

สำนักหอสมุดกลาง พระจอมเกล้าลาดกระบัง

QUALITY ASSURANCE SUPPORT SYSTEM  
FOR EDUCATION PURPOSE



E077984



เลขหมู่.....  
เลขทะเบียน 077984  
วัน,เดือน,ปี- 5 ต.ค. 2559

b. 12809007  
i.

BACHELOR OF ENGINEERING PROGRAM IN SOFTWARE ENGINEERING  
INTERNATIONAL COLLEGE  
KING MONGKUT'S INSTITUTE OF TECHNOLOGY LADKRABANG

2015

This material is reserved for educational use only, not allowed for commercial use.

Forbidden to modify the content, and cite the document when use

**Thesis Academic Year 2015**

B.Eng. in Software Engineering

International College, King Mongkuts Institute of Technology Ladkrabang

Title: Quality Assurance Support System for education purpose Authors:

1. Ms. Kamonchnok Koptong Student ID: 55090001

2. Ms. Passakun Siri Student ID: 55090037

3. Ms. Woraporn Lopansri Student ID: 55090041

Approved for submission

(Assist.Prof.Dr. Wichitsawat Suksawat Na Ayudhya)

Advisor

(Assist.Prof.Dr. Chaiwat Nuthong)

Co-advisor

(Dr. Nattaphong Jungteerapanish)

Co-advisor

Date: 24 May 2016

# Abstract

Ms. Kamonchnok Koptong  
Ms. Passakun Siri  
Ms. Woraporn Lopansri  
Assist.Prof.Dr. Wichitsawat Suksawat Na Ayudhya  
Assist.Prof.Dr. Chaiwat Nuthong  
Dr. Nattaphong Jungteerapanish  
**Academic Year 2015**

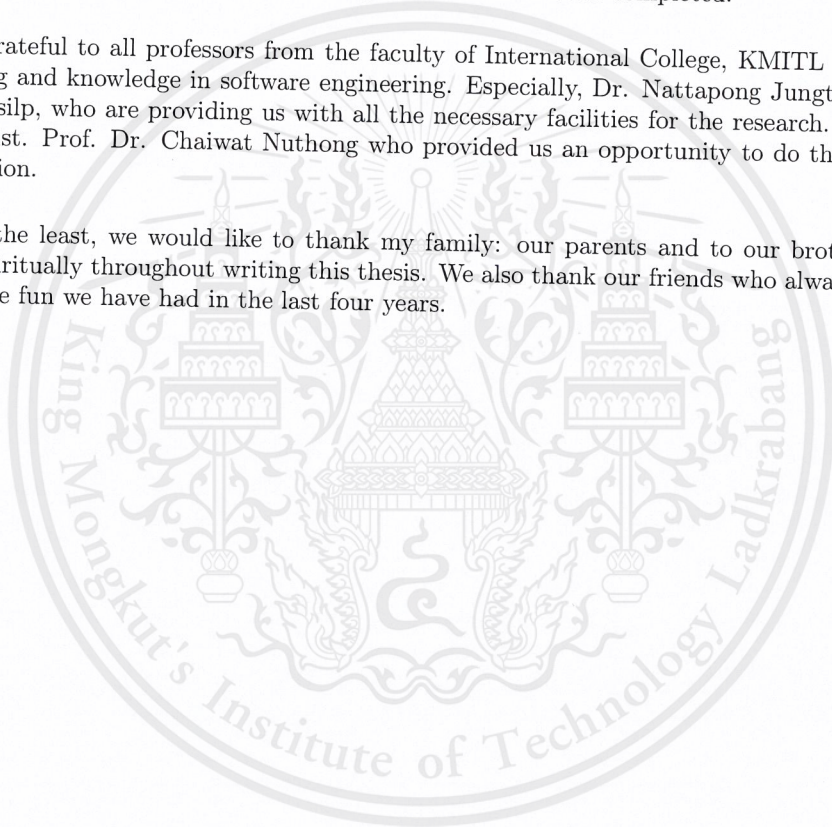
Recently, when the users need to do the quality assurance report for education purpose, they have to find the information from many resources that is inconvenience for the user. So, the primary aim of the project is to develop Quality Assurance Support System for education purpose (QASS) as a website for doing quality assurance report easily. It provides several features for users both the unique and common features. Basically it provides the admin function for adding, deleting and editing user profile, program and subject and it allows the users to manage their account by themselves. Moreover, it also allows the admin to add the subject into each semester of each program which is distribution of the curriculum. For quality assurance (QA) part, it allows the user who has the duty for this report to add, edit and delete the information about quality assurance on the website. Due to the quality assurance information available for everybody, any users who is authorized user can view all information of QA. With this system, it will be a useful website for users who have a duty to do the quality assurance report.

# Acknowledgment

First of all, We wish to express my sincere thanks to our project advisor, Asst. Prof. Dr. Wichitsawat Suksawat Na Ayudhya for the great suggestion, invaluable help and constant encouragement in developing our website for software project. We are grateful for his advice, not only the project field but also many advice in real life. Without his help and suggestion, our report would have been completed.

