



# FPT UNIVERSITY

## Capstone Project Document

### QUESTION BANK CHECKING SYSTEM Season 2 – Maintain and Upgrade

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## **Definitions, Acronyms and Abbreviations**

Name	Definition
QBCS	Question Bank Checking System
UI	User Interface
UX	User Experience
Single choice	It is Multiple choice (Single answer) question type in Moodle
Multiple choice	It is Multiple choice (Multiple answers) question type in Moodle

*Table 1 – Definitions, Acronyms and Abbreviations*

## A. Introduction

### 1. Project Information

- Project name: **Maintain and Upgrade Question Bank Checking System – Season 2**
- Project Code: **QBCS2**
- Product Type: **Website Application**
- Start Date: **Sep 10<sup>th</sup>, 2019**
- End Date: **Dec 12<sup>nd</sup>, 2019**

### 2. Introduction

FPT University QBCS is a system supports lecturer to import questions to the question bank and organize the questions into categories and topics. It can also detect duplicate questions as well as generate examination automatically. Our job is to maintain and upgrade the existing Question Bank Checking System for FPT University. In this version, we will improve existing features such as import questions, check duplicate questions, images and audios, more support for question formats, such as multiple choice, matching, short answer, essay, fill in blank type of question and minor upgrade in classify questions level feature. The upgrade will also improve in performance and reliability. The system will support the ability to make lecturers test themselves in the exam they created as a way to double check and verify the examination.

### 3. Current Situation

#### 3.1. Checking duplicate question

##### a. Manual process

- Lecturers check the exam manually.
- Slow and inaccurate.
- Duplicate questions content still often appears in exam.

##### b. QBCS process

- Can only check duplicate questions with the same correct answer.
- Take a long time to accept questions and remove duplicate questions.
- When there is more than one duplicate version of a question, the report split into multiple column which reduces user experience.

#### 3.2. Supported types of question

##### a. Manual process

- Lecturers can manually check every type of questions.

##### b. QBCS process

- Support only single choice questions.
- Can detect wrong format questions.

#### 3.3. Checking duplicate images

#### a. Manual process

- Lecturers check images in the exam manually.
- It is nearly impossible for lecturers to check all duplicate images.

#### b. QBCS process

- Using a temporary solution for check pixels.
- Slow, incomplete and inaccurate.

### 3.4. Checking duplicate audios

#### a. Manual process

- Lecturers have to listen to every audio on the exam.

#### b. QBCS process

- N/A

### 3.5. Automatic exam generation

#### a. Manual process

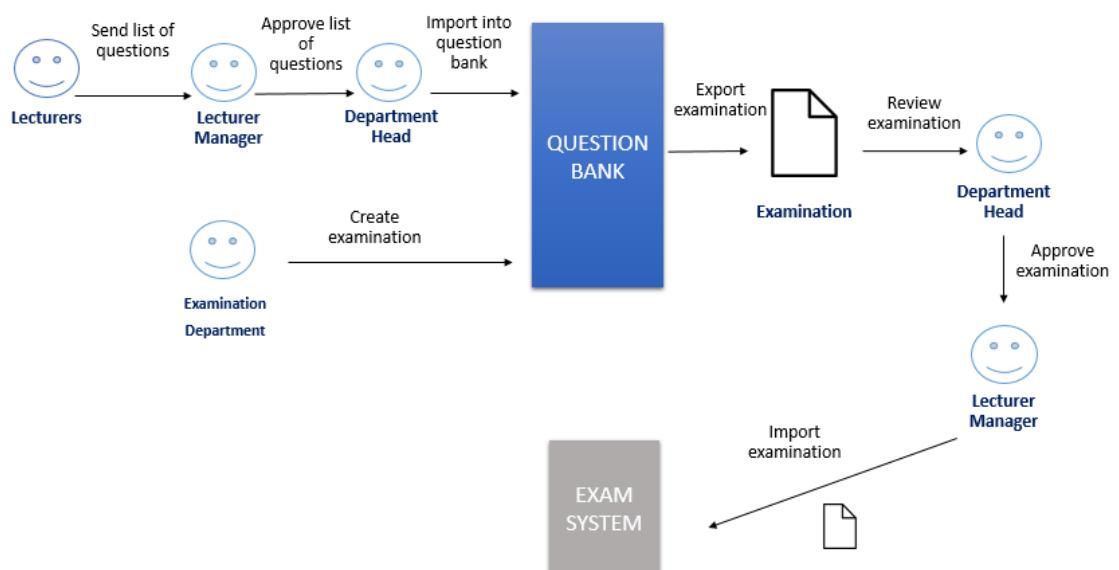
- Lecturers use LMS and FPT-Exam application to create an exam manually.
- Cannot track questions.
- Not supported.

#### b. QBCS process

- Can generate exams automatically.
- Grading using percentage of total grade per question method.
- Can classify questions into three levels, but cannot grading based on levels.
- Can track whether a question has appeared in the last exam.
- Can export to XML and GIFT.

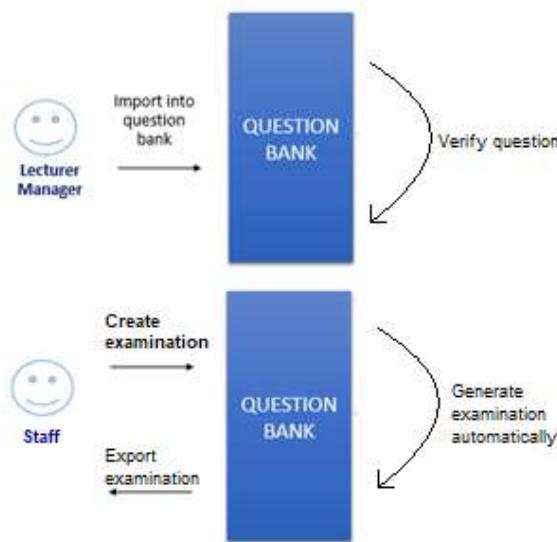
## 4. Problem Definition

#### a. Manual process



- **Advantages**
  - Staff have used to use the system.
  - Many verification steps make the system more trustable.
- **Disadvantages**
  - Questions in examination tests may be duplicate.
  - Lecturer Managers have to remember too many questions that were imported into the question bank.
  - The current system cannot track questions that were used for the examination tests.
  - Examination Department have to make examination tests manually.
  - Many staff involved, therefore may generate more human mistakes.

### b. QBCS process



- **Advantages**
  - Can detect duplicate questions, text and images.
  - Can generate exams automatically.
  - Can track questions that were used in previous exams.
  - Help gather questions from lecturers into question bank.
- **Disadvantages**

- Can only detect duplicate single choice questions, other formats need to be supported.
  - The generated report of duplicate questions is poorly designed in user experience, and the performance when removing duplicate questions is unsatisfactory.
  - Have not supported in checking duplicate audios.
  - Grading by question's level is incomplete.
  - Cannot conduct examination for lecturer to test and verify the exam.
  - Cannot export examination test to Microsoft Word document.
- The above problems may waste user's time and effort, especially performance problems. Also, the lack of necessary features may reduce reliability, availability, serviceability of the system.

## 5. Proposed Solution

The proposed solution is to improve and optimize the Question Bank Checking System by adding new features such as checking duplicate audios, support for all types of question format and upgrading existing features, can conduct examination test for lecturers in order to review and verify exams.

We will rebuild some of the front-end components to improve UI/UX and system performance as there are still many latent problems in the old system. We also alter roles and change to fit for requirements.

The following figure is the overview core-flow of our solution:

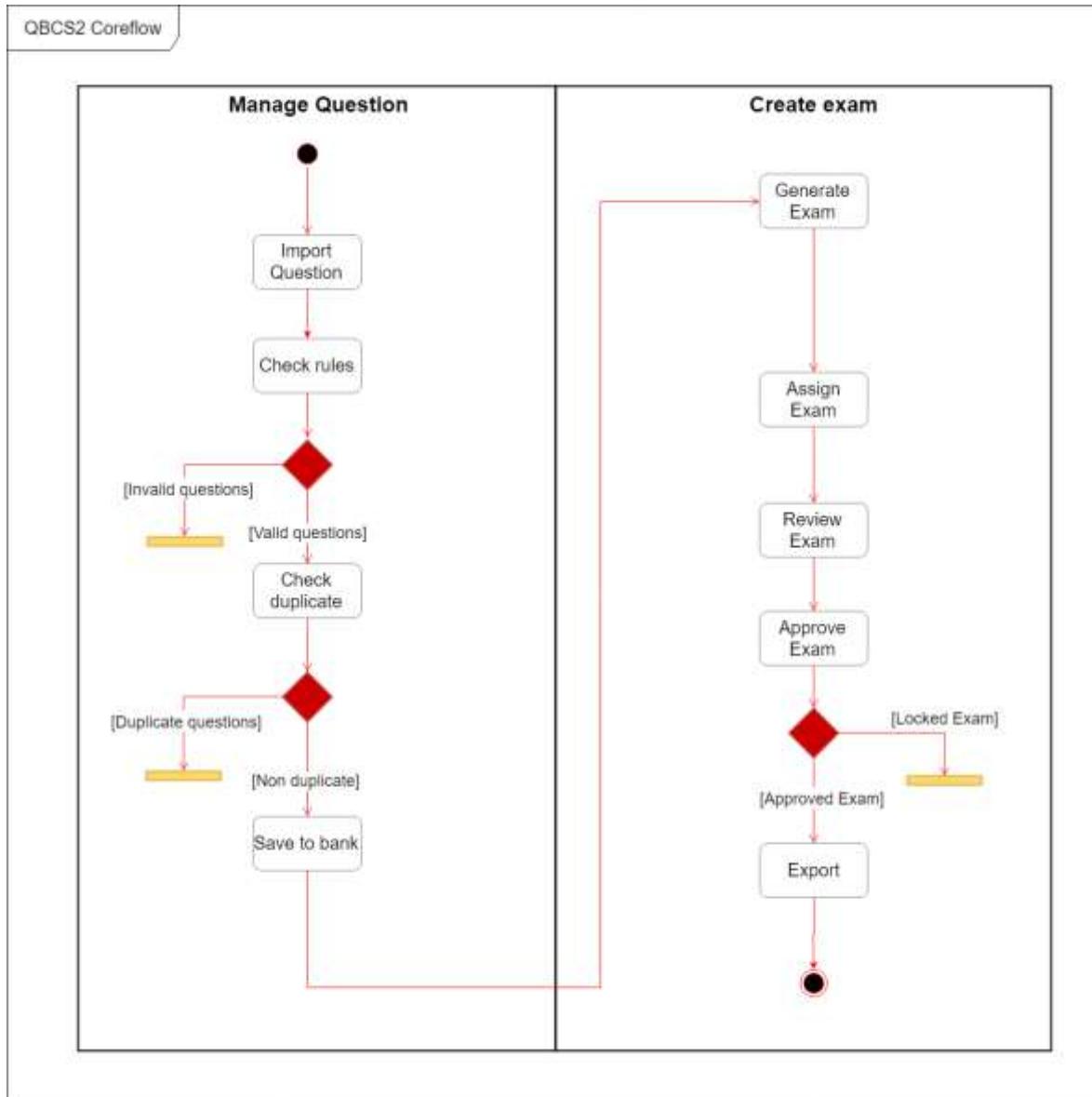


Figure 1 – QBCS2 Core flow

## 5.1. Feature functions

- The system supports detecting duplicate matching questions, multiple choice questions, short answer, essay, fill in bank questions.
- The system detects duplicate audios.
- The system organizes questions into categories, topics and three levels consisting of easy, medium and hard. It also helps grading questions based on its level.
- The system conducts examination for lecturers to test and review the exam, as well as verify the automatically generated exam.

## 5.2. Benefit and Challenge

The benefits and challenges of the proposed solution:

- **Benefit:**

- Reduce human mistakes.
- It supports generating and grading examination tests with 3 levels of question.
- It can detect audio duplication.
- It supports multiple types of question.
- It can conduct examination for lecturers to test, as well as verify the exam.
- Improvement in detecting duplicate images.
- Improvement in performance.
- It can export examination test to Microsoft Word document.

- **Challenge:**

- Semantic checking still takes a lot of time.
- Importing and checking audio is not time efficient.
- We can only support and automate 80% of manual process, human acts are still involved.

## 6. Functional Requirements

Functional requirements of the QBCS are:

No	Features	Description
1	Lecturer Manager can import a list of questions	Implemented, change role from Lecturer Manager to Lecturer.
2	Lecturer Manager can edit or remove duplicate, wrong format question	Implemented
3	Lecturer Manager can edit the level of each question based on three level (easy, normal or hard)	Implemented
4	Staff Manager can get statistic on QBCS	Implemented
5	Staff Manager manages users	Implemented
6	Staff manages courses, topics	Implemented
7	Staff can modify the format of questions	Implemented

8	Staff can create and export examination tests	Implemented, but lack of support for Microsoft Word
9	The system can detect duplicate questions	Implemented, but only support single choice type questions. And the system can only detect duplicate questions with the same right option.
10	The system can detect questions with wrong format	Implemented
11	The system notifies wrong questions	Implemented
12	The system generates examination tests automatically	Implemented, but cannot conduct a test for Lecturers and only support single choice questions.

#### Additional functional requirements:

- Added Lecturer role, user with role Lecturer can handle import questions into QBCS.
- Upgrade in Lecturer Manager role, Lecturer Manager can now handle examinations in QBCS system.

No	Features	Description
1	Import and detect duplicate multiple-choice questions	New, the system can now detect duplicate multiple-choice questions.
2	Import and detect duplicate matching questions	New, the system can now detect duplicate matching questions type.
3	Import and detect duplicate short answer and essay questions	New, the system can now detect duplicate short answer and essay questions.
4	Import and detect duplicate fill in blank questions	New, the system is now be able to detect duplicate type questions.
5	Import and detect duplicate groups of questions with reading passage	New, the system can import Reading or Listening as a

		group of questions with a passage and check duplicate.
6	Import questions manually	Upgrade, the system offers a tool supports for creating all types of questions.
7	Edit question	Upgrade, Lecturer can edit all contents of a question, including question content, option content and question level.
8	Edit Syllabus	Upgrade in UI/UX
9	Detect duplicate audios	New, the system can now detect duplicate audios.
10	Checking duplicate questions and all of its' options	Upgrade in availability, the system can now check questions and all of its answers.
11	Performance improvement for UI/UX	Upgrade, support more user friendliness UI/UX as well as fixing latent problems.
12	Assign an examination group to a Lecturer	New, Lecturer Manager can assign an examination group to a Lecturer.
13	Conduct examination test, quiz for lecturer	New, Lectures can now take a test on the system as a way to verify an examination group
14	Process examination test result	New, Lecturer Manager can either approve an exam or lock it and prevent it from being exported.
15	Generate examination automatically and create exam manually	Upgrade in UI/UX, add support for all types of questions.
16	Export examination	Upgrade, now support all types of questions and export to Microsoft Word document.
17	Staff Manager gets all imports and examinations	New, Staff Manager can get all imports and examinations from all users and courses.

## 7. Role & Responsibility

No	Full Name	Position	Contact
1	Kiều Trọng Khánh	Supervisor 1	khanhkt@fe.edu.vn
2	Nguyễn Lê Nhật Trường	Supervisor 2	truongln2@fe.edu.vn
3	Dương Thành Đạt	Leader	datdtse63506@fpt.edu.vn
4	Phan Thị Tuyết Giang	Member	GiangPTTse62203@fpt.edu.vn
5	Nguyễn Hồng Phát	Member	phatnhse63348@fpt.edu.vn

Table 2 - Roles and Responsibilities

## B. Software Project Management Plan

### 1. Problem Definition

#### 1.1. Name of this Capstone Project

- Official name: Maintain and Upgrade Question bank and checking system – Season 2
- Vietnamese name: Hệ thống soạn thảo và quản lý câu hỏi thi trắc nghiệm – Kỳ 2
- Abbreviation: QBCS2

#### 1.2. Problem Abstract

In FPT University, Examination Department has a process in creating examination, in season one, the last team had researched about this process and created an application named QBCS in order to automate it. Therefore, we have to learn about how the application works at first. After that, we maintain and upgrade QBCS application, adding new features as well as maintaining old ones.

#### 1.3. Project Overview

##### 1.3.1. Current Situation

- **Learning about the current application:** We have to find out the process of the current application, how the database was designed, and what is the core flow.
- **Lack of support for question types:** The current system can only detect single choice questions. However, in FPT University examination, we use many types of question, including multiple choice, matching and short answer, essay and fill in blank questions.
- **Lack of support for multimedia:** In FPT University, there are many linguistic courses, such as Japanese, Chinese and English with audios inside questions. The current system has not yet supported audios.
- **Lack of knowledge about algorithms:** We are lacking knowledge about the algorithms for audios checking feature. Therefore, we have to research the needed algorithms.
- **Performance problems:** The importing and checking phase usually take a lot of time. User also does not know when will it finish, or whether it has failed.

##### 1.3.2. The Proposed System

QBCS is a web-based application created for lecturers in order to store exam questions, and help lecturers in checking duplicate question as well as automatically generate exams, the system currently lacks many important features for this process. Following tables will show how we maintain, upgrade and integrate those features.

In QBCS Process, Lecturer Manager is the one who imports and Staff is the one who creates examination. In this process, we add Lecturer who imports questions into bank and Lecturer Manager, who is Department Head in FPT University, will also be able to manage examinations.

**a. Lecturer & Lecturer Manager:**

- QBCS Process:**

No	Function	Description
1	Lecturer Manager can import the questions from file to QBCS, the system will check for duplicate questions.	Implemented, but the system can only check for duplicate single choice questions.
2	Lecturer Manager can edit or remove a question if that question is syntactically/semantically duplicated with other questions.	Implemented
3	Lecturer Manager can get statistic on QBCS.	Implemented

- New, Maintain and Upgrade:**

No	Function	Description
1	Lecturer can import the questions from file to QBCS, the system will check for duplicate questions.	Upgrade, the system can check for duplicate single choice, multiple choice, matching, short answer, essay and fill in blank questions.
2	Lecturer can attend in an examination as a final step of verifying the examinations.	New, the system can now conduct a test for Lecturer.
3	Lecturer can classify each question into levels (easy, normal or hard) and grading the exam based on questions level.	Upgrade, the system can now detect duplicate multiple-choice questions.
4	Lecturer can import the questions with audios from file to QBCS, the system will check for duplicate questions.	New, the system can now detect duplicate audios.

**b. Department of Examination:**

- QBCS Process:**

No	Function	Description
----	----------	-------------

1	Staff can manage courses, topics.	Implemented
2	Staff can create and export exams to file.	Implemented, lack of support for Microsoft Word document.
3	Staff can edit question rules	Implemented

- **New, Maintain and Upgrade:**

No	Function	Description
1	The system support more question formats	Upgrade, support for multiple choice, matching, short answer, essay and fill in blank will be added
2	Create and export exams to file.	Upgrade, support for all formats of questions in exam and export to MS Word.
3	Lecturer Manager can manage courses, topics	Implemented, Lecturer Manager can manage course, topics.
4	Lecturer Manager can create and export exams to file.	Implemented, Lecturer Manager can manage examinations, including create and export exams.
5	Lecturer Manager can edit question rules	Implemented, Lecturer Manager can manage examinations, including create and export exams.

c. **Staff Manager:**

No	Function	Description
1	Staff Manager can get statistic on QBCS	Implemented
2	Staff Manager can manage users	Implemented
3	Staff Manager can get all imports from all users	New

4	Staff Manager can get all examinations from all users	New
---	---	-----

### 1.3.3. Boundaries of the System

#### a. Our system can:

- QBCS Process:

No	Function	Description
1	The system can check duplicate questions, the system supports single choice	Implemented
2	The system can generate exams automatically	Implemented
3	The system supports grouping questions by Topics or Learning Outcomes	Implemented
4	The system can generate and show statistic	Implemented
5	The system manages questions by categories	Implemented
6	The system can detect duplicate images	Implemented
7	The system can classify questions into three levels (easy, normal or hard)	Implemented

- New, Maintain and Upgrade:

No	Function	Description
1	The system can check duplicate questions, the system supports single choice, multiple choice, matching question, short answer, essay and fill in blank.	Upgrade, support for multiple choice, matching, short answer, essay and fill in blank will be added
2	The system can check duplicate a group of questions with Reading passage	Upgrade, support for a group of questions with Reading passage
3	The system can conduct examination for Lecturer and Lecturer Manager to test as a final step to verify.	Upgrade, the system can conduct an examination for Lecturer and Lecturer Manager to test on
4	The system can detect duplicate audios	New, the system can detect duplicate question audios inside the question bank

**b. Our system cannot:**

- The system does not manage human resource.
- The system does not connect to the Examination Department system.
- The system does not handle student's grades.

#### **1.3.4. Future Plans**

- Support for managing Learning Outcomes, using Learning Outcomes as rubrics to determine questions grade in examination.

#### **1.3.5. Development environment**

##### **1.3.5.1. Hardware requirements**

- **For server**

<b>Hardware</b>	<b>Minimum Requirement</b>	<b>Recommended</b>
Internet Connection	Cable, Wi-Fi (4Mbps)	Cable, Wi-Fi (8Mbps)
Operation System	Windows server 2012 R2	Windows server 2012 R2
Computer Processor	Intel® Xenon® E5-2660	Intel® Xenon® E5-2660
Computer memory	4GB RAM	6GB RAM

*Table 3 - Hardware Requirements for Server*

- **For PC**

<b>PC</b>	<b>Minimum Requirements</b>	<b>Recommended</b>
Internet Connection	Cable, Wi-Fi (4 Mbps)	Cable, Wi-Fi (8 Mbps)
Operating System	Windows 10, Android 6.0, IOS 9	Windows 10, Android 8.0, IOS 10.
Computer Processor	Intel® Core i3 1.4GHz	Intel® Core i5 2.50GHz
Computer Memory	4GB RAM	8GB RAM or more
Web Browser	Chromes (v42 or higher)	Chrome latest stable version

*Table 4 - Hardware requirement for PC*

##### **1.3.5.2. Software requirement**

<b>Software</b>	<b>Name / Version</b>	<b>Description</b>
Environment	.NET Framework 4.6	Specification for developing web application and mobile application
Modeling tool	StarUML 2.8	Used to design and draw diagram
IDE	Visual Studio 2017	Programming tool
DBMS	SQL Server 2017	Used to create & manage the database for system
Source control	Gitlab	Tool used for source control
Web browser	Chrome 70 or above	Browser used in testing

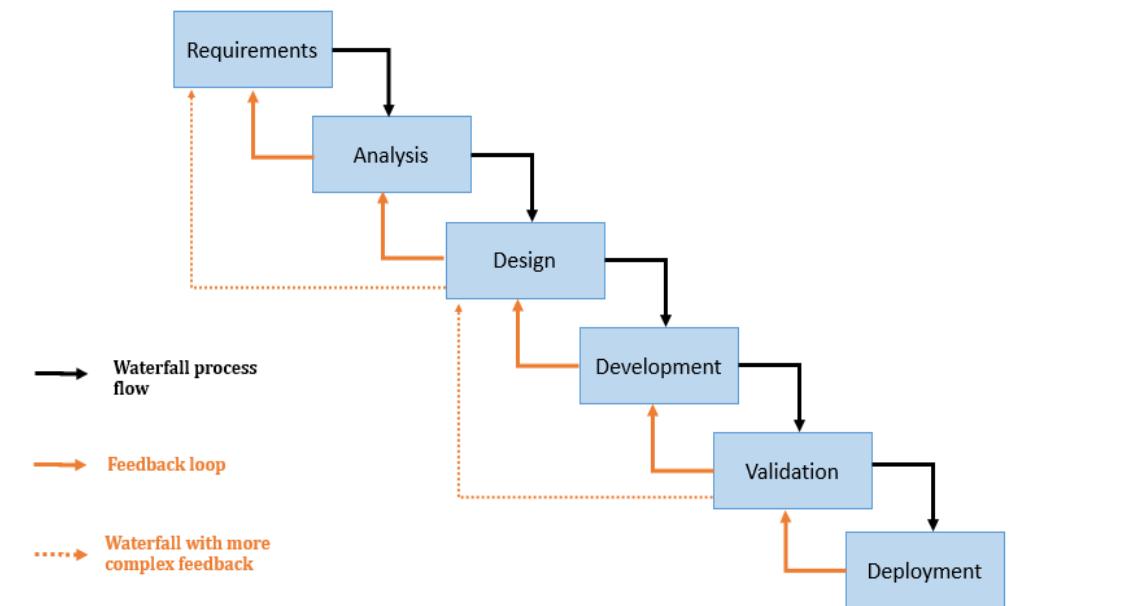
*Table 5 - Software Requirement*

## 2. Project Organization

### 2.1. Software Process Model

We apply Waterfall model with Royce's iterative feedback to develop this project. We choose this model because:

- The examination process is available and cannot be changed.
- Checking duplicate questions feature is already available, we just need to upgrade it.
- The audios and images checking algorithm are complex so we have to finish designing before implementation.



*Figure 2 - Modified Waterfall Model*

Reference:

[https://www.thomasalspaugh.org/pub/fnd/softwareProcess.html#Takeuchi\\_Nonaka1986-nnpd](https://www.thomasalspaugh.org/pub/fnd/softwareProcess.html#Takeuchi_Nonaka1986-nnpd)

### 2.2. Roles and responsibilities

No	Full name	Role in Group	Responsibilities
----	-----------	---------------	------------------

1	Kiều Trọng Khánh	Project Manager	Clarify user requirements and project scopes Carry out meetings with insiders to have more insight Supervise the development process
2	Nguyễn Lê Nhật Trường	Supervisor	Support with user requirements Support deploying to FPT University Server
3	Dương Thành Đạt	Team Leader Developer	Distribute task Trach member's progress Analyze requirements Write, cover and review documents Design GUI Code, develop Test
4	Nguyễn Thị Tuyết Giang	Developer	Design, re-design database Analyze requirements Write documents Code, develop Test
5	Nguyễn Hồng Phát	Developer	Design, re-design UI/UX GIT Master Analyze requirements Write documents Code, develop Design GUI Test

Table 6 - Roles and responsibilities

### 2.3. Tools and Techniques

Tool/Technique	Name
Front-end Web	HTML5, CSS, JavaScript, JQuery, Ajax, Vue.js
Back-end	C#, .NET Framework MVC
IDE	Visual Studio 2017
DBMS	MS SQL Server 2017
Source Control	Gitlab
Modelling tool	StarUML, draw.io

Table 7 - Tools and techniques

### 3. Project Management Plan

#### 3.1. Software development life cycle

Phase	Description	Deliverables	Resource needed	Dependencies and Constrains	Risks
Requirement	Collect requirement from Idea Owner, Examination Department Identify and clarify with Supervisor Research the current system	Introduction of Project, situation and problem definition of current process, proposed solution and functional requirement	3 days	Documents, Database and Source code of the application	Missing requirement
Analysis	Analysis requirement Define scope	Software requirement specification Project plan	3 days	Functional Requirement	Unclear scope
Design	Use-case design Architecture design Conceptual design	Software design document Project structure Mockup design Algorithm	5 days	Requirement Analysis	Ambiguous requirements Not enough experience in system design
Development	Implement function Unit test	Software source code	76 days	System design	Requirements are not met Logical error

Validation	System test	Test case	5 days	Software source code	Missing some cases
Deployment	Deploy application onto cloud platform	Runnable application on cloud	6 days	Database and Source code of the application	Lacking experience in DevOps

*Table 8 - Software development life cycle detail*

### 3.2. Phase detail

#### 3.2.1. Phase 1: Requirement

Task	Description	Author
Collect requirements	Find out the situation of the current system, their advantage and disadvantage	DatDT, PhatNH, GiangPTT
Identify and clarify main function	Understand how main functions of the system work	DatDT, PhatNH, GiangPTT
Clarify new features	Research and understand the new features need to be integrated into the system.	DatDT, PhatNH, GiangPTT

*Table 9 - Phase 1: Requirement*

#### 3.2.2. Phase 2: Analysis

Task	Description	Author
Analysis requirement	Define scope, list all functional requirements	DatDT, PhatNH, GiangPTT
Plan	Define software process model, make project management plan	DatDT, PhatNH, GiangPTT

*Table 10 - Phase 2: Analysis*

#### 3.2.3. Phase 3: Design

Task	Description	Author
Design and create use cases	List all functions, design use case diagram	DatDT, PhatNH, GiangPTT

Design Conceptual Diagram	Design conceptual diagram	DatDT, PhatNH, GiangPTT
Design System Architecture	Find suitable architect, create project structure	DatDT, PhatNH, GiangPTT
Evaluate and Redesign database	Identify changes in entities, ERD diagram, database and redesign	DatDT, PhatNH, GiangPTT
Design Mockup UI	Redesign Mockup UI for Lecturer Manager importing questions and check duplicate (Check duplicate now supports more formats)	DatDT, PhatNH
	Design Mockup UI for Lecturer Manager to assign, approve and lock Examination	DatDT, PhatNH, GiangPTT
	Design Mockup UI for Lecturer to take Examination.	PhatNH, GiangPTT
	Design Mockup UI for checking duplicate audios.	DatDT, PhatNH, GiangPTT
	Design Mockup UI for generating examination automatically.	PhatNH
	Design Mockup UI for creating examination manually.	PhatNH
Research algorithm for checking duplicate audios	Research algorithm, extended stored procedure needed	DatDT, PhatNH, GiangPTT

Table 11 - Phase 3: Design

### 3.2.4. Phase 4: Implement

Task	Description	Author
Import questions with multiple types	Read multiple choice, matching, essay, short answer, fill in blank and reading passage using GIFT, XML, and Microsoft Word file formats then insert to DB	GiangPTT
Import questions manually	- QBCS: Microsoft Word editor for import questions with and insert to DB. - QBCS2: A window supports import for all formats and types of question.	GiangPTT, PhatNH
Import Listening and Reading	Read questions in with a reading passage or audio in a specific order and insert to DB.	GiangPTT
Improve check question's rule	Check question's rules after import questions	GiangPTT

Improve check duplicate questions	<ul style="list-style-type: none"> <li>- Improve check duplicate questions, add support for all types of questions (multiple choice, matching, short answer, essay, fill in blank) and options in questions.</li> <li>- Add check duplicate for Reading.</li> </ul>	GiangPTT
Handle questions in multiple types in import result	<ul style="list-style-type: none"> <li>- Support for viewing multiple choice, matching, short answer, essay, fill in blank, Reading and Listening in import result.</li> <li>- Accept, delete or edit a question in import result.</li> </ul>	GiangPTT
Progress bar for import result	Use SQL Dependency and SignalR to create a real time progress view for import result.	PhatNH
Get import result	Get all questions in import and status, support for viewing all types of questions.	PhatNH
Check duplicate question in background every month	Automatically check duplicate questions in DB to check all question in bank every month, add support for all types of questions.	PhatNH, GiangPTT
Edit question	Edit question content, options, category, topic and level of the question, add support for all types of questions.	PhatNH
Show list question with category	Group all questions in course by category, topic, level, UI/UX update.	PhatNH
Search questions in course	Search questions based on its content in course	PhatNH
Export bank	Export all questions in bank, add support for all types of questions (multiple choice, matching, short answer, essay, fill in blank) and GIFT, XML, MS Word format.	DatDT
Generate examination automatically	Base on syllabus and fact that staff input, generate exam automatically with rubric matrix, add support for all types of questions and integrate statistic after generated.	PhatNH
Create exam manually	Choose one by one question in order to create an exam	PhatNH

Export examination	Export exams to Moodle file format GIFT, XML, MS Word and add support for all types of questions (multiple choice, matching, short answer, essay, fill in blank).	DatDT
Assign examination	Lecturer Manager assigns examination group to Lecturer in order to make Lecturer test the exams.	DatDT, PhatNH
Take an exam	Lecturer takes an exam and submit result to Lecturer Manager who assigned it	DatDT, PhatNH
Verify examination	Lecturer Manager verifies an exam, they can lock or approve it.	DatDT
Show current rules	Show all rules are currently applied	GiangPTT
Edit rule	Edit rules	GiangPTT
UI/UX optimization	Optimize web application performance	PhatNH, DatDT

*Table 12 - Phase 4: Implement*

### 3.2.5. Phase 5: Validation

Task	Description	Author
System test	Write test case, and test all system	DatDT, GiangPTT, PhatNH

*Table 13 - Phase 5: Validation*

### 3.2.6. Phase 6: Deployment

Task	Description	Author
User guide	Write user guide for Lecturer, Lecturer Manager and Staff Manager	DatDT
Installation guide	Write guide for configure SQL server, build and deploy web application	DatDT, GiangPTT, PhatNH
Deploy	Build and deploy to server	DatDT, GiangPTT, PhatNH

*Table 14 - Phase 6: Deployment*

### **3.3. All Meeting Minutes**

All meeting minutes could be found here.

## **4. Coding Convention**

Naming Conventions:

- All method name, class name must have the first letter capitalized.
- All variable, private field, parameter use **camelCase**.
- All constants are named using **ALL CAPS**.
- All Interface must have prefix **I\_**.

Declaration Conventions:

- Only one declaration in one line.

Reference: <https://docs.microsoft.com/en-us/dotnet/csharp/programming-guide/inside-a-program/coding-conventions>

## C. Software Requirement Specification

### 1. User Requirement Specification

#### 1.1. Lecturer Requirement

Teacher, Lecturer who is teaching in FPT University will login into the system as “Lecturer” role. Lecturer has permission to:

No	Function	Description
1	Get courses	Implemented, UI/UX updated
2	Get questions	Implemented, UI/UX updated
3	Search questions	Implemented
4	Edit a question	Updated, support multiple types of question and easier to use.
5	Get the statistic on number of questions	Implemented
6	Import questions	Upgrade, added support for all types of questions.
7	Check duplicate questions	Upgrade, added support for all types of question.
8	Review assigned examination	New, Lecturer takes an examination test which is assigned to the Lecturer by Lecturer Manager.
9	Feedback questions in an exam, approve or disapprove the questions	New, Lecturer can give feedback to questions when they are taking the test.
10	Import manually	New, Lecturer can create a manual import for a course.
11	Import Reading or Listening	New, Lecturer imports a group of questions that has a reading passage or audio as a master question. Every other questions presented in the

		group must stay together with the master question.
--	--	--

*Table 15 – Lecturer Requirements*

## 1.2. Lecturer Manager Requirement

Lecturer Manager is the Department Head of FPT University who will login into system as “Lecturer Manager” role. Lecturer Manager has permission to:

No	Function	Description
1	Assign examination	New, Lecturer Manager can assign examination to Lecturer in order to verify the examination.
2	Get test results	New, Lecturer Manager can get test results after Lecturer has done verifying the examination.
3	Get feedbacks in examination	New, Lecturer Manager can get feedbacks in examination.
4	Verify an exam	New, Lecturer Manager can approve an exam or lock it and prevent it from being exported.
5	Generate examination automatically	Added support for all type of questions, support for all type of exams. UI/UX updated.
6	Create exam manually	Added filters, search. UI/UX updated, Staff can create exam manually with more intuitive UI/UX.
7	Export examination	Upgrade, Staff can export examination in many types.
8	Get examination details	Upgrade in UI/UX, support for viewing all types of questions.
9	Disable an exam	Implemented

10	Get the statistic number of questions in examination	Upgrade, added automatic statistics after generating examination automatically.
11	Get question rules	Upgrade, add more rules.
12	Customize question rules	Upgrade, Lecturer Manager customize rules.
13	Get history of questions in examination	Implemented
14	Get list of examinations	Implemented

*Table 16 – Lecturer Manager Requirements*

### 1.3. Staff Manager Requirement

Staff Manager is a user who logins into the system with role “Staff Manager”. Staff Manager will have almost all permission in the system, they can watch all user’s activities. Staff Manager has access to some functions that no other role can.

No	Function	Description
1	Get all examinations	New, Staff Manager gets all created examinations from all course.
2	Get all imports	New, Staff Manager gets all imports from all users.
3	Add course for Lecturer	Implemented
4	Delete course from a Lecturer	Implemented
5	Get question changes log	Implemented
6	Get user activity log	Implemented
7	Manage monthly scan schedule	New, Staff Manager can manage the scan date of every month.

*Table 17 – Staff Manager Requirements*

## **2. System Requirement Specification**

### **2.1. External Interface Requirement**

#### **2.1.1. User Interface**

The web application user interface will be in English and provide the following components.

#### **2.1.2. Hardware Interface**

N/A

#### **2.1.3. Software Interface**

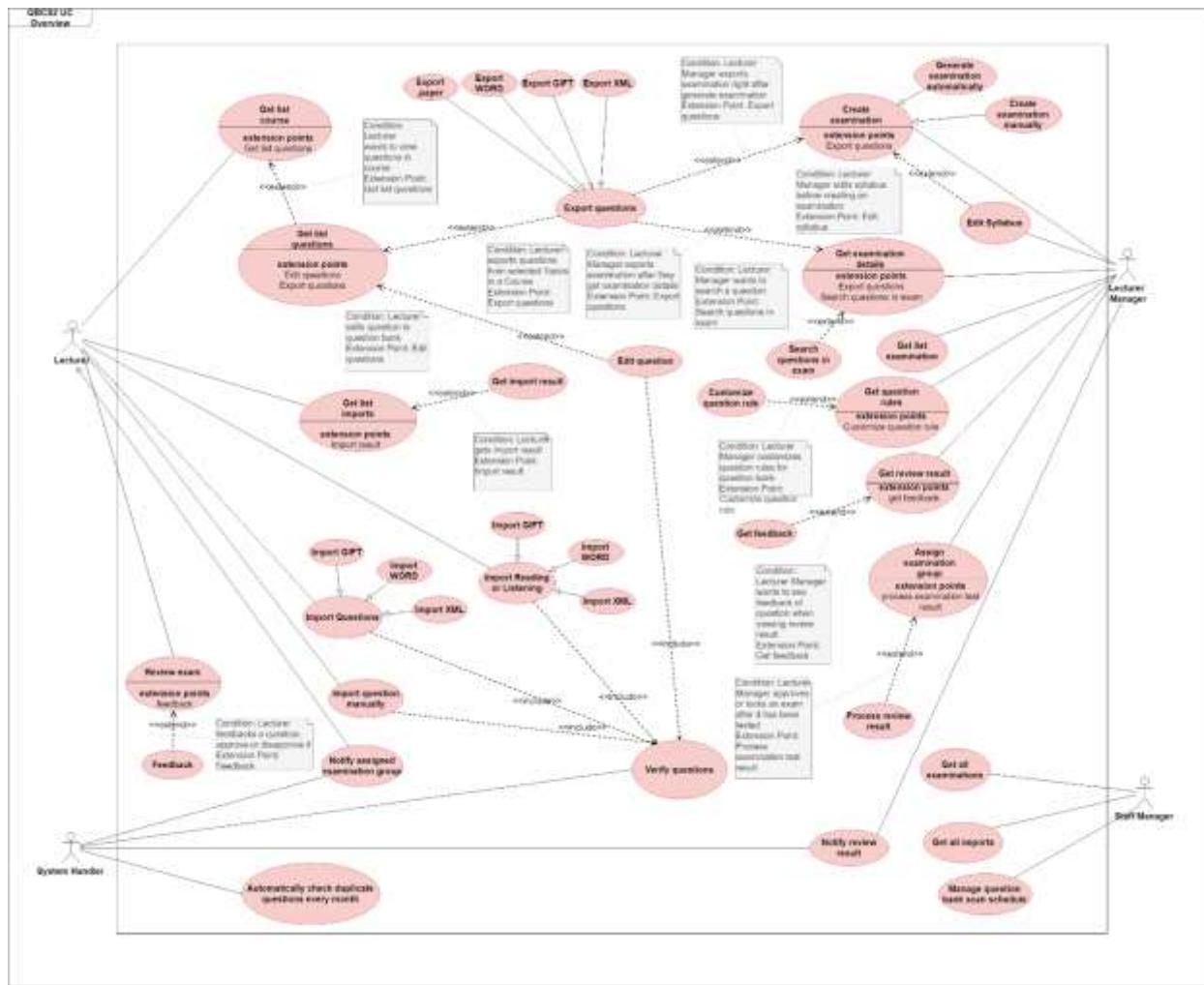
- Web application: browser Google Chrome (version 69 or higher) and Firefox (version 52 or higher), Internet Explorer (version 10 or higher) or with any web browser that support HTML5 & CSS3.

#### **2.1.4. Communication Protocol**

- HTTP protocol version 1.1 for communication between: web service and web application or mobile application that consumes the services.

## **2.2. System Overview Use Case**

Use cases that are not modified by our QBCS season 2 team will not appear in this section. For more details, please open [QBCS 1 document references](#).



*Figure 3 – Overview use-case*

## 2.3. List of use case

### 2.3.1 <Lecturer> Overview Use Case

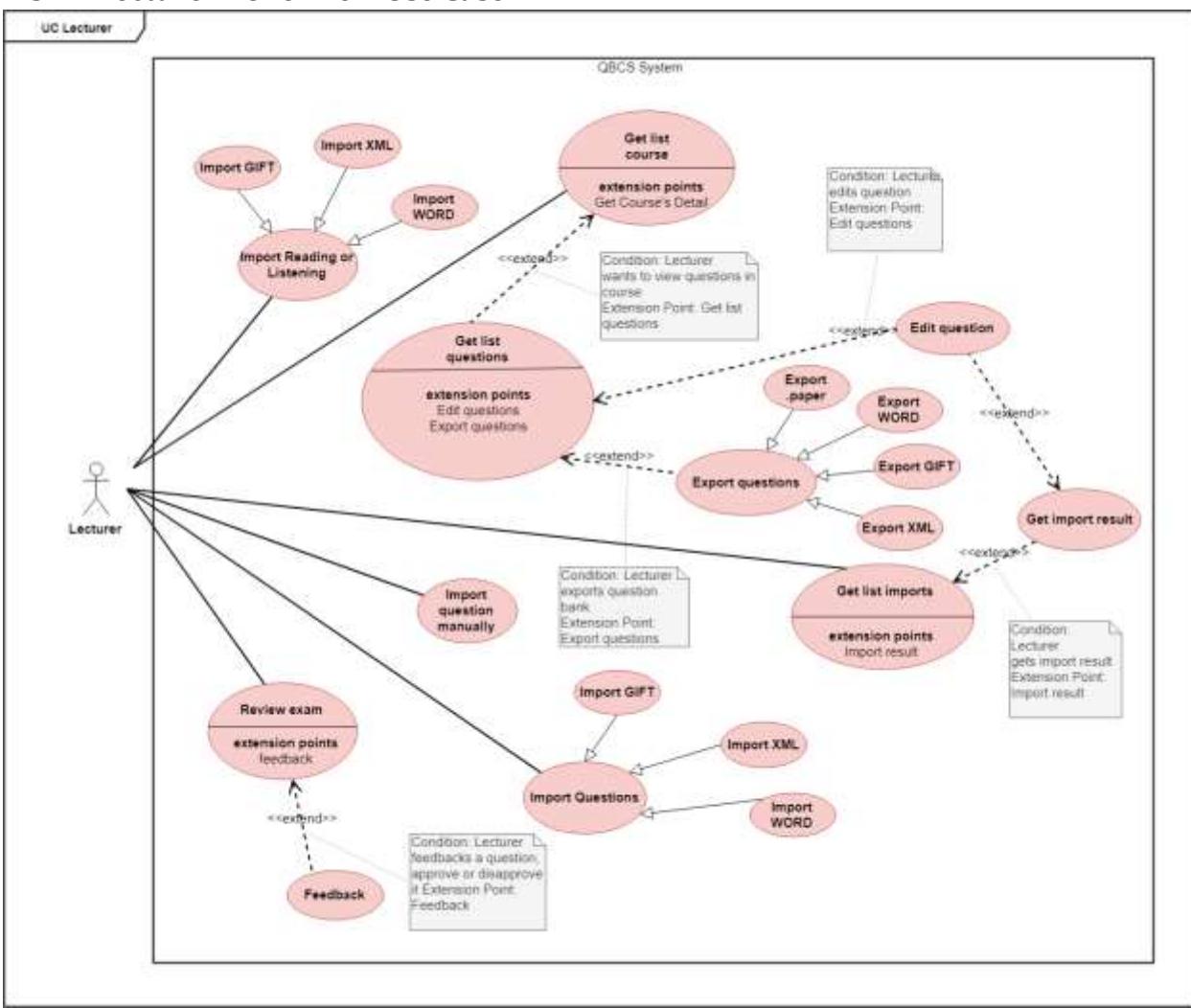


Figure 4 – <Lecturer> Overview use-case

### 2.3.1.1 <Lecturer> Import questions

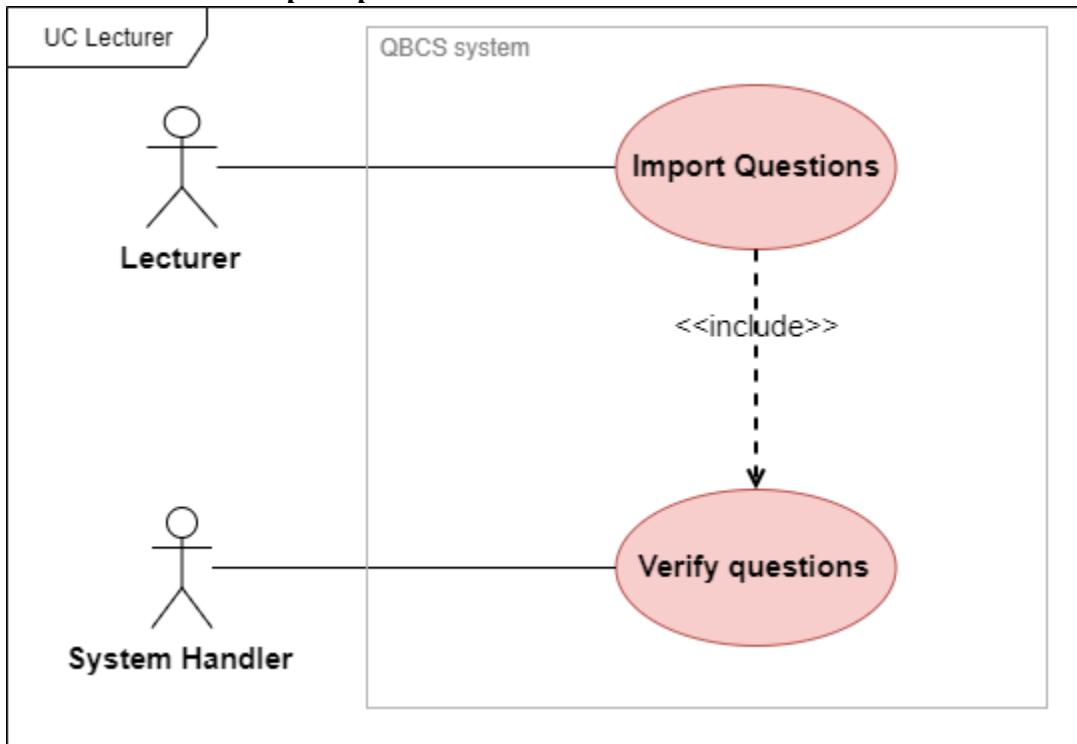


Figure 5 - <Lecturer> Import questions

USE CASE - QBCS2_UC01			
Use Case No.	QBCS2_UC01	Use Case Version	2.0
Use Case Name	Import questions		
Author	Phan Thi Tuyet Giang		
Date	25/11/2019	Priority	High
<b>Actor:</b>			
- Lecturer			
<b>Summary:</b>			
- This use case allows Lecturer to import questions into Question Bank.			
<b>Goal:</b>			
- Questions are imported into the Question Bank.			
- Imported questions must be verified based on specific rules.			

**Triggers:**

- Lecturer sends command to import their questions file into the system.

**Preconditions:**

- User must login into the system as Lecturer's role.

**Post conditions:**

- Success: System informs the numbers of valid/invalid questions to Lecturer.
- Fail: System displays the error message.

**Main Success Scenario:**

<b>Step</b>	<b>Actor Action</b>	<b>System Response</b>
1	Lecturer inputs their questions with: <ul style="list-style-type: none"> <li>• Course</li> <li>• Questions Owner's Name</li> <li>• Upload questions file to import</li> </ul>	System gets question's Course. System gets questions owner's Name. System gets questions from imported file. [Exception 1]
2	Lecturer sends command to import question file.	System checks questions with defined rules. System shows imported result to the Lecturer.

**Alternative Scenario: N/A****Exceptions:**

<b>No</b>	<b>Cause</b>	<b>System Response</b>
1	System cannot read file, because file is in wrong format.	System shows error message "Some error occurs when read your file. Please check your File's format and try again!" when system cannot read the file.

**Relationships:** QBCS2\_UC26**Business Rules:**

1. The selected course, owner and file must exist; the selected course, owner name and chosen file are displaying on user screen. When user sends command to import, all questions storing in the file (with compatible format) will be parsed into the system as well as checked for invalid and duplicate questions.
2. If the import file is GIFT or XML, questions in file format must follow [Moodle](#). Questions will be imported into the system
  - In GIFT format: single choice, multiple choice, fill in blank will have the right option placed after “=”, the wrong option will be placed after “~”. Matching type questions will be encoded as “=sub question -> option”.
  - In XML format: questions will be stored inside “<question></question>” tag, the type of the question is the “type” attribute of the tag.
3. If the import file is a MS Word document, questions in the file must exactly follow [QBCS format](#), otherwise it may not work as intended. In QBCS Word format:
  - Question content and options' content are stored in each row of a table, answers to a question will be stored in “ANSWER” row.
  - Question must contain Category and Topic row.
  - Question's level can only contain 1 – Easy, 2 – Medium, 3 – Hard. Otherwise user has to input question's level after importing it.
4. If there is no category or topic, when imported questions are saved into the system, they will be moved to “Default Category” – “Default Topic” of the selected course.
5. Question's rules include
  - For other types of matching questions, question content must not be empty
  - In fill in blank type question, question must not mix between dropdown and textbox.
  - Image must import from XML type, if not question will be missing image
  - Questions don't have “True”, “False” options.
  - In single choice, multiple choice and matching questions, option must not be empty
  - In single choice, multiple choice and matching questions, question must have least a correct option.
  - In question, all options must different from others.
  - In question, the correct option is not “All of others” or “None of others”.

If Lecturer's questions follow the question's rules, QBCS will accept their questions. If Lecturer's questions do not follow the question's rules, Lecturer can contact to Lecturer Manager to edit their questions.
6. Lecturer Manager can customize question's rules.
7. QBCS checks imported questions with bank's questions and other import. If questions are duplicate content (duplicate question content, duplicate option content...), Lecturer is allowed to edit the questions. Our system suggests about question's rules; users have responsibility about their action on system.
8. File's format is including: Microsoft Word, Moodle format File (XML, GIFT). If File has images, images will be encoded in a specific format.
9. Importing with Microsoft Word file's format, Lecturer must download template from QBCS.
10. System has to record the question owner's name when imports question into Bank.

*Table 18 - <Lecturer> Import questions*

### 2.3.1.2 <Lecturer> Import manually

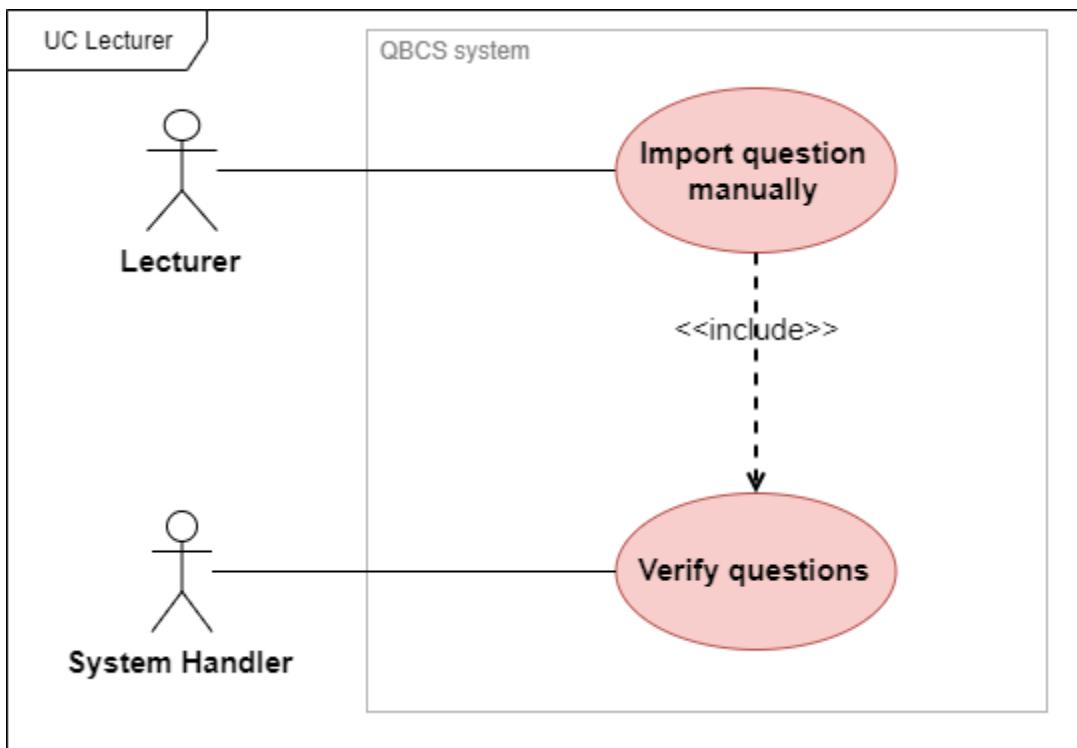


Figure 6 - <Lecturer> Import question manually

USE CASE - QBCS2_UC02			
Use Case No.	QBCS2_UC02	Use Case Version	2.0
Use Case Name	Create a manual import		
Author	Phan Thi Tuyet Giang		
Date	25/11/2019	Priority	High
<b>Actor:</b>			
- Lecturer			
<b>Summary:</b>			
- This use case allows Lecturer to directly create questions on the user interface of the system.			
<b>Goal:</b>			
- Lecturer creates questions manually.			

**Triggers:**

- Lecturer sends command to create a manual import.

**Preconditions:**

- User must login into the system as Lecturer's role.

**Post conditions:**

- Success: System informs the numbers of valid/invalid questions to Lecturer.
- Fail: N/A.

**Main Success Scenario:**

Step	Actor Action	System Response
1	Lecturer sends command to go to Import manually view.	System displays the form for Lecturer to input.
2	Lecturer choose course.	System gets question's course.
3	Input category and topic/learning outcome (optional)	System gets question's category and topic/learning outcome.
4	Lecturer sends command to create new question.	System generate template a question for Lecturer input question content.
5	Lecturer selects type of question.	System gets question's type.
6	Lecturer selects level of question.	System gets question's level.
7	Lecturer inputs data for question.	System gets question content and checks question rules. [ Alternative 1]
8	Lecturer sends command to save question.	System saves a question to cache.
9	Lecturer sends command to import question.	

		System saves questions on cache to server and displays added result to the Lecturer.
--	--	--

**Alternative Scenario:**

No	Cause	System Response
1	Lecturer input invalid rule question content.	The system displays the corresponding invalid rule message.

**Exceptions:** N/A

**Relationships:** QBCS2\_UC26

**Business Rules:**

1. The selected course must exist; the selected course and manually created questions are displaying on user screen. When user sends command to import, all questions showing on the screen be parsed into the system as well as checked for invalid and duplicate questions.
2. If user does not input Category and Topic, questions will be imported into “Default Category” – “Default Topic”.
3. Question’s rules include
  - For other types of matching questions, question content must not be empty
  - In fill in blank type question, question must not mix between dropdown and textbox.
  - Image must import from XML type, if not question will be missing image
  - Questions don’t have “True”, “False” options.
  - In single choice, multiple choice and matching questions, option must not be empty
  - In single choice, multiple choice and matching questions, question must have least a correct option.
  - In question, all options must different from others.
  - In question, the correct option is not “All of others” or “None of others”.

If Lecturer’s questions follow the question’s rules, QBCS will accept their questions. If Lecturer’s questions do not follow the question’s rules, Lecturer can contact to Lecturer Manager to edit their questions.

4. Lecturer must select course before input question content.
5. Default category is “default category” and learning outcome/topic is “default topic” if Lecturer forgets enter value.
6. Default question type is single choice and level is medium if Lecturer forgets choosing.

*Table 19 - <Lecturer> Import manually*

### 2.3.1.3 <Lecturer> Import Reading and Listening

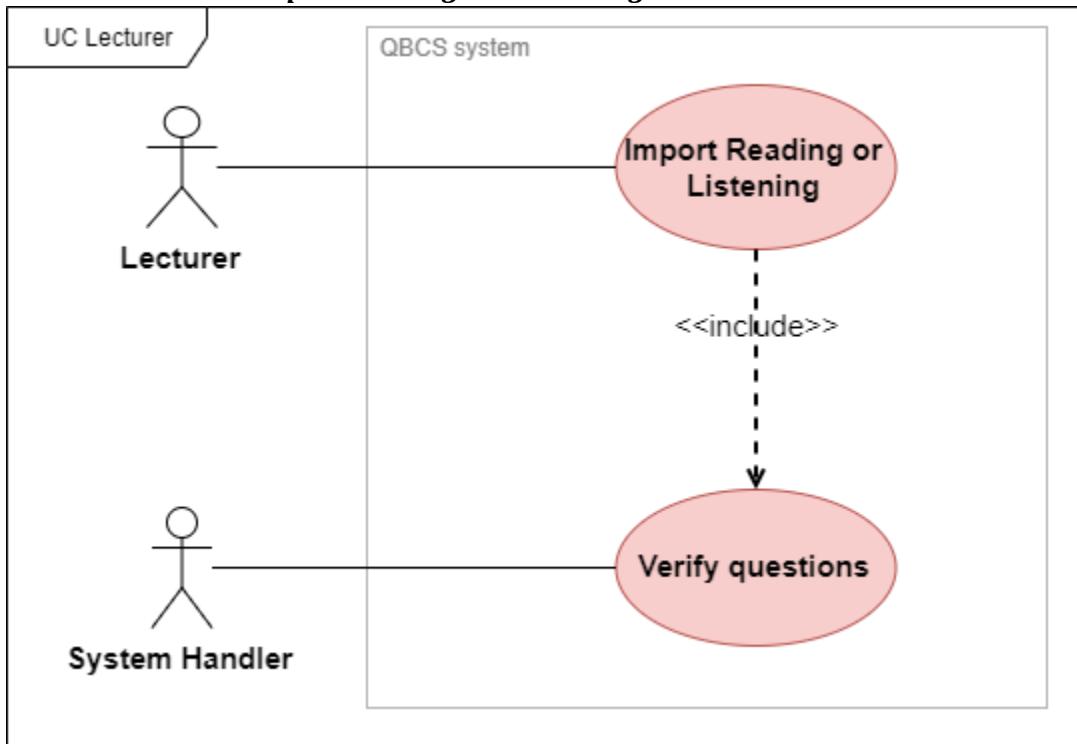


Figure 7 - <Lecturer> Import Reading or Listening

USE CASE - QBCS2_UC03			
Use Case No.	QBCS2_UC03	Use Case Version	2.0
Use Case Name	Import reading or listening		
Author	Phan Thi Tuyet Giang		
Date	25/11/2019	Priority	High
<b>Actor:</b>			
<ul style="list-style-type: none"> <li>- Lecturer</li> </ul>			
<b>Summary:</b>	<ul style="list-style-type: none"> <li>- This use case allows Lecturer to import a set of questions reading/listening.</li> </ul>		
<b>Goal:</b>	<ul style="list-style-type: none"> <li>- Lecturer import a set of questions with the primary question is a passage (reading) or audio (listening), and a set of sub-questions that follow the primary question to form a question.</li> </ul>		

**Triggers:**

- Lecturer send command to import a set of questions.

**Preconditions:**

- User must login into the system as Lecturer's role.

**Post conditions:**

- Success: System informs the numbers of valid/invalid questions to Lecturer.
- Fail: System displays the error message.

**Main Success Scenario:**

<b>Step</b>	<b>Actor Action</b>	<b>System Response</b>
1	Lecturer sends command to import Reading/Listening.	System displays Import Reading/Listening screen.
2	Lecturer enter owner name	System gets owner name of import's file
3	Lecturer choose course.	System gets question's course.
4	Lecturer upload questions file	System gets questions file<exception 1>
5	Lecturer upload audio(optional)	System gets audio file
6	Lecturer sends command to import question.	System checks a set of questions with defined rules. System gives imported result to the Lecturer.

**Alternative Scenario: N/A****Exceptions:**

<b>No</b>	<b>Cause</b>	<b>System Response</b>
1	System cannot read file, because file is in wrong format.	

		System shows error message "Some error occurs when read your file. Please check your File's format and try again!" when system cannot read the file.
--	--	--

**Relationships:** QBCS2\_UC26

**Business Rules:**

1. The selected course, owner and file must exist; the selected course, owner name and chosen file are displaying on user screen. When user sends command to import, all questions storing in the file (with compatible format) will be parsed into the system as well as checked for invalid and duplicate questions.
2. If the import file is GIFT or XML, questions in file format must follow [Moodle](#). Questions will be imported into the system
  - a. In GIFT format: single choice, multiple choice, fill in blank will have the right option placed after "=", the wrong option will be placed after "~". Matching type questions will be encoded as "=sub question -> option".
  - b. In XML format: questions will be stored inside "<question></question>" tag, the type of the question is the "type" attribute of the tag.
  - c. In GIFT and XML, the passage is an essay type question. The system will use the essay as a master question and will automatically map all of the questions below the essay to it, until the system finds another essay in the imported file.
3. If the import file is a MS Word document, questions in the file must exactly follow [QBCS Reading format](#), otherwise it may not work as intended. In QBCS Word format:
  - a. Question content and options' content are stored in each row of a table, answers to a question will be stored in "ANSWER" row.
  - b. Question must contain Category and Topic row.
  - c. Question's level can only contain 1 – Easy, 2 – Medium, 3 – Hard. Otherwise user has to input question's level after importing it.
  - d. The passage questions must have "PN" instead of "QN" as its unique identifier.
4. If there is no category or topic, when imported questions are saved into the system, they will be moved to "Default Category" – "Default Topic" of the selected course.
5. A set of questions must start with essay question type. It is a passage for reading question or a sentence for the audio of the listening question. If not, system automation adds a new question with type is essay, question content is empty into first of set of questions.
6. If Lecturer want to import a reading/listening question as a fill in blank type question, please come to Import screen.

