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# 1. System Features

In order to satisfy the stated requirements, the following features are planned for implementation.

EBET (Exam Based E-learning Tool) is an e-learning tool intended for University exam candidates. This web application will help the students to better prepare for their admission exams. Students will learn through exams in this application.

## 1.1 Account Management:

### 1.1.1) Create Account:

A user can enter the website without an account but to access the course materials he/she has to create an account. He/she needs to provide the following information to create account-

- Full name
- Mobile Number
- Email address
- Password

### 1.1.2) Verification:

After providing the information, the system will verify and send a confirmation code to the provided mobile number/email address. By inputting this code, an account will be created.

### 1.1.3) Update Account:

Users can update his/her profile. He/she can change his/her following information-

- Email address

- Mobile number
- Password

#### **1.1.4) Password Recovery:**

A user can recover his/her password if forgotten, by using his/her email or mobile phone number. Users can click on “Forget Password” Button and choose from two options- “1.Recover Through Email, 2.Recover Through Mobile Number”

Through Email: A recovery link will be sent to the user's email, if the user clicks on the “Recover Through Email” button. User will then input a new password and his/her password will be updated in Database.

Through Mobile: An OTP will also be sent to the user's mobile number, if a user clicks on the “Recover Through Mobile” button. User will have to input the OTP within 1 minute and then he/she will have to input a new password. His/her password will be updated in Database.

**1.1.5) Log in:** A user can log into the system by using his/her registered email-id or phone number and password.

There'll be an administrator account to input the questions into the system. An account for the administrator will be given with a predefined username and password. The administrator can login with those predefined username and password given by the system authorities.

## **1.2 Course Management:**

There'll be four courses offered in this system. They are - physics, chemistry, mathematics and biology. After creating an account and logging in to the system, users can subscribe to one or more courses. Subscription will be free of cost for now. The main

goal of our system is 'learning through exams'. After subscribing to a course user will see the syllabus of that course, a list of topics of that course.

There'll be a moderate amount of questions on each topic stored in our system. Users can practice questions and give exams on one or more topics by selecting one or multiple topics from the syllabus. Each question will have 4 options, there'll be one correct answer among those options. For each wrong answer 25% of that question's mark will be deducted from his/her achieved mark. Users can set the quantity of questions he/she wants to answer in a test and he/she can also set the amount of time for that test. Questions a user has seen or has not seen will be stored in the system. Users can set what sort of questions he/she wants in a test - incorrect & unseen / unseen / incorrect / seen & unseen.

After taking a test and submitting the answer users will see a detailed answer sheet of the test. Detailed explanations and answers to each question will be provided in the answer sheet.

Users can bookmark questions. They can also view the questions they answered wrong in a course.

Users can also set a goal - how many questions he/she wants to practice in a session. If he/she fails to complete or completes his goal in a session, in both cases the system will notify the user.

The system administrator can upload and modify questions. They can also add or delete chapters from a course.

## **1.3 Exam Management:**

Users will be able to give three types of tests. They are -

- **Demo Exam** - Guest users will have the option to give a demo exam. They'll have to select a topic and then give a demo exam on that topic.
- **Practice** - Only authenticated users will be able to give practice exams. After subscribing to a course user will see a list of topics on that course. After clicking on any of those topics users will see two options, 'Practice' and 'Test'. Users can set the quantity of questions he/she wants to answer. In 'Practice' mode there'll be no time limit. Users may take as much time as they need to answer their questions. After answering all the questions users will have to submit their answers and see the result. They'll be provided with an answer sheet of the questions with detailed explanations.
- **Test** - 'Test' mode is pretty similar to 'Practice' mode with only difference being the time limit. In 'Test' mode users can set the quantity of questions he/she wants to answer in a test and he/she can also set the amount of time for that test. In 'Test' mode users will have to answer all the questions on that given time. When the time runs out answers will be automatically submitted and results will be shown. Then they'll be provided with an answer sheet of the questions with detailed explanations. In the test exam there'll be only unseen questions.

In both 'Practice' and 'Test' mode users can set what sort of questions he/she wants in a test - incorrect & unseen / unseen / incorrect / seen & unseen.

## 1.4 Performance Management:

Each user's performance will be analyzed based on their performances on practice exams and test exams. The result of the analysis will be shown in two modules. They are

-

- **Progress graph** - Progress graph will be shown for each course the user has taken. Progress graph will be calculated based on users' performance in practice and test exams. Progress graph will be shown using a bar chart.
- **Percentage of course completion** - Similarly percentage of course completion will be calculated based on the user's performance in practice and test exams. Percentage of course completion for each course will be calculated based on how many topics of that course the user has completed. Percentage of course completion will be shown using a progress bar.

## 1.5 Information Management:

- **System database** - User information and all of user history will be stored in the system database. User history includes the questions the user has seen, the questions he/she gave the correct answer, the questions he/she gave the wrong answer, result of each exam. Questions and answers of the questions will also be stored in the system database, which will be input by the admin.



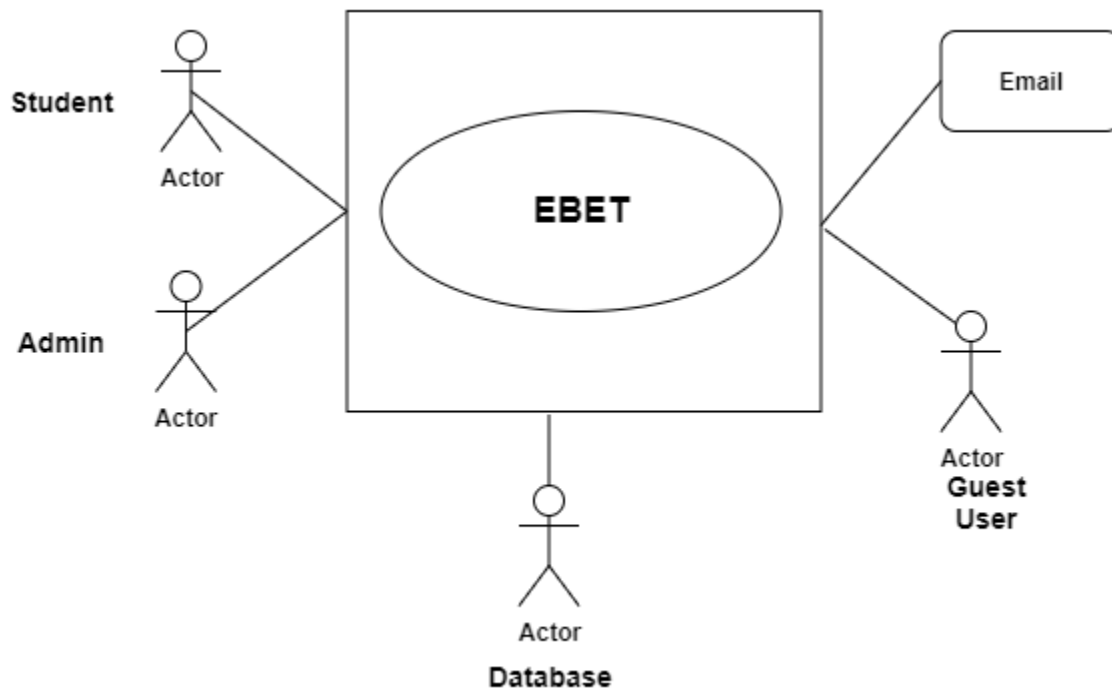
- **User database** - A replica of user info from the system database will also be stored in the user database for security consolidation. If a user updates his/her info, it will be updated in the user database first and then the same update will be replaced into the system database automatically.

## 2. Use case diagram

### 2.1 Use case diagram level: 0

**ID:** 1

**Name:** EBET



**Description:** Here, the use case “EBET” represents the entire content management system. Interacting with it are the four actors:

1. Admin - primary actor
2. Student - primary actor
3. Guest User - secondary actor
4. Database - secondary actor

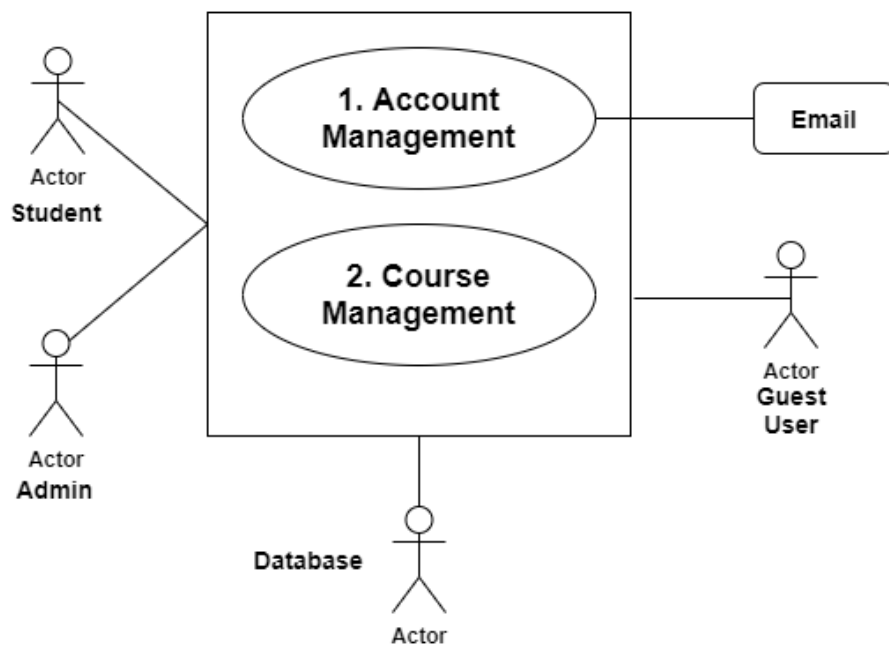
## 5. Email - external subsystem

Admin and student have been selected as primary actor based on the fact that they are both data produce, data consumer, and data manipulator.

## 2.2 Use case diagram level: 1

ID: 2

Name: Sub Systems of EBET



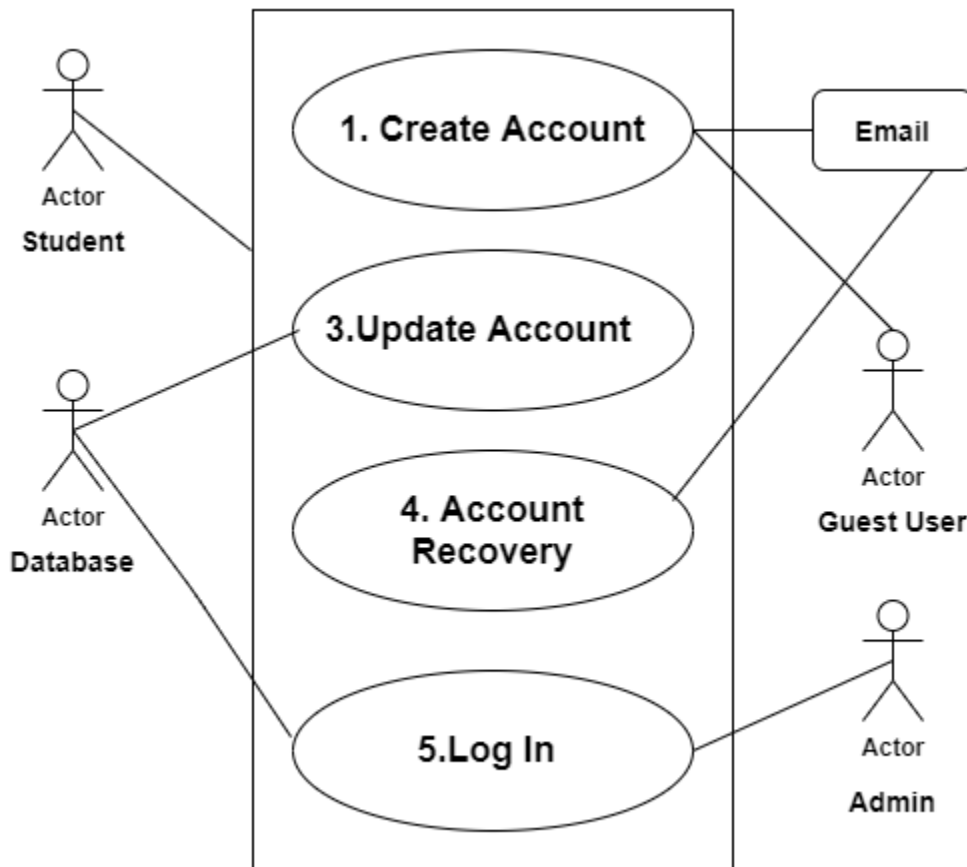
**Description:** The entire system is divided into two major parts.

1. **Account management:** An "account" or more specifically, a "user account" is just a collection of information that relates to a particular user. This is the module concerned with all the activities related to creating and managing a user account. This module is further decomposed in level 1.1 where all its sub-modules are covered.
2. **Course management:** As its name implies, this module is concerned with managing a course that the user wishes to subscribe. This has been decomposed in level 2.1 where all its sub-modules are discussed.

## 2.3 Use case diagram level: 1.1

**ID:** 3

**Name:** Account Management



**Description:** Account management has five components. The action reply for each of them is discussed below:

1.1.1 Create account: This is the module concerned with the creation of user accounts.

**User action:** The user is required to enter account information consisting of username, password, first name, last name and email id.

**System reply:** The system stores this information in database. But no new account is created yet. To complete account creation, a random link is generated and sent to the email provided by the user.

**User action:** The user accesses his email and manually accesses the link.

**System reply:** When the link has been accessed by the user, an account is created and the provided information is stored in database.

1.1.2 Update account: This is the module concerned with allowing users to modify the account information that they have provided earlier, either during initial sign-up or in a previous modification.

**User action:** The user is required to enter the new information for one/multiple or all of his username, password, email, first name and last name.

**System reply:** The new information will overwrite the old information and be stored in database.

1.1.3 Account recovery: This is the module concerned with helping users recover their account in case they forget their account username and/or password.

**User action:** The user is required to enter the email id that he has initially provided during account creation.

**System reply:** A link is generated and sent to the email provided by the user.

1.1.4 Log in: This is the module concerned with the authentication of user accounts to allow them access into the system.

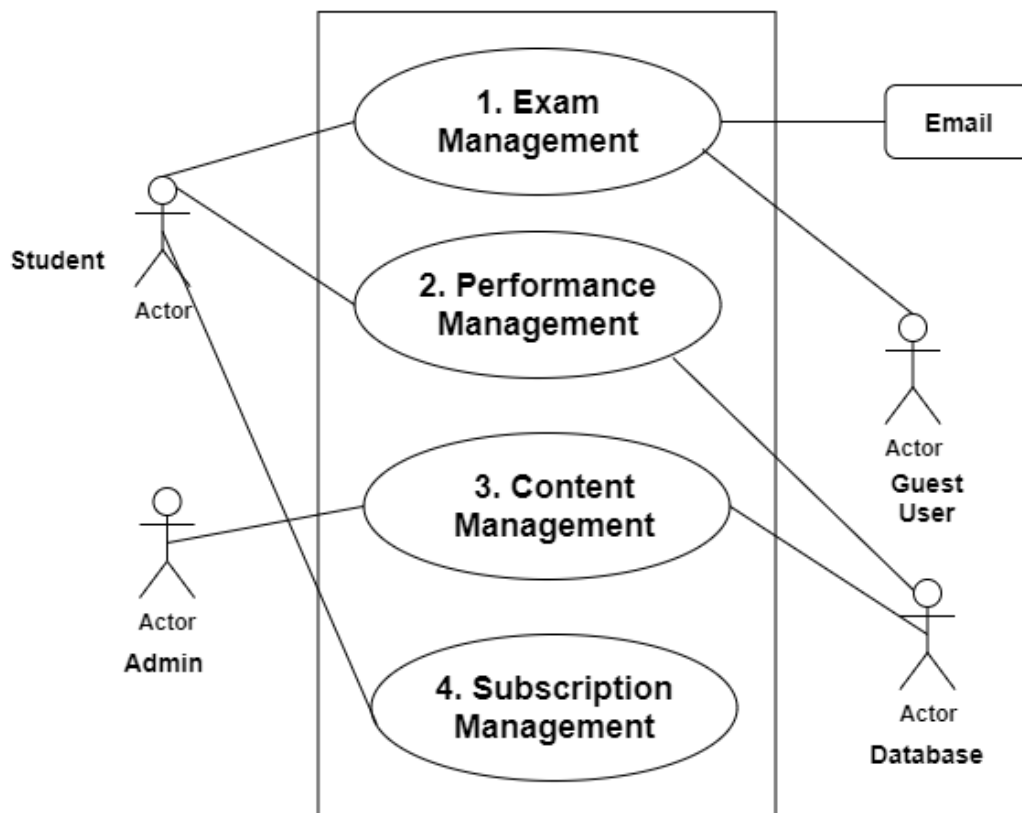
**User action:** The user is required to enter account credentials consisting of his username and password.

**System reply:** The system checks this in database to see if any matching username-password pair can be found. If found, the authentication is successful and the system allows users access. Else, an error message is displayed.

## 2.4 Use case diagram level: 1.2

**ID:** 4

**Name:** Course Management



**Description:** Account management has five components. The action reply for each of them is discussed below:

1.2.1 Exam Management: This module concerned with all the activities related to exam such as question management, exam time management etc. This module is further decomposed in level 1.2.1 where all its sub-modules are covered.

- 1.2.2 Performance Management: This module concerned with student's performance. This module is further decomposed in level 1.2.2 where all its sub-modules are covered.
- 1.2.3 Content Management: This module deals with maintaining the contents of a course. This module is further decomposed in level 1.2.3 where all its sub-modules are covered.
- 1.2.4 Subscription Management: This module concerned with maintaining user's subscription.

