
Product Requirements Document

Use Cases Specification

Magic Pigeons
SWEN90007 SM2 2020 Project

Link of github repository:

https://github.com/hedgehog7453/SWEN90007_2020_MagicPigeons

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**COMPUTING &
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1. Introduction

1.1 Proposal

This document specifies the use cases of an online examination system, the project of SWEN90007 Software Design and Architecture. This document records the usage of the system in the form of use cases which describes the flow of events with regards to two major actors, instructors and students.

This document will be updated throughout the development process and will be referred to during the software implementation.

1.2 Target Users

The target users of this document are the teaching team of subject SWEN90007 and the project development team.

1.3 Conventions, terms and abbreviations

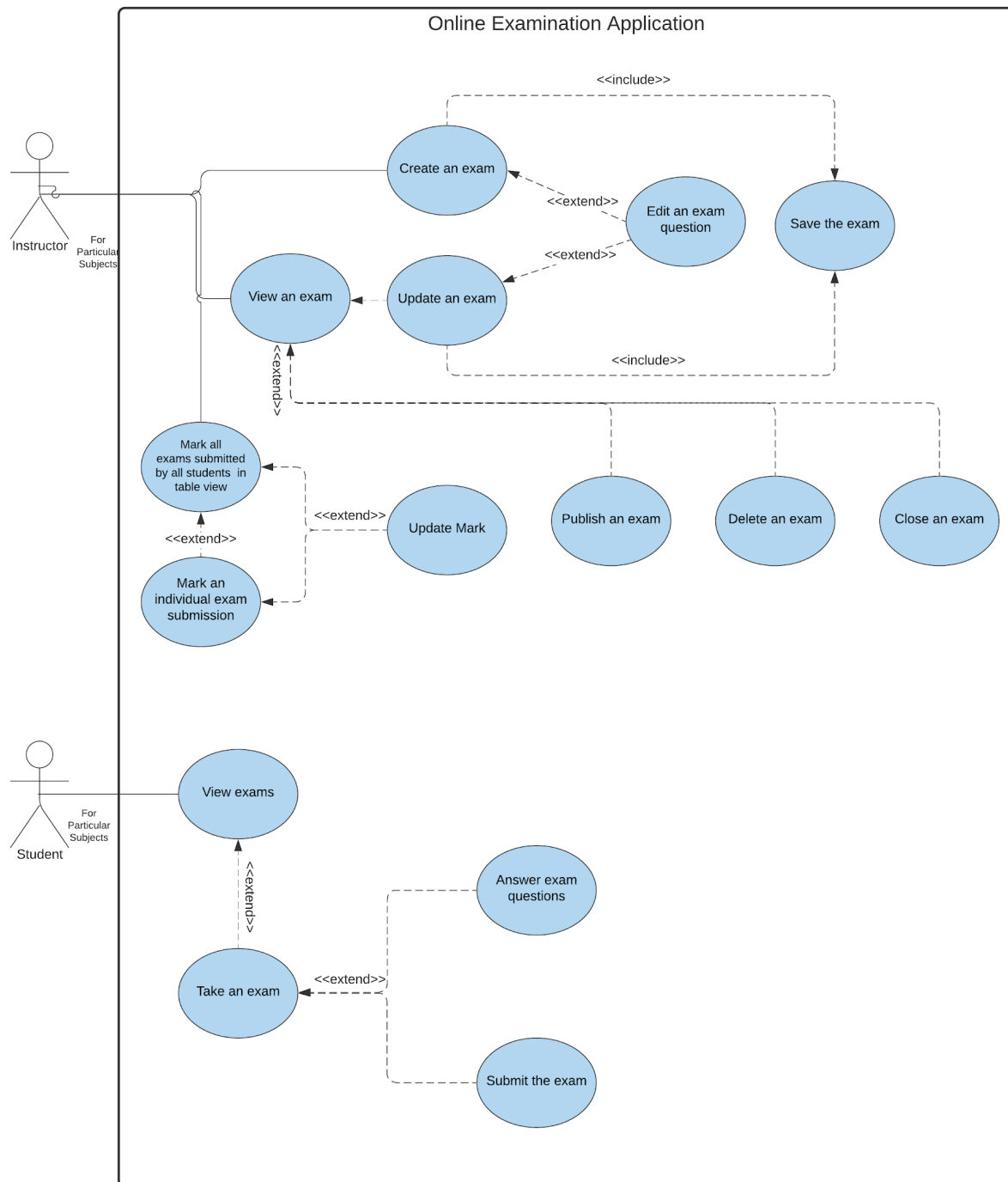
This section explains the concept of some important terms that will be used throughout this document. These terms are detailed alphabetically in the following table.