*Table 20 - <Lecturer> Import reading or listening*

#### 2.3.1.4 <Lecturer> Get list of imports

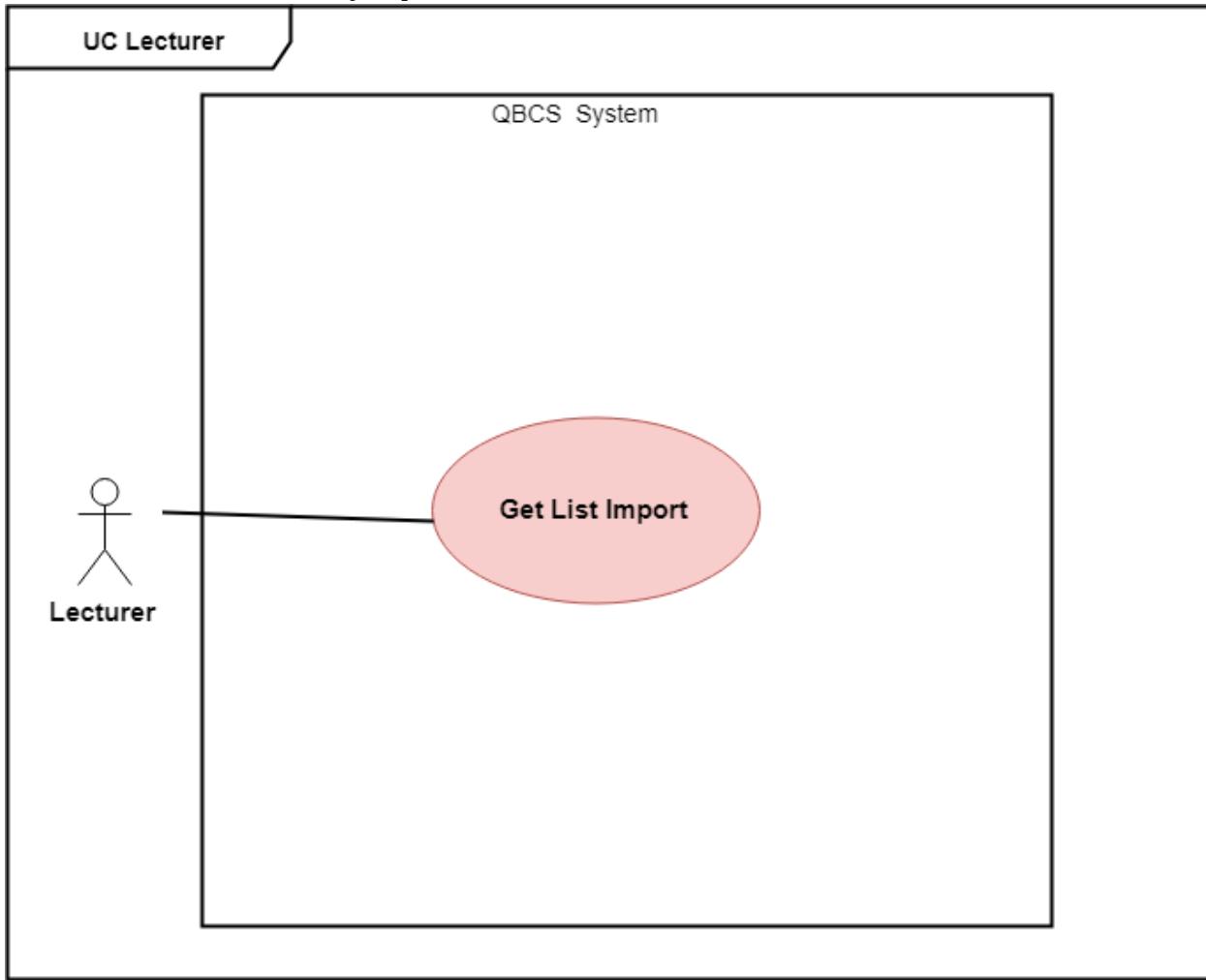


Figure 8 - <Lecturer> Get list of imports

USE CASE - QBCS2_UC04			
Use Case No.	QBCS2_UC04	Use Case Version	2.0
Use Case Name	Get list of imports		
Author	Duong Thanh Dat		
Date	21/11/2019	Priority	Normal
<b>Actor:</b>			
- Lecturer			
<b>Summary:</b>			

- This use case allows Lecturer gets history of their imported questions with import processing status.

**Goal:**

- Lecturer can get their history of imported questions.

**Triggers:**

- Lecturer sends command to get import result.

**Preconditions:**

- User must login into the system as Lecturer.

**Post conditions:**

- Success: System displays a history of imports.
- Fail: System show "Cannot get list import histories".

**Main Success Scenario:**

Step	Actor Action	System Response
1	Lecturer sends command to get a list of import histories.	System gives a list of import histories. [Exception 1]

**Alternative Scenario:** N/A

**Exceptions:**

No	Cause	System Response
1	The system cannot get history of imports.	System shows error message: "Cannot get list import histories. Please try again".

**Relationships:** N/A

**Business Rules:**

1. Lecturer can only get list of their imports.
2. System shows import owner, course, date, total of questions, success status and import status.

*Table 21 - <Lecturer> Get list of imports*

### 2.3.1.5 <Lecturer> Get import result

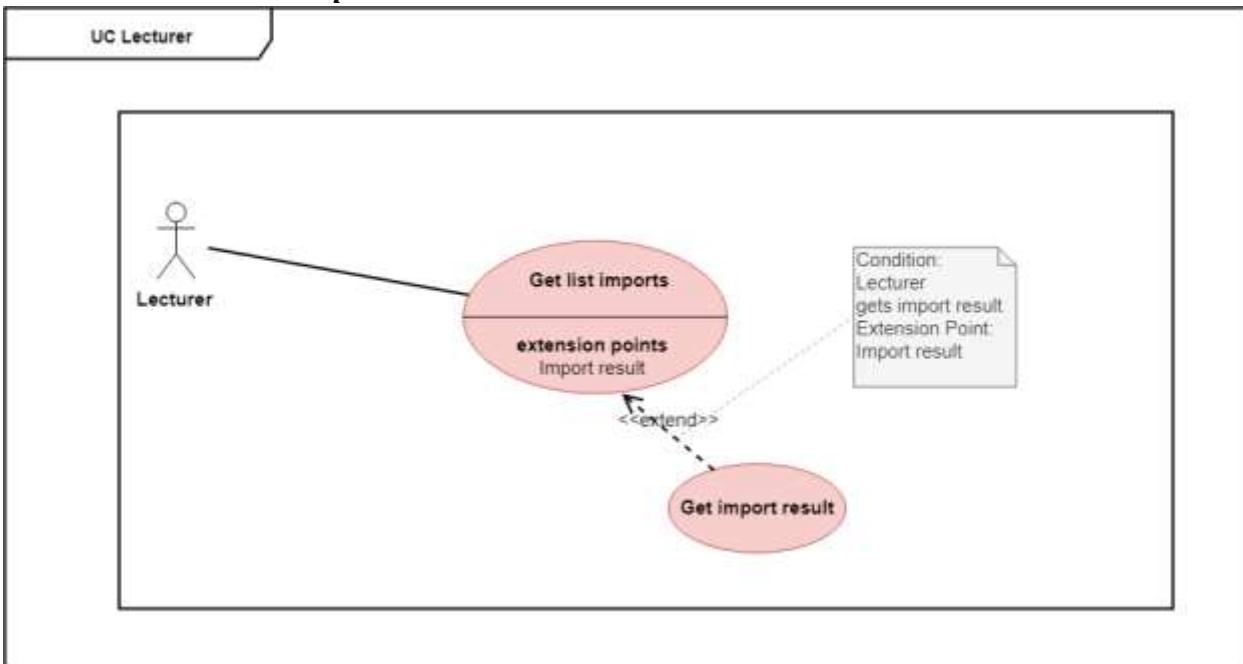


Figure 9 - <Lecturer> Get import result

USE CASE - QBCS2_UC05			
Use Case No.	QBCS2_UC05	Use Case Version	2.0
Use Case Name	Get import result		
Author	Duong Thanh Dat		
Date	21/11/2019	Priority	Normal
<b>Actor:</b>			
- Lecturer			
<b>Summary:</b>			
- This use case allows Lecturer to get and view result of an import.			
<b>Goal:</b>			
- Lecturer can get the import question result after system checks duplicate questions in an import.			
<b>Triggers:</b>			
- Lecturer sends command to get result of a questions import.			
<b>Preconditions:</b>			

- User must login into the system with role Lecturer.

**Post conditions:**

**Success:** System shows duplicate, success, invalid and deleted questions.

**Fail:** System shows “Cannot get the import result”.

**Main Success Scenario:**

Step	Actor Action	System Response
1	Lecturer Manager sends command to get import question result.	System shows imported question result. [Exception 1]

**Alternative Scenario:** N/A

**Exceptions:**

No	Cause	System Response
1	System cannot get the import result.	System shows error message “Cannot get the import result”.

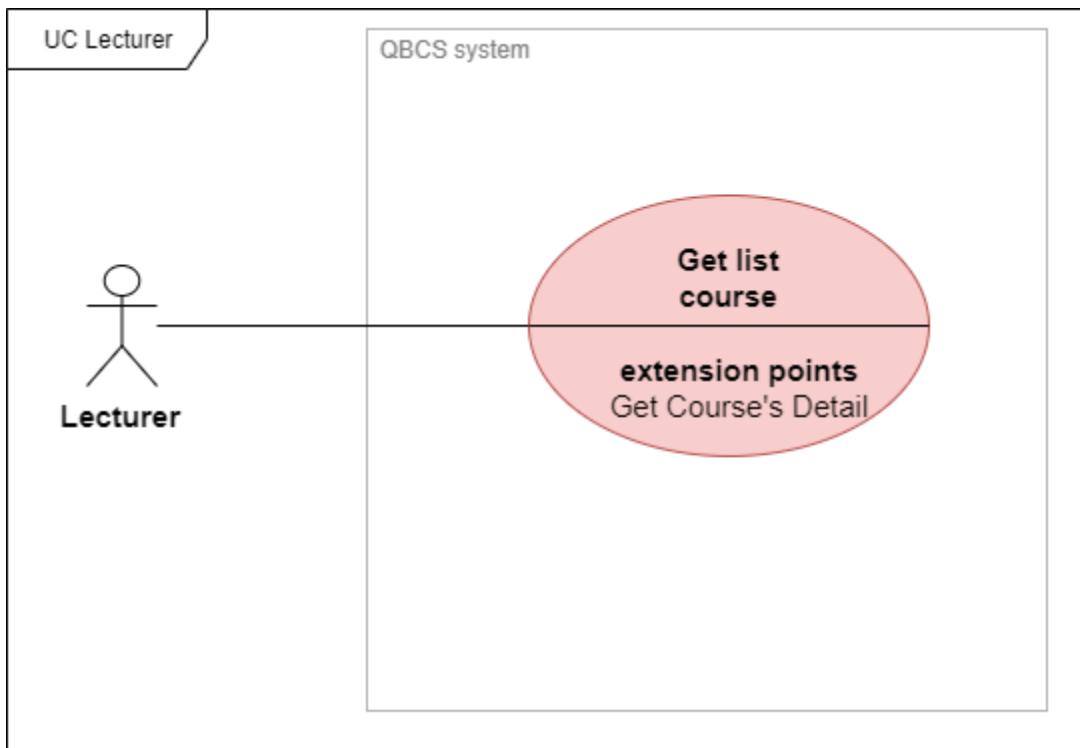
**Relationships:** QBCS2\_UC04

**Business Rules:**

1. Lecturer can only get result of their imports.
2. System brings user to import result, the result consists of four tabs:
  - Duplicate: contains duplicate questions
  - Success: contains questions without duplication and rules violation.
  - Invalid: contains questions that violate rules.
  - Delete: contains deleted questions.

*Table 22 - <Lecturer> Get import result*

**2.3.1.6 <Lecturer> Get list of courses**



*Figure 10 - <Lecturer> Get list courses*

USE CASE - QBCS2_UC06			
Use Case No.	QBCS2_UC06	Use Case Version	2.0
Use Case Name	Get list courses		
Author	Phan Thi Tuyet Giang		
Date	25/11/2019	Priority	Normal
<b>Actor:</b>			
- Lecturer			
<b>Summary:</b>			
- This use case allows Lecturer to get all courses that have been authorized.			
<b>Goal:</b>			
- Lecturers can access to all courses that have been granted access.			
<b>Triggers:</b>			
- Lecturer sends command to view course.			

**Preconditions:**

- User must login into the system as Lecturer's role.
- Lecturers must be granted access to a course by admin of QBCS.

**Post conditions:**

- Success: System shows a list of courses.
- Fail: System redirect to Error page.

**Main Success Scenario:**

Step	Actor Action	System Response
1	Lecturer send command to get course.	System displays list of courses that have been granted access. [Exception 1]

**Alternative Scenario: N/A****Exceptions:**

No	Cause	System Response
1	Lecturer don't have permission accessing this function.	System displays Error page.

**Relationships:** QBCS2\_UC07**Business Rules:** N/A*Table 23 - <Lecturer> Get list courses***2.3.1.7 <Lecturer> Get list of questions**

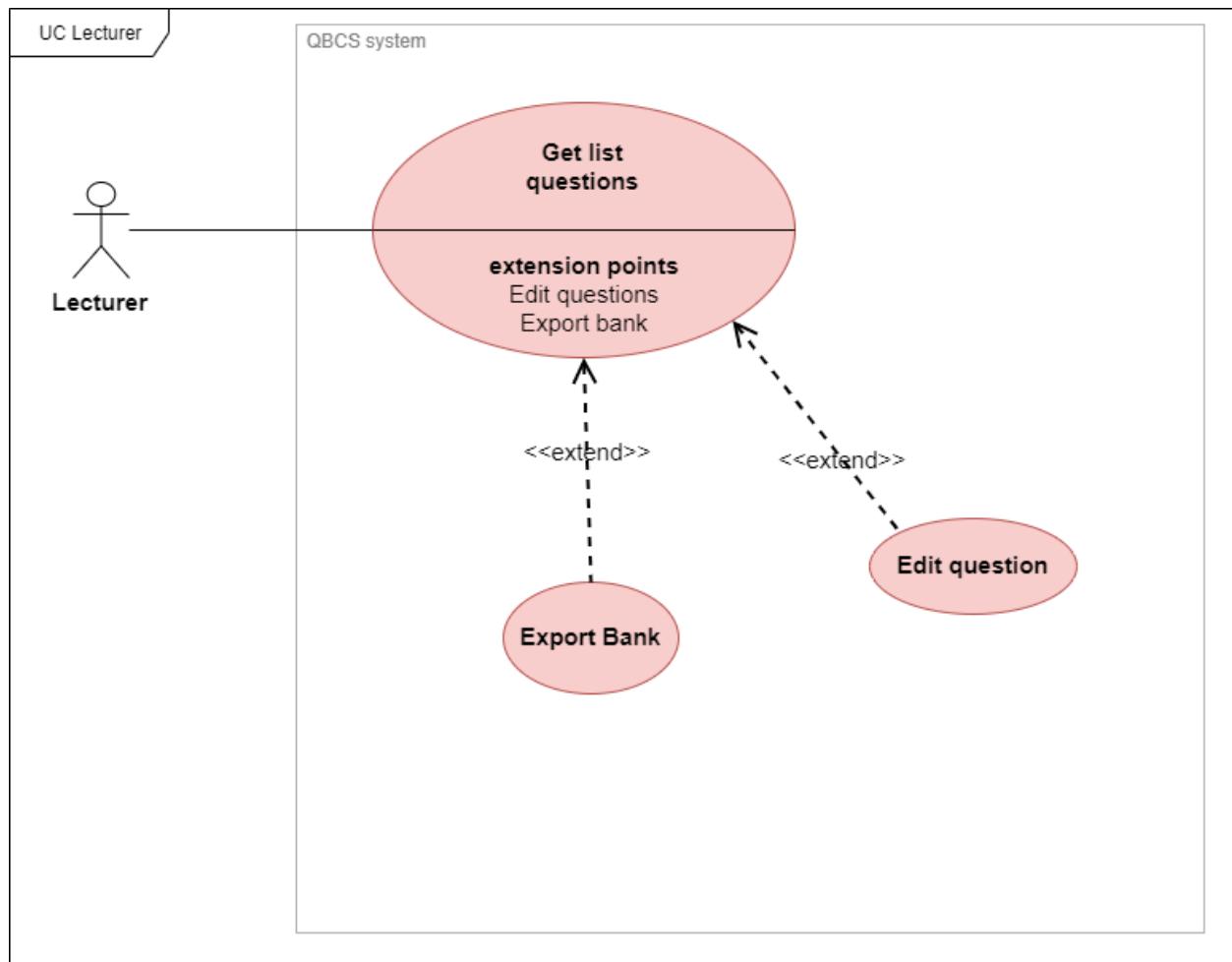


Figure 11 - <Lecturer> Get list of question

USE CASE - QBCS2_UC07			
Use Case No.	QBCS2_UC07	Use Case Version	2.0
Use Case Name	Get list of questions.		
Author	Phan Thi Tuyet Giang		
Date	25/11/2019	Priority	Normal
<b>Actor:</b>			
- Lecturer			
<b>Summary:</b>			
- This use case allows Lecturer to get all question in a course.			

**Goal:**

- Lecturer reviews question of course (view content, view edited history, edit question, disable question)

**Triggers:**

- Lecturers sends command to get all questions in their course.

**Preconditions:**

- User must login into the system as Lecturer's role.
- Lecturers must access get list course function before.

**Post conditions:**

- Success: System shows all questions of course.
- Fail: N/A

**Main Success Scenario:**

Step	Actor Action	System Response
1	Lecturer sends command to get course detail.	System displays list of all questions in course.

**Alternative Scenario:** N/A**Exceptions:** N/A**Relationships:** QBCS2\_UC06, QBCS2\_UC08**Business Rules:** N/A*Table 24 -<Lecturer> Get list of questions***2.3.1.8 <Lecturer> Export questions**

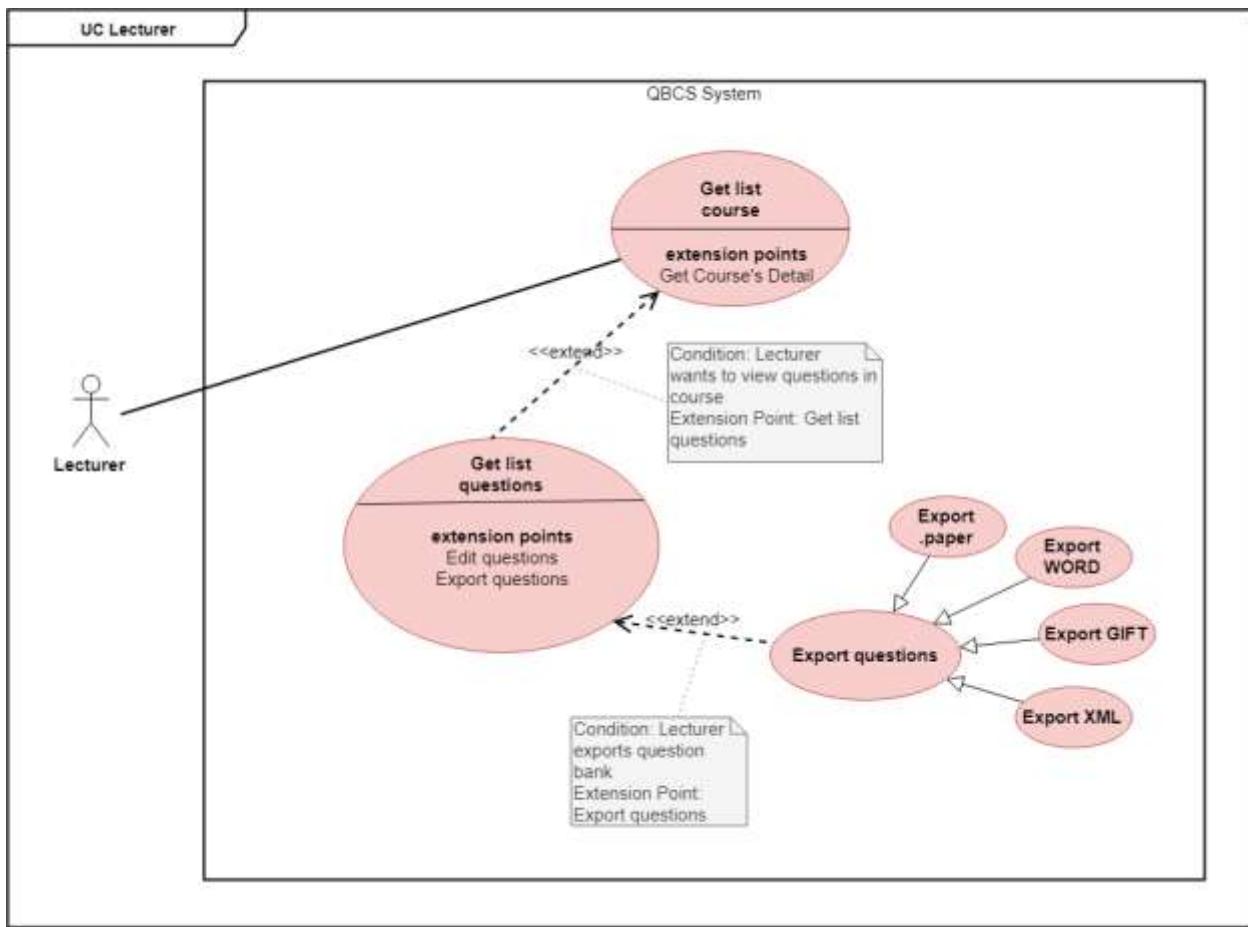


Figure 12 - <Lecturer> Export question bank

USE CASE - QBCS2_UC08			
Use Case No.	QBCS2_UC08	Use Case Version	2.0
Use Case Name	Export questions		
Author	Duong Thanh Dat		
Date	21/11/2019	Priority	Normal
<b>Actor:</b>			
<ul style="list-style-type: none"> <li>- Lecturer</li> </ul>			
<b>Summary:</b>			
<ul style="list-style-type: none"> <li>- This use case allows Lecturer to export questions from question bank with XML, GIFT, Word or Backup Examination formats.</li> </ul>			
<b>Goal:</b>			
<ul style="list-style-type: none"> <li>- The system returns the file with questions according to the user selected format.</li> </ul>			

**Triggers:**

- Lecturer exports questions with selected Topics from the question bank.

**Preconditions:**

- User must login into the system as Lecturer.

**Post conditions:**

- Success: System returns the file containing the questions in the question bank.
- Fail: Show error message.

**Main Success Scenario:**

<b>Step</b>	<b>Actor Action</b>	<b>System Response</b>
1	Lecturer chooses course to view detail.	System gives course detail.
2	Lecturer chooses Export questions and file format.	System shows a popup for user, the popup contains list of topics.
3	Lecturer selects Topic.	
4	Lecturer chooses to export question bank with category or not.	
5	Lecturer chooses to export question bank with audio in xml file or not.	
6	Lecturer sends command to export questions from question bank.	The system will export the file according to the Lecturer selected format.  [Exception 1]  [Exception 2]

**Alternative Scenario: N/A****Exceptions:**

<b>No</b>	<b>Cause</b>	<b>System Response</b>
1	The system cannot export questions from the question bank.	System shows error message: "Some error occurs when export the question bank. Please try again."
2	User has not selected any Topic.	System shows error message: "Please select Topic or Learning Outcome".

## **Relationships:** QBCS2\_UC07

### **Business Rules:**

1. The course and topics in course must exist; the selected course details are displaying on user screen. When user chooses topics and sends command to export questions, all questions in the selected topic will be rendered to the demanded format and exported into file.
2. If user select GIFT or XML, questions will be exported into the selected format same as [Moodle](#).
  - In GIFT format: single choice, multiple choice, fill in blank will have the right option placed after “=”, the wrong option will be placed after “~”. Matching type questions will be encoded as “=sub question -> option”
  - In XML format: questions will be stored inside “<question></question>” tag, the type of the question is the “type” attribute of the tag.
3. If user select Word, questions will be exported to a Word file with the template following [examination department template](#).
  - In Word format: question content and options' content are stored in each row of a table, answers to a question will be stored in “ANSWER” row.
  - In paper examination format: answers to questions stay separately in a table at the bottom page.
4. If user select PAPER, questions will be exported to a “.paper” file, all questions information will be encoded and stored inside the file.
5. If selected list of questions has images, Lecturer must choose to export the file in XML or Word format.
6. If user wants to export audio embedded in xml file, user must select export with audio in xml file. Otherwise, the audio will be exported separately from the questions.  
System would return a zip file contains the question file, essay folder, image folder and audio folder if there are essay, image, audio inside list of questions.

*Table 25 - <Lecturer> Export questions*

### **2.3.1.9 <Lecturer> Edit question**

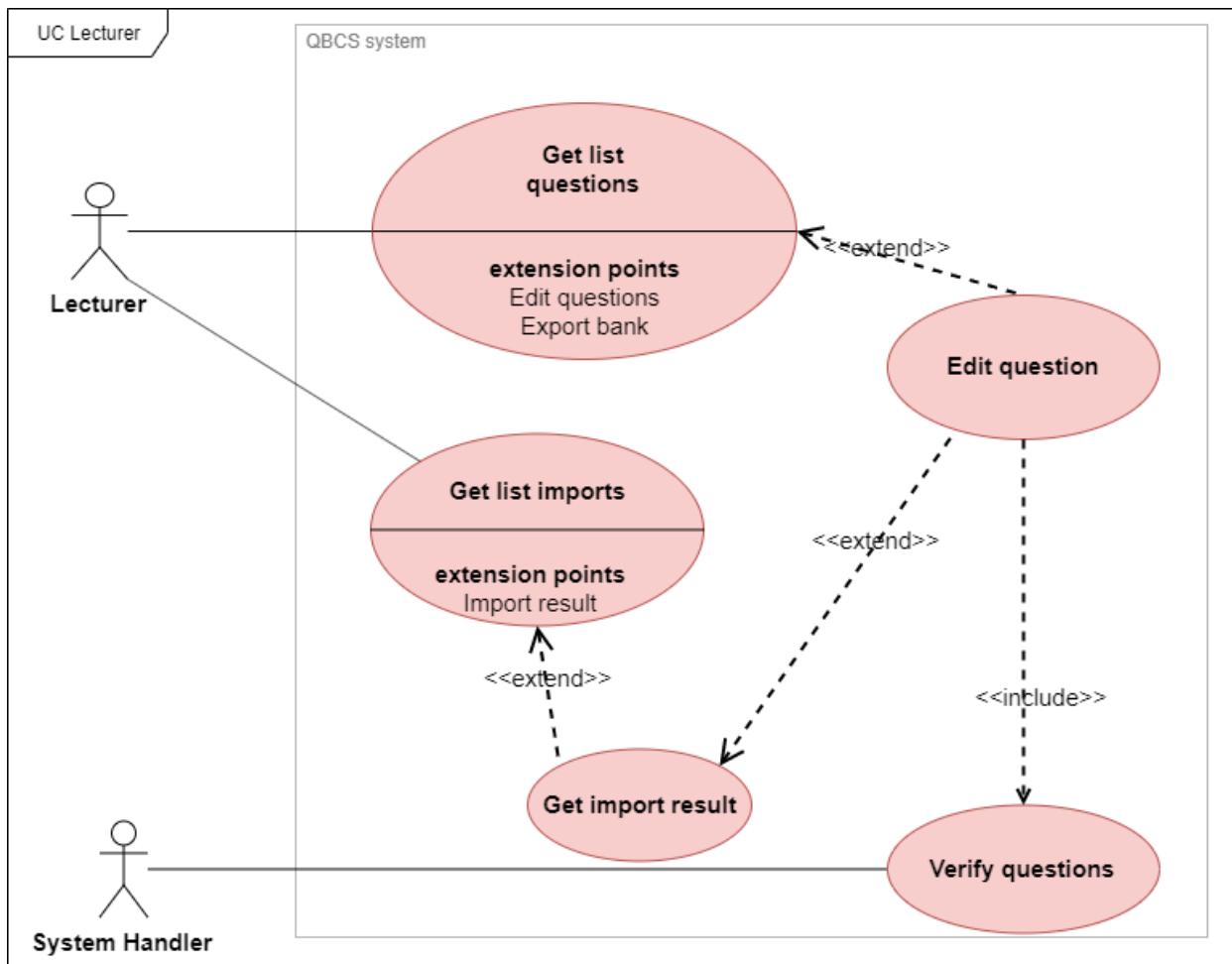


Figure 13 - <Lecturer> Edit questions

USE CASE - QBCS2_UC09			
Use Case No.	QBCS2_UC09	Use Case Version	2.0
Use Case Name	Edit question		
Author	Phan Thi Tuyet Giang		
Date	25/11/2019	Priority	High
Actor:	<ul style="list-style-type: none"> <li>- Lecturer</li> </ul>		
Summary:			

- This use case allows Lecturer to edit a question.

**Goal:**

- Lecturers updates the question's information (question content, option, image, ...).

**Triggers:**

- Lecturer sends command to update question.

**Preconditions:**

- User must login into the system as Lecturer's role.
- Lecturers must view import detail or view list questions of course.

**Post conditions:**

- Success: the question is updated and save history last change information.
- Fail: N/A.

**Main Success Scenario:**

Step	Actor Action	System Response
1	Lecturer sends command to get question.	System displays question to user.
2	Lecturer enter value on each textbox to edit content.	System save new information.
3	Lecturer sends command to save update question.	System will check rule and update question. [Alternative 1]

**Alternative Scenario:**

Step	Cause	System Response
1	Question information is invalid	The system displays the corresponding invalid rule message.

**Exceptions:** N/A

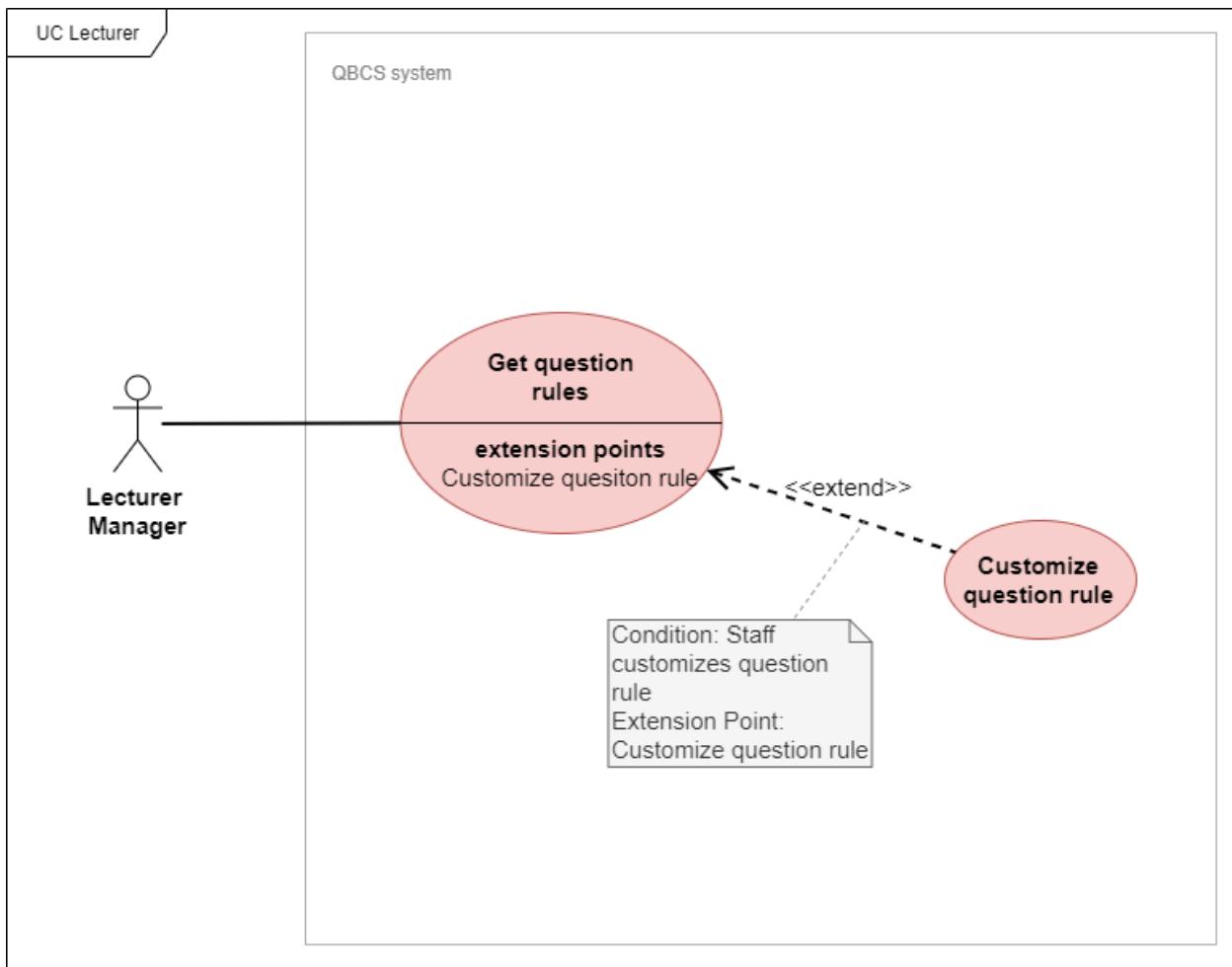
**Relationships:** QBCS2\_UC05, QBCS2\_UC07, QBCS2\_UC26

**Business Rules:**

1. When Lecturer updates the question, the question will be verified. If the question is valid, it will be updated in Bank. If the question is invalid, the question will not be updated.
2. Question's information update must compliance Question's rule:
  - For other types of matching questions, question content must not be empty
  - In fill in blank type question, question must not mix between dropdown and textbox.
  - Image must import from XML type, if not question will be missing image
  - Questions don't have "True", "False" options.
  - In single choice, multiple choice and matching questions, option must not be empty
  - In single choice, multiple choice and matching questions, question must have least a correct option.
  - In question, all options must different from others.
  - In question, the correct option is not "All of others" or "None of others".

*Table 26 - <Lecturer> Edit question*

#### **2.3.1.10 <Lecturer> Get question rules**



*Figure 14 - <Lecturer Manager> Get question rules*

USE CASE - QBCS2_UC10			
<b>Use Case No.</b>	QBCS2_UC10	<b>Use Case Version</b>	2.0
<b>Use Case Name</b>	Get question rules.		
<b>Author</b>	Phan Thi Tuyet Giang		
<b>Date</b>	25/11/2019	<b>Priority</b>	Normal
<b>Actor:</b>			
<ul style="list-style-type: none"> <li>- Lecturer Manager</li> </ul>			
<b>Summary:</b>			
<ul style="list-style-type: none"> <li>- This use case allows Lecturer Manager to get question rules.</li> </ul>			
<b>Goal:</b>			

- Lecturers Manager get question rules.

**Triggers:**

- Lecturer Manager send command to get question rules.

**Preconditions:**

- User must login into the system as Lecturer Manager's role.

**Post conditions:**

- Success: System shows all question rules.
- Fail: Redirect to Error Page

**Main Success Scenario:**

Step	Actor Action	System Response
1	Lecturer Manager sends command to get all rules.	<p>System shows rules with information:</p> <ul style="list-style-type: none"> <li>• Rule Key</li> <li>• Rule Value</li> <li>• Create Date</li> <li>• Activation Date</li> <li>• Is in use</li> </ul> <p>[exception 1]</p>

**Alternative Scenario:** N/A

**Exceptions:**

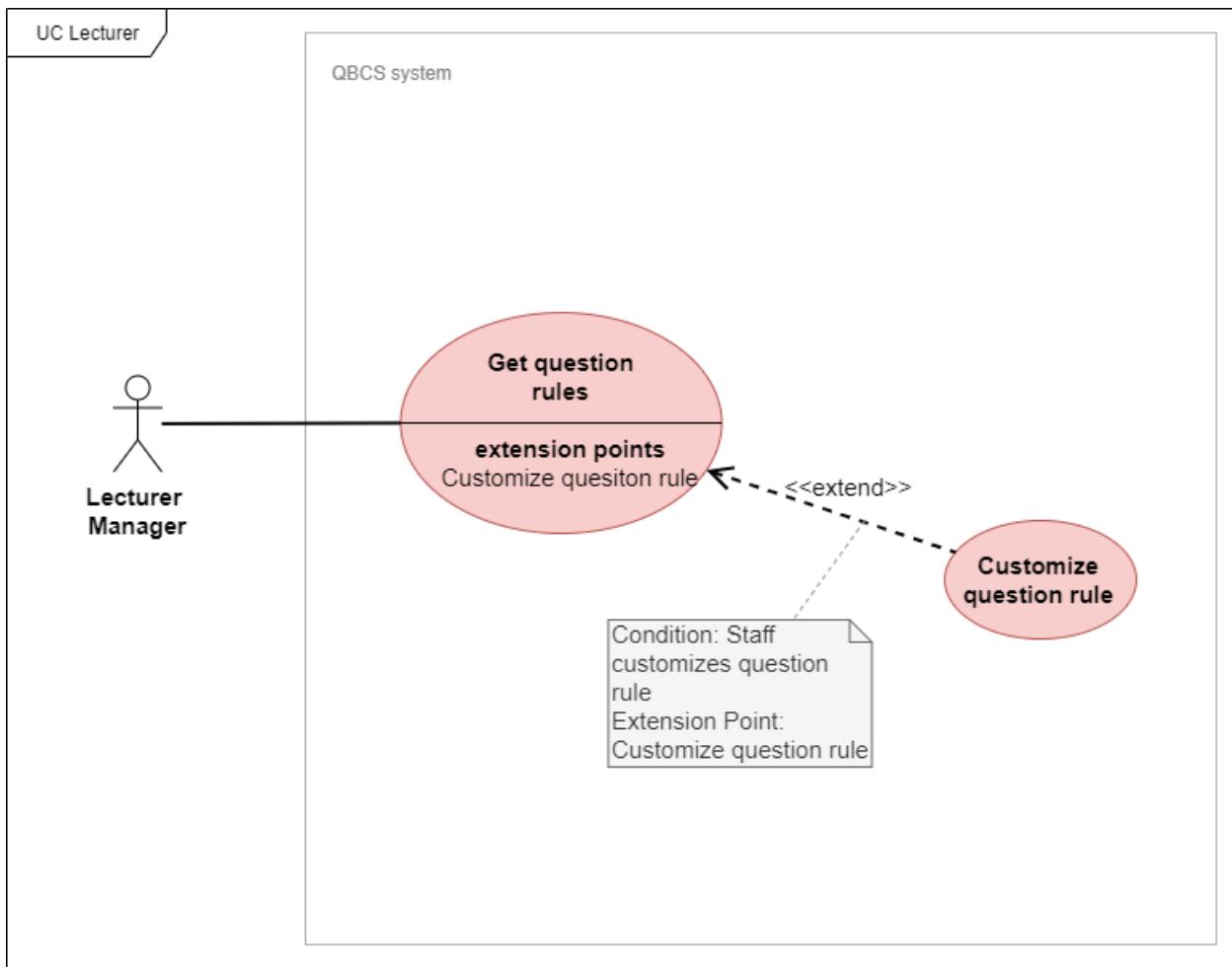
No	Cause	System Response
1	Lecturer don't have permission accessing this function.	System displays Error page.

**Relationships:** QBCS2\_UC11

**Business Rules:** System get all rules that is not disable.

*Table 27 - <Lecturer Manager> Get question rules*

**2.3.1.11 <Lecturer> Customize question rules**



*Figure 15 - <Lecturer Manager> Customize question rules*

USE CASE - QBCS2_UC11			
Use Case No.	QBCS2_UC11	Use Case Version	2.0
Use Case Name	Customize question rules		
Author	Phan Thi Tuyet Giang		
Date	25/11/2019	Priority	Normal
<b>Actor:</b>			
<ul style="list-style-type: none"> <li>- Lecturer Manager</li> </ul>			
<b>Summary:</b>			
<ul style="list-style-type: none"> <li>- This use case allows Lecturer Manager updates question rules.</li> </ul>			
<b>Goal:</b>			

*Table 28 - <Lecturer Manager> Customize question rules*

- Lecturers Manager changes question rules.

**Triggers:**

- Lecturer Manager send command to update information of question's rules.

**Preconditions:**

- User must login into the system as Lecturer Manager's role.

**Post conditions:**

- Success: System disable all old rules and create new rules base on received data on form update.
- Fail: System shows error message "Please input the required information".

**Main Success Scenario:**

Step	Actor Action	System Response
1	Lecturer Manager sends command to edit rules.	System displays Edit rule form.
2	Lecturer Manager change information of rules.	
3	Lecturer manager sends command to save rules.	System gets new rules and validate it. [Exception 1] System disables the current rule and adds new rule set.

**Alternative Scenario:** N/A

**Exceptions:**

No	Cause	System Response
1	User leaves Value blank.	System shows error message "Please input the required information".

**Relationships:** QBCS2\_UC10

**Business Rules:**

1. The current rule set is disabled and replaced by a new rule set.
2. Before using a rule, System will check the Activation Date of a rule.
3. User can only change or add value of a rule and cannot add a new rule

### 2.3.1.12 <Lecturer> Review exam

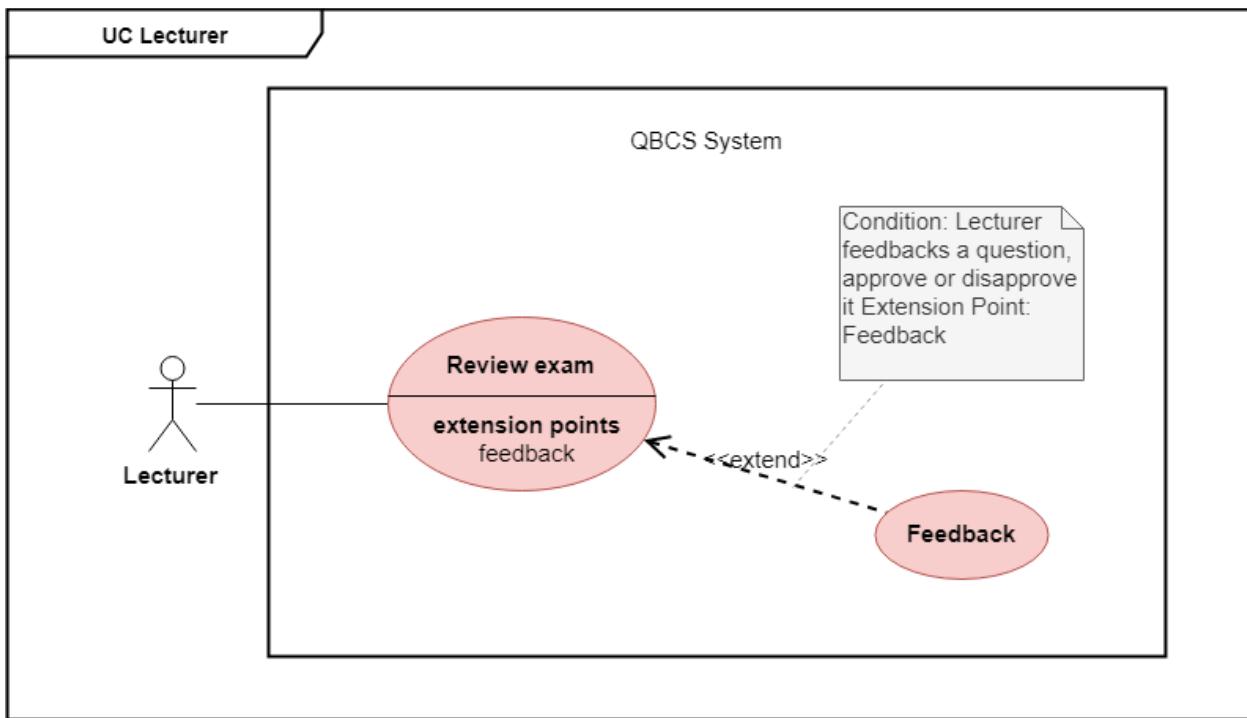


Figure 16 - <Lecturer> Take an exam

USE CASE - QBCS2_UC12			
Use Case No.	QBCS2_UC12	Use Case Version	2.0
Use Case Name	Review exam		
Author	Nguyen Hong Phat		
Date	21/11/2019	Priority	High
<b>Actor:</b>			
- Lecturer			
<b>Summary:</b>			
- This use case allows Lecturer to review an assigned exam.			
<b>Goal:</b>			
- Lecturer reviews an exam assigned by Lecturer Manager.			
<b>Triggers:</b>			

- Lecturer sends the command to review an exam.

**Preconditions:**

- User must login into the system as Lecturer.

**Post conditions:**

- Success: System brings user to exam page, allow Lecturer to review the exam.
- Fail: Show error message.

**Main Success Scenario:**

Step	Actor Action	System Response
1	Lecturer sends command to get assigned examination.	System displays all examination assigned to the Lecturer.
2	Lecturer sends command to Review an exam inside assigned examination group.	System displays an exam screen.
3	Lecturer sends command to finish the exam.	System grades the exam, displays exam result and displays review action.
4	Lecturer reviews the exam, Lecturer sends command to approve, disapprove questions and feedbacks questions.	System displays question has been approved or disapproved.
5	Lecturer sends command to submit the revision result.	System shows submit successful message and sends a notification to Lecturer Manager who assigned it.  [Exception 1]

**Alternative Scenario: N/A**

**Exceptions:**

No	Cause	System Response
1	Lecturer could not submit revision result.	System shows error message.

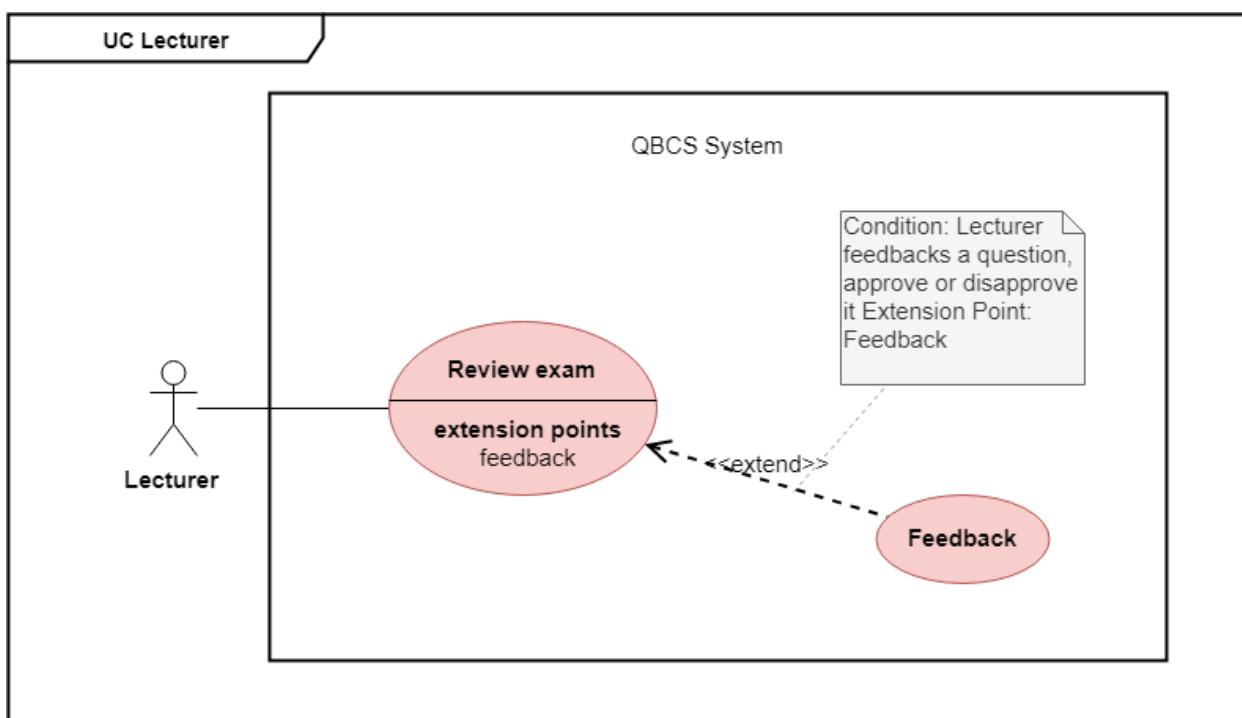
**Relationships:** QBCS2\_UC27, QBCS2\_UC28

**Business Rules:**

1. Lecturer has to take the exam before viewing it.
2. The attempt will be graded as if it is a real examination.
3. After finishing the exam, Lecturer could review questions one by one.
4. Lecturer has to approve or disapprove each question in order to submit revision result.

*Table 29 - <Lecturer> Take an exam*

**2.3.1.13 <Lecturer> Feedback questions**



*Figure 17 - <Lecturer> Feedback questions*

USE CASE - QBCS2_UC13			
Use Case No.	QBCS2_UC13	Use Case Version	2.0
Use Case Name	Feedback questions		
Author	Nguyen Hong Phat		
Date	21/11/2019	Priority	Normal
Actor:	<ul style="list-style-type: none"> <li>- Lecturer</li> </ul>		

**Summary:**

- This use case allows Lecturer to approve, disapprove and feedback questions after finishing an exam.

**Goal:**

- Lecturer feedbacks questions, approve or disapprove them.

**Triggers:**

- Lecturer sends command to approve, disapprove question.

**Preconditions:**

- User must login into the system as Lecturer.

**Post conditions:**

- Success: System shows that feedback is saved to the question.
- Fail: Show error message.

**Main Success Scenario:**

Step	Actor Action	System Response
1	Lecturer sends command to approve or disapprove a question.	System saves command and opens a dialogue for Lecturer to write feedback. [Exception 1]
2	Lecturer writes feedback and sends command to save feedback.	System saves feedback to the question in the vision attempt.

**Alternative Scenario: N/A****Exceptions:**

No	Cause	System Response
1	The system could not process Lecturer command.	System shows error message.

**Relationships:** QBCS2\_UC12**Business Rules:**

1. Lecturer reviews questions one by one, after approving or disapproving a question, feedback field will appear for Lecturer.

2. Lecturer has to reviews all questions in the exam in order to submit the review attempt.

Table 30 - <Lecturer> Feedback questions

### 2.3.2 <Lecturer Manager> Overview Use Case

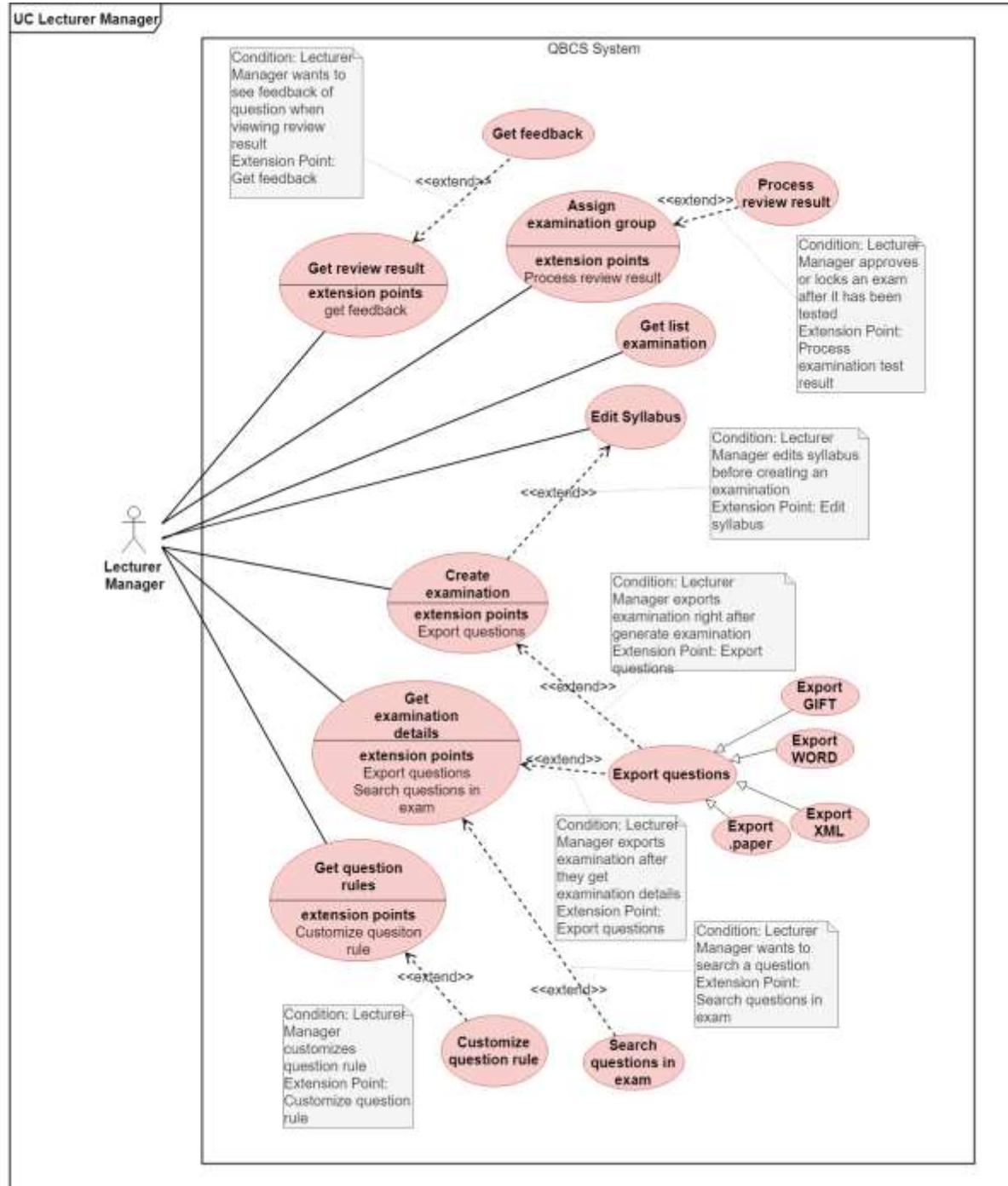


Figure 18 – <Lecturer Manager> Overview use-case

### 2.3.2.1 <Lecturer Manager> Assign examination

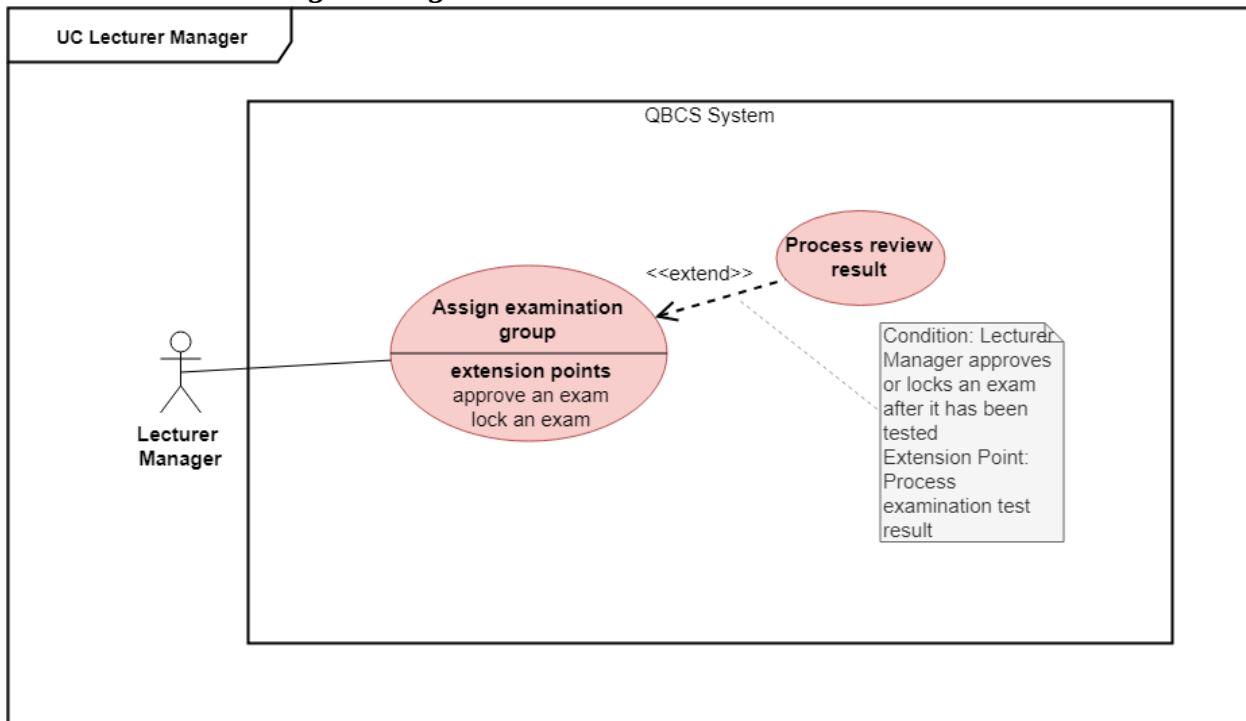


Figure 19 - <Lecturer Manager> Assign examination

USE CASE - QBCS2_UC14			
Use Case No.	QBCS2_UC14	Use Case Version	2.0
Use Case Name	Assign examination		
Author	Nguyen Hong Phat		
Date	21/11/2019	Priority	Normal
<b>Actor:</b>			
- Lecturer Manager			
<b>Summary:</b>			
- This use case allows Lecturer Manager to assign a created examination group to a Lecturer, Lecturer has to review all exams inside the examination group.			
<b>Goal:</b>			
- Lecturer reviews the exam, ensure that the examination is capable for student to take.			
<b>Triggers:</b>			
- Lecturer Manager sends command to assign an examination group to a Lecturer.			

**Preconditions:**

- User must login into the system as Lecturer Manager.
- At least one examination group has been created inside the course that Lecturer Manager manages.

**Post conditions:**

- Success: Assigned Lecturer is notified and has to review all exams inside the examination group.
- Fail: System show “Cannot assign Lecturer to this examination”.

**Main Success Scenario:**

<b>Step</b>	<b>Actor Action</b>	<b>System Response</b>
1	Lecturer Manager gets examination details, sends command to verify examination.	System displays examination's assignee, attempt and possible Lecturers whom can be assigned to examination.
2	Lecture Manager chooses a Lecturer to assign.	System helps Lecturer Manager to look for Lecturer by name and email.
3	Lecturer Manager sends command to assign a Lecturer.	System adds selected Lecturer as assignee to the examination group and notifies the assigned Lecturer. [Exception 1]

**Alternative Scenario: N/A****Exceptions:**

<b>No</b>	<b>Cause</b>	<b>System Response</b>
1	Lecturer has already been assigned to the examination group.	System shows error message: “Cannot assign Lecturer to examination group”.

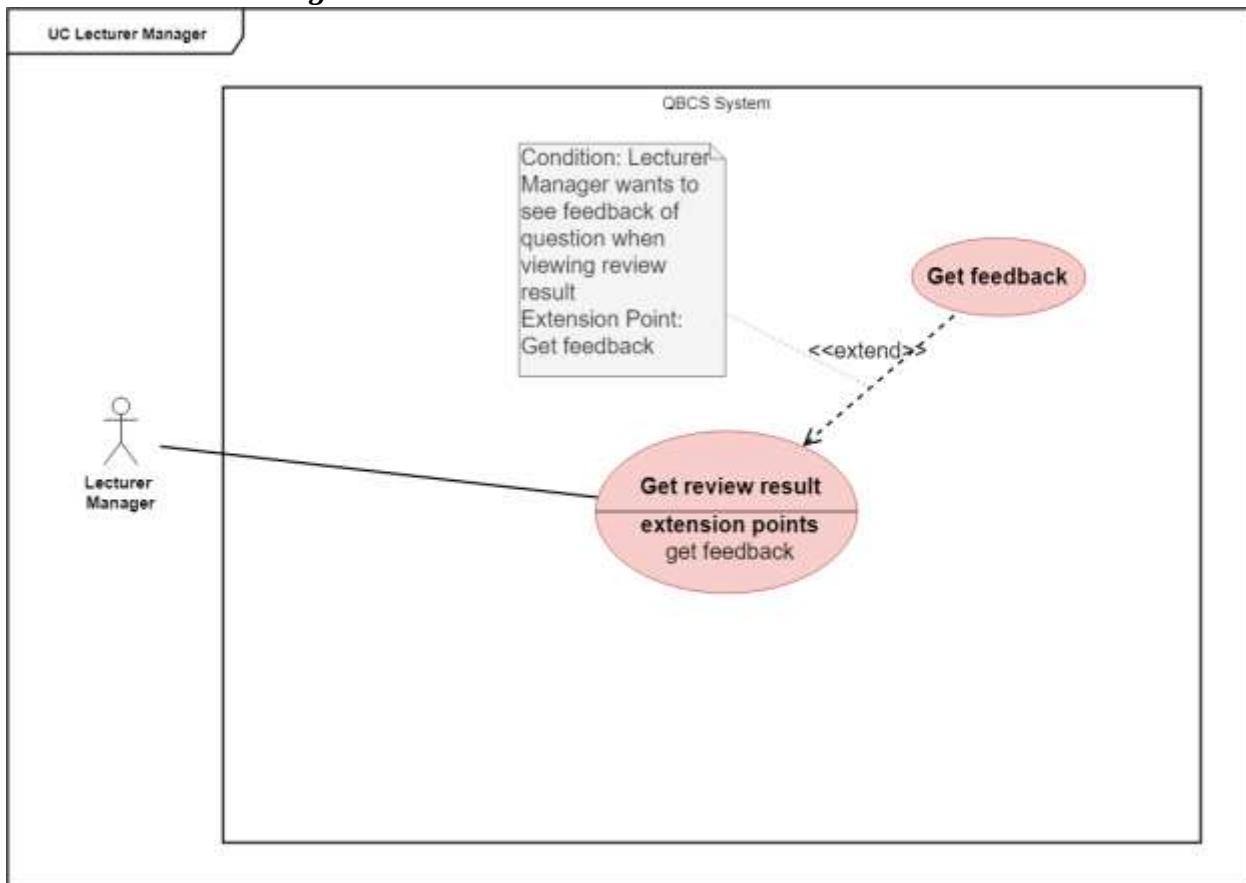
**Relationships:** QBCS2\_UC15, QBCS2\_UC16, QBCS2\_UC26, QBCS2\_UC27**Business Rules:**

1. Examination group must exist; assignee can be Lecturer or even Lecturer Manager.

2. Multiple Lecturer can be assigned to one examination group.
3. If the examination group has many exams, the assigned Lecturer has to review all of the exams inside the examination group.