We are also grateful to all professors from the faculty of International College, KMITL who always give us the best teaching and knowledge in software engineering. Especially, Dr. Nattapong Jungteerapanich and Dr. Isara Anantavrasilp, who are providing us with all the necessary facilities for the research. My sincere thanks also goes to Assist. Prof. Dr. Chaiwat Nuthong who provided us an opportunity to do this project and gave us many suggestion.

Last but not the least, we would like to thank my family: our parents and to our brothers and sister for supporting us spiritually throughout writing this thesis. We also thank our friends who always help us, support us, and for all the fun we have had in the last four years.



# Contents

<b>1</b>	<b>Introduction</b>	
1.1	Motivation	1
1.2	Objective	1
1.3	Scope of Research	2
1.4	Organization	2
<b>2</b>	<b>Literature Review</b>	
2.1	Features	3
2.2	Related Work	3
2.2.1	The program that calculates the standard indicators for Quality Assurance (QA) of Ban-natantai School	3
2.2.2	Data storage of Quality Assurance Support System of Rajabhat Phuket University	3
2.2.3	Quality Assurance Support System of Suranaree University of Technology	5
2.2.4	The information system for quality assurance and management by faculty of Veterinary Science Kasetsart University	6
2.2.5	Development of Information System quality assurance with Cloud Computing of Raja-mangala University of Technology Rattanakosin	8
2.2.6	Document Management Program for Quality Assurance of Faculty of Industrial Educa-tion, King Mongkut's Institute of Technology Ladkrabang	8
2.3	Conclusion Remarks	9
<b>3</b>	<b>Background Knowledge</b>	
3.1	Unified Modeling Language Diagrams	11
3.1.1	Use case Diagram	11
3.1.2	Activity Diagram	11
3.1.3	Class Diagram	11
3.1.4	Sequence Diagram	11
3.2	Development Tools and Software Libraries	11
3.2.1	Node.js	11
3.2.2	MongoDB	11
3.2.3	Robomongo	12
3.2.4	Sublime text	12
3.2.5	Bootstrap	12
3.2.6	HTML5	12
3.2.7	TeXstudio	12
3.2.8	Putty	12
3.2.9	FileZilla	12
3.3	Quality Assurance Report	12
3.3.1	CUPT QA assessment system	12
3.3.2	The quality assurance of Faculty and Institution	13
<b>4</b>	<b>Methodology</b>	
4.1	Requirement	16
4.2	System analysis and design	16
4.2.1	Use case and description	18
4.2.2	Activity diagram	18
4.2.3	Class diagram and Sequence diagram	25
4.2.4	Data modeling	39
4.3	Development Methodology	51

<b>5 Experiment</b>	
5.1 Experiment .....	54
5.2 Result .....	54
<b>6 Conclusion</b>	
6.1 Conclusion .....	56
6.2 Suggestion .....	56
<b>Bibliography</b>	57
<b>Appendix A</b>	58



# List of Figures

1.1	Scope of Quality Assurance Support System in Monkey office system . . . . .	2
2.1	QASS of Bannatantai School: Start Page . . . . .	3
2.2	QASS of Bannatantai School: Calculate the percentages of each indicators . . . . .	4
2.3	QASS of Bannatantai School: Summary results . . . . .	4
2.4	QASS of Rajabhat Phuket University: Log-in Page . . . . .	5
2.5	QASS of Rajabhat Phuket University: Insert the information . . . . .	5
2.6	QASS of Rajabhat Phuket University: Upload the file . . . . .	6
2.7	QASS of Rajabhat Phuket University: Search the document . . . . .	6
2.8	QASS of Rajabhat Phuket University: Show the result . . . . .	6
2.9	QASS of Suranaree University: Log-in Page . . . . .	7
2.10	QASS of Suranaree University: Insert data page . . . . .	7
2.11	QASS of Suranaree University: Set priority page . . . . .	7
2.12	QASS of Suranaree University: Show the results . . . . .	8
2.13	QASS of Technology Rattanakosin: Log-in page . . . . .	8
2.14	QASS of Technology Rattanakosin: Insert the information page . . . . .	9
2.15	QASS of Technology Rattanakosin: Search the information page . . . . .	9
2.16	QASS of Industrial Education,KMITL: Welcome Page . . . . .	9
2.17	QASS of Industrial Education,KMITL: Upload document page . . . . .	10
2.18	QASS of Industrial Education,KMITL: Show evidence page . . . . .	10
4.1	Use case diagram . . . . .	18
4.2	Activity diagram: View personal information- Profiles, works, educations . . . . .	25
4.3	Activity diagram: Add program and sub-programs . . . . .	26
4.4	Activity diagram: Delete program and sub-programs . . . . .	27
4.5	Activity diagram: Edit program and sub-programs . . . . .	28
4.6	Activity diagram: View program and sub-programs . . . . .	29
4.7	Activity diagram: Edit quality assurance information . . . . .	30
4.8	Activity diagram: View quality assurance information . . . . .	31
4.9	Activity diagram: Add student enroll subject . . . . .	32
4.10	Activity diagram: Delete subjects . . . . .	33
4.11	Activity diagram: Edit subject . . . . .	34
4.12	Activity diagram: View subject . . . . .	35
4.13	Activity diagram: Add teaching semester . . . . .	36
4.14	Sequence diagram: Delete teaching semester . . . . .	37
4.15	Sequence diagram: Edit teaching semester . . . . .	38
4.16	OVER all of Class diagram . . . . .	39
4.17	UserProfile class diagram . . . . .	39
4.18	Person class diagram . . . . .	40
4.19	Sequence diagram: View personal information- Profiles, works, educations . . . . .	40
4.20	Admin class diagram . . . . .	40
4.21	Program class diagram . . . . .	41
4.22	Sequence diagram: Add program and sub-programs . . . . .	41
4.23	Sequence diagram: Delete program and sub-programs . . . . .	42
4.24	Sequence diagram: Edit program and sub-programs . . . . .	42
4.25	Sequence diagram: View program and sub-programs . . . . .	43
4.26	QASS class diagram . . . . .	43
4.27	Sequence diagram: Edit quality assurance information . . . . .	44
4.28	Sequence diagram: View quality assurance information . . . . .	45
4.29	Student Enroll class diagram . . . . .	45