**User action:** Student click on the button "Subscribe" to subscribe to a particular course.

**System reply:** System show a subscription plan to the student.

**User action:** Student choose a subscription plan and subscribe.

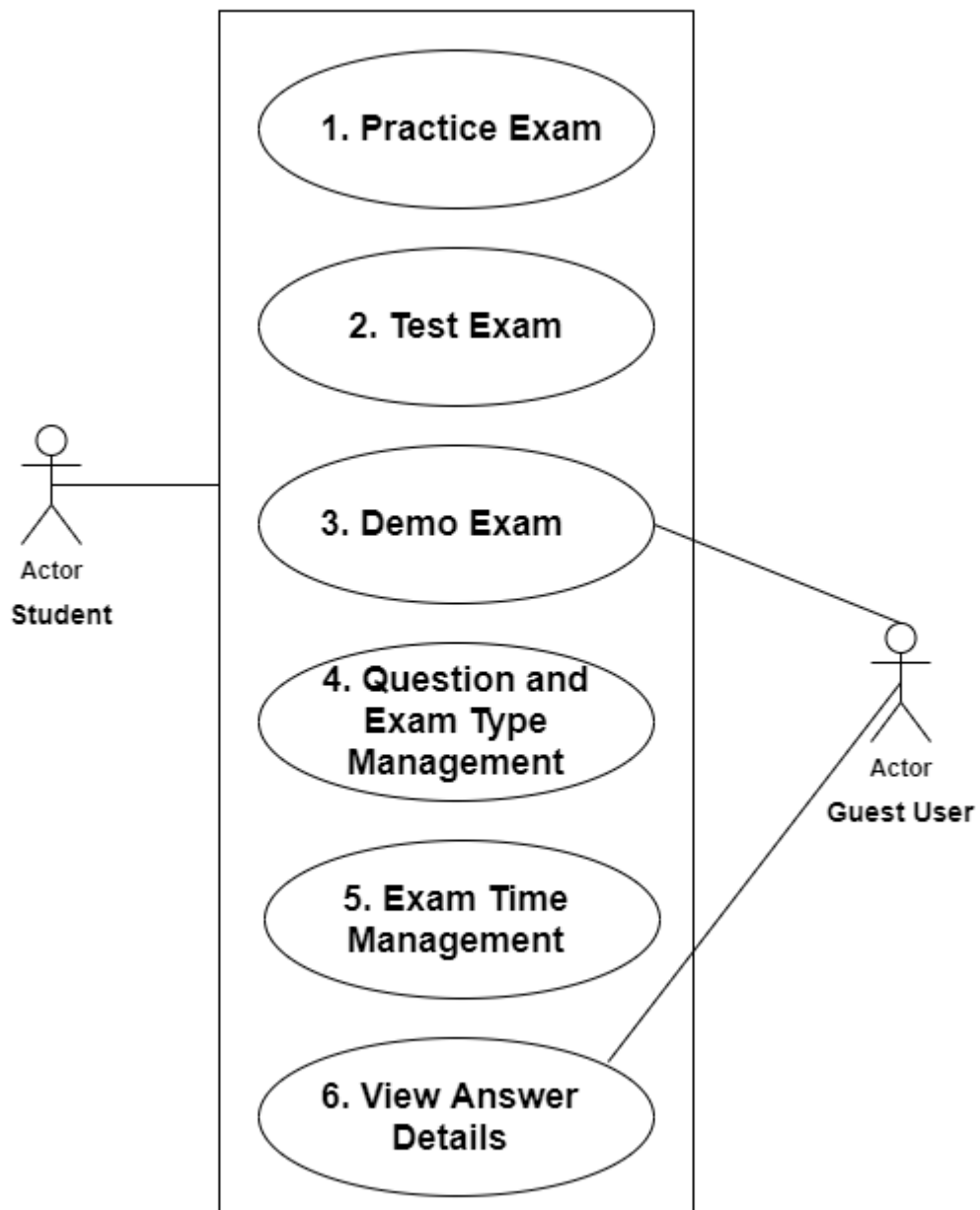
**System reply:** Information will store in database.



## 2.5 Use case diagram level: 1.2.1

**ID:** 5

**Name:** Exam Management



1.2.1.1 Practice Exam: This module concerned with taking practice exam.

**User action:** Student choose one or more chapters for exam.

**System reply:** A window will come where user inputs what kind of question they want to practice such as seen, unseen, correct, wrong and also choose how many questions they want to practice.

**User action:** Student will choose what kind of questions they want to practice and start exam.

**System reply:** System will fetch questions from database.

**User action:** Student will give exam and submit answer.

**System reply:** Submitted answer will be stored in database.

1.2.1.2 Test Exam: This module concerned with taking Test exam.

**User action:** Student choose one or more chapters for exam.

**System reply:** A window will come where user inputs what kind of question they want to practice such as seen, unseen, correct, wrong and also choose how many questions they want to practice and a time limit.

**User action:** Student will choose what kind of questions they want to practice and start exam.

**System reply:** System will fetch questions from database.

**User action:** Student will give exam and submit answer.

**System reply:** Submitted answer will be stored in database.

1.2.1.3 Demo Exam: This module concerned with taking Test exam.

**User action:** Student or guest user click on the button "Take a demo".

**System reply:** System will provide some pre-set questions to user.

**User action:** User start exam and submit answer

**System reply:** System will show the exam result.

1.2.1.4 Question and exam Type Management: This module concerned managing different types of questions such as seen, unseen, correct, wrong and different types of exam.

**User action:** Student will choose what kind of questions they want to practice such as seen, unseen, correct, wrong and also select the exam type such as practice exam, test exam etc. and start exam.

**System reply:** System will fetch questions based on user's choice.

1.2.1.5 Exam Time Management: This module maintains exam time in test exam.

**User action:** Student choose a time limit to start exam.

**System reply:** System store the time limit. During exam time system will check if exam time is finished or not simultaneously. If exam time is finished then system will automatically submit the answers and store in database.

1.2.1.6 View Answer Details: This module will show the details of question answer to the user.

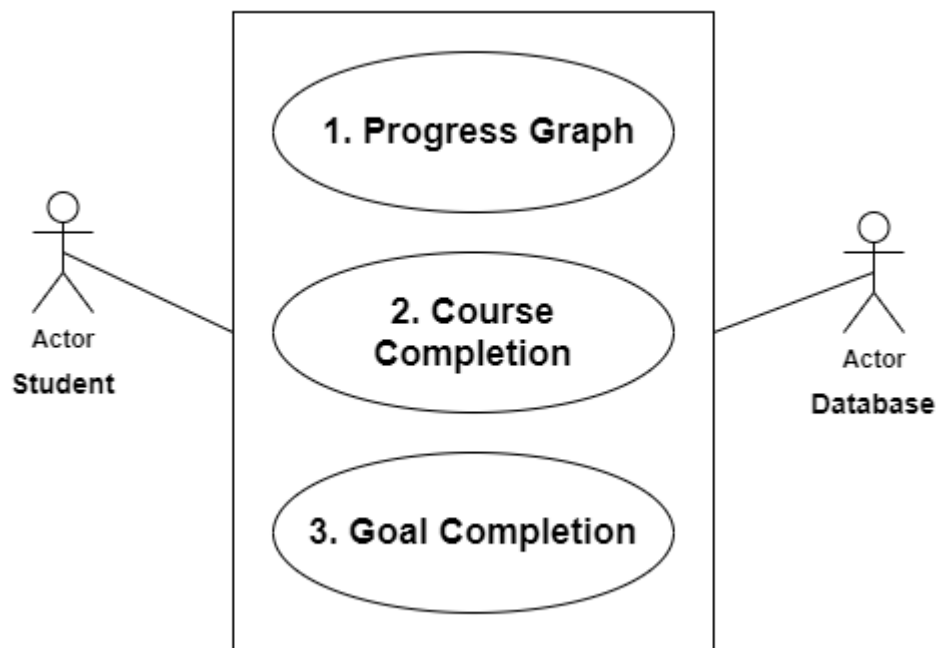
**User action:** Student choose any chapter and wants to view his/her bookmarked questions or all the wrong questions.

**System reply:** System will fetch the data and show on users' screen.

## 2.6 Use case diagram level: 1.2.2

**ID:** 6

**Name:** Performance Management



1.2.2.1 Progress Graph: This module view students' progress graph using bar chart.

**User action:** Student give exam and submit answer.

**System reply:** System will calculate new progress graph using the new submitted answers and view on users' screen.

1.2.2.2 Course Completion: This module view students' progress graph using progress bar.

**User action:** Student give exam and submit answer.

**System reply:** System will calculate new course completion graph using the new submitted answers and view on users' screen.

1.2.2.3 Goal Completion: This module aware student if he/she catchup his/her goal.

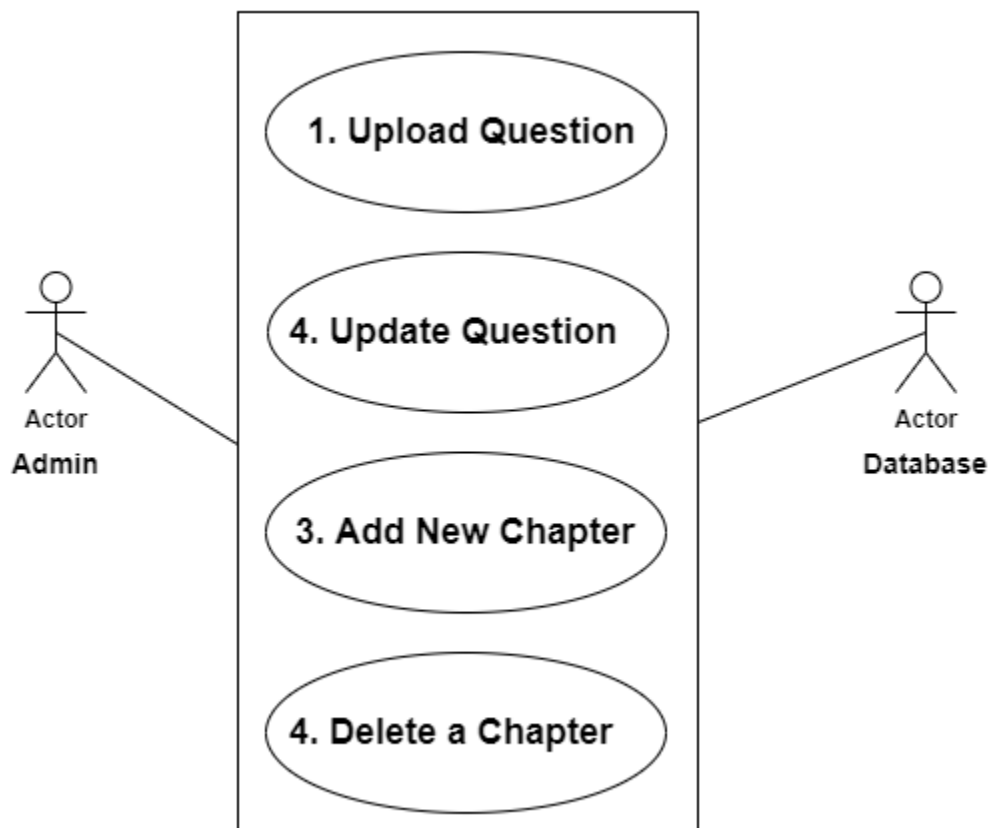
**User action:** Student create their daily goal.

**System reply:** System store the daily goal on database and check if the goal is completed or not and on the next day a notification will be prompted on users' screen.

## 2.7. Use case diagram level: 1.2.3

**ID:** 7

**Name:** Content Management



1.2.3.1 Upload Question: In this module admin upload new question.

**User action:** Admin upload new question.

**System reply:** Uploaded question will store in database.

1.2.3.2 Update Question: In this module admin update an existing question.

**User action:** Admin update an existing question.

**System reply:** Question will be stored in database.

1.2.3.3 Add New Chapter: In this module admin add a new chapter.

**User action:** Admin select a course and add a new chapter.

**System reply:** New chapter will be added into database.

1.2.3.4 Delete a Chapter: In this module admin delete a chapter.

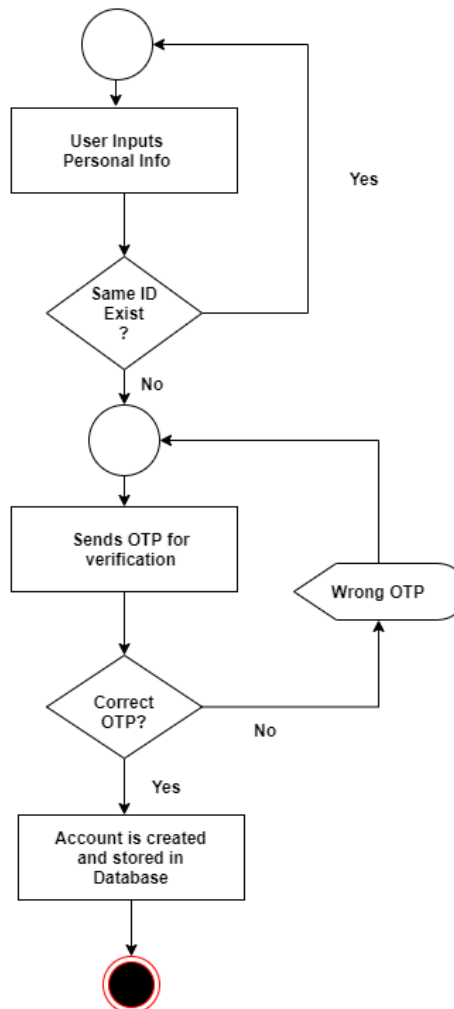
**User action:** Admin select a course and delete a chapter.

**System reply:** Chapter will be deleted and change will be stored in database.

## 2. Activity Diagram

### 2.1 Activity diagram ID: 1

**Name:** Create Account



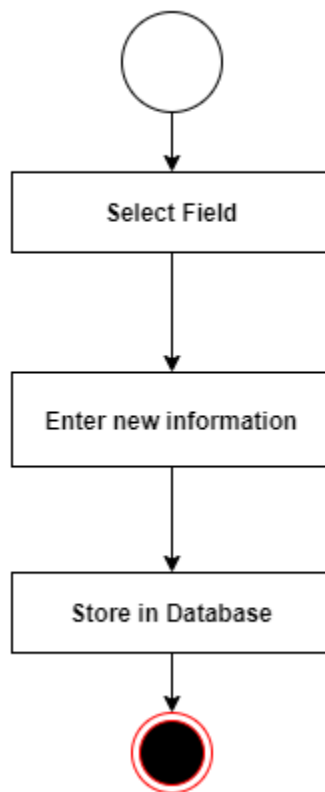
**Description:** This is the activity diagram of the corresponding use case diagram level: 1.1.1. It shows all the necessary activities required for the create account module to work.

The necessary fields (denoted by personal info here) required for creating account are: username, password, email and phone number. OTP stands for one-time pad. Here, it means that a one-time useable link will be generated and sent to the email of the user. After an hour, the link will be “dead” automatically, so it cannot be accessed anymore.



## 2.2 Activity diagram ID: 2

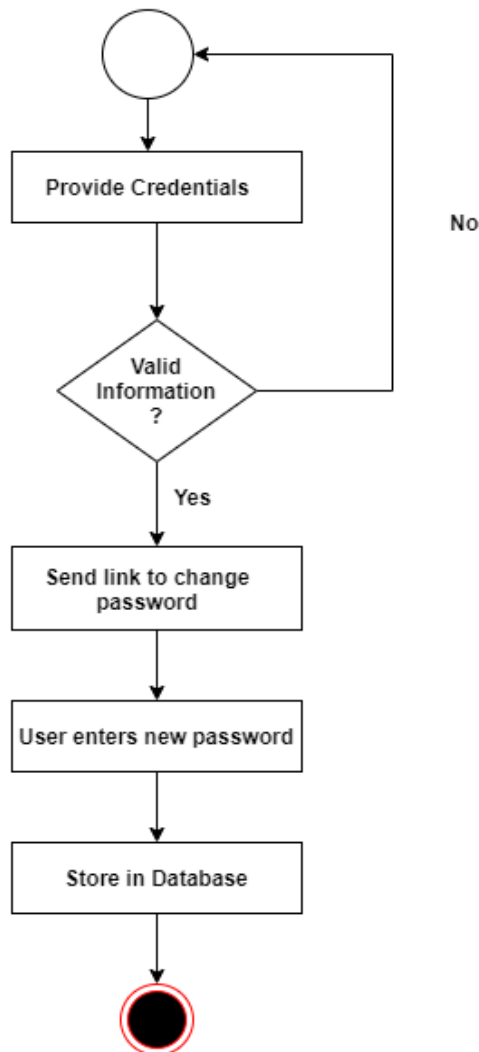
**Name:** Update Account



**Description:** This is the activity diagram of the corresponding use case diagram level: 1.1.2. It shows all the necessary activities required for the update account module to work. The procedure has been discussed in section 1.1.2 of the description of use case diagram ID: 3.

## 2.3 Activity diagram ID: 3

### **Name:** Account Recovery

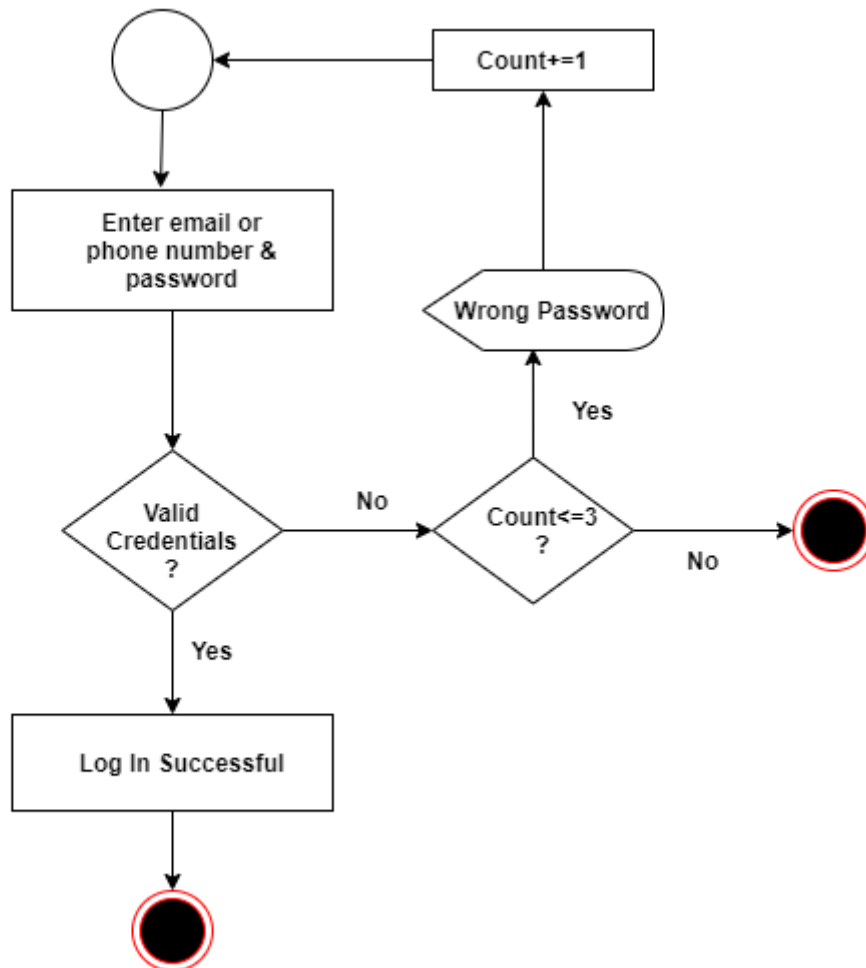


**Description:** This is the activity diagram of the corresponding use case diagram level: 1.1.3. It shows all the necessary activities required for the account recovery module to work.

Account to be recovered can be identified using email id. The procedure has been discussed in section 1.1.3 of the description of use case diagram ID: 3.

