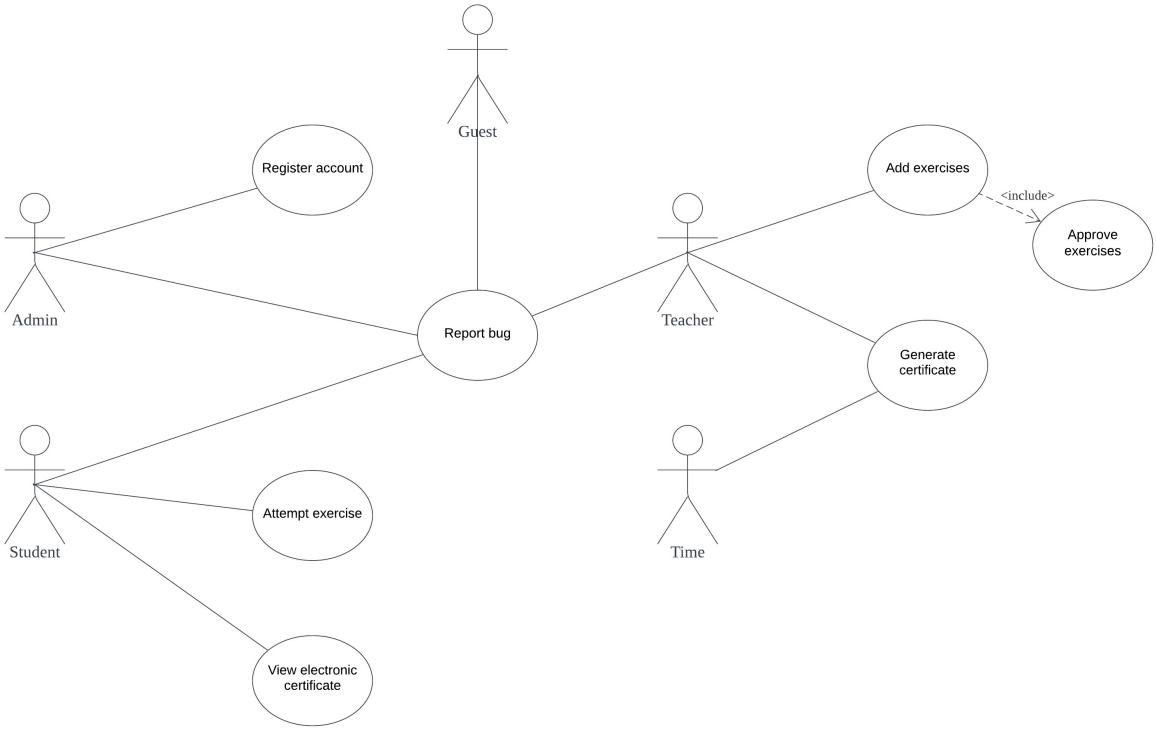
1. User Requirements

1. The web-based application is mainly for **desktop/notebook** computer in a **home** setting. The platform shall be in English.
2. The system should be allowed to report system bugs anytime on any webpages by submitting bug report regardless of whether the user have or have not logged in to the system. The bug report should record the name, email address of the reporter, the title and the description of the bug. After receiving the report, the system should store it in the web application.
3. The administrative staff shall be able to **generate accounts** for teachers and students.
    a) The admin staff shall be able to register the account **through the application**.
    b) The application shall allow the input of **name of the users, class, role (teachers or students), account usernames and passwords.**
4. After login by username and password, a teacher shall be able to add the exercise into the application with the help of **artificial intelligence**.
    a) The exercises shall be in **multiple choices** format.
    b) All exercises shall be generated by the **AI**.
    c) Teachers simply login the platform and specify the **topic** name of the exercises and **number** of questions. The generative AI engine shall then generate the questions and answers.
    d) Teachers shall be **able to approve** the questions one by one. If teachers reject all the answer, no exercises shall be added. Otherwise, the appropriate exercises approved by the teachers shall appear on the exercises.
    e) Teachers could choose to provide hints to the questions during the approval process.
    f) There will be no questions banks for reference but sample topic names such as sorting, fractions, counting, addition, subtraction, multiplication and division will be provided.