4.30	Sequence diagram: Add student enroll subject . . . . .	46
4.31	Subject class diagram . . . . .	46
4.32	Sequence diagram: Delete subjects . . . . .	47
4.33	Sequence diagram: Edit subject . . . . .	47
4.34	Sequence diagram: View subject . . . . .	48
4.35	Teaching semester class diagram . . . . .	48
4.36	Sequence diagram: Add teaching semester . . . . .	49
4.37	Sequence diagram: Delete teaching semester . . . . .	50
4.38	Sequence diagram: Edit teaching semester . . . . .	50
4.39	Data modeling of User role . . . . .	51
4.40	Data modeling of quality assurance-aun . . . . .	52
4.41	Data modeling of performance . . . . .	53
6.1	Gantt Chart . . . . .	58



# Chapter 1

## Introduction

### 1.1 Motivation

The quality assurance is represented as the systematic review of educational programs to ensure that acceptable standards of education and infrastructure are being maintained. To produce the Quality Assurance report, there is a lot of information to indicate. Currently, the information is stored in paper forms, which is hard to find and keep. Some information is lost, duplicated, or mismatched.

The quality assurance report is not used only in university, but also used in a big company and there is no software that can solve these problems, so we hope that the project will help the person, who make the quality assurance report does not waste the time to collect or find information. People who have duty of quality assurance report can use our website for saving the time and using fewer resources.

The Quality Assurance Support System (QASS) is the subsystem in the Monkey office system. It is a system that collects about the information or documents of faculty. The system includes three main functions, first 'workflow' function help users know process what to do in case of doing something (e.g. what are documents that user who will have an internship must prepare and send to approve). Second is 'DMS' function, which help users manage the documents from 'workflow'. The last function is 'QASS' that help user search or edit information that will use in QA reports easier.

## 1.2 Objective

The project is to develop a program called Quality Assurance Support System for education purpose. It is the subsystem of the Monkey office system. The Quality Assurance part must have the following features:

- The system can keep the information, which is used for Quality Assurance in the database.
- The system allows users to enter, read, update and delete the information depends on their authorization in Quality Assurance system on a website.
- The others can choose 'view report function' to view the electronic report on the website.

## 1.3 Scope of Research

- Developed the website with Node.js web framework written in Javascript language.
- For database management, we use MongoDB ( An open-source, document oriented database).
- The system is validated by using the quality assurance report of Computing in Engineering System as information.

The scope of our group's responsibility is shown in Figure 1.1.

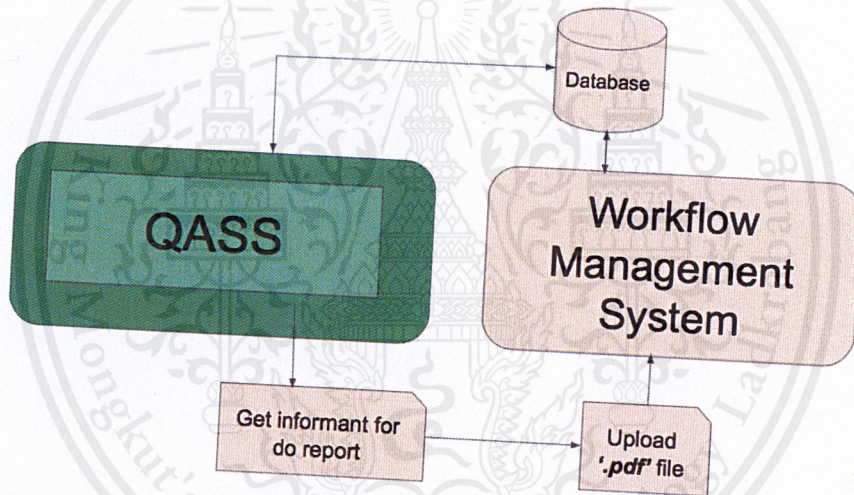


Figure 1.1: Scope of Quality Assurance Support System in Monkey office system

## 1.4 Organization

The rest of thesis is organized as follows. Chapter 2 describes quality assurance support system features and Monkey office system respect to these features. Chapter 3 describes background knowledge. The methodology of the program is given Chapter 4. Chapter 5 is experiment of program. Lastly, Chapter 6 gives conclusion and suggestion.