## 2.4 Activity diagram ID: 4

### Name: Log In



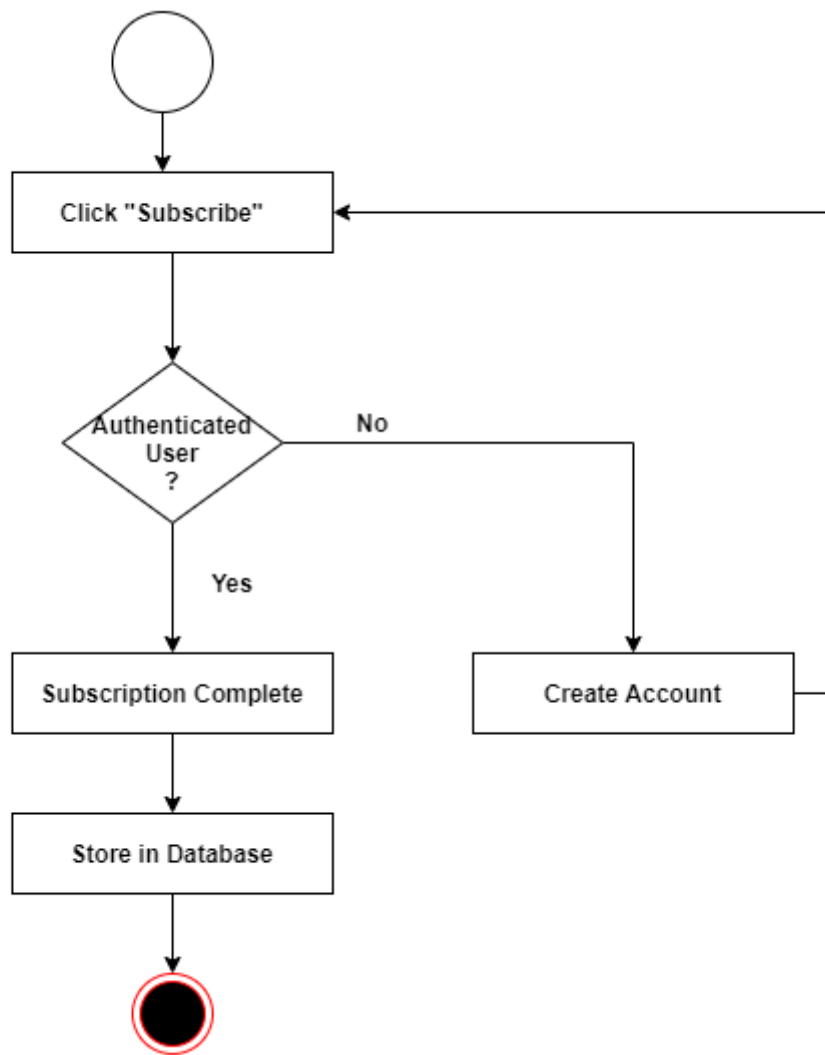
**Description:** This is the activity diagram of the corresponding use case diagram level:

1.1.2. It shows all the necessary activities required for the Log In module to work.

Credentials stand for the username-password pair. Relevant explanations about the procedure can be found in the corresponding use case diagram.

## 2.5 Activity diagram ID: 5

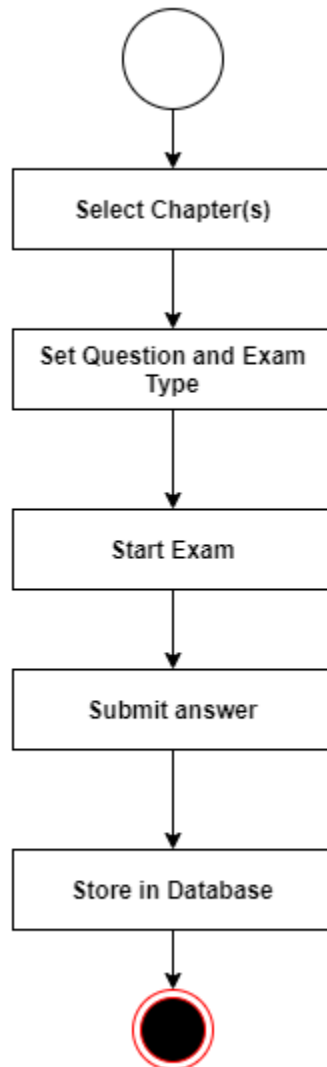
**Name:** Subscription Management



**Description:** This is the activity diagram of the corresponding use case diagram level: 1.2.4. It shows all the necessary activities required for the subscription management module to work. The procedure has been discussed in section 1.2.4 of the description of use case diagram ID: 4.

## 2.6 Activity diagram ID: 6

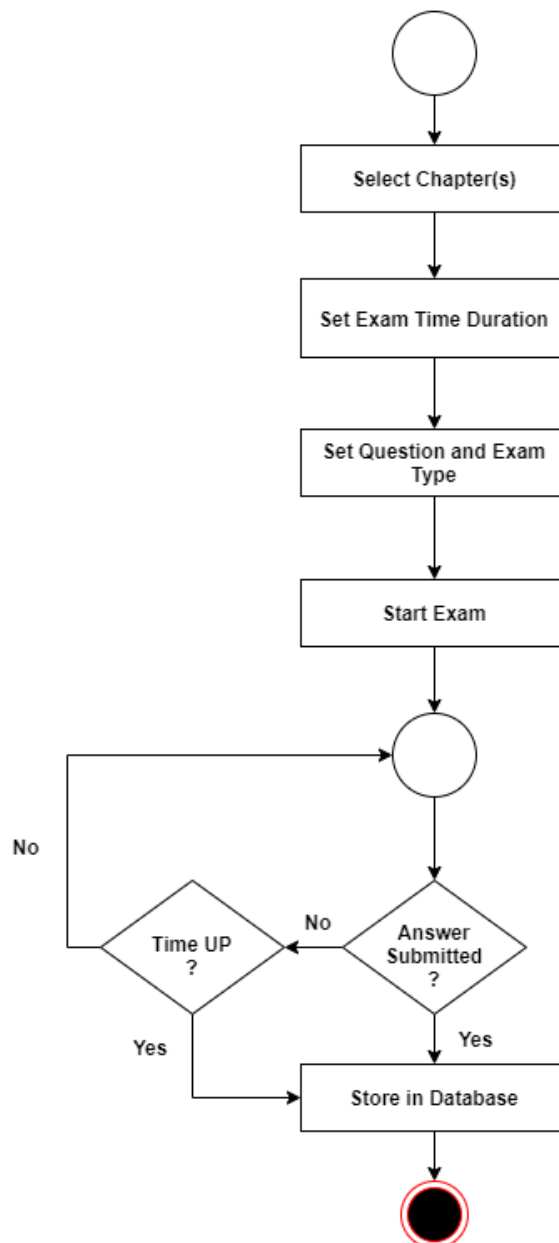
**Name:** Practice Exam



**Description:** This is the activity diagram of the corresponding use case diagram level: 1.2.1.1. It shows all the necessary activities required for the practice exam module to work. The procedure has been discussed in section 1.2.1.1 of the description of use case diagram ID: 5.

## 2.7 Activity diagram ID: 7

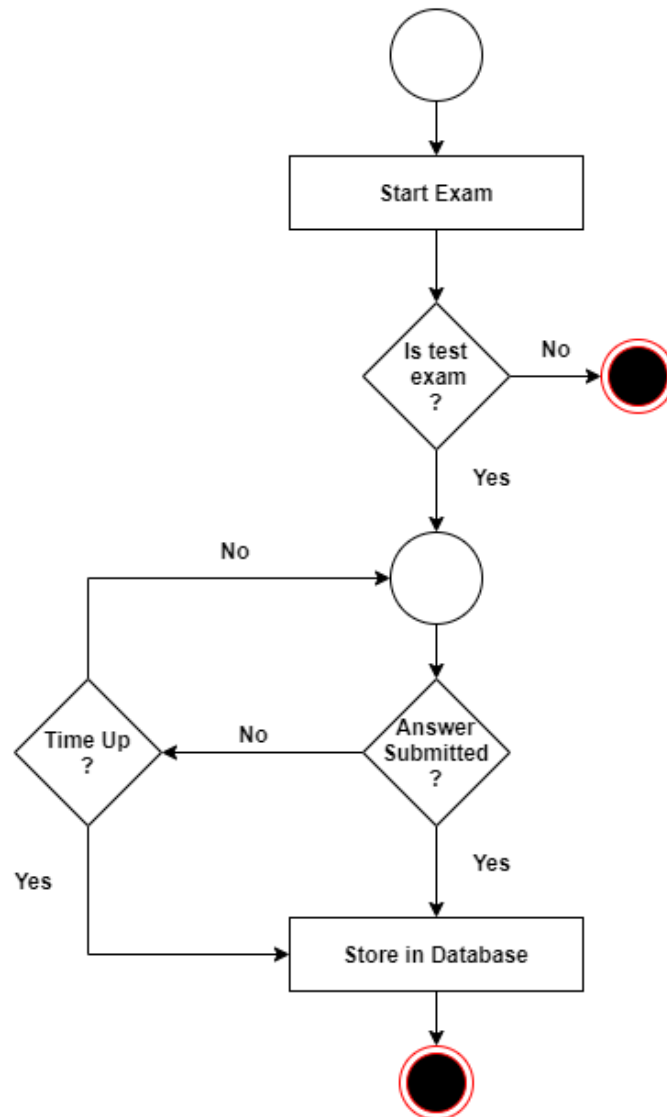
### Name: Test Exam



**Description:** This is the activity diagram of the corresponding use case diagram level: 1.2.1.2. It shows all the necessary activities required for the test exam module to work. The procedure has been discussed in section 1.2.1.2 of the description of use case diagram ID: 5.

## 2.8 Activity diagram ID: 8

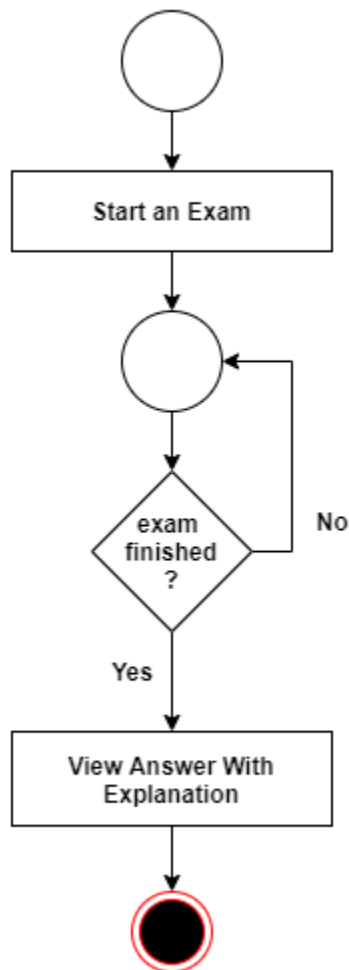
### **Name:** Exam Time Management



**Description:** This is the activity diagram of the corresponding use case diagram level: 1.2.1.5. It shows all the necessary activities required for the exam time management module to work. The procedure has been discussed in section 1.2.1.5 of the description of use case diagram ID: 5.

## 2.9 Activity diagram ID: 9

**Name:** View Answer Details

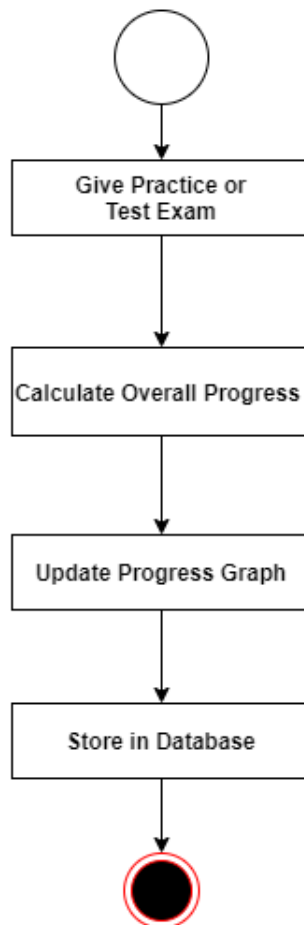


**Description:** This is the activity diagram of the corresponding use case diagram level: 1.2.1.6. It shows all the necessary activities required for the view answer details module to work. The procedure has been discussed in section 1.2.1.6 of the description of use case diagram ID: 5.



## 2.10 Activity diagram ID: 10

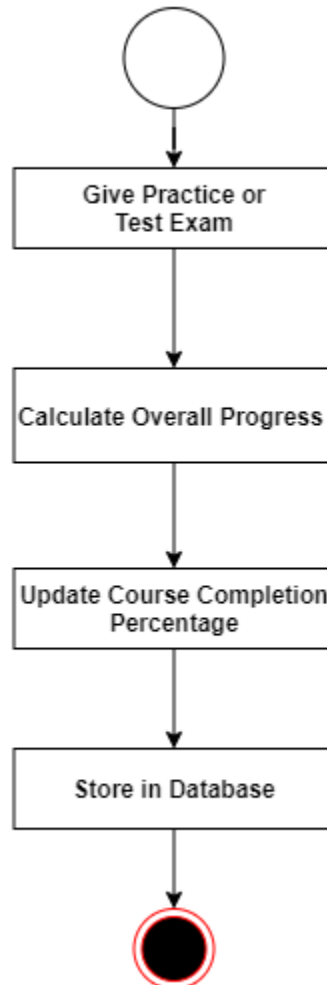
**Name:** Progress Graph



**Description:** This is the activity diagram of the corresponding use case diagram level: 1.2.2.1. It shows all the necessary activities required for the progress graph module to work. The procedure has been discussed in section 1.2.2.1 of the description of use case diagram ID: 6.

## 2.11 Activity diagram ID: 11

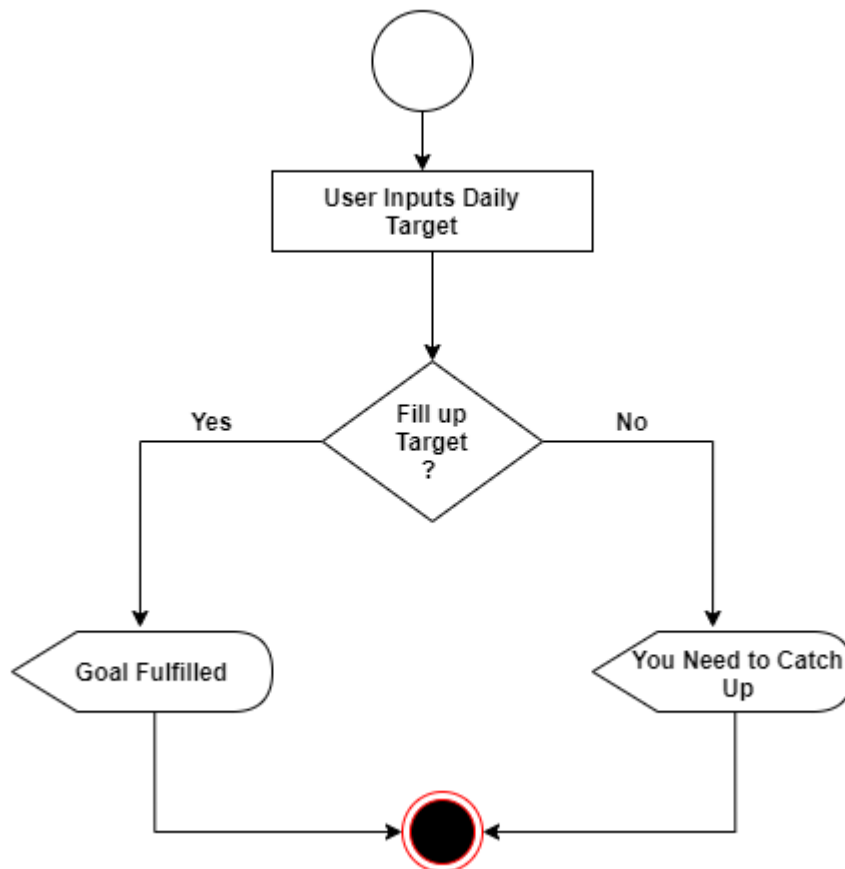
**Name:** Course Completion



**Description:** This is the activity diagram of the corresponding use case diagram level: 1.2.2.2. It shows all the necessary activities required for the course completion module to work. The procedure has been discussed in section 1.2.2.2 of the description of use case diagram ID: 6.

## 2.12 Activity diagram ID: 12

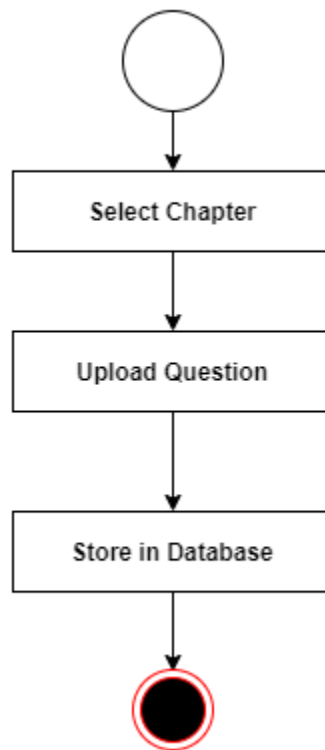
### Name: Goal Completion



**Description:** This is the activity diagram of the corresponding use case diagram level: 1.2.2.3. It shows all the necessary activities required for the goal completion module to work. The procedure has been discussed in section 1.2.2.3 of the description of use case diagram ID: 6.

## 2.13 Activity diagram ID: 13

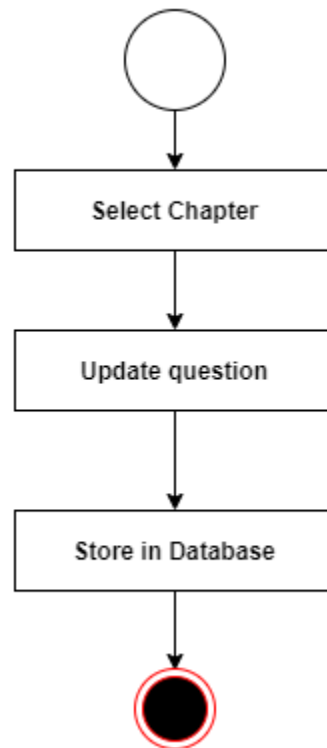
**Name:** Upload Question



**Description:** This is the activity diagram of the corresponding use case diagram level: 1.2.3.1. It shows all the necessary activities required for the upload question module to work. The procedure has been discussed in section 1.2.3.1 of the description of use case diagram ID: 7.

## 2.14 Activity diagram ID: 14

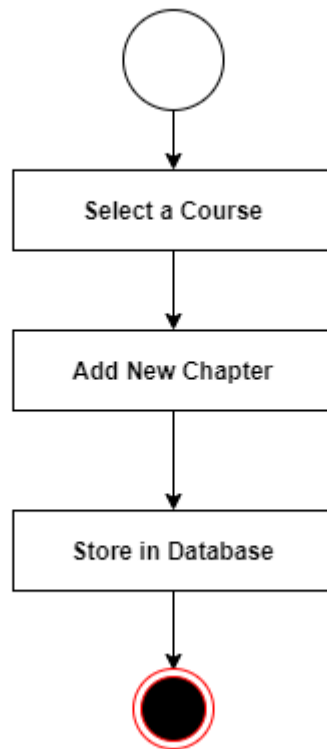
**Name:** Update Question



**Description:** This is the activity diagram of the corresponding use case diagram level: 1.2.3.2. It shows all the necessary activities required for the update question module to work. The procedure has been discussed in section 1.2.3.2 of the description of use case diagram ID: 7.