Term	Description

2. Actors

Actor	Description
Instructor	Instructor manages the exam(s) for the subject(s) he/she teaches. He/she can create exams and publish them. He/she can also update or delete an exam not currently being taken. He/she can also close an exam. He/she is also responsible for marking the exam(s).
Student	Students have access to the exams of the subjects they are taking and can start and submit each of these exams once.

3. Use Case Diagram



4. Use Cases

4.1 Exceptions

[UC000] Known Exception

Preconditions

- The known exception shall be raised by any system operation.

Main Events Flow

1. System identifies one of the following problems:
 - Lost connection - [SF01]
 - User cancelling an action - [SF02]
 - No connection to database - [SF03]
 - SQL exception - [SF04]

Subflows

[SF01] Lost connection

The front-end lost connection to the server. This may be caused by connection issues or server not responding.

1. The system detects a timeout and identifies the server that it lost connection to.
2. The system displays an error message to the user indicating that the connection is lost and suggests the user to check the internet connection and try again later.
3. The system stays on the page and logs the error in the exception log.

[SF02] Action cancelled

The user cancels the action by clicking cancel at certain steps.

1. The system returns to the previous page with all changes discarded.

[SF03] No connection to database

The server fails to connect to the database.

1. The system displays an error message to the user indicating that the connection to the database has been lost and suggests the user to try again later.
2. The system stays on the page and logs the error in the exception log.

[SF04] SQL exception

The server is connected to the database and tries to make an action (create, read, update, delete), but the database throws an SQL exception.

1. The system displays an error message to the user indicating that the operation cannot be done at the moment and suggests the user to try again later.
2. The system stays on the page and logs the error in the exception log.

4.2 Instructor Use Cases

[UC001] Instructor - View an Exam

Pre-conditions

The instructor is teaching one or more subjects.

Main Events Flow

1. The instructor selects a particular subject they are teaching.
2. The system displays all exams that have been created for this subject. - [EF01]
3. From the list of exams shown, the instructor selects the particular exam they want to view.
4. The system displays all information of the exam, including the exam status [Unpublished/Published/Closed], exam description, exam questions and marks allocated to them and the number of submissions.

Alternative Flows

None

Exception Flows

[EF01] No exam under the subject

1. Instead of displaying a list of exams, the system displays a text label indicating that there are currently no exams for this subject.

[EF02] Unknown exception

1. The system logs the runtime exception that has happened during the application execution however not recognized

[EF03] Known Exception

1. The system logs the exception. Refer to [UC000].

Post-conditions

None

Additional Information

Exam Fields

Field	Description	Type (Length)	Mandatory	Unique	Editable	Details
Exam status	Each exam has three status, including unpublished, published and closed.	Enum	✓			
Exam title	This field is a short title for the exam.	String	✓	✓	✓	
Exam description	This field includes the exam details and the exam instructions.	String	✓		✓	
Exam questions	This field includes a list of Question objects which includes the information of a question (see [UC004] for question details).	Question	✓		✓	
The number of submissions	The current student number who submitted the exam.	Integer	✓			

[UC002] Instructor - Create an Exam

Pre-conditions

- The instructor is teaching one or more subjects.