# Chapter 2

## Literature Review

This chapter is survey of works and researches that related to Quality Assurance Support System. Section 2.1 gives a brief description of Quality Assurance Support System features. Section 2.2 gives the details of work based on website that similar to this project. Concluding remarks are given in section 2.4.

### 2.1 Features

This section discusses the information that user will use in Quality Assurance Report. To help user do the report faster and more accurate.

- **Search Quality Assurance information:** This feature provides user to search the result of each indicator which is in quality assurance report using keywords.

### 2.2 Related Work

#### 2.2.1 The program that calculates the standard indicators for Quality Assurance (QA) of Bannatantai School

A program that calculates the standard indicators for QA of Bannatantai School is the program that was developed from MS-Excel 2007 to use in Bannatantai school. First sheet shows the details of Quality Assurance Support System of Bannatantai School and shows the instruction how to use program as shown in Figure 2.1. Users can enter a number of students and teachers and the number of student or teacher who got level three or higher into the table then the program would calculate the percentage of each indicator as shown in Figure 2.2. The result of quality assurance of Bannatantai school as shown in Figure 2.3.

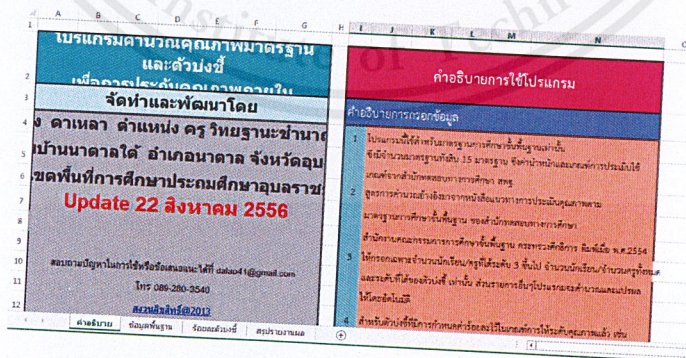


Figure 2.1: QASS of Bannatantai School: Start Page

มาตรฐาน	ตัวบ่งชี้	จำนวนนักเรียน/ครูที่ในระดับ 3 ชั้น โย	จำนวนนักเรียน/ จำนวนครูทั้งหมด	ร้อยละ/ระดับที่ ได้ของตัวบ่งชี้
1	1	400	421	95.01
	2	395	421	93.82
	3	410	421	97.39
	4	395	421	93.82
	5	421	421	100.00
	6	421	421	100.00
2	1	390	421	92.64
	2	421	421	100.00
	3	400	421	95.01
	4	421	421	100.00

Figure 2.2: QASS of Bannatantai School: Calculate the percentages of each indicators

มาตรฐาน/ตัวบ่งชี้	จำนวน นักเรียน/ ครูที่อยู่ใน ในระดับ	จำนวน นักเรียน/ ครูทั้งหมด	ร้อยละ/ ระดับที่ได้	ค่า น้ำหนัก	คะแนน ที่ได้	เทียบ ระดับ คุณภาพ	ความหมาย
ด้านที่ 1 มาตรฐานด้านคุณภาพผู้เรียน				30.00	26.55	4	ดีมาก
มาตรฐานที่ 1 ผู้เรียนมีสุขภาพ ที่ดีและมีสุนทรียภาพ				5.00	4.86	5	ดีเยี่ยม
1.1 มีสุขนิสัยในการดูแลสุขภาพ และออกกำลังกายสม่ำเสมอ	400	421	95.01	0.50	0.48	5	ดีเยี่ยม
1.2 มีน้ำหนัก ส่วนสูง และ สมรรถภาพทางกายตามเกณฑ์	395	421	93.82	0.50	0.47	5	ดีเยี่ยม
1.3 ป้องกันตนเองจากสิ่งเสียด ให้โทษและหลีกเลี่ยงตนเองจาก สภาวะที่เสี่ยงต่อความรุนแรง โรค	410	421	97.39	1.00	0.97	5	ดีเยี่ยม

Figure 2.3: QASS of Bannatantai School: Summary results

## 2.2.2 Data storage of Quality Assurance Support System of Rajabhat Phuket University

A system is developed as a website for Phuket Rajabhat University to keep the information for Quality Assurance. Before the users come to access the data storage of quality assurance system, the users have to log-in first as shown in Figure 2.4.