5. After login by username and password, a student can work on the exercises and the scores shall be recorded.
    a) The students shall be allowed to **reattempt** the exercises.
    b) Student could bookmark the questions as they wish.
6. At the end of each month, if the student obtains a certain number of scores, he/she shall get an **electronic certificate** in the system.
    a) The certificate shall include:
        1. **Total scores** obtained that month,
        2. Details of each submission including **submission date** and **time**, **topic name, exercise number** and the **score.**
    b) The end of each month is defined as the **last day of the month, 11 pm**.
    c) The certificate shall be issued if the total score reaches **2000** given that each exercise carries **100** mark. e.g. a student with 20 **exercises** full score will obtain a certificate.
7. Alternatively, teachers could manually issue certificates any time. The teacher will specify the number of scores and the number of days. If a student obtains the scores within the days specified, he/she will get an electronic certificate in the web application.

2. Use Case Diagram



3. Use Case Descriptions

EasyMath system: Register account	
Actor(s)	Admin
Description	An admin user may register account for both teachers and students. The admin user needs to input the name of the user, class, role, account username and password.
Data	User information including the name of the user, class, role, account username and password.
Stimulus	Admin user request to register a student or a teacher
Response	Account is created
Comments	Student account and teacher account will have different functions

EasyMath system: Add exercise	
Actor(s)	Teacher
Description	A teacher may add a list of multiple-choice questions generated by AI. Teacher could provide “hints” to the questions before approval.
Data	Topic name and number of questions
Stimulus	Teacher request to generate the questions
Response	Approved exercises appear in the system
Comments	During the approval process, questions that are not approved will not be shown in the exercise. If no questions are approved, no exercises will be shown. Sample topic name such as counting, sorting, addition, subtraction, multiplication, division, and fraction will be provided.

EasyMath system: Attempt exercise	
Actor(s)	Student
Description	A student may select an exercise from the system and attempt the exercise, student can bookmark questions which they find difficult or worth reviewing for later review.
Data	Exercise number, student’s answers
Stimulus	The student requests to attempt the exercise
Response	The score for the exercise attempted is recorded in the system.
Comments	If the student chooses to reattempt the exercise, this use case will be invoked again

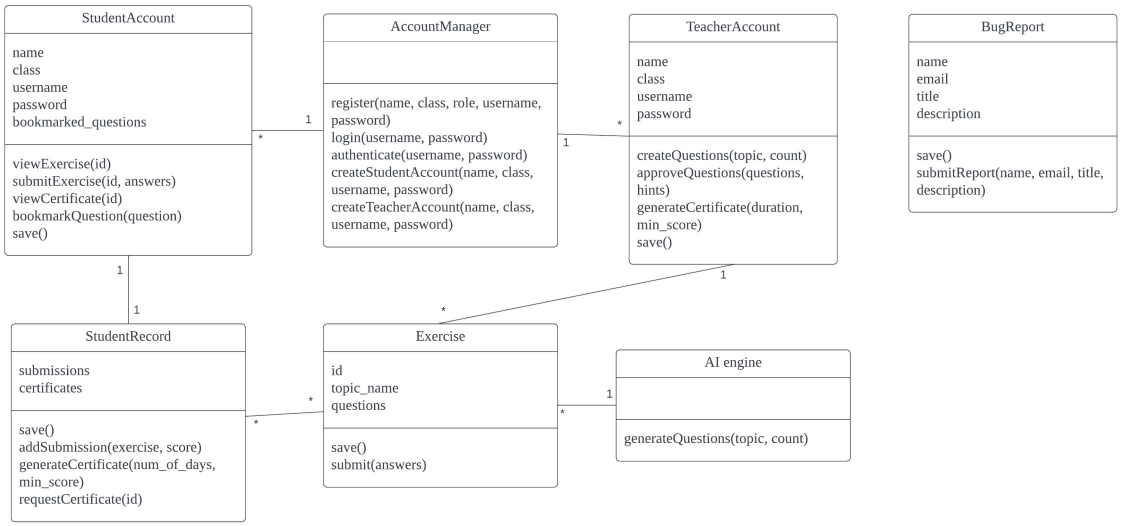
EasyMath system: View electronic certificate	
Actor(s)	Student
Description	A student may choose to view the certificate.
Data	Certificate issue month
Stimulus	The student requests to view the certificate
Response	Students who reach total score of at least 2000 in exercises will see the certificate
Comments	Certificate will be automatically generated at 11pm on last day of a month (refer to Generate Certificate use case). The certificate will include the total scores and submission date, time, topic name and exercise number for each submission.