*Table 31 - <Lecturer Manager> Assign examination*

### 2.3.2.2 <Lecturer Manager> Get review result



*Figure 20 - <Lecturer Manager> Get review result*

USE CASE - QBCS2_UC15			
Use Case No.	QBCS2_UC15	Use Case Version	2.0
Use Case Name	Get review result		
Author	Nguyen Hong Phat		
Date	21/11/2019	Priority	High
Actor:	<ul style="list-style-type: none"> <li>- Lecturer Manager</li> </ul>		

**Summary:**

- This use case allows Lecturer Manager to view review result of Lecturers who have been assigned to review an examination group.

**Goal:**

- Lecturer Manager can view the grade of the attempt, approve status and feedback of each question.

**Triggers:**

- Lecturer Manager sends command to get review result.

**Preconditions:**

- User must login into the system as Lecturer Manager
- Assigned Lecturer has done reviewing an exam in the assigned examination group.

**Post conditions:**

- Success: Lecturer Manager gets the review result of the assigned Lecturer.
- Fail: System shows error message.

**Main Success Scenario:**

Step	Actor Action	System Response
1	Lecturer Manager sends command to manage examination attempts.	System displays manage attempt screen, with list of attempt made assigned Lecturer.
2	Lecturer Manager sends command to get review result details.	System displays review attempt made by assigned Lecturer. [Exception 1]

**Alternative Scenario: N/A****Exceptions:**

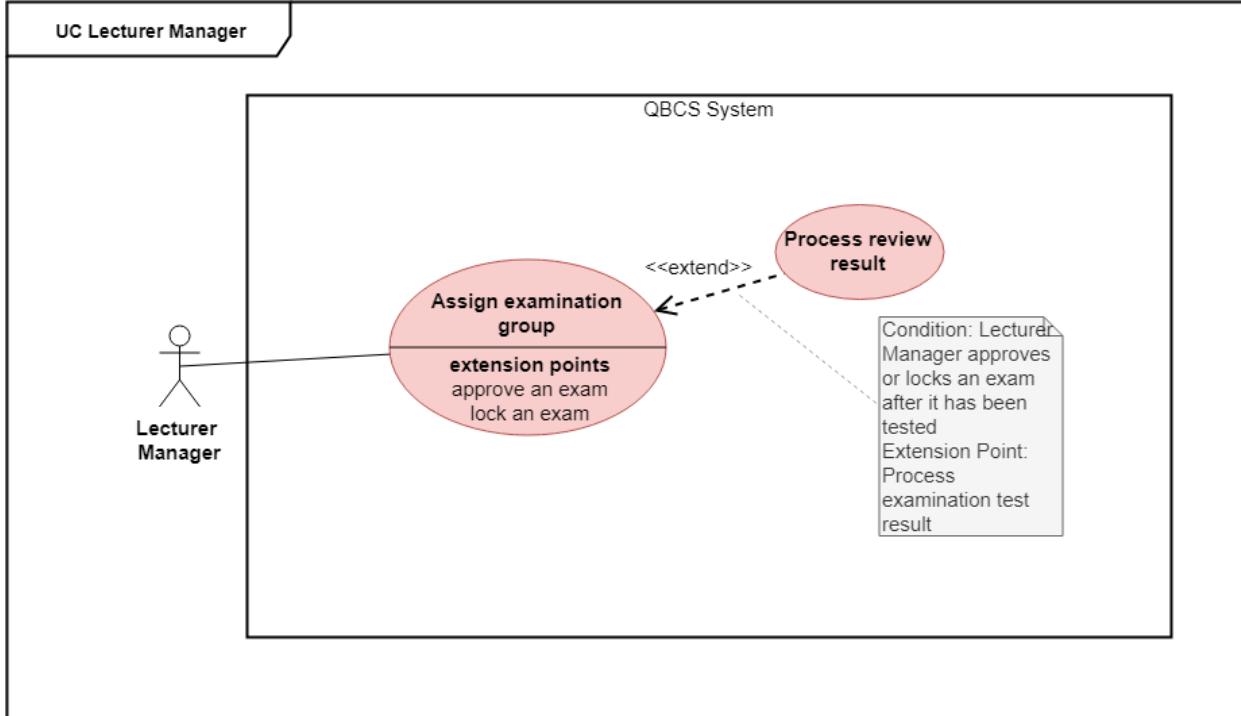
No	Cause	System Response
1	System could not get review attempt.	System shows error message.

**Relationships:** QBCS2\_UC12, QBCS2\_UC14, QBCS2\_UC16**Business Rules:**

1. The examination group must exists and has examinations in it; the assignee has done taking and reviewing all questions inside an exam.

*Table 32 - <Lecturer> Get test result*

### 2.3.2.3 <Lecturer Manager> Process examination test result



*Figure 21 - <Lecturer Manager> Process examination test result*

USE CASE - QBCS2_UC16			
Use Case No.	QBCS2_UC16	Use Case Version	2.0
Use Case Name	Process examination review result		
Author	Nguyen Hong Phat		
Date	21/11/2019	Priority	Normal
<b>Actor:</b>			
<ul style="list-style-type: none"> <li>- Lecturer Manager</li> </ul>			
<b>Summary:</b>			
<ul style="list-style-type: none"> <li>- This use case allows Lecturer Manager to make decision about approve an exam or lock it.</li> </ul>			
<b>Goal:</b>			
<ul style="list-style-type: none"> <li>- To approve an exam if it is capable for student to take, or lock it if it is too hard.</li> </ul>			

**Triggers:**

- Lecturer Manager sends command to approve or lock an exam.

**Preconditions:**

- User must login into the system as Lecturer Manager
- Lecturer has done reviewing an exam assigned by Lecturer Manager

**Post conditions:**

- Success: Lecturer Manager approves or locks an exam.
- Fail: Show error message.

**Main Success Scenario:**

<b>Step</b>	<b>Actor Action</b>	<b>System Response</b>
1	Lecturer Manager sends command get assigned examination details.	System display list of exams that Lecturer Manager has assigned.
2	Lecturer Manager sends command to approve or lock an exam.	System approves or locks the exam based on user decision. [Exception 1]

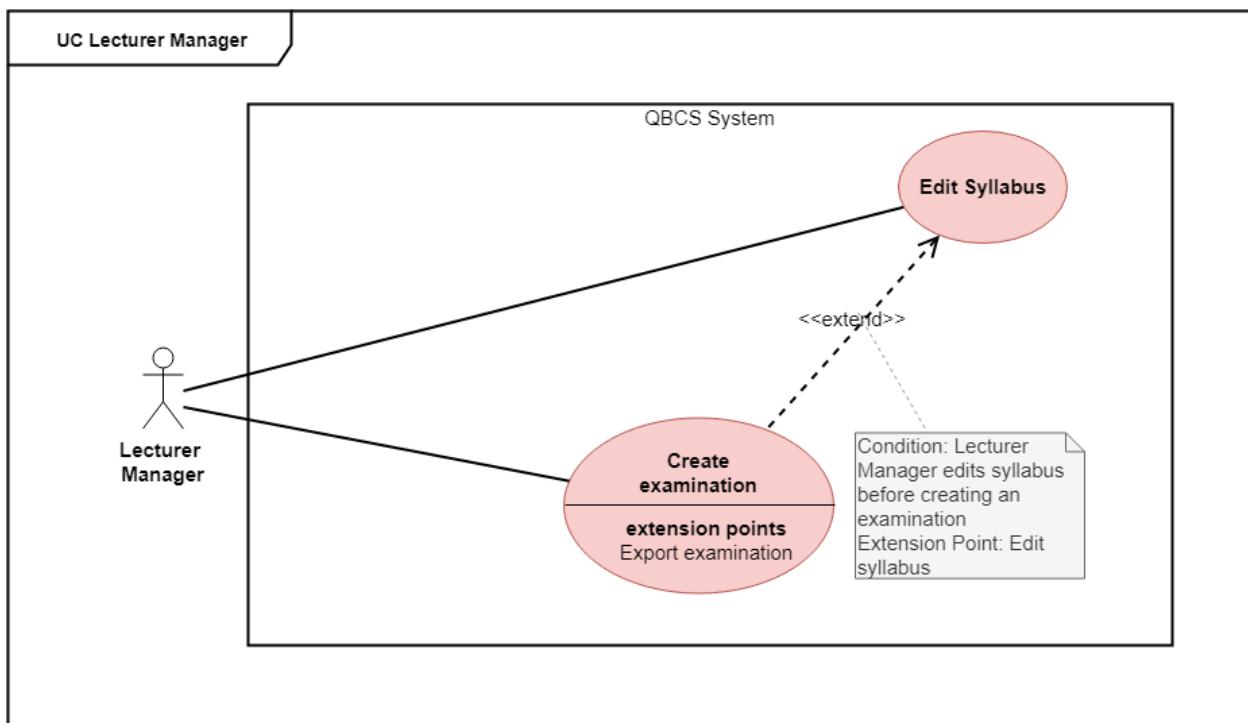
**Alternative Scenario:** N/A**Exceptions:**

<b>No</b>	<b>Cause</b>	<b>System Response</b>
1	System could not update the status of the exam.	System shows error message.

**Relationships:** QBCS2\_UC14, QBCS2\_UC15**Business Rules:**

1. The exam must exist; the exam is reviewed.
2. Lecturer Manager can only approve or lock an exam after Lecturer has done reviewing it.
3. If an exam is locked, it can no longer be exported.

*Table 33 - <Lecturer Manager> Process examination test result***2.3.2.4 <Lecturer Manager> Edit syllabus**



*Figure 22 - <Lecturer Manager> Edit syllabus*

USE CASE - QBCS2_UC17			
Use Case No.	QBCS2_UC17	Use Case Version	2.0
Use Case Name	Edit syllabus		
Author	Duong Thanh Dat		
Date	21/11/2019	Priority	High
<b>Actor:</b>			
- Lecturer Manager			
<b>Summary:</b>			
- This use case allows Lecturer Manager to edit syllabus of a course.			
<b>Goal:</b>			
- Lecturer Manager edits syllabus of a course in order to fit the examination.			
<b>Triggers:</b>			
- Lecturer Manager sends command to edit syllabus.			
<b>Preconditions:</b>			
- User must login into the system as Lecturer Manager.			

**Post conditions:**

- Success: System shows a list of created parts of syllabus.
- Fail: Show error message.

**Main Success Scenario:**

<b>Step</b>	<b>Actor Action</b>	<b>System Response</b>
1	Lecturer Manager sends command to go to Examination's Questions.	System shows list of courses.
2	Lecturer Manager sends command to edit syllabus.	System displays user to edit syllabus screen.
3	Lecturer Manager inputs total of question, default grade for ordinary student and sends command to update.	System updates and shows Total question, Default grade.
4	Lecturer Manager chooses New Syllabus, input name and amount on the syllabus and sends command to create new syllabus.	System creates a new Syllabus based on user's inputs and shows it on the screen.  [Exception 1]
5	Lecturer Manager sends command to manage Topic in the syllabus.	System shows a list of topics belongs to the syllabus.
6	Lecturer Manager sends command to add topic to the selected syllabus.	System adds topic to the selected syllabus and shows a list of topics belongs to the syllabus.

**Alternative Scenario: N/A**

**Exceptions:**

<b>No</b>	<b>Cause</b>	<b>System Response</b>
1	Total questions of all syllabus must equal to Total question field.	System notices the user the amount of questions that user is lacking of.

**Relationships:** N/A

**Business Rules:**

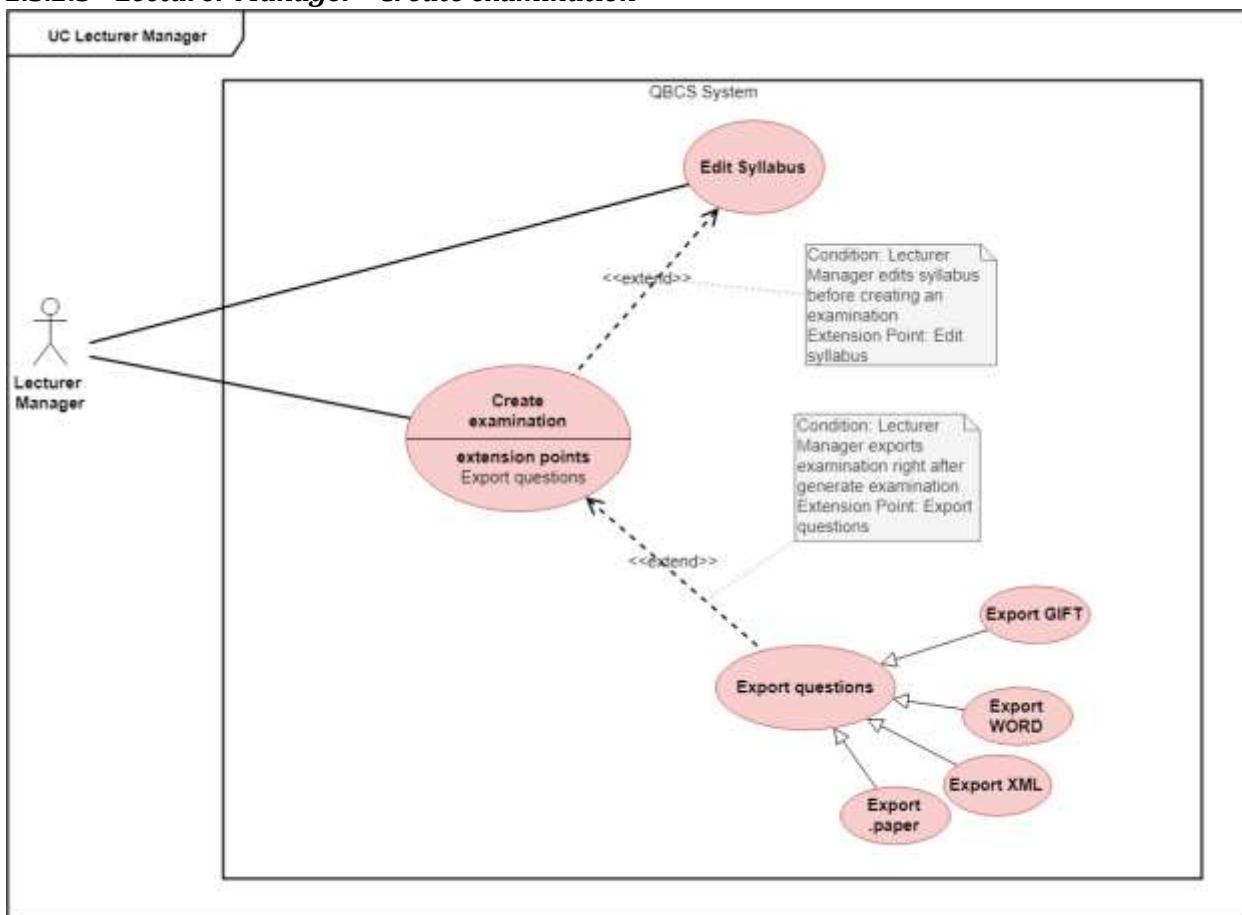
Lecturer Manager can edit syllabus according to the following regulations:

- Number of questions in the examination test.
- Syllabus's name and topics or learning outcomes belong to the syllabus.
- Questions in each topics.
- Delete syllabus that is no longer needed.

The total amount of all parts of syllabus must equal to the amount of "Total question".

*Table 34 - <Lecturer Manager> Edit syllabus*

**2.3.2.5 <Lecturer Manager> Create examination**



*Figure 23 - <Lecturer Manager> Create examination*

USE CASE – QBCS2_UC18			
Use Case No.	QBCS2_UC18	Use Case Version	2.0
Use Case Name	Create examination		

<b>Author</b>	Duong Thanh Dat		
<b>Date</b>	21/11/2019	<b>Priority</b>	High

**Actor:**

- Lecturer Manager

**Summary:**

- This use case allows Lecturer Manager to create examination from question bank.

**Goal:**

- Lecturer Manager creates exams for a final examination.

**Triggers:**

- Lecturer Manager sends command to create examination.

**Preconditions:**

- User must login into the system with Lecturer Manager role.
- There are enough questions in selected course.

**Post conditions:**

- Success: System displays created exams.
- Fail: Show error message.

**Main Success Scenario:**

<b>Step</b>	<b>Actor Action</b>	<b>System Response</b>
1	Lecturer Manager sends command to view list course.	System displays a list of courses that Lecturer Manager can manage.
2	Lecturer Manager sends command to generate examination automatically.	System displays a list of steps for Lecturer Manager to follow in order to provide information for the exam. [Alternative 1]
3	Lecturer Manager inputs information in each step, finally sends command to generate examination automatically.	System display examination statistics after created. [Exception 1]

**Alternative Scenario:**

No	Cause	System Response
1	There are questions with no level existed in the course.	System locks generate examination automatically feature, only allow user to manually create exam.

**Exceptions:**

No	Cause	System Response
1	The system cannot save the exam tests.	System shows error message: "Some error occurs when save the exam test. Please try again."

**Relationships:** QBCS2\_UC17

**Business Rules:**

1. Lecturer Manager can only generate examination automatically if all questions in the selected course have level attached to it.
2. When generate examination automatically, Lecturer Manager must follow these steps:
  - Input number of examinations user wants to create.
  - Input types of questions in exam.
  - Re-check syllabus.
  - Total mark for students based on level (Easy for Normal student, Medium for Good student and Hard for Excellent student).
3. When create examination manually, Lecturer Manager has to add questions to the exam one by one. System will show a caution if the question has appeared in the last examinations.

*Table 35 - <Lecturer Manager> Create Examination*

### 2.3.2.6 <Lecturer Manager> Get list examination

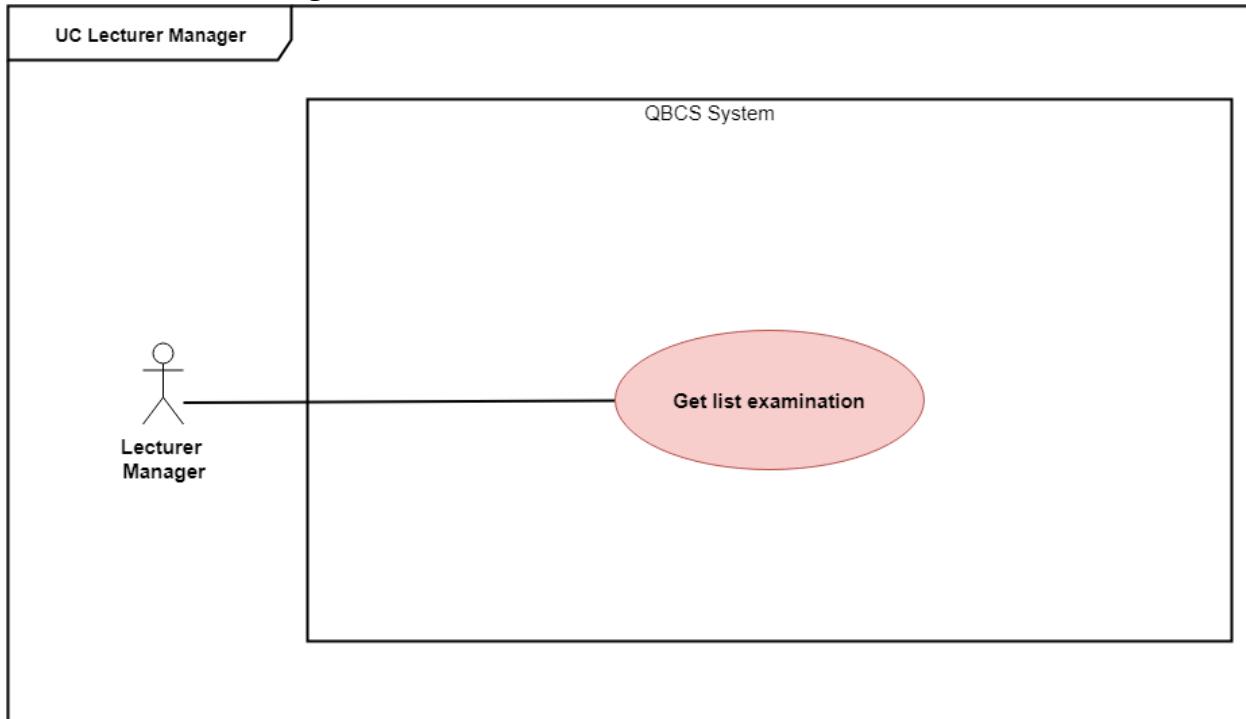


Figure 24 - <Lecturer Manager> Get list examination

USE CASE - QBCS2_UC19			
Use Case No.	QBCS2_UC19	Use Case Version	2.0
Use Case Name	Get list examination		
Author	Duong Thanh Dat		
Date	21/11/2019	Priority	Normal
<b>Actor:</b>			
- Lecturer Manager			
<b>Summary:</b>			
- This use case allows Lecturer Manager to get a list of examinations in their courses.			
<b>Goal:</b>			
- Lecturer Manager gets a list of examinations, all examinations inside Lecturer Manager's courses will be displayed.			
<b>Triggers:</b>			
- Lecturer Manager sends command to get list of examinations.			

**Preconditions:**

- User must login into the system as Lecturer Manager.

**Post conditions:**

- Success: System shows a list of examinations.
- Fail: Show error message.

**Main Success Scenario:**

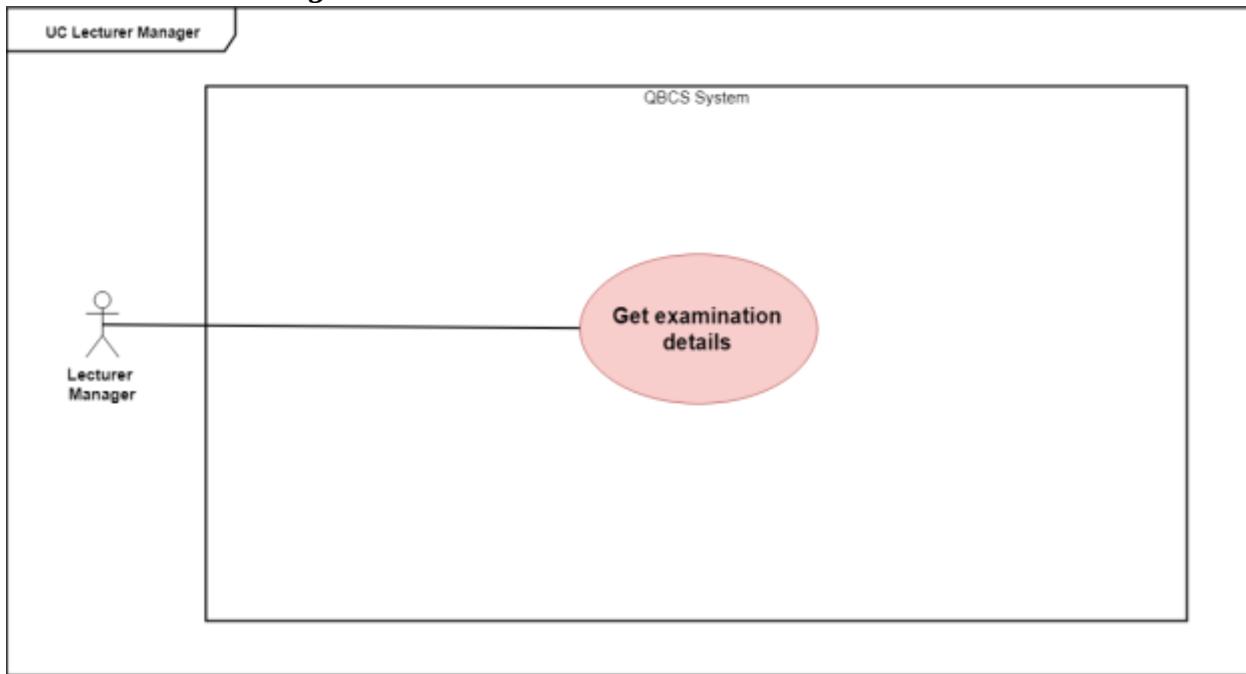
Step	Actor Action	System Response
1	Lecturer Manager sends command to get list of examinations.	System displays all examinations that belong to courses that the Lecturer Manager manages. [Exception 1]

**Alternative Scenario: N/A****Exceptions:**

No	Cause	System Response
1	The system cannot get a list of exam tests.	System shows error message: "Some error occurs when get list exam test. Please try again."

**Relationships: N/A****Business Rules: N/A***Table 36 - <Lecturer Manager> Get list examination*

### 2.3.2.7 <Lecturer Manager> Get examination details



*Figure 25 - <Lecturer Manager> Get examination details*

USE CASE - QBCS2_UC20			
Use Case No.	QBCS2_UC20	Use Case Version	2.0
Use Case Name	Get examination details		
Author	Duong Thanh Dat		
Date	21/11/2019	Priority	Normal
<b>Actor:</b>			
- Lecturer Manager			
<b>Summary:</b>			
- This use case allows Lecturer Manager to get all details in an exam.			
<b>Goal:</b>			
- The system displays an exam's questions and details for user.			
<b>Triggers:</b>			
- Lecturer Manager sends the get examination details command.			
<b>Preconditions:</b>			
- User must login into the system with role Lecturer Manager.			

- The examination exists in the system.

**Post conditions:**

- Success: System displays list of question in exam.
- Fail: Show error message.

**Main Success Scenario:**

Step	Actor Action	System Response
1	Lecturer Manager sends command to get examination details.	The system displays all questions and details in an exam for user.  [Exception 1]

**Alternative Scenario: N/A**

**Exceptions:**

No	Cause	System Response
1	The system cannot get the detail of the exam test.	System shows error message: "Some error occurs when get detail exam test. Please try again."

**Relationships:** QBCS2\_UC22, QBCS2\_UC18

**Business Rules:** N/A

*Table 37 - <Lecturer Manager> Get examination details*

### 2.3.2.8 <Lecturer Manager> Search question in exam

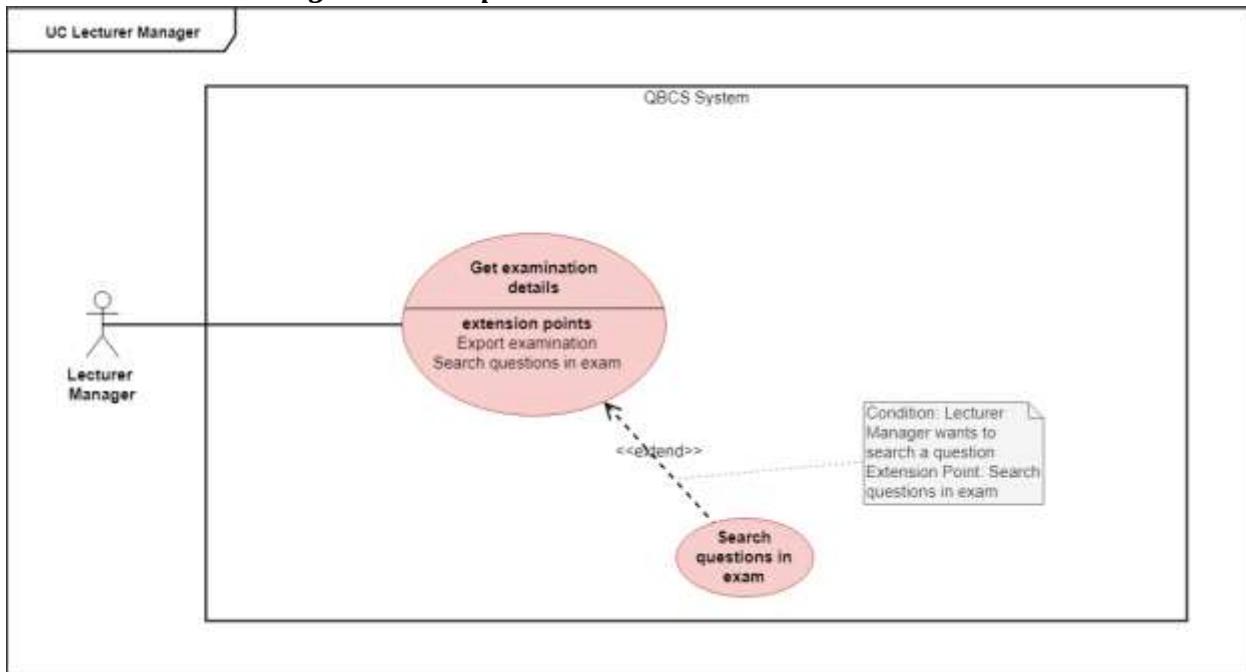


Figure 26 - <Lecturer Manager> Search question in exam

USE CASE - QBCS2_UC21			
Use Case No.	QBCS2_UC21	Use Case Version	2.0
Use Case Name	Search questions in exam		
Author	Duong Thanh Dat		
Date	21/11/2019	Priority	Normal
<b>Actor:</b>			
<ul style="list-style-type: none"> <li>- Lecturer Manager</li> </ul>			
<b>Summary:</b>			
<ul style="list-style-type: none"> <li>- This use case allows Lecturer Manager to search questions based on its content.</li> </ul>			
<b>Goal:</b>			
<ul style="list-style-type: none"> <li>- Lecturer Manager finds questions based on inputted content.</li> </ul>			
<b>Triggers:</b>			
<ul style="list-style-type: none"> <li>- Lecturer Manager inputs content to search bar.</li> </ul>			
<b>Preconditions:</b>			
<ul style="list-style-type: none"> <li>- User must login into the system as Lecturer Manager.</li> </ul>			

**Post conditions:**

- Success: System shows a list of created parts of syllabus.
- Fail: Show error message.

**Main Success Scenario:**

Step	Actor Action	System Response
1	Lecturer Manager inputs question content in search input bar.	System shows a list of questions based on user's input. [Alternative 1]

**Alternative Scenario:**

No	Cause	System Response
1	There is no question fits user input.	System shows "No question found" on screen.

**Exceptions:** N/A**Relationships:** QBCS2\_UC20**Business Rules:** N/A*Table 38 - <Lecturer Manager> Search question in exam*

### 2.3.2.9 <Lecturer Manager> Export questions

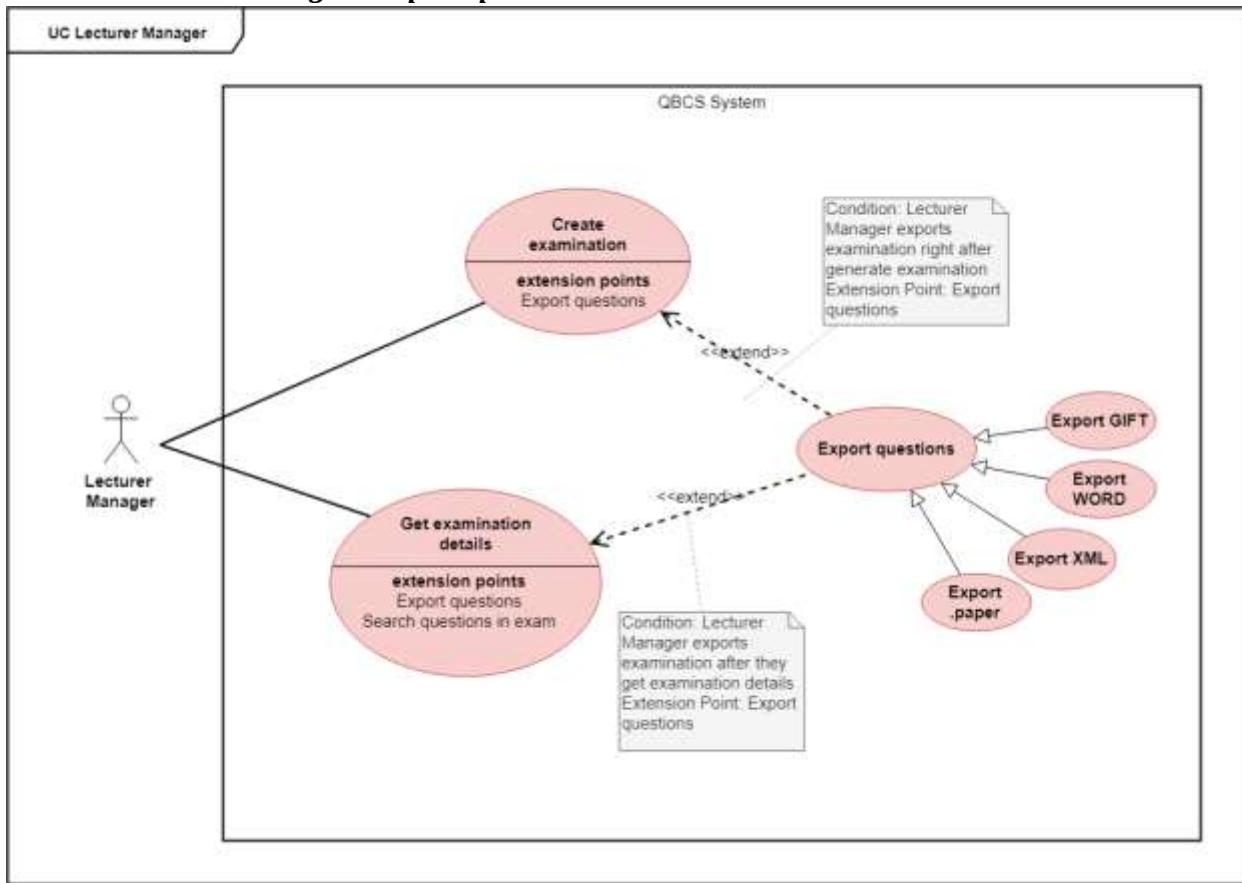


Figure 27 - <Lecturer Manager> Export questions

USE CASE - QBCS2_UC22			
Use Case No.	QBCS2_UC22	Use Case Version	2.0
Use Case Name	Export questions		
Author	Duong Thanh Dat		
Date	21/11/2019	Priority	High
<b>Actor:</b>			
1. Lecturer Manager			
<b>Summary:</b>			
2. This use case allows Lecturer Manager to export individual examinations or the whole examination group to XML, GIFT or MS Word.			
<b>Goal:</b>			
3. The system returns the file according to the user selected format.			

**Triggers:**

4. Lecturer Manager chooses file format and sends command to export examination.

**Preconditions:**

5. User must login into the system with Lecturer Manager role.
6. The examination group exists in the system.

**Post conditions:**

7. Success: System returns the file with selected format containing the questions in the examination.
8. Fail: Show error message.

**Main Success Scenario:**

<b>Step</b>	<b>Actor Action</b>	<b>System Response</b>
1	Lecturer Manager selects examination to export.	System displays selected examination's details.
2	Lecturer Manager chooses file format and sends command to export examination.	The system will export the file according to the Lecturer Manager selected format. [Exception 1]

**Alternative Scenario: N/A****Exceptions:**

<b>No</b>	<b>Cause</b>	<b>System Response</b>
1	The system cannot export the exam tests.	System shows error message: "Some error occurs when export the exam test. Please try again."

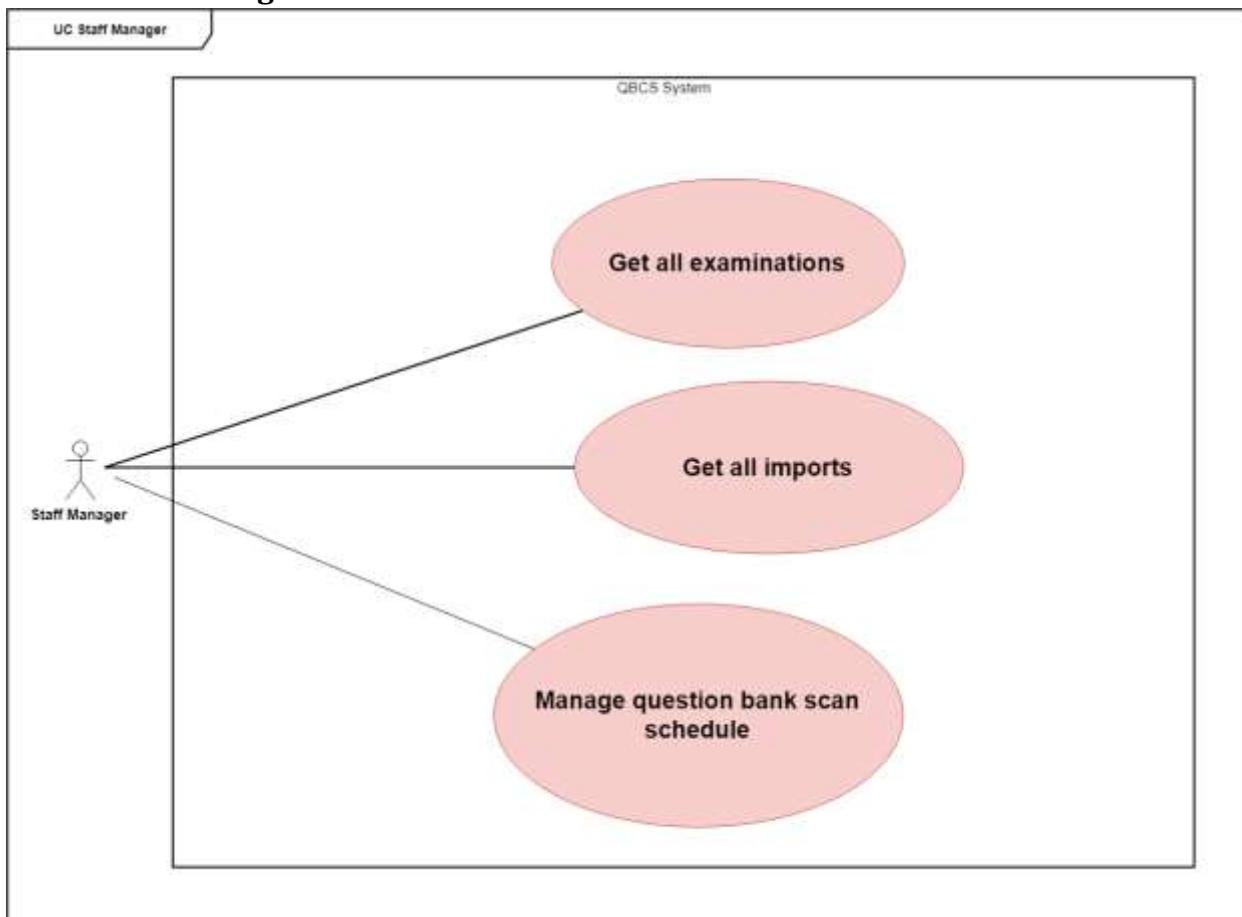
**Relationships:** QBCS2\_UC18, QBCS2\_UC20**Business Rules:**

7. The group examination must exist; the selected examination is displaying on user screen. When user sends command to export examination, all questions that are storing in the system format will be rendered to the demanded format and exported into file.
8. If user select GIFT or XML, questions will be exported into the selected format same as Moodle.
  - In GIFT format: single choice, multiple choice, fill in blank will have the right option placed after "=", the wrong option will be placed after "~". Matching type questions will be encoded as "=sub question -> option"

- In XML format: questions will be stored inside “<question></question>” tag, the type of the question is the “type” attribute of the tag.
9. If user select Word, questions will be exported to a Word file with the template following [examination department template](#).
- In Word format: question content and options' content are stored in each row of a table, answers to a question will be stored in “ANSWER” row.
  - In paper examination format: answers to questions stay separately in a table at the bottom page.
10. If user select PAPER, questions will be exported to a “.paper” file, all questions information will be encoded and stored inside the file.
11. If selected list of questions has images, Lecturer must choose to export the file in XML or Word format.
12. If user wants to export audio embedded in xml file, user must select export with audio in xml file. Otherwise, the audio will be exported separately from the questions.
13. System would return a zip file contains the question file, essay folder, image folder and audio folder if there are essay, image, audio inside list of questions.

*Table 39 - <Lecturer Manager> Export questions*

### 2.3.3 <Staff Manager> Overview Use Case



*Figure 28 – <Staff Manager> Overview use-case*

### 2.3.3.1 <Staff Manager> Get all examinations

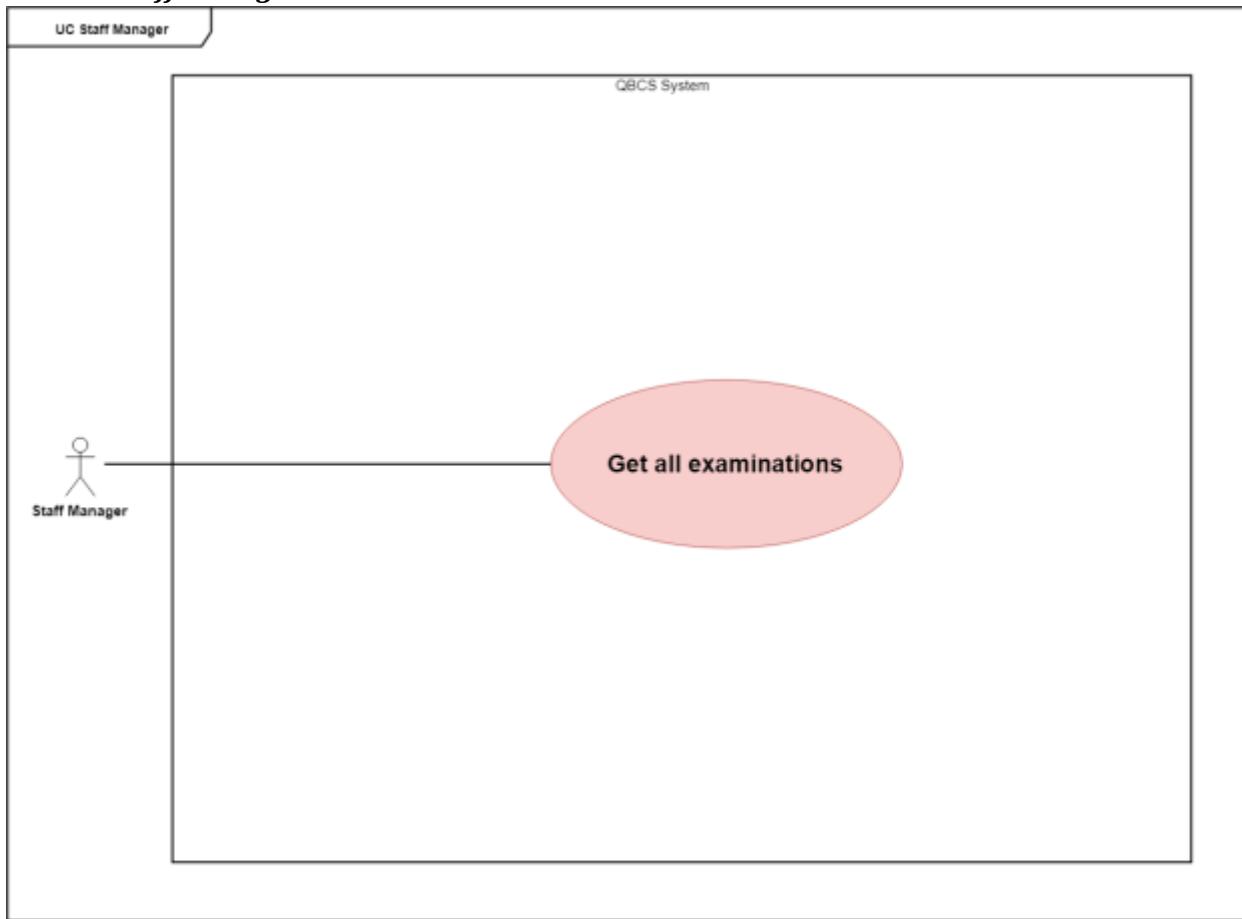


Figure 29 – <Staff Manager> Get all examinations

USE CASE - QBCS2_UC23			
Use Case No.	QBCS2_UC23	Use Case Version	2.0
Use Case Name	Get all examinations		
Author	Duong Thanh Dat		
Date	21/11/2019	Priority	Normal
<b>Actor:</b>			
- Staff Manager			
<b>Summary:</b>			
- This use case allows Staff Manager to get all examinations from all courses.			
<b>Goal:</b>			

- Staff Manager gets all examinations ever created from all courses in the system.

**Triggers:**

- Staff Manager sends command to get all examinations.

**Preconditions:**

- User must login into the system as Staff Manager.

**Post conditions:**

- Success: System shows all examinations from all courses.
- Fail: Show error message.

**Main Success Scenario:**

Step	Actor Action	System Response
1	Staff Manager sends command to get all examinations.	System displays all examinations ever created from all courses. [Exception 1]

**Alternative Scenario: N/A**

**Exceptions:**

No	Cause	System Response
1	The system cannot get all examinations.	System shows error message: "Some error has occurred. Please try again."

**Relationships: N/A**

**Business Rules: N/A**

*Table 40 – <Staff Manager> Get all examinations*

### 2.3.3.2 <Staff Manager> Get all imports

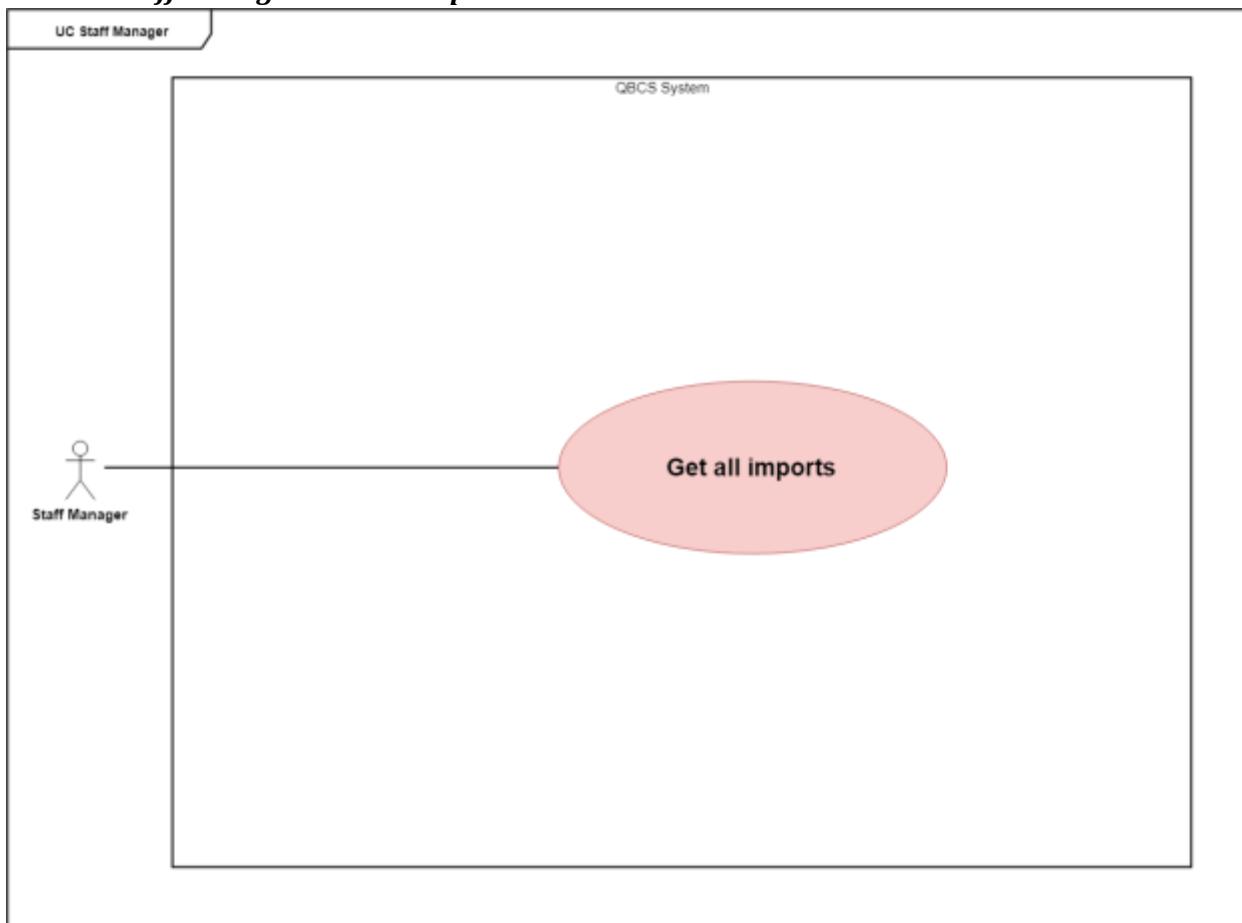


Figure 30 – <Staff Manager> Get all imports

USE CASE - QBCS2_UC24			
Use Case No.	QBCS2_UC24	Use Case Version	2.0
Use Case Name	Get all imports		
Author	Duong Thanh Dat		
Date	21/11/2019	Priority	Normal
<b>Actor:</b>			
- Staff Manager			
<b>Summary:</b>			
- This use case allows Staff Manager to get all imports from all Lecturer.			
<b>Goal:</b>			

- Staff Manager gets all imports from all Lecturer in the system.

**Triggers:**

- Staff Manager sends command to get all imports,

**Preconditions:**

- User must login into the system as Staff Manager.

**Post conditions:**

- Success: System shows all imports from all Lecturer.
- Fail: Show error message.

**Main Success Scenario:**

Step	Actor Action	System Response
1	Staff Manager sends command to get all imports.	System displays import history screen and shows all imports from all Lecturer in the system.  [Exception 1]

**Alternative Scenario:** N/A

**Exceptions:**

No	Cause	System Response
1	The system cannot get all imports.	System shows error message: "Some error has occurred. Please try again."

**Relationships:** N/A

**Business Rules:** N/A

*Table 41 – <Staff Manager> Get all imports*

### 2.3.3.3 <Staff Manager> Manage question bank scan schedule

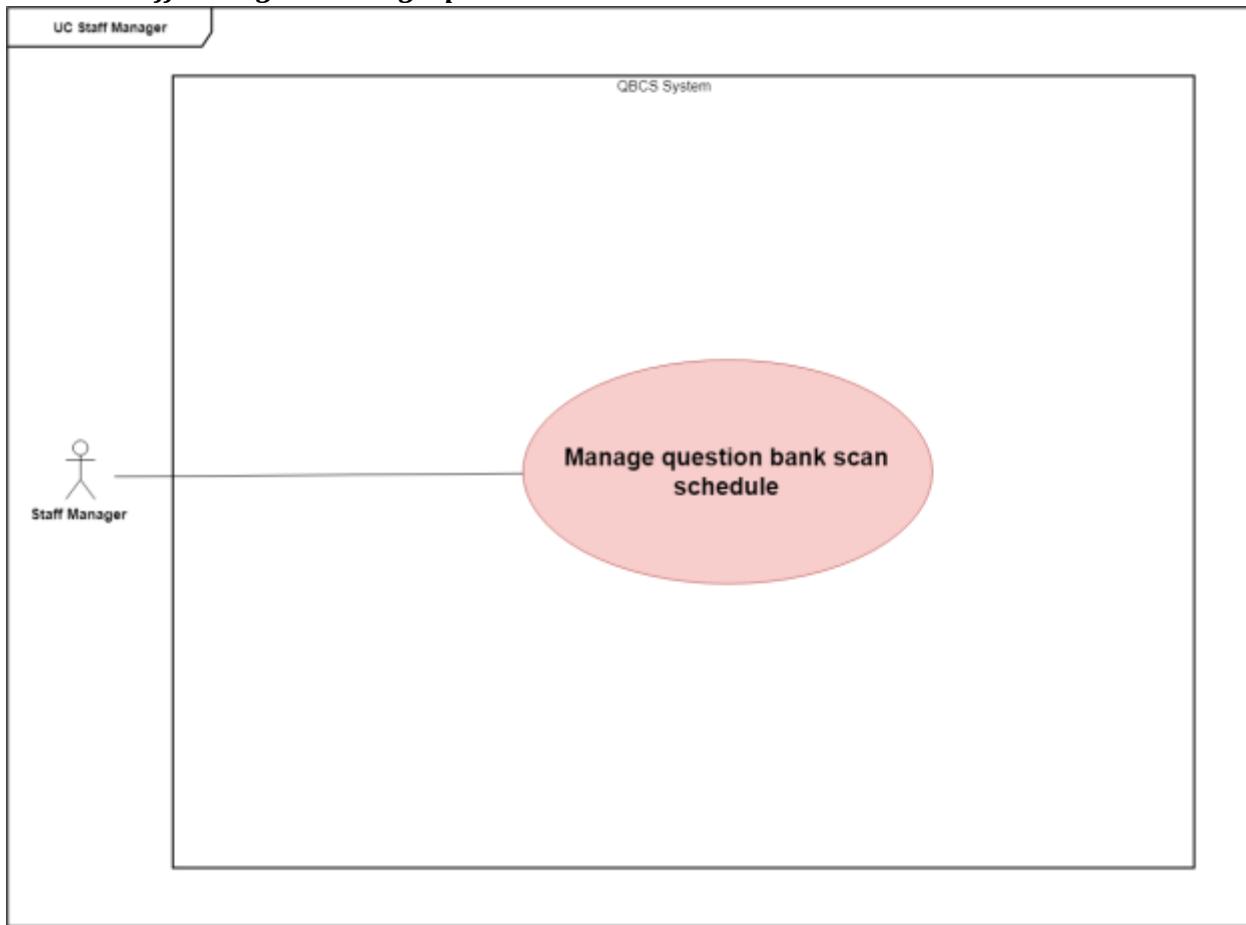


Figure 31 – <Staff Manager> Manage question bank scan schedule

USE CASE - QBCS2_UC25			
Use Case No.	QBCS2_UC25	Use Case Version	2.0
Use Case Name	Manage question bank scan schedule		
Author	Duong Thanh Dat		
Date	21/11/2019	Priority	Normal
<b>Actor:</b>			
- Staff Manager			
<b>Summary:</b>			
- This use case allows Staff Manager to manage question bank scan schedule.			
<b>Goal:</b>			

- Staff Manager selects a date in month, the system will automatically scan for duplicate questions in question bank every month when it is the selected date.

**Triggers:**

- Staff Manager sends command to set date for scan schedule.

**Preconditions:**

- User must login into the system as Staff Manager.

**Post conditions:**

- Success: System shows that the selected date is set.
- Fail: Show error message.

**Main Success Scenario:**

Step	Actor Action	System Response
1	Staff Manager sends command to set scan schedule.	System displays a date picker for Staff Manager to choose a date.
2	Staff Manager selects date and sends command to confirm.	System saves the selected date and will automatically scan the system when it is date. [Exception 1]

**Alternative Scenario:** N/A

**Exceptions:**

No	Cause	System Response
1	The system cannot save the selected date.	System shows error message.

**Relationships:** QBCS2\_UC28

**Business Rules:** N/A

*Table 42 – <Staff Manager> Get all imports*

#### 2.3.4 <System Handler> Overview Use Case

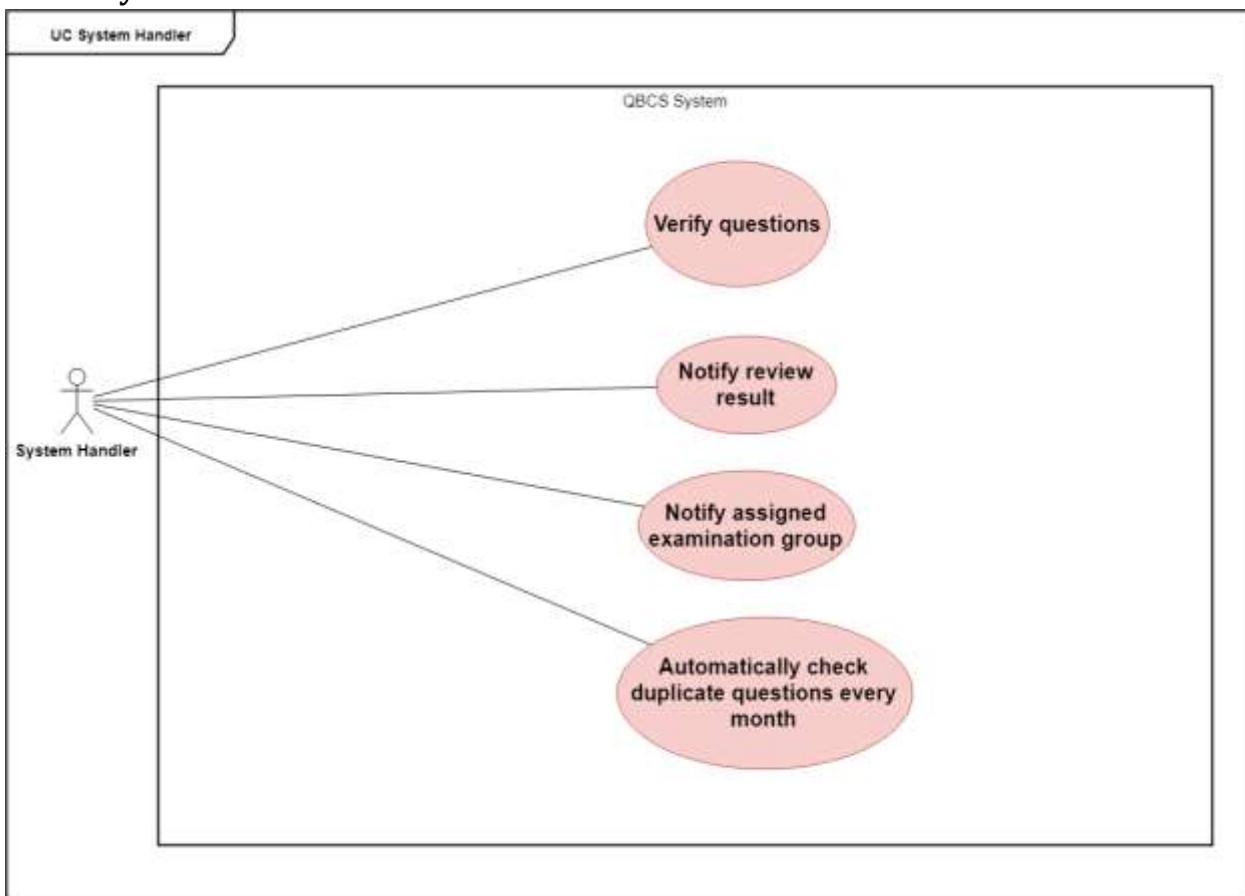


Figure 32 – <System Handler> Overview use case

### 2.3.4.1 <System Handler> Verify questions

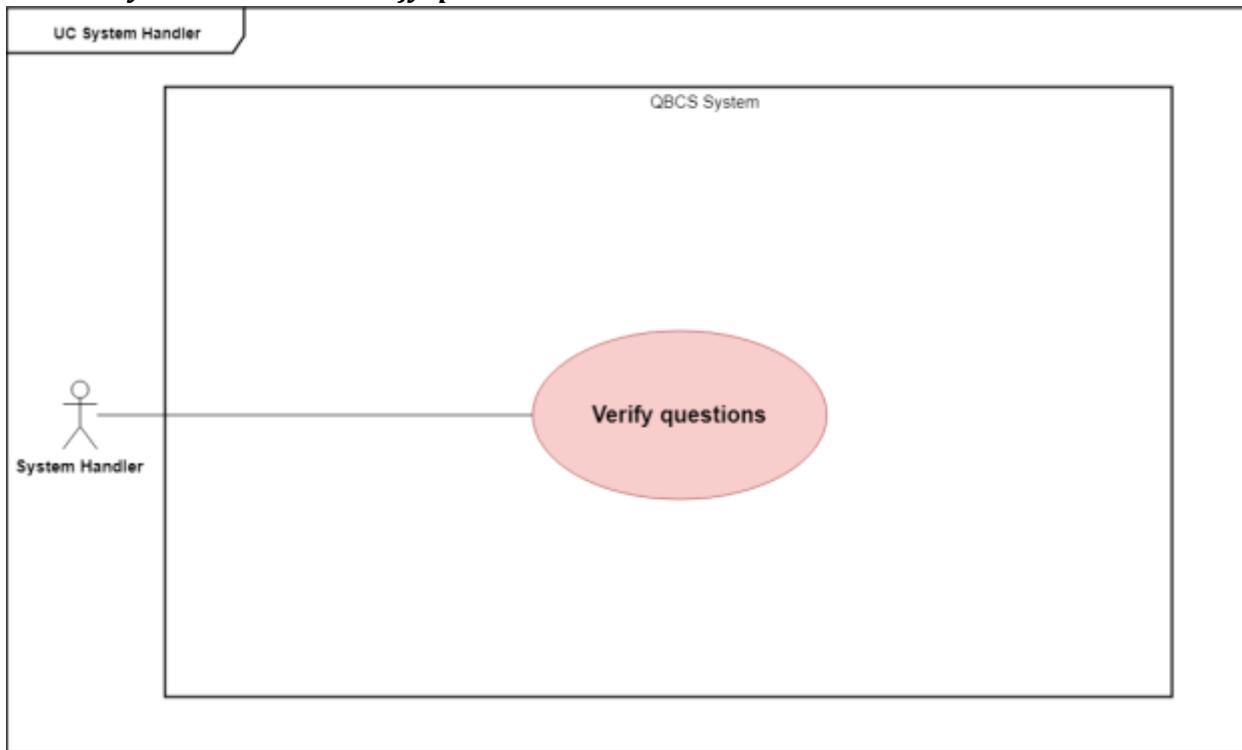


Figure 33 – <System Handler> Verify questions

USE CASE - QBCS2_UC26			
Use Case No.	QBCS2_UC26	Use Case Version	2.0
Use Case Name	Verify questions		
Author	Duong Thanh Dat		
Date	21/11/2019	Priority	High
<b>Actor:</b>			
- System Handler			
<b>Summary:</b>			
- System Handler verifies questions and checks for duplication whenever questions are imported or edited.			
<b>Goal:</b>			
- System Handler verifies questions to make sure that questions are not duplicate or invalid.			
<b>Triggers:</b>			

- User imports questions into bank, user edits a question.