On the one hand, the system has many functions, for example, 'insert the overall result of each standard indicator', as shown in Figure 2.5, 'upload the file' into the system, as shown in Figure 2.6, 'search documents in the system' including the document from other departments that use together for attaching file into the system, as shown in Figure 2.7 and the last function is 'show the result' after the users enter the overall result and attach file of each indicator, as shown in Figure 2.8.

On the other hand, the system does not support all of file formats, it supports only six file formats which are .doc , .xls , .ppt , .mdb , .pdf and .jpg. Another disadvantage is that the user can search documents using only pre-defined keywords. User-defined keywords are not allowed see in Figure 2.7.



Figure 2.4: QASS of Rajabhat Phuket University: Log-in Page

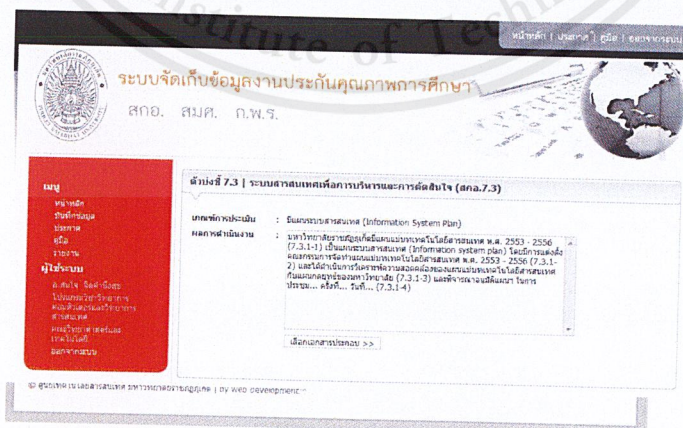


Figure 2.5: QASS of Rajabhat Phuket University: Insert the information

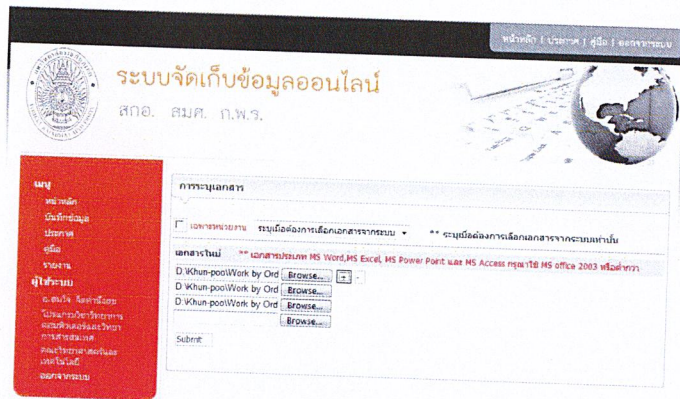


Figure 2.6: QASS of Rajabhat Phuket University: Upload the file



Figure 2.7: QASS of Rajabhat Phuket University: Search the document

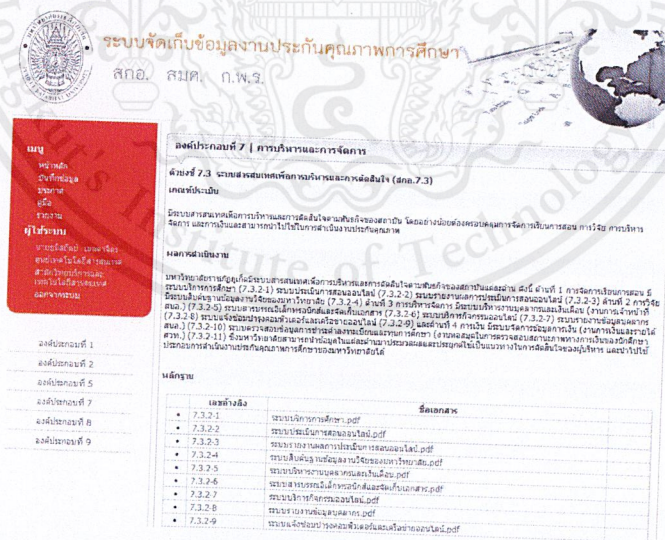


Figure 2.8: QASS of Rajabhat Phuket University: Show the result  
The program will show the results when user click each indicators.

### 2.2.3 Quality Assurance Support System of Suranaree University of Technology

A system is developed as a website for Suranaree University of Technology to store the information for quality assurance purpose. It has a good privacy because before the users come inside the website, the users have to log-in first as shown in Figure 2.9.

For advantages, this system provides a function that can help the users insert the information that needed in the quality assurance process easily. It allows the users to insert and delete the necessary information of each

topic that related to the quality assurance as shown in Figure 2.10. The system also allows the admin to set the priority of each department to insert the information as shown in Figure 2.11. Therefore, the information that was kept in the system is also necessary for the quality assurance. Admin can view overview of the information as Excel file format as shown in Figure 2.12. It is much easier to review the overall information in Excel file than in website.