Main Events Flow

1. The instructor selects a particular subject which the exam is created for.
2. The instructor clicks on the 'Create new exam' button.
3. The system enters the 'edit exam' page with a text area for exam description and a blank page to add questions.
4. The instructor may fill in the exam description.
5. The instructor clicks the 'Add new question' button. - [AF01]
6. The instructor edits the exam question [UC004].
The instructor repeats step 5 - 6 until all questions have been created.
7. The instructor saves the exam. - [UC005]

Alternative Flows**[AF01] Edit existing questions**

1. The exam is only saved once the instructor has applied all changes, therefore, the instructor can go back at any time to edit an existing question.

Exception Flows**[EF01] Unknown exception**

1. The system logs the runtime exception that has happened during the application execution however not recognized

[EF02] Known Exception

1. The system logs the exception. Refer to [UC000].

Post-conditions

After the exam is successfully saved, the exam will be stored in the database. It will be shown as unpublished on the 'view exam' page and can be seen when viewing the exam through [UC001].

Additional Information**Exam Fields**

Field	Description	Type (Length)	Mandatory	Unique	Editable	Details
Exam title	This field includes the title of the exam. The title should be no longer than 50 characters.	String	✓	✓	✓	
Exam description	This field includes the exam details and the exam instructions.	String	✓		✓	
Exam questions	This field includes a list of Question objects which includes the information of a question (see [UC004] for question details)	Question	✓		✓	

[UC003] Instructor - Update an Exam

Pre-conditions

- There is an existing exam in the subject the instructor is teaching.
- The exam to be updated has not been submitted by any student and there is no student currently taking the exam.

Main Events Flow

1. The instructor performs the steps in [UC001] and reaches the 'view exam' page.
2. The instructor clicks the 'update exam' button.
3. The system verifies that the exam can be updated. - [EF01]
4. The system enters the 'edit exam' page where all exam questions are shown in an editable view.
5. The instructor can edit existing exam questions and/or clicks the 'Add new question' button to create new exam questions. - [UC004]
Step 5 is repeated until all questions have been updated.
6. The instructor saves the changes. - [UC005]

Alternative Flows

None

Exception Flows**[EF01] Exam cannot be updated**

The exam cannot be updated if one of the following conditions holds true:

1. There are currently students taking the exam.
2. Someone has submitted an exam.

The system displays a popup message 'The exam cannot be updated!'.

[EF02] Unknown exception

1. The system logs the runtime exception that has happened during the application execution however not recognized

[EF03] Known Exception

1. The system logs the exception. Refer to [UC000].

Post-conditions

After the exam is successfully saved, the changes will be stored in the database and applied to the exam. The new version of the exam will be displayed when viewing the exam.

[UC004] Instructor - Edit an Exam Question

Pre-conditions

- The instructor is creating or updating an exam.
- This use case is related to the use case [UC002] and [UC003].

Main Events Flow

1. The instructor enters the “edit exam” page through use case [UC002] or [UC003].
2. The instructor chooses the question type from:
 - a. multiple choice question
 - b. short-answer question
3. The instructor fills in the question description. - [AF01]
4. The instructor allocates a mark to the question.

Alternative Flows**[AF01] Creating a multiple-choice question**

When creating a multiple-choice question:

1. After filling in the description, the instructor is required to create more than 2 choices for that question.

[AF02] Deleting a question

At any time of this use case:

1. The instructor clicks the ‘Delete’ button of the question that needs to be deleted.
2. The system pops-up a message asking the instructor to confirm to delete the question.
3. The instructor clicks ‘confirm’.
4. This question is successfully deleted in the exam.

Exception Flows**[EF01] Unknown Exception**

1. The system logs the runtime exception that has happened during the application execution however not recognized

[EF02] Known Exception

1. The system logs the exception. Refer to [UC000].

Post-conditions

All the change of the question is successfully saved in the database, and the modifications will be presented when viewing the exam.

Additional Information

Question Fields

Field	Description	Type (Length)	Mandatory	Unique	Editable	Details
Question type	This field describes the type of the question which restricts the format of answers to be provided for the students.	Enum	✓			The question type should be chosen from 'short-answer question' and 'multiple choices'
Question marks	This field is the assigned marks of this question.	Float	✓		✓	Instructors can assign marks as their demands.
Question description	This field is the question stem.	String	✓		✓	The question description should correspond to its type.
Question options	This field is the question options designed for multiple choices.	String []			✓	The option would only be provided if the question type is multiple choices.