**Preconditions:**

- User is logged in and has to be authorized for the course that they import questions into.
- User has to be authorized to use import or edit question feature.

**Post conditions:**

- Success: System shows invalid or duplicate questions.
- Fail: Show error message.

**Main Success Scenario:**

Step	Actor Action	System Response
1	System Handler checks for invalid and duplicate questions.	System returns a list of invalid questions and a list of duplicate questions. [Exception 1]

**Alternative Scenario: N/A**

**Exceptions:**

No	Cause	System Response
1	System Handler cannot check for invalid questions.	System shows error message.

**Relationships: N/A**

**Business Rules: N/A**

*Table 43 – <System Handler> Verify questions*

### 2.3.4.2 <System Handler> Notify review result

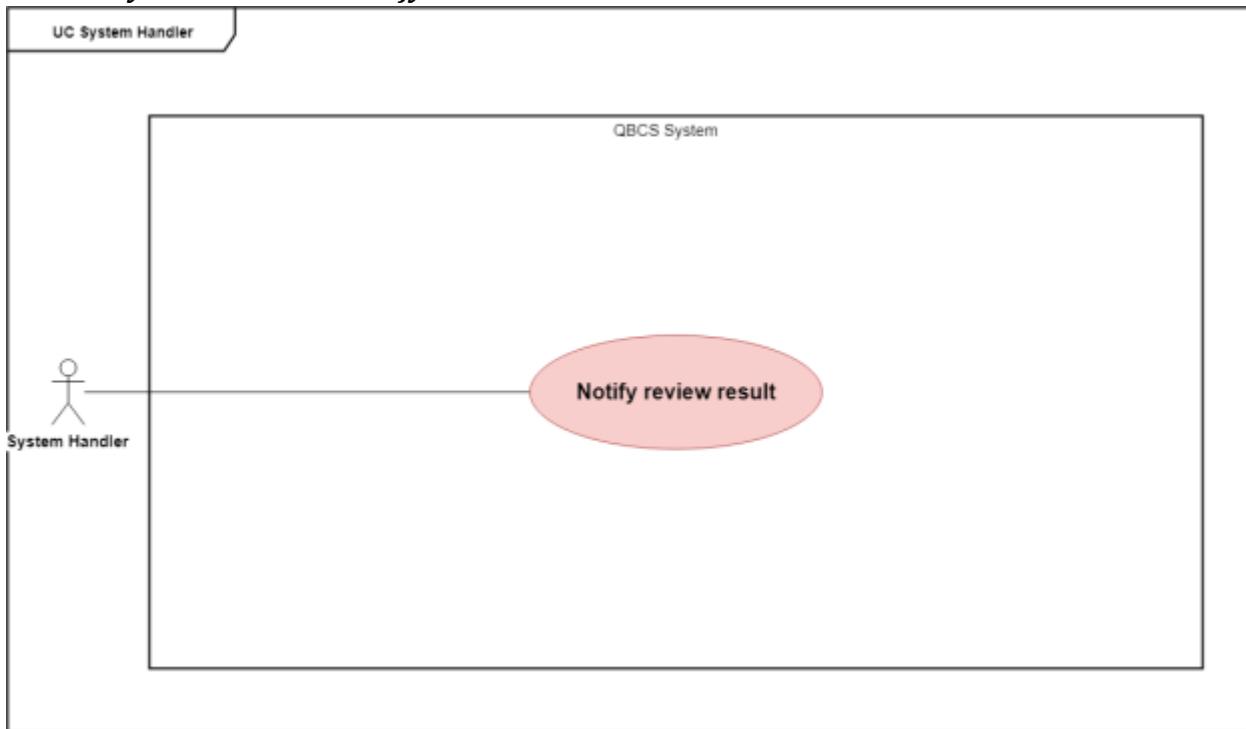


Figure 34 – <System Handler> Notify review result

USE CASE - QBCS2_UC27			
Use Case No.	QBCS2_UC27	Use Case Version	2.0
Use Case Name	Notify review result		
Author	Duong Thanh Dat		
Date	21/11/2019	Priority	Normal
<b>Actor:</b>			
<ul style="list-style-type: none"> <li>- System Handler</li> </ul>			
<b>Summary:</b>			
<ul style="list-style-type: none"> <li>- System Handler notifies review result for Lecturer Manager whenever Lecturer has done reviewing an assigned exam.</li> </ul>			
<b>Goal:</b>			
<ul style="list-style-type: none"> <li>- System Handler notifies Lecturer Manager that assigned users have done reviewing the exam.</li> </ul>			
<b>Triggers:</b>			
<ul style="list-style-type: none"> <li>- Lecturer sends command to submit a reviewed exam.</li> </ul>			

**Preconditions:**

- User is logged in and has to be authorized for the examination group.

**Post conditions:**

- Success: System shows notification for Lecturer Manager.
- Fail: Show error message.

**Main Success Scenario:**

Step	Actor Action	System Response
1	System Handler notifies Lecturer Manager that the examination group is reviewed.	The system shows notification for Lecturer Manager who assigned the examination group.  [Exception 1]

**Alternative Scenario:** N/A**Exceptions:**

No	Cause	System Response
1	System Handler cannot send notification.	System shows error message.

**Relationships:** N/A**Business Rules:** N/A*Table 44 – <System Handler> Notify review result*

### 2.3.4.3 <System Handler> Notify assigned examination group

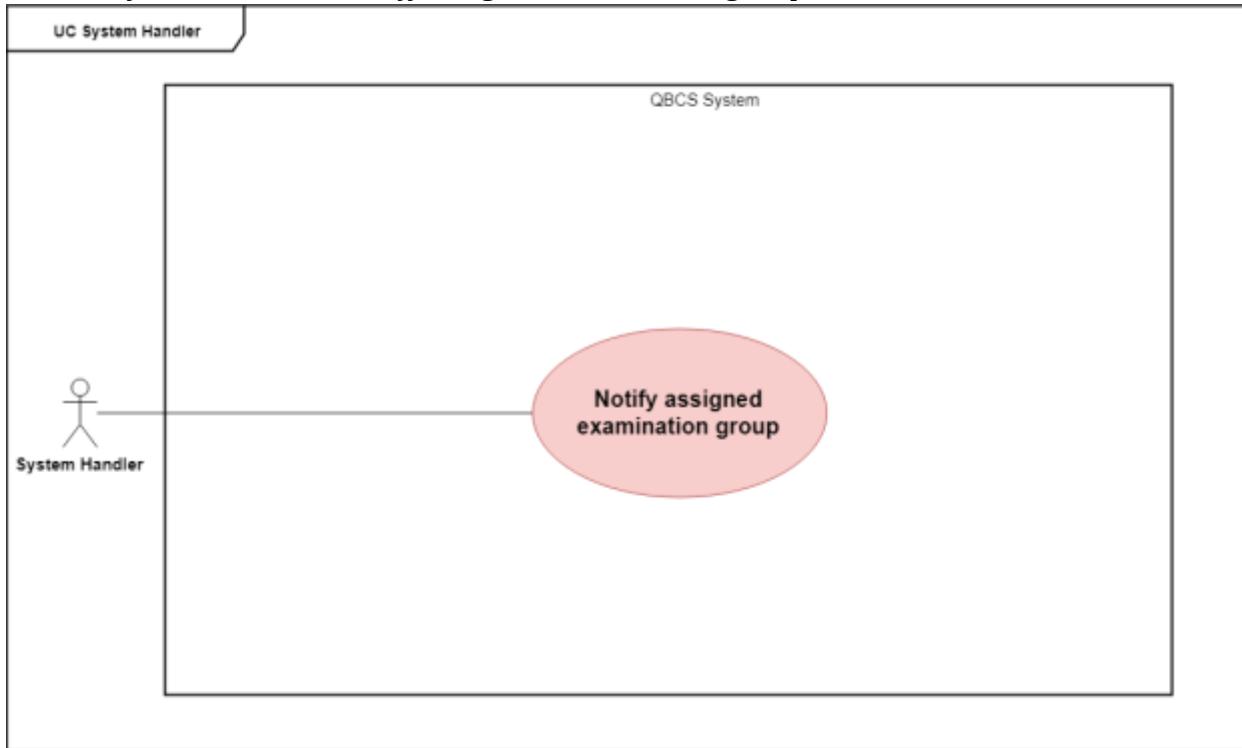


Figure 35 – <System Handler> Notify assigned examination group

USE CASE - QBCS2_UC28			
Use Case No.	QBCS2_UC28	Use Case Version	2.0
Use Case Name	Notify assigned examination group		
Author	Duong Thanh Dat		
Date	21/11/2019	Priority	Normal
<b>Actor:</b>			
<ul style="list-style-type: none"> <li>- System Handler</li> </ul>			
<b>Summary:</b>			
<ul style="list-style-type: none"> <li>- System Handler notifies to Lecturers that have been assigned an examination group to review.</li> </ul>			
<b>Goal:</b>			
<ul style="list-style-type: none"> <li>- System Handler notifies assigned exams for Lecturer.</li> </ul>			
<b>Triggers:</b>			
<ul style="list-style-type: none"> <li>- Lecturer Manager sends command to assign examination group to Lecturer.</li> </ul>			

**Preconditions:**

- User is logged in and has to be authorized for the examination group.

**Post conditions:**

- Success: System shows invalid or duplicate questions.
- Fail: Show error message.

**Main Success Scenario:**

Step	Actor Action	System Response
1	System Handler notifies users who are assigned to test the examination group.	The system shows notification for users who are assigned. [Exception 1]

**Alternative Scenario:** N/A**Exceptions:**

No	Cause	System Response
1	System Handler cannot check for invalid questions.	System shows error message.

**Relationships:** QBCS2\_UC14**Business Rules:** N/A

*Table 45 – <System Handler> Notify assigned examination group*

#### 2.3.4.4 <System Handler> Automatically check duplicate questions every month

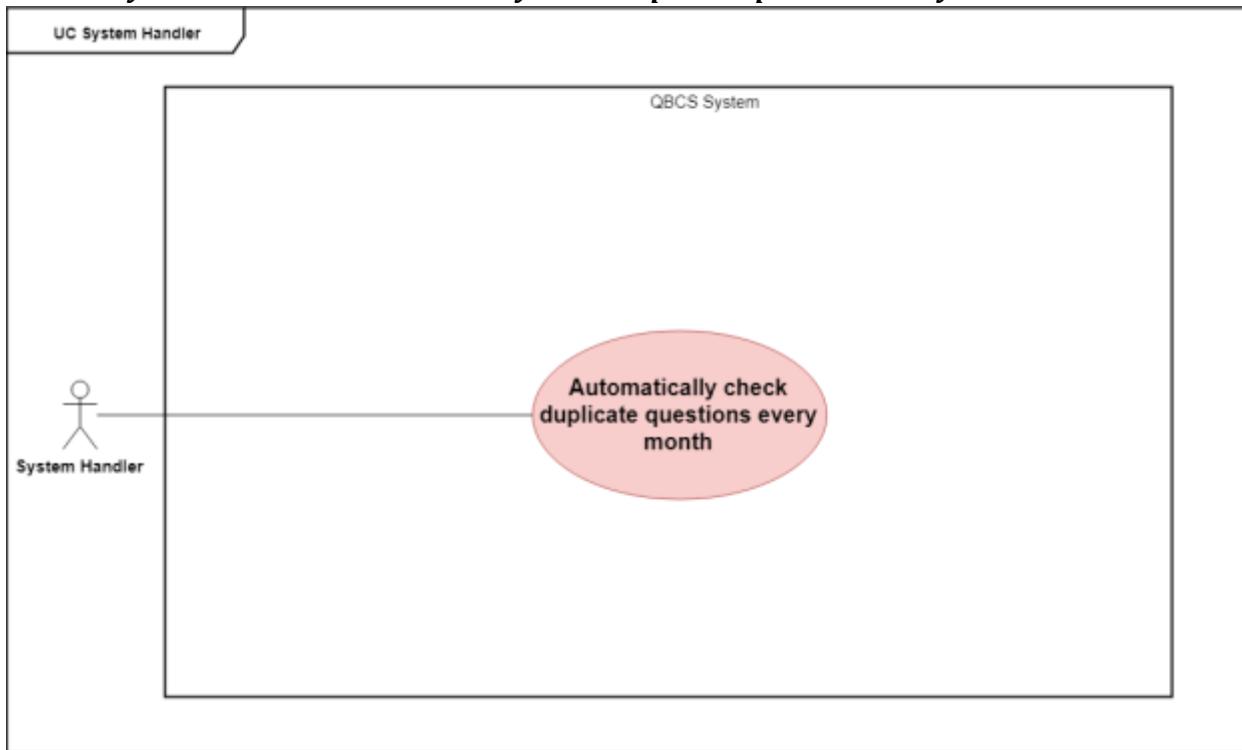


Figure 36 – <System Handler> Automatically check duplicate questions every month

USE CASE - QBCS2_UC29			
Use Case No.	QBCS2_UC29	Use Case Version	2.0
Use Case Name	Automatically check duplicate questions every month		
Author	Duong Thanh Dat		
Date	21/11/2019	Priority	Normal
<b>Actor:</b>			
- System Handler			
<b>Summary:</b>			
- System Handler automatically check for duplicate questions.			
<b>Goal:</b>			
- To make sure that there are no duplicate questions in the system.			
<b>Triggers:</b>			
- When it is the date of month that Staff Manager set is the system.			
<b>Preconditions:</b> N/A			

**Post conditions:**

- Success: System shows caution in courses that have duplicate questions.
- Fail: Show error message.

**Main Success Scenario:**

<b>Step</b>	<b>Actor Action</b>	<b>System Response</b>
1	System Handler scans whole system automatically for duplicate questions.	System shows caution in courses that have duplicate questions for users who can view course.  [Exception 1]

**Alternative Scenario:** N/A**Exceptions:**

<b>No</b>	<b>Cause</b>	<b>System Response</b>
1	System Handler cannot check for invalid questions.	System shows error message.

**Relationships:** QBCS2\_UC25**Business Rules:** N/A

*Table 46 – <System Handler> Automatically check duplicate questions every month*

### 3. Software System Attribute

#### 3.1 Usability

QBCS system has been deployed and used since Half 1 – Summer 2019, henceforth, feedbacks from users have been collected and applied to the system.

The system will need two days of training for Lecturer and about a week of usage to be fluent.

#### 3.2 Reliability

Results generated from QBCS features are reviewed, verified and used in FPT University.

#### 3.3 Availability

The system is available 24/7.

### 3.4 Security

The system divides users into 3 roles: Lecturer, Lecturer Manager and Staff Manager. Each role can only have access to a group of functions.

### 3.5 Maintainability

The system is divided into modules in which each module can be modified without affecting the whole QBCS system. Whenever there are changes or new requirements, components in the system can be modified easily without having to modify other components.

### 3.6 Portability

QBCS system is a web-based application; therefore, it can be accessed from any web supported web browsers.

### 3.7 Performance

Performance details and measurements are shown in [Performance Measures](#).

## 4. Conceptual Diagram

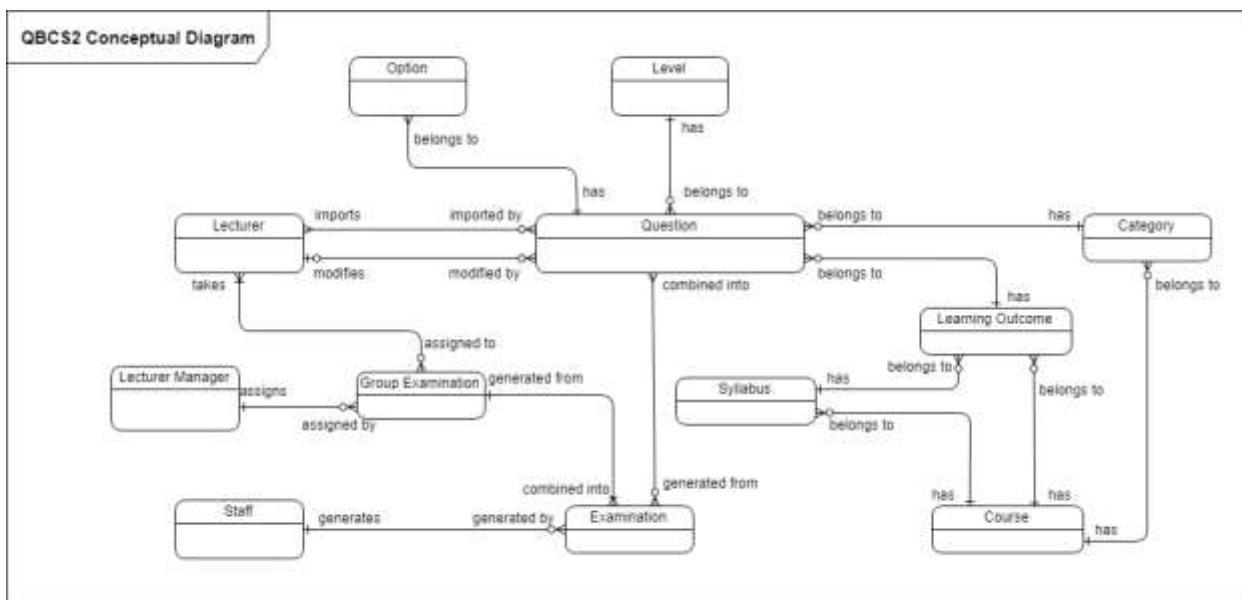


Figure 37 – Conceptual Diagram

CONCEPTUAL DICTIONARY	
ENTITY NAME	DESCRIPTION
Lecturer	The Lecturer who imports questions to bank.
Lecturer Manager	The Lecturer Manager who manages Examination and assigns Examination Test to Lecturer.
Staff	The Staff who generates exams from the questions.
Question	The Question is imported by Lecturer Manager and used by Staff to generate exams.

	Contain question's information.
Option	The option of a question. Contain option's information.
Level	The level of a question. Contain level's information.
Category	The category of a question. Contain category's information.
Learning Outcome	The learning outcome of a question. Contain learning outcome's information.
Syllabus	The syllabus that contains learning outcomes and decides the number of questions in a course. Contain syllabus's information.
Course	The course that contains questions. Contain course's information.
Examination	The examination that is generated from questions. Contain examination's information.
Examination Group	The examination group assigned to Lecturer by Lecturer Manager, which Lecturer has to test exams in the examination group in order to verify the examination group.

*Table 47 – Conceptual diagram dictionary*

## D. Software Design Description

### 1. Design Overview

- This document describes the technical and user interface design of **QBCS System**. It includes the architectural design, the detailed design of common functions and business functions and the design of database model.
- The architectural design describes the overall architecture of the system and the architecture of each main component and subsystem.
- The detailed design describes static and dynamic structure for each component and functions. It includes class diagrams, class explanations and interaction diagrams for each use cases.
- The database design describes the relationships between entities and details of each entity.
- Document overview:
  - o Section 2: gives an overall description of the system architecture design.
  - o Section 3: gives component diagrams which describe the connection and integration of the system.
  - o Section 4: gives detail design description which includes class diagram, class explanation, and sequence diagram.
  - o Section 5: describes interfaces of the system including Component and User interfaces.
  - o Section 6: describes a fully attributed Entity Relationship Diagram.

- Section 7: describes algorithms.

## 2. Software Architectural Design

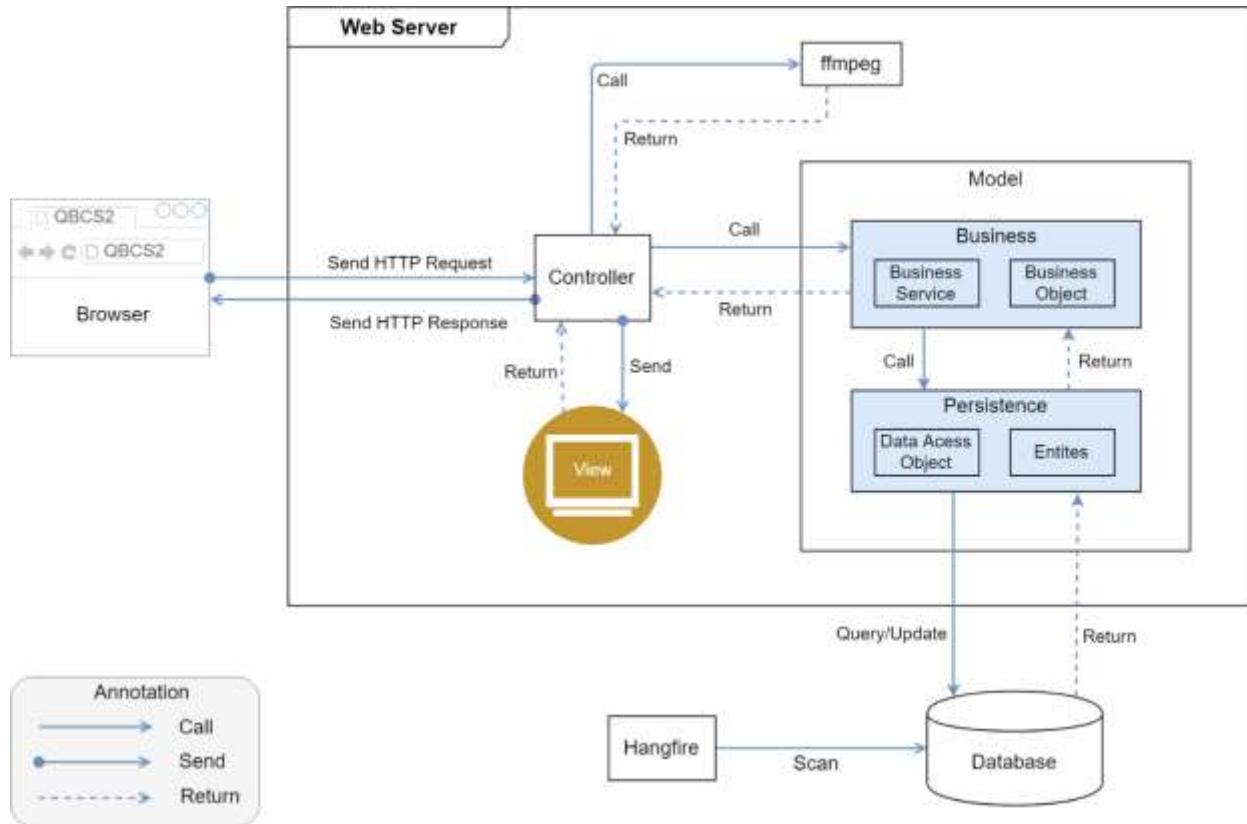


Figure 38 – Software Architectural Design

Our system was designed and developed using MVC architecture. From the start, our project had been using MVC architecture because it needs development and maintenance through many phases – [QBCS Season 1 Architectural Design](#). Thus, we chose to keep using MVC architecture because it helps dividing the project into view, controller and model which makes it convenient for us to maintain and develop.

- Our system includes the following components:
  - **Controller** is the part of the web server which acts like an event handler to handle user interactions.
  - **Model** is the part of the web server which processes business logic of the system and transfers data between the web server and the database.
    - **Business** is the part of the model which processes business to solve domain problems.
      - + **Business Component** is the part of the business component that solves business of system.

- + **Business Objects** is the part of the business component that defines objects to use in business component.
- **Persistence** is the part of the model which transfers objects between the system and the database.
  - + **Entities** is the part of the persistence component that maps table in database with each object in DAO.
  - + **Data Access Object** is the part of the persistence component that provides methods and classes to persistent store data into database.
- **View** is the part of the web server that acts like event handles the display of the data. The selection of View is under control of Controller.
- **ffmpeg** is a suite of libraries that helps handling audios.
- **Hangfire** is a worker runs in the background that helps our system automatically scan for duplicate questions in bank monthly.

### 3. Component Diagram

Annotation:

New components are shown in **green**

Updated components are shown in **orange**

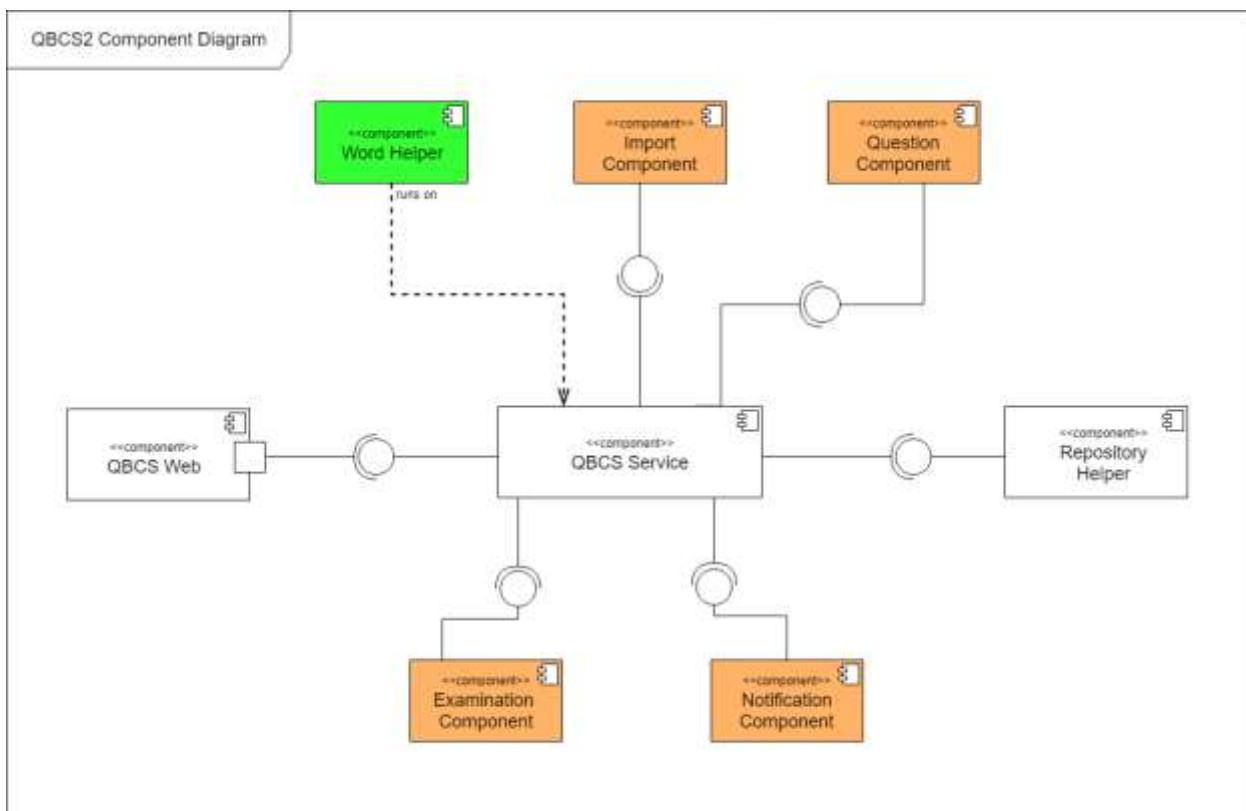


Figure 39 – Component Diagram

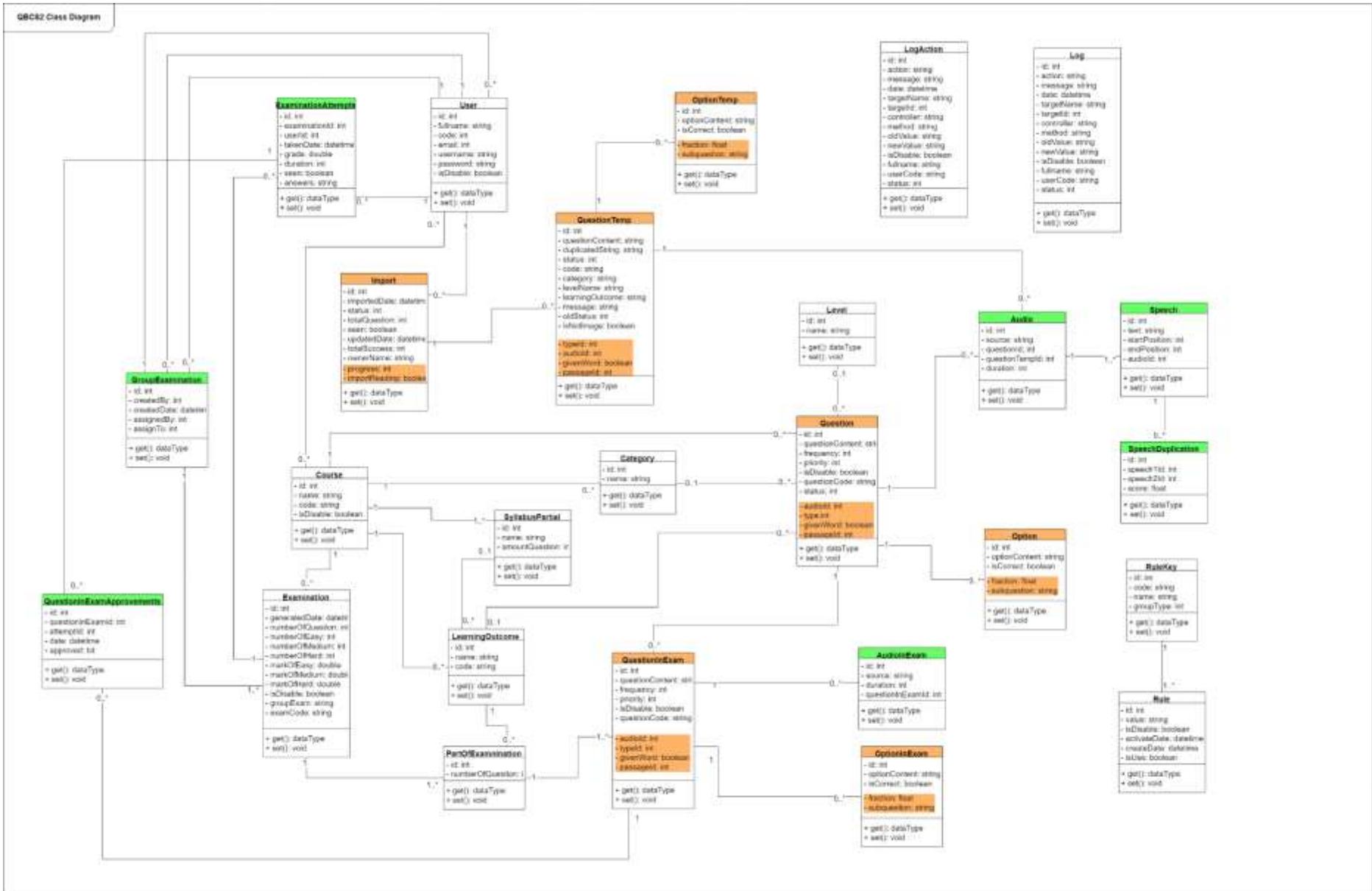
<b>Component Dictionary: describes components</b>	
QBCS Service	Service component handles system's business logic and process business logic.
Repository Helper	Repository Helper handles interactions between service and entity
Word Helper	Component that handles parsing MS Word file for importing and exporting MS Word.
Import component	Import component handles business when importing questions to the system.
Question component	Question component processes business in checking duplicate questions and questions format.
Examination component	Examination component handles business in managing examinations.
Notification component	Notification component handles business in sending notification to the right user.

## 4. Detailed Description

### 4.1. Class Diagram

Annotation:

- We only highlights new classes. For more details, please open [QBCS1 document references](#).
  - New classes are shown in **green**
  - Updated classes are shown in **orange**



*Figure 40 - QBCS Class Diagram*

Entity Data dictionary: describe all content of all entities		
Class Name	Mapping column with Conceptual diagram	Description
Import	N/A	Contain status and information of an import
QuestionTemp	N/A	Contain question before being processing and will be deleted when the process finishes
OptionTemp	N/A	Contain options of a question before being processed and will be deleted if the question is deleted
Question	Question	Contain question's information
Option	Option	Contain option's information
QuestionInExam	N/A	Contain question's information, this is just an instance of question.
OptionInExam	N/A	Contain option's information, this is just an instance of option.
Audio	N/A	Contain audio information.
Speech	N/A	Contain speeches inside an audio
SpeechDuplicate	N/A	Contain duplication details between two speeches
AudioInExam	N/A	Contain information about audio in exam
Examination Group	Examination Group	Contain examination group information.
Examination attempts	N/A	Contain examination taking attempts by Lecturer.
QuestionInExam Approvements	N/A	Contain approval status of questions in an exam.

Table 48 - Class diagram description

## 4.2. Class Diagram Explanation

### 4.2.1. Import

Attribute	Type	Visibility	Description
Id	int	private	Unique identifier of an Import
importedDate	datetime	private	The time user import question

status	int	private	The status of an Import (Not Check, Checked, Editing, Done, Canceled)
totalQuestion	int	private	The total question of a file import
seen	boolean	private	The status seen or not to notify for user
updatedDate	datetime	private	The time import status is updated
totalSuccess	int	private	The total question are inserted to bank from file import
ownerName	string	private	The name of the owner of the import file
progress	int	private	The progress of the import
importReading	boolean	private	The status of the import to identify if it contains a reading or not

Table 49 - Class diagram Import Attributes

Method	Return Type	Visibility	Description
get	Attribute type	public	Get attribute value.
Set	void	public	Set value of attribute.

Table 50 - Class diagram Import Operations

#### 4.2.2. QuestionTemp

Attribute	Type	Visibility	Description
Id	int	private	Unique identifier of a Question Temp
questionContent	string	private	The content of Question Temp
duplicatedString	string	private	The string contain id of question are duplicated

status	int	private	The status of Question Temp (Not Check, Editable, Invalid, Deleted, Success)
code	string	private	The code of Question Temp
category	string	private	The category of Question Temp
levelName	string	private	The level of Question Temp (Easy, Medium, Hard)
learningOutcome	string	private	The learning outcome of Question Temp
message	string	private	The message error of a Question Temp if invalid
type	int	private	The type of a Question Temp (Import or Update)
oldStatus	int	private	The status before it is deleted of a Question Temp
typeId	int	private	The unique identifier of the type of question
audioId	int	private	The unique identifier of the referred audio
givenWord	boolean	private	The field used to identify if there are given words in Fill In Blank question type.
passageId	Int	private	The unique identifier of the referred passage.

Table 51 - Class diagram Question Temp Attributes

Method	Return Type	Visibility	Description
get	Attribute type	public	Get attribute value.
Set	void	public	Set value of attribute.

Table 52 - Class diagram Question Temp Operations

#### 4.2.3. OptionTemp

Attribute	Type	Visibility	Description
Id	int	private	Unique identifier of Option Temp
optionContent	string	private	The content of Option Temp
isCorrect	boolean	private	The Option Temp is correct or not
fraction	float	private	The fraction of the question
subquestion	string	private	Subquestion in matching question type.

Table 53 - Class diagram OptionTemp Attributes

Method	Return Type	Visibility	Description
get	Attribute type	public	Get attribute value.
Set	void	public	Set value of attribute.

Table 54 - Class diagram OptionTemp Operations

#### 4.2.4. Question

Attribute	Type	Visibility	Description
Id	int	private	Unique identifier of a Question
questionContent	string	private	The content of a Question
frequency	int	private	The times a Question are generated in examination
priority	int	private	The priority of a Question in generated examination
isDisable	boolean	private	The disable status of a Question
questionCode	string	private	The automated generate code of a Question
status	int	private	The status of a Question

typeId	int	private	The unique identifier of the type of question
audioId	int	private	The unique identifier of the referred audio
givenWord	boolean	private	The field used to identify if there are given words in Fill In Blank question type.
passageId	Int	private	The unique identifier of the referred passage.

Table 55 - Class diagram Question Attributes

Method	Return Type	Visibility	Description
get	Attribute type	public	Get attribute value.
Set	void	public	Set value of attribute.

Table 56 - Class diagram Question Operations

#### 4.2.5. Option

Attribute	Type	Visibility	Description
Id	int	private	Unique identifier of Option
optionContent	string	private	The content of Option
isCorrect	boolean	private	The Option is correct or not
fraction	float	private	The fraction of the question
subquestion	string	private	Subquestion in matching question type.

Table 57 - Class diagram Option Attributes

Method	Return Type	Visibility	Description
get	Attribute type	public	Get attribute value.
Set	void	public	Set value of attribute.

Table 58 - - Class diagram Option Operations

#### 4.2.6. QuestionInExam

Attribute	Type	Visibility	Description
Id	int	private	Unique identifier of a Question
questionContent	string	private	The content of a Question
frequency	int	private	The times a Question are generated in examination
priority	int	private	The priority of a Question in generated examination
questionCode	string	private	The code of a Question
isDisable	boolean	private	The disable status of a Question
typeId	int	private	The unique identifier of the type of question
audioId	int	private	The unique identifier of the referred audio
givenWord	boolean	private	The field used to identify if there are given words in Fill In Blank question type.
passageId	Int	private	The unique identifier of the referred passage.

Table 59 - Class diagram QuestionInExam Attributes

Method	Return Type	Visibility	Description
get	Attribute type	public	Get attribute value.
Set	void	public	Set value of attribute.

Table 60 - Class diagram QuestionInExam Operations

#### 4.2.7. OptionInExam

Attribute	Type	Visibility	Description
Id	int	private	Unique identifier of Option in Exam
optionContent	string	private	The content of Option in Exam

isCorrect	boolean	private	The Option in Exam is correct or not
fraction	float	private	The fraction of the question
subquestion	string	private	Subquestion in matching question type.

Table 61 - Class diagram OptionInExam Attributes

Method	Return Type	Visibility	Description
get	Attribute type	public	Get attribute value.
Set	void	public	Set value of attribute.

Table 62 - - Class diagram OptionInExam Operations

#### 4.2.8. Audio

Attribute	Type	Visibility	Description
Id	int	private	Unique identifier of Audio
Source	string	private	The source of Audio
questionId	int	private	Refer to question that contains the Audio
questionTempId	int	private	Refer to question temp that contains the Audio
duration	int	private	Duration of the Audio

Table 63 - Class diagram Audio Attributes

Method	Return Type	Visibility	Description
get	Attribute type	public	Get attribute value.
Set	void	public	Set value of attribute.

Table 64 - Class diagram Audio Operations

#### 4.2.9. Speech

Attribute	Type	Visibility	Description

<b>Id</b>	int	private	Unique identifier of Speech
<b>Text</b>	string	private	Text of speech
<b>startPosition</b>	int	private	Start position of the speech inside the audio
<b>endPosition</b>	int	private	End position of the speech inside the audio
<b>audioId</b>	int	private	Refer to audio that contains the speech

*Table 65 - Class diagram Speech Attributes*

<b>Method</b>	<b>Return Type</b>	<b>Visibility</b>	<b>Description</b>
get	Attribute type	public	Get attribute value.
Set	void	public	Set value of attribute.

*Table 66 - Class diagram Speech Operations*

#### 4.2.10. Speech duplication

<b>Attribute</b>	<b>Type</b>	<b>Visibility</b>	<b>Description</b>
<b>Id</b>	int	private	Unique identifier of Speech duplication
<b>speechId1</b>	int	private	The reference of the first speech
<b>speechId2</b>	int	private	The reference of the second speech
<b>score</b>	float	private	Duplication percentage

*Table 67 - Class diagram Speech Duplication Attributes*

<b>Method</b>	<b>Return Type</b>	<b>Visibility</b>	<b>Description</b>
get	Attribute type	public	Get attribute value.
Set	void	public	Set value of attribute.

*Table 68 - Class diagram Speech Duplication Operations*

#### 4.2.11. Group examination

Attribute	Type	Visibility	Description
Id	int	private	Unique identifier of Speech duplication
createdBy	int	private	Refer to the creator of the examinations
createdDate	datetime	private	Date that the examination group is created
assignedBy	int	private	The Lecturer Manager who assigned the examination
assignTo	Int	private	The examination is assigned to which Lecturer

Table 69 - Class diagram Group Examination Duplication Attributes

Method	Return Type	Visibility	Description
get	Attribute type	public	Get attribute value.
Set	void	public	Set value of attribute.

Table 70 - Class diagram Group Examination Operations

#### 4.2.12. AudioInExam

Attribute	Type	Visibility	Description
Id	int	private	Unique identifier of Audio
Source	string	private	The source of Audio
questionExamId	int	private	Refer to question exam that contains the Audio
duration	Int	Private	Duration of the audio in exam

Table 71 - Class diagram Audio Attributes

Method	Return Type	Visibility	Description

get	Attribute type	public	Get attribute value.
Set	void	public	Set value of attribute.

Table 72 - Class diagram Audio Operations

#### 4.2.13. ExaminationAttempts

Attribute	Type	Visibility	Description
Id	int	private	Unique identifier of Audio
examinationId	int	private	Refer to the exam that user takes
userId	int	private	Refer to the user that takes the exam
takenDate	datetime	private	Attempt is taken on which date
grade	double	private	Grade of the attempt
duration	int	private	Duration of the examination
seen	boolean	private	Show notification to user
answers	string	private	Data of the answers of the user on the exam

Table 73 - Class diagram ExaminationAttempts Attributes

Method	Return Type	Visibility	Description
get	Attribute type	public	Get attribute value.
Set	void	public	Set value of attribute.

Table 74 - Class diagram ExaminationAttempts Operations

#### 4.2.14. QuestionInExamApprovers

Attribute	Type	Visibility	Description
Id	int	private	Unique identifier of the approvement of question

questionInExamId	int	private	Refer to the question in the exam
attemptId	int	private	Refer to the review attempt of the exam
date	datetime	private	Question is approved on which date
approved	bit	private	Status of the approval

Table 75 - Class diagram QuestionInExamApprovements Attributes

Method	Return Type	Visibility	Description
get	Attribute type	public	Get attribute value.
Set	void	public	Set value of attribute.

Table 76 - Class diagram QuestionInExamApprovements Operations

#### 4.3. Interaction Diagram

##### 4.3.1. Import manually

Summary: this diagram shows process Lecturer creates a manual import.

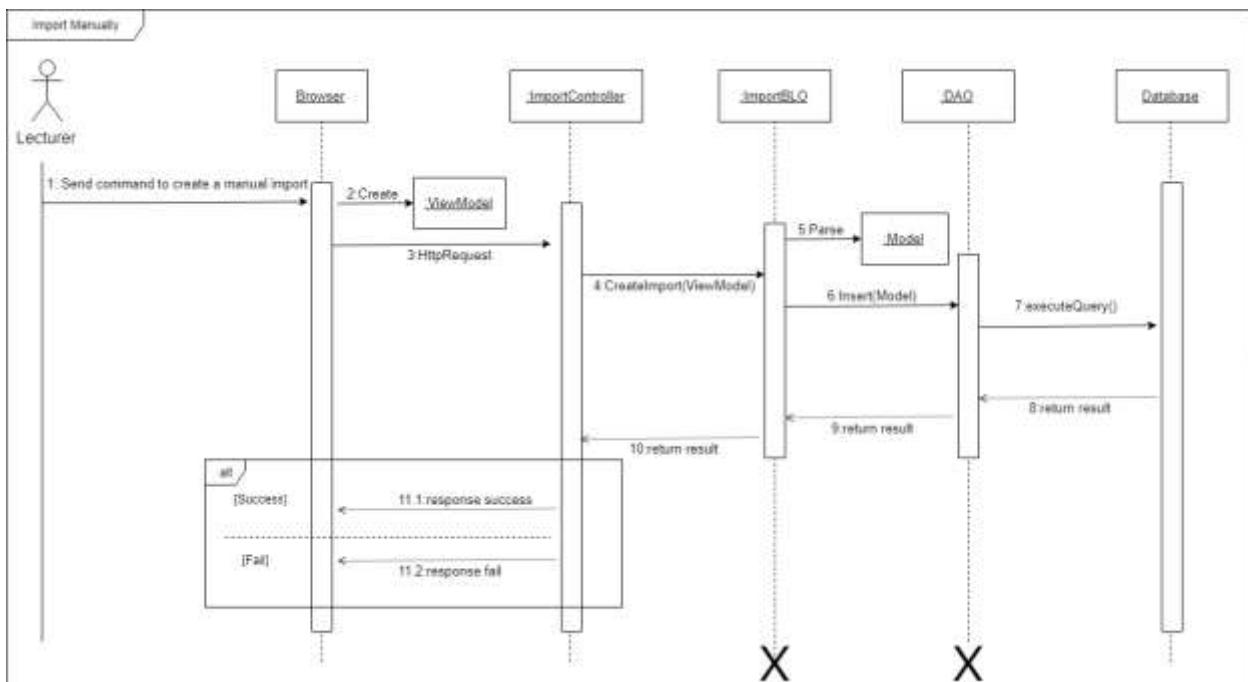


Figure 41 - Import question manually sequence diagram

### 4.3.2. Assign examination group

Summary: this diagram shows the process when Lecturer Manager assigns an examination group to a Lecturer

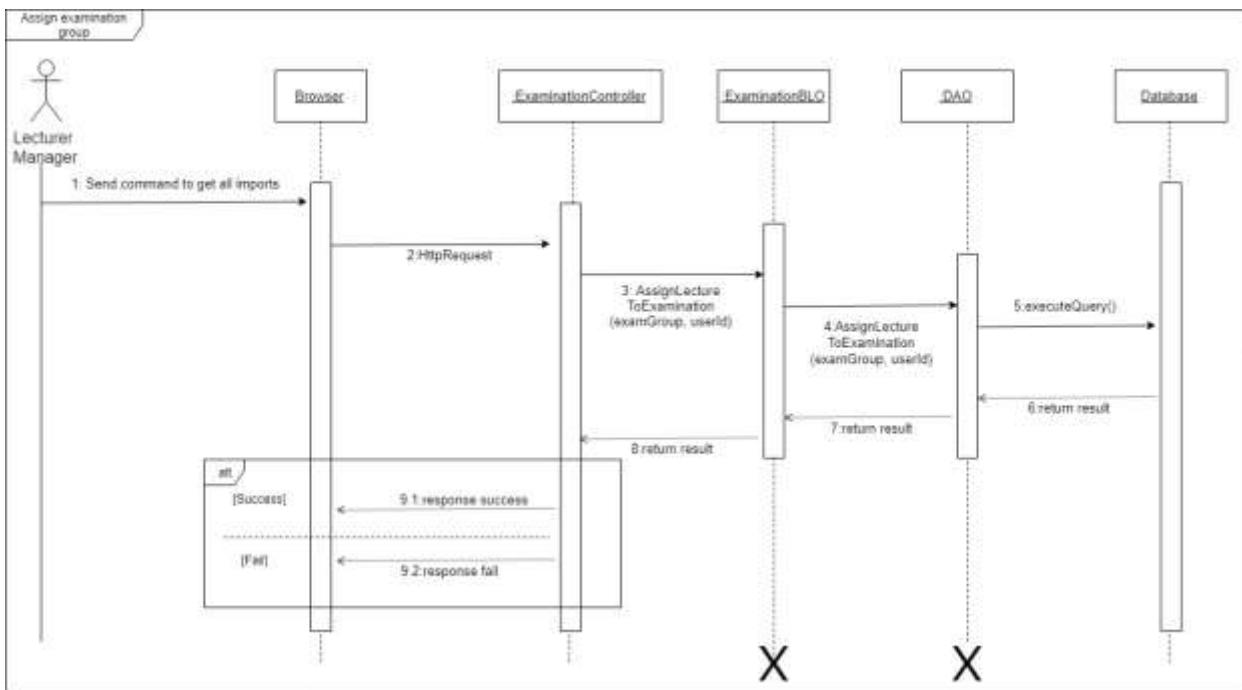


Figure 42 – Assign examination group sequence diagram

### 4.3.3. Get review result

Summary: this diagram shows the process when process Lecturer Manager gets Lecturer's test result

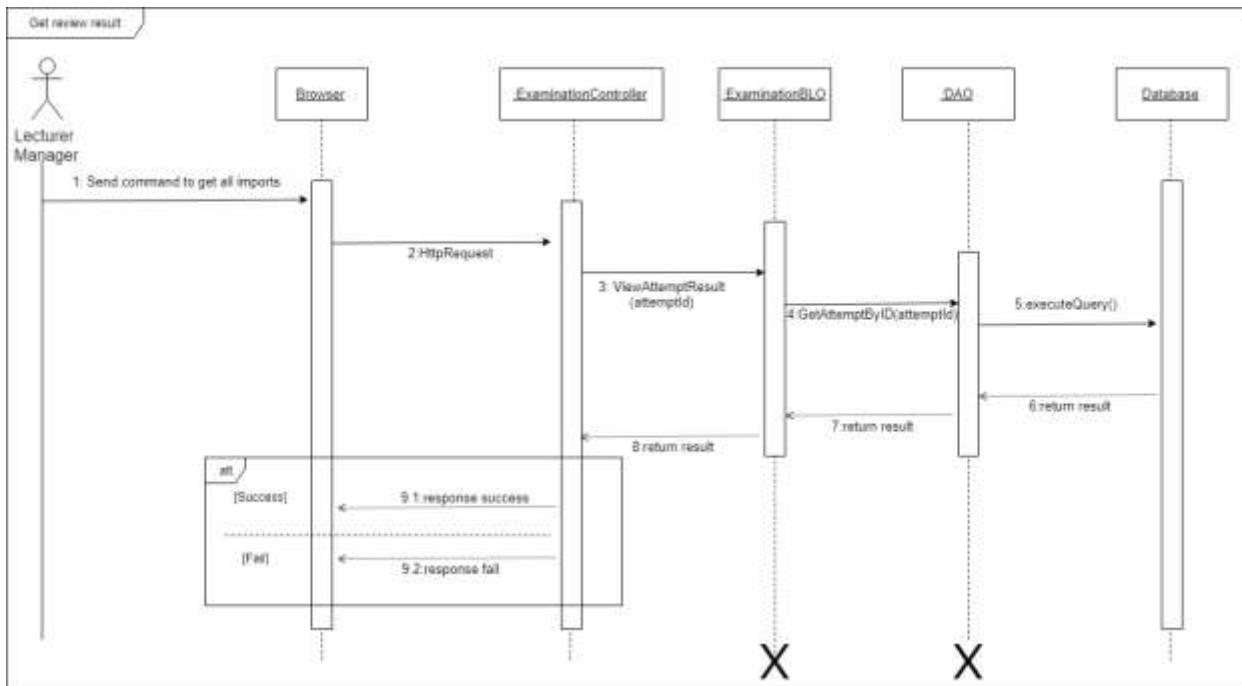


Figure 43 – Get review result sequence diagram

### 4.3.4. Process examination review result

Summary: this diagram shows the process when Lecturer Manager approves or locks an examination after reviewing examination through test results.

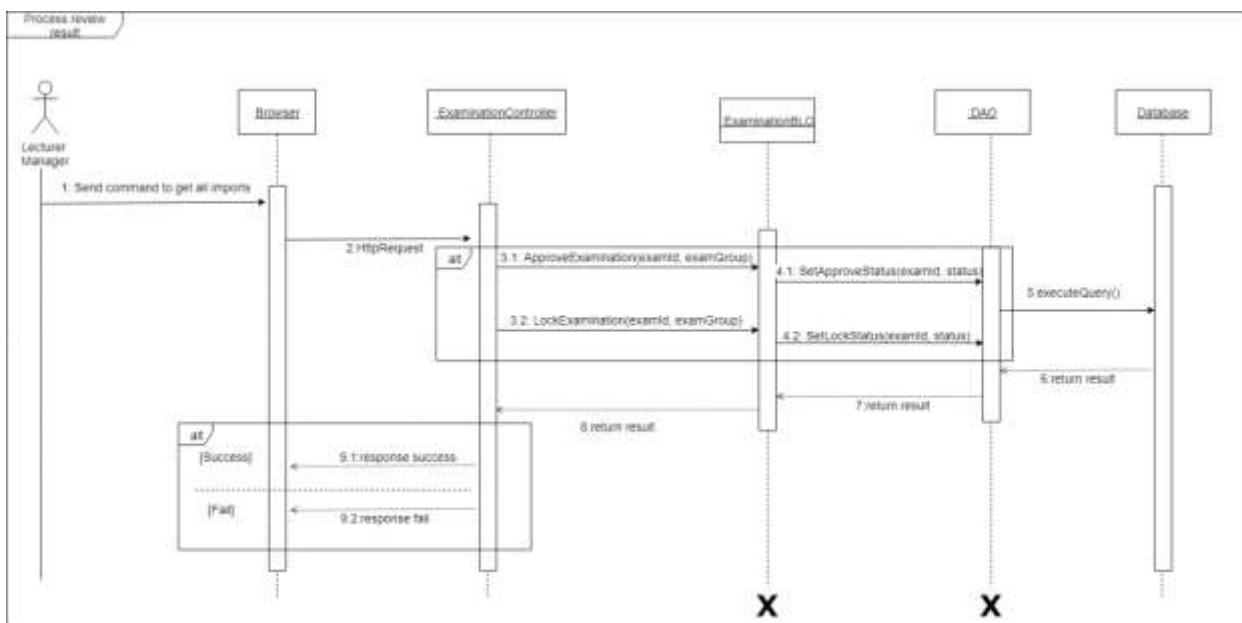


Figure 44 – Process review result sequence diagram

#### 4.3.5. Review questions

Summary: this diagram shows the process when Lecturer reviews a question in an examination

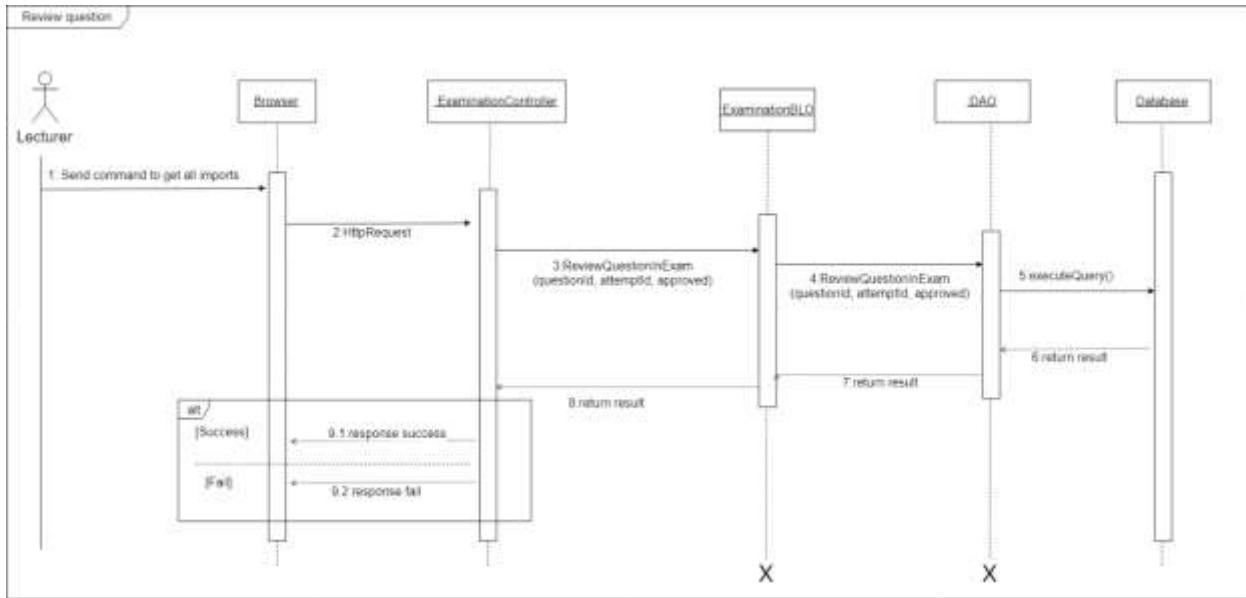


Figure 45 – Review questions in exam sequence diagram

#### 4.3.6. Submit review result

Summary: this diagram shows the process when Lecturer has done reviewing an examination and submit the review result

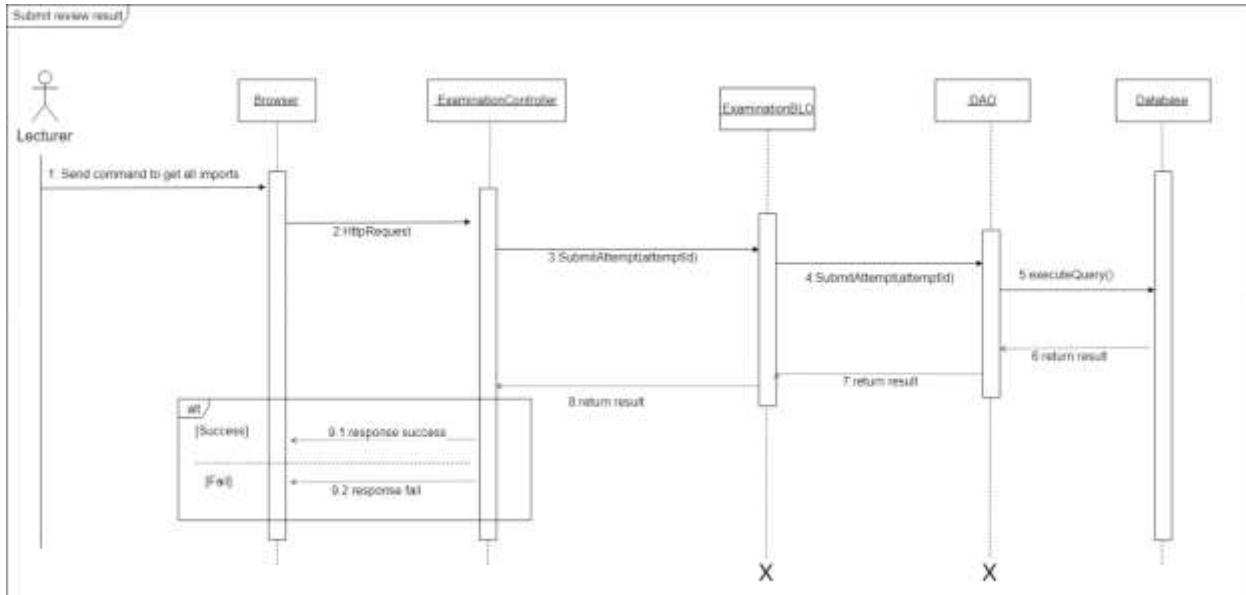


Figure 46 – Submit review result sequence diagram

#### 4.3.7. Get all examinations

Summary: this diagram shows the process when Staff Manager gets all examinations from all course in the system.

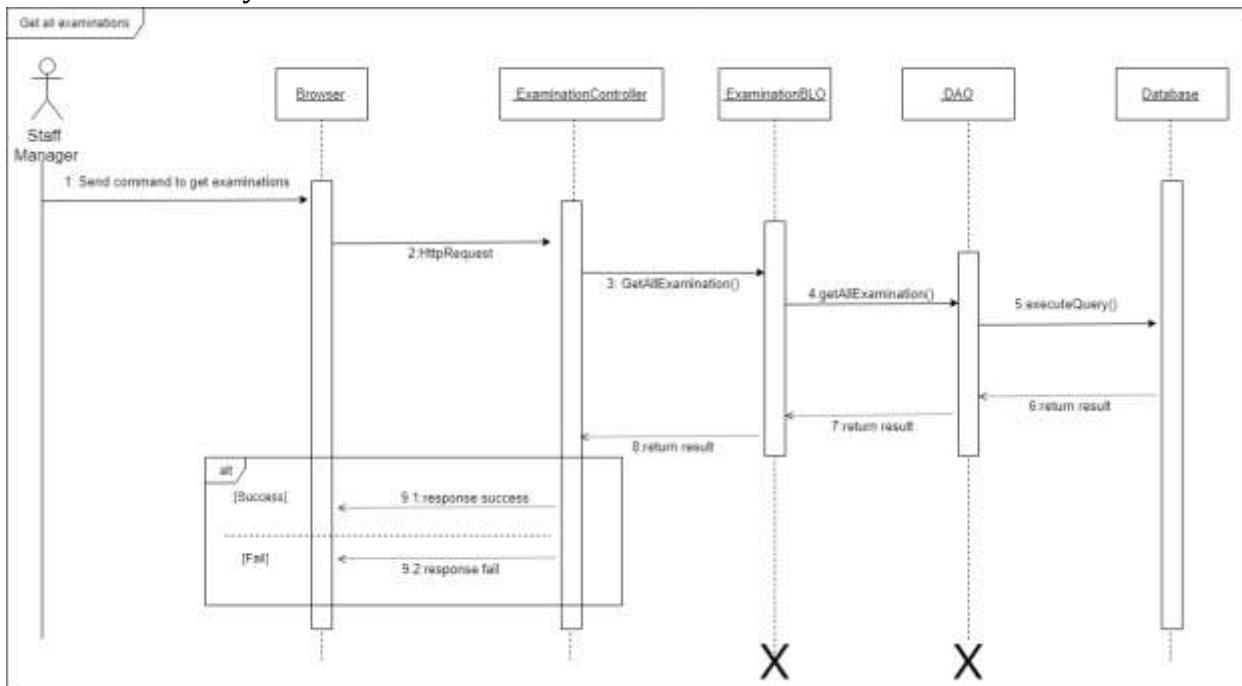


Figure 47 – Get all examinations sequence diagram

#### 4.3.8. Get all imports

Summary: this diagram shows the process when Staff Manager gets all imports from all Lecturer in the system.

