Actor	Student	Use-Case Type	Essential, Detail		
Stakeholders and Interests					
Student – wants to take a test					
Brief Description					
This use-case describes how the student takes tests on the CBT platform.					
Trigger	Student clicks on ‘Start’ button	Type	Internal		
Relationships					
Association:					
Include:					
Extend:					
Generalisation:					
Normal flow of Events					
<div><div>1.</div><div>The student logs in to the application.</div></div> <div><div>2.</div><div>The student clicks on the ‘Start’ button.</div></div> <div><div>3.</div><div>The system checks if the student has taken the test before.</div></div> <div><div>4.</div><div>The system selects the questions for the student to answer.</div></div> <div><div>5.</div><div>The system displays the questions and options for the student to answer.</div></div> <div><div>6.</div><div>The student navigates the questions.</div></div> <div><div>7.</div><div>The system submits the questions and corresponding answers.</div></div> <div><div>8.</div><div>The system deactivates the navigation buttons.</div></div> <div><div>9.</div><div>The system marks the script.</div></div> <div><div>10.</div><div>The system displays the score.</div></div> <div><div>11.</div><div>The system sends the score to the student via mail.</div></div>					
Sub-Flows					
<div><div>i.</div><div>The system checks if the student has taken the test before.<div><div>a.</div><div>If the student has taken the test before:<div><div>-</div><div>The system does not display any questions.</div></div><div><div>-</div><div>The system displays the message “You cannot retake this test”.</div></div></div></div><div>b.</div><div>If the student has not taken the test before:<div><div>-</div><div>Proceed to the next event.</div></div></div></div></div> <div><div>ii.</div><div>The system sends the score to the student via mail.<div><div>a.</div><div>If there are issues with sending mail:<div><div>-</div><div>The system retries sending the mail.</div></div><div><div>-</div><div>The system displays the error message “Unable send mail”.</div></div></div></div><div>b.</div><div>If there are no issues with sending mail:<div><div>-</div><div>Proceed to the next event.</div></div></div></div></div>					
Alternate/Exceptional Flows:					
<div><div>a.</div><div>The student has taken the test before.</div></div> <div><div>b.</div><div>The system has issues sending the scores to the student.</div></div>					

Use Case Description for 'View Script' Use Case

Use Case Name	View Script	ID	12	Importance Level	Medium
Primary Actor	Student	Use-Case Type		Detail, Essential	
Stakeholders and Interests					
Student – wants to view their script					
Brief Description					
This use-case describes how the student views and prints their script.					
Trigger	Student clicks on the ‘View Script’ button.	Type	Internal		
Relationships					
Association:					
Include:					
Extend: Print Script					
Generalisation:					
Normal flow of Events					
<div>1. A pop-up menu appears.</div> <div>2. The student clicks on ‘view script’ button.</div> <div>3. The system generates the test script of the student.</div> <div>4. The system clicks on the ‘Print’ button.</div> <div>5. The system prints the script.</div>					
Sub-Flows					
<div>i. The system generates the test script of the student.<div>a. If there are issues with the test script generation:<div>- The system displays the error message “Could not generate script”</div></div><div>b. If there are no issues with the test script generation:<div>- Proceed to the next event.</div></div></div> <div>ii. The system prints the script.<div>a. If there are issues with printing the script:<div>- The system displays the error message “Could not print Script”</div></div><div>b. If there are no issues with test script generation:<div>- Proceed to the next event.</div></div></div>					
Alternate/Exceptional Flows:					
<div>a. The system is unable to generate the student’s script.</div> <div>b. The system is unable to print the student’s script.</div>					

PART D: STRUCTURAL MODELS

Class Responsibility Collaborator (CRC) Cards

Class Responsibility Collaborator (CRC) Card for Class 'Lecturer'

Front-Side:

Class Name: Lecturer	ID: 1	Type:
Description: A class responsible for managing user records and administering tests.		Associated Use Cases: 9
Responsibilities <ul style="list-style-type: none">• Create Records• Set time duration for tests• Specify number of questions for tests• Upload questions for tests• Update Student Records• View Student Scores• Save Student Scores• Delete Student Records	Collaborators <ul style="list-style-type: none">• Student• Test	

Back-Side:

Attributes: <ul style="list-style-type: none">• Staff ID: int• Name: String• Department: String• Email Address: String• Phone Number: String
Relationships: Generalisation (a-kind-of): Person Aggregation (has-parts): <ul style="list-style-type: none">• Manages Multiple Students Records• Administers multiple tests Other Associations: Manages the creation, updating, and deletion of Student Records.

Class Responsibility Collaborator (CRC) Card for Class 'Student'

Front-Side:

Class Name: Student	ID: 2	Type:
Description: A class responsible for taking tests on the platform.		Associated Use Cases: 3
Responsibilities <ul style="list-style-type: none">• Take Test• View Script• Print Script		Collaborators <ul style="list-style-type: none">• Test• Lecturer

Back-Side:

Attributes: <ul style="list-style-type: none">• Matriculation Number: int• Name: String• Level: String• Department: String• Date of Birth: Date• Phone Number: String• Gender: String• Email Address: String
Relationships: Generalisation (a-kind-of): Person Aggregation (has-parts): <ul style="list-style-type: none">• Takes multiple tests Other Associations: <ul style="list-style-type: none">• Participates in the CBT system

Class Responsibility Collaborator (CRC) Card for Class 'System's Database'

Front-Side:

Class Name: System's Database	ID: 3	Type:
Description: A class responsible for storing data on the CBT platform.		Associated Use Cases: 7
Responsibilities <ul style="list-style-type: none">• Manage user records• Manage test data	Collaborators <ul style="list-style-type: none">• Lecturer• Student• Test	

Back-Side:

Attributes: <ul style="list-style-type: none">• Students: Table<Student>• Lecturers: Table<Lecturer>• Questions: Table<Question>
Relationships: Generalisation (a-kind-of): System Aggregation (has-parts): <ul style="list-style-type: none">• Stores multiple users.• Stores multiple questions Other Associations: <ul style="list-style-type: none">• Use in use cases to retrieve or store data.

Class Responsibility Collaborator (CRC) Card for Class 'Test'

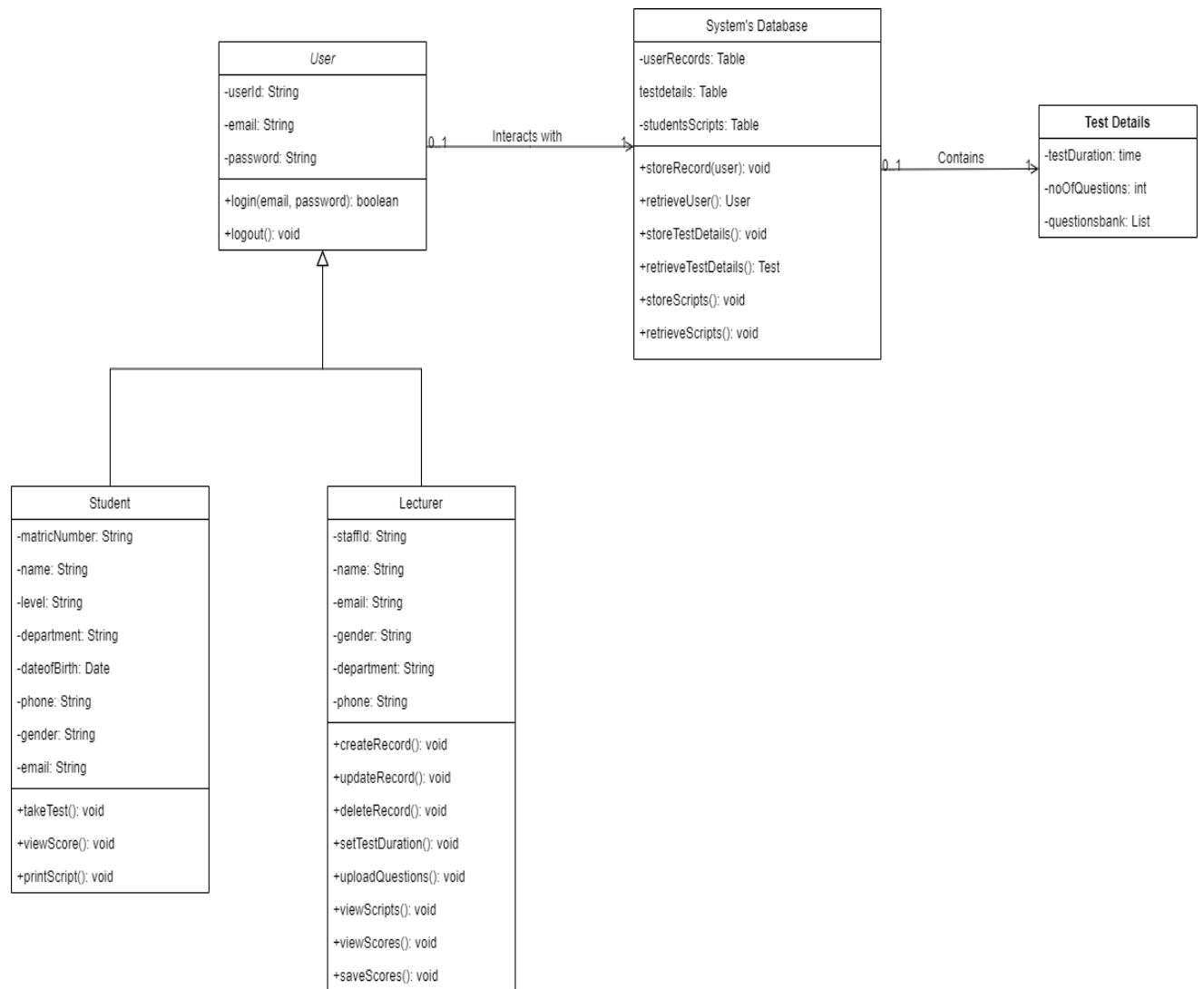
Front-Side:

Class Name: Test	ID: 4	Type:
Description: A class representing tests on the CBT platform		Associated Use Cases: 8
Responsibilities <ul style="list-style-type: none">• Manage test parameters	Collaborators <ul style="list-style-type: none">• Lecturer• Student	

Back-Side:

Attributes: <ul style="list-style-type: none">• Test Duration: Time• Number of Questions: int• Questions Bank: List<Question>
Relationships: Generalisation (a-kind-of): Functionality Aggregation (has-parts): <ul style="list-style-type: none">• Consists of multiple questions• Consists of multiple test details Other Associations: <ul style="list-style-type: none">• Administered by a lecturer• Taken by multiple students

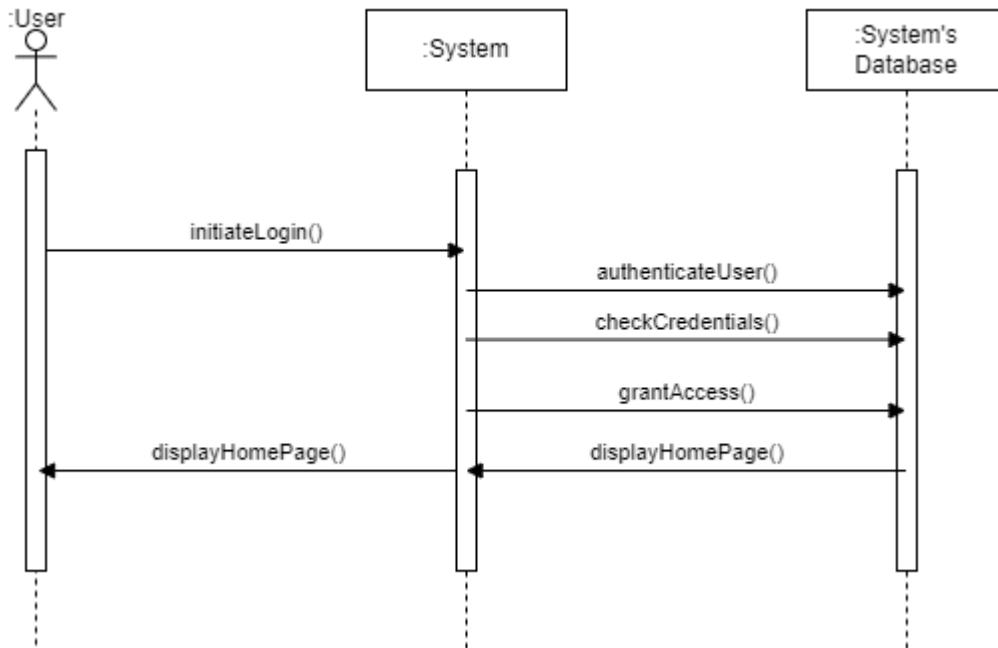
Class Diagram



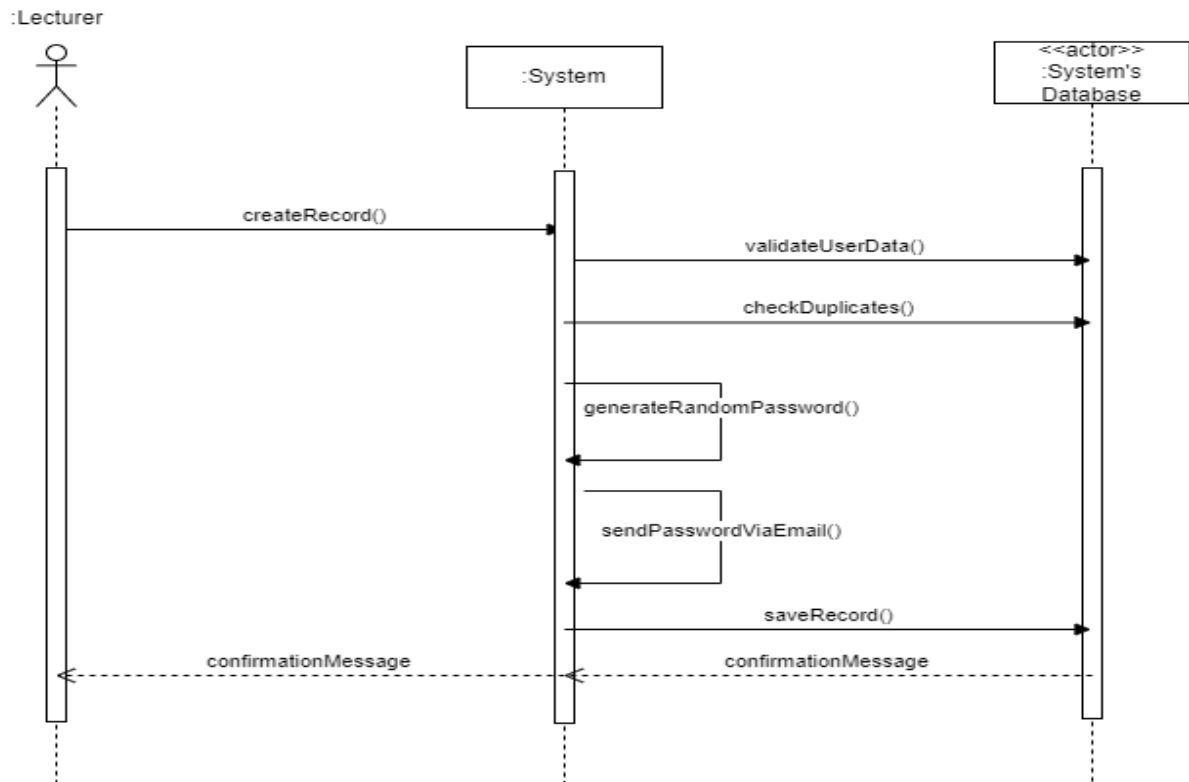
PART D: BEHAVIOURAL MODELS

Sequence Diagrams

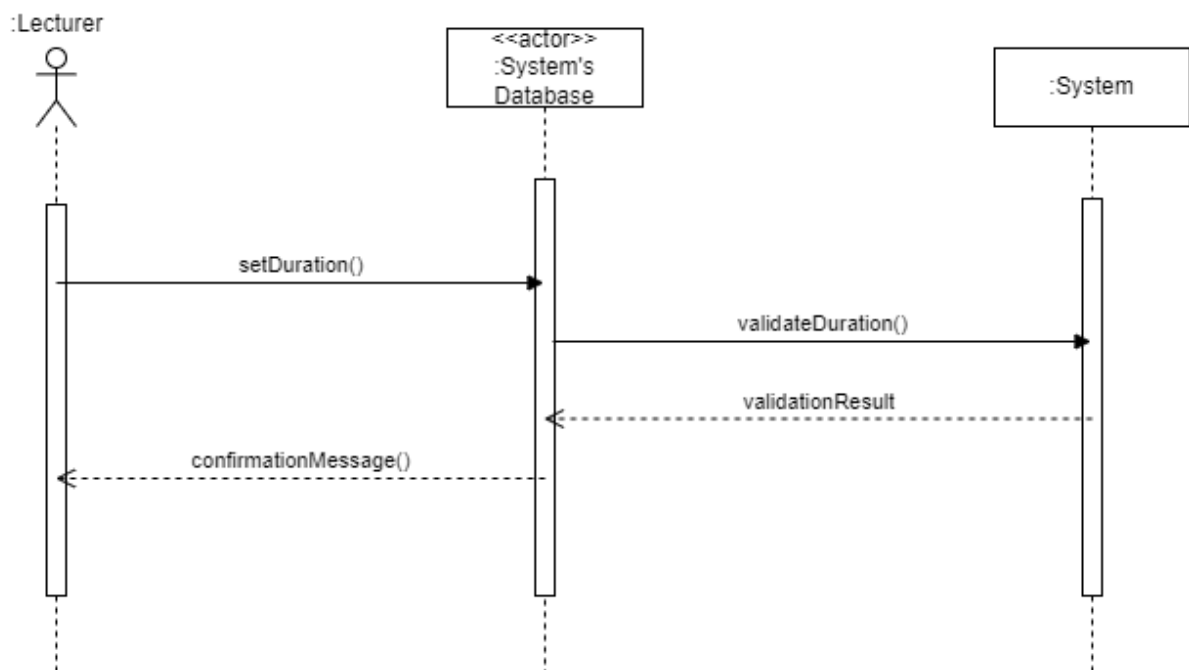
Sequence Diagram for 'Login' Use Case



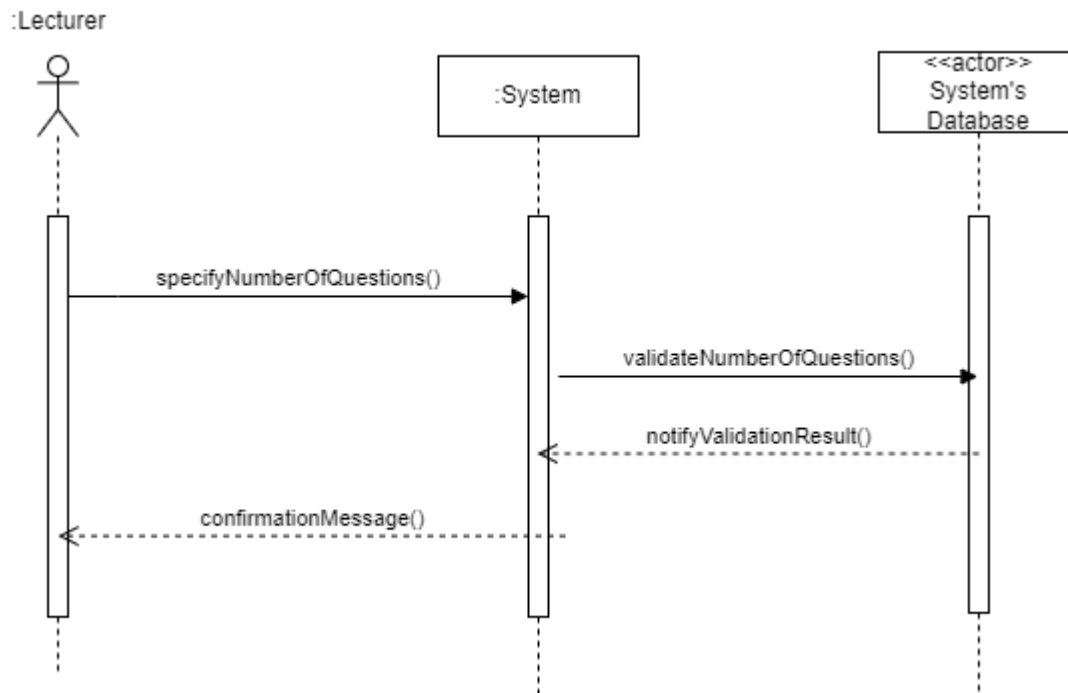
Sequence Diagram for 'Create User Records' Use Case



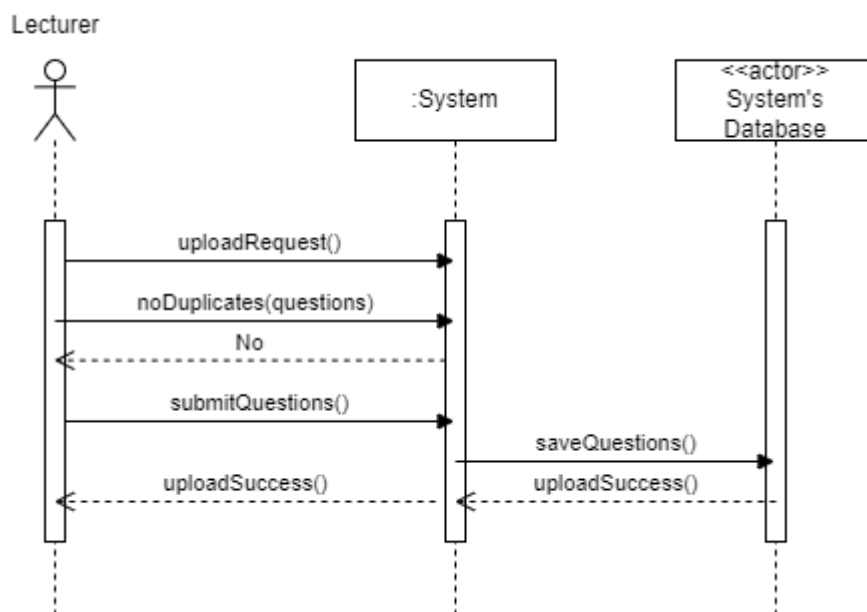
Sequence Diagram for 'Set Time Duration' Use Case



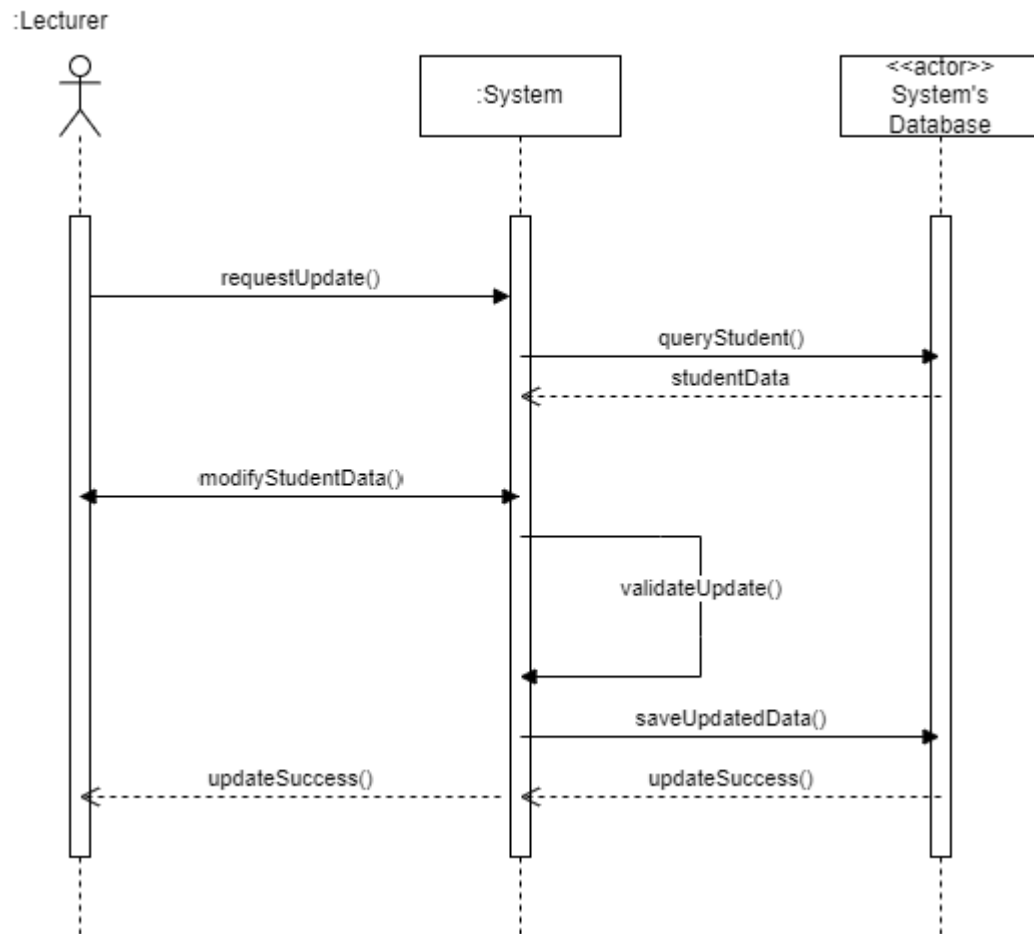
Sequence Diagram for 'Specify No of Questions for test' Use Case