[UC005] Instructor - Save the Exam

Pre-conditions

- The instructor is creating or updating an exam.
- This use case is related to the use case [UC002] and [UC003].

Main Events Flow

1. The instructor enters the “edit exam” page through creating an exam [UC002] or updating an exam [UC003].
2. The instructor clicks on the “save the exam” button.
3. The system saves the exam details to the database.

Alternative Flows

None

Exception Flow

[EF01] Unknown exception

1. The system logs the runtime exception that has happened during the application execution however not recognized

[EF02] Known Exception

1. The system logs the exception. Refer to [UC000].

Post-conditions

The exam details are successfully saved in the database.

[UC006] Instructor - Publish an Exam

Pre-conditions

There is at least one unpublished exam in a particular subject.

Main Events Flow

1. The instructor enters the 'view exam' page through use case [UC001].
2. The instructor clicks the 'publish' button from the dropdown menu.
3. The system checks whether the exam can be published - [EF01].
4. If the exam meets the requirements of integrity, the system will save and publish the exam.
5. The system would prompt that the exam has been successfully published, and the exam would be available for students enrolled in this subject to view.

Alternative Flows

None

Exception Flow

[EF01] Exam cannot be published

The exam cannot be published if one of the following conditions holds true:

- **Mandatory field(s) not filled:** The exam cannot be published if any of the required fields is empty.
- **Invalid content type:** Each content should be corresponding to its field description.
- **Repeated unique field(s):** The unique field and existing fields are repeated.
- **Someone else is updating the exam:** The exam can only be published when nobody is editing the exam.
- **The exam is already published:** Due to concurrency issues, the exam may already be published by other instructors. In this case, the exam cannot be published again.
- **The exam is deleted:** Due to concurrency issues, the exam may be deleted by other instructors. In this case, the exam cannot be published.

The system will display an error message to the user regarding the specific situation.

[EF02] Unknown exception

1. The system logs the runtime exception that has happened during the application execution however not recognized

[EF03] Known Exception

1. The system logs the exception. Refer to [UC000].

Post-conditions

The status of the exam will be changed to 'published' in the database. The exam will become visible to students and will be available for the students to take.

[UC007] Instructor - Delete an Exam

Pre-conditions

- There is an existing exam in the subject the instructor is teaching.
- The exam to be deleted has not been submitted by any student and there is no student currently taking the exam.

Main Events Flow

1. The instructor selects the subject in which the exam they want to delete is.
2. The instructor clicks on the option button on the exam, and then chooses the delete option.
3. The system will prompt to ask if the instructor wants to delete the exam.
4. The system verifies that the exam can be deleted. - [EF01]
5. If the instructor confirms to delete the exam, the exam would be deleted and the system would prompt the deletion is successful. - [EF02]

Alternative Flows

None

Exception Flow**[EF01] Exam cannot be deleted**

The exam cannot be deleted if one of the following conditions holds true:

1. There are currently students taking the exam.
2. Someone has submitted an exam.

The system displays a popup message 'The exam cannot be deleted!'.

[EF02] Unknown exception

1. The system logs the runtime exception that has happened during the application execution however not recognized

[EF03] Known Exception

1. The system logs the exception. Refer to [UC000].

Post-conditions

The exam is deleted both in the exam listing page and database.

[UC008] Instructor - Close an Exam

Pre-conditions

The exam is published.

Main Events Flow

1. The instructor selects a published exam from the 'view exam' page. - [UC001]
2. The instructor clicks 'close exam'.
3. The system pops-up a message asking the instructor to confirm closing the exam.
4. The instructor clicks 'confirm'. - [EF01]
5. The system changes the exam status to 'closed'.
6. The system creates submission data for students.
 - a. For students who have submitted the exam, the system records their answers.
 - b. For students who have not taken the exam or are currently taking the exam, the system records all answered questions and marks any unanswered question as 'unanswered'.