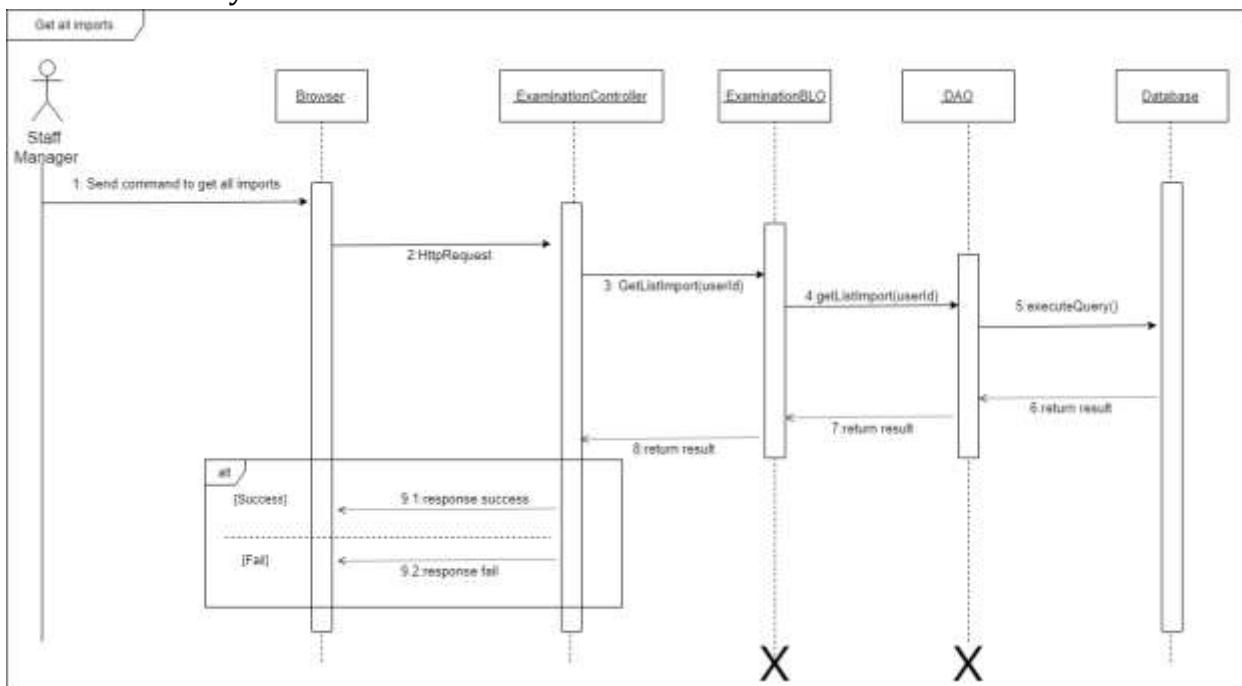


Figure 48 – Get all imports sequence diagram

#### 4.3.9. Manage question bank scan schedule

Summary: this diagram shows the process when Staff Manager manage the date of the duplication automatic scanning schedule of the system.

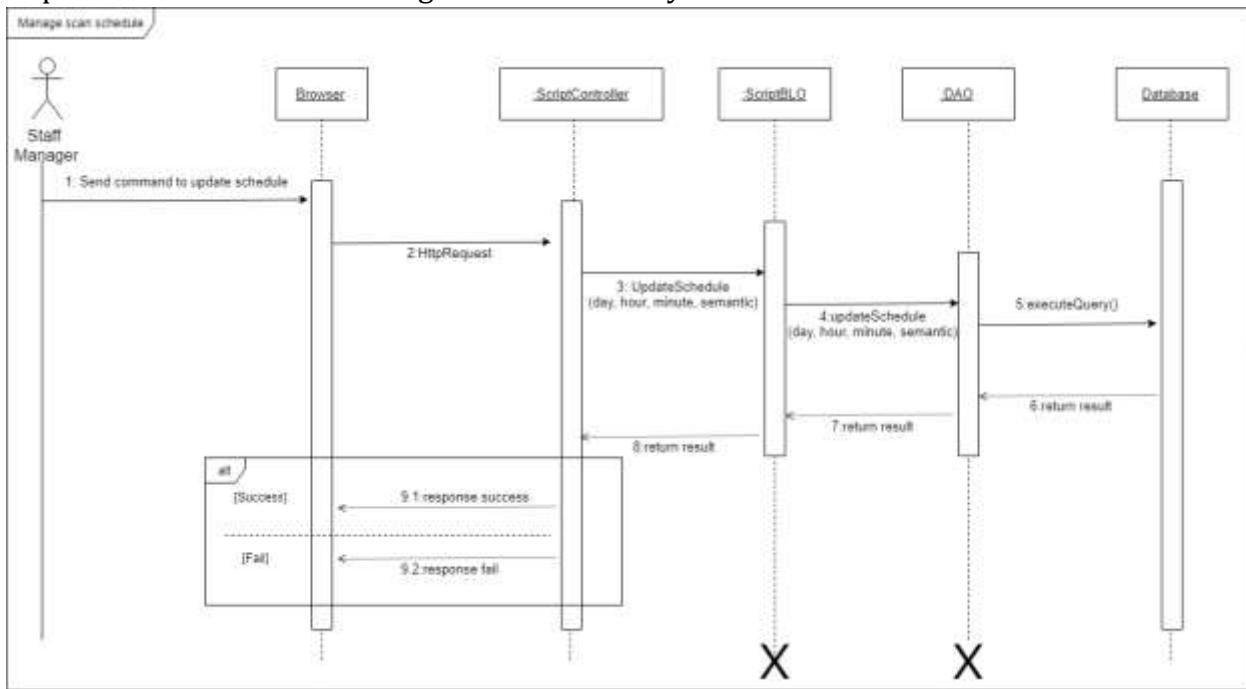


Figure 49 – Manage schedule sequence diagram

## 5. Interface

### 5.1 Component Interface

We only list new interfaces. QBCS Season 1 component interfaces [references](#).

#### 5.1.1. Question

Signature	Description	Input	Output	Output format	Exception
public void UpdateQuestionsLevel(I Enumerable<QuestionVi ewModel> questions)	Update level of questions	Parameters include: questions: IEnumerable<QuestionView Model>	N/A	N/A	NullReferenceException
public List<QuestionViewMode l> GetQuestionInPassage(i nt passageId)	Get all questions belong to a passage	Parameters include: passageId: int	QuestionViewModel	List<QuestionV iewModel>	NullReferenceException
public List<AudioViewModel> GetAudios(int questionId)	Get audios of a question	Parameters include: questionId: int	AudioViewModel includes: Id: int Source: string SHA1: string Duration: int	List<AudioVie wModel>	N/A

Table 77 - Component Interface Question Service

#### 5.1.2. Import

##### a. Service

Signature	Description	Input	Output	Output format	Exception

public void UpdateModifiedQuestio ns(List<ModifiedQuestio nViewModel> modified)	Update questions after editing	Parameters include: modified: List<ModifiedQuestionViewM odel>	N/A	N/A	NullReferenceException
public void CreateImport(ImportMa nuallyViewModel model)	Create a manual import	Parameters include: model: ImportManuallyViewModel	N/A	N/A	NullReferenceException
public void UpdateProgress(int importId)	Update progress of import	Parameters include: importId: int	N/A	N/A	N/A

Table 78 - Component Interface Import Service

## b. Controller

Signature	Description	Input	Output	Output format	Exception
public ActionResult CreateImport(ImportMa nuallyViewModel model)	Send request to create a manual import	Parameters include: Model: ImportManuallyViewModel	A json with result	json	NullReferenceException

Table 79 - Component Interface Import Controller

### 5.1.3. Examination

#### a. Service

<b>Signature</b>	<b>Description</b>	<b>Input</b>	<b>Output</b>	<b>Output format</b>	<b>Exception</b>
public int SaveAttemptResult (int examId, int userId, int duration, string answers)	Save Lecturer review attempt	Parameters include: examId: int userId: int duration:int answers: string	Attempt result saved	Integer	NullReferenceException
public void SubmitAttempt (int attemptId)	Submit Lecturer review attempt	Parameters include: attemptId	N/A	N/A	NullReferenceException
public bool AssignLectureToExamination(string examGroup, int userId)	Assign Lecturer to an examination	Parameters include: examGroup: string userId: int	Boolean.	Boolean	NullReferenceException
public bool UnassignLectureFromExamination (string examGroup, int userId)	Un assign Lecturer to an examination	Parameters include: examGroup: string userId: int	Boolean	Boolean	NullReferenceException
public IEnumerable<AssignedExaminationViewModel> GetAssignedExaminations (int userId)	Get all assigned examination	Parameters include: userId: int	AssignedExaminationViewModel includes: ExamGroup: string Course: CourseViewModel Creator: UserViewModel DateTime: Date AverageScore: double Examinations: List<ExaminationViewModel> Attempts: List<ExaminationAttemptViewModel>	IEnumerable< AssignedExaminationViewModel>	NullReferenceException

			del> MyProperty: int MarkOfEasy: double MarkOfMedium: double MarkOfHard: double		
public ExaminationAttemptVie wModel GetAttemptById (int attemptId)	Get attempt result	Parameters include: attemptId: int	ExaminationAttemptViewModel includes: Id: int User: UserViewModel TakenDate: string Grade: double Duration: int Answers: string ExamId: int Submitted: bool ExamCode: string	ExaminationAt temptViewMo del	NullReferenceException
public void SetApproveStatus (int examId, bool v)	Set status of an examination to approved	Parameters include: examId: int v: bool	N/A	N/A	NullReferenceException
public void SetLockedStatus (int examId, bool v)	Set status of an examination to locked	Parameters include: examId: int v: bool	N/A	N/A	NullReferenceException
public bool ReviewQuestionInExam (int questionId, int attemptId, bool approved)	Review a question in exam	Parameters include: questionId: int attemptId: int approved: bool	Boolean	Boolean	NullReferenceException

Table 80 - Component Interface Examination Service

## b. Controller

<b>Signature</b>	<b>Description</b>	<b>Input</b>	<b>Output</b>	<b>Output format</b>	<b>Exception</b>
public ActionResult ManageExaminationAttempt(string examGroup)	Manage examination attempt	Parameters include: examGroup: string	Html page	Html string	NullReferenceException
public ActionResult AssignToExamination(string examGroup, int userId)	Send request to assign Lecturer to review an examination	Parameters include: examGroup: string userId: int	A json with result	json	NullReferenceException
public ActionResult UnassignFromExamination(string examGroup, int userId)	Send request to un assign Lecturer from reviewing an examination	Parameters include: examGroup: string userId: int	A json with result	Json	NullReferenceException
public ActionResult AssignedExaminationList()	Send request to get list of assigned examination to system and return result	N/A	Html page	Html string	NullReferenceException
public ActionResult ApproveExamination(int examId, string examGroup)	Send request to approve examination	Parameters include: examId: int examGroup: string	Redirect to manage examination attempt page	Html string	N/A
public ActionResult LockExamination(int examId, string examGroup)	Send request to lock examination	Parameters include: examId: int examGroup: string	Redirect to manage examination attempt page	Html string	N/A

public ActionResult TakeExamination(int examId)	Send take examination request to system and return result	N/A	Html page	Html string	NullReferenceException
public ActionResult SaveAttemptResult(int examId, int duration, string answers)	Save taking examination attempt result	Parameters include: examId: int duration: int answers: string	A json with result	Json	NullReferenceException
public ActionResult ViewAttemptResult(int attemptId)	Send request to get attempt result	Parameters include: attemptId: int	Html page	Html string	NullReferenceException
public ActionResult ExportToPaper(int examId, int duration)	Send request to export examination to .paper	Parameters include: examId: int duration: int	A file with “.paper” extension	File	NullReferenceException
public ActionResult WriteFeedback(int questionId, string content)	Send request to save a written feedback	Parameters include: questionId: int content: string	A json with result	Json	NullReferenceException
public ActionResult ReviewQuestionInExam (int questionId, int attemptId, bool approved)	Send request to get all questions in a finished exam to review	Parameters include: questionId: int attemptId: int approve: bool	A json with result	Json	NullReferenceException

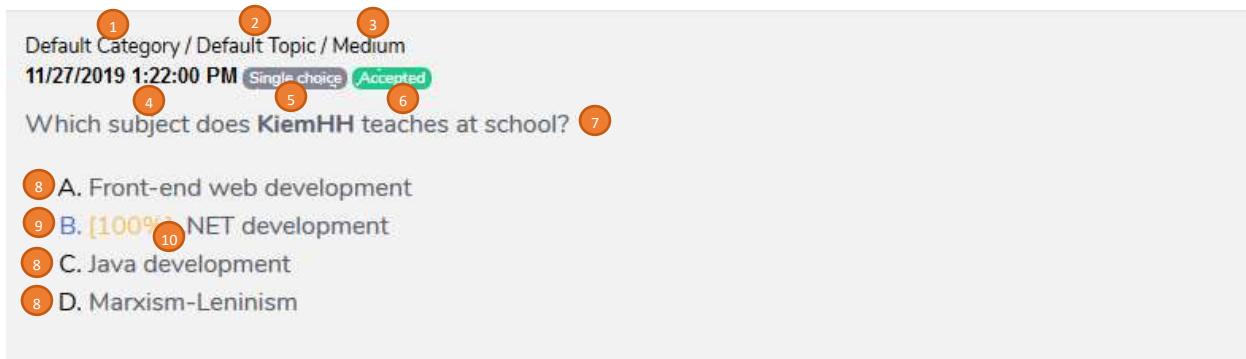
public ActionResult SubmitAttempt(int attemptId)	Send request to submit to system and return result	Parameters include: attemptId: int	Redirect to assigned examination list page	Html string	N/A
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*Table 81 - Component Interface Examination Controller*

## 5.2 User Interface

### 5.2.1. Common Interface

#### 5.2.1.1. Single choice question



#### → Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
1	Category	Category of the question	Yes	No	Text View	String
2	Topic / Learning outcome	Topic / Learning outcome of the question	Yes	No	Text View	String
3	Level	Level of the question	Yes	No	Text Box	String
4	Question code / Imported date	Question code / Imported date of the question	Yes	Yes	Text Box	String
5	Question type	Type of the question	Yes	Yes	Text View	String
6	Current status of the question	The status of the question	Yes	No	Text View	String
7	The question	The question part of the question	Yes	Yes	Text View	String
8	Incorrect option	The option part of the question, which is incorrect	Yes	No	Text View	String
9	Correct option	The correct option of the question	Yes	Yes	Text View	String

10	Fraction	The fraction of the question, between 0 – 100	Yes	No	Text View	Number
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### 5.2.1.2. Multiple choice question

Default Category / Default Topic / Medium  
 11/27/2019 1:22:00 PM Multiple choice Accepted

Who is this?



See more

- 9 A. [50%] Ares 10
- 8 B. [-50%] Apolo 10
- 9 C. [50%] Mars 10
- 8 D. [-50%] Zeus 10

### → Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
1	Category	Category of the question	Yes	No	Text View	String
2	Topic / Learning outcome	Topic / Learning outcome of the question	Yes	No	Text View	String
3	Level	Level of the question	Yes	No	Text Box	String
4	Question code / Imported date	Question code / Imported date of the question	Yes	Yes	Text Box	String
5	Question type	Type of the question	Yes	Yes	Text View	String

6	Current status of the question	The status of the question	Yes	No	Text View	String
7	The question	The question part of the question	Yes	Yes	Text View	String
8	Incorrect option	The option part of the question, which is incorrect	Yes	No	Text View	String
9	Correct option	The correct option of the question	Yes	Yes	Text View	String
10	Fraction	The fraction of the question, between 0 – 100	Yes	No	Text View	Number

#### 5.2.1.3. Matching question

Default Category / Default Topic / Hard  
11/27/2019 1:22:00 PM Matching Accepted

Map the framework to the programming languages below:

Spring	8	↔	9	Java
.NET	8	↔	9	C#
Laravel	8	↔	9	PHP
Vue	8	↔	9	JS

#### → Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
1	Category	Category of the question	Yes	No	Text View	String
2	Topic / Learning outcome	Topic / Learning outcome of the question	Yes	No	Text View	String
3	Level	Level of the question	Yes	No	Text Box	String

4	Question code / Imported date	Question code / Imported date of the question	Yes	Yes	Text Box	String
5	Question type	Type of the question	Yes	Yes	Text View	String
6	Current status of the question	The status of the question	Yes	No	Text View	String
7	The question	The question part of the question	Yes	Yes	Text View	String
8	Sub question content	The left side of the sub question	Yes	No	Text View	String
9	Sub question answer	The right side of the sub question	Yes	No	Text View	String

#### 5.2.1.4. Short answer question

Default Category / Default Topic / Medium  
 11/27/2019 1:22:00 PM Short answer Accepted

Are you a student?

1 Yes, I am  
 2 No, I'm not

#### → Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
1	Category	Category of the question	Yes	No	Text View	String
2	Topic / Learning outcome	Topic / Learning outcome of the question	Yes	No	Text View	String
3	Level	Level of the question	Yes	No	Text Box	String
4	Question code / Imported date	Question code / Imported date of the question	Yes	Yes	Text Box	String
5	Question type	Type of the question	Yes	Yes	Text View	String

6	Current status of the question	The status of the question	Yes	No	Text View	String
7	The question	The question part of the question	Yes	Yes	Text View	String
8	Suggestions	The suggestions answer of the question, if the question is answered match these answer then the question is marked correct	Yes	No	Text View	String

#### 5.2.1.5. Essay question

The screenshot shows a question card for an essay. At the top, there are three small orange circles labeled 1, 2, and 3. Below them is a timestamp: 11/27/2019 1:22:00 PM. To the right of the timestamp are two buttons: 'Essay' (gray) and 'Accepted' (green). Below the timestamp, there are three more orange circles labeled 4, 5, and 6. The main text area contains a question: "What would happen if the earth stopped spinning? Write an essay within 500 words about what you would do, and explains your decision." A final orange circle labeled 7 is located at the bottom right of the text area.

#### → Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
1	Category	Category of the question	Yes	No	Text View	String
2	Topic / Learning outcome	Topic / Learning outcome of the question	Yes	No	Text View	String
3	Level	Level of the question	Yes	No	Text Box	String
4	Question code / Imported date	Question code / Imported date of the question	Yes	Yes	Text Box	String
5	Question type	Type of the question	Yes	Yes	Text View	String
6	Current status of the question	The status of the question	Yes	No	Text View	String
7	The question	The question part of the question	Yes	Yes	Text View	String

#### 5.2.1.6. Fill in blank question

Default Category / Default Topic / Medium  
 4 HCI201 - Q003 Fill in blank Accepted 6

Avatar là một bộ phim khoa học viễn tưởng của Mỹ năm 2009

do James Cameron viết kịch bản và đạo diễn, với

Sam Worthington/Sam 11, Zoe Saldana 7, và Sigourney Weaver 12.

... 12

See more

The screenshot shows a question card for the movie 'Avatar'. At the top, it says 'Default Category / Default Topic / Medium' and 'Accepted'. Below that is the question text: 'Avatar là một bộ phim khoa học viễn tưởng của Mỹ năm 2009 do James Cameron viết kịch bản và đạo diễn, với Sam Worthington/Sam 11, Zoe Saldana 7, và Sigourney Weaver 12.' There are dropdown menus for 'Category' (Mỹ), 'Topic' (Việt Nam (incorrect)), and 'Level' (Trung Quốc (incorrect)). Below the text, there are small images of the actors Sam Worthington, Zoe Saldana, and Sigourney Weaver. At the bottom right, there is a link to 'David Moore'.

## → Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
1	Category	Category of the question	Yes	No	Text View	String
2	Topic / Learning outcome	Topic / Learning outcome of the question	Yes	No	Text View	String
3	Level	Level of the question	Yes	No	Text Box	String
4	Question code / Imported date	Question code / Imported date of the question	Yes	Yes	Text Box	String
5	Question type	Type of the question	Yes	Yes	Text View	String
6	Current status of the question	The status of the question	Yes	No	Text View	String
7	The question	The question part of the question	Yes	Yes	Text View	String
8	Multiple choice blank	The section of the question that student have to choose one of these options to fill in the blank	Yes	No	Dropdown	String
9	Incorrect choice	The choice that is incorrect for the blank	Yes	No	Option	String

10	Correct choice	The choice that is correct for the blank	Yes	No	Option	String
11	Short answer blank	The section of the question that student have to fill the answer to the blank	Yes	No	Text Box	String

→ **Buttons & Hyperlinks**

No	Function	Description	Validation	Outcome
12	See more	If the question is too long, the question will be collapsed and can be expanded using the see more button	The question content is more than 500 characters long	Expand the full question content

**5.2.1.7. Set of questions with audio**

DUPLICATE 0/1 SUCCESS 0/1 INVALID 0/1 DELETED 0/1

Show 10 questions per page Search question content Filter question type

Question ID	Question Content	Duplicated With
21227	<p>Default Category / Default Topic / Easy</p> <p>音問を聞いて答えてください！</p> <p>1. 11/27/2019 3:26:25 PM Chọn từ thích hợp điền vào _____. A: フランスへ _____ しにいきますか. B: へんきょうにいきます。 A. [100%] なにか B. なにも C. なにを D. どれ</p> <p>2. JAP101-Q001 Chọn từ thích hợp điền vào _____. A: 日よう日 どこへいきますか。 B: _____ いきません。 A. どこか B. [100%] どこへ C. どこも D. いくら</p> <p>2. JAP101-Q001 Chọn từ thích hợp điền vào _____. A: 日よう日 どこへいきますか。 B: _____ いきません。 A. どこか B. [100%] どこへ C. どこも D. いくら</p> <p>2. 11/27/2019 3:26:25 PM Chọn từ thích hợp điền vào _____. A: フランスへ _____ しにいきますか. B: へんきょうにいきます。 A. [100%] なにか B. なにも</p>	<p>3. Audio duplications detail: 89.15% similar 18:08 - 18:37</p> <p>4. AP101-LIS</p> <p>5. AP101-Q001</p> <p>6. JAP101-Q001</p> <p>7. 11/27/2019 3:26:25 PM</p> <p>8. 11/27/2019 3:26:25 PM</p>

## → Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
1	Question audio	Audio of the listening question	Yes	No	Audio	Audio
2	Duplicate question audio	Audio of the duplicated question	Yes	No	Audio	Audio
3	Audio duplication detail	Detail of the similarity between 2 audios, including how many parts they are similar, and how much similar between them	Yes	No	Control group	N/A

4	Duplication detail of audio 1	Show duplicated parts of the left audio	Yes	No	Progress Bar	N/A
5	Duplication detail of audio 2	Show duplicated parts of the right audio	Yes	No	Progress Bar	N/A
6	Duplication matching	Hover a part on the duplication detail to see the matching part of the other audio, click to play the audio at that position	Yes	No	Progress Bar	N/A
7	Similarity level	The similarity percentage of the 2 part	Yes	Yes	Text View	String
8	Child questions	These question that follow the audio, ask information given in the audio	Yes	No	Question Content	Question Content

Table 82 - <Field> Verify question result

#### → Buttons & Hyperlinks

No	Function	Description	Validation	Outcome
9	Edit child question content	Click to edit the child question content, which not affect the content of the whole questions set	N/A	Show necessary input to edit the child question content

Table 83 - <Button/Hyperlinks> Verify question result

### 5.2.2. Lecturer

#### 5.2.2.1. Import Questions

#### 5.2.2.2. Import Set of Reading Listening Questions

### 5.2.2.3. Create a manual import

### 5.2.2.4. View import history

The screenshot shows the QBCS Import History page. On the left is a sidebar with navigation links: Import (selected), Import, Import manually, Import Reading Listening, Import History (selected), Course, Assigned examination, Statistics, and History Changes. The main area is titled 'Import history' and contains a table of import entries. At the top of the table are columns: No., Owner, Course, Date, Total, Success, and Status. A search bar is at the top right. Numbered callouts point to specific elements: 1 points to the 'Enable real time progress' checkbox; 2 points to the 'Show' dropdown; 3 points to the search bar; 4 points to the 'Owner' column header; 5 points to the 'Course' column header; 6 points to the 'Date' column header; 7 points to the 'Total' column header; 8 points to the 'Success' column header; 9 points to the 'Status' column header; 10 points to a progress bar for entry 1; 11 points to a progress bar for entry 2; 12 points to the page footer 'Showing 1 to 3 of 3 entries'; and 13 points to the 'Previous' and 'Next' navigation buttons.

→ Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
2	Import limit	Change number of records per page	No	Yes	Dropdown	Number
3	Search textbox	Filter import by keyword	No	No	Textbox	String
4	Owner	Owner of the import	Yes	Yes	Text View	String
5	Course	Course code which the import belongs to	Yes	Yes	Text View	String
6	Date	The import date	Yes	Yes	Text View	Date Time
7	Total	Total number of questions imported	Yes	Yes	Text View	Integer

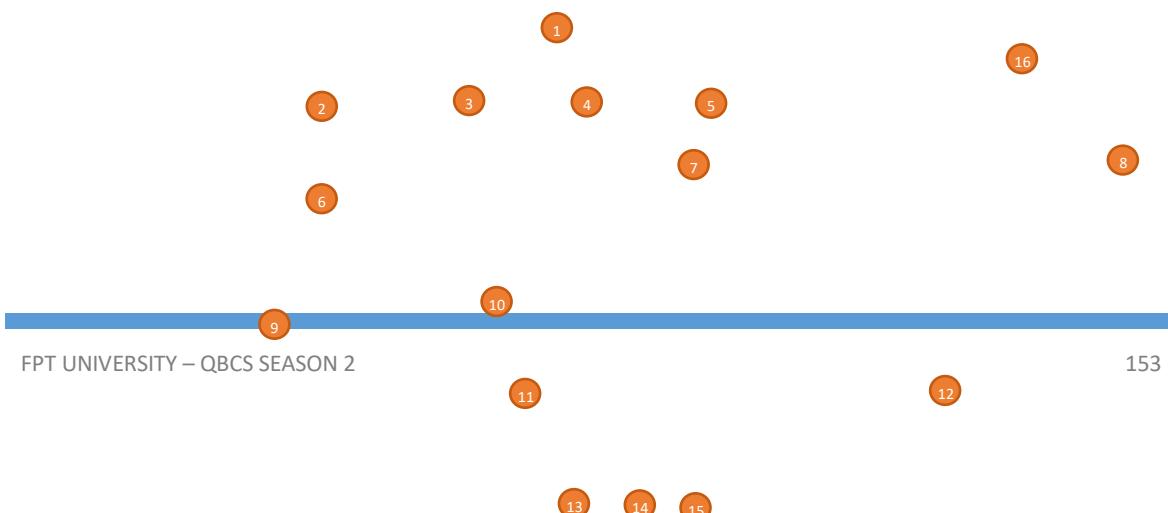
8	Success	Total number of successfully questions imported	Yes	Yes	Text View	Integer
9	Status	Current status of import file	Yes	Yes	Text	String
10	Import progress	Progress of the import, only visible if the real time progress function checkbox (1) is enabled	Yes	Yes	Progress Bar	String
12	Import count	Total number of import and current viewing number of imports	Yes	Yes	Text View	String

Table 84 - <Field> Import History

No	Function	Description	Validation	Outcome
1	Enable real time progress	Allow view progress of the import in real time (9).	N/A	Enable/disable the real time progress function
11	View import result	View the detail of the import and duplication result	Status of the import must be: “Checked” or “Editing”	View the detail of the import, including questions in import and duplication result
13	Pagination	Navigation between pages of import list	N/A	Switch between pages

Table 85 - <Buttons&Hyperlinks> Import History

#### 5.2.2.5. View import detail



The screenshot shows the QBCS interface for managing imported questions. The left sidebar includes links for Import, Import History, Course, Assigned examination, Statistics, and History Changes. The main content area is titled "Import Result #2215" and specifies "Human-Computer Interaction - HQ201". It displays a table of imported questions with the following data:

Question ID	Question Content	Duplicated With
17698	PPH301 / Topic3 / Medium C448-Q000054	PPH301 / Topic4 / Hard C448-Q000054 A _____ is the smallest unit that can be displayed on a computer monitor. A. micron B. pixel C. nump D.  pixel
18045	PPH301 / Topic1 / Easy Q665	PPH301 / Topic1 / Easy Q666

## → Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
1	Import ID	Identifier of the import	Yes	Yes	Text View	ID
6	Limit question per page	Limit how many questions are shown per page	No	Yes	Dropdown	Int
7	Search textbox	Search Question Code, Question content, Option	No	No	Text Box	String
8	Filter question type	Filter questions by question type	No	No	Dropdown	Question Type
9	Temporary question ID	Identifier of the question in import	Yes	Yes	Text View	String
10	Question metadata	Additional information about the question: Category, Topic/Learning outcome, Level, Question Code, Question Type	Yes	No	Text View	String
11	Question Content	The content of the question	Yes	Yes	Question Content	Question Content

12	Duplicated question content	The content of the question(s) that the question duplicates with	Yes	No	Question Content	Question Content
----	-----------------------------	--	-----	----	------------------	------------------

Table 86 - <Field> Verify question result

## → Buttons & Hyperlinks

No	Function	Description	Validation	Outcome
2	Duplicated questions tab	View duplicated questions in this import	N/A	Show duplicated question table
3	Success questions tab	View successful imported questions in this import	N/A	Show success question table
4	Invalid questions tab	View questions in this import that is invalid	N/A	Show invalid question table
5	Deleted questions tab	View questions that has been deleted later in any tab	N/A	Show deleted question table
13	Delete question button	Change question status to deleted	Question must not in delete list	Question moved to deleted list
14	Accept question button	Change question status to success	Question must not in success list	Question moved to success list
15	Edit question button	Edit question content	N/A	Show necessary input for user to edit the question content

Table 87 - <Button/Hyperlinks> Verify question result

DUPLICATE 1/1

SUCCESS 0/1

INVALID 0/1

DELETED 0/1

Show 10 questions per page

Search question content

Filter question type ▾

Question ID	Question Content	Duplicated With
21227	<p>Default Category / Default Topic / Easy</p>  <p>音問を聞いて答えてください！</p> <p>1.</p> <p>1. 11/27/2019 3:26:25 PM  Chọn từ thích hợp điền vào _____. A: フランスへ _____ しにいきますか。 B: へんきょうにいきます。 A. [100%] なにか B. なにも C. なにを D. どれ</p> <p>8.</p> <p>2.</p> <p>2. JAP101-Q001  Chọn từ thích hợp điền vào _____. A: 日よう日 どこへいきますか。 B: _____ いきません。 A. どこか B. [100%] どこへ C. どこも D. いくら</p> <p>8.</p> <p>3.</p> <p>3. Audio duplications detail: AP101-LIS  89.15% similar 18:08 - 18:37</p> <p>4.</p> <p>5.</p> <p>6.</p> <p>7.</p> <p>2.</p> <p>2. 11/27/2019 3:26:25 PM  Chọn từ thích hợp điền vào _____. A: フランスへ _____ しにいきますか。 B: へんきょうにいきます。 A. [100%] なにか B. なにも</p> <p>8.</p>	<p>3. Audio duplications detail: AP101-LIS  89.15% similar 18:08 - 18:37</p> <p>4.</p> <p>5.</p> <p>6.</p> <p>7.</p> <p>18:08 - 18:37</p> <p>2.</p> <p>Lắng nghe đoạn hội thoại và trả lời các câu hỏi:</p> <p>1. JAP101-Q001  Chọn từ thích hợp điền vào _____. A: 日よう日 どこへいきますか。 B: _____ いきません。 A. どこか B. [100%] どこへ C. どこも D. いくら</p> <p>2. 11/27/2019 3:26:25 PM  Chọn từ thích hợp điền vào _____. A: フランスへ _____ しにいきますか。 B: へんきょうにいきます。 A. [100%] なにか B. なにも</p>

## Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
1	Question audio	Audio of the listening question	Yes	No	Audio	Audio
2	Duplicate question audio	Audio of the duplicated question	Yes	No	Audio	Audio
3	Audio duplication detail	Detail of the similarity between 2 audios, including how many parts they are similar, and how much similar between them	Yes	No	Control group	N/A
4	Duplication detail of audio 1	Show duplicated parts of the left audio	Yes	No	Progress Bar	N/A

5	Duplication detail of audio 2	Show duplicated parts of the right audio	Yes	No	Progress Bar	N/A
6	Duplication matching	Hover a part on the duplication detail to see the matching part of the other audio, click to play the audio at that position	Yes	No	Progress Bar	N/A
7	Similarity level	The similarity percentage of the 2 part	Yes	Yes	Text View	String
8	Child questions	These question that follow the audio, ask information given in the audio	Yes	No	Question Content	Question Content

Table 88 - <Field> Verify question result

Button/Hyperlinks

No	Function	Description	Validation	Outcome
9	Edit child question content	Click to edit the child question content, which not affect the content of the whole questions set	N/A	Show necessary input to edit the child question content

Table 89 - <Button/Hyperlinks> Verify question result

#### 5.2.2.6. View course list

Code	Name	Total Questions	Action
EN021	Top Notch 1	9	<span>1</span> <span>2</span> <span>3</span> <span>4</span> <span>5</span> <span>6</span> <span>7</span>
HCI201	Human-Computer Interaction	282	<span>1</span> <span>2</span> <span>3</span> <span>4</span> <span>5</span> <span>6</span> <span>7</span>
PRX301	Web Development (XML)	302	<span>1</span> <span>2</span> <span>3</span> <span>4</span> <span>5</span> <span>6</span> <span>7</span>

→ **Fields**

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
1	Code	Reference code of the course	Yes	Yes	Text View	String
2	Name	Full name of the course	Yes	Yes	Text View	String
3	Total Questions	Total number of questions available in course	Yes	Yes	Text View	Number
4	Action	Available actions with the course	Yes	No	Buttons	N/A

Table 90 - <Field> View course list

→ **Buttons & Hyperlinks**

No	Function	Description	Validation	Outcome
5	View course detail	View detail of course	N/A	View course's categories, topics and list questions in this course
6	Manage category/topics	Manage category/topics	N/A	Enable lecturers to add new, edit, delete course's category and topics
7	View check bank result	View duplicate result of monthly check bank scan	The check bank results in more than 1 duplicate question	Lecturer can see which questions in course is duplicate, and decide to approve, disable that question in bank

Table 91 - <Button/Hyperlinks> View course list

**5.2.2.7. View question bank**

The screenshot shows the QBCS Question Bank interface for the course "Human-Computer Interaction" (HCI201). The interface includes a sidebar with import options and a main area for managing questions.

**Question Bank:**

- Topic dropdown: PRIC3B1 (200) (1)
- Topic dropdown: Topic4 (25) (2)
- Filter buttons: Choose Level (3), Question type (4)
- Show dropdown: Show 10 (5)
- Search bar: NOT (7)
- Search result: Search result for "NOT" in current topic (8)

**Table of Questions:**

Code	Que	Imported by	Action
C260-Q000345	P900 C260 The _____ gate shows that the output is the _____ of the inputs.	Nguyễn Long Quốc at 11/26/2019 7:12:49 PM	<span>(9)</span> <span>(10)</span> <span>(11)</span> <span>(12)</span> <span>(13)</span> <span>(14)</span> <span>(15)</span> <span>(16)</span>
C260-Q000367	PROPOSE C260-Q000367 In scientific notation, the method of displaying numbers uses a(n) _____.	Nguyễn Long Quốc at 11/26/2019 7:12:49 PM	<span>(13)</span> <span>(14)</span> <span>(15)</span> <span>(16)</span>
C260-Q000375	PROPOSE C260-Q000375 _____ algebra is concerned with the logic of the operators AND, OR, and NOT.	Nguyễn Long Quốc at 11/26/2019 7:12:49 PM	<span>(13)</span> <span>(14)</span> <span>(15)</span> <span>(16)</span>

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## → Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
5	Limit question per page	Limit how many questions are shown per page	No	Yes	Dropdown	Int
6	Topic list	List of topic in this course for lecturer to filter by	No	No	Dropdown	String

7	Search textbox	Search Question Code, Question content, Option	No	No	Text Box	String
9	Question code	Code of the question, needed when reference back to bank from examination, import results...	Yes	Yes	Text View	String
10	Question metadata	Additional information of question	Yes	No	Text View	String
11	Question Content	The content of the question	Yes	Yes	Question Content	Question Content
12	Creator	Question creation details, including the author and the imported date of the question	Yes	No	Text View	String

Table 92 - <Field> Verify question bank

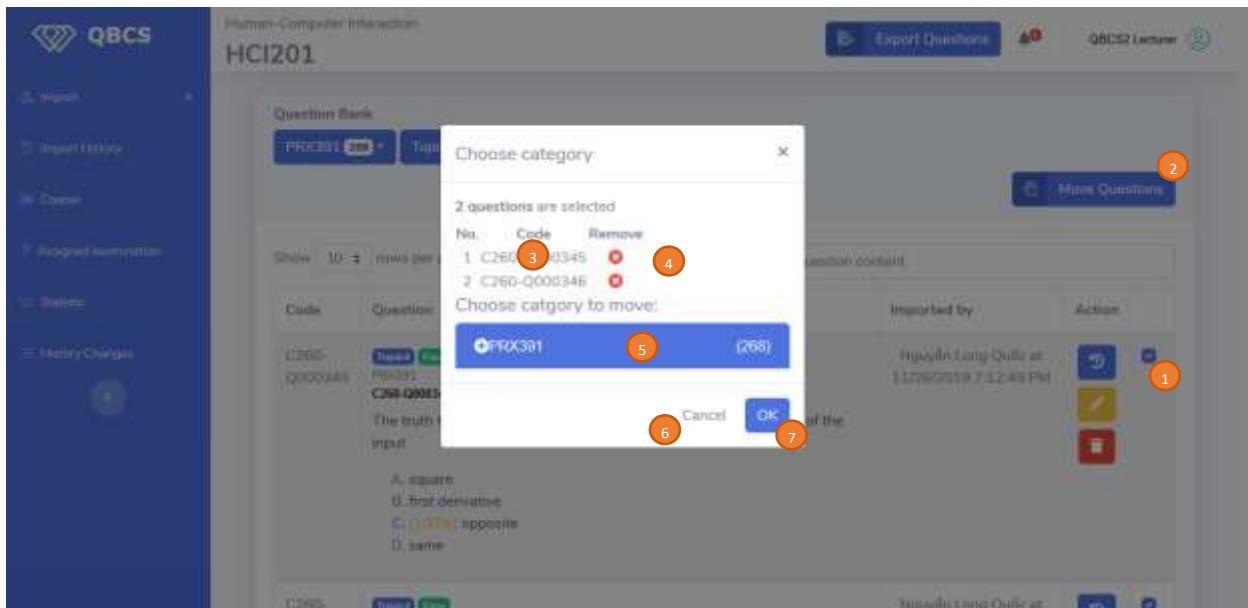
#### → Buttons & Hyperlinks

No	Function	Description	Validation	Outcome
1	Category filter button	Filter questions by category	N/A	Questions table show questions in the filtered category
2	Topic filter button	Filter questions by topic	Questions is filtered with a category	Questions table show questions in the filtered topics
3	Level filter button	Filter questions by level	Question is filtered with a topic	Questions table show questions in the filtered level
4	Type filter button	Filter questions by type	N/A	Questions table show questions with the selected type
8	Search all button	Search for the given keyword <sup>(7)</sup> in all category/topic	Search keyword is not empty	Show search results in all topic and category
13	View question history	View question detail and history	N/A	View history of this question, including creation date, creator information, modify log

14	Edit question	Edit the question content, options and metadata	N/A	Show appropriate input to edit the question content
15	Disable question	Disable the question	N/A	Disable the question. Question that is disabled will no longer appear in bank.
16	Move question checkbox	Select questions you want to move to another category/topic	N/A	Show the move question button and allow these selected questions to be moved (view 5.2.2.9 for more information)

Table 93 - <Button/Hyperlinks> Verify question bank

#### 5.2.2.8. Move question in bank



→ Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
3	Selected questions	Code of selected questions which are about to be moved	No	Yes	Text View	String

Table 94 - <Field> Move question in bank

→ **Buttons & Hyperlinks**

No	Function	Description	Validation	Outcome
1	Move question checkbox	Select questions you want to move to another category/topic	N/A	Show the move question button <sup>(2)</sup> and allow these selected questions to be moved
2	Move question button	Move these selected questions	At least 1 question is checked	Show the move question dialog
4	Unselect question	Drop question from selected questions list	N/A	Remove the question from the selected list, which will no longer be move
5	Category, topic	Choose the category, topic in which you want to move these question to	N/A	These topic will be the destination of the selected questions
6	Cancel	Cancel the moving process	N/A	Close the move questions dialog, but keep all the checked questions
7	OK	Confirm the moving process	N/A	Move all selected questions to the selected category/topic

Table 95 - <Button/Hyperlinks> Move question in bank

**5.2.2.9. View check bank result**

Check bank result 1

**Web Development (XML) - PRX301**

DUPLICATE 2 APPROVED 3 DISABLED 4

Show 10 5 questions per page Search question content Filter question type

Question ID <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">6</span>	Question Content	Duplicated With <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">11</span>
4167	top / Default for MAS201 / Hard C448-Q000009 <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">7</span> How much does thunder spirit cost? A. 1. B. 2. C. <span style="background-color: #FFFF00; border: 1px solid black; padding: 2px;">100%</span> 3. D. 4.	top / Default for MAS201 / Hard C448-Q000008 <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">13</span> How much does thunder spirit cost? A. 1. B. 2. C. <span style="background-color: #FFFF00; border: 1px solid black; padding: 2px;">100%</span> 3. D. 4.
	<span style="border: 1px solid red; border-radius: 50%; padding: 2px;">Delete</span> <span style="border: 1px solid green; border-radius: 50%; padding: 2px;">Accept</span> <span style="border: 1px solid blue; border-radius: 50%; padding: 2px;">Edit</span> <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">14</span>	<span style="border: 1px solid red; border-radius: 50%; padding: 2px;">Delete</span> <span style="border: 1px solid green; border-radius: 50%; padding: 2px;">Accept</span> <span style="border: 1px solid blue; border-radius: 50%; padding: 2px;">Edit</span>
5168	top / Default for MAS201 / Medium C448-Q000034 <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">12</span> Match the actor and their cast	top / Default for MAS201 / Easy C448-Q000002 <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">16</span> Match the actor and their cast
	Superman <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">8</span> Henry Cavill Batman <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">9</span> Ben Affleck Wonder Woman <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">10</span> Gal Gadot Louis Lane <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">11</span> Amy Adam	Superman <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">8</span> Henry Cavill Batman <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">9</span> Ben Affleck Wonder Woman <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">10</span> Gal Gadot Louis Lane <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">11</span> Amy Adam
	<span style="border: 1px solid red; border-radius: 50%; padding: 2px;">Delete</span> <span style="border: 1px solid green; border-radius: 50%; padding: 2px;">Accept</span> <span style="border: 1px solid blue; border-radius: 50%; padding: 2px;">Edit</span>	<span style="border: 1px solid red; border-radius: 50%; padding: 2px;">Delete</span> <span style="border: 1px solid green; border-radius: 50%; padding: 2px;">Accept</span> <span style="border: 1px solid blue; border-radius: 50%; padding: 2px;">Edit</span>
	top / Default for MAS201 / Medium C448-Q000003 <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">15</span> Match the actor and their cast	Captain America <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">16</span> Chris Evans Superman <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">8</span> Henry Cavill Batman <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">9</span> Ben Affleck Thor <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">10</span> Chris Hemsworth.
		<span style="border: 1px solid red; border-radius: 50%; padding: 2px;">Cancel</span> <span style="border: 1px solid green; border-radius: 50%; padding: 2px;">Save</span>

→ **Fields**

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
1	Title	Title of the page, including course name and course code	Yes	No	Text View	String
5	ID	Id of the question in bank	Yes	Yes	Text View	ID
6	Question Metadata	Metadata of the question	Yes	No	Text View	String
7	Question content	Content of the question that is detect duplicated	Yes	No	Question Content	Question Content
11	Duplicated questions	Questions that duplicated with the question on the left column	Yes	No	Table Column	N/A
12	Duplicated question (not approved or disabled yet)	The question that is duplicate with the left question, which can be accept, delete or edit inline	Yes	No	Question Content	Question Content
13	Approved question	The question that is detect duplicate but have been approved	Yes	No	Question Content	Question Content
14	Disabled question	The question that is detect duplicate but have been disabled	Yes	No	Question Content	Question Content

Table 96 - <Field> View check bank result

→ **Buttons & Hyperlinks**

No	Function	Description	Validation	Outcome
2	Duplicated questions tab	View duplicated questions found in the scan result	N/A	Show duplicated question table

3	Approved questions tab	View duplicated questions that have been approved or saved	N/A	Show approved question table
4	Disabled questions tab	View duplicated questions that have been disabled	N/A	Show disabled question table
8	Delete question button	Change question status to deleted	Question must not in delete list	Question moved to deleted list
9	Accept question button	Change question status to success	Question must not in success list	Question moved to success list
10	Edit question button	Edit question content	N/A	Show necessary input for user to edit the question content
15	Cancel	Cancel the edit result	N/A	Restore all approve/disable changes that has been made to question and return to course list
16	Save	Save the modifications made to these question	N/A	Approved questions will no longer count as duplicated (but if another question that has not been approved duplicate with this question, it will show in the approved tab), Disabled questions will be disable and no longer can be seen from the course detail page

Table 97 - <Buttons&Hyperlinks> View check bank result

#### 5.2.2.10. View assigned examination

## → Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
1	Course Code	Code of the course in which this question belong to	Yes	Yes	Text View	String
2	Exam Group	Group of the assigned examinations	Yes	Yes	Text View	String
3	Creator	Author of the examination, also the one who assign it to you	Yes	Yes	Text View	String
4	Created date	The date in which this exam was created	Yes	Yes	Text View	String
5	Total examinations	Total number of exams in this group	Yes	Yes	Text View	Number
6	Average Score	Average Score of all attempts you have made when review this examination	Yes	No	Text View	Number
7	Take exam column	Display links that take you to test and review these exams (each exam code will be rendered as 1 link)	Yes	No	Column	N/A

8	Review attempt column	Display links that let you review your taken attempts (each attempt will be rendered as 1 link)	Yes	No	Column	N/A
---	-----------------------	---	-----	----	--------	-----

Table 98 - <Field> View assigned examinations

## → Buttons & Hyperlinks

No	Function	Description	Validation	Outcome
9	Test exam button	Start a review of the exam by test it like a student and then make a decision between approve/disapprove each questions. The blue button mean the exam has not been taken yet, the yellow color mean you have taken the exam and have at least 1 attempt, the gray locked button mean you have test the examination too many times with negative result and cannot take it again.	N/A	View the examination review tool that help teacher do the exam and review each questions when the attempt finish.
10	View finished attempts	View the finished attempt and review it	Attempt has been finished and not submitted	View attempts that you have taken before and finish, graded but not submitted. You can review each question and make a submit
11	View submitted attempts	The green button mean this attempt has been fully approved/disapproved and submitted.	Attempt has been submitted	View the submitted attempt to view what you have reviewed in that attempt

Table 99 - <Button/Hyperlinks>View assigned examinations

### 5.2.2.11. Test examination

Take my exam for this batch! 1

58:52 2

**Examination Code: EX000021** 3

**Answered: 1/6** 4

**Question 1** 5  
**Answered:** 6 7  
8 9 10 11 12 13 14 15 16 17

**Question 1:** 13  
**Answered:** 14  
15 16 17

**Question 1:** 16  
**Answered:** 17

**Question 1:** 17  
**Answered:** 18

**Question 1:** 18  
**Answered:** 19

**Question 1:** 19  
**Answered:** 20

**Question 1:** 20  
**Answered:** 21

**Question 1:** 21  
**Answered:** 22

**Question 1:** 22  
**Answered:** 23

**Question 1:** 23  
**Answered:** 24

**Question 1:** 24  
**Answered:** 25

**Question 1:** 25  
**Answered:** 26

**Question 1:** 26  
**Answered:** 27

**Question 1:** 27  
**Answered:** 28

**Question 1:** 28  
**Answered:** 29

**Question 1:** 29  
**Answered:** 30

**Question 1:** 30  
**Answered:** 31

**Question 1:** 31  
**Answered:** 32

**Question 1:** 32  
**Answered:** 33

**Question 1:** 33  
**Answered:** 34

**Question 1:** 34  
**Answered:** 35

**Question 1:** 35  
**Answered:** 36

**Question 1:** 36  
**Answered:** 37

**Question 1:** 37  
**Answered:** 38

**Question 1:** 38  
**Answered:** 39

**Question 1:** 39  
**Answered:** 40

**Question 1:** 40  
**Answered:** 41

**Question 1:** 41  
**Answered:** 42

**Question 1:** 42  
**Answered:** 43

**Question 1:** 43  
**Answered:** 44

**Question 1:** 44  
**Answered:** 45

**Question 1:** 45  
**Answered:** 46

**Question 1:** 46  
**Answered:** 47

**Question 1:** 47  
**Answered:** 48

**Question 1:** 48  
**Answered:** 49

**Question 1:** 49  
**Answered:** 50

**Question 1:** 50  
**Answered:** 51

**Question 1:** 51  
**Answered:** 52

**Question 1:** 52  
**Answered:** 53

**Question 1:** 53  
**Answered:** 54

**Question 1:** 54  
**Answered:** 55

**Question 1:** 55  
**Answered:** 56

**Question 1:** 56  
**Answered:** 57

**Question 1:** 57  
**Answered:** 58

**Question 1:** 58  
**Answered:** 59

**Question 1:** 59  
**Answered:** 60

**Question 1:** 60  
**Answered:** 61

**Question 1:** 61  
**Answered:** 62

**Question 1:** 62  
**Answered:** 63

**Question 1:** 63  
**Answered:** 64

**Question 1:** 64  
**Answered:** 65

**Question 1:** 65  
**Answered:** 66

**Question 1:** 66  
**Answered:** 67

**Question 1:** 67  
**Answered:** 68

**Question 1:** 68  
**Answered:** 69

**Question 1:** 69  
**Answered:** 70

**Question 1:** 70  
**Answered:** 71

**Question 1:** 71  
**Answered:** 72

**Question 1:** 72  
**Answered:** 73

**Question 1:** 73  
**Answered:** 74

**Question 1:** 74  
**Answered:** 75

**Question 1:** 75  
**Answered:** 76

**Question 1:** 76  
**Answered:** 77

**Question 1:** 77  
**Answered:** 78

**Question 1:** 78  
**Answered:** 79

**Question 1:** 79  
**Answered:** 80

**Question 1:** 80  
**Answered:** 81

**Question 1:** 81  
**Answered:** 82

**Question 1:** 82  
**Answered:** 83

**Question 1:** 83  
**Answered:** 84

**Question 1:** 84  
**Answered:** 85

**Question 1:** 85  
**Answered:** 86

**Question 1:** 86  
**Answered:** 87

**Question 1:** 87  
**Answered:** 88

**Question 1:** 88  
**Answered:** 89

**Question 1:** 89  
**Answered:** 90

**Question 1:** 90  
**Answered:** 91

**Question 1:** 91  
**Answered:** 92

**Question 1:** 92  
**Answered:** 93

**Question 1:** 93  
**Answered:** 94

**Question 1:** 94  
**Answered:** 95

**Question 1:** 95  
**Answered:** 96

**Question 1:** 96  
**Answered:** 97

**Question 1:** 97  
**Answered:** 98

**Question 1:** 98  
**Answered:** 99

**Question 1:** 99  
**Answered:** 100

**Question 1:** 100  
**Answered:** 101

**Question 1:** 101  
**Answered:** 102

**Question 1:** 102  
**Answered:** 103

**Question 1:** 103  
**Answered:** 104

**Question 1:** 104  
**Answered:** 105

**Question 1:** 105  
**Answered:** 106

**Question 1:** 106  
**Answered:** 107

**Question 1:** 107  
**Answered:** 108

**Question 1:** 108  
**Answered:** 109

**Question 1:** 109  
**Answered:** 110

**Question 1:** 110  
**Answered:** 111

**Question 1:** 111  
**Answered:** 112

**Question 1:** 112  
**Answered:** 113

**Question 1:** 113  
**Answered:** 114

**Question 1:** 114  
**Answered:** 115

**Question 1:** 115  
**Answered:** 116

**Question 1:** 116  
**Answered:** 117

**Question 1:** 117  
**Answered:** 118

**Question 1:** 118  
**Answered:** 119

**Question 1:** 119  
**Answered:** 120

**Question 1:** 120  
**Answered:** 121

**Question 1:** 121  
**Answered:** 122

**Question 1:** 122  
**Answered:** 123

**Question 1:** 123  
**Answered:** 124

**Question 1:** 124  
**Answered:** 125

**Question 1:** 125  
**Answered:** 126

**Question 1:** 126  
**Answered:** 127

**Question 1:** 127  
**Answered:** 128

**Question 1:** 128  
**Answered:** 129

**Question 1:** 129  
**Answered:** 130

**Question 1:** 130  
**Answered:** 131

**Question 1:** 131  
**Answered:** 132

**Question 1:** 132  
**Answered:** 133

**Question 1:** 133  
**Answered:** 134

**Question 1:** 134  
**Answered:** 135

**Question 1:** 135  
**Answered:** 136

**Question 1:** 136  
**Answered:** 137

**Question 1:** 137  
**Answered:** 138

**Question 1:** 138  
**Answered:** 139

**Question 1:** 139  
**Answered:** 140

**Question 1:** 140  
**Answered:** 141

**Question 1:** 141  
**Answered:** 142

**Question 1:** 142  
**Answered:** 143

**Question 1:** 143  
**Answered:** 144

**Question 1:** 144  
**Answered:** 145

**Question 1:** <span style="border: 1px solid orange; border-radius:

## → Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
1	Title	Title of the examination, including course name	Yes	Yes	Text View	String
2	Count down	The count down time of the examination	Yes	Yes	Text View	MM:SS
3	Exam Code	The code of the examination in which you are reviewing	Yes	Yes	Text View	String
4	Total answered	Number of answered questions	Yes	Yes	Text View	String
5	Visualized count down	Time left, which is visualized into a horizontal bar for easy calculate how much percent of time you got left	Yes	Yes	Progress bar	Number
8	Question status	Status of the question, can either be "Not yet answered" or "Answered"	Yes	Yes	Text View	String

12	Single choice question	A single choice question, which have a question content and a set of questions as radio buttons. You can choose the option you think correct by check at the one	No	No	Text View and Radio Buttons	N/A
13	Multiple choice question	A multiple choice question, which have a question content and a set of questions as checkboxes. You can choose many options as long as you think it is correct	No	No	Text View and Checkboxes	N/A
14	Matching question	A matching question, which have a question content and a set of dropdown. In order to answer the question you have to match the correct pairs of given statement	No	No	Text View and Dropdowns	N/A
15	Short answer question	A short answer question, which have a question statement and a text box for you to type in the correct option	No	No	Text View and Text Box	N/A
16	Essay question	An essay question, which have a question statement and a text area for you to type in your essay in multiple line	No	No	Text View and Text Area	N/A
17	Fill in blank question	A fill in blank question, which have multiple blank as a dropdown (given word) or a text box (no given word). In order to answer the question you must choose the correct option in the dropdown or type	No	No	Text View and Dropdowns/text Boxes	N/A

		in the correct answer in the textbox				
18	Passage question	A passage question, which has a parent question, in which all following child questions will extract information from this question and answer them individually	Yes	No	Text View	N/A
19	Listening question	If a passage question has an audio/audios as attachment, it will become a listening question. In order to answer the following questions, you must listen to the audio carefully and extract information from it	Yes	No	Audio	Audio
20	Child question(s)	A passage question has a parent and a set of child questions, which can be any of the six supported types. These questions must be rendered in the given sequence, shuffle is not allowed	No	No	N/A	N/A

Table 100 - <Field> Test examination

#### → Buttons & Hyperlinks

No	Function	Description	Validation	Outcome
6	Navigation board	Display a map of questions, which can be clicked to quickly jump to the question	N/A	Quickly jump to the question position
7	Flagged question	Navigation of the flagged questions, have a red triangle on its top left corner	The question has been flagged	Quickly jump to the flagged question position

9	Flag question button	Click this button if you want to flag this question for later navigation	Attempt has been submitted	The question is flagged and have a red triangle on top of its navigation
10	Back to QBCS	Exit the examination and return to QBCS	N/A	Return to QBCS system and pending the attempt. However, attempt will be saved locally and the next time you review this examination your answers will be restored.
11	Finish attempt	Finish the attempt to save and grade your result	N/A	The attempt will be save to system and will be graded. Lecture can now review the exam by approve/disapprove each question and give feedbacks to the owner of the exam.

Table 101 - <Button/Hyperlinks> Test examination

#### ***5.2.2.12. Review examination***

Examination Code: EX000021  
Grade: 7.78/10

Question 1  
Answered  
Marked 1 out of 1  
 Flag question

C142-Q009614  
Which subject does KlemHH teaches at school?  
Select one:  
 Front-end web development 7  
 .NET development 6  
 Java development 8  
 Marxism-Leninism 9

Question 2  
Answered  
Marked 1 out of 1  
 Flag question

C142-Q009615  
Who is this?  
  
Select one or more:  
 Zeus 5  
 Ajaatu 10  
 Mars 11  
 Zaus 12

Question 3  
Answered  
Marked 1 out of 1  
 Flag question

C142-Q009616  
Map the framework to the programming languages below:  
Spring Java 1  
/NET C# 2  
Laravel PHP 3  
Vue JS 4

Question 4  
Answered  
Marked 1 out of 1  
 Flag question

C142-Q009617  
Are you a student?  
Yes, I am 1  
Yes, I am / No, I'm not 2  
I disapprove this question because... 13

Question 5  
Answered  
Marked 0 out of 1  
 Flag question

C142-Q009618  
What would happen if the earth stopped spinning? Write an essay within 500 words about what you would do, and explain your decision.  
When the world stop spinning, I'll be by your side!

Question 6  
Not yet answered  
Marked 0.00 out of 1  
 Flag question

C142-Q009619  
Avatar là một bộ phim... Tình cảm giả định của Mỹ năm 2009 do James Cameron viết kịch bản và đạo diễn, và sự tham gia của các diễn viên Sam Worthington , Zoe Saldana , Stephen Lang , Joel David Moore , và Sigourney Weaver .

→ **Fields**

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
1	Grade	Grade of the attempt, up to 10	Yes	Yes	Text View	String
5	Score	Score of each question, up to 1	Yes	Yes	Text View	String
6	Correct	If your answer for the question is right, a green check icon will display after the option	Yes	No	Icon	Icon
7	Incorrect	If your answer for the question is wrong, a red cross icon will display after the option	Yes	No	Icon	Icon
12	Feedback content	A text area that allow you to write a feedback about the question	No	Yes	Text Area	String

Table 102 - <Field> Review examination

→ **Buttons & Hyperlinks**

No	Function	Description	Validation	Outcome
2	Correct question	Question that have been correctly answered	Question score = 1	Quickly scroll to the question position
3	Incorrect question	Question that have been incorrectly answered	Question score = 0	Quickly scroll to the question position
4	Partial correct question	Multiple choice, matching, fill in blank questions that have been answered with at least 1 correct option and 1 incorrect option	Question score > 0 and Question score < 1	Quickly scroll to the question position
8	Approve	Approve the question	Attempt must be finish	When the attempt is submitted, approved question will have it status approved and a green check icon will be shown on the question

				row in the examination detail page
9	Disapprove question	Disapprove the question	Attempt must be finish	When the attempt is submitted, disapproved question will have its status change to disapprove and a red cross will be shown on the question row in the examination detail page, telling the lecture manager that this question should be replaced by another question
10	Feedback question	Write feedback about what you think of this question	Attempt must be finish	Show the necessary input for lecturer to write a feedback
11	Close feedback	Close the feedback dialog	Feedback dialog is open	Close the feedback dialog of this question, which can be opened later
13	Send feedback	Send your written feedback	Feedback content must not be empty	Send the feedback to lecture manager. The feedback will stick to this question and author of the feedback

Table 103 - <Buttons&Hyperlinks> Review examination

### 5.2.3. Lecturer Manager

#### 5.2.3.1. Create examination manually

The screenshot shows the QBCS Exam Manager interface with two main panels:

- Left Panel (Question Bank):**
  - Header: Question Bank, Human-Computer Interaction.
  - Filters: Topic (3), Medium (0), Question types (dropdown).
  - Show: 10, now per page, Search question content.
  - Table rows (highlighted with orange circles):
    - Row 1: C200-Q000375, Question, Boolean, ... algebra is concerned with the logic of the operators AND, OR, and NOT. Options: A. Linear, B. Modern, C. Boolean, D. Functional.
    - Row 2: C200-Q000376, Question, Boolean, ... The truth table for the \_\_\_\_\_ gate indicates that the output is 1 only when the inputs are different. Options: A. OR, B. (XOR) XOR, C. AND, D. NAND.
  - Add button.
- Right Panel (Question in exam):**
  - Header: 3rd questions in exam, Show by number of questions.
  - Header: C200-Q000375, Question, Boolean, ... algebra is concerned with the logic of the operators AND, OR, and NOT.
  - Show: 10, now per page, Search question content.
  - Table rows (highlighted with orange circles):
    - Row 1: C200-Q000375, Question, Boolean, ... The concept of computer design that allows for future modifications and additions by members of the public is known as which of the following? Options: A. closed architecture, B. (XOR) open architecture, C. proprietary architecture, D. standard architecture.
    - Row 2: C200-Q000376, Question, Boolean, ... In scientific notation, the method of displaying numbers uses what ... Options: A. (XOR) mantissa, B. asymptote, C. absolute, D. ordinate.

## → Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
1	Question Bank	View questions in bank, available for examination	Yes	Yes	Card	N/A
2	Question in exam	Questions that have been picked for this examination	Yes	Yes	Card	N/A
4	Question code	Reference code of the question, which can be used to track back to bank for edit, disable...	Yes	Yes	Text View	String
5	Question content	Content of the question in bank	Yes	Yes	Question Content	Question Content
8	Total question	Total number of selected questions and total of required questions for the examination	Yes	Yes	Text View	String
9	Question statistic	Average grade of the examination based on questions levels	Yes	No	Text Views	String

11	Selected question content	Content of the selected question, which is in the drafting exam	Yes	Yes	Question Content	Question Content
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Table 104 - <Field> Create examination manually

#### → Buttons & Hyperlinks

No	Function	Description	Validation	Outcome
3	Question filter bar	Filter question by category/topic/level/type	N/A	Questions filtered by given conditions
6	Add button	Add this question to exam	Question must not in exam	Questions appear in the right table and the add button turn into checked button
7	Checked button	Indicate that the question has been added in exam, click again to remove it from the exam	Question must be in exam	Remove the question from the question in exam table, the checked button turn back into add button
10	Change statistic view	Change statistic view <sup>(9)</sup>	N/A	Switch between view by level percent to view by student grade
12	Delete button	Remove this question from exam	N/A	Question disappear on the right table and on the left table, this question checked button will turn back into add button

Table 105 - <Buttons&Hyperlinks> Create examination manually

#### 5.2.3.2. Generate examination automatically

Automatic generate an exam for  
HCI201 - Human-Computer Interaction

Step 1 Select amount of exam Step 2 Select question types Step 3 Preview syllabus Step 4 Select percent of level

Total Exam: 30% 5

6 Next 7 Cancel

Step 1 Selected amount of exam Step 2 Select question types Step 3 Preview syllabus Step 4 Select percent of level

SingleChoice  
 MultipleChoice  
 Matching  
 ShortAnswer  
 Essay  
 FillinBlank  
 Passage  
 Listening 8

9 Previous Next Cancel

Step 1 Selected amount of exam Step 2 Select question types Step 3 Preview syllabus Step 4 Select percent of level

Total Question: 50% 10

Default Grade for Ordinary Student: 40% 11

12 Update

Name	Amount	Action
Human	20	<span>13</span> <span>14</span> <span>15</span>
Computer	30	<span>16</span> <span>17</span>

No	Name	Action
1	Topic2	<span>18</span>
2	Topic4	<span>19</span>
3	Topic5	<span>20</span>
4	Topic7	<span>21</span>

22 Previous 23 Next 24 Cancel

Step 1 Selected amount of exam    Step 2 Select question types    Step 3 Preview syllabus    Step 4 Select percent of level

**ENTER BY PERCENTAGE**    **ENTER BY GRADE**

Enter by grade

Minimum grade of ordinary student :  / 100 13

Minimum grade of good student :  / 100 14

Minimum grade of excellent student :  / 100 15

16 Previous    **Finish**    Cancel

## → Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
1	Step 1	Select number of examination to generate	Yes	Yes	Wizard Step	String
2	Step 2	Select question types that you want to include in this examination	Yes	Yes	Wizard Step	String
3	Step 3	Review the syllabus before the auto generation begin	Yes	Yes	Wizard Step	String
4	Step 4	Enter percent of questions levels or grade of specific students	Yes	Yes	Wizard Step	String
5	Total exam	Number of examination you want to generate for this group (for example: if you want to create an exam for the main test, the retake test and the backup test, enter 3)	No	Yes	Text Field	Number
10	Syllabus	The syllabus of this course (View detail at Syllabus)	Yes	No	Syllabus	N/A

13	Minimum grade of ordinary student	Enter grade of ordinary student, these grade will be used to calculate the percent of easy question for generation	Yes	Yes	Text Field	Number
14	Minimum grade of good student	Enter grade of good student, these grade will be used to calculate the percent of medium question for generation	Yes	Yes	Text Field	Number
15	Minimum grade of excellent student	Enter grade of excellent student, these grade will be used to calculate the percent of hard question for generation	Yes	Yes	Text Field	Number

Table 106 - <Field> Generate examination automatically

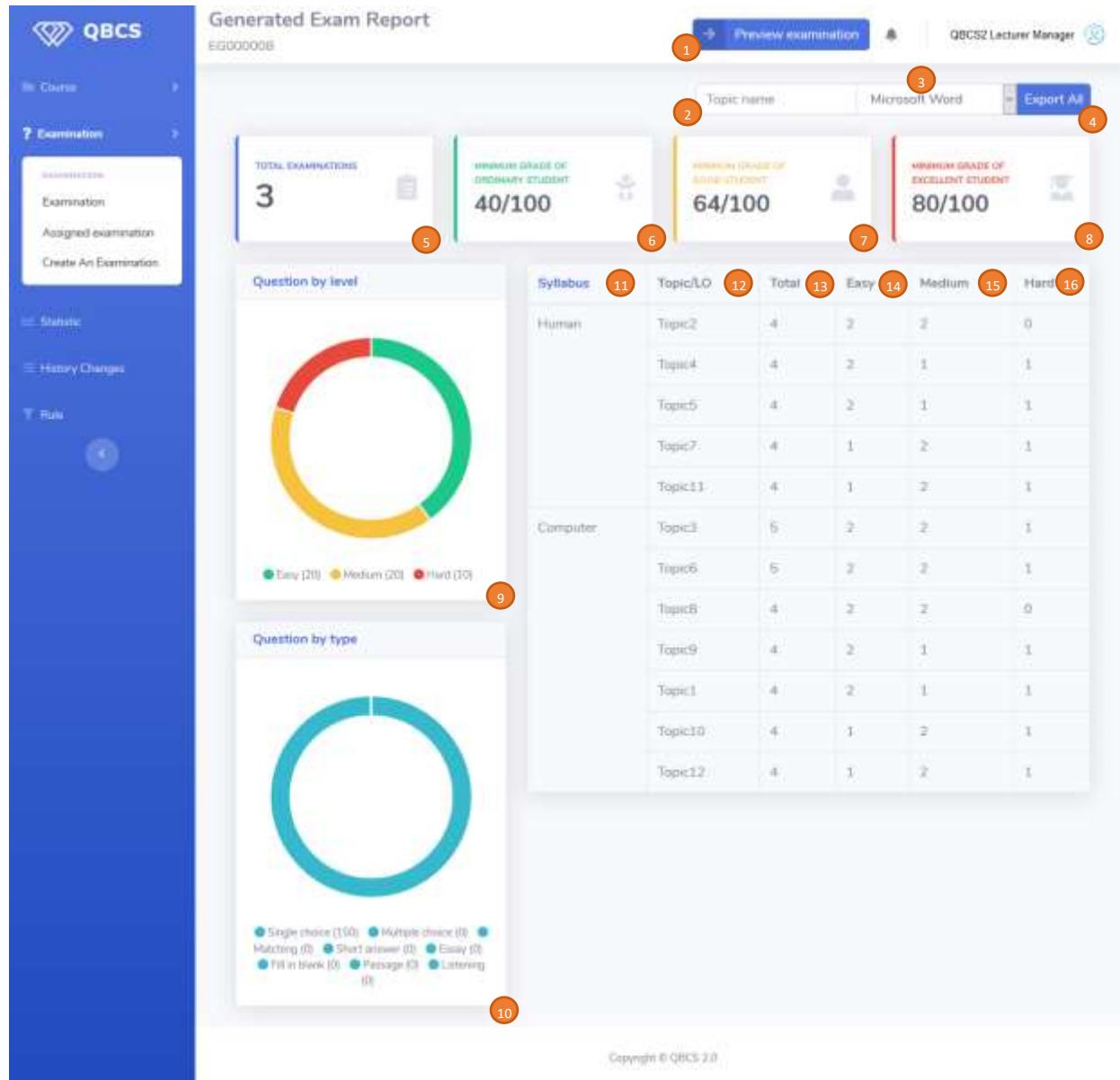
#### → Buttons & Hyperlinks

No	Function	Description	Validation	Outcome
6	Next	Move to the next step	Input for this step must be valid	Save this step's inputs and show required input of the next step
7	Cancel	Cancel the wizard	N/A	Clear the required inputs and start the wizard again
8	Question types	Choose questions types that will be included in this examination	N/A	Questions with selected types will have a chance to be in the generated exam, other types will not include in exam
9	Previous	Move backward a step	N/A	Show required input of the previous step
11	Enter by percentage	Enter percent of each questions levels for the generation of exam	N/A	Show required input for enter percent of each question levels: Easy, Medium, Hard
12	Enter by grade	Enter grade of each type of student for the generation	N/A	Show required input for enter percent of each

				student type: Ordinary, Good, Excellent
16	Finish	Finish the wizard	All step must be valid	Start generating the examination based on user requirement

Table 107 - <Button/Hyperlinks> Generate examination automatically

### 5.2.3.3. View generated report



→ Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
2	Topic name	Enter topic name of the exported word document	No	No	Text Field	String
3	Extension	Enter extension of the exported format	Yes	No	Dropdown	String
5	Total examinations	Total generated examinations	Yes	Yes	Card	String
6	Grade of ordinary student	Grade of ordinary student, calculated by question level	Yes	Yes	Card	String
7	Grade of good student	Grade of good student, calculated by question level	Yes	Yes	Card	String
8	Grade of excellent student	Grade of excellent student, calculated by question level	Yes	Yes	Card	String
9	Question by level statistic	A visualized percentages of question by 3 levels: easy, medium, hard	Yes	Yes	Pie Chart	Number
10	Question by types statistic	A visualized percentages of question by 8 supported types	Yes	Yes	Pie Chart	Number
11	Syllabus	Syllabus in which examination questions was generated	Yes	Yes	Text View	String
12	Topic/LO	Topic in the syllabus	Yes	Yes	Text View	String
13	Total question	Number of question in this topic	Yes	Yes	Text View	Number
14	Easy question	Number of easy question in this topic	Yes	Yes	Text View	Number
15	Medium question	Number of medium question in this topic	Yes	Yes	Text View	Number
16	Hard question	Number of hard question in this topic	Yes	Yes	Text View	Number

Table 108 - <Field> View generated report

→ **Buttons & Hyperlinks**

No	Function	Description	Validation	Outcome
1	Preview examination	View the generated examinations	N/A	Take user to the examination detail page
4	Export	Export the generated examinations	N/A	Allow lecturer to choose destination on local computer and save the examination with the selected format

*Table 109 - <Buttons&Hyperlinks> View generated report*

#### ***5.2.3.4. View created examination***

QBCS

HC1201 - Human-Computer Interaction  
EG0000010 ①

Verify examination ②

QBCS2 Lecture Manager ③

EX000016 EX000017 EX000018 ④ ⑤

Show 10 ⑥ Rows per page ⑦

Search question content

No. Status Question Level Action ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭

1 ⑪  
**C298-Q000048** An example of an investing activity is:  
 A. Paying wages of employees.  
 B. Withdrawals by the owner.  
 C. **[100%]** Purchase of land.  
 D. Selling inventory.

2 ⑧ ⑨  
**C298-Q000049** A vehicle had an estimated useful life of 8 years. The vehicle cost \$23,000 and its estimated salvage value is \$1,500. The depreciation expense (using straight line method) for a year is:  
 A. **[100%]** \$ 2,887.50.  
 B. \$ 3,646.50.  
 C. \$ 2,875.00.  
 D. \$10,750.00.

3 ⑪  
**C298-Q000051** Various \_\_\_\_ techniques have been designed to allow the same image information to be stored in a smaller file.  
 A. consolidation  
 B. **[100%]** compression  
 C. scanning  
 D. resolution.

Prev ⑪ ⑫ ⑬ ⑭ Next

Export examination group ⑮ ⑯

File extension: Microsoft Word ⑯  

 \* The examination is not verified yet. Verify & Export ⑱ ⑲ Export Anyway ⑲

Created by: **Đặng Thị Minh Thuyết** ThuyetDTM@fe.edu.vn ⑳  
 at 12/3/2018 3:29:12 PM ㉑

- Number of easy questions: 20 ㉒
- Number of medium questions: 18 ㉒
- Number of hard questions: 11 ㉒
- Minimum grade of ordinary student: 40/100 ㉓
- Minimum grade of good student: 62.00/100 ㉓
- Minimum grade of excellent student: 78/100 ㉓

Disable exam group ㉔ Disable group ㉕

Copyright © QBCS 2.0

→ **Fields**

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
1	Title	Information of this examination group, including Course Code, Course Name and Exam Group	Yes	Yes	Text View	String
6	No.	Index of this question in the examination	Yes	Yes	Text View	Number
7	Status	Approved/Disapproved status of this question	Yes	Yes	Icons	Approved/Disapproved
8	Approved status	An approved made by a review. Because an examination can be reviewed multiple times by multiple lecturer so that it can have many approved icon	Yes	No	Icon	Icon
9	Disapproved status	A disapproved made by a review. Each question can have multiple disapprove icons because an examination can be reviewed multiple times by multiple lecturer	Yes	No	Icon	Icon
10	Approval/Disapproval detail	Information about who and when the question was reviewed	Yes	No	Tooltip	String
11	Question metadata	Additional information about the current question	Yes	No	Text View	String
12	Question content	Content of the current question	Yes	Yes	Question Content	Question Content
13	Level	Level of the current question	Yes	No	Text View	String

15	Export Extension	Extension of the file in which this examination will be exported to	No	Yes	Dropdown	String
16	Topic	Additional topic name of the exported questions (only needed when export word for examination template)	No	No	Text Field	String
20	Author	Full name and email of the creator of this examination group	Yes	Yes	Text Field	String
21	Created date	The date in which this examination was created	Yes	Yes	Text Field	Date
22	Level statistic	Percentage of question levels	Yes	Yes	Text Field	String
23	Grade statistic	Percentage of student grade	Yes	Yes	Text Field	String

Table 110 - <Field> View created examinations

#### → Buttons & Hyperlinks

No	Function	Description	Validation	Outcome
2	Verify examination	Verify this examination group by assign it to a lecturer to review and manage attempts of them	N/A	Take lecturer manager to the verification process
3	Navigation	Navigate between examinations in this group by its code	N/A	View the questions table of the selected exam code
4	Preview	Preview this examination in quiz mode, where correct option is hidden	N/A	Provide necessary tool for lecturer to test the exam
5	Disable	Disable this examination code	N/A	Disable this examination code, prevent it from accessible and export
14	Replace	Replace the question with another in bank	Examination must not be approved	The question will be disabled and replaced with another question with the same level, topic,

				and type. If multiple questions available, system will choose the highest priority and lowest frequency question
17	Export all	Toggle between export all examination in this group or just this viewing examination	N/A	When export all is enable, all examination in group will be exported in a single .zip file
18	Verify and export	Pending the export until the verification process finish	The examination is not verified yet	Take lecturer to the verification process. After the verification finish and all examination is approved or locked, the export can process normally
19	Export	Export the examination(s) with the user requirement, even if the verification process is not finish	N/A	Export the examination into file
24	Disable group	Disable all examinations in this exam group	N/A	Disable all examinations in this exam group, prevent it from accessible and export

Table 111 - <Buttons&Hyperlinks> View created examinations

#### 5.2.3.5. Assign examination

The screenshot shows the QBCS2 Lecturer Manager interface for managing examinations. The top navigation bar includes 'View examination' (button 2) and 'QBCS2 Lecturer Manager' (button 1). The main area displays the 'Examination verifying process' (step 3) with four steps: Step 1 (Create examination), Step 2 (Assign an lecture), Step 3 (Approve or turn the mark based on lecture result (WU)), and Step 4 (Export examination). Below this, a summary for 'EX0000016' shows a grade of '9.20/10' (attempt 1) with status icons (9, 10). The left sidebar lists 'My Course', 'Examination', 'Statistic', 'History Changes', and 'Rule'. The bottom section shows 'Assigned lectures of this exam' (11) for 'Nguyễn Long Quốc' (12) and 'Attempts of Nguyễn Long Quốc' (17) for the same student. The 'Attempts' table includes columns for ExamCode (18), Lecture (19), Date (20), Grade (21), Duration (22), and Detail (23). A copyright notice 'Copyright © QBCS 2.0' is at the bottom.

## → Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
1	Title	Information about this examination, including exam group and course code	Yes	Yes	Text View	String
3	Examination verification process	View process of examination verification	Yes	Yes	Wizard	N/A
4	Step 1	Create examination	Yes	Yes	Text View	String
5	Step 2	Assign a lecture to review this examination group	Yes	Yes	Text View	String
6	Step 3	After the lecture has submitted examination review, lecturer manager can view the result of the	Yes	Yes	Text View	String

		attempt, then make decision whether to approve/lock the exam based on review result				
7	Step 4	Export the examination after all examination has been approve/locked	Yes	Yes	Text View	String
8	Average grade	Average grade of all submitted review of this exam code	Yes	Yes	Text View	String
11	Search lecturer	Search for a lecturer and assign he/she to review the exam	No	No	Text Field	String
13	ID	Index of lecturer to review this exam	Yes	Yes	Text View	String
14	Lecturer name	Full name of the reviewer	Yes	Yes	Text View	String
18	Exam code	Exam Code of which the attempt belong to	Yes	Yes	Text View	String
19	Lecturer name	Full name of whose the attempt belong to	Yes	Yes	Text View	String
20	Date	The date when this review was made	Yes	Yes	Text View	Date Time
21	Grade	Grade of the attempt	Yes	Yes	Text View	Number
22	Duration	How long does the reviewer take to test the exam	Yes	Yes	Text View	MM:SS

Table 112 - <Field> Assign examination

#### → Buttons & Hyperlinks

No	Function	Description	Validation	Outcome
2	View examination	View examination detail	N/A	Redirect lecturer to examination detail page
9	Approve the examination	Approve the examination. The button will be larger if average grade of all submitted	At least 1 attempt has	The examination status will change to Approved, which can be exported and all question in this

		attempt is greater or equals required grade of this course	been submitted	exam can no longer be replaced by another question
10	Lock the examination	Lock the examination. The button will be larger if average grade of all submitted attempt is less than required grade of this course	At least 1 attempt has been submitted	The examination status will change to Locked, which can no longer be export
12	Assign to exam	Assign the selected lecturer to this exam	A lecturer is chosen	Assign the lecture to review the exam. Assigned lecture will be notify
15	View attempt	View attempts of this reviewer	N/A	Filter attempts of this lecturer
16	Remove lecturer	Remove this lecturer from reviewer list	N/A	Remove this lecturer from reviewer list, lecturer can no longer accessible to this examination
17	Show all attempts	Show all attempts of all reviewer	N/A	Show all attempts of all reviewer
23	View attempt	View result of the attempt, including answers, approval, feedbacks,...	N/A	Show all information about the attempt

Table 113 - <Buttons&Hyperlinks> Assign examination

#### 5.2.3.6. View examination attempt result

The screenshot shows a QBCS examination attempt result page with various fields and status indicators. Numbered circles 1 through 11 point to specific elements:

- 1: View attempt result link
- 2: Examination Code: EX000016
- 3: Grade: 1.60/10
- 4: Question 1 Answered, Marked 0 out of 1, Flag question button
- 5: Back to QBCS button
- 6: Approval status icon (green)
- 7: Approval status icon (yellow)
- 8: Author: Đặng Thị Minh Thúyết (Email: DThuyetD7@fptuni.edu.vn)
- 9: Question 2 Answered, Marked 0 out of 1, Flag question button
- 10: Feedback date: 23/03/2014 10:33:19
- 11: Feedback content: "This question is too hard."

## → Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
1	Exam code	Code of the examination	Yes	Yes	Text View	String
2	Grade	Grade of the attempt	Yes	Yes	Text View	String
4	Question overview	Score of the question and answered status	Yes	Yes	Text View	String
6	Approval status	Status of the question, either approved or disapproved	Yes	Yes	Icon	Icon
8	Author	Author of the feedback	Yes	Yes	Text View	String
9	Email	Email of the feedback's author	Yes	Yes	Text View	String
10	Feedback date	The date in which this feedback was sent	Yes	Yes	Text View	String
11	Feedback content	The content of the feedback	Yes	Yes	Text View	String

Table 114 - <Field> View examination attempt result

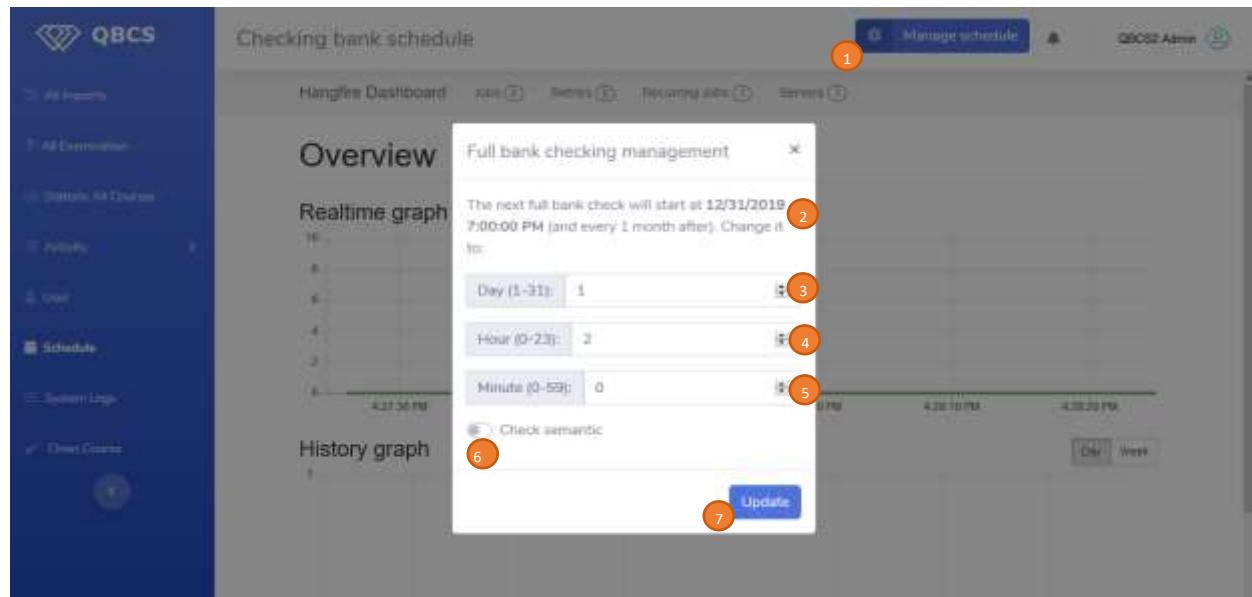
## → Buttons & Hyperlinks

No	Function	Description	Validation	Outcome
3	Questions map	Navigation map of questions	N/A	Quickly scroll to the position of question
5	Back to QBCS	Exit the attempt result and return to QBCS	N/A	Return to QBCS system
7	Feedback	View feedback button	N/A	Open the feedback dialog

Table 115 - <Buttons&Hyperlinks> View examination attempt result

## 5.2.4. Staff Manager

### 5.2.4.1. Schedule a monthly full bank check



#### → Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
2	Current configuration	Information about the current setting, including the next time the full-bank check occur	Yes	No	Text View	String
3	Day	The day of the month when the full-bank check occur	No	Yes	Text View	Number

4	Hour	The hour of the day when the full-bank check occur	No	Yes	Text View	Number
5	Minute	The minute of the hour when the full-bank check occur	No	Yes	Text View	Number

Table 116 - <Field> Schedule a monthly full bank check

#### → Buttons & Hyperlinks

No	Function	Description	Validation	Outcome
1	Manage schedule	Configuration the full-bank check, like when will it happen and should it check semantic or not	N/A	Display the dialog with necessary input for configuration
6	Check semantic	Should the full-bank scan check the semantic similarity between question content or not	N/A	If enabled, the full bank check will check semantic similarity between questions. This can make the checking process took very long!
7	Update	Save the configuration	N/A	Update the time and check semantic function of the scan

Table 117 - <Buttons&Hyperlinks> Schedule a monthly full bank check

#### 5.2.4.2. Manage scheduled full bank check (Hangfire dashboard)

## → Fields

No	Field Name	Description	Read only	Mandatory	Control Type	Data Type
8	Id	The ID of the recurring job, in this case it is fixed as "check-bank"	Yes	Yes	Text View	String
9	Cron	The schedule of the job, specify the time when the full-bank check occur	Yes	Yes	Text View	Minute Hour Day Month Year
10	Time zone	The time zone which apply the configured schedule	Yes	Yes	Text View	String
11	Job	Name of the job	Yes	Yes	Text View	String
12	Next execution	Count down of when the full-bank check will occur	Yes	Yes	Text View	String
13	Last execution	The last time the full-bank check has occurred	Yes	Yes	Text View	String
14	Created	The time at which this job was scheduled	Yes	Yes	Text View	String

Table 118 - <Field> Manage scheduled full bank check (Hangfire dashboard)

→ **Buttons & Hyperlinks**

No	Function	Description	Validation	Outcome
1	Jobs	View current job (checking bank in progress)	N/A	View running, success, fail check bank progress
2	Retries	Retry failed full bank check	N/A	View retries
3	Recurring job	View configured monthly full-bank check	N/A	View configured recurring job
4	Servers	View server's workers	N/A	View all server's workers status
5	Trigger now	Start the full-bank check now	At least 1 recurring job is selected	Start the full-bank check immediately and pending the next check to be in the next month
6	Delete	Cancel the full-bank check	At least 1 recurring job is selected	Delete the recurring job
7	Select job	Select the recurring job, ready for (5) or (6) action	N/A	Selected recurring job can be trigger now or delete

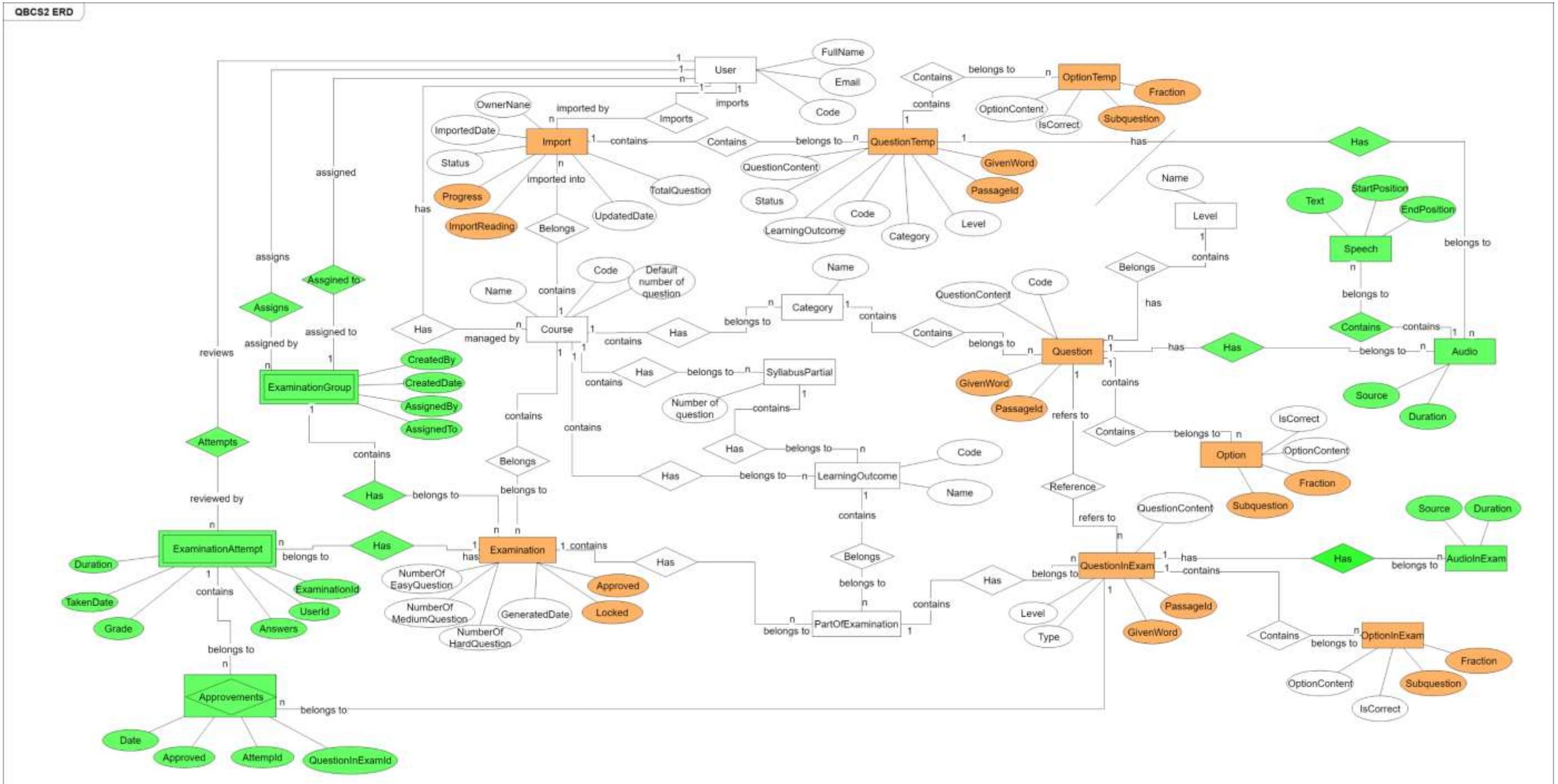
Table 119 - Manage scheduled full bank check (Hangfire dashboard)

## 6. Database Design

### 6.1 Entity Relationship Diagram

Annotation:

- We only highlights new entities. For more details, please open [QBCS1 document references](#)
  - New entities, relations are shown in **green**
  - Updated entities, relations are shown in **orange**



*Figure 42 - QBCS ERD*

## 6.2 Data Dictionary

Entity Name	Description
Course	Contain the subject information.
Category	Contain the category of subject information.
SyllabusPartial	Contain the information about number of questions in exam test for group of topic/LOC.
LearningOutcome	Contain the topic/LOC information.
Question	Contain the question information.
Level	Contain some level for questions (hard, easy, and medium).
Option	Contain options can choice for each question.
Audio	Contain Audio for questions.
Speech	Contain speeches inside an audio
AudioInExam	Contain audios inside an exam
Examination	Contain the exam test information.
PartOfExam	Contain the topic, learning outcomes in examination information.
QuestionInExam	Contain the question in exam test information.
OptionInExam	Contain options can choice for each question in the exam test.
Import	Contain information about import actions.
QuestionTemp	Contain information about questions that has not been processed.
OptionTemp	Contain options can choice for each temporary question.
User	Contain that users participates on system.
ExaminationGroup	Group of Examination, contains information about examinations.
ExaminationAttempt	Contains information about taking examination.
Approvements	Contains approval status of question in exam.

Table 120 - ERD Data Dictionary

## 7. Algorithm

### 7.1 Compare question

#### 7.1.1. Definition

The algorithm compares questions to check whether a question is similar to others

#### 7.1.2. Define Problem

When importing question, system will automatically check questions with other questions in bank and in another imported file in the same course.

#### 7.1.3. Solution

Base on type of question, we separate checking duplicate question to 3 group:

1. Check question by question content (short answer/ essay/ fill in blank)
2. Check question by sub-question and option content (matching)
3. Check question by 5 parts: question content, image, all option, correct option, incorrect option (multiple choice)

Based on the following decision tree to decide whether two questions are duplicate.

Annotations using in decision tree:

- questionContent1: content of question 1
- image1: images in question 1
- allOption1: all options in question 1
- correctOption1: all correct options in question 1
- incorrectOption1: all incorrect options in question 1
- subquestion1: all sub-questions in question 1 for matching question type
- optionContent1: all option-contents in question 1 for matching question type
- questionContent2: content of question2
- image2: images in question 2
- allOption2: all options in question 2
- correctOption2: all correct options in question 2
- incorrectOption2: all incorrect options in question 2
- subquestion2: all sub-questions in question 2 for matching question type
- optionContent2: all option-contents in question 2 for matching question type

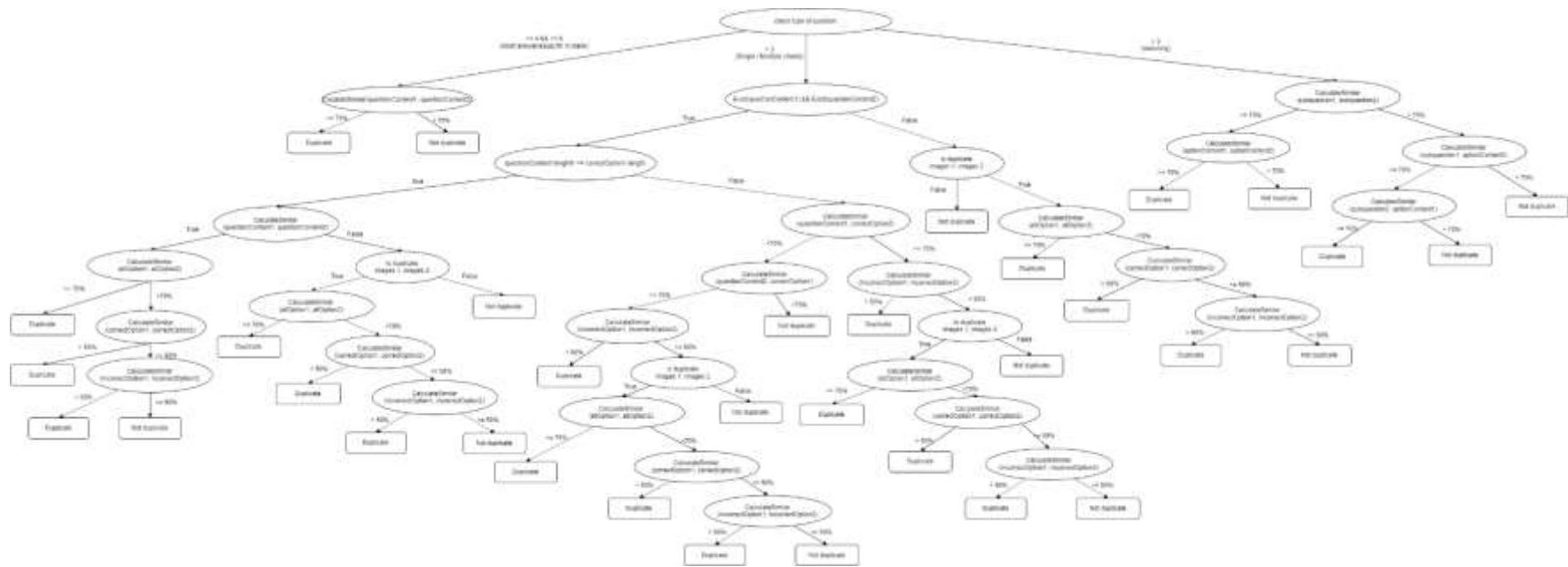


Figure 50 -Duplicate question condition tree

#### **7.1.4. Example**

##### **Question 1:**

Select the CORRECT statements

- A. An organization that uses a project organizational structure earns their revenue primarily from performing projects for other groups under contract.
- B. When you separate business and organizational issues from project management planning, you do a better job of ensuring project success.
- C. Few business and information technology students understand the concepts of systems and performing a systems analysis.
- D. [100%] If project managers lead projects in isolation, it is unlikely that those projects will ever truly serve the needs of the organization (correct option)

##### **Question 2:**

Select the CORRECT statements

- A. An organization that uses a project organizational structure earns their revenue primarily from performing projects for other groups under contract.
- B. When you separate business and organizational issues from project management planning, you do a better job of ensuring project success.
- C. A project should be developed using progressive elaboration, starting from specific details and broadening in scope as it progresses.
- D. [100%] One attribute that helps define a project is that a project has a unique purpose. (correct option)

Step 1: check type question: 2 question is single choice

Step 2: check exist question content

Step 4: calculate question content similar = 100% > 70%

Step 5: calculate all option similar = 50% < 70%

Step 6: calculate correct option similar = 0% < 50%

Step 7: calculate incorrect option similar = 66,67% > 50% => duplicate question.

#### **7.1.5. Complexity**

The complexity of this algorithm is O (1)

## **7.2 Compare a set of question**

### **7.2.1. Solution**

The algorithm compares a set of questions to check whether a set of questions is similar to others

### **7.2.2. Solution**

When importing a set of questions support for reading or listening exam, system will automatically check a set of questions with other set of questions in bank and in another imported file in the same course.

### **7.2.3. Solution**

A set of questions is separated 2 part: passage, list questions in passage.

Two sets of questions are considered the duplicated if audio is similar for the listening question or the passage content is the similar 70% larger or equal for the reading question and the percentage of the duplicate questions in passage divided by the total number of questions in passage is 70% larger or equal.

To check duplicate a set of questions with others, we follow to 5 steps:

- Step 1: check passage contains audio.
- Step 2: if passage contains audio, calculate audio similar by using Audio Similarity algorithm and move on to step 4.
- Step 3: if passage does not contain audio, calculate passage content similar by using String Similarity algorithm.
- Step 4: if audio similar or passage content similar 70% larger or equal, count number of questions in list questions in passage is duplicated by using Compare Question algorithm for each element.
- Step 5: divide count number of duplicated questions for total number of questions. If it is larger than 70%, conclusion two set of questions are duplicated, else not duplicate.

### **7.2.4. Example**

#### **Reading 1**

Read this passage and answer question:

The Golden Gate Bridge is a suspension bridge spanning the Golden Gate, the one-mile-wide (1.6 km) strait connecting San Francisco Bay and the Pacific Ocean. The structure links the American city of San Francisco, California—the northern tip of the San Francisco Peninsula—to Marin County, carrying both U.S. Route 101 and California State Route 1 across the strait. The bridge is one of the most internationally recognized symbols of San Francisco,

California, and the United States. It has been declared one of the Wonders of the Modern World by the American Society of Civil Engineers.

The Golden Gate Bridge is a famous bridge in San Francisco. The bridge has a red color, but gray clouds often surround it. On clear day people come to take pictures of the bridge. The pictures show the green hills next to the bridge and the blue water under it

1. What is this text talk about?
  - A. [33.33%] **The Golden Gate Bridge**
  - B. [33.33%] San Francisco
  - C. [33.33%] A famous bridge
  - D. Taking photographs
2. What color is the Golden Gate Bridge?
  - A. [100%] Red
  - B. Green
  - C. Blue
  - D. Gray
3. Where does the Golden Gate Bridge come from?
  - A. [100%] San Francisco
  - B. California
  - C. Pacific Ocean
  - D. Wakanda

## Reading 2:

Read this passage and answer question:

The Golden Gate Bridge is a famous bridge in San Francisco. The bridge has a red color, but gray clouds often surround it. On clear days people come to take pictures of the bridge. The pictures show the green hills next to the bridge and the blue water under it

1. What is this text mostly about?
  - A. Gray clouds
  - B. San Francisco
  - C. [100%] **A famous bridge**
  - D. Taking photographs
2. What color is the Golden Gate Bridge?
  - A. [100%] Red
  - B. Green
  - C. Blue
  - D. Gray

Step 1: check passage contains audio => no.

Step 2: skip this step.

Step 3: calculate passage content similar = 72,9% > 70%.

Step 4: check each sub-question in each, question1 in passage 1 duplicate with question 1 in passage 2, question2 in passage 1 duplicate with question 2 in passage 2. Count number of duplicate questions = 2.

Step 5: divide count number of duplicated questions for total number of questions.  $2/3 = 66,67\% > 50\% \Rightarrow$  duplicated.

### 7.2.5. Complexity

The complexity of this algorithm is  $O(n^2)$

## 7.3 Using State Machine to read File Moodle (GIFT)

### 7.3.1. Definition

Reading GIFT format file is exported from Moodle

### 7.3.2. Define Problem

Input:

- Text File (extension: .txt) GIFT format

Output:

- A question.

### 7.3.3. Solution

We will use state machine to sign the Moodle's symbols following this table:

::	start question, start question code
text	<i>question code value</i>
::	end question code, start question content
text	<i>question content value</i>
{	end question content, start option
=	start correct option
%	start fraction
number	<i>correct fraction value</i>
%	end fraction
text	<i>correct option content value</i>
<<end line>>	end correct option
~	start incorrect option
%	start fraction
number	<i>incorrect fraction value</i>
%	end fraction
text	<i>incorrect option content value</i>
<<end line>>	end incorrect option
}	end option, end question

Based on the data received from the state machine, analyzing the final data is a question based on the following:

- Create new Question
- Code of question = *question code value*.
- Question content = *question content value*.
- All fraction value and option content value are null: question type = essay.
- Has only one correct option value, fraction value is null: question type = single choice. Correct option content = *correct option content value* and fraction = 100. Incorrect option content = *incorrect option content value* and fraction = *incorrect fraction value*
- All options are incorrect option and sum of positive fractions equal 100: question type = multiple choice. Correct option content = *correct option content value – which has positive fraction* and fraction = *correct fraction value*. Incorrect option content = *incorrect option content value – which has negative fraction* and fraction = *incorrect fraction value*.
- All options are correct option and all fraction is not null: question type is short answer, options have option content = *correct option value*, fraction = *correct fraction value*
- All options are correct option and all fractions is null and correct option content value contains string “->”: question type = matching, sub-question = value before “->”, option content = value after “->”

#### 7.3.4. Example

##### Example 1:

::U02 - Q.022::Which is NOT an advantage of online catalogs?{

- ~Easy to update product information.
  - ~Able to integrate with the processing process.
  - ~Good search and comparison capabilities.
  - =More portable than paper catalogs.
- }

**Result 1:** a question has

- Question code = U02 - Q.022
- Type = single choice
- Question content = Which is NOT an advantage of online catalogs?
- Correct option = More portable than paper catalogs
- Incorrect option: others...

##### Example 2:

---

::C260-Q000006:: Assembly language, while easier to use than machine code, hasn't What type of correspondence with machine code?{

~%33.33333%many-to-one

~%-50%one-to-one

~%33.33333%many-to-many

~%33.33333%one-to-many

}

**Result 2:** a question has

- Question code = C260-Q000006
- Type = multiple choice
- Question content = Assembly language, while easier to use than machine code, hasn't What type of correspondence with machine code?
- Correct option = many-to-one (33,33%), many-to-many (33,33%), one-to-many (33,33%)
- Incorrect option: one-to-one (-50%)

### 7.3.5. Complexity

In total, the complexity of this algorithm is  $O(n)$ .

## 7.4. Audio duplication checking

### 7.4.1. Definition

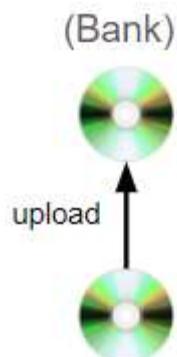
The algorithm to decide whether two audio file are duplicated with each other or not.

### 7.4.2. Define Problem

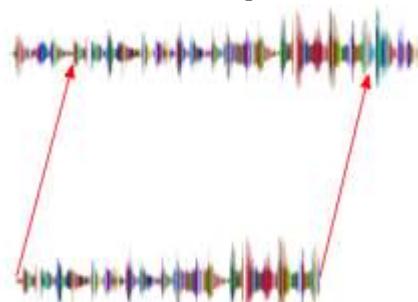
When an imported question has an audio as attachment, the system will check the similarity between the content of two audio file instead of the text content of the question.

Two audios can be duplicated because:

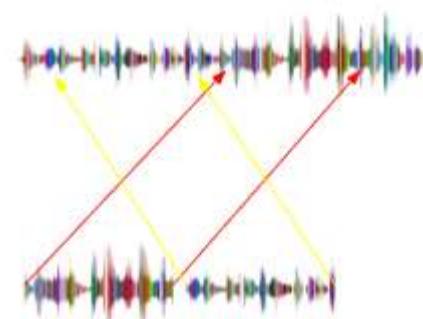
- Teacher use the same file for the question



- Each teacher cut a part from an audio and 2 part is collapsed on each other

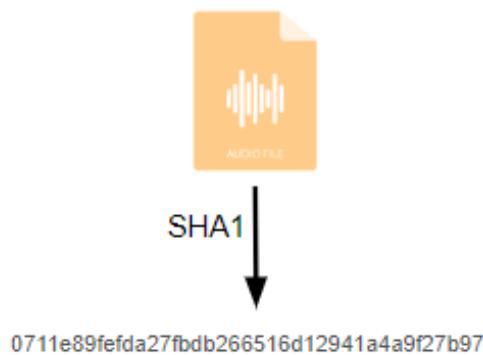


- Teacher cut and join audio from multiple source, which made part of audio have the similar content

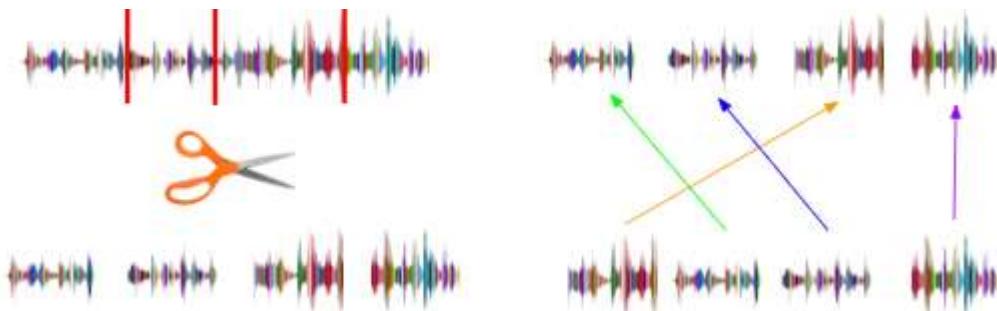


### 7.4.3. Solution

The easiest problem can be solved using simple hashing algorithm. In our case, we use the SHA1 to calculate checksum of imported audio file. If the two audio have the same checksum, they are duplicated.



However, the hashing cannot find similarity between complex duplication. The audio that does not filter by SHA1 will be split into multiple smaller audio, and each audio will be checked against each other to find the duplicated part.



The position in which audio will be split is where the audio is silence (amplitude < 30dB), and minimum of 3 seconds silence. Each part is converted into text using Mozilla DeepSpeech, which is later, will be saved into database. Because DeepSpeech only recognize audio with WAV encoding so we must convert the origin audio to .wav before pass it to DeepSpeech engine. Later these speeches will be loaded using SQL Assembly and the two speech will be checked duplicate by using the current string duplication algorithm. If the duplication is > 70% then 2 part is duplicated with each other. If two audios have more than 50% duplicated part will be conclusion duplicate.

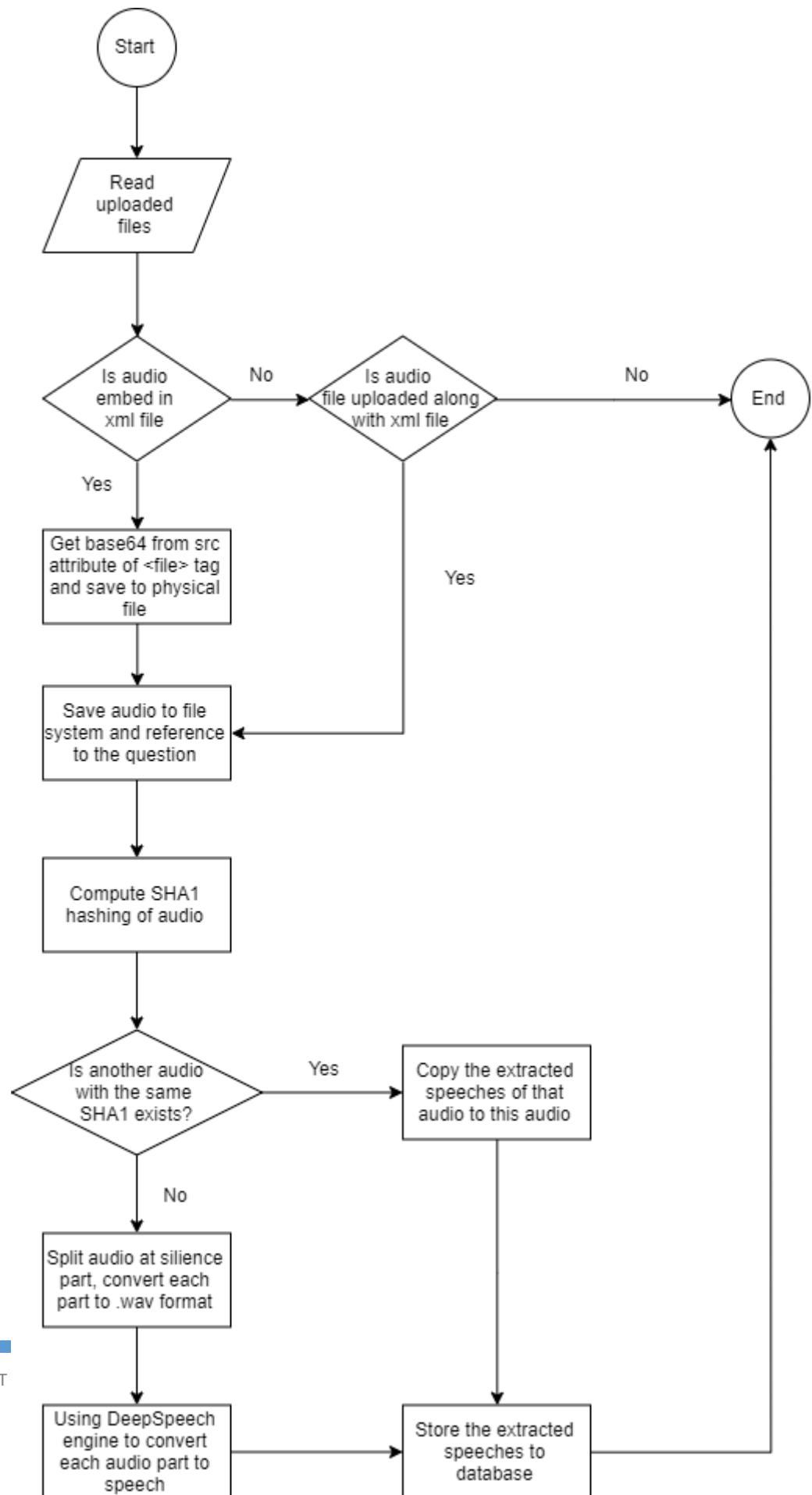
#### 7.4.4. Complexity

The complexity of this algorithm depends on how many parts the audio is spliced into and how long does each part. It also depends on the extension of the audio file. Average an audio with 30 minutes long will be spliced into approximately 15 parts, each part will take about 3 minute to extract speech. However, if the audio is existed in the bank before (by using SHA1 we can know which audio is existed), speech to text extraction is not necessary.

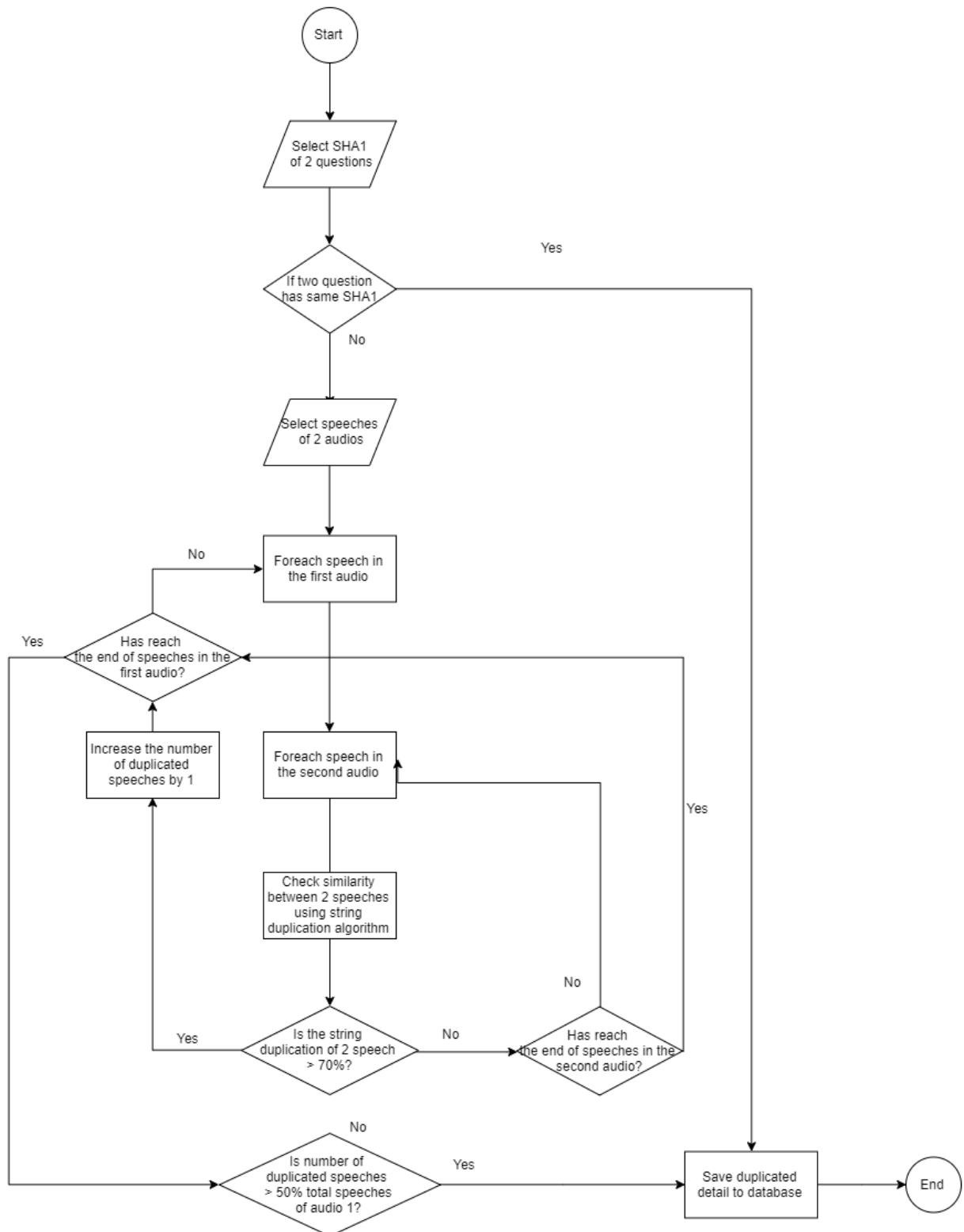
Each speech duplication will be checked using the string duplication checking, average algorithm is:  $O(n^2)$  with n is how many part extracted from audio.

#### **7.4.5. Flowchart diagram**

A) Extract speeches from audio (process at server container)



## B) Check duplication speeches (process at SQL Server Assembly)



## **E. System Implementation & Test**

### **1. Introduction**

#### **1.1 Overview**

This section describes all approaches and methodologies used by the team in order to plan, manage and conduct the testing part of the QBCS system. This section also includes test plans, test cases and test results of the testing.

#### **1.2 Test Approach**

- Goal: Test all features on the core flow of QBCS system.
- Method: Black-box testing.
- Size: System component.
- Technique used:
  - Test plan checklist.
  - Monkey testing.

## **2. Data Relationship Diagram**

### **2.1 Physical Diagram**

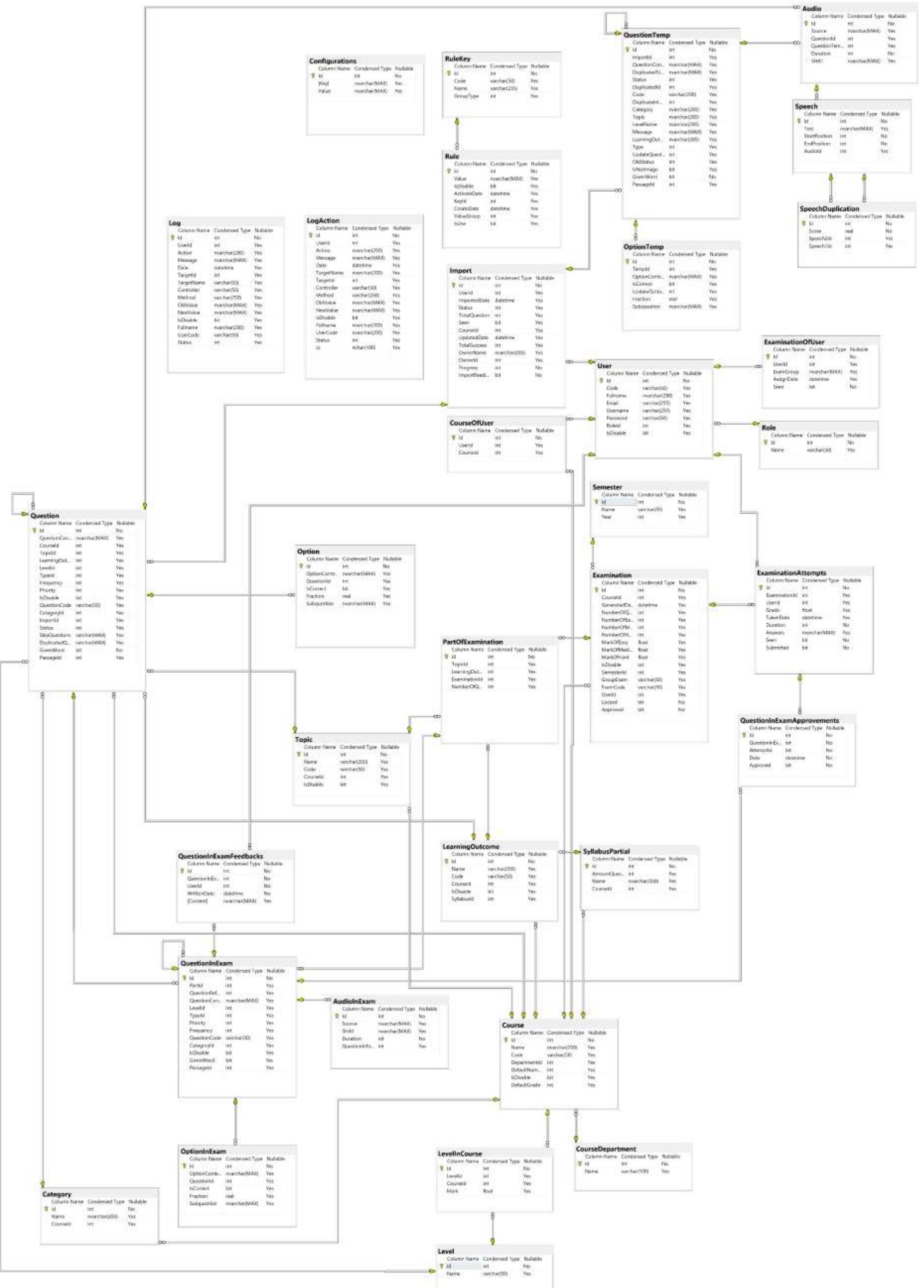


Figure 51 - QBCS Physical Diagram

## 2.2 Data Dictionary

- Data dictionary describes the content of all tables.
- We only describe new tables and fields. For more details, please open [QBCS1 document references](#).
- New Tables are highlighted in **green**.
- Updated Tables are highlighted in **orange**.

Table Name	Description
<i>User</i>	Describe the user of the system.
<i>ExaminationOfUser</i>	Describe the relationship between the examination and the creator
<i>ExaminationAttempts</i>	Describe the number of take examination attempts conducted.
<i>QuestionInExamApprovements</i>	Describe the approval status of questions review attempt.
<i>QuestionInExamFeedbacks</i>	Describe the feedbacks of a question the examination
<i>CourseOfUser</i>	Describe the relationship between each user and each course.
<i>Course</i>	Describe the course in the system.
<i>CourseDepartment</i>	Describe the department of courses in the system.
<i>Question</i>	Describe the question in the system.
<i>Option</i>	Describe each option of a question.
<i>Audio</i>	Describe the audio and duration of the audio in a question content.
<i>Audio in Exam</i>	Describe the audio of questions in exam
<i>Speech</i>	Contain the speech extraction from the audio.
<i>SpeechDuplication</i>	Determine which speech is duplicate with another and the percentage of the duplication.
<i>Category</i>	Describe the category in which the questions are stored.
<i>LearningOutcome</i>	Describe the learning outcome of a question.
<i>Level</i>	Describe the level of a question.