EasyMath system: Generate certificate by timer	
Actor(s)	Time
Description	Certificate will automatically be generated certificate at 11 pm on last day of a month.
Data	Certificate issue month
Stimulus	Time reaches 11 pm on last day of a month.
Response	Certificate is generated and transmitted
Comments	-

EasyMath system: Generate certificate by teacher	
Actor(s)	Teacher
Description	The teacher could also manually issue a certificate at any time.
Data	Number of days and minimum score needed
Stimulus	Teacher presses generated certificate button
Response	Certificate is generated and transmitted
Comments	-

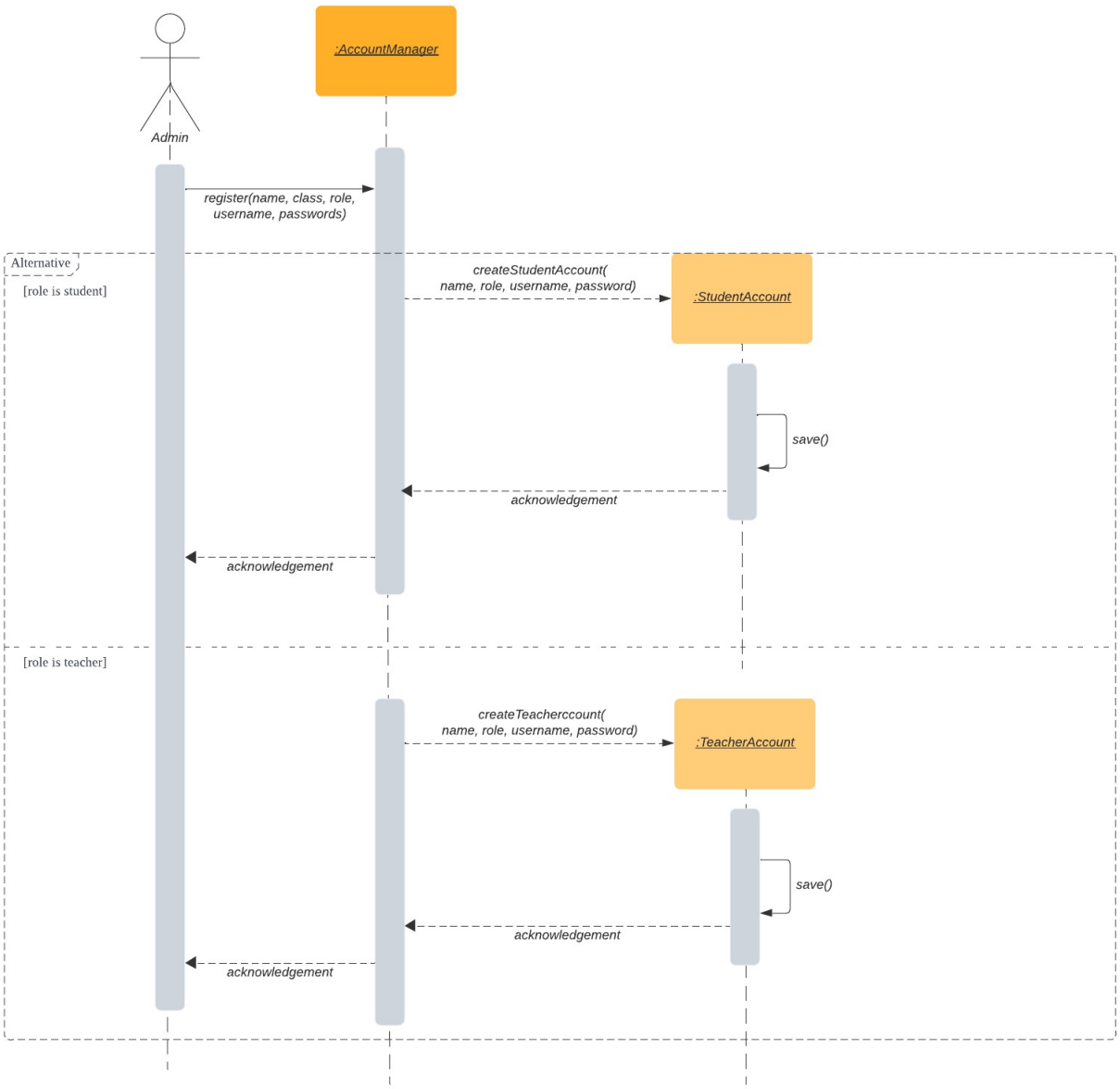
EasyMath system: Report bug	
Actor(s)	Teacher, Student, Admin, Guest
Description	Report bug by clicking the report bug button.
Data	Name and e-mail address of the reporter, title and description of the bug
Stimulus	Submit bug report form.
Response	Bug report will be store in the system.
Comments	All fields must be filled and cannot be left blank.