Figure 2.9: QASS of Suranaree University: Log-in Page

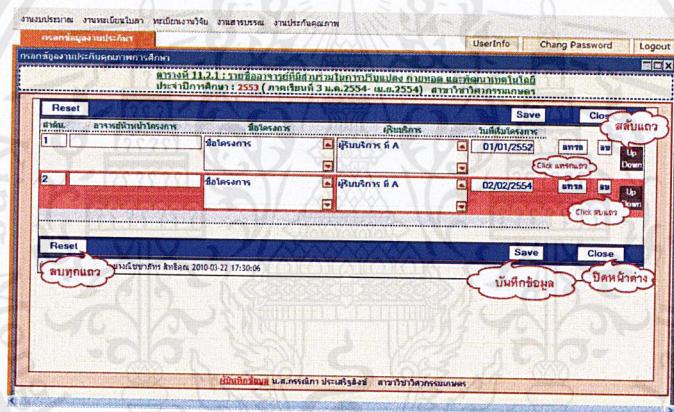


Figure 2.10: QASS of Suranaree University: Insert data page  
User that have permission only can edit or add some information.

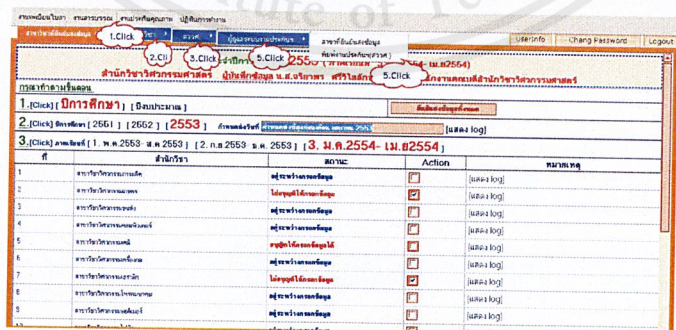


Figure 2.11: QASS of Suranaree University: Set priority page

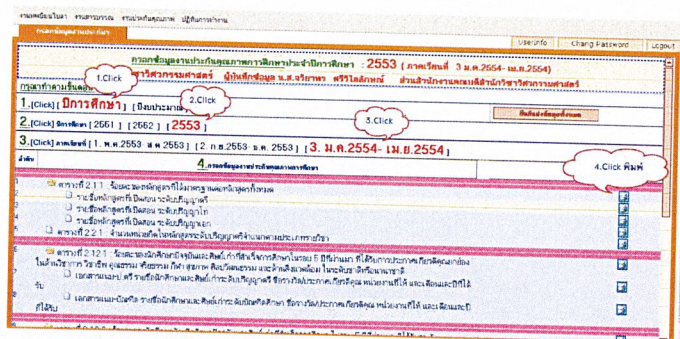


Figure 2.12: QASS of Suranaree University: Show the results Show overview of the information as excel file feature

## 2.2.4 The information system for quality assurance and management by faculty of Veterinary Science Kasetsart University

The information system for quality assurance and management is developed for faculty of Veterinary Science, Kasetsart University. It has useful database for work and quality assurance system. This system supports the users to log-in, edit user personal profile, set priority and insert the information. This system provides the overview result of information to help the manager decides the work.

For advantages, this system separates the data into six groups in the database: data management, public information, faculty log-in, personnel log-in, executive information and faculty information, therefore, this system has a good structure of database then it is an effective system for the users because the work of each department is not duplicate.

## 2.2.5 Development of Information System quality assurance with Cloud Computing of Rajamangala University of Technology Rattanakosin

A system with cloud computing is developed as a website for Rajamangala University of Technology Rattanakosin by following the system development life cycle. The website is developed with PHP as a programming language. For database is developed using MySQL. For the system development life cycle, it consists of six steps: Scope of problem, problem analysis, System design, Modeling system, Development and Motoring and Evaluation the system. It can help the users decrease duplication of work and the information documents are more secure and facilitate the retrieval of information in the form that the users want.

The program have menu log-in as Figure 2.13, and program prompts the user to insert the information about each indicator as Figure 2.14 and the last function is that program can search the information and show the result of each indicator as 2.15