<i>Import</i>	Describe the file, containing questions and imported to the system.
<i>QuestionTemp</i>	Describe the question in the file that is not yet imported to system. These questions is pending for system checking.
<i>OptionTemp</i>	Describe each option of a question in the file.
<i>Examination</i>	Describe the examination that is generated from questions in the bank.
<i>Semester</i>	Describe the semester in which the created examination belongs to
<i>PartOfExamination</i>	Describe the detail of an examination. This contains the relationship of an examination.
<i>QuestionInExam</i>	Describe the question in an examination.
<i>OptionInExam</i>	Describe each option of a question.
<i>SyllabusPartial</i>	Describe a part of the syllabus in a course. This contains learning outcomes and the number of questions.
<i>RuleKey</i>	Describe the key or name of a rule.
<i>Rule</i>	Describe the value of a rule.
<i>LogAction</i>	Describe the log recorded for Staff Manager to use.
<i>Log</i>	Describe the changes of questions and rules.
<i>Configuration</i>	Describe the variables used in algorithm

Table 121 - <Physical Diagram> Data Dictionary

Table Name	Attribute	Description
<i>ExaminationOfUser</i>	<i>Id</i>	Incremental id of examination of user
<i>ExaminationOfUser</i>	<i>UserId</i>	User assigned to review the examination
<i>ExaminationOfUser</i>	<i>ExamGroup</i>	Group of the examination
<i>ExaminationOfUser</i>	<i>AssignDate</i>	Date in which user is assigned
<i>ExaminationOfUser</i>	<i>Seen</i>	Has user seen the examination

Table 122 - <Physical Diagram> ExaminationOfUser

<b>Table Name</b>	<b>Attribute</b>	<b>Description</b>
<i>ExaminationAttempts</i>	<i>Id</i>	Incremental id of examination attempt
<i>ExaminationAttempts</i>	<i>ExaminationId</i>	Incremental id of the examination
<i>ExaminationAttempts</i>	<i>UserId</i>	User who takes the examination
<i>ExaminationAttempts</i>	<i>Grade</i>	Grade of the attempt
<i>ExaminationAttempts</i>	<i>TakenDate</i>	Date in which user takes examination
<i>ExaminationAttempts</i>	<i>Duration</i>	The time user used for the examination
<i>ExaminationAttempts</i>	<i>Answers</i>	Answers of the user in the examination
<i>ExaminationAttempts</i>	<i>Seen</i>	Has user seen the examination
<i>ExaminationAttempts</i>	<i>Submitted</i>	Has user submitted the examination

Table 123 - <Physical Diagram> ExaminationAttempts

<b>Table Name</b>	<b>Attribute</b>	<b>Description</b>
<i>QuestionInExamApprovals</i>	<i>Id</i>	Incremental id of the approval
<i>QuestionInExamApprovals</i>	<i>QuestionInExam</i>	Id of the question in the examination
<i>QuestionInExamApprovals</i>	<i>AttemptId</i>	Id of the examination attempt
<i>QuestionInExamApprovals</i>	<i>Date</i>	Date of the approval review
<i>QuestionInExamApprovals</i>	<i>Approved</i>	Approve status of the question in the examination

Table 124 - <Physical Diagram> QuestionInExamApprovals

<b>Table Name</b>	<b>Attribute</b>	<b>Description</b>
<i>QuestionInExamFeedbacks</i>	<i>Id</i>	Incremental id of the approval
<i>QuestionInExamFeedbacks</i>	<i>QuestionInExam</i>	Id of the question in the examination
<i>QuestionInExamFeedbacks</i>	<i>UserId</i>	Id of the user
<i>QuestionInExamFeedbacks</i>	<i>WrittenDate</i>	Date in which the user writes the feedback
<i>QuestionInExamFeedbacks</i>	<i>Content</i>	Text content of the feedback

Table 125 - <Physical Diagram> QuestionInExamApprovals

<b>Table Name</b>	<b>Attribute</b>	<b>Description</b>
<i>Audio</i>	<i>Id</i>	Incremental id of the audio
<i>Audio</i>	<i>Source</i>	Path of the audio
<i>Audio</i>	<i>QuestionId</i>	Id of the question
<i>Audio</i>	<i>QuestionTempId</i>	Id of the temporary question
<i>Audio</i>	<i>Duration</i>	Duration of the audio
<i>Audio</i>	<i>SHA1</i>	Hash value of the audio

Table 126 - <Physical Diagram> Audio

<b>Table Name</b>	<b>Attribute</b>	<b>Description</b>
<i>AudioInExam</i>	<i>Id</i>	Incremental id of the audio
<i>AudioInExam</i>	<i>Source</i>	Path of the audio
<i>AudioInExam</i>	<i>Duration</i>	Duration of the audio
<i>AudioInExam</i>	<i>SHA1</i>	Hash value of the audio
<i>AudioInExam</i>	<i>QuestionInExamId</i>	Id of the question in examination

Table 127 - <Physical Diagram> *AudioInExam*

<b>Table Name</b>	<b>Attribute</b>	<b>Description</b>
<i>Speech</i>	<i>Id</i>	Incremental id of the speech
<i>Speech</i>	<i>Text</i>	Text content of the speech
<i>Speech</i>	<i>StartPosition</i>	Start position of the speech in the audio
<i>Speech</i>	<i>EndPosition</i>	End position of the speech in the audio
<i>Speech</i>	<i>AudioId</i>	Id of the audio

Table 128 - <Physical Diagram> *Speech*

<b>Table Name</b>	<b>Attribute</b>	<b>Description</b>
<i>SpeechDuplication</i>	<i>Id</i>	Incremental id of the duplication
<i>SpeechDuplication</i>	<i>Score</i>	Percentage of the duplication
<i>SpeechDuplication</i>	<i>Speech2Id</i>	Id of the second speech
<i>SpeechDuplication</i>	<i>Speech1Id</i>	Id of the first speech

Table 129 - <Physical Diagram> *SpeechDuplication*

<b>Table Name</b>	<b>Attribute</b>	<b>Description</b>
<i>Configurations</i>	<i>Id</i>	Incremental id of the configuration
<i>Configurations</i>	<i>Key</i>	Key of the configuration
<i>Configurations</i>	<i>Value</i>	Value of the configuration

Table 130 - <Physical Diagram> *Configurations*

<b>Table Name</b>	<b>Attribute</b>	<b>Description</b>
<i>Semester</i>	<i>Id</i>	Incremental id of the semester
<i>Semester</i>	<i>Name</i>	Name of the semester
<i>Semester</i>	<i>Year</i>	Year which the semester is in

Table 131 - <Physical Diagram> *Semester*

<b>Table Name</b>	<b>Attribute</b>	<b>Description</b>
<i>Examination</i>	<i>UserId</i>	The user who approve the examination
<i>Examination</i>	<i>Locked</i>	Lock status of the examination
<i>Examination</i>	<i>Approved</i>	Approve status of the examination

Table 132 - <Physical Diagram> *Examination*

<b>Table Name</b>	<b>Attribute</b>	<b>Description</b>
<i>Question</i>	<i>GivenWord</i>	Status of given word in fill in blank question

<i>Question</i>	<i>PassageId</i>	Refer to the master question Id, used for Reading and Listening
-----------------	------------------	---

*Table 133 - <Physical Diagram> Question*

<b>Table Name</b>	<b>Attribute</b>	<b>Description</b>
<i>Option</i>	<i>Fraction</i>	Percentage grade of the question
<i>Option</i>	<i>Subquestion</i>	Sub question of the question, used for Matching question

*Table 134 - <Physical Diagram> Option*

<b>Table Name</b>	<b>Attribute</b>	<b>Description</b>
<i>QuestionInExam</i>	<i>GivenWord</i>	Status of given word in fill in blank question
<i>QuestionInExam</i>	<i>PassageId</i>	Refer to the master question Id, used for Reading and Listening

*Table 135 - <Physical Diagram> QuestionInExam*

<b>Table Name</b>	<b>Attribute</b>	<b>Description</b>
<i>OptionInExam</i>	<i>Fraction</i>	Percentage grade of the question
<i>OptionInExam</i>	<i>Subquestion</i>	Sub question of the question, used for Matching question

*Table 136 - <Physical Diagram> OptionInExam*

<b>Table Name</b>	<b>Attribute</b>	<b>Description</b>
<i>QuestionTemp</i>	<i>GivenWord</i>	Status of given word in fill in blank question
<i>QuestionTemp</i>	<i>PassageId</i>	Refer to the master question Id, used for Reading and Listening

*Table 137 - <Physical Diagram> QuestionTemp*

<b>Table Name</b>	<b>Attribute</b>	<b>Description</b>
<i>OptionTemp</i>	<i>Fraction</i>	Percentage grade of the question
<i>OptionTemp</i>	<i>Subquestion</i>	Sub question of the question, used for Matching question

*Table 138 - <Physical Diagram> OptionTemp*

### 3. Performance Measures

#### 3.1 Import Questions

When Lecturer imports a file with 100 questions using:

- GIFT format, it will take approximately less than a second.
- XML format, it will take approximately 2 seconds.
- MS Word format, it will take approximately a second.

#### 3.2 Import Reading or Listening

##### a. Reading

When Lecturer imports a file with 20 questions following 2 reading passages, it will take approximately a second.

## **b. Listening**

When Lecturer imports a file with a 10-minute-long audio, it will take approximately 5 minutes.

### **3.3 Verify an import**

It depends on multiple aspects of the system to clarify the time it takes to check duplicate questions; we will briefly describe and calculate it using following cases:

- When there is no question in question bank, checking duplicate for 200 questions will take approximately 2-3 minutes.
- When there are 1000 questions in question bank, checking duplicate for 200 questions to question bank will take approximately 15 minutes.
- When there is no question in bank, checking duplicate for 10 questions semantically will take approximately 5 minutes.

### **3.4 Generate examination automatically**

When generate exam automatically, with 100 questions in course, generate 1 exam with 50 questions will take approximately 10 seconds.

## **4. Test Plan**

We only conduct testing on new and updated features of the QBCS. The idea is to test new features as many times as we can to increase product availability.

#### **4.1 Features to be tested**

- Import questions of multiple types and check for duplication.
- Import manually.
- Assign Examination.
- Review examination.
- Verify examination.
- Export examination.

#### **4.2 Features not to be tested**

N/A

### **5. System testing test cases**

QBCS System is a web application that helps storing questions and creating Examination. The system has been deployed and used by lecturers across FPT University; henceforth, we have been collecting requirements and defects as well as fixing and implementing them into the system in order to improve it.

## 5.1 <Lecturer> Test cases

### 5.1.1. <Lecturer> Import questions

ID	Test Case Description	Test case procedure	Expected output	Inter Dependence Test Case	Result	Test Date
IQ1	Import questions file in GIFT format	1. User enters the owner name. 2. User chooses the Category. 3. User drag and drop file 4. User clicks "Import" button	System shows message: "Your imports are processing. We will notify when it has result "	N/A	Pass	19/11/2019
IQ2	Import questions file in XML format	1. User enters the owner name. 2. User chooses the Category. 3. User drag and drop file 4. User clicks "Import" button	System shows message: "Your imports are processing. We will notify when it has result "	N/A	Pass	19/11/2019
IQ3	Import questions file in WORD format	1. User enters the owner name. 2. User chooses the Category. 3. User drag and drop file 4. User clicks "Import" button	System shows message: "Your imports are processing. We will notify when it has result "	N/A	Pass	19/11/2019
IQ4	Import questions file using formats that are not GIFT, XML or WORD.	1. User enters the owner name. 2. User chooses the Category. 3. User drag and drop file 4. User clicks "Import" button	System shows error message: "File's format is invalid. Please check your File and Import again!"	N/A	Pass	19/11/2019

Table 139 - Test case <Lecturer> Import questions

### 5.1.2. <Lecturer> Import manually

<b>ID</b>	<b>Test Case Description</b>	<b>Test case procedure</b>	<b>Expected output</b>	<b>Inter Dependence Test Case</b>	<b>Result</b>	<b>Test Date</b>
IM0	User inputs information for questions	1. User chooses Course. 2. User enters Category. 3. User enters Topic.	System shows Course name, Category and Topic.	N/A	Pass	19/11/2019
IM1	User creates single choice question	1. User chooses level of question 2. User chooses single choice type 3. User inputs question content 4. User saves question	System shows the created single choice question.	IM0	Pass	19/11/2019
IM2	User creates multiple choice question	1. User chooses level of question 2. User chooses multiple choice type 3. User inputs question content 4. User saves question	System shows the created multiple question.	IM0	Pass	19/11/2019
IM3	User creates matching question	1. User chooses level of question 2. User chooses matching type 3. User inputs question content 4. User saves question	System shows the created matching question.	IM0	Pass	19/11/2019
IM4	User creates short answer question	1. User chooses level of question 2. User chooses short answer type 3. User inputs question content 4. User saves question	System shows the created short answer question.	IM0	Pass	19/11/2019

IM5	User creates essay question	<ol style="list-style-type: none"> <li>1. User chooses level of question</li> <li>2. User chooses essay type</li> <li>3. User inputs question content</li> <li>4. User saves question</li> </ol>	System shows the created essay question.	IM0	Pass	19/11/2019
IM6	User creates fill in blank question	<ol style="list-style-type: none"> <li>1. User chooses level of question</li> <li>2. User chooses fill in blank type</li> <li>3. User inputs question content</li> <li>4. User saves question</li> </ol>	System shows the created fill in blank question.	IM0	Pass	19/11/2019
IM7	User creates group of questions with a Reading passage	<ol style="list-style-type: none"> <li>1. User chooses import Reading/Listening</li> <li>2. User inputs Reading passage content</li> <li>3. User creates questions for the Reading passage</li> </ol>	System shows the created group of questions with a Reading passage.	IM0	Pass	19/11/2019
IM8	User creates group of questions with a Listening audio	<ol style="list-style-type: none"> <li>1. User chooses import Reading/Listening</li> <li>2. User inputs passage content</li> <li>3. User uploads audio</li> <li>4. User creates questions for the Listening</li> </ol>	System shows the created group of questions with a Listening audio.	IM0	Pass	19/11/2019
IM9	User creates group of questions with a Listening audio	<ol style="list-style-type: none"> <li>1. User chooses import Reading/Listening</li> <li>2. User inputs passage content</li> <li>3. User uploads audio</li> <li>4. User creates questions for the Listening</li> </ol>	System shows the created group of questions with a Listening audio.	IM0	Pass	19/11/2019

IM10	User imports all created questions	1. User sends command to import	System displays import history screen. System imports all created questions. System checks for invalid and duplicate questions. System shows import to user.	IM0, IM1, IM2, IM3, IM4, IM5, IM6, IM7, IM8, IM9,	Pass	19/11/2019
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Table 140 - Test case <Lecturer> Import manually

### 5.1.3. <Lecturer> Review examination

ID	Test Case Description	Test case procedure	Expected output	Inter Dependence Test Case	Result	Test Date
RE1	User is notified when an exam is assigned		System notifies Lecturer when he/she is assigned to review an examination	N/A	Pass	19/11/2019
RE2	Take exam	1. User goes to assigned examination. 2. User clicks take exam. 3. User takes exam and finish to get result	System shows list of assigned examination.  System displays examination screen.  System shows result.	N/A	Pass	19/11/2019
RE3	Approve a question	1. User approves a question	System shows question has been approved	RE2	Pass	19/11/2019

RE4	Decline a question	1. User declines a question	System shows question has been declined	RE2	Pass	19/11/2019
RE5	Submit review result	1. After reviewing all questions, user clicks submit result	System shows that review result has been submitted and displays assigned examination screen.	RE2, RE3, RE4	Pass	19/11/2019

Table 141 - Test case <Lecturer> Review examination

## 5.2 <Lecturer Manager> Test cases

### 5.2.1. <Lecturer Manager> Assign examination

ID	Test Case Description	Test case procedure	Expected output	Inter Dependence Test Case	Result	Test Date
AE1	Lecturer Manager assigns an examination to a Lecturer	<ol style="list-style-type: none"> <li>1. User go to examination screen</li> <li>2. User selects an examination to verify</li> <li>3. User chooses a Lecturer</li> <li>4. User click "Assign"</li> </ol>	System shows that Lecturer has been assigned.	N/A	Pass	19/11/2019

Table 142 - Test case <Lecturer Manager> Assign examination

### 5.2.2. <Lecturer Manager> Verify examination

ID	Test Case Description	Test case procedure	Expected output	Inter Dependence Test Case	Result	Test Date
VE1	Lecturer Manager receives notification		When a Lecturer had done reviewing an exam, system will send a notification to the Lecturer Manager who assigned it.	N/A	Pass	19/11/2019
VE2	Lecturer Manager approves an examination	<ol style="list-style-type: none"> <li>1. User go to examination screen</li> <li>2. User selects an examination to verify</li> <li>3. User gets review result</li> <li>4. User approves the examination</li> </ol>	System shows that examination has been approved.	N/A	Pass	19/11/2019
VE3	Lecturer Manager locks an examination	<ol style="list-style-type: none"> <li>1. User go to examination screen</li> <li>2. User selects an examination to verify</li> <li>3. User gets review result</li> <li>4. User locks the examination</li> </ol>	System shows that examination has been locked. System locks the exam and prevents it from being exported	N/A	Pass	19/11/2019

*Table 143 - Test case <Lecturer Manager> Verify examination*

### **5.2.3. <Lecturer Manager> Export examination**

ID	Test Case Description	Test case procedure	Expected output	Inter Dependence Test Case	Result	Test Date
EE1	Export examination WORD format	1. User go to examination details 2. User select MS WORD file extension in examination details page. 3. Click "Export" button.	The system returns file with MS WORD extension. Questions in file must follow examination template.	N/A	Pass	19/11/2019
EE2	Export paper examination (back up examination)	1. User go to examination details 2. User select Back up examination (WORD) file extension in examination details page. 3. Click "Export" button.	The system returns file with MS WORD extension. Questions in file must follow backup examination template.	N/A	Pass	19/11/2019
EE3	Export examination .paper file format	1. User go to examination details 2. User select .PAPER file extension in examination details. 3. Click "Export" button.	The system returns file with .paper extension.	N/A	Pass	19/11/2019

*Table 144 - Test case <Lecturer Manager> Export examination*

## F. Software User's Manual

### 1. Installation Guide

#### 1.1 Server – side set up environment

##### 1.1.1. Hardware requirements

Server	Minimum Requirements	Recommended
Internet Connection	Cable, Wi-Fi (8 Mbps)	Cable, Wi-Fi (50 Mbps or more)
Computer Processor	Intel® Xeon ® 1.4GHz	Intel® Xeon ® Quad Core (12M Cache, 2.50 GHz)
Computer Memory	6GB RAM	32GB or more
Storage space	1GB	5GB or more

*Table 145 - Hardware requirement for server*

##### 1.1.2. Software requirements

Area Name	Name & Version	Description
Environment	.NET Framework 4.6.1	Specification for developing web application
Operating System	Window 10, Window Server 2012	Operating system and platform for development
IDE	Visual Studio 2017 or above version	Development tool
DBMS	SQL Server 2017 or above version	Used to create & manage the database for system
Web server	IIS	Deployment environment
Web browser	Chrome 69 or above.	Browser

*Table 146 - Software requirement for server*

#### 1.2 Deployment at server – side

##### 1.2.1. Prepare development package

**Step 1:** Download and Install .NET Framework 4.6.1

Link download: <https://support.microsoft.com/en-my/help/3102436/the-.net-framework-4-6-1-offline-installer-for-windows>

## **Step 2:** Download and Install Microsoft SQL Server 2017

Link download: <https://www.microsoft.com/en-us/sql-server/sql-server-editions-express>

## **Step 3:** Download and Install Visual Studio 2017 (Optional)

Link download:

[https://my.visualstudio.com/Downloads?q=visual%20studio%202017&wt.mc\\_id=o~msft~vscom~older-downloads](https://my.visualstudio.com/Downloads?q=visual%20studio%202017&wt.mc_id=o~msft~vscom~older-downloads)

## **Step 4:** Download and Install ffmpeg.exe

Link download: <https://wwwffmpeg.org/download.html>

## **Step 5:** Download pre-trained DeepSpeech model

Link download:

<https://github.com/mozilla/DeepSpeech/releases/download/v0.5.1/deepspeech-0.5.1-models.tar.gz>

### **1.2.2. Configure server before deploying**

**Step 1:** Publish web application to deploy Visual Studio 2017. Please follow step by step:

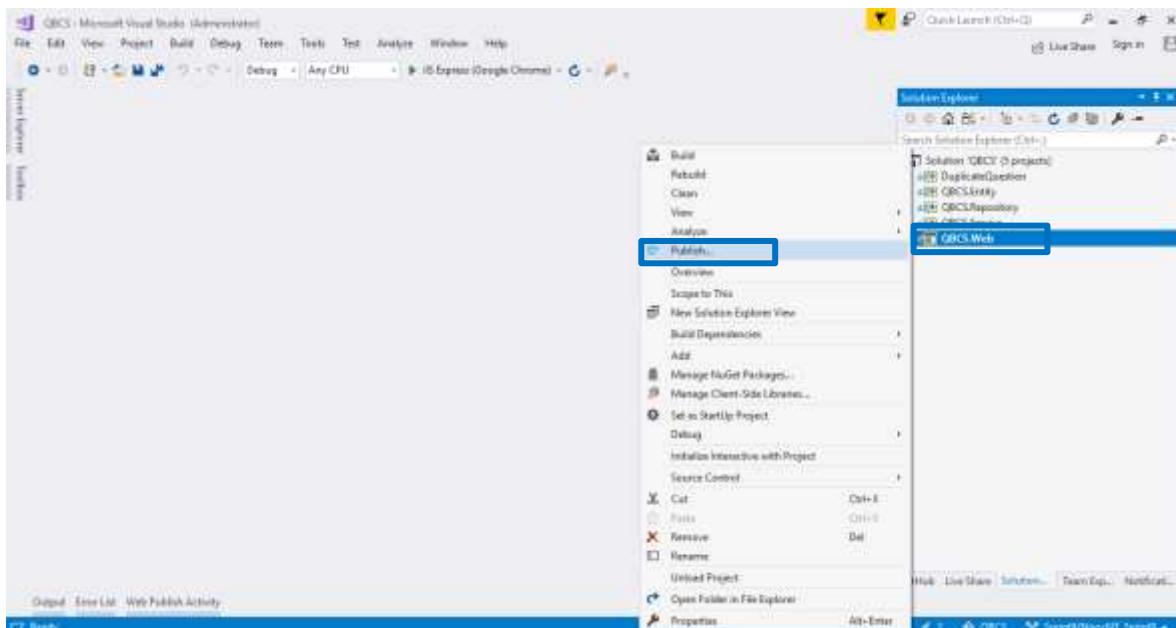


Figure 52 - <Installation Guide> Step 1.1

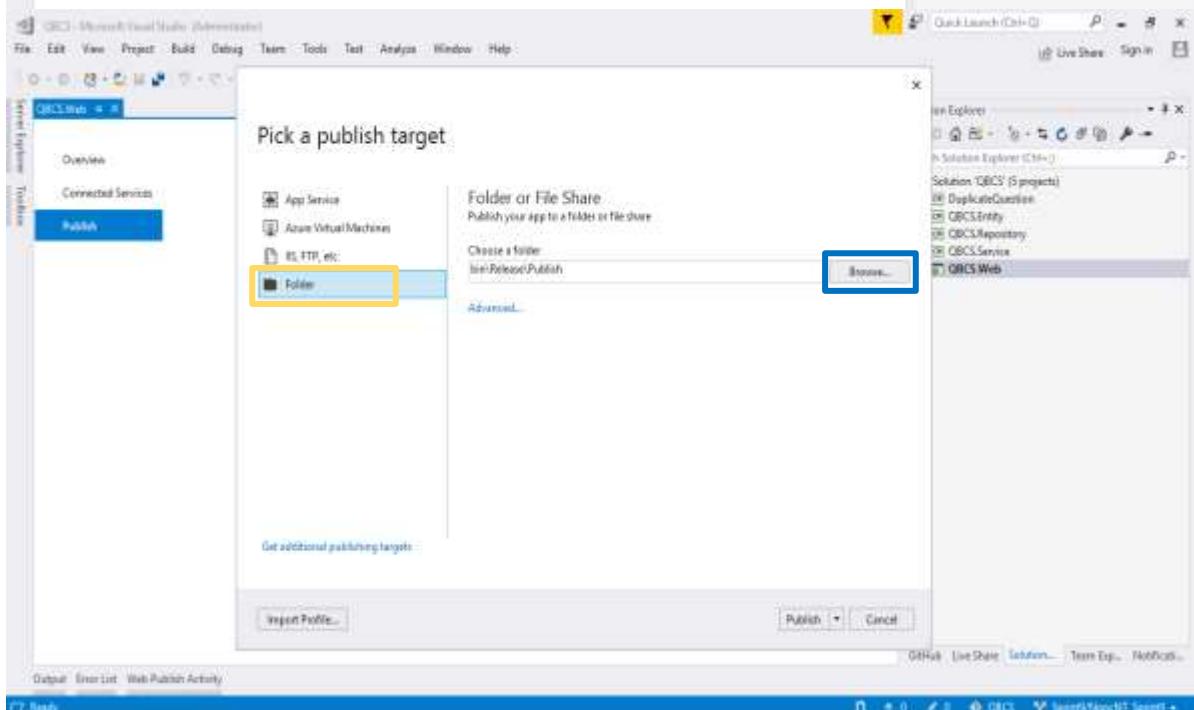
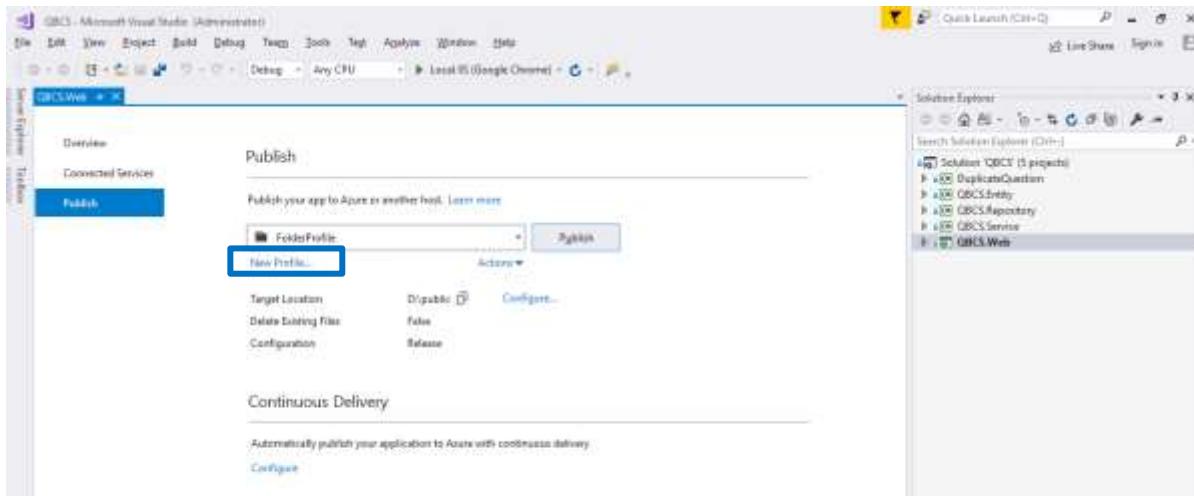


Figure 53 - <Installation Guide> Step 1.2

Figure 54 - <Installation Guide> Step 1.3

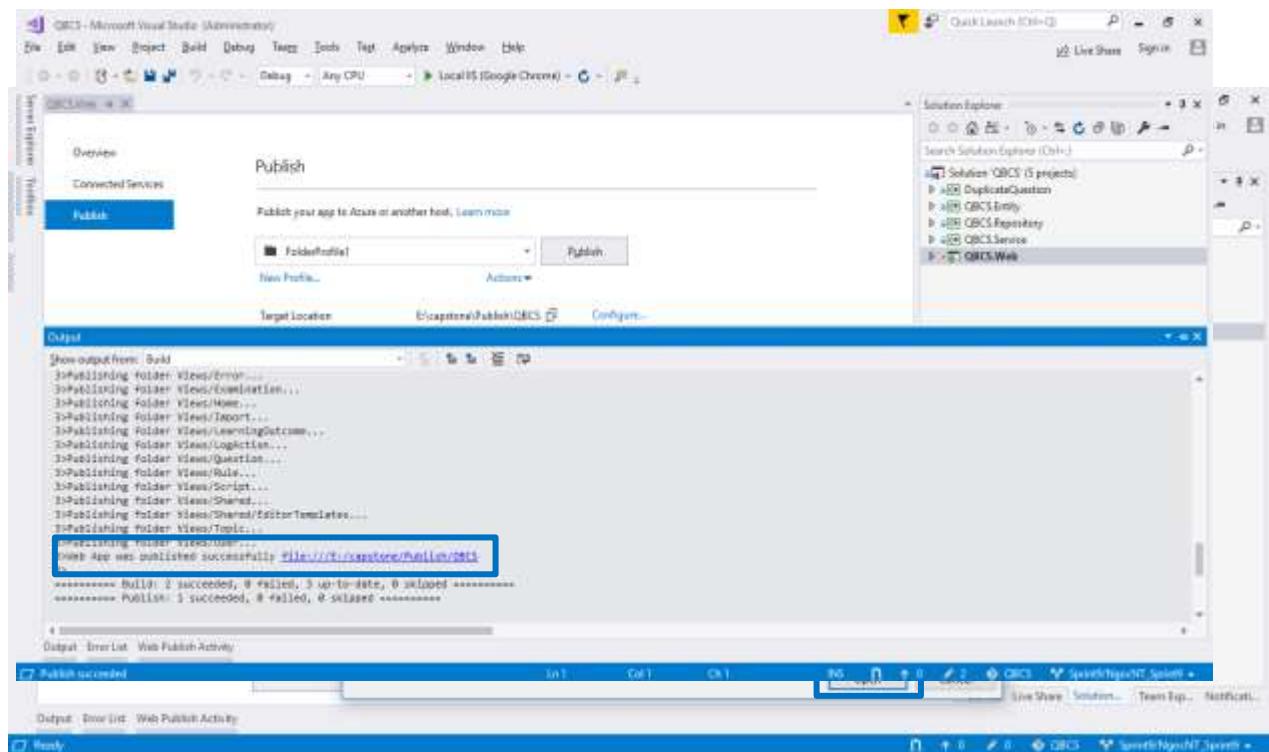


Figure 55 - <Installation Guide> Step 1.4

Figure 56 - <Installation Guide> Step 1.5

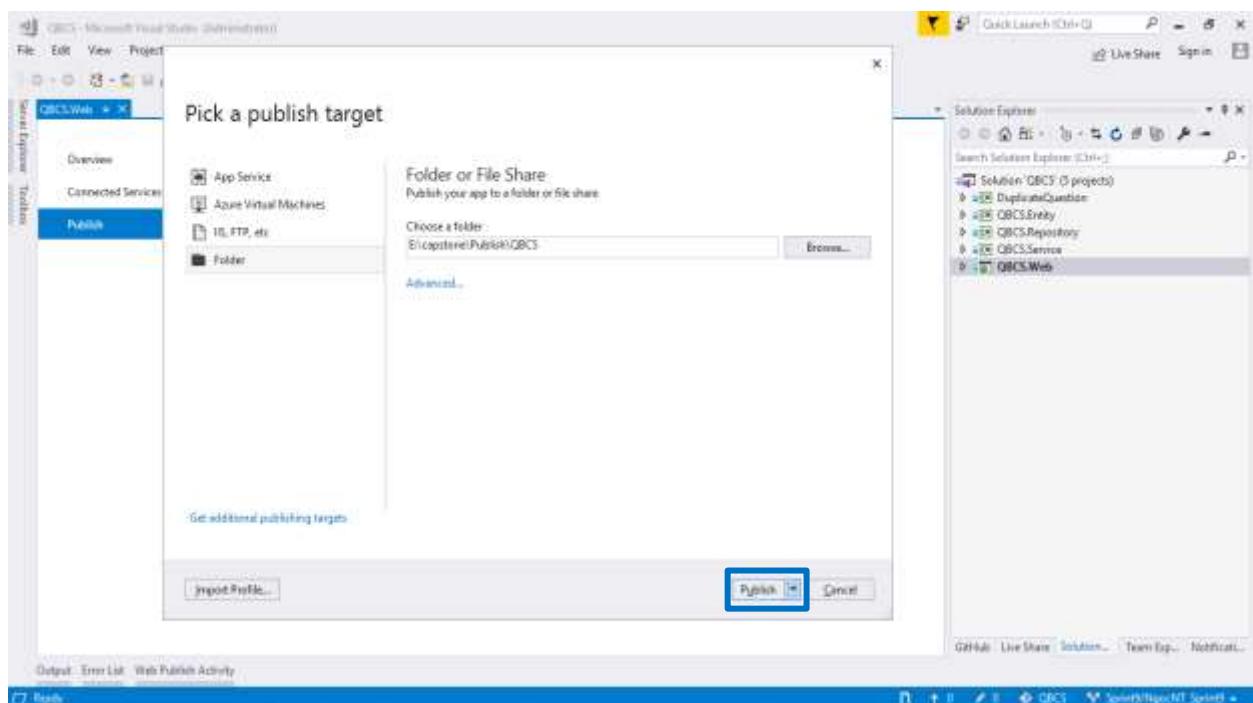


Figure 57 - <Installation Guide> Step 1.6

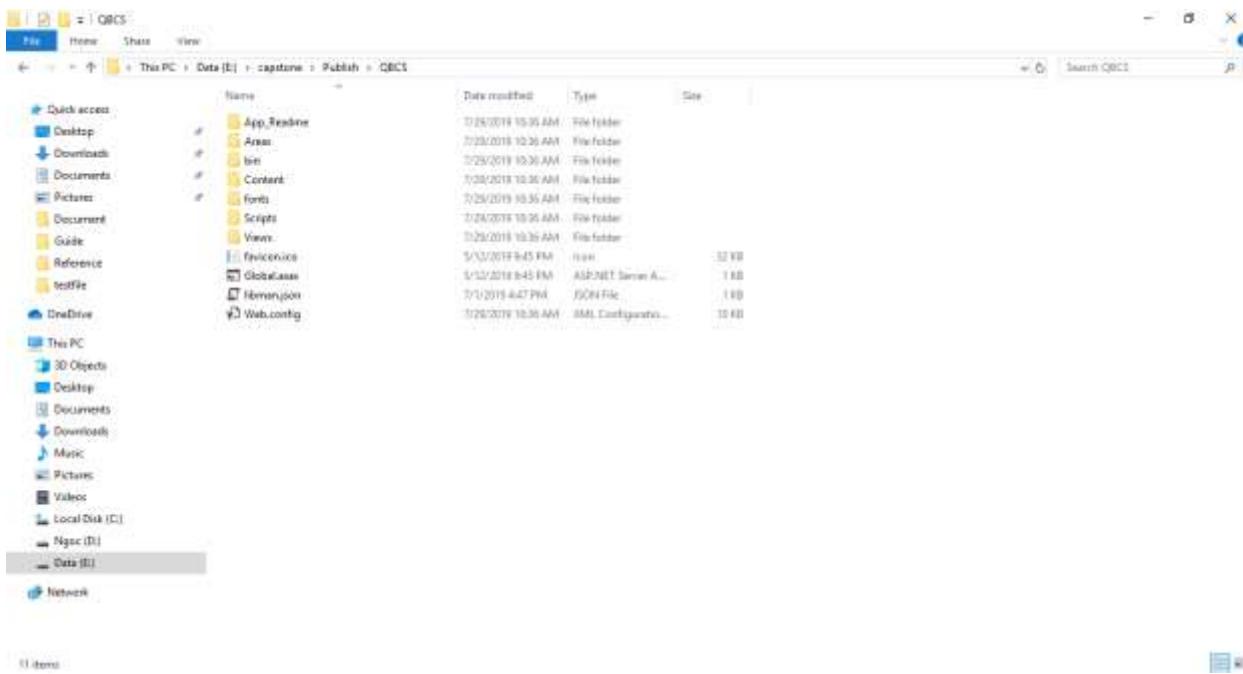


Figure 58 - <Installation Guide> Step 1.6

## Step 2: Configure CLR for database

Run SQL Command step by step:

1. `Sp_configure 'clr enabled',1`
2. `RECONFIGURE`
3. `EXEC sp_configure 'show advanced options', 1`
4. `RECONFIGURE`
5. `EXEC sp_configure 'clr strict security', 0`
6. `RECONFIGURE`

## Step 3: Run script create database and assemblies

## Step 4: Configure Broker for database

Run SQL following Command:

```
ALTER DATABASE QBCS SET ENABLE_BROKER WITH ROLLBACK IMMEDIATE
```

## Step 5: Change connection string in Web.config

### 1.2.3. Deployment of web application

Please follow the instruction step by step:

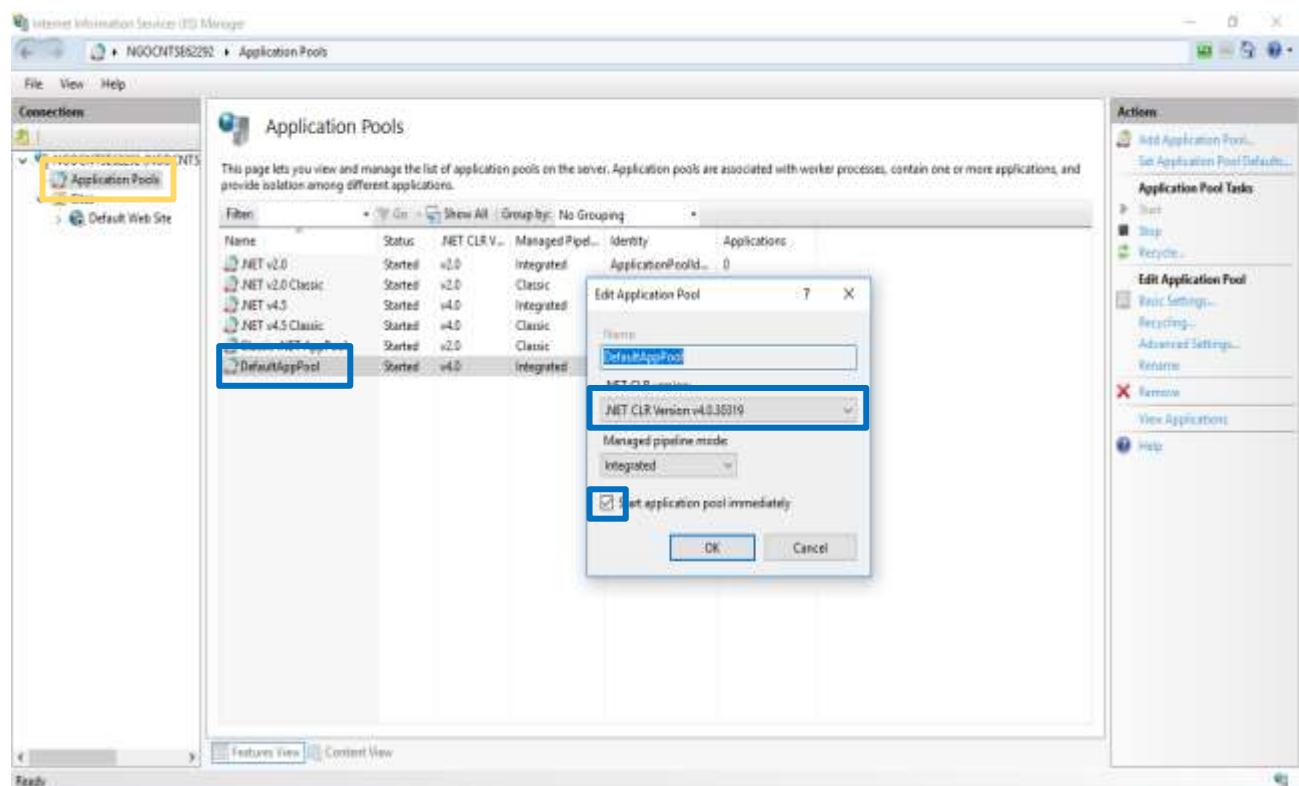


Figure 59 - <Installation Guide> Step 1.2.3.1

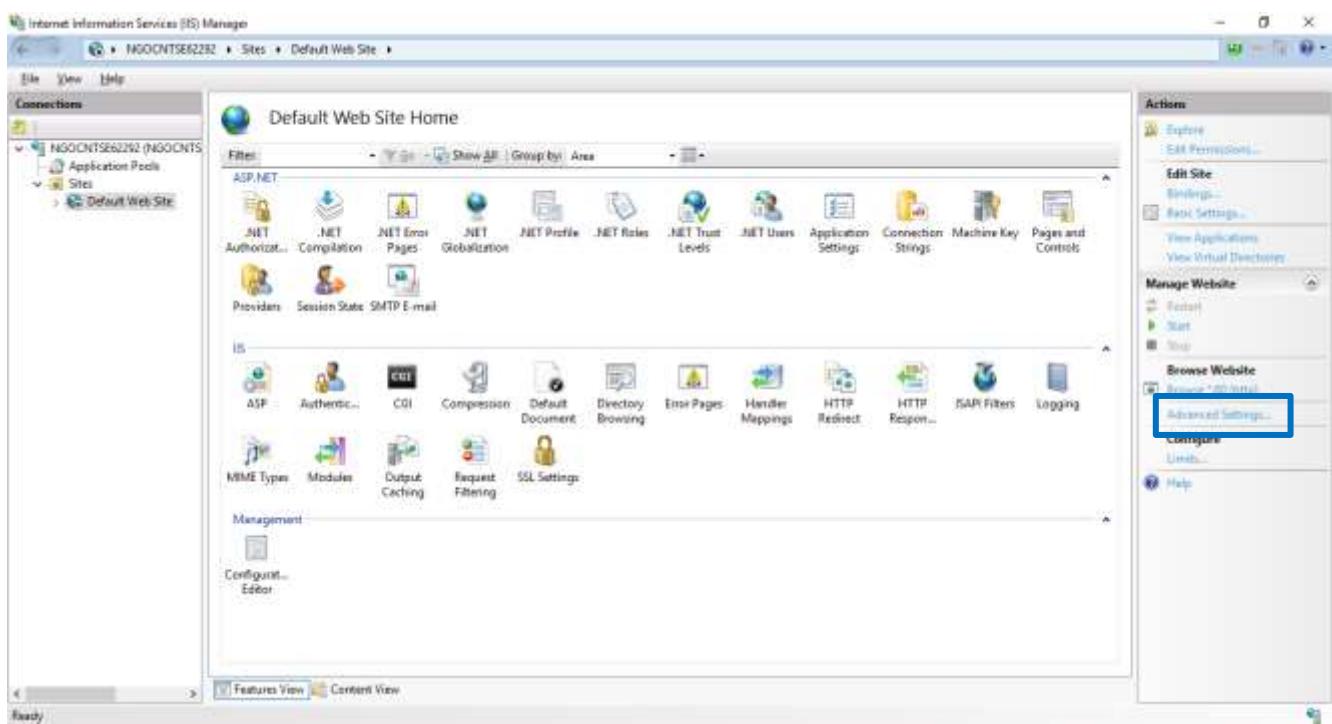
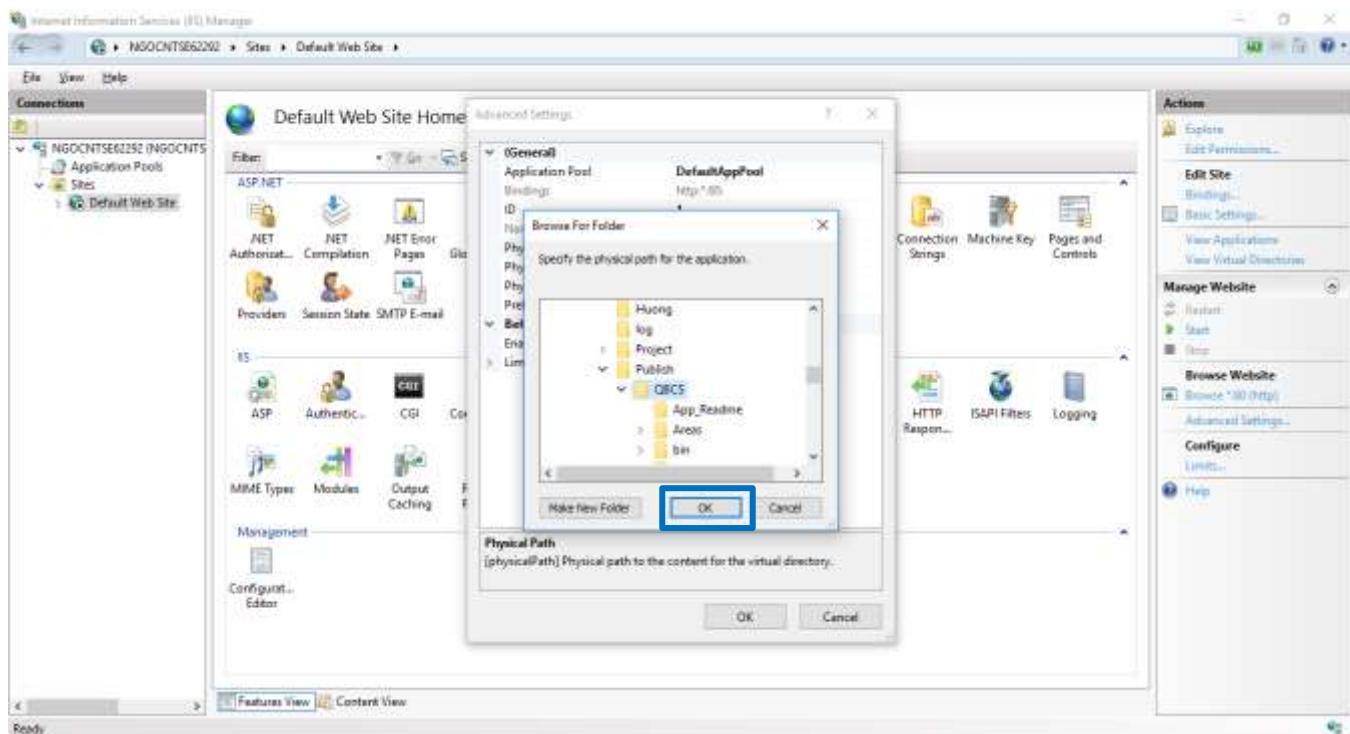


Figure 60 - <Installation Guide> Step 1.2.3.2



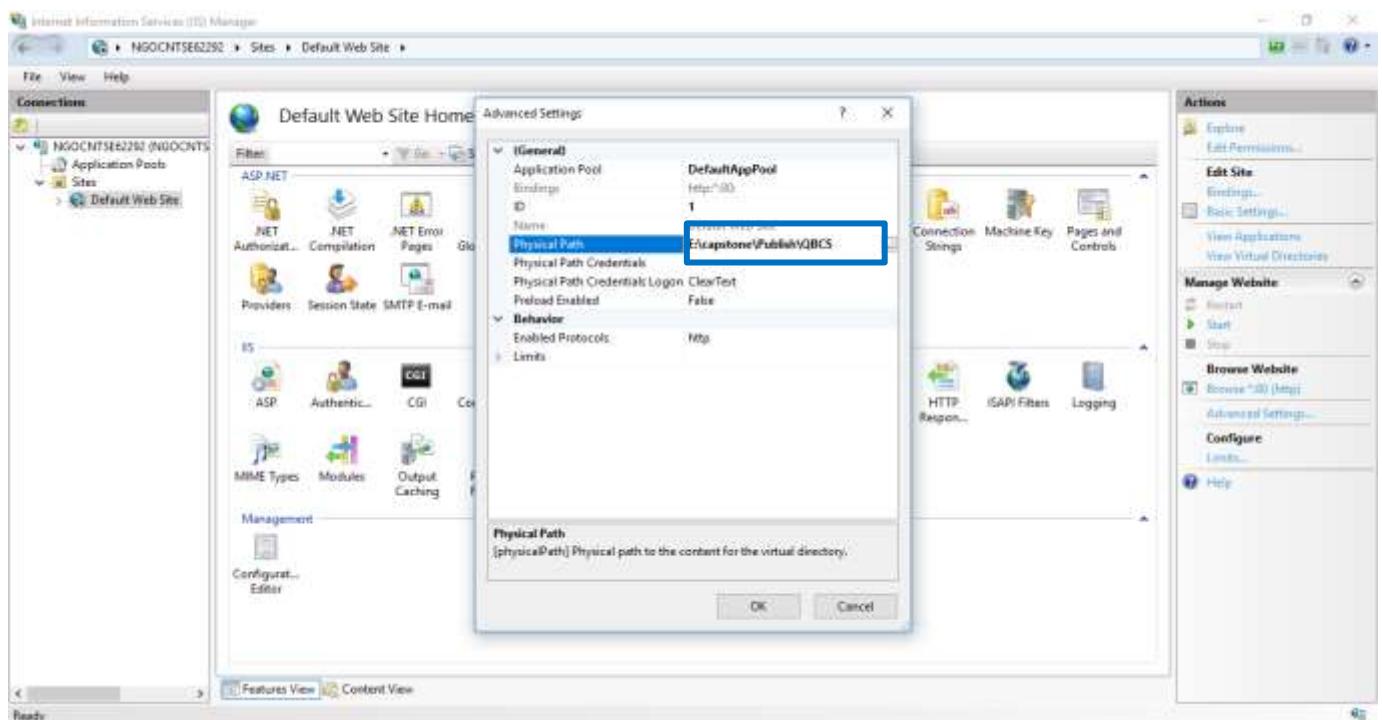


Figure 61 - <Installation Guide> Step 1.2.3.

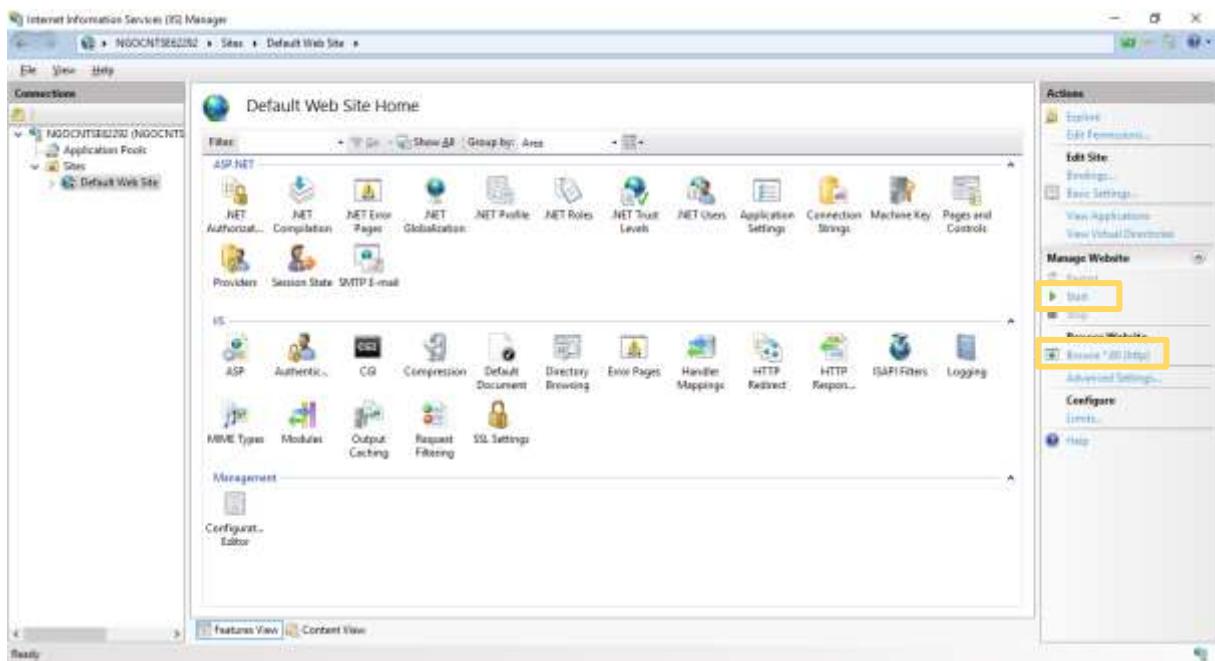


Figure 62 - <Installation Guide> Step 1.2.3.4

Set system environment variable for ffmpeg.exe

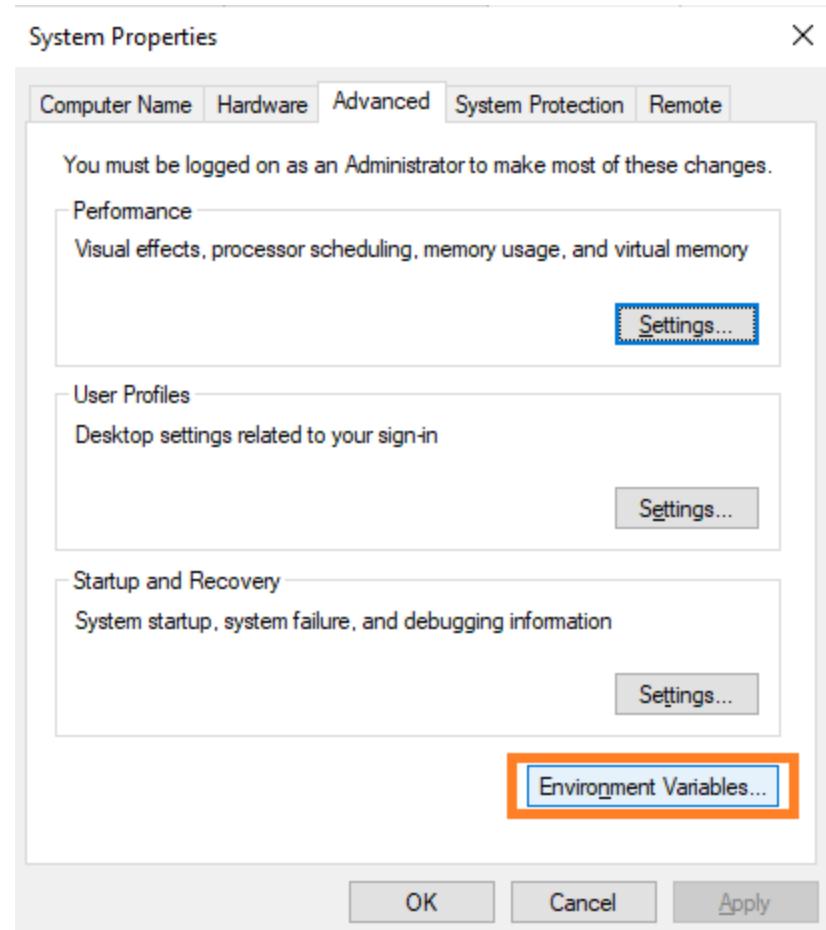


Figure 63 - <Installation Guide> Step 1.2.3.5

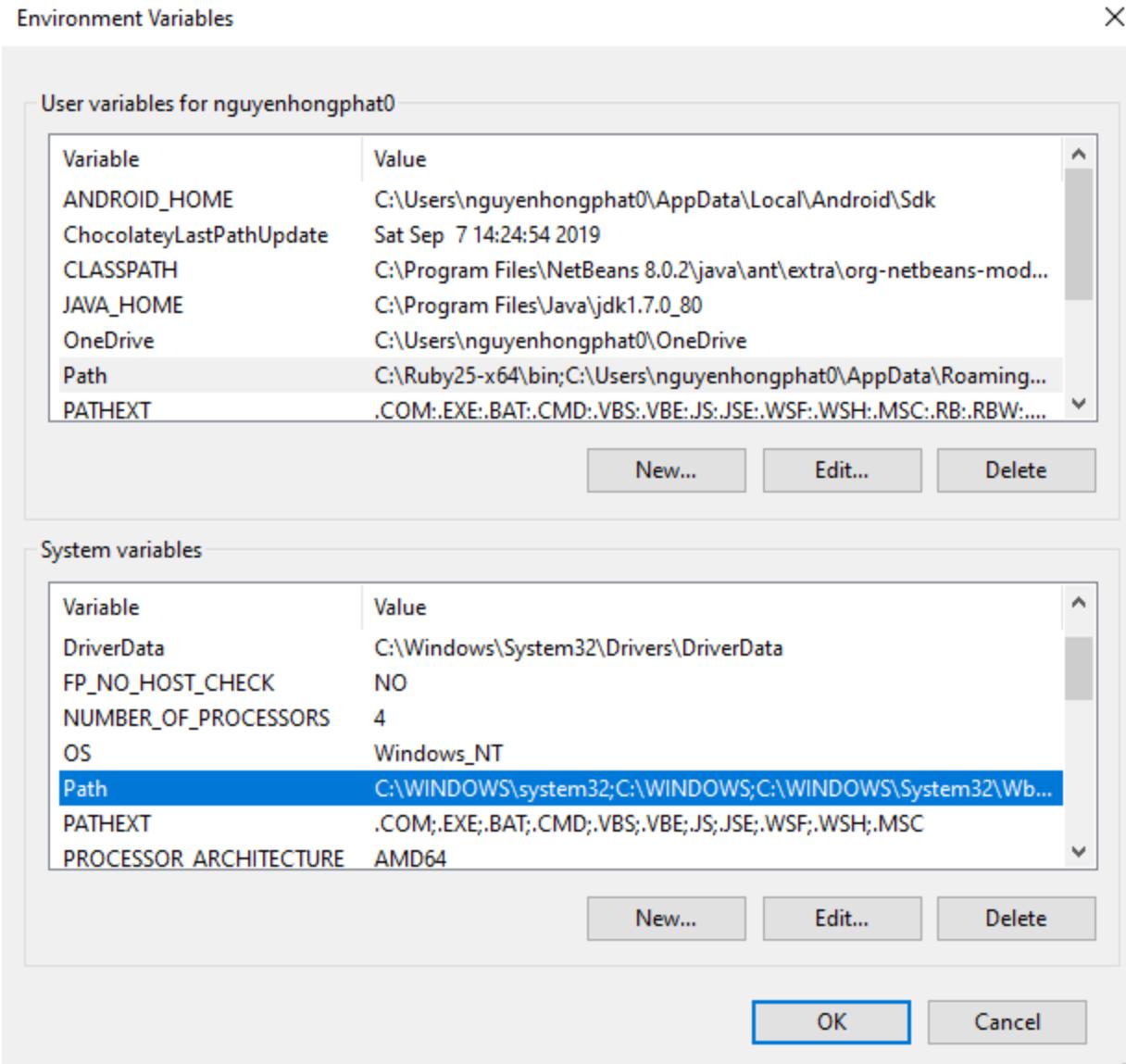


Figure 64 - <Installation Guide> Step 1.2.3.6

Copy DeepSpeech pre-trained model to deployed folder (same folder as Web.config)

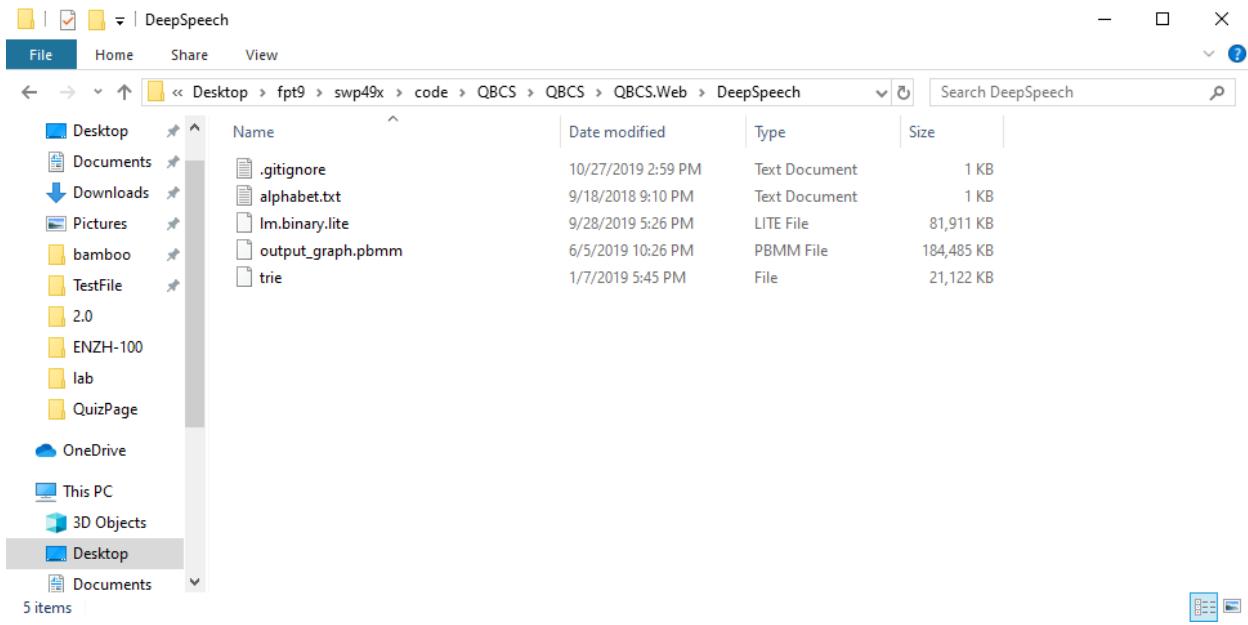


Figure 65 - <Installation Guide> Step 1.2.3.7

### 1.3 Environment set up at client – side

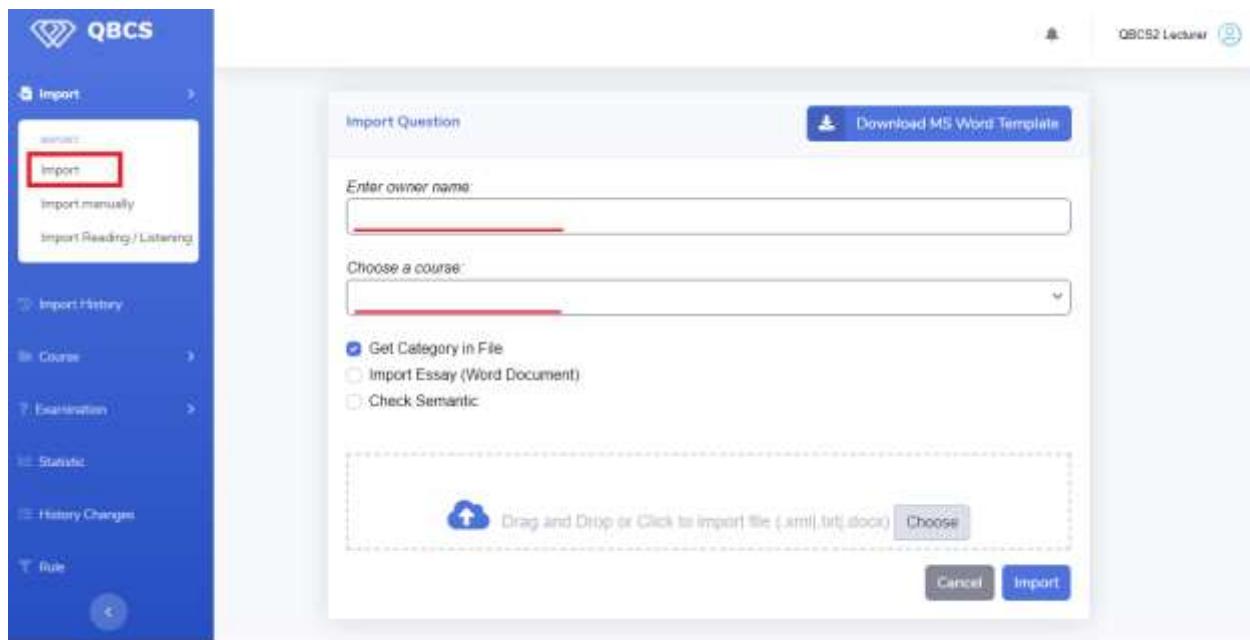
The application is developed and tested mostly on Google Chrome. We suggest that our clients should use Google Chrome when interact with the system. Google Chrome download: <https://www.google.com/chrome/>

## 2. User Guide

### 2.1. Import question process

#### 2.1.1. Import screen

##### 2.1.1.1. Normal import



- Fields underlined in red are mandatory.
- “Get Category in File” – used to get information in a directory way CourseName/Chapter-Topic-LO/QuestionLevel. (Should be checked)
- “Import Essay” – Check this if you are importing a Word file with Essay questions
- “Check Semantic” – used to check semantically duplicate questions.