## 2.15 Activity diagram ID: 15

**Name:** Add New Chapter

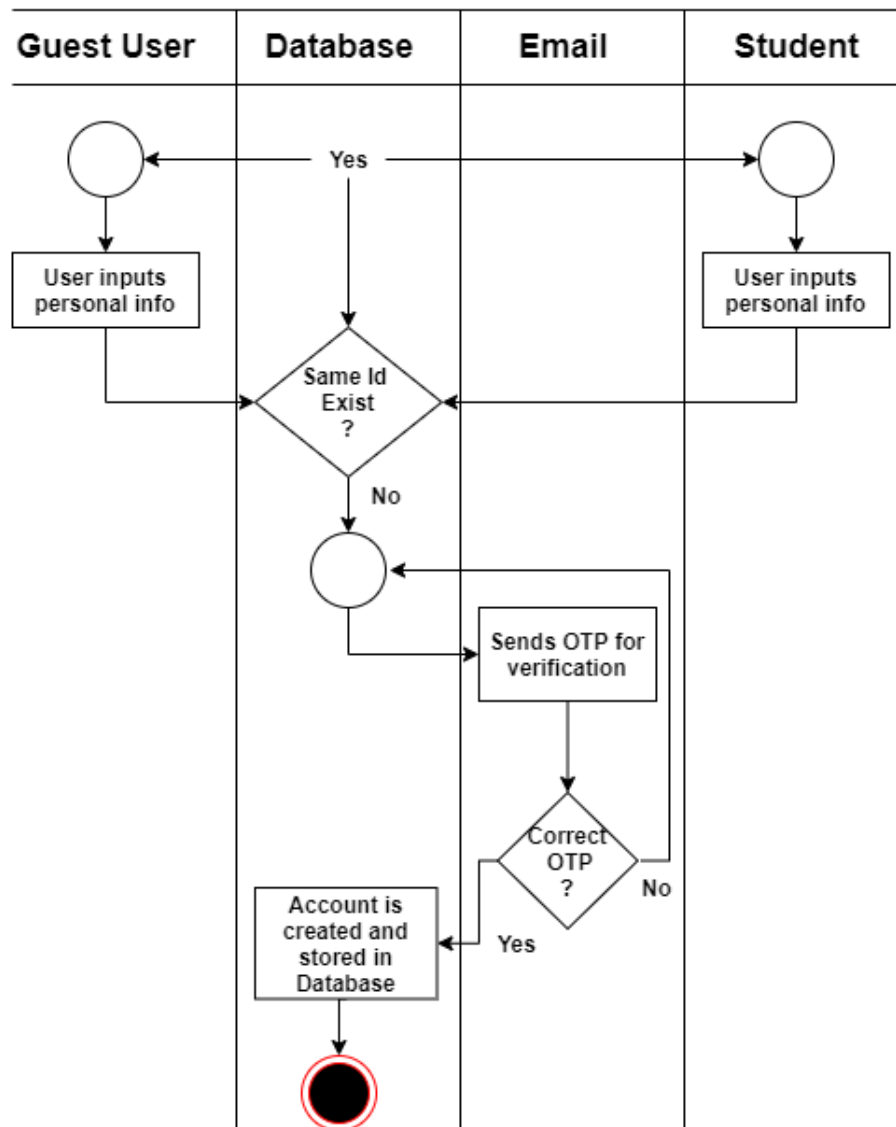


**Description:** This is the activity diagram of the corresponding use case diagram level: 1.2.3.3. It shows all the necessary activities required for the add new chapter module to work. The procedure has been discussed in section 1.2.3.3 of the description of use case diagram ID: 7.

## 4. Swimlane Diagram

### 4.1 Swimlane diagram ID: 1

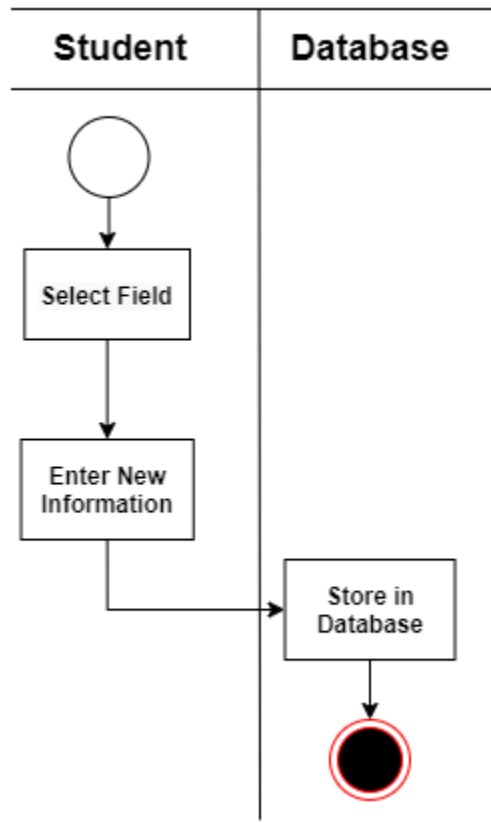
**Name:** Create Account



**Description:** This is the swimlane diagram of the corresponding activity diagram ID:1. It shows how different actors are involved with each activity of the create account module. The necessary description of “personal info” and “OTP” can be found in the same activity diagram. Hence, it is not being repeated here.

## 4.2 Swimlane diagram ID: 2

**Name:** Update Account



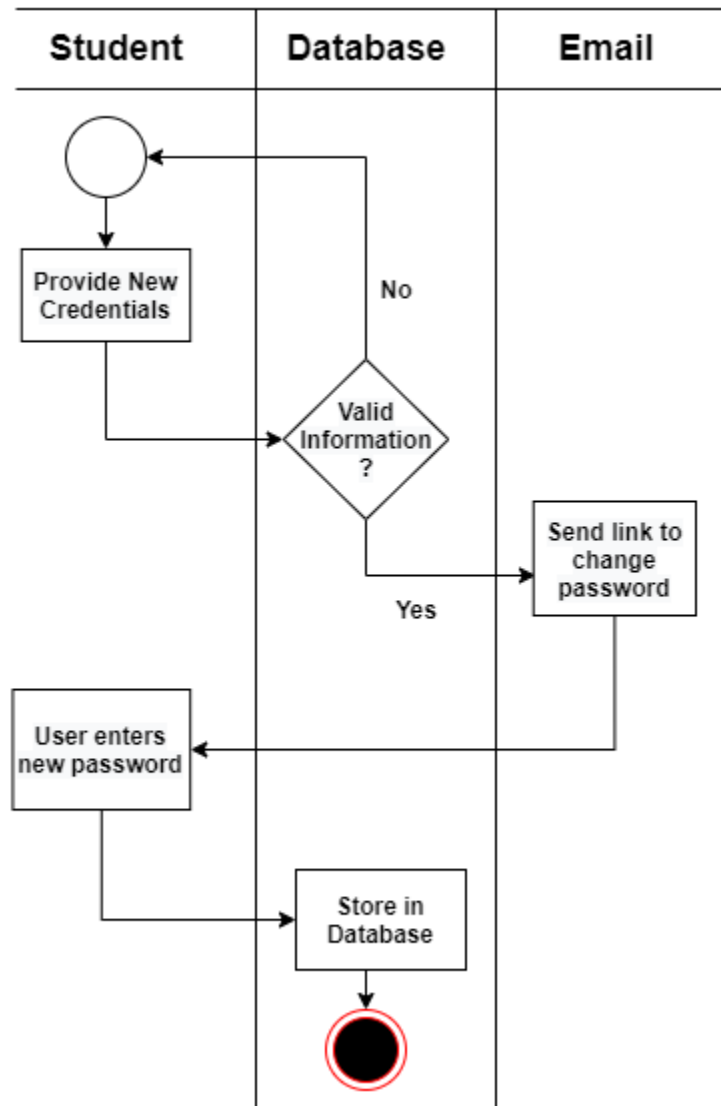
**Description:** This is the swimlane diagram of the corresponding activity diagram ID:2. It shows how different actors are involved with each activities of the module.

The necessary description of the activity can be found in the same activity diagram. Hence, it is not being repeated here.



### 4.3 Swimlane diagram ID: 3

**Name:** Account Recovery

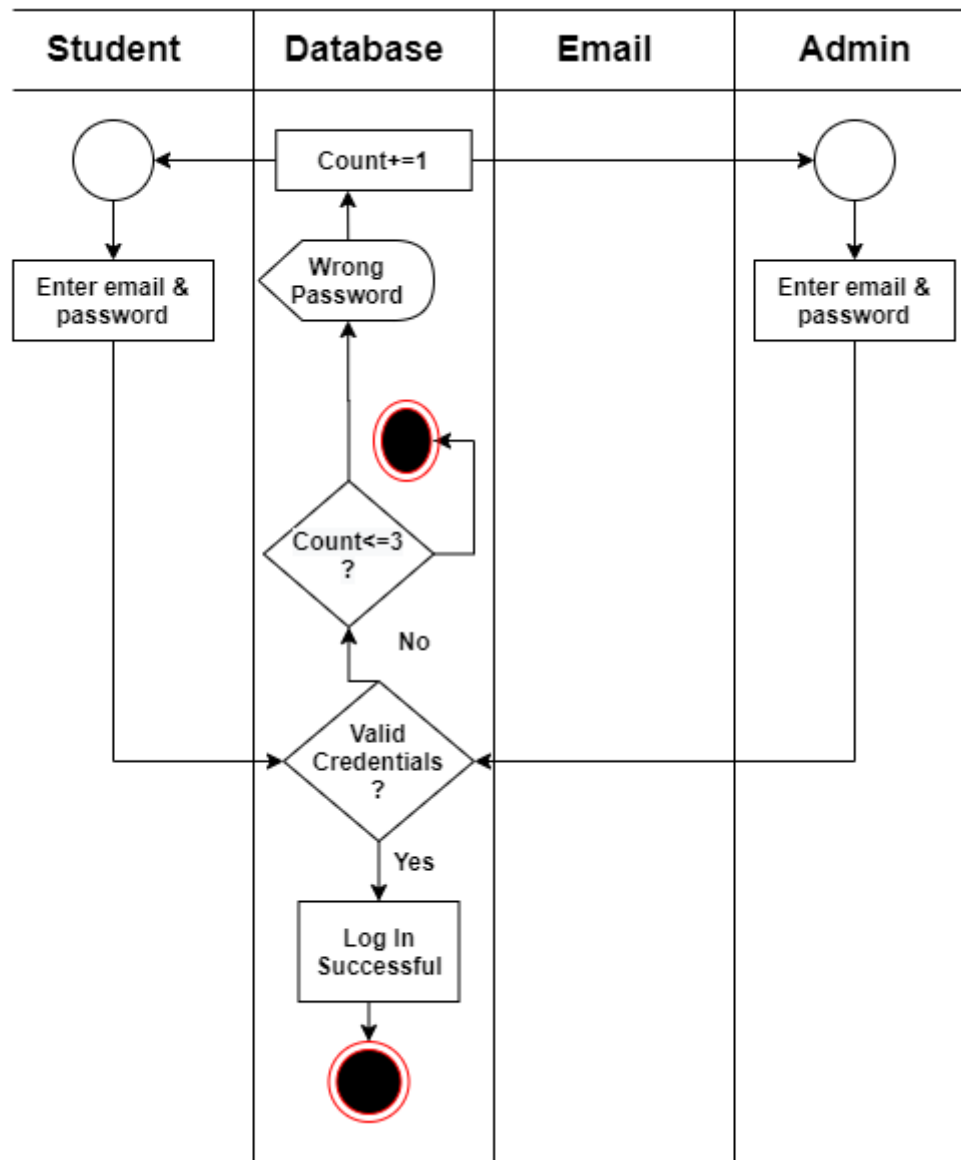


**Description:** This is the swimlane diagram of the corresponding activity diagram ID:3. It shows how different actors are involved with each activities of the module.

The necessary description of the activity can be found in the same activity diagram. Hence, it is not being repeated here.

#### 4.4 Swimlane diagram ID: 4

**Name:** Log In

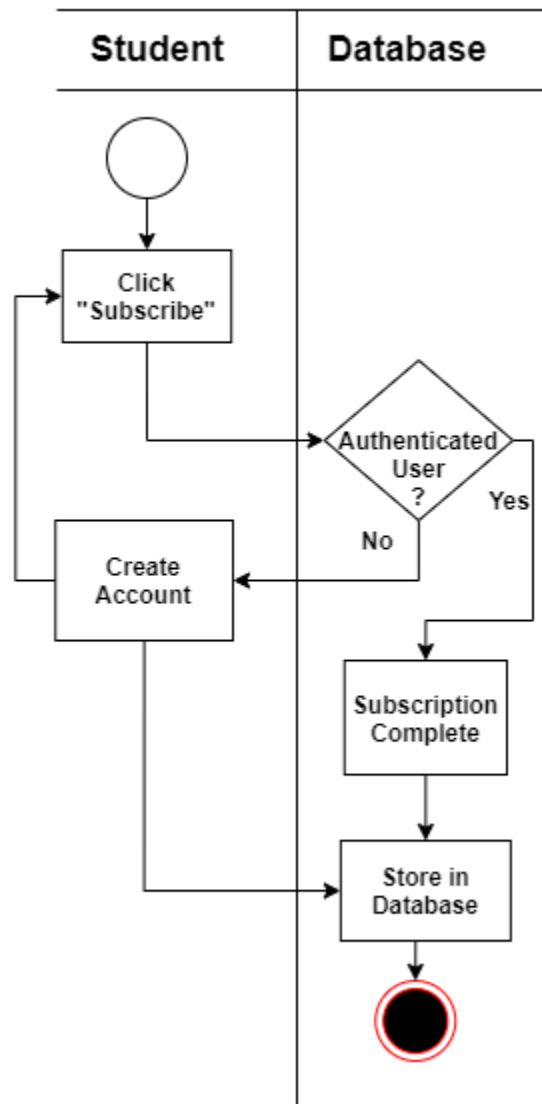


**Description:** This is the swimlane diagram of the corresponding activity diagram ID:4. It shows how different actors are involved with each activities of the module.

The necessary description of the activity can be found in the same activity diagram. Hence, it is not being repeated here.

## 4.5 Swimlane diagram ID: 5

**Name:** Subscription Management

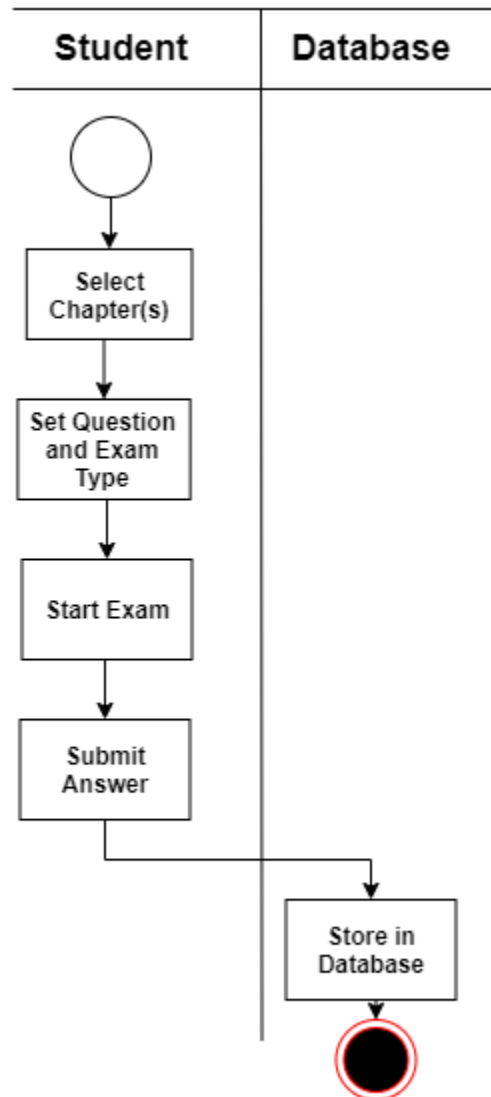


**Description:** This is the swimlane diagram of the corresponding activity diagram ID:5. It shows how different actors are involved with each activities of the module.

The necessary description of the activity can be found in the same activity diagram. Hence, it is not being repeated here.

## 4.6 Swimlane diagram ID: 6

**Name:** Practice Exam

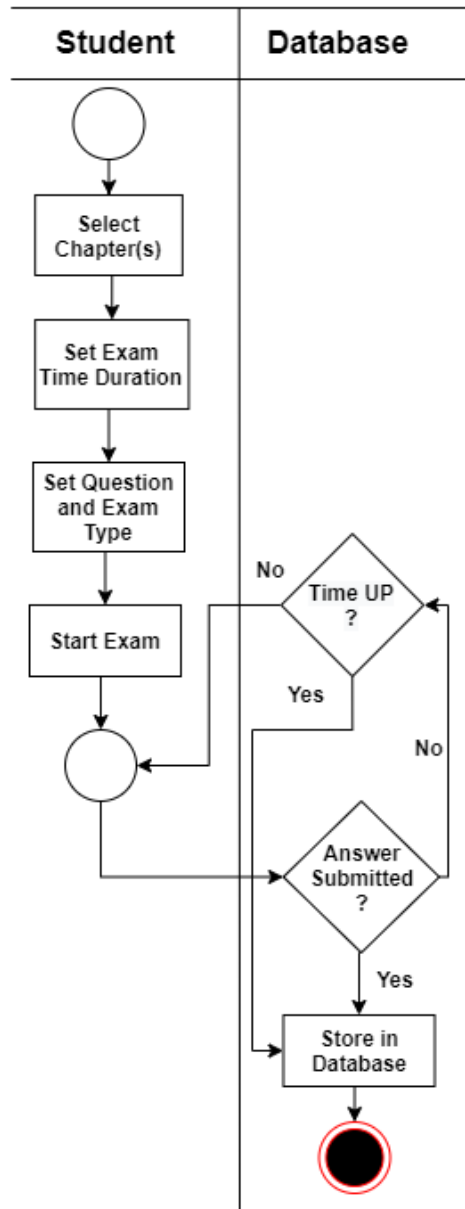


**Description:** This is the swimlane diagram of the corresponding activity diagram ID:6. It shows how different actors are involved with each activities of the module.

The necessary description of the activity can be found in the same activity diagram. Hence, it is not being repeated here.

## 4.7 Swimlane diagram ID: 7

**Name:** Test Exam

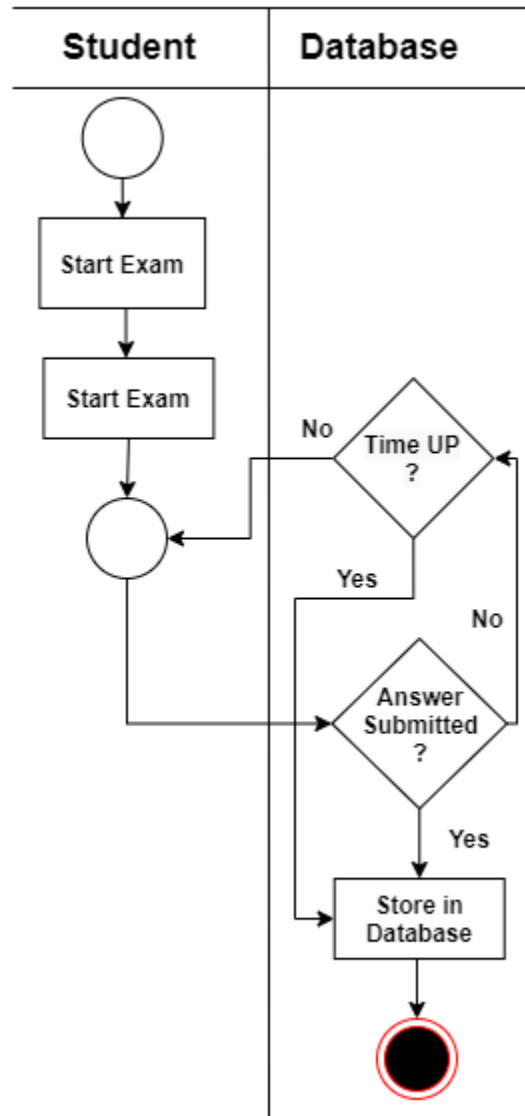


**Description:** This is the swimlane diagram of the corresponding activity diagram ID:7. It shows how different actors are involved with each activities of the module.