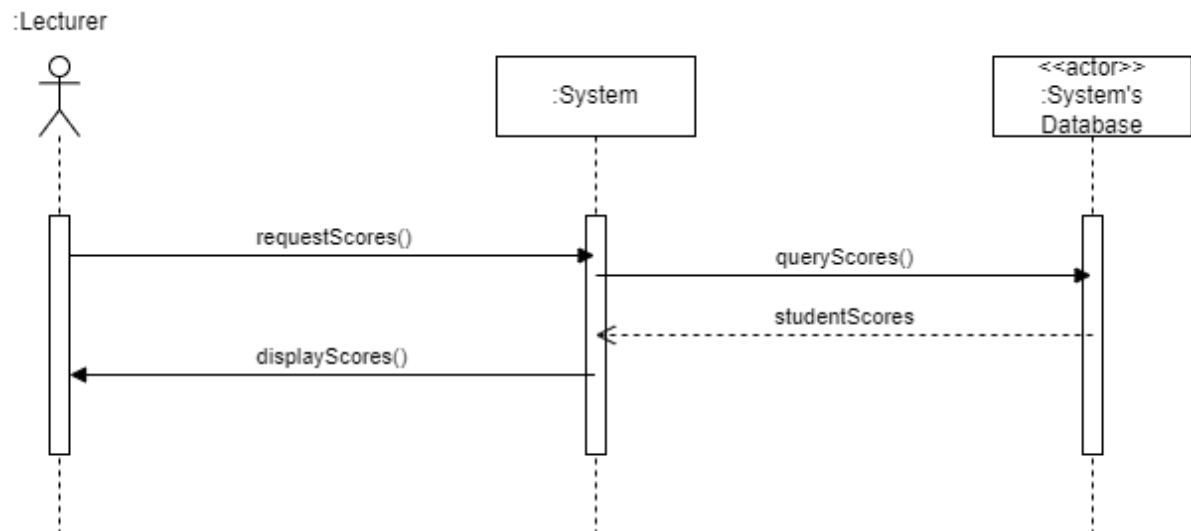
Sequence Diagram for 'Upload Questions for test' Use Case



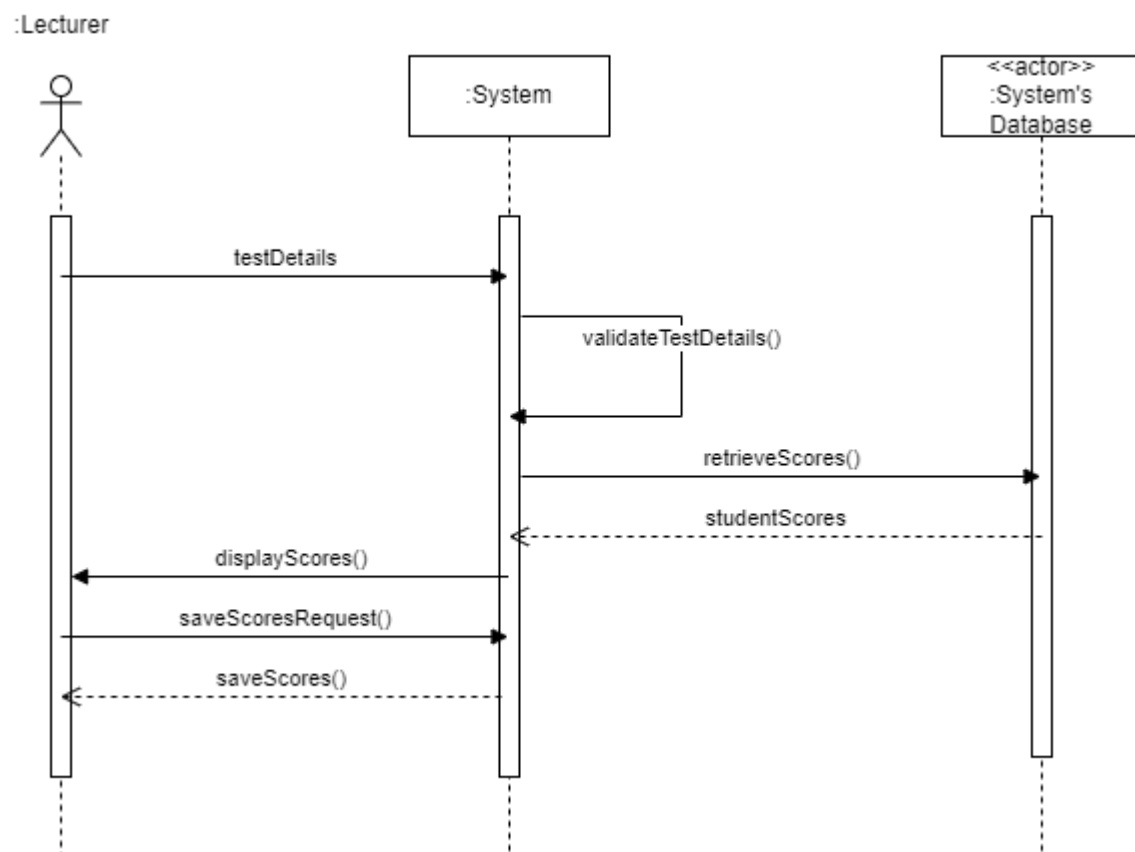
Sequence Diagram for 'Update Student Records' Use Case



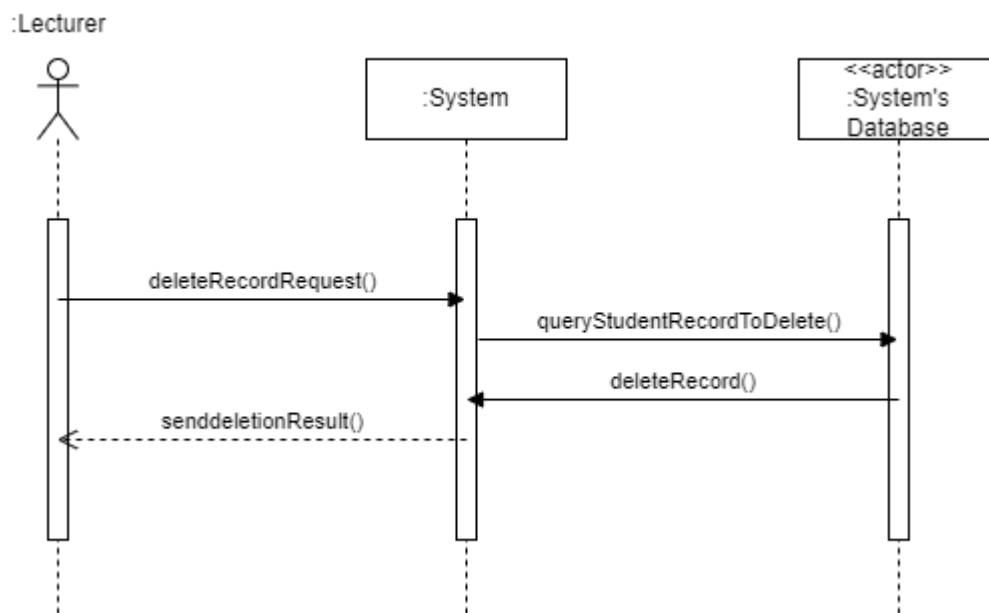
Sequence Diagram for 'View Students Scores' Use Case