**Import Question**

[Download MS Word Template](#)

Enter owner name:  
Nguyễn Long Quốc

Choose a course:  
EN051 - Summit 1

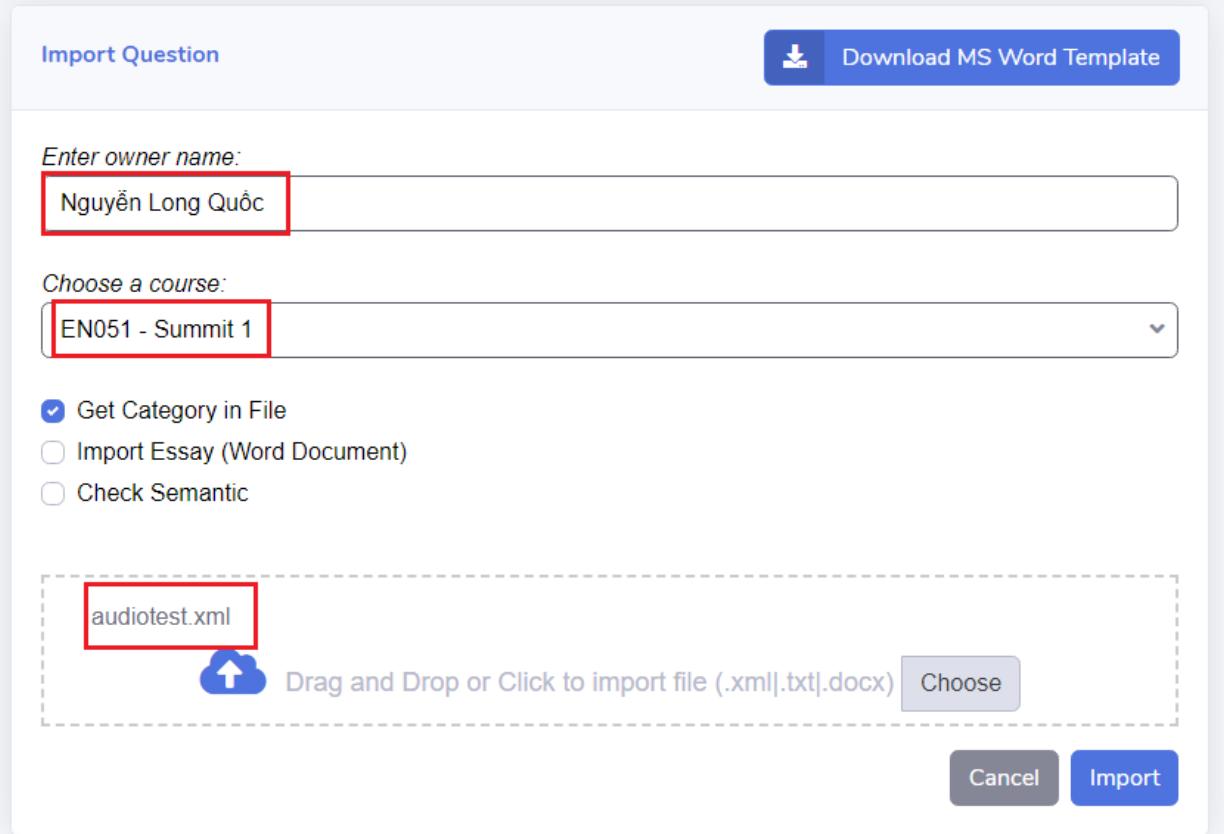
Get Category in File  
 Import Essay (Word Document)  
 Check Semantic

Drag and Drop or Click to import file (.xml|.txt|.docx)

Choose

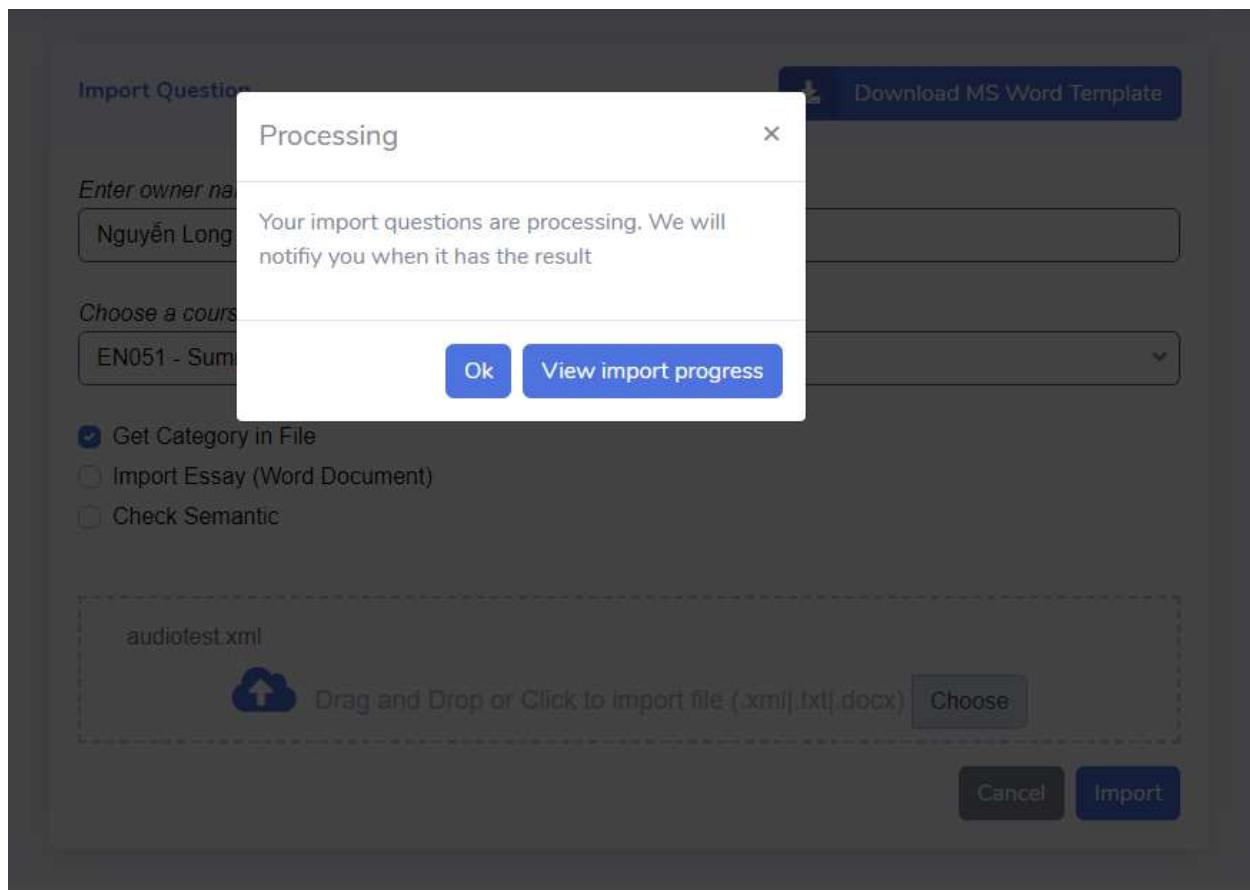
Cancel Import

audiotest.xml

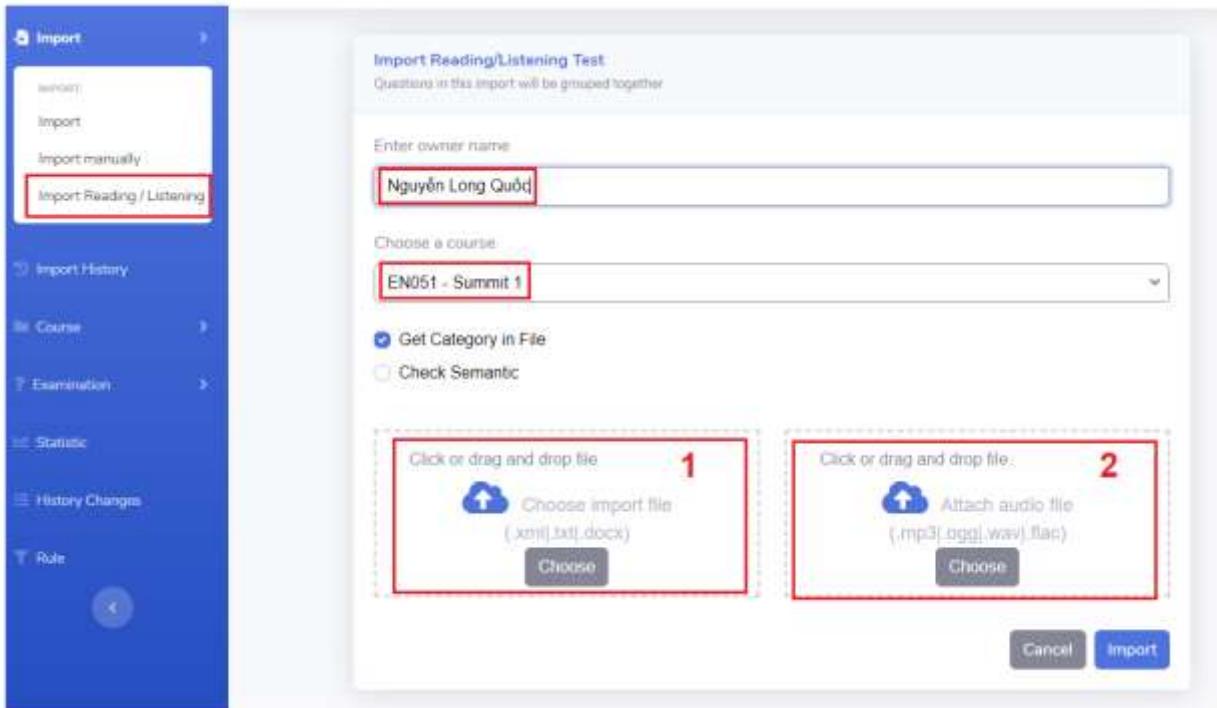


After choosing your question file name, make sure to enter **your name**, and **course name**.

- Drag and drop file or click “Choose” and put your questions file into the form, after that, file name will be shown.
- Click button Import to import questions from file into question bank – QBCS.
- The pop up will appear. Click “OK” to stay in import screen. Click “View import progress” to move to Import History Screen.



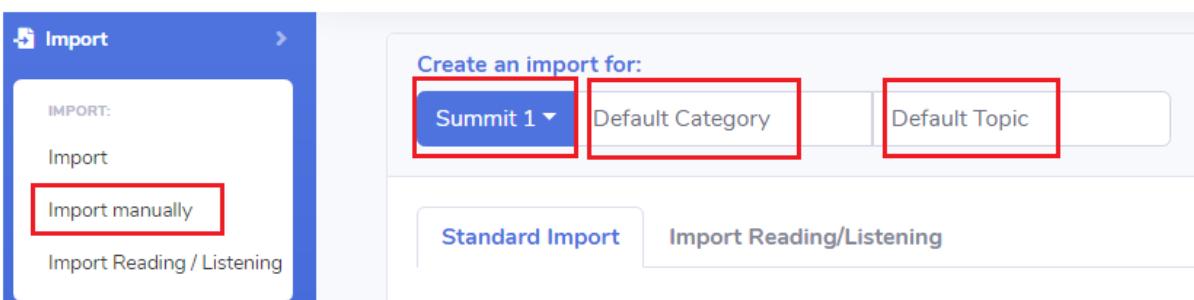
### 2.1.1.2. Import Reading or Listening



- “Get Category in File” – used to get information in a directory way CourseName/Chapter-Topic-LO/QuestionLevel. (Should be checked)
- “Check Semantic” – used to check semantically duplicate questions.
- There are two forms to input file:
  - Form **number 1** is the form where you input questions file.
  - Form **number 2** is the form where you input audio file if you are importing a set of questions with Listening audio (Optional).

### 2.1.1.3. Import manually

#### Step 1: Select target Course, Category and Topic for questions



- Choose Course
- Choose Category of the selected course
- Choose Topic
- Created questions will be stored into selected Course, Category, Topic

## Step 2: Create questions

1. Choose question's level
2. Choose question's type, bellow is multiple choice question
3. Input question's content
4. Input option's content
5. Option is correct or not
6. Set fraction for option (0% = incorrect option)
7. Preview questions before saving
8. Save, a question is created, **but not yet inserted into the system.**

### Question 2

Easy **1** ▾ Multiple choice **2** ▾

Edit question content:

File Edit View Insert Format Table

Which of the following animals are mammal: **3**

POWERED BY TINY

Edit options:

Cat <b>4</b>	50 <b>6</b> %
<input checked="" type="checkbox"/> Correct? <b>5</b>	Delete option
Dog	50 %
<input checked="" type="checkbox"/> Correct?	Delete option
Sea horse	0 %
<input type="checkbox"/> Correct?	Delete option
Alligator	0 %
<input type="checkbox"/> Correct?	Delete option
Eagle	0 %
<input type="checkbox"/> Correct?	Delete option

Add an option

Cancel **Save** **8**

Preview:  
Multiple choice  
Which of the following animals are mammal:  
A. [50%] Cat  
B. [50%] Dog  
C. Sea horse  
D. Alligator  
E. Eagle

*Example of a Multiple choice question*

For Matching type question:

- There is no fraction for option.
- If you want to delete an option, click “Delete option”

### Question 3

Easy ▾ Matching ▾

Preview:  
Matching

Match:

Dog	⤓	Bark
Cat	⤓	Meow
Snake	⤓	Hiss
Lion	⤓	Roar

Edit question content:

File Edit View Insert Format Table

← → Paragraph      ...

Match:

POWERED BY TINY

Edit options:

Dog	Bark	<input type="button" value="Delete option"/>
Cat	Meow	<input type="button" value="Delete option"/>
Snake	Hiss	<input type="button" value="Delete option"/>
Lion	Roar	<input type="button" value="Delete option"/>

Add an option

Cancel Save

*Example of a Matching question*

For Fill in blank type question:

- You can add **multiple choice** in a sentence, multiple choice question has correct and incorrect options and the options are shown.
- On the other hand, all option in **short answer** are correct, but options will not be shown when taking test. Students have to input answer into a text field.
- One question cannot contain both **multiple choice** and **short answer**, this question is just an example.

#### Question 4

Medium ▾ Fill in blank

Edit question content:

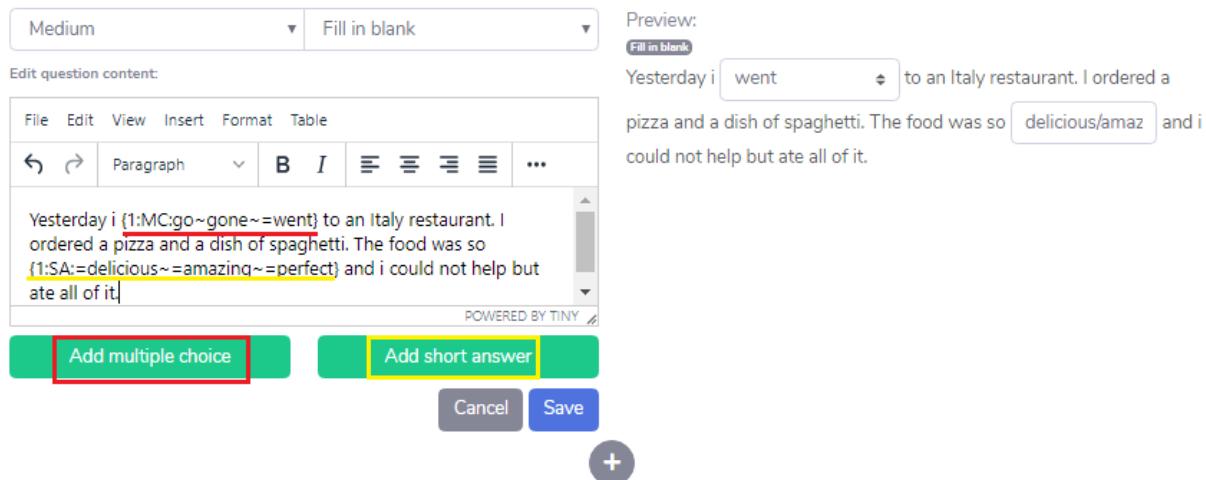
File Edit View Insert Format Table

Yesterday i (1:MC:go~gone~=went) to an Italy restaurant. I ordered a pizza and a dish of spaghetti. The food was so (1:SA:=delicious~=amazing~=perfect) and i could not help but ate all of it.

Preview:  
Fill in blank  
Yesterday i went to an Italy restaurant. I ordered a pizza and a dish of spaghetti. The food was so delicious/amaz and i could not help but ate all of it.

Add multiple choice Add short answer Cancel Save

+



*Example of a Fill in blank question*

## Question 5

Medium ▾ Essay ▾

Edit question content:

Preview:  
Essay  
Describe a dog (500 words).

File Edit View Insert Format Table

Paragraph ▾ B I [bold] [italic] [list] [list] [list] [list] [list] ...

Describe a dog (500 words).

POWERED BY TINY

Cancel Save

## *Example of an Essay question*

For short answer type:

- You can add **options**, but they are actually suggestion for the question.
- There are no right or wrong options.

## Question 6

Medium Short answer

Edit question content:

File Edit View Insert Format Table

← → Paragraph B I [=] ...

Describe a cat:

POWERED BY TINY

Preview:  
Short answer

Describe a cat:

- Ears, Body, Fur, Tail
- Wings, Feathers
- Slim, No legs

Ears, Body, Fur, Tail Delete option

Wings, Feathers Delete option

Slim, No legs Delete option

Add an option

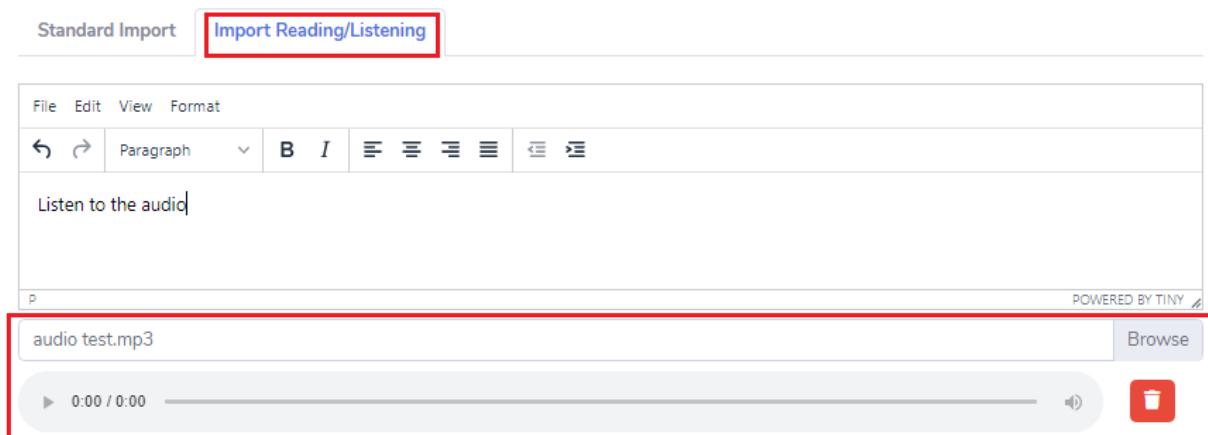
Cancel Save

+

*Example of a Short Answer question*

If you want to import questions as a group, used for Listening and Reading:

- Click to “Import Reading/Listening” tab
- Fill question’s content:
  - If it is a reading, input reading passage into the question’s content.
  - If it is a listening, you can leave it blank or simply write “Listen to the audio”
- You can upload audio by clicking “Browse” and delete it by clicking the trash icon.



### Step 3: Preview

- After all questions have been created, it will be shown on the screen.
- If you have done with your import, click “Import Now” to import questions into the system.
- Manually created questions will still have to be checked for duplication when imported into the system.

#### Question 1



Single choice

Describe a dog:

- A. [100%] Have two ears and four legs
- B. Have wings and feathers
- C. Have small ears and two legs
- D. All options are correct

#### Question 2



Multiple choice

Which of the following animals are mammal:

- A. [50%] Cat
- B. [50%] Dog
- C. Sea horse
- D. Alligator
- E. Eagle

### Question 3



Matching

Match:

Dog	↔	Bark
Cat	↔	Meow
Snake	↔	Hiss
Lion	↔	Roar

### Question 4



Fill in blank

Yesterday i  went to an Italy restaurant. I ordered a pizza and a dish of spaghetti.

### Question 5



Essay

Describe a dog (500 words).

### Question 6



Short answer

Describe a cat:

- Ears, Body, Fur, Tail
- Wings, Feathers
- Slim, No legs



Check semantic

Import Now (6 question)

## 2.1.2. Import History screen

- You can click “Import History” on the left side menu bar, or click on the “Notifying bell icon” in order to enter this Screen.
- Click on the “Eye icon” to enter “Result screen”.

Import history

You will be notified when the checking process is done

No.	Owner	Course	Date	Total	Success	Status
1	Kiều Trong Khánh	PRX301	10/12/2019 4:18:31 PM	148	0	Checked 148/148
2	Kiều Trong Khánh	PRX301	10/12/2019 4:04:28 PM	148	0	Editing 0/148

Showing 1 to 2 of 2 entries

Click to enter Result Screen

## 2.1.3. Result screen

### 2.1.3.1. Duplicated tab

Import Result #1051

Web Development (XML) - PRX301

DUPLICATED (148) SUCCESS (148) INVALID (0) DELETED (0)

Show 10 questions per page

Search question content

Filter question type

Filter type in 'Question Content' column

Question ID	Question Content	Duplicated With
5181	PRX301 / Topic2 / Hard Match cast <del>Henry Cavill</del> Match the actor and their cast.	PRX301 / Topic2 / Hard Match cast <del>Henry Cavill</del> Match the actor and their cast.
	Superman	Captain America
	Batman	Henry Cavill
	Wonder Woman	Ben Affleck
	Louis Lane	Chris Evans

Delete Accept Edit

- When click “Delete”, the question will be moved to “Deleted” tab.
- Click “Accept” to add the question into “Success” tab no matter of the content.
- Click “Edit” will bring up the edit question form.
  - Do not touch tags underlined in red if they appear.

- You can edit content, delete options, add options. Simply click “OK” button to finish editing the question.
- There may be more than one question on “Duplicated With” (right side) column, but there is always only one question of “Question Content” (left side) column.

Question ID	Question Content	Duplicated With																				
5181	<p>PRX391 / Topic2 / Hard</p> <p><b>Match cast Matching</b></p> <p>Match the actor and their cast</p> <table> <tbody> <tr> <td>Superman</td> <td>↔</td> <td>Henry Cavil</td> </tr> <tr> <td>Batman</td> <td>↔</td> <td>Ben Afflect</td> </tr> <tr> <td>Wonder Woman</td> <td>↔</td> <td>Gal Gadot</td> </tr> <tr> <td>Louis Lane</td> <td>↔</td> <td>Amy Adam</td> </tr> </tbody> </table> <p><b>Buttons:</b> Delete   Accept   Edit</p>	Superman	↔	Henry Cavil	Batman	↔	Ben Afflect	Wonder Woman	↔	Gal Gadot	Louis Lane	↔	Amy Adam	<p><b>Edit question content:</b></p> <p>[html]Match the actor and their cast&lt;br&gt;</p> <p><b>Upload Image</b></p> <p><b>Edit options:</b></p> <table> <tbody> <tr> <td>[html]Captain America</td> <td>Chris Evans</td> </tr> <tr> <td>[html]Superman</td> <td>Henry Cavil</td> </tr> <tr> <td>[html]Batman</td> <td>Ben Afflect</td> </tr> <tr> <td>[html]Thor</td> <td>Chris Hemsworth</td> </tr> </tbody> </table> <p><b>Delete option</b></p> <p><b>Add an option</b></p> <p><b>OK</b></p>	[html]Captain America	Chris Evans	[html]Superman	Henry Cavil	[html]Batman	Ben Afflect	[html]Thor	Chris Hemsworth
Superman	↔	Henry Cavil																				
Batman	↔	Ben Afflect																				
Wonder Woman	↔	Gal Gadot																				
Louis Lane	↔	Amy Adam																				
[html]Captain America	Chris Evans																					
[html]Superman	Henry Cavil																					
[html]Batman	Ben Afflect																					
[html]Thor	Chris Hemsworth																					

*Edit Form appears after clicking “Edit” button*

<p>5302</p> <p>PRX391 / Topic1 / Easy C448-Q000086 Single</p> <p>It is thought that each neuron in the brain may have as many as connections to adjacent neurons.</p> <p>A. 10 B. [100%] 10,000 C. 100 D. 1,000,000</p> <p><span style="background-color: red; border-radius: 5px; padding: 2px 10px;">Delete</span> <span style="background-color: green; border-radius: 5px; padding: 2px 10px;">Accept</span> <span style="background-color: blue; border-radius: 5px; padding: 2px 10px;">Edit</span></p>	<p>PRX391 / Topic1 / Easy C448-Q000087 Single</p> <p>It is thought that each neuron in the brain may have as many as connections to adjacent neurons.</p> <p>A. 10 B. [100%] 10,000 C. 100 D. 1,000,000</p> <p><span style="background-color: red; border-radius: 5px; padding: 2px 10px;">Delete</span> <span style="background-color: green; border-radius: 5px; padding: 2px 10px;">Accept</span> <span style="background-color: blue; border-radius: 5px; padding: 2px 10px;">Edit</span></p>	<p>PRX391 / Topic1 / Easy C448-Q000088 Single</p> <p>It is thought that each neuron in the brain may have as many as connections to adjacent neurons.</p> <p>A. 1 B. 8 C. [100%] 10,000 D. 1,000,000</p> <p><span style="background-color: red; border-radius: 5px; padding: 2px 10px;">Delete</span> <span style="background-color: green; border-radius: 5px; padding: 2px 10px;">Accept</span> <span style="background-color: blue; border-radius: 5px; padding: 2px 10px;">Edit</span></p>
---	---	--

After checking all of the duplicate questions, you can click “View Approved Questions” to go to the Success tab.

<p>7605</p> <p>PRX391 / Topic1 / Easy C448-Q000096 Single</p> <p>What is the biggest city in Viet Nam</p> <p>A. Can Tho B. [100%] Ho Chi Minh C. Da Nang D. Ha Noi</p> <p><span style="background-color: red; border-radius: 5px; padding: 2px 10px;">Delete</span> <span style="background-color: green; border-radius: 5px; padding: 2px 10px;">Accept</span> <span style="background-color: blue; border-radius: 5px; padding: 2px 10px;">Edit</span></p>	<p>PRX391 / Topic1 / Easy C448-Q000097 Single</p> <p>In Viet Nam, the biggest city is</p> <p>A. Can Tho B. [100%] Ho Chi Minh C. Da Nang D. Ha Noi</p> <p><span style="background-color: red; border-radius: 5px; padding: 2px 10px;">Delete</span> <span style="background-color: green; border-radius: 5px; padding: 2px 10px;">Accept</span> <span style="background-color: blue; border-radius: 5px; padding: 2px 10px;">Edit</span></p>	<p><span style="background-color: grey; border-radius: 5px; padding: 2px 10px;">Cancel</span> <span style="border: 2px solid red; padding: 2px 10px;">View Approved Questions</span></p>
--	--	--

### 2.1.3.2. Success tab

- This tab contains questions that are not duplicate with others, or simply not violate any question “Rules”.
- Click “Delete” button delete the question and move it to “Deleted” tab.

## Import Result #1051

Web Development (XML) - PRX301

DUPLICATED 16/148

SUCCESS 130/148

INVALID 2/148

DELETED 0/148

Show 10 questions per page

Search question content

Filter question type ▾

Question ID	Question Content	Action												
5184	<p>PRX391 / Topic2 / Hard          Quotes Matching Accepted</p> <p>Match the CORRECT sentences:</p> <table> <tbody> <tr> <td>Hôm nay nhìn xe rước hoa xuôi ngược nếp đường</td> <td>⇒</td> <td>Gửi thư trao cho người yêu và câu luyến thương</td> </tr> <tr> <td>Chiều tìm không mây đường cũ bước lẩn vể</td> <td>⇒</td> <td>Buồn nghe day dứt tim</td> </tr> <tr> <td>Nhìn xe kết hoa màu trắng ngõ lòng mình mơ</td> <td>⇒</td> <td>Pháo hồng nhuộm tím đưa</td> </tr> <tr> <td>Nhớ thương đầy với mong thấy ai mỉm cười</td> <td>⇒</td> <td>làn môi xinh tuyệt vời</td> </tr> </tbody> </table>	Hôm nay nhìn xe rước hoa xuôi ngược nếp đường	⇒	Gửi thư trao cho người yêu và câu luyến thương	Chiều tìm không mây đường cũ bước lẩn vể	⇒	Buồn nghe day dứt tim	Nhìn xe kết hoa màu trắng ngõ lòng mình mơ	⇒	Pháo hồng nhuộm tím đưa	Nhớ thương đầy với mong thấy ai mỉm cười	⇒	làn môi xinh tuyệt vời	<button>Delete</button>
Hôm nay nhìn xe rước hoa xuôi ngược nếp đường	⇒	Gửi thư trao cho người yêu và câu luyến thương												
Chiều tìm không mây đường cũ bước lẩn vể	⇒	Buồn nghe day dứt tim												
Nhìn xe kết hoa màu trắng ngõ lòng mình mơ	⇒	Pháo hồng nhuộm tím đưa												
Nhớ thương đầy với mong thấy ai mỉm cười	⇒	làn môi xinh tuyệt vời												
5186	<p>PRX391 / Topic2 / Hard          Quotes Matching Accepted</p> <p>Match the CORRECT sentences:</p> <table> <tbody> <tr> <td>On the first page</td> <td>⇒</td> <td>of our story</td> </tr> <tr> <td>The things turn out</td> <td>⇒</td> <td>so bright</td> </tr> <tr> <td>Even angel has</td> <td>⇒</td> <td>their weakest scheme</td> </tr> <tr> <td>And you take that</td> <td>⇒</td> <td>To new extreme</td> </tr> </tbody> </table>	On the first page	⇒	of our story	The things turn out	⇒	so bright	Even angel has	⇒	their weakest scheme	And you take that	⇒	To new extreme	<button>Delete</button>
On the first page	⇒	of our story												
The things turn out	⇒	so bright												
Even angel has	⇒	their weakest scheme												
And you take that	⇒	To new extreme												

### 2.1.3.3. Invalid tab

DUPLICATED 13/148		SUCCESS 130/148	INVALID 2/148	DELETED 3/148																								
Show 10 questions per page		Search question content Filter question type ▾																										
Question ID	Question Content	Message																										
5323	<p>Edit question content:</p> <div style="border: 1px solid #ccc; padding: 5px; min-height: 100px;"> [html]What you should do before you eat?&lt;cbr&gt; </div> <p>Upload Image</p> <p>% of total mark</p> <p>Edit options:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Wash your hands</td> <td style="text-align: right; padding: 5px;">100</td> <td style="text-align: right; padding: 5px;">%</td> </tr> <tr> <td style="padding: 5px;"><input checked="" type="checkbox"/> Correct?</td> <td colspan="2" style="text-align: right; padding: 5px;">Delete option</td> </tr> <tr> <td style="padding: 5px;">Wash your shoes</td> <td style="text-align: right; padding: 5px;">0</td> <td style="text-align: right; padding: 5px;">%</td> </tr> <tr> <td style="padding: 5px;"><input type="checkbox"/> Correct?</td> <td colspan="2" style="text-align: right; padding: 5px;">Delete option</td> </tr> <tr> <td style="padding: 5px;">Do the dishes</td> <td style="text-align: right; padding: 5px;">0</td> <td style="text-align: right; padding: 5px;">%</td> </tr> <tr> <td style="padding: 5px;"><input type="checkbox"/> Correct?</td> <td colspan="2" style="text-align: right; padding: 5px;">Delete option</td> </tr> <tr> <td style="padding: 5px;"> </td> <td style="text-align: right; padding: 5px;">0</td> <td style="text-align: right; padding: 5px;">%</td> </tr> <tr> <td style="padding: 5px;"><input type="checkbox"/> Correct?</td> <td colspan="2" style="text-align: right; padding: 5px;">Delete option</td> </tr> </table> <p>Add an option</p> <p>Click "OK" to save edited question</p>	Wash your hands	100	%	<input checked="" type="checkbox"/> Correct?	Delete option		Wash your shoes	0	%	<input type="checkbox"/> Correct?	Delete option		Do the dishes	0	%	<input type="checkbox"/> Correct?	Delete option			0	%	<input type="checkbox"/> Correct?	Delete option		<p>Option content is empty</p> <p>Rule violated</p>		
Wash your hands	100	%																										
<input checked="" type="checkbox"/> Correct?	Delete option																											
Wash your shoes	0	%																										
<input type="checkbox"/> Correct?	Delete option																											
Do the dishes	0	%																										
<input type="checkbox"/> Correct?	Delete option																											
	0	%																										
<input type="checkbox"/> Correct?	Delete option																											
5324	PRX391/Topic2/Hard ACM? <input checked="" type="checkbox"/> Do you like firework?	<p>Option content is empty</p> <p>Click edit to bring up edit form</p>																										

#### 2.1.3.4. Deleted tab

- Contains question that you have just deleted from “Duplicated” or “Success” tab.
- Click “Restore” to move the question to its original tab (the tab in which you deleted it).

DUPLICATED 13/148

SUCCESS 130/148

INVALID 2/148

DELETED 3/148

Show 10 questions per page

Search question content

Filter question type ▾

Question ID	Question Content	Action												
5182	<p>PRX391 / Topic2 / Hard</p> <p>Match cast <span style="background-color: #e0e0e0; border: 1px solid #ccc; padding: 2px;">Matching</span> <span style="background-color: #f0f0f0; border: 1px solid #ccc; padding: 2px;">Deleted</span></p> <p>Match the actor and their cast</p> <table> <tbody> <tr> <td>Captain America</td> <td>↳</td> <td>Chris Evans</td> </tr> <tr> <td>Superman</td> <td>↳</td> <td>Henry Cavil</td> </tr> <tr> <td>Batman</td> <td>↳</td> <td>Ben Affleck</td> </tr> <tr> <td>Thor</td> <td>↳</td> <td>Chris Hemsworth</td> </tr> </tbody> </table>	Captain America	↳	Chris Evans	Superman	↳	Henry Cavil	Batman	↳	Ben Affleck	Thor	↳	Chris Hemsworth	<button style="background-color: #e0e0e0; border: 1px solid #ccc; color: #ccc; padding: 2px 10px;">Restore</button>
Captain America	↳	Chris Evans												
Superman	↳	Henry Cavil												
Batman	↳	Ben Affleck												
Thor	↳	Chris Hemsworth												
5188	<p>PRX391 / Topic2 / Hard</p> <p>Sầu tím thiếp hờ ng <span style="background-color: #e0e0e0; border: 1px solid #ccc; padding: 2px;">Matching</span> <span style="background-color: #f0f0f0; border: 1px solid #ccc; padding: 2px;">Deleted</span></p> <p>Nỗi lòng bài hát lại với nhau:</p> <table> <tbody> <tr> <td>Chiều tím không có mây đường khá cũ bước đi</td> <td>↳</td> <td>Buồn day dứt tim luôn</td> </tr> <tr> <td>Nhớ thương đầy với mong thấy ai mỉm cười, làn môi ...</td> <td>↳</td> <td>xinh tuyệt vời</td> </tr> <tr> <td>Để rồi buồn ơi, ánh trăng soi còn đó</td> <td>↳</td> <td>Và nghe hơi gió biết rằng mình vừa mơ</td> </tr> <tr> <td>Nhin xe kết hoa màu trắng ngõ lòng mình mơ</td> <td>↳</td> <td>Pháo hồng nhuộm tím đưa</td> </tr> </tbody> </table>	Chiều tím không có mây đường khá cũ bước đi	↳	Buồn day dứt tim luôn	Nhớ thương đầy với mong thấy ai mỉm cười, làn môi ...	↳	xinh tuyệt vời	Để rồi buồn ơi, ánh trăng soi còn đó	↳	Và nghe hơi gió biết rằng mình vừa mơ	Nhin xe kết hoa màu trắng ngõ lòng mình mơ	↳	Pháo hồng nhuộm tím đưa	<button style="background-color: #e0e0e0; border: 1px solid #ccc; color: #ccc; padding: 2px 10px;">Restore</button>
Chiều tím không có mây đường khá cũ bước đi	↳	Buồn day dứt tim luôn												
Nhớ thương đầy với mong thấy ai mỉm cười, làn môi ...	↳	xinh tuyệt vời												
Để rồi buồn ơi, ánh trăng soi còn đó	↳	Và nghe hơi gió biết rằng mình vừa mơ												
Nhin xe kết hoa màu trắng ngõ lòng mình mơ	↳	Pháo hồng nhuộm tím đưa												

#### 2.1.3.4. Save result

- Simply click “Save” on the bottom right of the screen to add these questions into bank. Small confirm pop up will appear, click “OK”.

**Import Result #1051**

This import was loaded from a backup  
Fresh reload

Web Development (XML) - PRX301

DUPLICATED 23/145	SUCCESS 138/145	INVALID 0/145	DELETED 5/145												
Show 10 <input type="button" value="questions per page"/>	<input type="text" value="Search question content"/>	<input type="button" value="Filter question type"/>													
Question ID	Question Content	Action													
5182	PRX391 / Topic2 / Hard Match cast <span style="background-color: #ccc; border: 1px solid #ccc; padding: 2px;">Matching</span> <span style="background-color: #ccc; border: 1px solid #ccc; padding: 2px;">Deleted</span> Match the actor and their cast <table border="1"> <tr> <td>Captain America</td> <td><input type="button" value="Edit"/></td> <td>Chris Evans</td> </tr> <tr> <td>Superman</td> <td><input type="button" value="Edit"/></td> <td>Henry Cavill</td> </tr> <tr> <td>Batman</td> <td><input type="button" value="Edit"/></td> <td>Ben Affleck</td> </tr> <tr> <td>Thor</td> <td><input type="button" value="Edit"/></td> <td>Chris Hemsworth</td> </tr> </table>	Captain America	<input type="button" value="Edit"/>	Chris Evans	Superman	<input type="button" value="Edit"/>	Henry Cavill	Batman	<input type="button" value="Edit"/>	Ben Affleck	Thor	<input type="button" value="Edit"/>	Chris Hemsworth	<input type="button" value="Restore"/>	
Captain America	<input type="button" value="Edit"/>	Chris Evans													
Superman	<input type="button" value="Edit"/>	Henry Cavill													
Batman	<input type="button" value="Edit"/>	Ben Affleck													
Thor	<input type="button" value="Edit"/>	Chris Hemsworth													
5188	PRX391 / Topic2 / Hard Sẽ u tìm thiếp? p hóng <span style="background-color: #ccc; border: 1px solid #ccc; padding: 2px;">Matching</span> <span style="background-color: #ccc; border: 1px solid #ccc; padding: 2px;">Deleted</span> Nói lời bài hát lại với nhau; <table border="1"> <tr> <td>Chiều tìm không có mấy đường khá cũ bước đi</td> <td><input type="button" value="Edit"/></td> <td>Buồn day dứt tìm luôn</td> </tr> <tr> <td>Nhà thương đây với mong thấy ai mỉm cười, lần mồi ...</td> <td><input type="button" value="Edit"/></td> <td>xinh tuyệt vời</td> </tr> <tr> <td>Để rồi buồn ô, ánh trăng soi còn đỡ</td> <td><input type="button" value="Edit"/></td> <td>Và nghe hơi gió biết rằng mình vừa mở</td> </tr> <tr> <td>Nhin xe kết hoa màu trắng ngõ lồng minh mờ</td> <td><input type="button" value="Edit"/></td> <td>Phao hồng nhuộm tim đưa</td> </tr> </table>	Chiều tìm không có mấy đường khá cũ bước đi	<input type="button" value="Edit"/>	Buồn day dứt tìm luôn	Nhà thương đây với mong thấy ai mỉm cười, lần mồi ...	<input type="button" value="Edit"/>	xinh tuyệt vời	Để rồi buồn ô, ánh trăng soi còn đỡ	<input type="button" value="Edit"/>	Và nghe hơi gió biết rằng mình vừa mở	Nhin xe kết hoa màu trắng ngõ lồng minh mờ	<input type="button" value="Edit"/>	Phao hồng nhuộm tim đưa	<input type="button" value="Restore"/>	
Chiều tìm không có mấy đường khá cũ bước đi	<input type="button" value="Edit"/>	Buồn day dứt tìm luôn													
Nhà thương đây với mong thấy ai mỉm cười, lần mồi ...	<input type="button" value="Edit"/>	xinh tuyệt vời													
Để rồi buồn ô, ánh trăng soi còn đỡ	<input type="button" value="Edit"/>	Và nghe hơi gió biết rằng mình vừa mở													
Nhin xe kết hoa màu trắng ngõ lồng minh mờ	<input type="button" value="Edit"/>	Phao hồng nhuộm tim đưa													
5325	PRX391 / Topic2 / Hard What is your favorite web framework? <span style="background-color: #ccc; border: 1px solid #ccc; padding: 2px;">Editing</span> <span style="background-color: #ccc; border: 1px solid #ccc; padding: 2px;">Deleted</span> Which front end framework do you think the best? Explain why?	<input type="button" value="Restore"/>													
Prev	1	Next	<input type="button" value="Cancel"/>	<input style="border: 2px solid red; background-color: #007bff; color: white; border-radius: 5px; padding: 5px; width: 100px; height: 30px;" type="button" value="Save"/>											



## 2.2. Generate examination process

### 2.2.1. Examination's Questions screen

A screenshot of the QBCS software interface. On the left, a sidebar menu has "Examination's Questions" highlighted with a red box. The main area shows a table titled "List all course" with one entry: No. 448, Code PRX01, Name Web Development (XML). To the right of the table are buttons for "View Status", "Search for your Course here" (with a search bar containing "java"), "View history of questions", and "Action" (with icons for edit, delete, and add). Below the table, it says "Showing 1 to 1 of 1 entries (filtered from 930 total entries)". At the bottom right, there are "Previous" and "Next" buttons, and a link "Click here to Go to Syllabus screen".

### 2.2.2. Syllabus screen

- This screen will create information for “Create exam automatically” to base on.
- Amount of Questions of all Syllabuses must equal to “Total Question”
- Information consists of:
  - Total of questions.
  - Number of easy questions – based on Default Grade
  - Questions are from which Learning outcomes – based on Learning outcomes that you have added to the Syllabus.

Create syllabus for  
Web Development (XML) (PRX301)

Total question for the exam  
Total Question: 50

Default Grade for Ordinary Student: 40

Total mark for easy questions will be 40/100

Update

Must match "Total Question"

List all syllabus

No	Name	Amount Questions	Action
1	Test Syllabus	50	

+ New Syllabus

Edit Syllabus name, Amount of Questions and Learning Outcomes contain in the Syllabus

Learning outcomes

No	Name	Action
1	Topic2	

Topic3

Select and add learning outcomes to Syllabus

### 2.2.3. Examination screen

#### a. Entry screen

- Contains all Examination created.
- Click “Create New Exam” to start creating Examination.

All Examination

Click here to start creating examination

Create new Exam

Show 10 entries

Search:

Course	Group	Code	Generated Date	Easy	Medium	Hard	Action
No data available in table							

Showing 0 to 0 of 0 entries

Previous Next

Activity

History Changes

Course

Examination's Questions

Statistic All Courses

Status

**Examination**

Import

Mentally

Click Examination on the left side menu bar

#### b. List of courses screen

- In order to Generate Exam Automatically, all of your questions must contain Question Level (Easy, Medium, Hard).

The screenshot shows the QBCS software interface. On the left, a sidebar menu includes: Activity, History Changes, Course, Examination's Questions, Statistic All Courses, Statistic, and Examination (which is highlighted with a red border). The main content area is titled "List all course" and contains a search bar with placeholder text "Search for your Course here" and a search input field containing "PRX". Below the search is a table with columns: No., Code, Name, and Action. One entry is shown: No. 448, Code PRX301, Name Web Development (XML). At the bottom of the table, it says "Showing 1 to 1 of 1 entries (filtered from 538 total entries)". To the right of the table are two buttons: "Generate Exams Automatically" and "Create Exam Manually". Navigation buttons include "Previous", "1", and "Next". A blue arrow points from the search input field to the search placeholder text. Another blue arrow points from the "Action" column header to the edit and delete icons in the table row.

## 2.2.4. Generate exam automatically

### Step 1: Select total of exams you want to create

Automatic generate an exam for:

PRX301 - Web Development (XML)

Step 1 Step 2 Step 3 Step 4

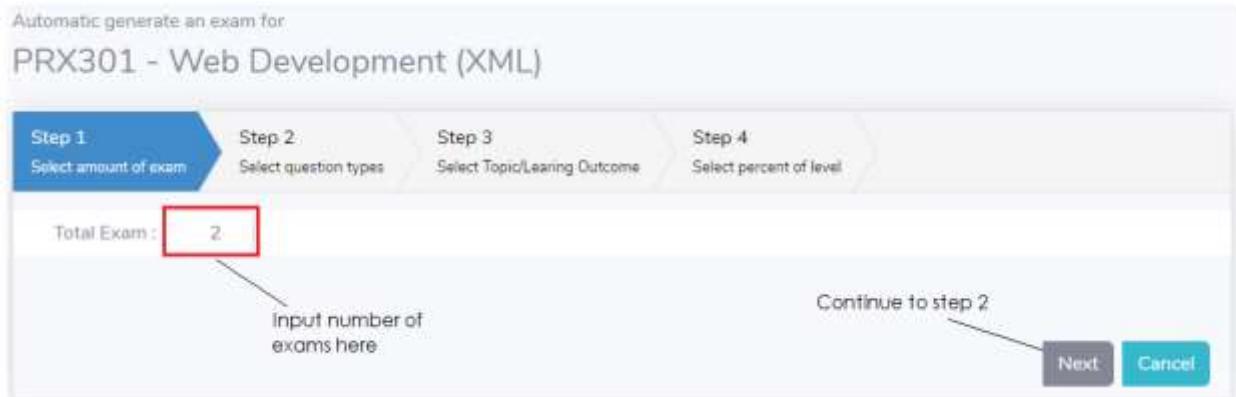
Select amount of exam Select question types Select Topic/Learning Outcome Select percent of level

Total Exam:  2

Input number of exams here

Continue to step 2

Next Cancel



### Step 2: Select types for questions contain in the exam.

Step 1 Step 2 Step 3 Step 4

Select amount of exam Select question types Preview syllabus Select percent of level

SingleChoice  
 MultipleChoice  
 Matching  
 ShortAnswer  
 Essay  
 FillinBlank  
 Passage  
 Listening

Previous Next Cancel



### Step 3: Re-confirm and select Topic/Learning Outcomes.

Step 1: Select amount of exam  
Step 2: Select question types  
Step 3: Preview syllabus  
Step 4: Select percent of level

Total Question: 50  
Default Grade for Ordinary Student: 40

Name	Action
test	<a href="#">Manage learning outcomes in syllabus</a>

[+ New Syllabus](#)

No	Name	Action
1	Topic2	<a href="#">Delete</a>
2	Topic3	<a href="#">Delete</a>
3	Topic4	<a href="#">Delete</a>
4	Topic5	<a href="#">Delete</a>

Previous Next Cancel

#### Step 4: Enter student's grade

- Enter percent of easy, medium or hard questions
- Or enter percent by Grade, ordinary = easy, good = medium, excellent = hard.x
- Click Button “Finish” to generate Exams.

Automatic generate an exam for:

PRX301 - Web Development (XML)

Step 1: Select amount of exam  
Step 2: Select question types  
Step 3: Select Topic/Learning Outcomes  
Step 4: Select percent of level

[ENTER BY PERCENTAGE](#) [ENTER BY GRADE](#)

Enter by grade

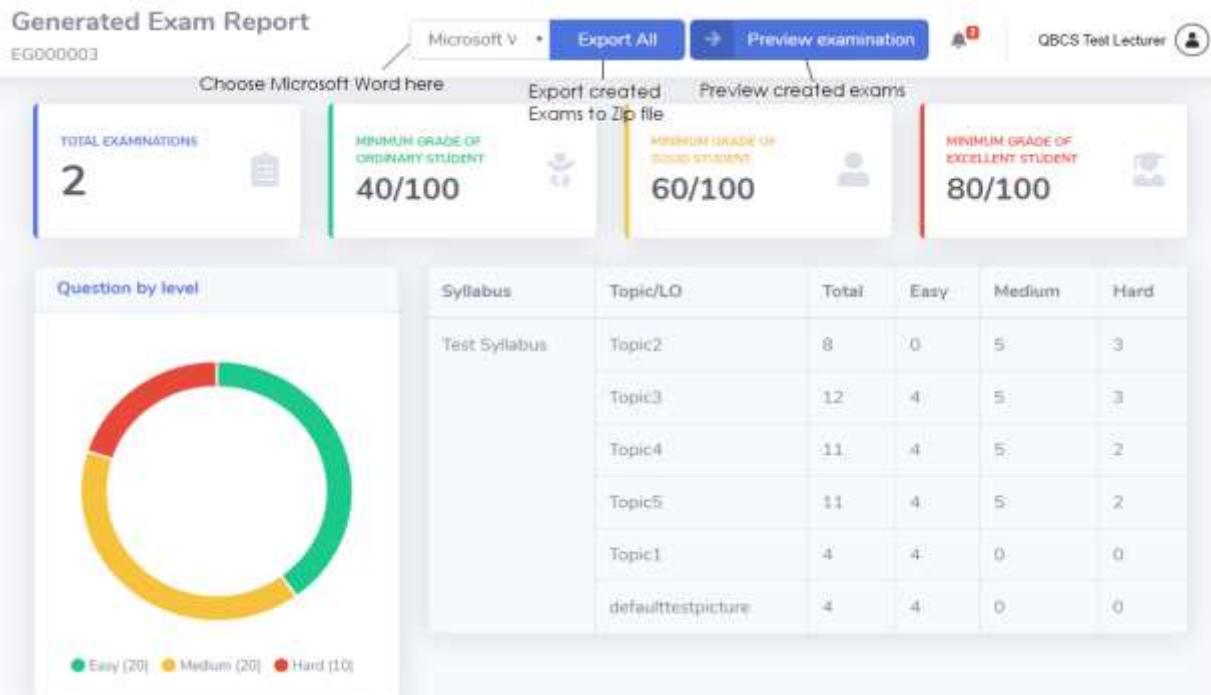
Minimum grade of ordinary student: 40 / 100

Minimum grade of good student: 60 / 100

Minimum grade of excellent student: 80 / 100

Previous Finish Cancel

#### Step 5: Statistics



## 2.2.5. Create exam manually

Create an exam for  
**Web-based Java Applications**

Full screen Save exam QBCS2 Lecture Manager

Save and create examination

2750 questions in exam.

View by number of questions

Difficulty student: 300/300 | Score student: 100/300 | Excellent student: 300/300

Show 10 rows per page Search question content

Question Bank Select Category Select Topic

PROC391 120 Topic1 16 Choose Level Selected Level

Question types Select types of questions

Show 10 rows per page Search question content

Code Question Add

C439-Q000316 Topic1 Easy C439-Q000316 [REDACTED]

This question has appeared in the previous examination

Telephone support and hot lines, such as a poison control center, can make use of \_\_\_\_\_

A. [REDACTED] expert systems  
B. SDRAM  
C. MRAM  
D. ROM

C439-Q000307 Topic1 Easy C439-Q000307 [REDACTED]

C439-Q000307 Topic1 Easy C439-Q000307 [REDACTED]

1 Topic1 Easy C439-Q000316 [REDACTED]

The total pool of IPv4 addresses is separated into groups, called \_\_\_\_\_

A. [REDACTED] classes  
B. aggregations  
C. entities  
D. clusters

2 Topic1 Easy C439-Q000307 [REDACTED]

C439-Q000307 Topic1 Easy C439-Q000307 [REDACTED]

Effort is ongoing to make \_\_\_\_\_ available on cell phones.

A. [REDACTED]

## 2.2.6. Preview created Exams

Activity

History Changes

Course

Examination's Questions

Statistic All Courses

Statistic

**Examination**

**Two exams in one Group Examination**

All Examination

Review Exams in Group Examination

Create new Exam

Show 10 entries

Search:

Course	Group	Code	Generated Date	Easy	Medium	Hard	Action
PRX301	EG000004	EX000005	18:59 12/10/2019	25	15	10	
PRX301	EG000003	EX000004	18:15 12/10/2019	20	20	10	
PRX301	EG000003	EX000003	18:15 12/10/2019	20	20	10	

**Disable the Exam**

Examination Group : EG000003

**EX000003 EX000004** Exams code for 2 created exams

**Delete Examination Group**

Delete whole Examination Group  
-> It will delete all 2 created exams

Click to select Exam

- Number of easy questions: 20
- Number of medium questions: 20
- Number of hard questions: 10

- Minimum grade of ordinary student: 40/100
- Minimum grade of good student: 64/100
- Minimum grade of excellent student: 80/100

Show 10 questions per page

Search question content:

No.	Code	Question	Topic/LO	Level	Action
1	C448-Q000142	<p>PROGT</p> <p><b>C448-Q000142</b> </p> <p>A(n) _____ is a standard or typical example that gives the end user a good idea of what they will see when their application is completed.</p> <p>A. flowchart B. <b>proto</b>otype C. data dictionary</p>	Topic2	Medium	

**Delete this question and automatically replace it with another**

- A. **Binary**  
B. Octal  
C. Decimal  
D. Hexadecimal

Prev **1** 2 3 4 5 Next

File extension

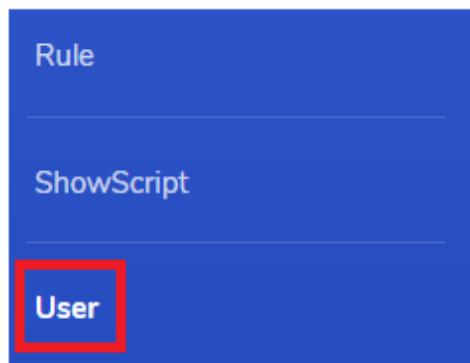
Microsoft Word

Export All:  Check on this to export all exams in Exam Group to a Zip

Click to Export Exam — **Export**

### 2.3. Add Course for Lecturer

→ Select "User" from the left side menu bar.



→ Search for User on the User List Screen.

The screenshot shows a 'User list' screen. At the top, there is a search bar with the placeholder 'Search for Lecturer Name here' and a search input field containing 'Kiều'. Below the search bar is a table with columns: 'Code', 'Fullname', 'Role', and 'Action'. The table contains three entries:

Code	Fullname	Role	Action
ChungKTT	Kiều Thị Thu Chung	Lecturer	
KhanhKT	Kiều Trọng Khanh	Lecturer	
LongKH	Kiều Hoàng Long	Lecturer	

Below the table, a message says 'Showing 1 to 3 of 3 entries (filtered from 188 total entries)'. At the bottom right, there are buttons for 'Previous' and 'Next'.

→ Enter Course Name or Code, then Click "Add Course" to finish.

The screenshot shows a 'Profile' section with a lecturer's code and name. Below it is a 'List Course' section. In the 'List Course' section, there is a search bar labeled 'Enter Course Name or Code here' with the placeholder 'PRX'. To the right of the search bar is a teal 'Add Course' button. Below the search bar is a table with columns 'Course Code' and 'Course Name'. The table has one row with the text 'No data available in table'. At the bottom of the table are 'Previous' and 'Next' buttons. On the left side of the 'List Course' section, there is a note 'Enter a course:' above the search bar.

## 2.4. Review examination

### 2.4.1. <Lecturer Manager> Assign Lecturer

Step 1: Go to examination screen and click Verify button

The screenshot shows the 'All Examination' page. On the left is a sidebar with navigation options: 'Course', 'Examination' (which is selected and highlighted with a red box), 'Status', 'History Changes', and 'Rule'. The main area is titled 'All Examination' and contains a table of examinations. The table has columns: Course, Group, Generated Date, Easy, Medium, Hard, View, and Verify. Two rows are listed: PRJ321 (Group EG000006, Generated Date 11.18.10/12/2019, Easy 20, Medium 15, Hard 15) and PRJ321 (Group EG000005, Generated Date 22.48.09/12/2019, Easy 10, Medium 0, Hard 0). The 'Verify' button for the first row is highlighted with a red box. A red arrow points from the text 'Click here to go to assign examination screen' to the 'Verify' button.

Step 2: Enter Lecturer's name and click assign

**Selected Examination**  
Assigned Lecture To verify examination group  
**EG000005 - PRJ321**

**Examination verifying process**

Step 1 Create examination Step 2 Assign an lecturer Step 3 Evaluate the exam based on lecturer review result (IR) Step 4 Export examination

**EX000010**  
Wait for lecturer to review the exam

**Assigned Lecturers of this exam**

Find a Lecturer Enter Lecturer name to assign **Assign to exam** Click to assign

Show 10 entries per page Search lecturer by name

ID	Lecture	Action
1:	Đặng Thị Minh Thuyết <b>Assigned Lecturer</b>	

#### 2.4.2. <Lecturer> Review examination

Step 1: Go to assigned examination and click review exam button

**Examinations assigned to me**

Show 10 entries Search

Course	Group	Creator	Created Date	Total examinations	Average Score	Take exam	Review attempts
PRJ321	EG000005	Đặng Thị Minh Thuyết	12/9/2019 10:48:39 PM	1	0		No attempt yet

Showing 1 to 1 of 1 entries Click here to take and review examination Previous 1 Next

## Step 2: Lecturer takes the exam

59:25

Examination Code: EX000010  
Answered: 0/10

Question 1: Not yet answered  
Flag question

C439-Q000236  
\_\_\_\_\_ patterns contain information about the color and brightness of a pixel.  
Select one:  
 Binary  
 Octal  
 Decimal  
 Hexadecimal

Question 2: Not yet answered  
Flag question

C439-Q000237  
To find the \_\_\_\_\_ of a given bit, flip it to the opposite state.  
Select one:  
 root  
 complement  
 position  
 sign

## Step 3: Lecturer reviews questions one by one in the exam

View attempt result  
EX000010

Examination Code: EX000010  
Grade: 5/10

Question 1: Answered  
Marked 0 out of 1  
Flag question

C439-Q000236  
\_\_\_\_\_ patterns contain information about the color and brightness of a pixel.  
Select one:  
 Binary ✓  
 Octal ✗  
 Decimal ✗  
 Hexadecimal ✗

After reviewing all questions,  
click here to submit

Submit this review

Approve

Feedback questions

Decline

Question 2: Answered  
Marked 0 out of 1  
Flag question

C439-Q000237  
To find the \_\_\_\_\_ of a given bit, flip it to the opposite state.  
Select one:  
 root ✗  
 complement ✗  
 position ✗  
 sign ✓

Feedback for this question

Write a feedback  
Feedback content...

Question 3

C439-Q000238

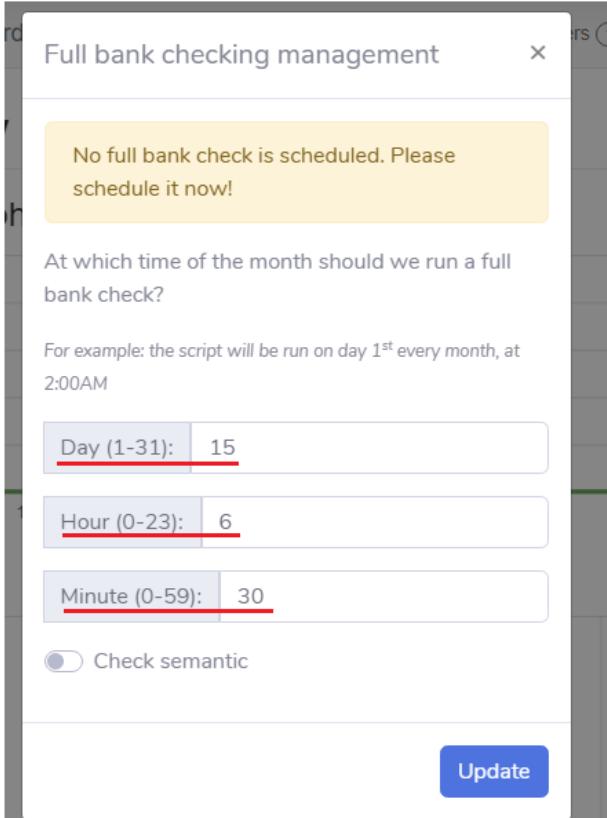
### 2.4.3. <Lecturer Manager> Approve examination

The screenshot shows the QBCS system interface for managing examinations. At the top, a progress bar indicates four steps: Step 1 (Create examination), Step 2 (Assign an Lecturer), Step 3 (Evaluate the exam based on Lecturer review result (0/1)), and Step 4 (Export examination). Step 3 is highlighted with a blue dot. Below the progress bar, the examination details are shown: EX0000010, Grade 5/10, and 1 attempt. There are two buttons: "Approve the examination" (green checkmark icon) and "Lock the examination" (red lock icon). A red arrow points from the "Approve the examination" button to the "Lock the examination" button. On the left, there's a section for "Assigned Lecturers of this exam" with a "Find a Lecturer" input and an "Assign to exam" button. On the right, there's a table titled "All attempts" showing one attempt: ExamCode EX0000010, Lecturer Đặng Thị Minh Thuyết, Date 12/10/2019 4:41:16 PM, Grade 5, Duration 03:20s. A blue arrow points from the "View Lecturer review attempt details" link in the "Detail" column to the "Detail" column of the table row.

### 2.5. Manage automatically scan schedule

- Select “Schedule” on the sidebar.
- Click “Manage Schedule” button.
- Input day, hour and minute for the scanner and click Update.
- If you want to check for duplication semantically, turn on “Check semantic”.

The screenshot shows the QBCS system interface for managing scan schedules. The sidebar on the left has a red box around the "Schedule" option. The main area shows a "Checking bank schedule" message and a "Manage schedule" button, which is also highlighted with a red box. Below that is an "Overview" section with a "Realtime graph" showing a grid from 0 to 10 on the y-axis and time from 10:48:30 PM to 10:47:28 PM on the x-axis. Below the graph is a "History graph" with a similar grid. At the bottom right of the graph area, there are "Day" and "Week" buttons.



## G. Appendix

### References

**DEEPSPEECH Speech to text recognition** document:

<https://github.com/mozilla/DeepSpeech>

**.NET DEEPSPEECH CLIENT NUGET** package:

<https://www.nuget.org/packages/DeepSpeech>

**FFMPEG Audio Processing** document:

<https://www.ffmpeg.org>

**NAUDIO .Net audio library** document:

<https://github.com/naudio/NAudio>

**Moodle** document:

- GIFT format: [https://docs.moodle.org/38/en/GIFT\\_format](https://docs.moodle.org/38/en/GIFT_format)
- XML format: [https://docs.moodle.org/38/en/Moodle\\_XML\\_format](https://docs.moodle.org/38/en/Moodle_XML_format)

**QBCS Microsoft Word Template:**

- WORD format, normal questions: [click here](#)
- WORD format, Reading Questions (group of questions with passage): [click here](#)

## **QBCS Season 1 document references**

- [QBCS Season 1 document](#)