The necessary description of the activity can be found in the same activity diagram. Hence, it is not being repeated here.

## 4.8 Swimlane diagram ID: 8

**Name:** Exam Time Management

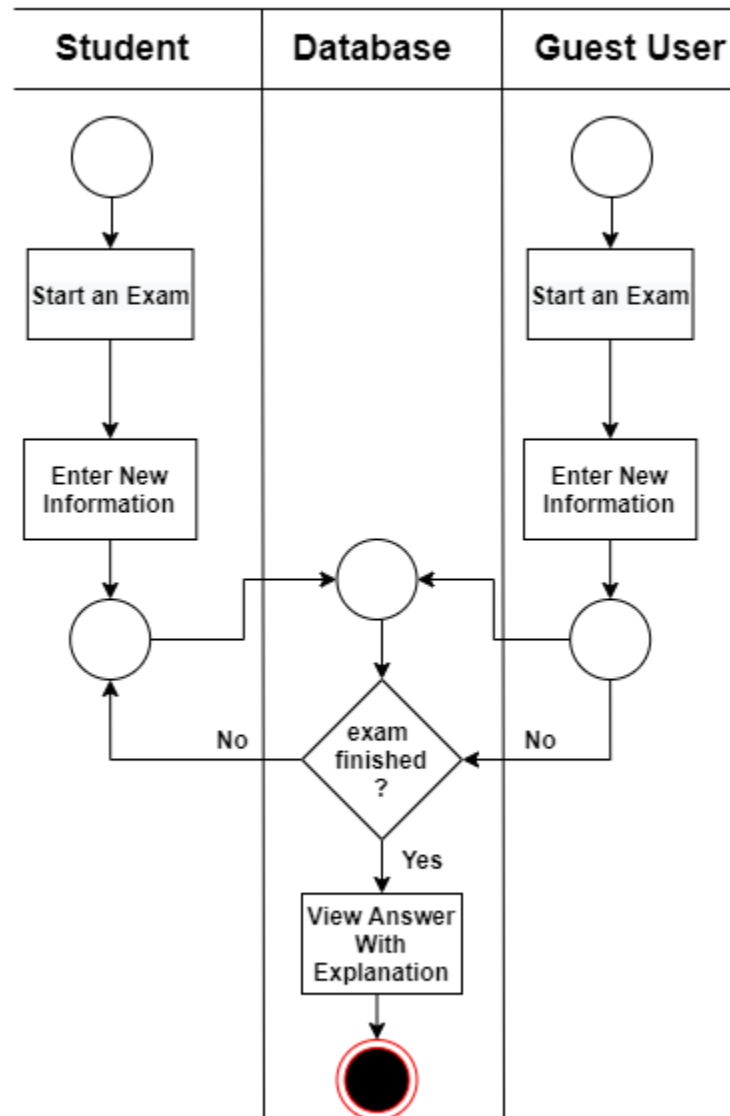


**Description:** This is the swimlane diagram of the corresponding activity diagram ID:8. It shows how different actors are involved with each activities of the module.

The necessary description of the activity can be found in the same activity diagram. Hence, it is not being repeated here.

## 4.9 Swimlane diagram ID: 9

**Name:** View Answer Details

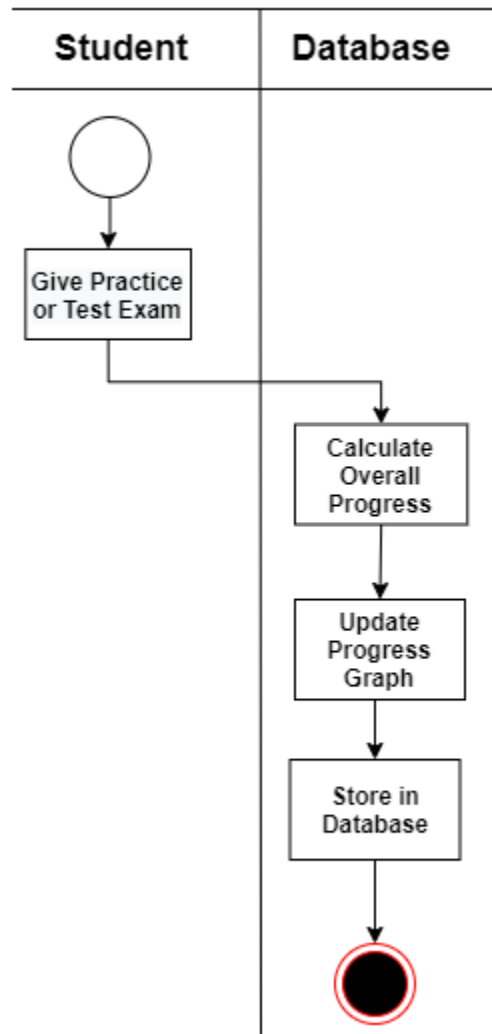


**Description:** This is the swimlane diagram of the corresponding activity diagram ID:9. It shows how different actors are involved with each activities of the module.

The necessary description of the activity can be found in the same activity diagram. Hence, it is not being repeated here.

## 4.10 Swimlane diagram ID: 10

**Name:** Progress Graph

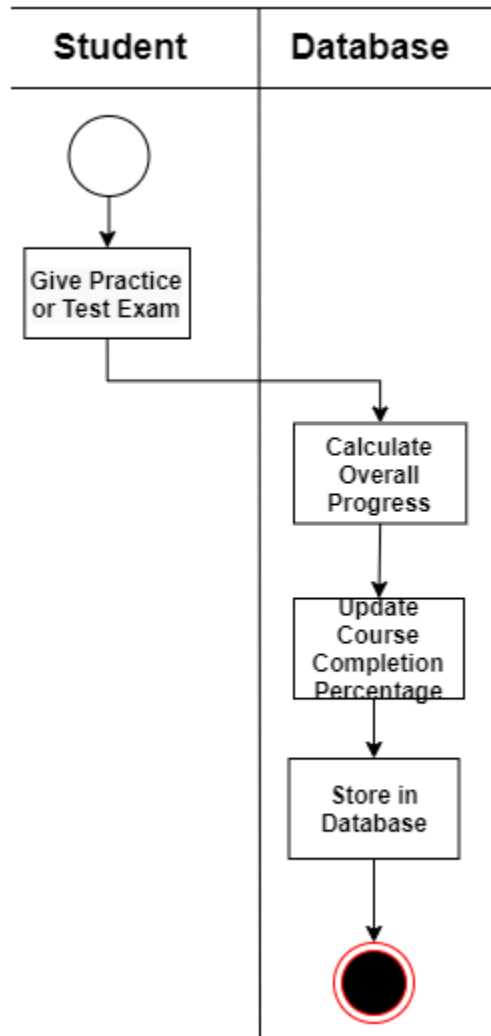


**Description:** This is the swimlane diagram of the corresponding activity diagram ID:10. It shows how different actors are involved with each activities of the module. The necessary description of the activity can be found in the same activity diagram. Hence, it is not being repeated here.



#### 4.11 Swimlane diagram ID: 11

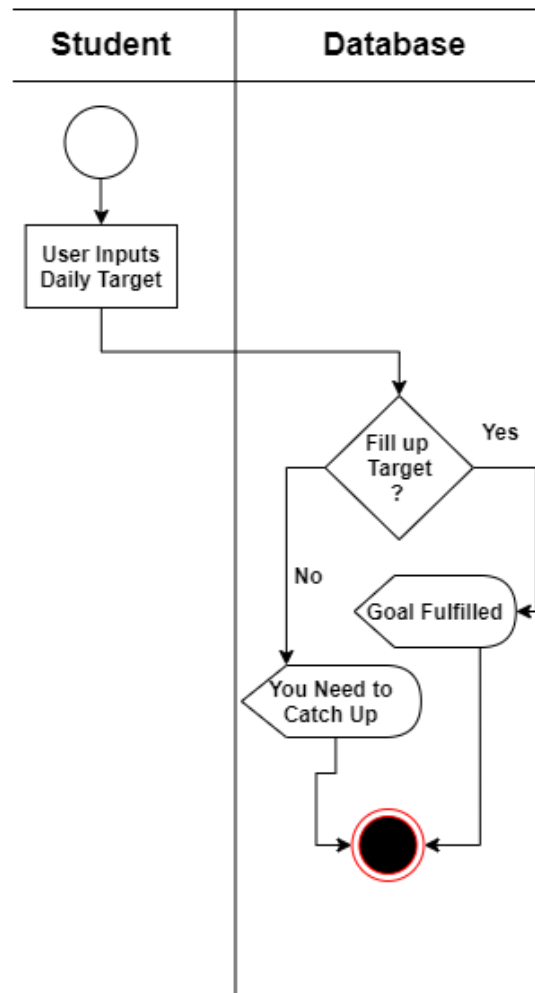
**Name:** Course Completion



**Description:** This is the swimlane diagram of the corresponding activity diagram ID:11. It shows how different actors are involved with each activities of the module. The necessary description of the activity can be found in the same activity diagram. Hence, it is not being repeated here.

## 4.12 Swimlane diagram ID: 12

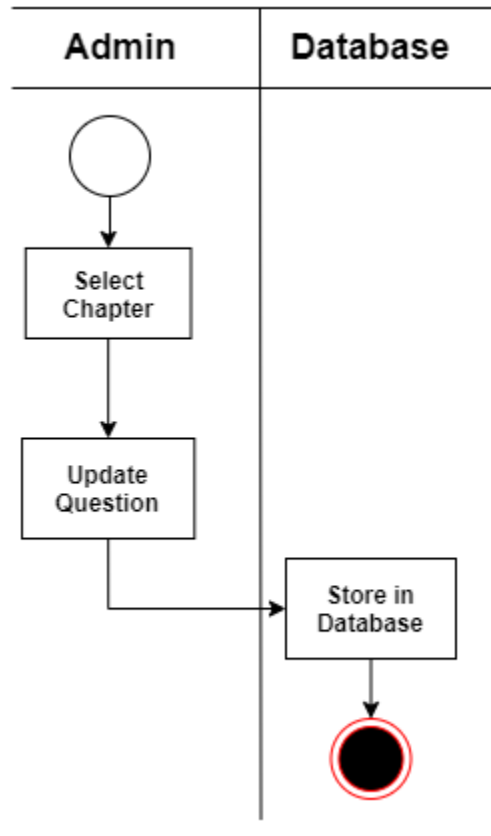
**Name:** Goal Completion



**Description:** This is the swimlane diagram of the corresponding activity diagram ID:12. It shows how different actors are involved with each activities of the module. The necessary description of the activity can be found in the same activity diagram. Hence, it is not being repeated here.

### 4.13 Swimlane diagram ID: 13

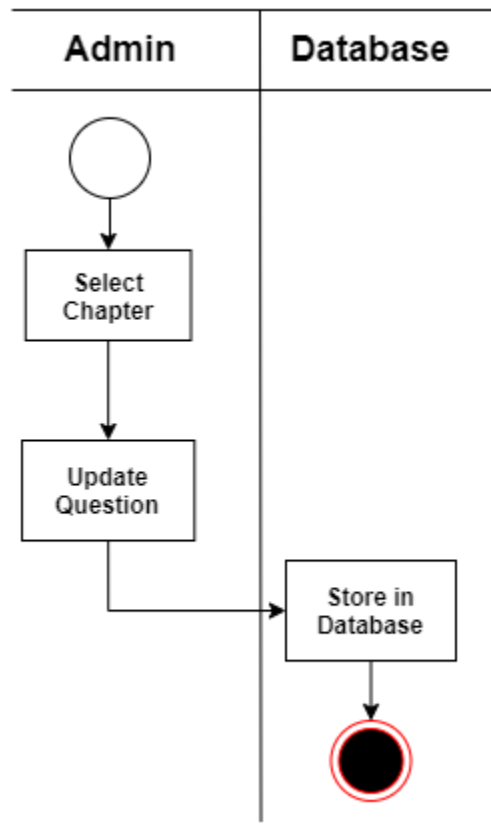
**Name:** Upload Question



**Description:** This is the swimlane diagram of the corresponding activity diagram ID:13. It shows how different actors are involved with each activities of the module. The necessary description of the activity can be found in the same activity diagram. Hence, it is not being repeated here.

#### 4.14 Swimlane diagram ID: 14

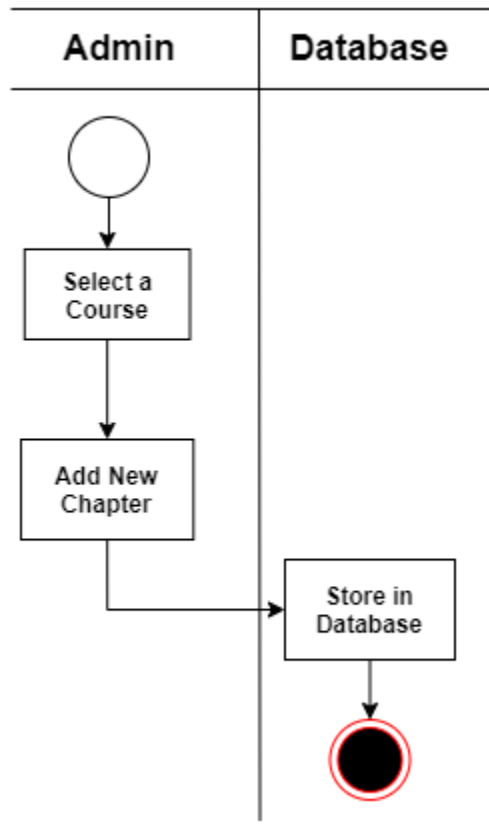
**Name:** Update Question



**Description:** This is the swimlane diagram of the corresponding activity diagram ID:14. It shows how different actors are involved with each activities of the module. The necessary description of the activity can be found in the same activity diagram. Hence, it is not being repeated here.

#### 4.15 Swimlane diagram ID: 15

**Name:** Add New Chapter



**Description:** This is the swimlane diagram of the corresponding activity diagram ID:15. It shows how different actors are involved with each activities of the module. The necessary description of the activity can be found in the same activity diagram. Hence, it is not being repeated here.

## 5. Databased Modeling

### 5.1 Data Object Identification

ID	Noun	Attribute
1.	Exam	x
2.	Application	x
3.	Student	7, 8, 9, 10, 45
4.	Account	x
5.	User	7, 8, 9, 10, 45
6.	Course	21, 44
7.	Name	x
8.	Mobile	x
9.	Email	x
10.	Password	x
11.	Verification code	x
12.	Information	x
13.	System	x
14.	Update	x
15.	Link	x
16.	Database	x
17.	OTP	x
18.	Admin	9, 10, 19, 46
19.	Username	x
20.	Subscription	46, 47

21.	Syllabus	x
22.	Question	24, 51, 53, 23
23.	Chapter	x
24.	Answer	x
25.	Options	x
26.	Marks	x
27.	Quantity	x
28.	Test exam	47, 31, 26, 27
29.	Amount	x
30.	Time	x
31.	Answer sheet	x
32.	Goal	x
33.	Demo Exam	x
34.	Guest User	x
35.	Practice Exam	26,27,31
36.	Result	x
37.	Chapter	42,43
38.	Explanation	x
39.	QuestionStatus	46,47,48,49
40.	Performance	x
41.	Progress graph	x
42.	ChapterId	x
43.	ChapterName	x
44.	Course completion	x
45.	Topics	x
46.	System database	x

47.	User database	x
48.	CourseID	x
49.	Seen	x
50.	Unseen	x
51.	Correct	X
52.	Wrong	x
53.	StudentID	x
54.	SubscriberID	x
55.	Correct answer	x
56.	ImageURL	x
57.	Image	50,52
58.	ImageID	x
59.	Options	x
60.	Answer Details	x

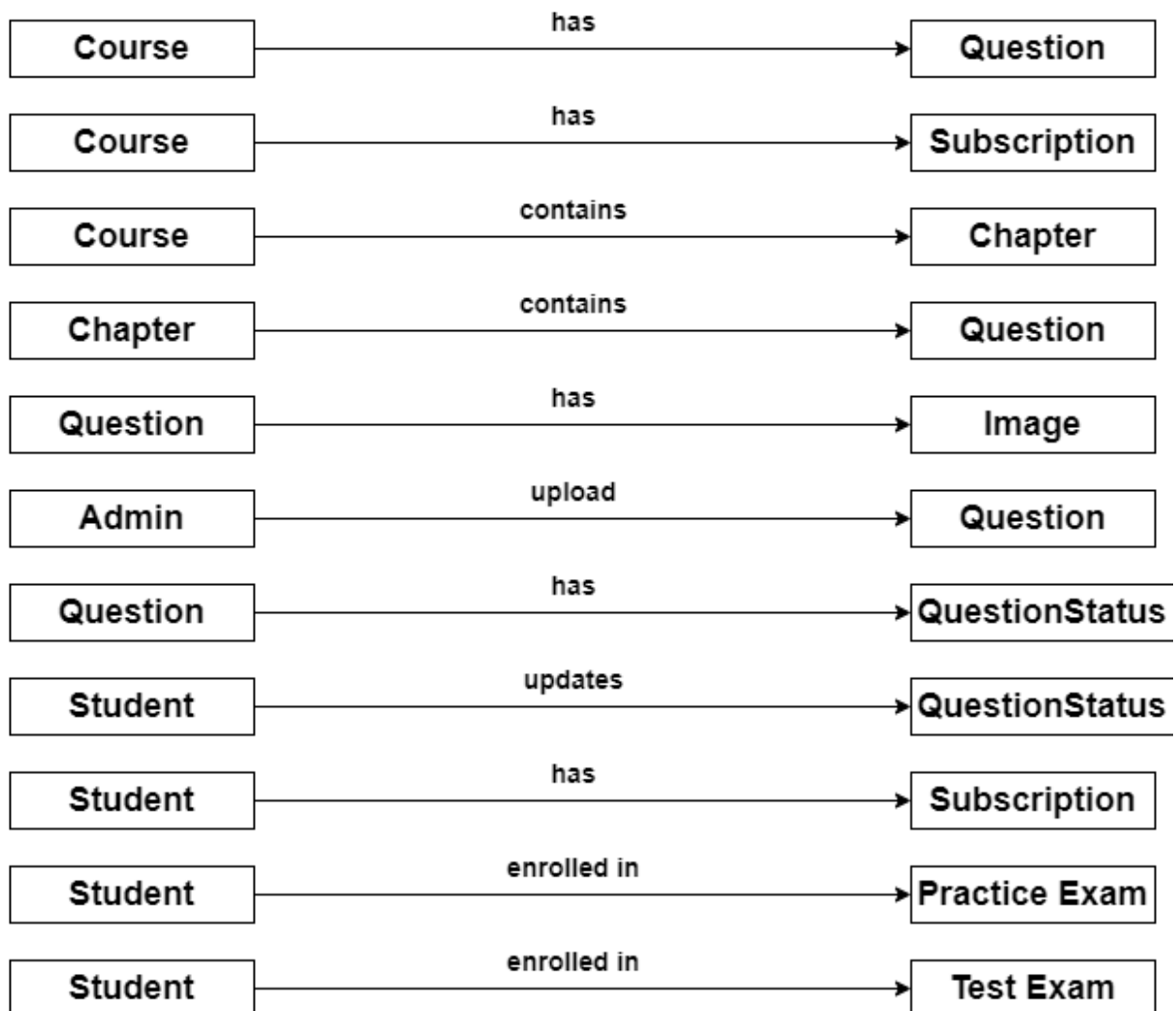
## 5.2 Final Data Objects

ID	Noun	Attribute
3	Student	7, 8, 9, 10, 45
6	Course	21, 44
18	Admin	9, 10, 19, 46
20	Subscription	46, 47