Alternative Flows

None

Exception Flow

[EF01] Close cancelled

- If the instructor cancels the close of the exam when the system is asking, the exam will remain unchanged.

[EF02] Unknown exception

1. The system logs the runtime exception that has happened during the application execution however not recognized

[EF03] Known Exception

1. The system logs the exception. Refer to [UC000].

Post-conditions

None

[UC009] Instructor - Mark All Exams Submitted by All Students in Table View

Pre-conditions

There are students enrolled in the subjects.

Main Events Flow

1. The instructor selects the subject for which the exam they want to mark.
2. The instructor clicks the 'view all marks' button.
3. The system displays a table view of exam marks.
4. The instructor selects the cell containing the mark they want to update.
5. The instructor enters the marks.

The instructor repeats step 3-4 until marking is complete.

6. The instructor clicks the 'save' button. - [EF01]
7. The system saves the marks entered.

Alternative Flows

None

Exception Flow**[EF01] Marks cannot be saved**

The marks cannot be saved if one of the following conditions holds true:

- **Invalid input type:** The variable type of marks is not float.
- **Invalid input value:**
 - The total marks of a student exceed the maximum marks.
 - The marks of each individual submission and the total marks is negative. (Fudge points can be negative).

[EF02] Unknown exception

1. The system logs the runtime exception that has happened during the application execution however not recognized

[EF03] Known Exception

1. The system logs the exception. Refer to [UC000].

Post-conditions

The results would be recorded in the database and details of the assessment should also be recorded. When clicking on the 'view submission', a detailed view should be presented, including the student's answers, grades, and comments.

Additional Information**Sample Table View**

	Exam01 name		Exam02 name		Exam03 name		Fudge points	Total Marks
Student 001	20/50	View Submission	17/25	View Submission	--/25	Exam not published	--	37/100
Student 002	40/50	View Submission	--/25	No submission	--/25	Exam not published	+5	70/100
Student 003
.....

[UC010] Instructor - Mark an Individual Exam Submission

Pre-conditions

The exam is closed, and students have made submissions.

Main Events Flow

1. The instructor enters the table view of marks [UC009].
2. The instructor selects a submission to mark and clicks the 'view submission' button.
3. The instructor views the examination paper and clicks the textbox on an individual question to input the marks of this question. - [AF01]

The instructor repeats step 3 until all the questions are marked.

4. The instructor clicks the 'submit' button to submit the result.
5. The system checks whether all the questions are marked. - [AF02]
6. The system saves the marks to the database and returns to the table view.

Alternative Flows**[AF01] Modifying the marks of a question**

The instructor can go back at any time to modify marks of any question.

Exception Flow**[EF01] Not all the questions are marked**

1. The system prompts the number of unmarked questions and asks the instructor to mark them.
2. The system returns to step 3.

[EF02] Unknown exception

1. The system logs the runtime exception that has happened during the application execution however not recognized

[EF03] Known Exception

1. The system logs the exception. Refer to [UC000].

Post-conditions

The marks of each question will be recorded in the database. The total marks of the exam can be viewed in the table view of marks.

[UC011] Instructor - Update Mark

Pre-conditions

The student has made a submission and the submission is marked. This use case is related to the [UC009] and [UC010].

Main Events Flow

1. The instructor selects the subject to update the mark.
2. The system displays a table of exams of this subject, including all the students' identifiers and their marks ([UC009]).
3. The instructor selects a closed exam to modify the marks.
4. The instructor can review the examination paper to find questions to be remarked on. If the mark is required to update, the instructor can click the textbox next to the question to modify the marks of this question.
The instructor repeats step 4 until all questions are updated.
5. The instructor finishes the re-grading and submits the result by clicking the 'submit' button.
6. The system checks whether all the questions are marked. - [AF01]
7. The system saves the marks to the database and returns to the table view.

Alternative Flows

None

Exception Flow**[EF01] Not all the questions are marked**

1. The system prompts the number of unmarked questions and asks the instructor to mark them.
2. The system returns to step 4.

[EF02] Unknown exception

1. The system logs the runtime exception that has happened during the application execution however not recognized

[EF03] Known Exception

1. The system logs the exception. Refer to [UC000].

Post-conditions

The mark is updated in the database.