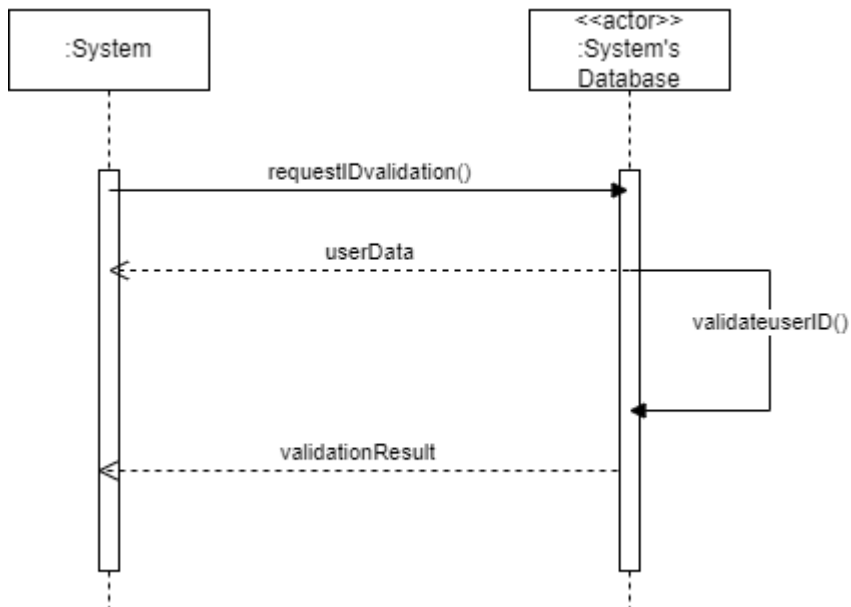
Sequence Diagram for 'Save Student Scores' Use Case



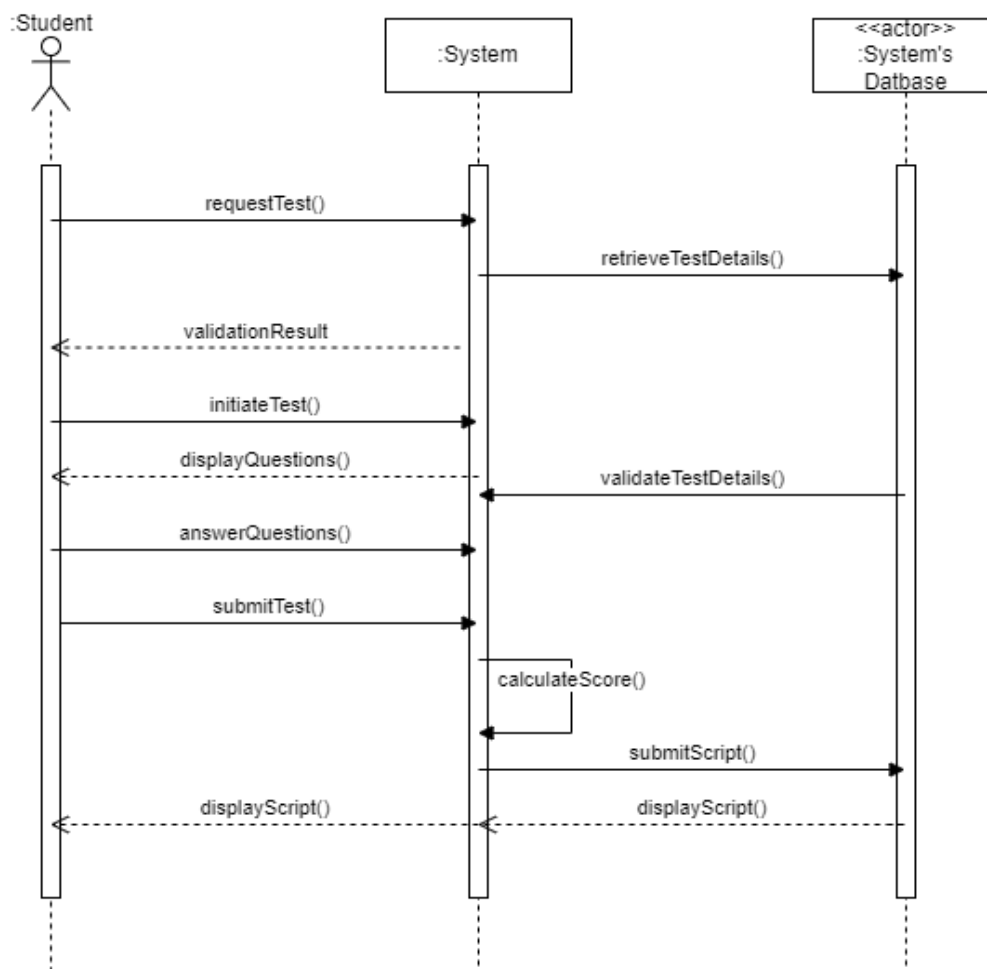
Sequence Diagram for 'Delete Student Records' Use Case



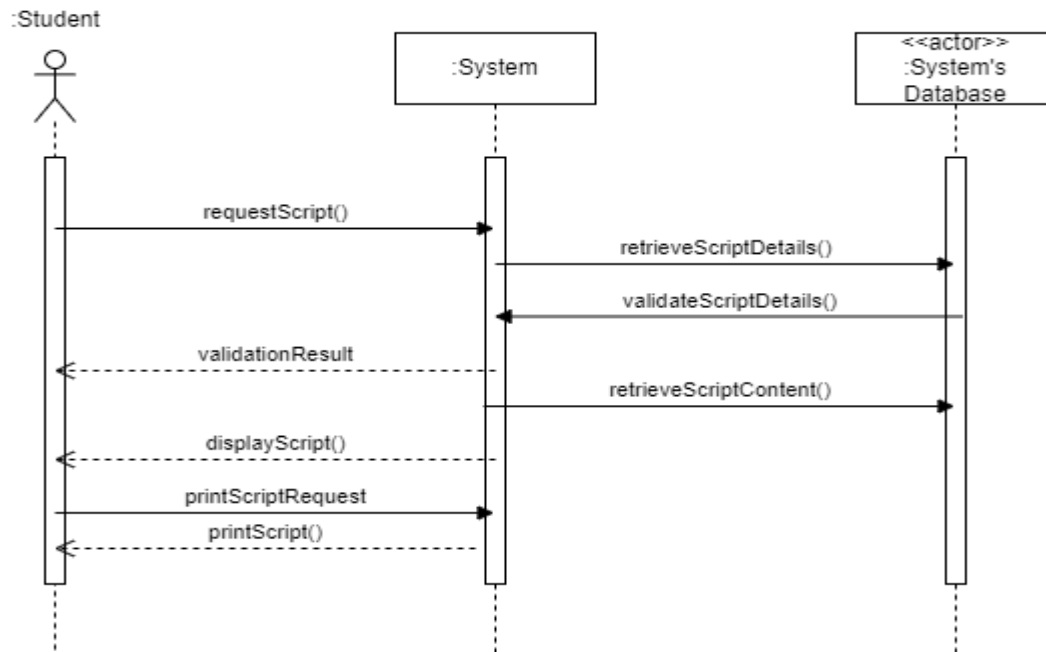
Sequence Diagram for 'Validate Users ID' Use Case