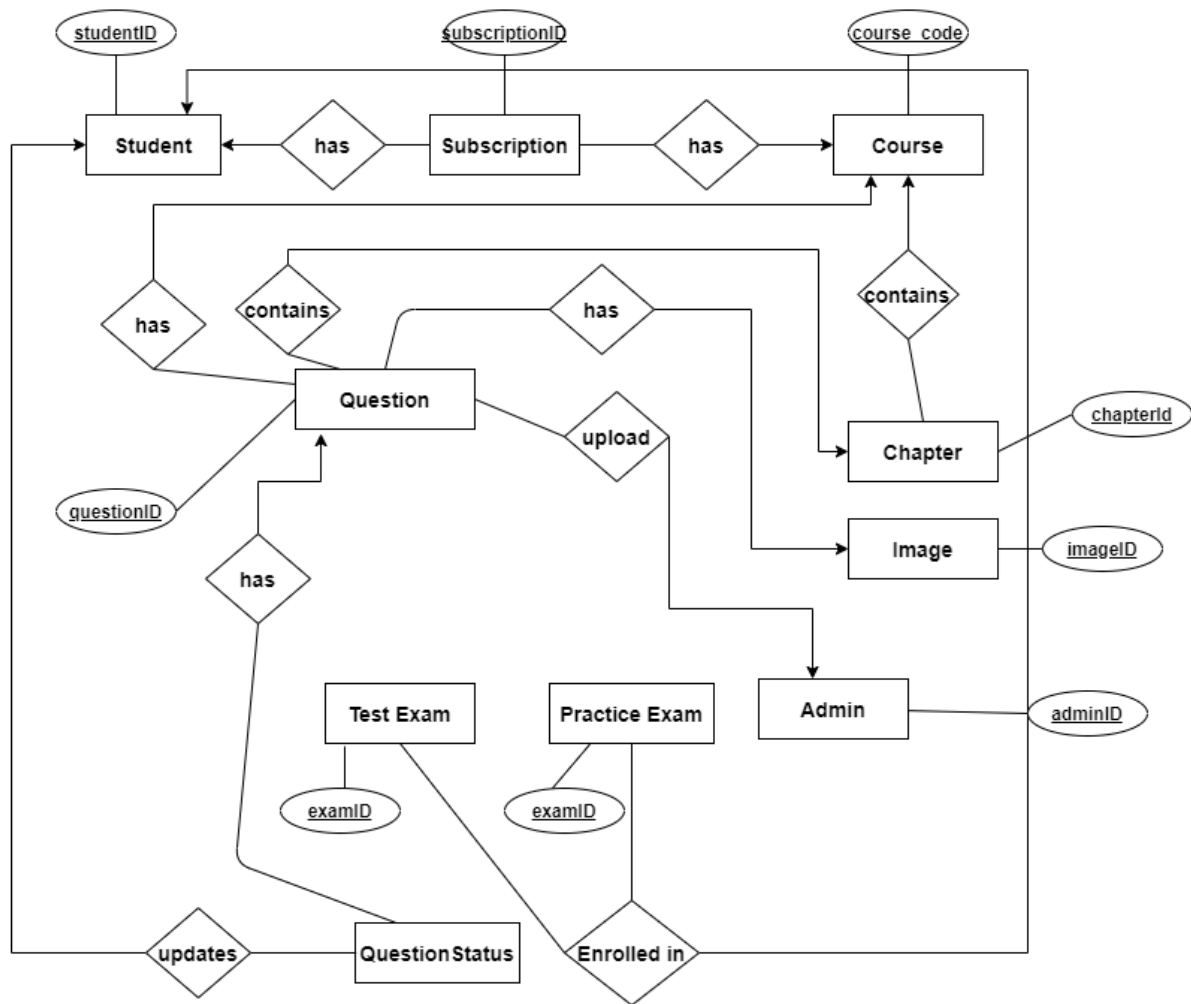


22	Question	24, 51, 53, 23
28	Test exam	47, 31, 26, 27
35	Practice Exam	26, 27, 31
51	Image	50, 52
37.	Chapter	42, 43
39	QuestionStatus	46, 47, 48, 49

## 5.3 Relationship Between Data Objects



## 5.4 ER Diagram



## 5.5 Relationship Schema

### Student

Attribute	Type	Size
<u>studentID</u>	int	8
name	varchar	25
email	varchar	30
password	varchar	20
phone	varchar	20

### Course

Attribute	Type	Size
<u>course_code</u>	int	8
name	varchar	20

### Admin

Attribute	Type	Size
<u>adminID</u>	int	8
username	varchar	20
password	varchar	20
email	varchar	25

**Question**

Attribute	Type	Size
<u>questionID</u>	int	8
question	varchar	300
option1	varchar	200
option2	varchar	200
option3	varchar	200
option4	varchar	200
correct_answer	varchar	200
isBookmarked	Int	8
<u>chapter_id</u>	varchar	100
<u>imageID</u>	int	8
<u>course_code</u>	int	8

**Subscription**

Attribute	Type	Size
<u>subscriberID</u>	int	8
date	date	null
length	date	null
price	Int	8
<u>course_code</u>	Int	8
<u>studentID</u>	int	8

### **Practice Exam**

Attribute	Type	Size
<u>examID</u>	int	8
quantity	int	8
Total_correct_answer	int	8
Total_wrong_answer	int	8
<u>studentID</u>	int	8

### **Test Exam**

Attribute	Type	Size
<u>examID</u>	int	8
Starting_time	date	null
quantity	int	8
Total_correct_answer	int	8
Total_wrong_answer	int	8
<u>studentID</u>	int	8

### **Image**

Attribute	Type	Size
<u>imageID</u>	int	8
imageURL	varchar	100

**questionStatus**

Attribute	Type	Size
practiceSeenOrUnseen	int	8
practiceCorrectOrWrong	int	8
testSeenOrUnseen	Int	8
testCorrectOrWrong	Int	8
<u>questionID</u>	int	8
<u>studentID</u>	int	8

## 6. Class Based Modeling

### 6.1 General Classification

General Classification Criteria:

1. External entities
2. Things
3. Events
4. Roles
5. Organizational units
6. Places
7. Structures

### General Classification

SL.	Noun	General Classification
1.	Exam	2, 3, 4
2.	Application	1
3.	Student	2, 4, 5, 7
4.	Account	2, 4, 5
5.	User	2, 4, 5, 7
6.	Course	2, 4, 5, 7



7.	Name	2
8.	Mobile	2
9.	Email	2
10.	Password	2
11.	Verification code	2
12.	Information	2, 7
13.	System	1
14.	Update	2
15.	Link	2
16.	Database	1, 2, 4, 5
17.	OTP	2
18.	Admin	2, 4, 5, 7
19.	Username	2
20.	Subscription	2, 3, 5, 7
21.	Syllabus	2, 7
22.	Question	2, 7

23.	Chapter	2, 5, 7
24.	Answer	2, 7
25.	Options	2, 7
26.	Marks	2
27.	Quantity	2
28.	Test exam	2, 3, 5, 7
29.	Amount	2
30.	Time	2
31.	Answer sheet	2, 5, 7
32.	Goal	2, 3, 7
33.	Demo Exam	2, 3, 5, 7
34.	Guest User	2, 4, 5, 7
35.	Practice Exam	2, 3, 5, 7
36.	Result	2, 3
37.	Explanation	2, 7
38.	Performance	2, 5, 7

39.	Progress graph	2, 5, 7
40.	Course completion	2, 5, 7
41.	Topics	2, 5, 7
42.	System database	1, 2, 4, 5, 7
43.	User database	1, 2, 4, 5, 7
44.	Time stamp	2
45.	IP	2
46.	Correct answer	2, 7
47.	ImageURL	2
48.	Image	2, 7
49.	Options	2, 7
50.	Answer Details	2, 7

## 6.2 Selection Criteria

The candidate classes are then selected as classes by six Selection Criteria. A candidate class generally becomes a class when it fulfills around three characteristics.

1. Retain information
2. Needed services

3. Multiple attributes

4. Common attributes

5. Common operations

6. Essential requirements

SL.	Noun	Selection Criteria
1.	Exam	1-6
2.	Student	1-6
3.	Account	1-6
4.	User	1-6
5.	Course	1-6
6.	Information	1
7.	Database	1, 2, 3, 6
8.	Admin	1-6
9.	Subscription	1-6
10.	Syllabus	1
11.	Question	1

12.	Chapter	1, 4
13.	Answer	1
14.	Options	1
15.	Test exam	1-6
16.	Answer sheet	1
17.	Goal	1, 2, 3,6
18.	Demo Exam	1-6
19.	Guest User	1-6
20.	Practice Exam	1-6
21.	Result	1, 3
22.	Explanation	1
23.	Performance	1, 2, 3, 6
24.	Progress graph	1-6
25.	Course completion	1-6
26.	Topics	1, 3
27.	System database	1-6

28.	User database	1-6
29.	Correct answer	1
30.	Image	1, 2, 3, 6
31.	Answer Details	1

### 6.3 Potential Classes

Exam	-examType -totalQuestion -seenOrUnseen -correctOrWrong -totalCorrectAnswer -totalWrongAnswer -isBookmarked	+ examType() + setQuantity() + setQuestionType() + getQuestion() + selectTopic(s)() + viewAnswerDetails() + viewResult() + submitAnswer()
Practice Exam	-examType -totalQuestion -seenOrUnseen -correctOrWrong	+ examType() + setQuantity() + setQuestionType() + getQuestion()

	-totalCorrectAnswer -totalWrongAnswer -isBookmarked	+ selectTopic(s)() + viewAnswerDetails() + viewResult() + submitAnswer() + updatePracticeQuestionStatus()
Test Exam	-examType -totalQuestion -seenOrUnseen -correctOrWrong -totalCorrectAnswer -totalWrongAnswer -isBookmarked -totalMarks -startingTime	+ examType() + setQuantity() + setQuestionType() + getQuestion() + selectTopic(s)() + viewAnswerDetails() + viewResult() + submitAnswer() + calculateMarks() + setTime() + checkTimeOut() + showResult() + updateTestQuestionStatus()
Demo Exam	-chapterId -courseCode	+ giveDemoExam() + selectCourse() + submit() + calculateMarks() + viewAnswerDetails()
User	-userName -email -phoneNo -password	+ createAccount() + emailVerification() + giveDemoExam()
Student	-courseCode	+ createAccount()

	-userName -email -phoneNo -password	+ emailVerification() + giveDemoExam() + LogIn() + editPersonallInfo() + resetPassword() + recoverAccount() + logout() + subscribeToCourse() + viewProgress() + enrollIntoACourse() + setGoal() + giveExam() + viewCourseMaterial() + viewQuestions()
Course	-courseCode -isBookmarked -topics -syllabus	+ getCourseCode() + viewSyllabus() + viewPreviousResults() + viewBookmarkedQuestions() + viewWrongAnswers()
Admin	-name -email -phoneNo -password	+ logIn() + addNewChapter() + removeChapter() + updateQuestion() + uploadQuestion() + logOut()
System		+ verifyInfo() + sendOTP() + notifyUser()



Performance		+ viewProgressGraph() + viewCourseCompletion() + viewGoalCompletion()
Subscription	-subscriberId -subscriptionLength -subscriptiondate -subscriptionPrice -isValid	+ getSubscriptionDate() + setSubscriptionDate() + getSubscriptionLength() + setSubscriptionLength() + getSubscriptionPrice() + setSubscriptionPrice() + setSubscriptionEndDate() + checkSubscriptionValidity()
Email		+ notifyThroughEmail()
Database		+ updateInfo() + updateCourseMaterial() + updateQuestionStatus()

## 6.4 Analysis

- All the attributes and methods of the class Student is included in that of User class. Hence, Student class is a subclasses of User superclass.
- Both, Practice Exam and Test Exam is Exam. They have all the attributes and methods of Exam plus some unique ones of their own. So, they will inherit form Exam for polymorphism purposes.

## 6.5 Class Cards

User	
<b>Attributes:</b> -userName -email -phoneNo -password	<b>Methods:</b> + createAccount() + emailVerification() + giveDemoExam()
<b>Responsibilities:</b> <ul style="list-style-type: none"> <li>• Authentication</li> <li>• Creating account</li> <li>• Changing user info</li> <li>• Reset password if forgets it</li> <li>• Logging out from a session</li> <li>• Giving demo exam</li> </ul>	<b>Collaborators:</b> <ul style="list-style-type: none"> <li>• Demo Exam</li> <li>• Question</li> </ul>

Student	
<b>Attributes:</b> -courseCode	<b>Methods:</b> + Login() + editPersonalInfo() + resetPassword() + recoverAccount() + logout()

	+ subscribeToCourse() + viewProgress() + enrollIntoACourse() + setGoal() + giveExam() + viewCourseMaterial() + viewQuestions()
Responsibilities: <ul style="list-style-type: none"> <li>• Subscribing to a course</li> <li>• Viewing progress graph</li> <li>• Enroll into a course</li> <li>• Setting a goal</li> <li>• Giving exam</li> </ul>	Collaborators: <ul style="list-style-type: none"> <li>• Subscription</li> <li>• Progress</li> <li>• Course</li> <li>• Exam</li> </ul>

Admin	
Attributes: <ul style="list-style-type: none"> <li>-name</li> <li>-email</li> <li>-phoneNo</li> <li>-password</li> </ul>	Methods: <ul style="list-style-type: none"> <li>+ logIn()</li> <li>+ addNewChapter()</li> <li>+ removeChapter()</li> <li>+ updateQuestion()</li> <li>+ uploadQuestion()</li> <li>+ logOut()</li> </ul>
Responsibilities: <ul style="list-style-type: none"> <li>• Updating course material</li> </ul>	Collaborators: <ul style="list-style-type: none"> <li>• Course</li> </ul>

Exam	
<b>Attributes:</b> -examType -totalQuestion -seenOrUnseen -correctOrWrong -totalCorrectAnswer -totalWrongAnswer -isBookmarked	<b>Methods:</b> + examType() + setQuantity() + setQuestionType() + getQuestion() + selectTopic(s) + viewAnswerDetails() + viewResult() + submitAnswer()
<b>Responsibilities:</b> <ul style="list-style-type: none"> <li>• Taking test</li> <li>• Getting question</li> <li>• Viewing answer</li> </ul>	<b>Collaborators:</b> <ul style="list-style-type: none"> <li>• Practice Exam</li> <li>• Test Exam</li> <li>• Course</li> <li>• Student</li> </ul>

Practice Exam	
<b>Attributes:</b>	<b>Methods:</b> + updatePracticeQuestionStatus()
<b>Responsibilities:</b> <ul style="list-style-type: none"> <li>• Taking exam</li> <li>• Updating question status</li> </ul>	<b>Collaborators:</b> <ul style="list-style-type: none"> <li>• Course</li> <li>• Exam</li> <li>• Student</li> </ul>

Test Exam	
<b>Attributes:</b> -totalMarks -startingTime	<b>Methods:</b> + calculateMarks() + setTime() + checkTimeOut() + showResult() + updateTestQuestionStatus()
<b>Responsibilities:</b> <ul style="list-style-type: none"> <li>• Taking test exam</li> <li>• Showing result</li> <li>• Viewing answer details</li> </ul>	<b>Collaborators:</b> <ul style="list-style-type: none"> <li>• Course</li> <li>• Exam</li> <li>• Student</li> </ul>

Demo Exam	
<b>Attributes:</b> -chapterId -courseCode	<b>Methods:</b> + giveDemoExam() + selectCourse() + submit() + calculateMarks() + viewAnswerDetails()
<b>Responsibilities:</b> <ul style="list-style-type: none"> <li>• Getting demo exam question</li> <li>• Viewing answer details</li> </ul>	<b>Collaborators:</b> <ul style="list-style-type: none"> <li>• Course</li> <li>• User</li> </ul>

Course	
<b>Attributes:</b> -courseCode -isBookmarked -topics -syllabus	<b>Methods:</b> + getCourseCode() + viewSyllabus() + viewPreviousResults() + viewBookmarkedQuestions() + viewWrongAnswers()
<b>Responsibilities:</b> <ul style="list-style-type: none"> <li>Showing previous exam result to student</li> <li>Viewing bookmarked questions</li> <li>Viewing wrong answers</li> </ul>	<b>Collaborators:</b> <ul style="list-style-type: none"> <li>Exam</li> <li>Student</li> <li>Course</li> </ul>

System	
<b>Attributes:</b>	<b>Methods:</b> + verifyInfo() + sendOTP() + notifyUser()
<b>Responsibilities:</b> <ul style="list-style-type: none"> <li>Calling email (external subsystem)</li> <li>Verify user info</li> <li>Notify user</li> </ul>	<b>Collaborators:</b> <ul style="list-style-type: none"> <li>User</li> <li>Email</li> </ul>

Subscription	
<p>Attributes:</p> <ul style="list-style-type: none"> <li>-subscriberId</li> <li>-subscriptionLength</li> <li>-subscriptiondate</li> <li>-subscriptionPrice</li> <li>-isValid</li> </ul>	<p>Methods:</p> <ul style="list-style-type: none"> <li>+ getSubscriptionDate()</li> <li>+ setSubscriptionDate()</li> <li>+ getSubscriptionLength()</li> <li>+ setSubscriptionLength()</li> <li>+ getSubscriptionPrice()</li> <li>+ setSubscriptionPrice()</li> <li>+ setSubscriptionEndDate()</li> <li>+ checkSubscriptionValidity()</li> </ul>
<p>Responsibilities:</p> <ul style="list-style-type: none"> <li>• Get and set subscription related messages</li> <li>• Checking subscription validity</li> </ul>	<p>Collaborators:</p> <ul style="list-style-type: none"> <li>• Course</li> <li>• Student</li> </ul>