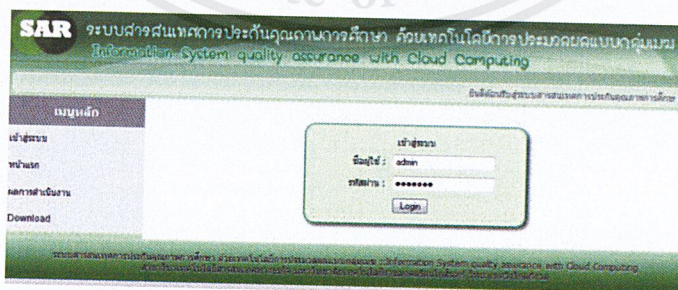


Figure 2.13: QASS of Technology Rattanakosin: Log-in page

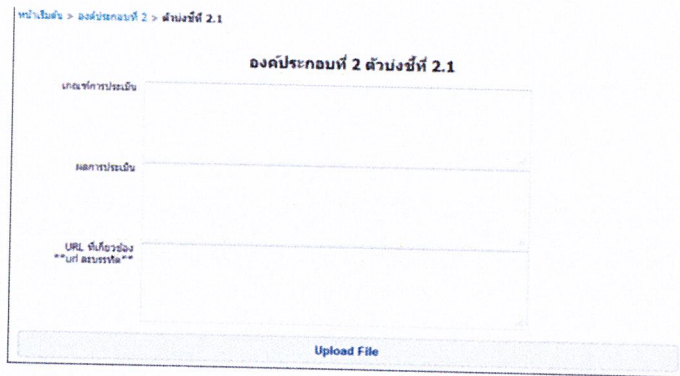


Figure 2.14: QASS of Technology Rattanakosin: Insert the information page

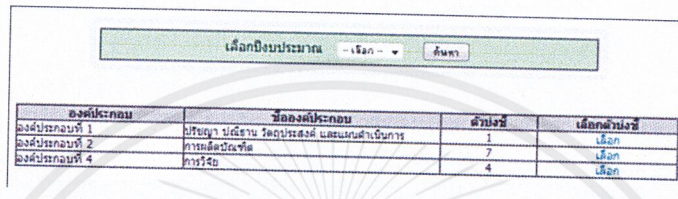


Figure 2.15: QASS of Technology Rattanakosin: Search the information page

## 2.2.6 Document Management Program for Quality Assurance of Faculty of Industrial Education, King Mongkut's Institute of Technology Ladkrabang

The program is developed for faculty of Industrial Education of King Mongkut's Institute of Technology Ladkrabang. This research is done to develop the document management program for quality assurance, find the quality of Document Management Program for Quality Assurance and find the satisfaction of the program. It is developed with Microsoft Visual Studio Express 2005 and the database is developed using Microsoft Access.

For advantages, this program has a good user interface that users can understand the program easily as shown in Home page as Figure 2.16. The user can upload evidence documents into the system easily as shown in Figure 2.17 and the system can show the evidence document of each indicator as shown in Figure 2.18. Another thing is that users can retrieve the information from the program quickly.

For disadvantages, this program is not flexible because it already sets the indicator and the users cannot customize their own indicator. Another thing is that program cannot allow the users to enter the description of each evidence document and delete the evidence document from the system.



Figure 2.16: QASS of Industrial Education.KMITL: Welcome Page

This material is reserved for educational use only, not allowed for commercial use.

Forbidden to modify the content, and cite the document when use

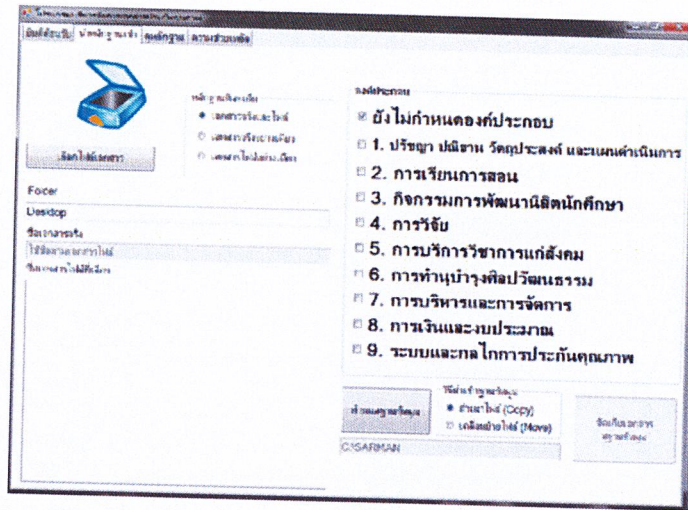


Figure 2.17: QASS of Industrial Education,KMITL: Upload document page

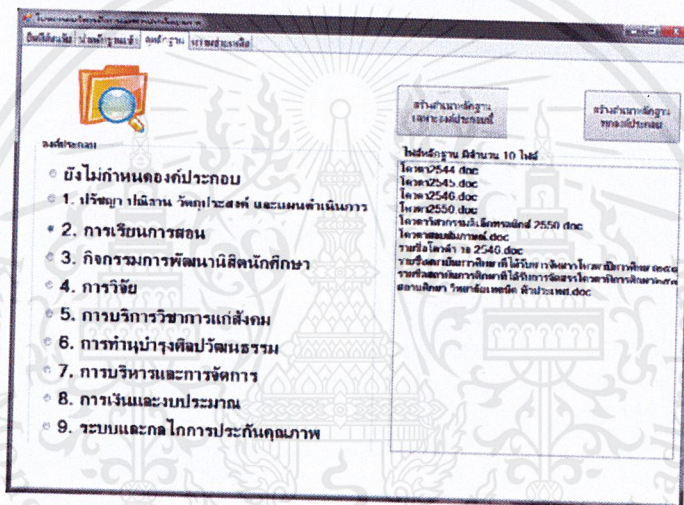


Figure 2.18: QASS of Industrial Education,KMITL: Show evidence page

### 2.3 Conclusion Remarks

Table 2.1 show comparison of capabilities between the Quality Assurance Support System and the existing applications mentioned in Section 2.2. We found that those systems have a unique feature, which is insert information of indicator on the website.