Sequence Diagram for 'Take Test' Use Case

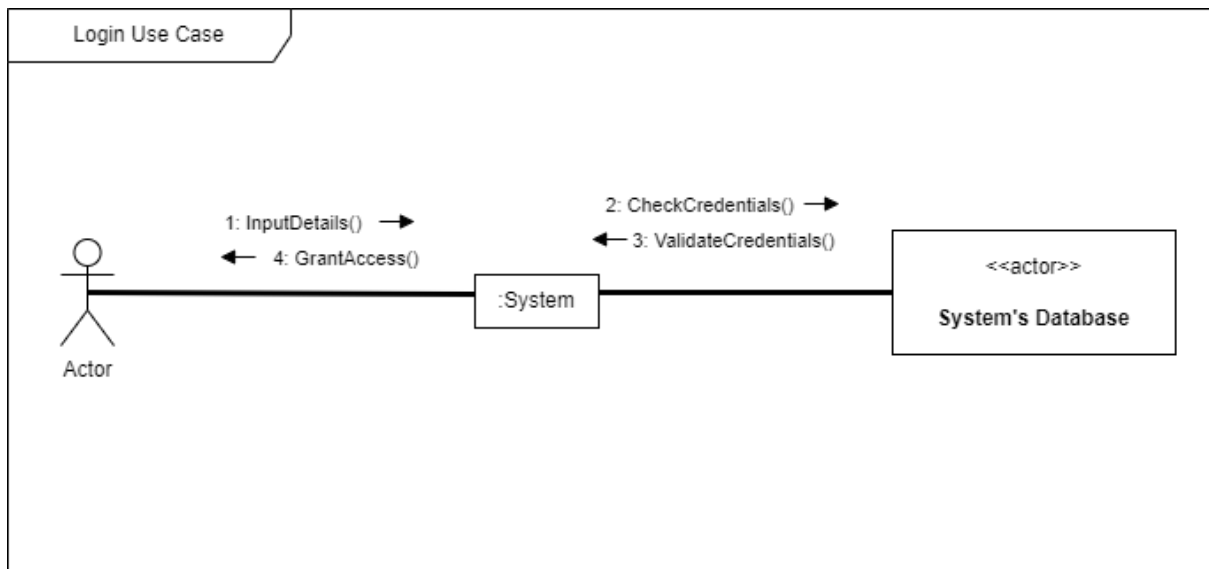


Sequence Diagram for 'View Script' Use Case

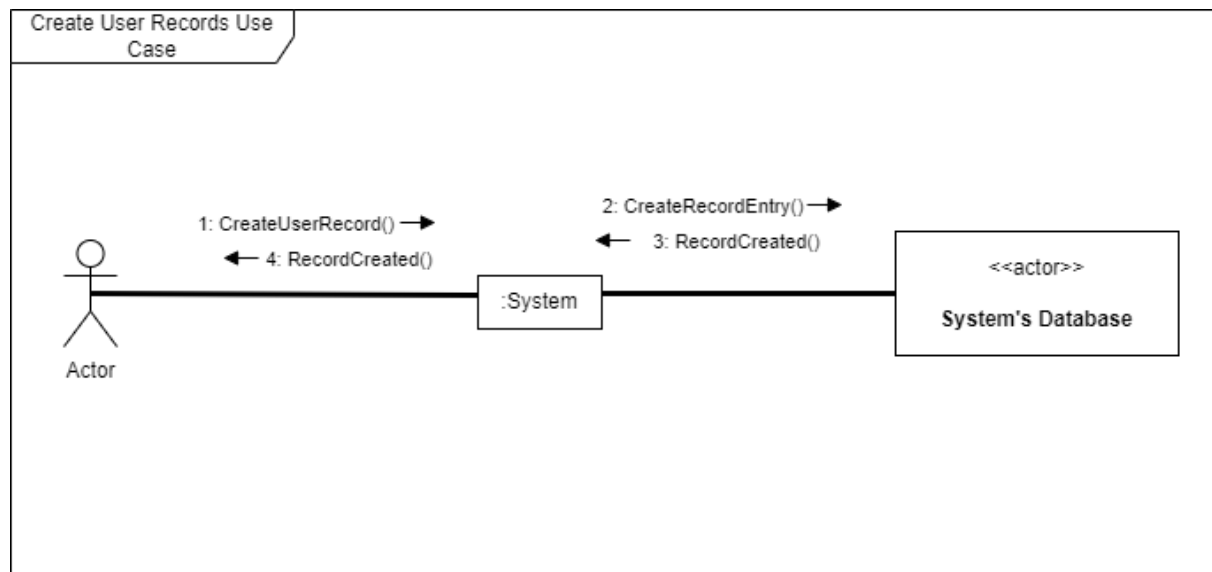


Communication Diagrams

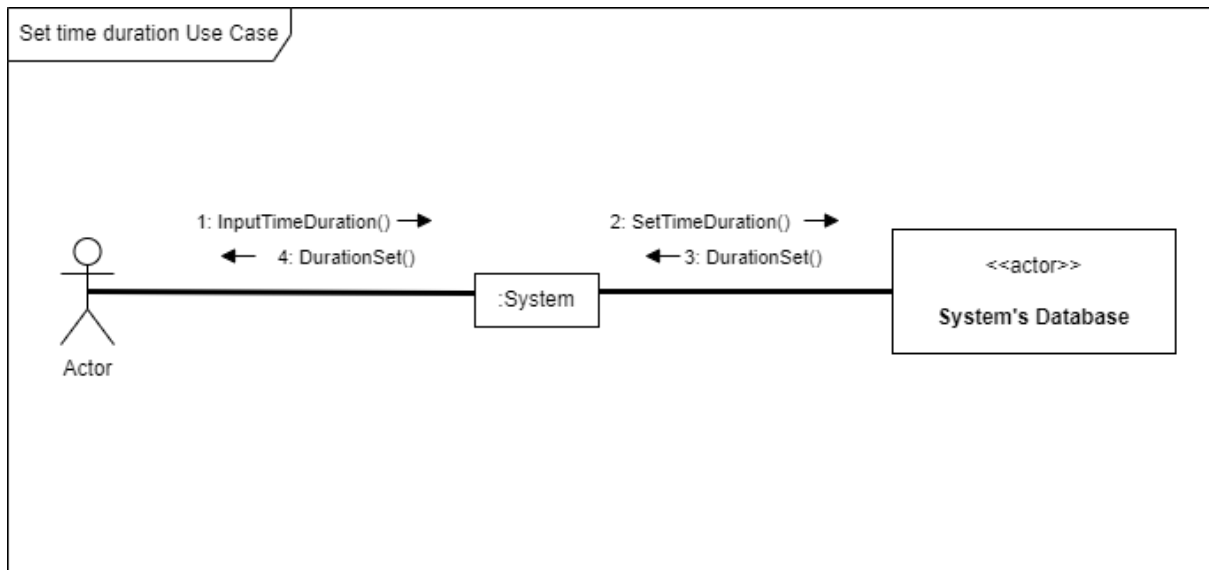
Communication Diagram for 'Login' Use Case



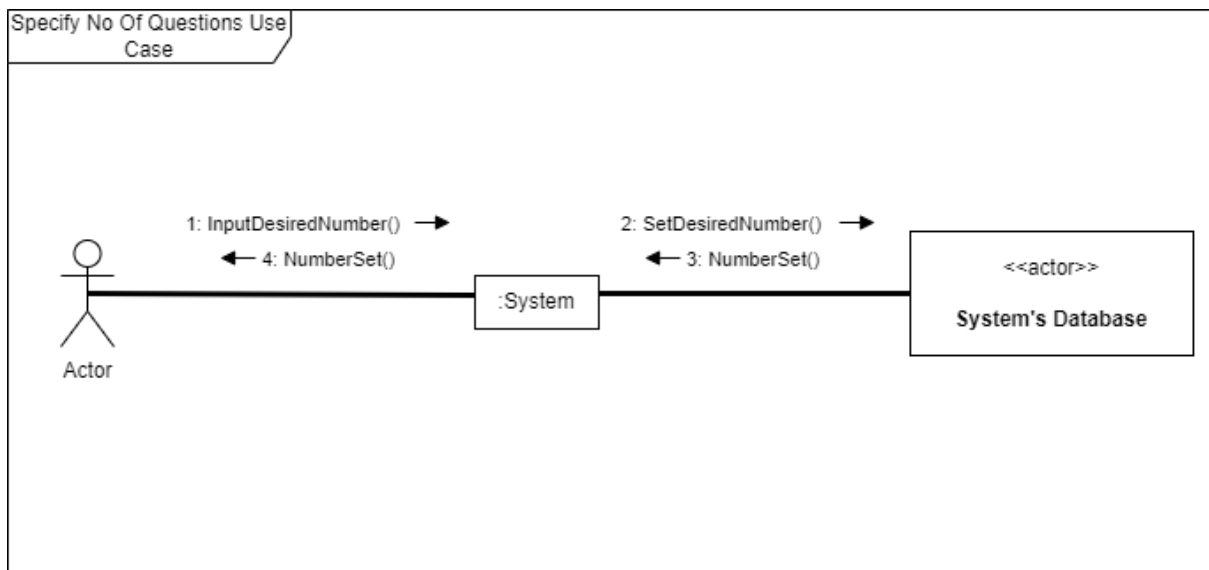
Communication Diagram for 'Create User Records' Use Case