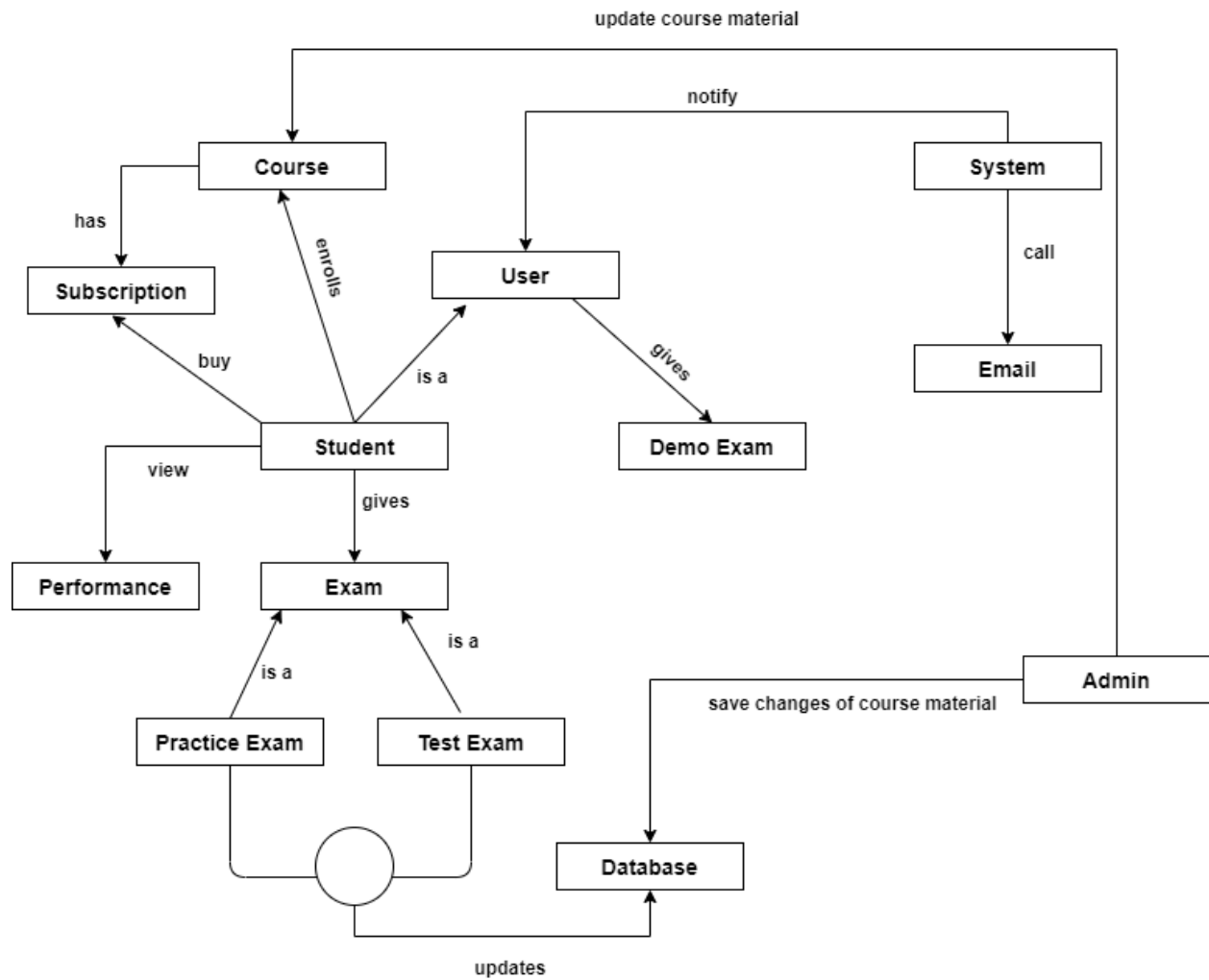
Performance	
<p>Attributes:</p>	<p>Methods:</p> <ul style="list-style-type: none"> <li>+ viewProgressGraph()</li> <li>+ viewCourseCompletion()</li> <li>+ viewGoalCompletion()</li> </ul>
<p>Responsibilities:</p> <ul style="list-style-type: none"> <li>• Viewing students' progress</li> <li>• Viewing students course completion percentage</li> <li>• Viewing goal completion</li> </ul>	<p>Collaborators:</p> <ul style="list-style-type: none"> <li>• Student</li> </ul>

Email	
Attributes:	Methods: + notifyThroughEmail()
Responsibilities: <ul style="list-style-type: none"><li>• Sending verification message</li></ul>	Collaborators: <ul style="list-style-type: none"><li>• System</li></ul>

Database	
Attributes:	Methods: + updateInfo() + updateCourseMaterial() + updateQuestionStatus()
Responsibilities: <ul style="list-style-type: none"><li>• Updating user info</li><li>• Updating question status in user database</li><li>• Update course material</li></ul>	Collaborators: <ul style="list-style-type: none"><li>• Practice Exam</li><li>• Test Exam</li><li>• Course</li></ul>



## 6.6CRC Diagram



## 8. Behavioral Modeling

### 7.1 Event Identification Table:

NO.	Event	State Name	Initiator	Collaborator
1.	Sign Up	Provide info to create new account	User	
2.	Complete account creation	Verifying email to create a new account	User	Email
3.	Log In	Logging into an account by authentication	User Admin	System
4.	Send link for verification	Sending link through email	System	Email User
5.	Edit personal info	Editing personal info	Student	
6.	Recover password	Recovering password	Student	
7.	Subscribe to a course	Subscribing to a course	Student	Course Subscription
8.	Choose subscription plan	Choosing subscription plan	Student	Course Subscription
9.	Select topics for exam	Selecting topics for exam	Student	Course
10.	Enroll into a course	Enrolling into a course	Student	Course
11.	Set quantity of questions	Setting quantity of question	Student	Practice Exam

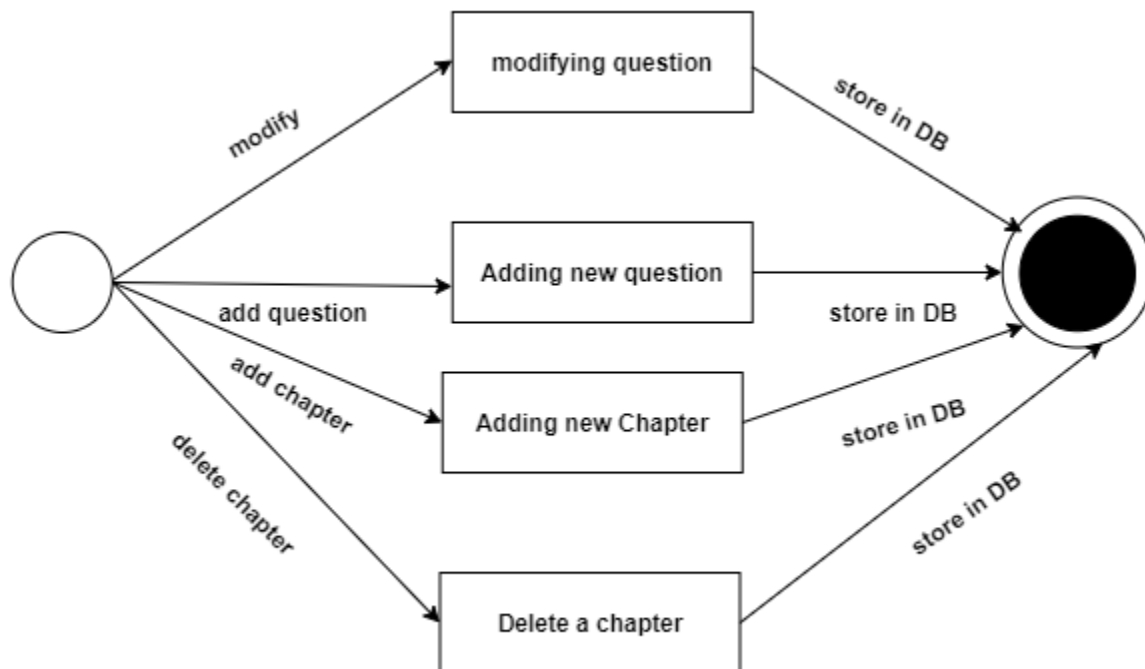
				Test Exam
12.	Set time duration	Setting time duration	Student	Test Exam
13.	Select question type	Selecting question type	Student	Practice Exam Test Exam
14.	Take a test	Taking a test	Student	Course Exam
15.	Set a goal	Setting a goal	Student	Course Performance
16.	Notify user about progress	Notifying user about progress	System	Performance Student
17.	Give practice exam	Giving practice exam	Student	Course Practice exam
18.	View answer details	Viewing answer details	System	User Exam
19.	Give test exam	Giving test exam	Student	Course Test Exam
20.	Give demo exam	Giving demo exam	User	Course Demo Exam
21.	View progress graph	Viewing progress graph	Student	Performance
22.	View course completion	Viewing course completion	Student	Performance
23.	Upload question	Uploading question	Admin	Course

				Database
24.	Modify question	Modifying question	Admin	Course Database
25.	Add new chapter	Adding new chapter	Admin	Course Database
26.	Logout	Logging out	User Admin	
27.	View previous exam details	Viewing previous exam details	Student	Course
28.	Submit answer	Submitting answer	User System	Exam
29.	View wrong answers	Viewing wrong answers	Student	Course Database
30.	View bookmarked questions	Viewing bookmarked questions	Student	Course Database
31.	Show result	Viewing result	User	Exam Demo Exam