4.3 Students Use Cases

[UC012] Student - View Exams

Pre-conditions

The student is enrolled in some subjects.

Main Events Flow

1. The system displays all the subjects the student has enrolled in.
2. Student clicks the subject he wants to view the exams for.
3. The system displays all the exams published by the instructor(s) of that subject. - [AF01]
4. Student clicks the exam he wants to view.
5. System displays the exam description and a 'start' button if the exam is open (not being updated or closed).

Alternative Flows

None

Exception Flow

[EF01] No exams available

1. Students click a subject and there are no published exams at the moment.
2. System displays 'No published exams available.'

[EF02] Unknown Exception

1. The system logs the unknown runtime exception which happens while the application is executing.

[EF03] Known Exception

1. The system logs the exception. Refer to [UC000].

Post-conditions

None

[UC013] Student - Take an Exam

Pre-conditions

The student is enrolled in a subject with a published exam currently open to students. The student can view and start the exam. This is related to use case [UC012].

Main Events Flow

1. The student chooses to start an exam from the view exam page.
2. The system alerts the student that he/she can only attempt the exam once with a notification.
- [AF02] [AF03]
3. The student chooses 'confirm' on the prompt.
4. The system displays the first question.
5. The student starts to answer the questions. - [UC014]
6. After finishing answering the questions, the student submits the exam. - [UC015]

Alternative Flows

None

Exception Flow**[EF01] Lost connection - [UC000-SF01]**

If the user loses connection to the server at any time between step 4-5, the system creates a submission with all answered questions recorded and marks any unanswered question as 'unanswered'.

[EF02] The exam cannot be taken - [UC000-SF01]

The exam cannot be attempted if one of the following conditions holds true:

- The exam is deleted
- The exam is closed
- The exam is being updated
- The student has already attempted this exam

The system will return an error message indicating the exception being thrown. Note that the start button will disappear in all these conditions. Therefore, the only way for the user to get these exceptions is from an outdated web page.

[EF03] Unknown Exception

The system logs the unknown runtime exception which happens while the application is executing.

[EF04] Known Exception

1. The system logs the exception. Refer to [UC000].

Post-conditions

An exam submission is created and saved.

[UC014] Student - Answer Exam Questions

Pre-conditions

The student is taking an exam. This is related to use case [UC013].

Main Events Flow

1. The system displays the first question.
2. The student answers the question by either:
 - a. selecting a choice from two or more choices for a multiple-choice question
 - b. typing in the answer for a short-answer question
3. The student clicks 'next' to go to the next question. - [AF01]
4. The system displays the next question.
5. Repeat the process until there are no more questions.

Alternative Flows

[AF01] Student goes back to the answered questions.

1. Student clicks a question that has been answered.
2. System takes the student back to the question with the recorded answer.
3. Student changes the answer.

The student repeats step 1 - 3 to change all the answers of those questions in need.

Exception Flow

[EF01] Unknown Exception

The system logs the unknown runtime exception which happens while the application is executing.

[EF02] Known Exception

1. The system logs the exception. Refer to [UC000].

Post-conditions

None

[UC015] Student - Submit the Exam

Pre-conditions

The student has gone to the last question.

Main Events Flow

1. The system displays a 'submit the exam' button instead of a 'next' button for the last question.
2. The student clicks the 'submit the exam' button.
3. The system notifies the student when attempting to submit the exam with a message saying that 'The exam cannot be attempted once submitted.' - [EF02] [EF03]
4. The system creates a submission that records all the answers for that exam and then sends the submission to the database.

Alternative Flow

None

Exception Flow**[EF01] Trying to submit to a closed exam.**

1. The student clicks the 'submit the exam' button.
2. The system alerts the user with a popup message 'Exam is now closed. A submission has been automatically generated at time of closure'

[EF02] Known Exception

1. The system logs the exception. Refer to [UC000].

Post-conditions

The answers will be saved in the database along with the student's identifier. The instructor of this subject should be able to view the details of the student's submission.