4. Class Diagram

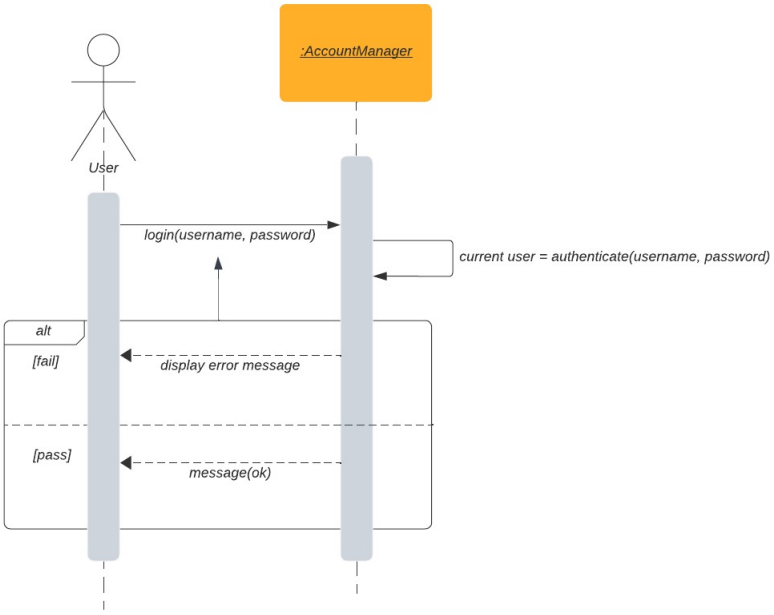


5. Sequence Diagrams

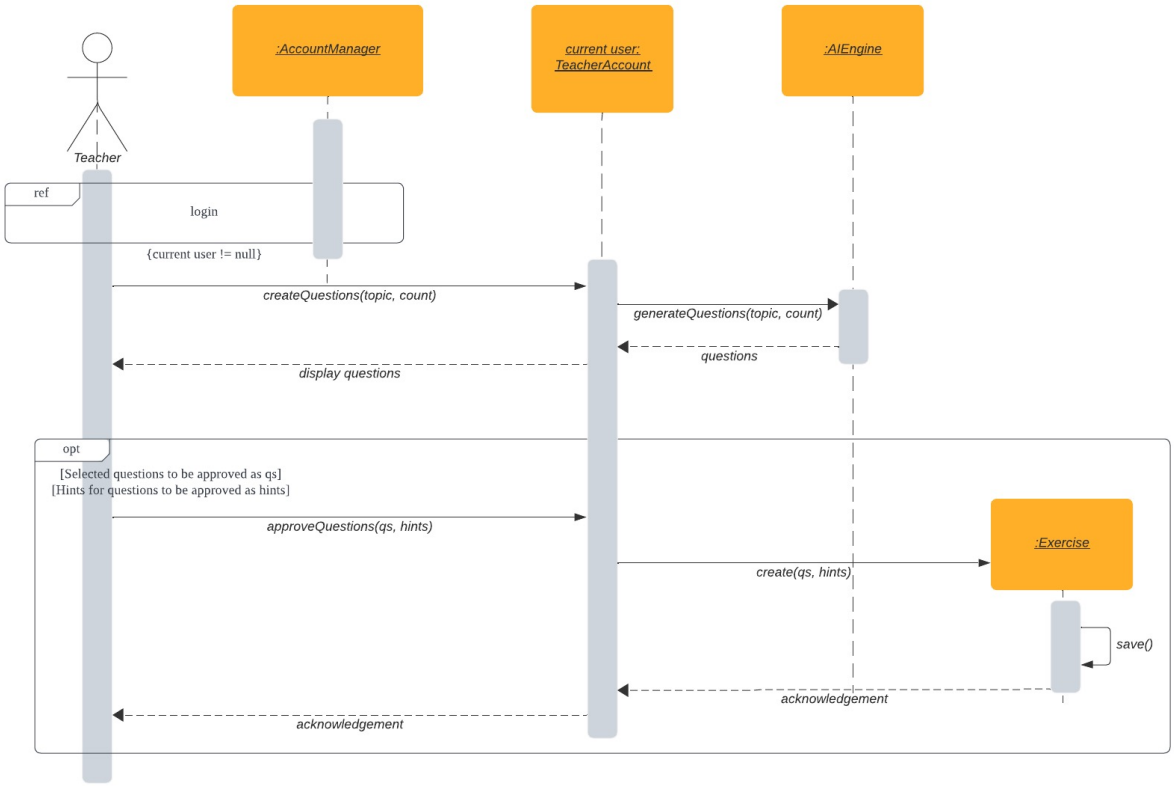
Register



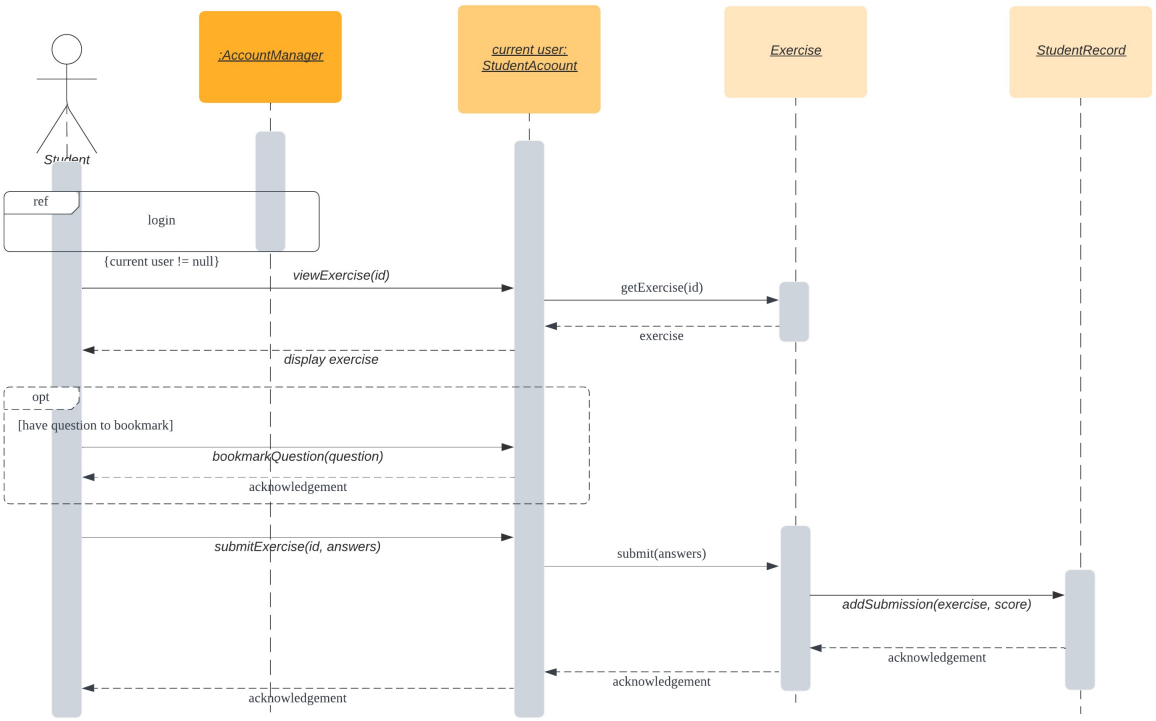
Login


:AccountManager
User
login(username, password)
current user = authenticate(username, password)
alt
[fail]
display error message
[pass]
message(ok)