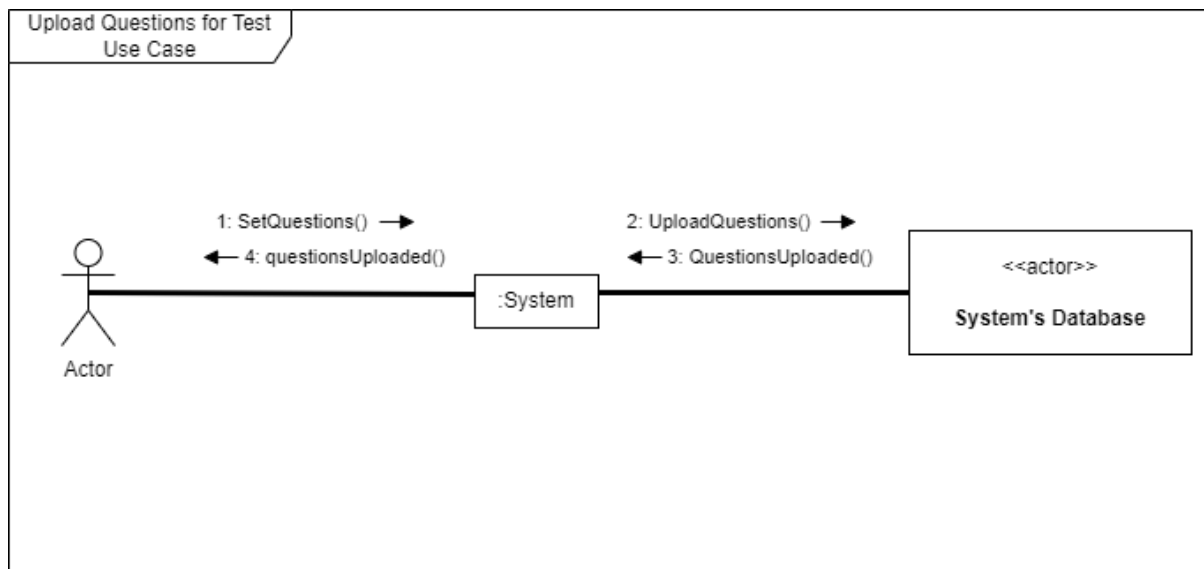
Communication Diagram for 'Set Time Duration' Use Case



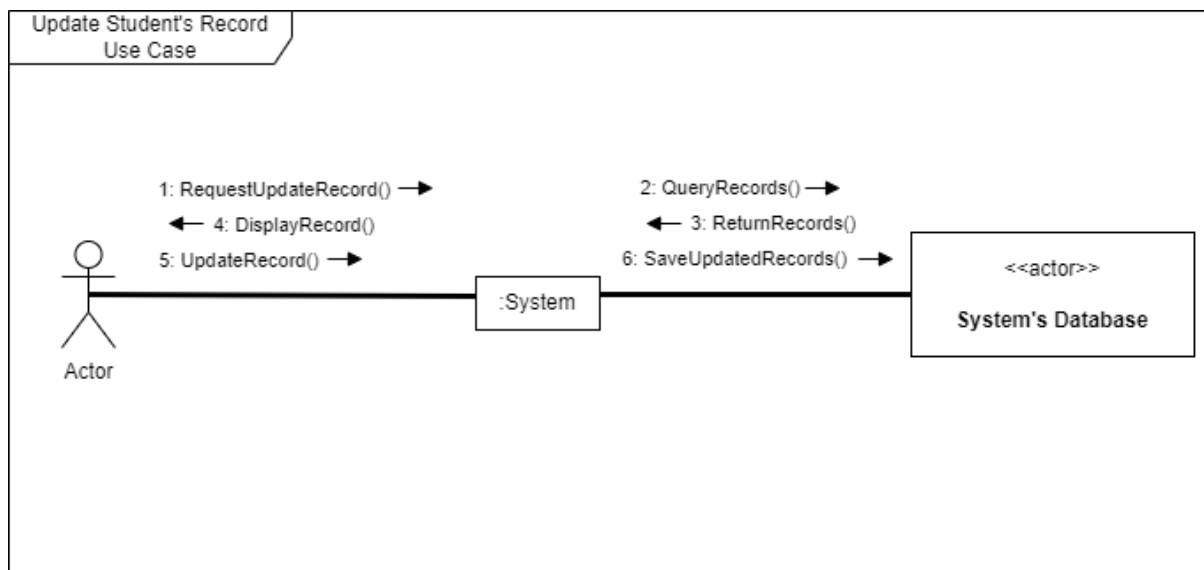
Communication Diagram for 'Specify No of Questions for test' Use Case



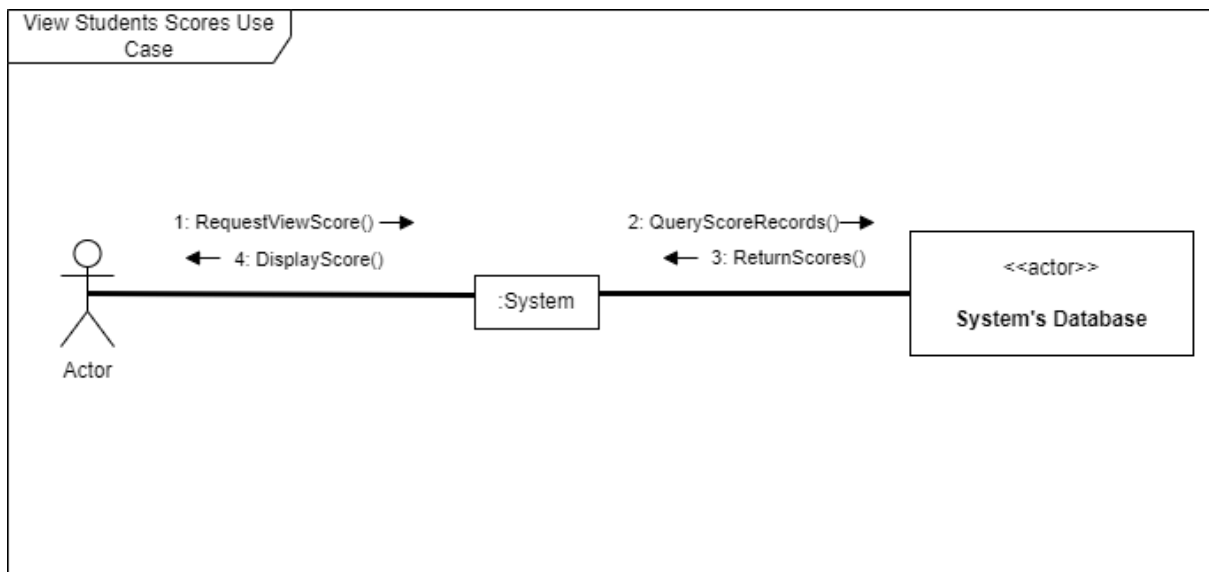
Communication Diagram for 'Upload Questions for test' Use Case