## 7.2 State Transition Diagrams

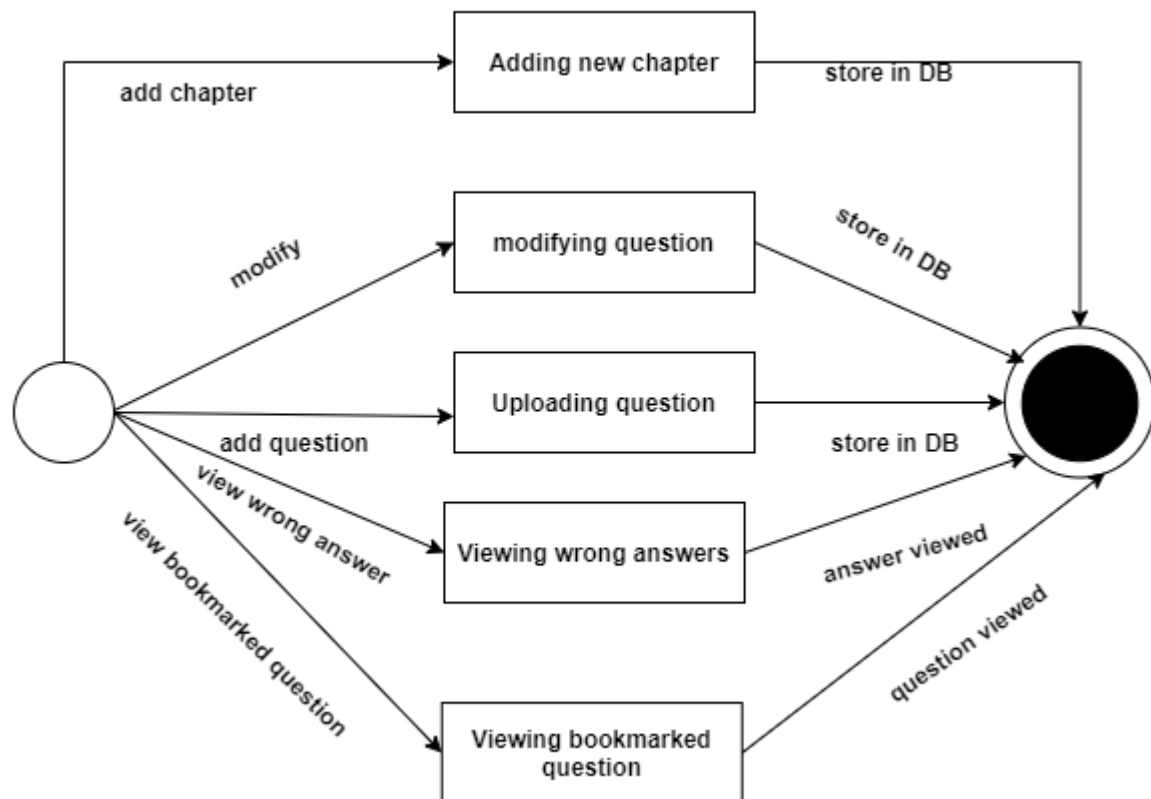
### 7.2.1 Class name: Admin

ID: C\_01



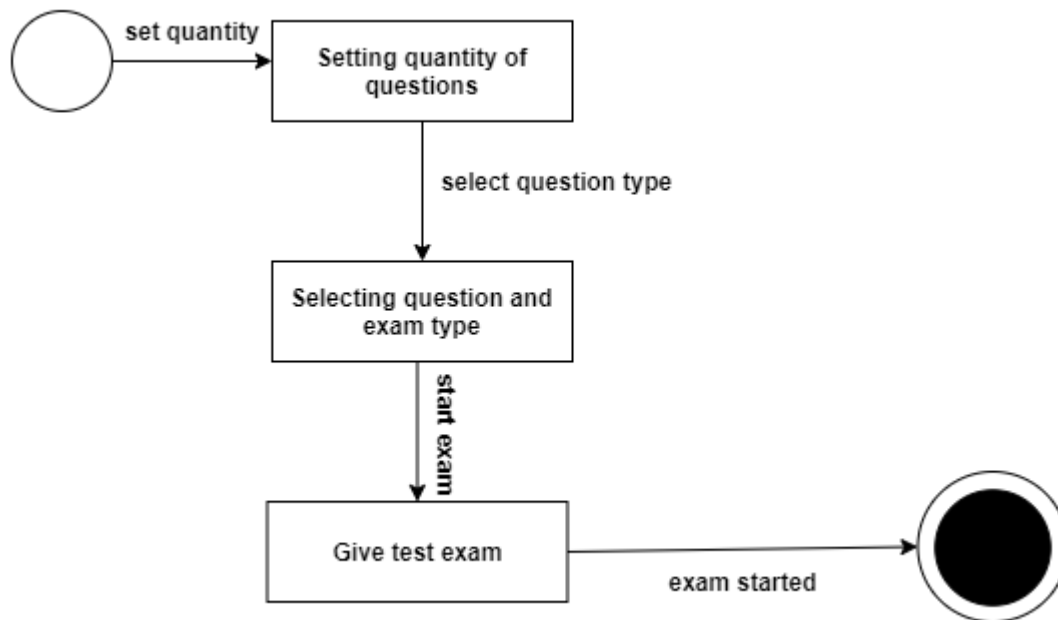
## 7.2.2 Class name: Database

ID: C\_02



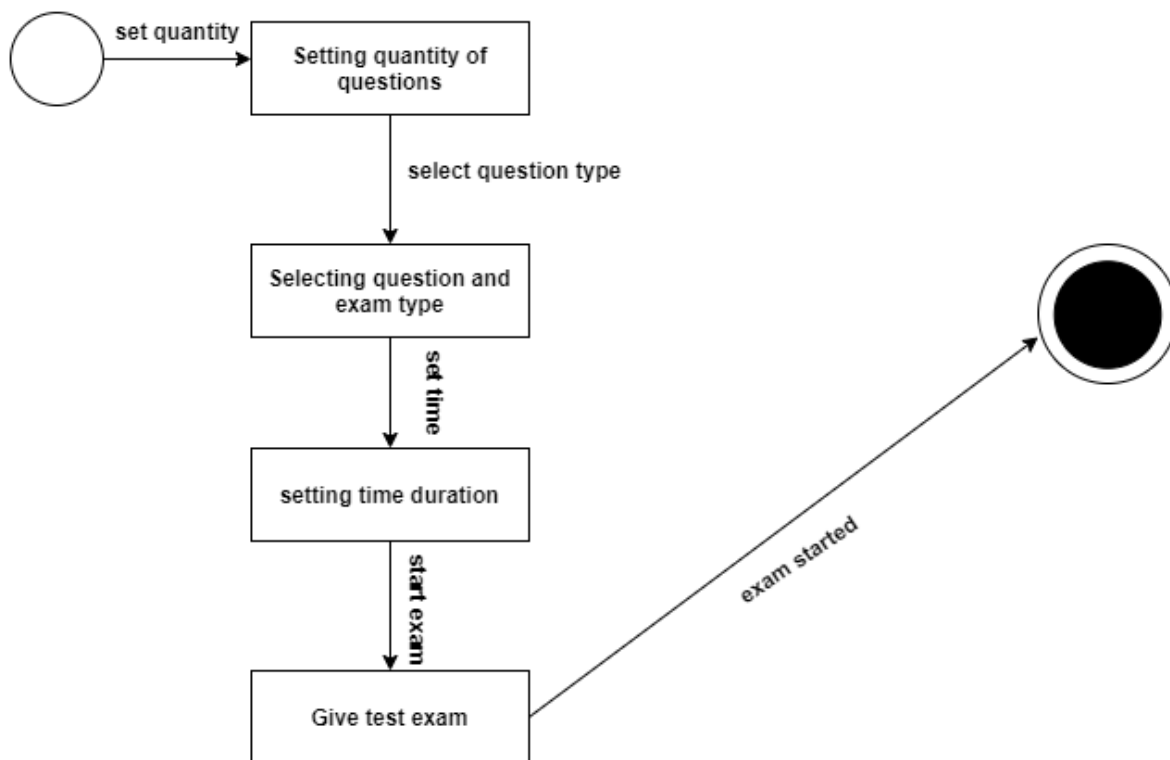
### 7.2.3 Class name: Practice Exam

ID: C\_03



## 7.2.4 Class name: Test Exam

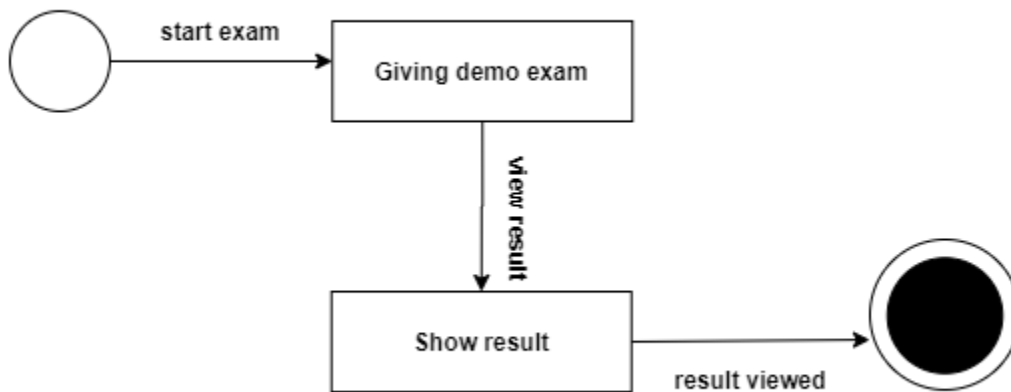
ID: C\_04





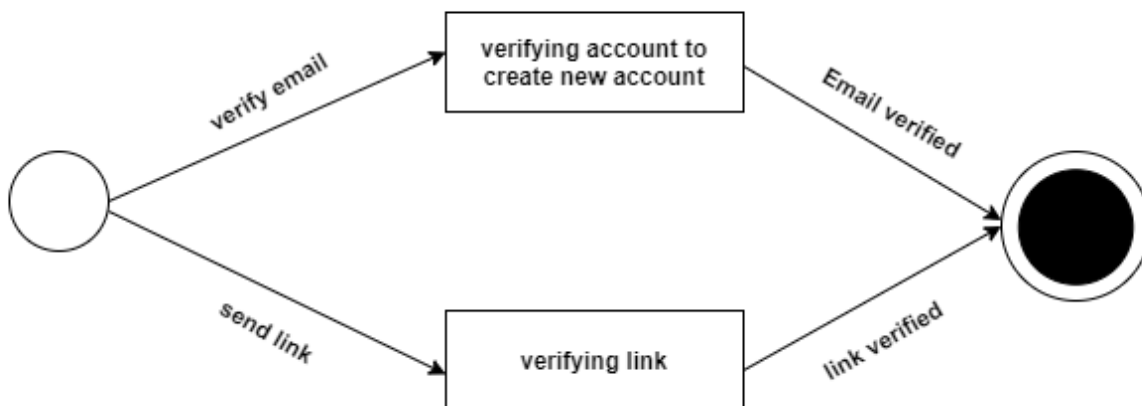
### 7.2.5 Class name: Demo Exam

ID: C\_05



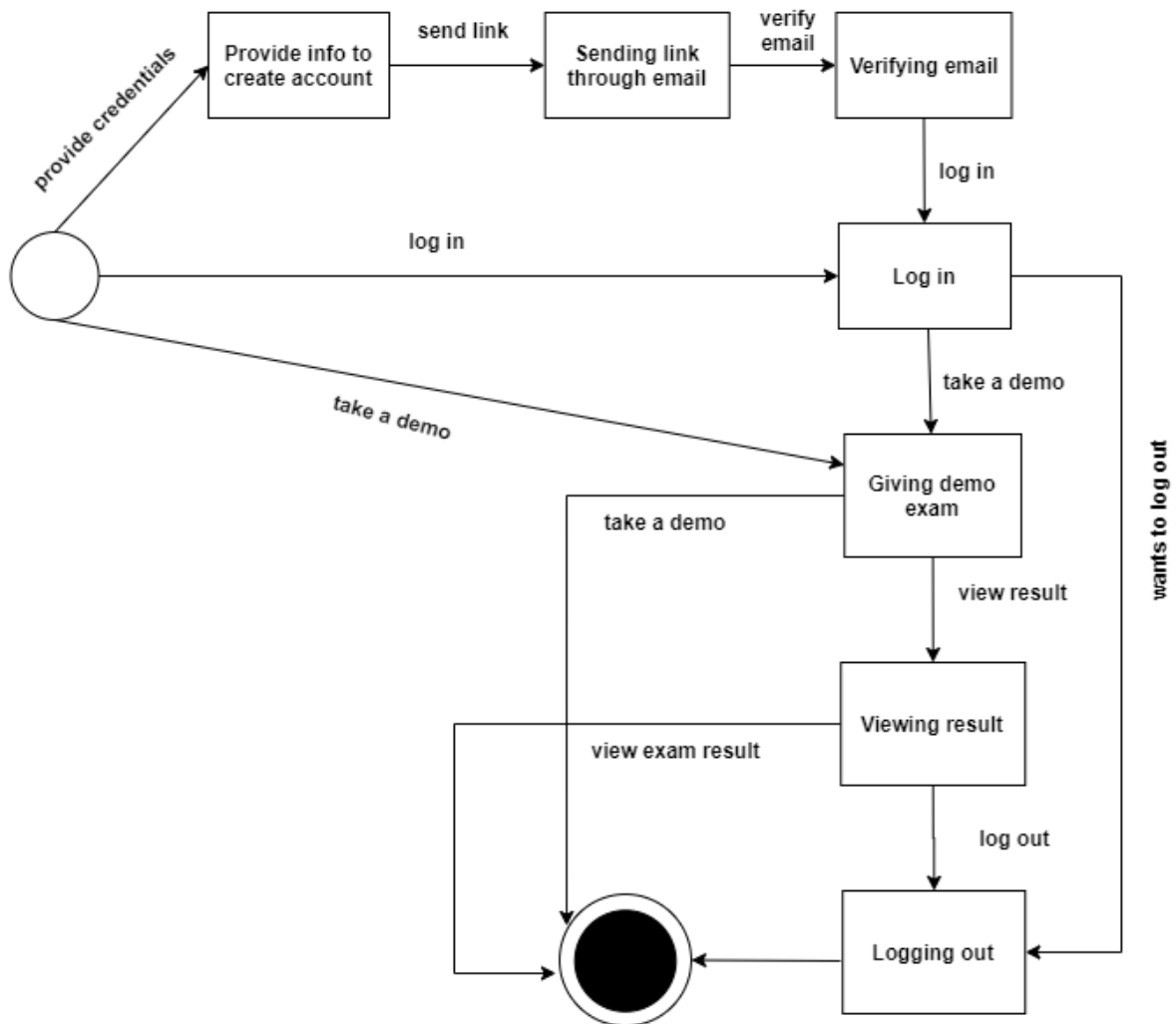
### 7.2.6 Class name: Email

ID: C\_06



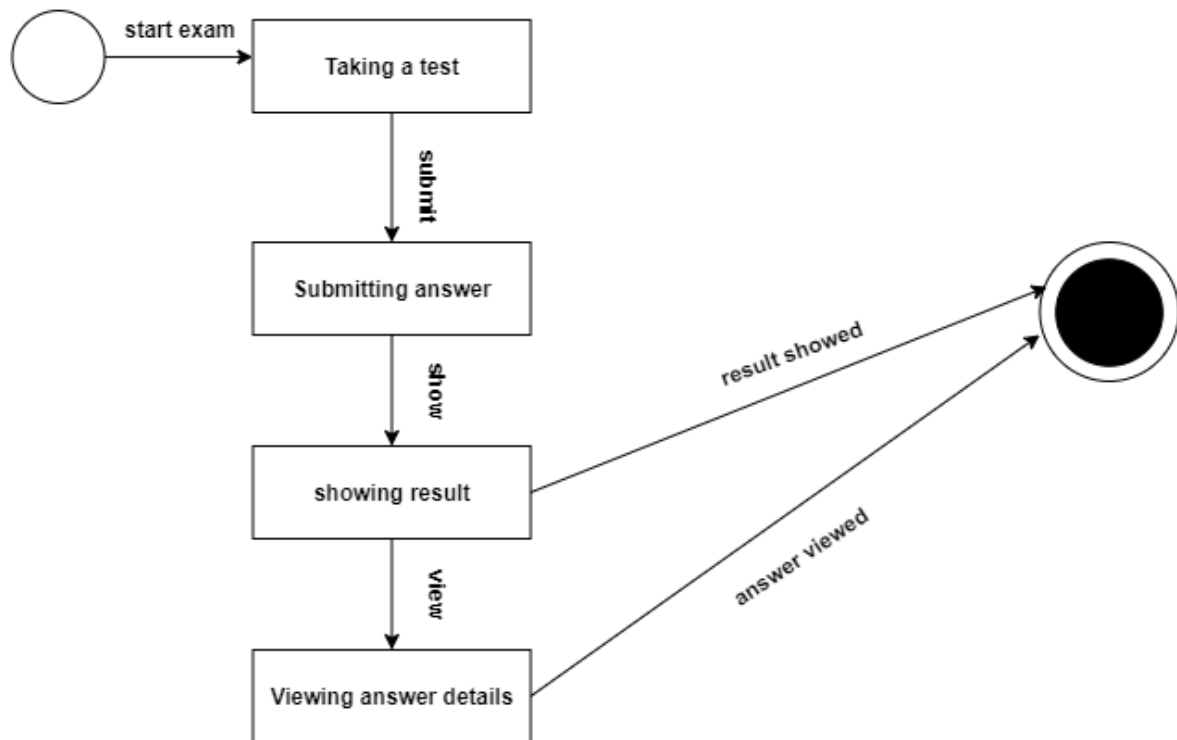
## 7.2.7 Class name: User

ID: C\_07



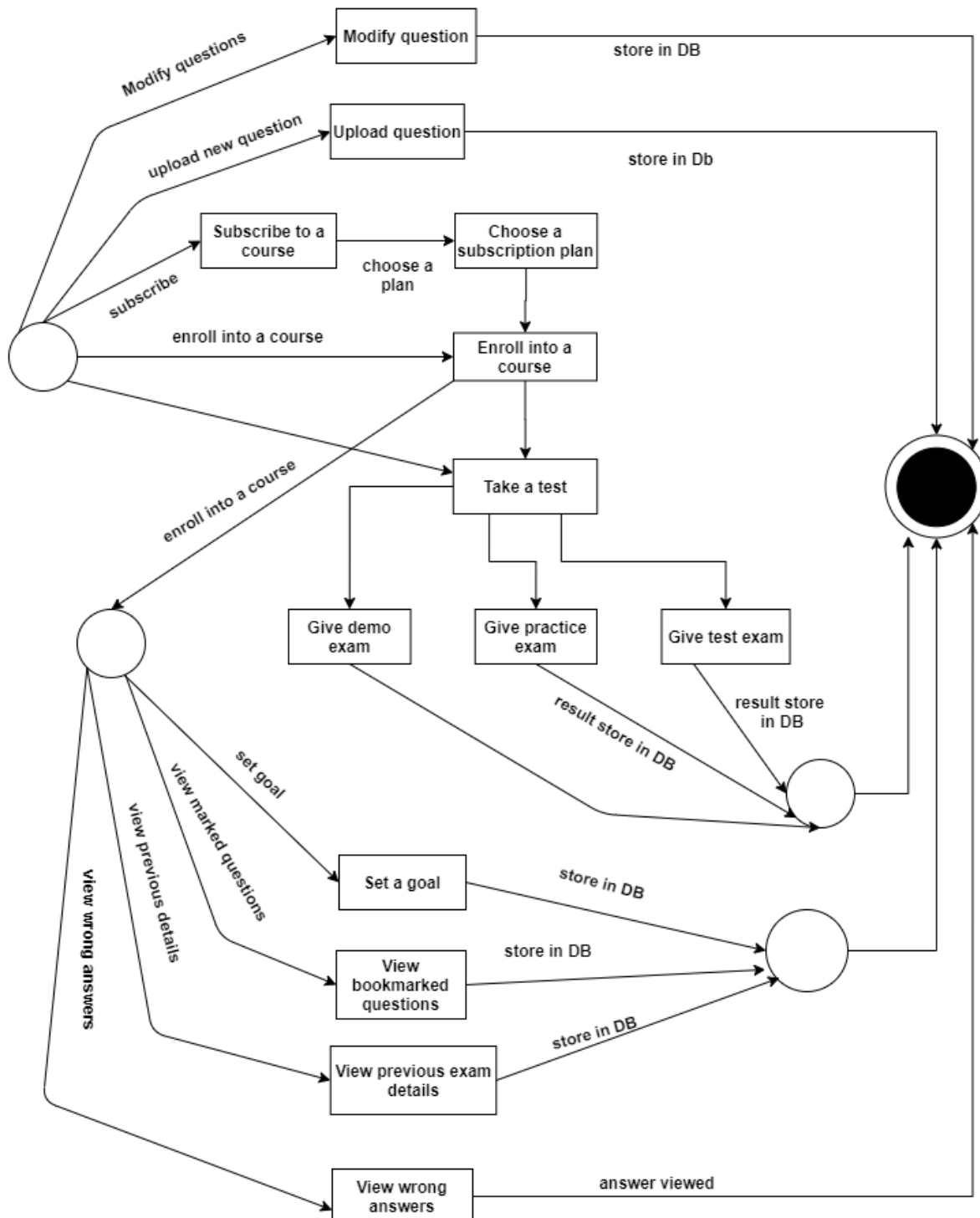
## 7.2.8 Class name: Exam

ID: C\_08



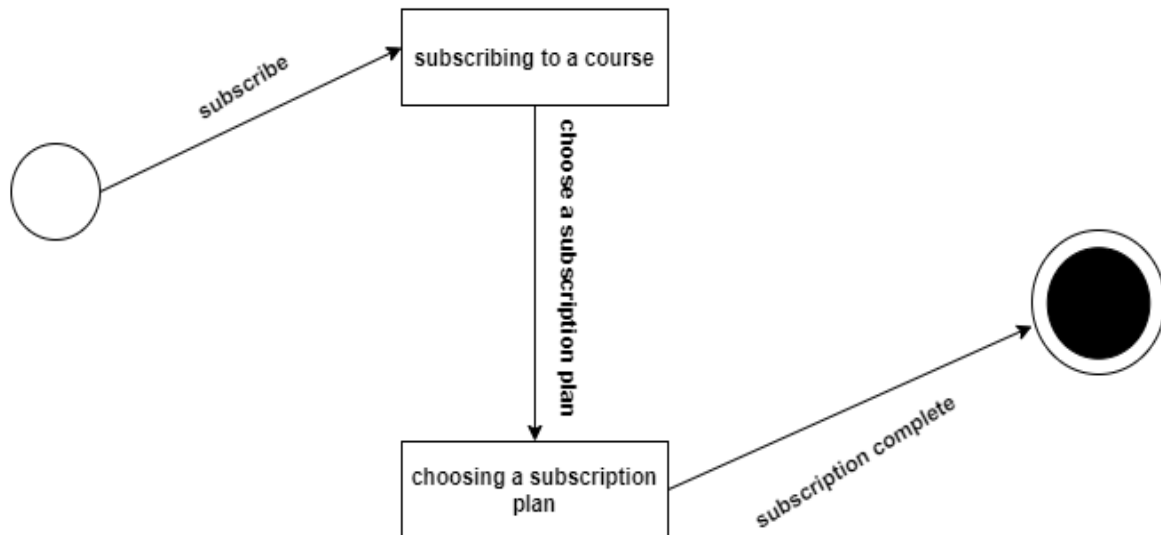
## 7.2.9 Class name: Course

ID: C\_09



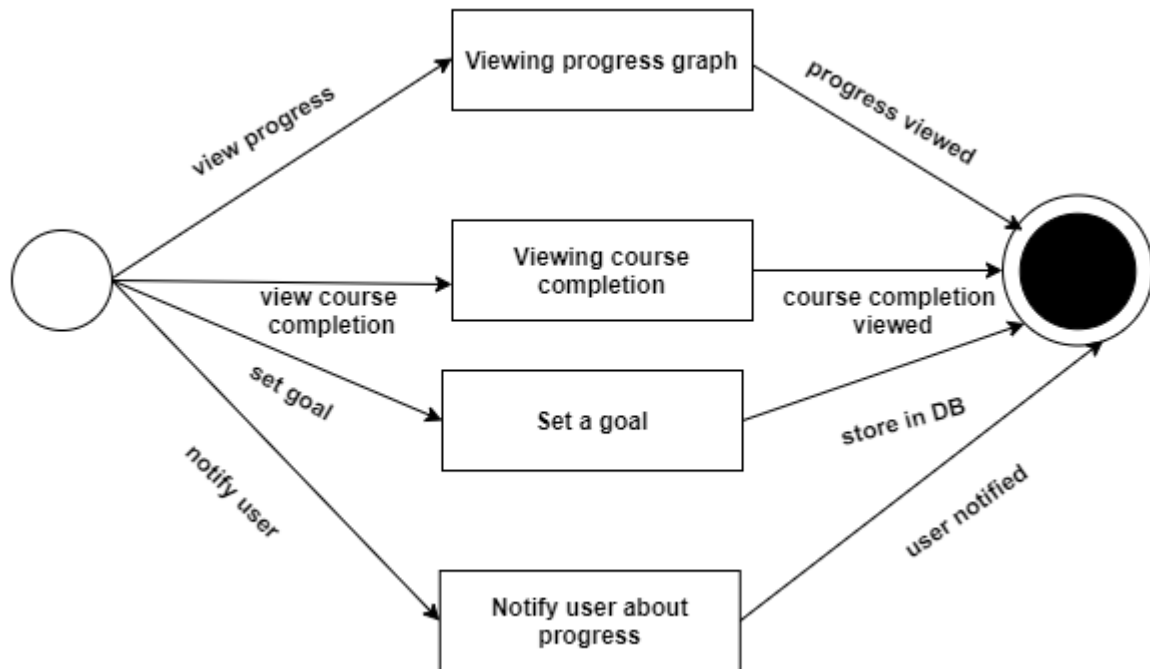
## 7.2.10 Class name: Subscription

ID: C\_10



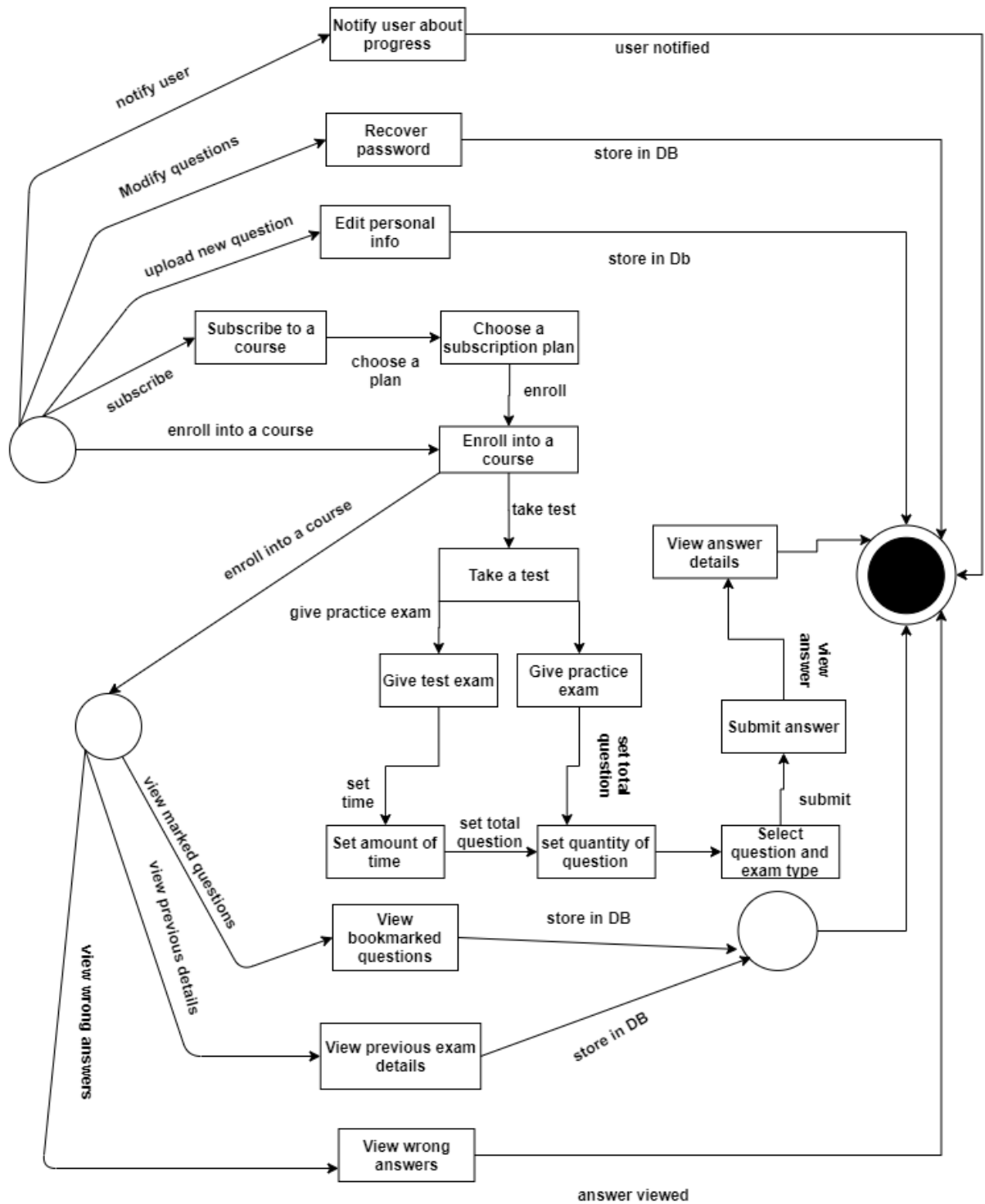
## 7.2.11 Class name: Performance

ID: C\_11



## 7.2.12 Class name: Student

ID: C\_12



## 8. Sequence Diagram