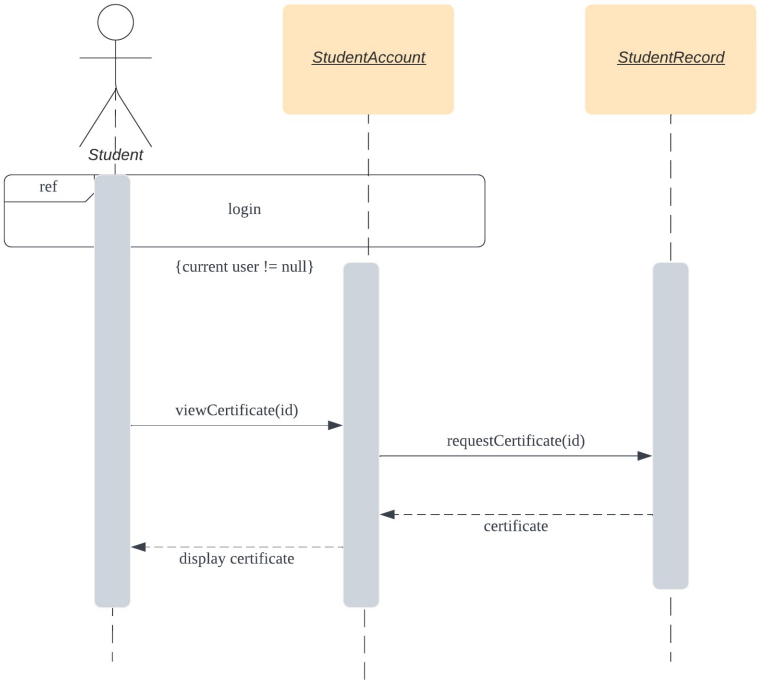
Generate Exercise



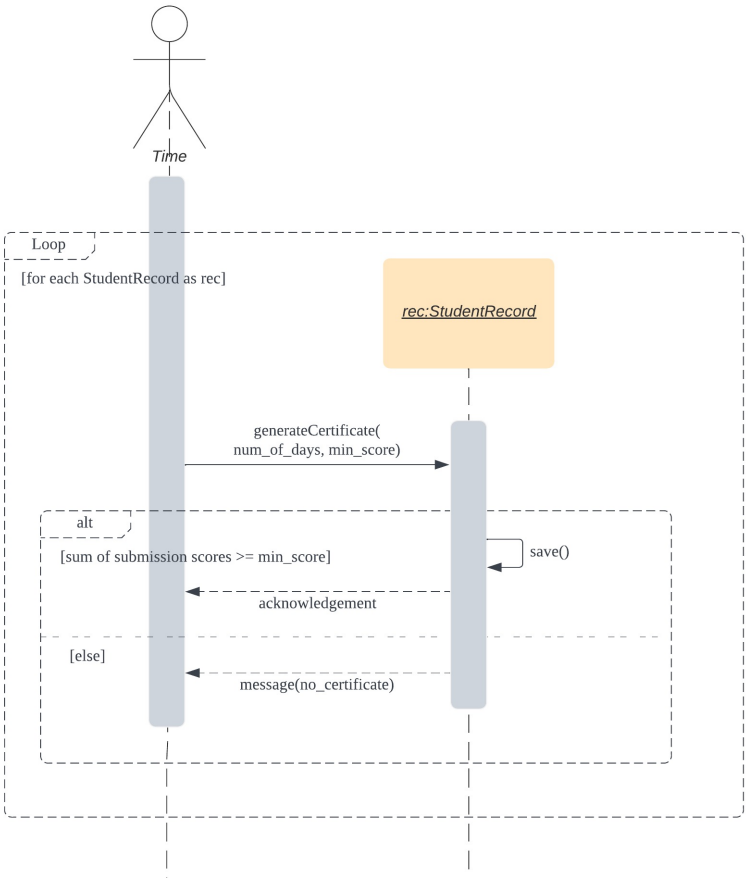
Attempt Exercise



View Certificates



Generate Certificates by Time



Generate Certificates by Teacher