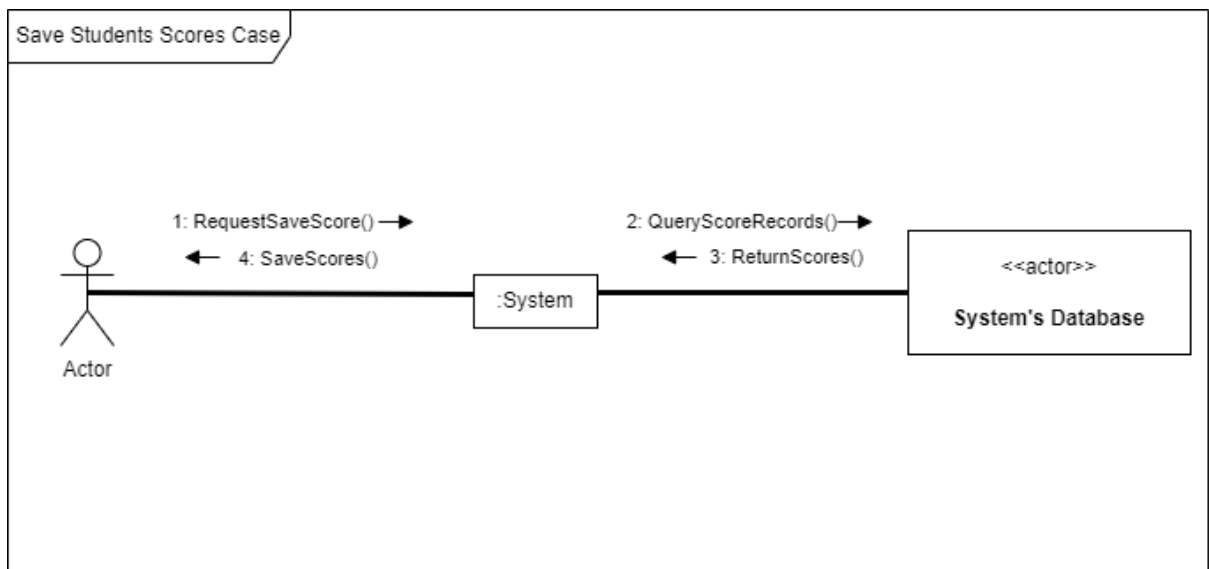
Communication Diagram for 'Update Student Records' Use Case



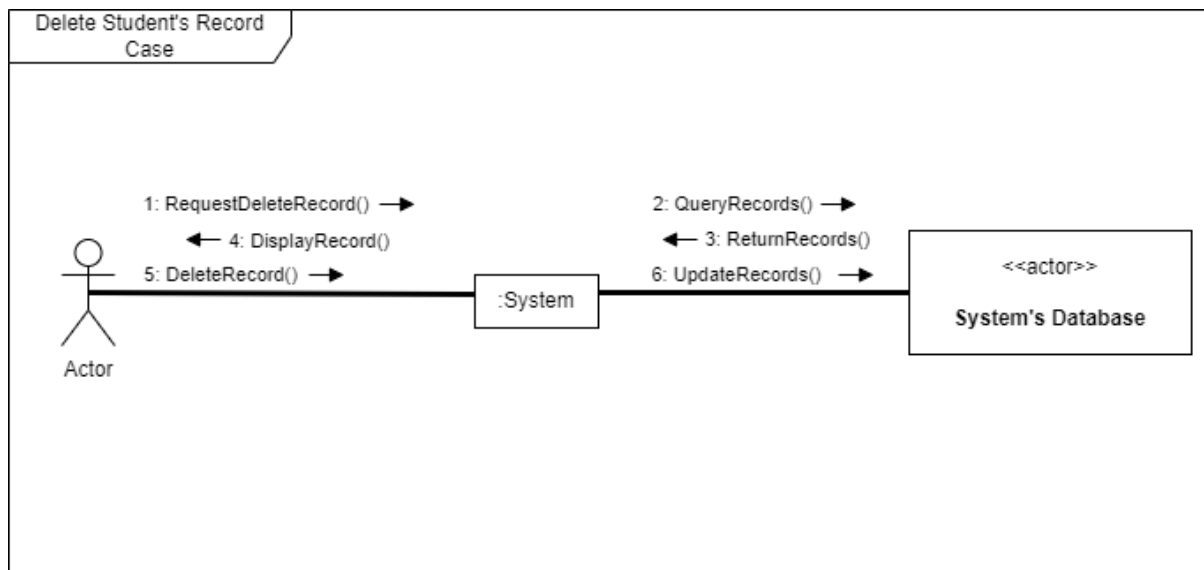
Communication Diagram for 'View Students Scores' Use Case



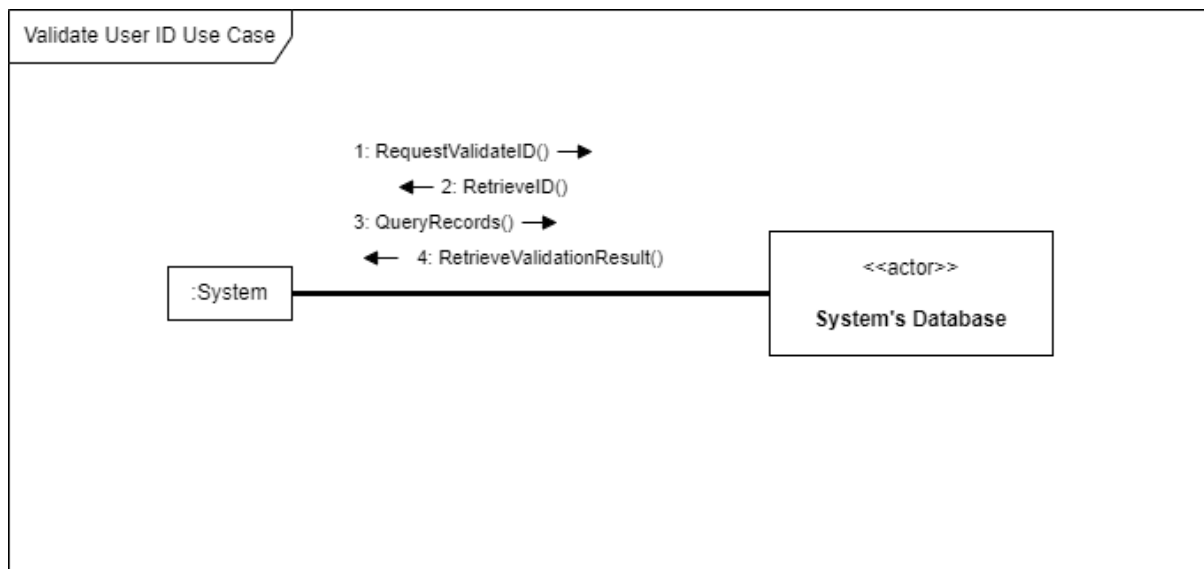
Communication Diagram for 'Save Student Scores' Use Case



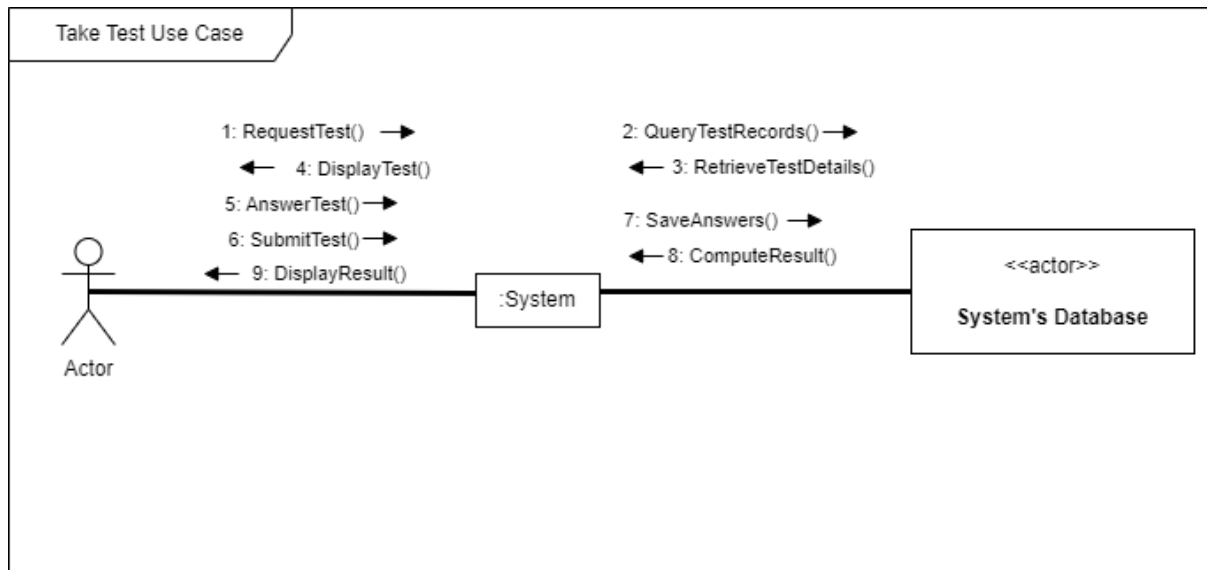
Communication Diagram for 'Delete Student Records' Use Case



Communication Diagram for 'Validate Users ID' Use Case



Communication Diagram for 'Take Test' Use Case



Communication Diagram for 'View Script' Use Case