For other systems, the insertion feature is allowed the users to add and edit some information on their website. But our website is not supported this feature. The users, who have this duty, can search the information to do the quality assurance report from the QA function from the website.

Features		Related Work QA system						QASS
		Bannatantai School	Rajabhat Phuket Uni.	Suranaree Uni.	Veterinary Science .KU.	Rajamangala Uni	Faculty of Industrial Education, KMITL	
User Management	Log-In	X	✓	✓	✓	✓	✓	✓
	User Profile (CRUD)	X	X	X	✓	✓	X	✓
	Search QA Information	X	✓	X	X	✓	X	✓
	Insert QA Information (On website)	X	✓	✓	✓	✓	X	✓
	Analyze QA result	✓	X	X	X	X	X	X
	Show overview of QA result	✓	✓	✓	✓	✓	X	✓

Table 2.1: Comparison features of Bannatantai school, Rajabhat Phuket University, Suranaree University, Veterinary Science, Kasetsart University, Rajamangala University, Faculty of Industrial Education, KMITL and Quality Assurance System

## Chapter 3

# Background Knowledge

This chapter describes the background knowledge of the proposed project. The chapter is divided into three parts: Unified Modeling Language (UML) diagrams, development tools and software libraries, and Quality Assurance report. The first part gives the quick review on UML. For the second part, this part discusses about the tools and the software for development. The final part gives the background knowledge about Quality Assurance Report to validate the system.

### 3.1 Unified Modeling Language Diagrams

Unified Modeling Language (UML) is a standard visual modeling language intended to be used to analysis, design, and implementation of software-based systems. Developers use the UML to describe, specify, design, and document existing or new structure and behavior of artifacts of software systems.

#### 3.1.1 Use case Diagram

Use case diagram is used to represented all operation and relationship between the user and the system. In another word, use case diagram is a methodology used in system analysis to identify, clarify, and organize system requirements.

#### 3.1.2 Activity Diagram

Activity diagram is used to describe dynamics aspects of the system. It is a flowchart to represent the flow from one activity to another activity.

#### 3.1.3 Class Diagram

The class diagram is a static diagram that represents the static view of an application. It is not only used for visualizing, describing and documenting different aspects of a system but also for constructing executable code of the software application. In each class, it would represent the information included class name, attribute and its operations.

#### 3.1.4 Sequence Diagram

In UML, the sequence diagram is a diagram that represent an interaction between the object/class of the order and it would show how the object operates with others in the sequence of order.

### 3.2 Development Tools and Software Libraries

#### 3.2.1 Node.js

Node.js is an open-source, cross-platform run-time environment for developing server-side web applications. Node.js applications are written in JavaScript. We use Node.js to create web servers and networking and use a collection of modules to handle various core functionality. Node's modules use an API designed to reduce complexity of writing server application.

This material is reserved for educational use only, not allowed for commercial use.

Forbidden to modify the content, and cite the document when use

### 3.2.2 MongoDB

MongoDB is a cross-platform document oriented database. Classified as a NOSQL<sup>1</sup> database. MongoDB is a document which is a data structure composed of field and value pairs similar to JSON objects. We use MongoDB to manage and collect data.

### 3.2.3 Robomongo

Robomongo is a shell-centric cross-platform open-source MongoDB management tool. Robomongo provides the beautiful GUI with syntax highlighting, auto-completion, and different view modes for helping users manage with database easier than do with command line.

### 3.2.4 Sublime text

Sublime text is a cross-platform source code editor with a Python application programming interface (API). It natively supports many programming languages and markup languages. We use Sublime text for implementing and editing source code.

### 3.2.5 Bootstrap

Bootstrap is a free and open-source collection of tools for creating websites and web application. It uses to decorate web page and font in website. Moreover, developers use the tool to make color and background in term of website decoration. We can use Bootstrap by downloading library free open-source from website and push it into project. The library of tool is used by developer, who calls part of library in HTML files.

### 3.2.6 HTML5

HTML5 is a core technology markup language of the internet used for structuring and presenting content for the World Wide Web. It is used when we want to design or create any content of our web page that show on web browser.

### 3.2.7 TeXstudio

TeXstudio is a cross-platform open source LaTeX editor with an interface similar to Texmaker. TeXstudio is a LaTeX IDE that provides modern writing support, such as interactive spelling checker, code folding, and syntax highlighting.

### 3.2.8 Putty

Putty is a free and open-source terminal emulator, serial console and network file transfer application. The tool is used for connecting with server.

### 3.2.9 FileZilla

FileZilla is a cross-platform file transfer protocol (FTP) application software. It is used to transfer file to server easier.

When we want to edit or add file, we do not need to use pass command. We connect to server and pass this software then pull or push file.

## 3.3 Quality Assurance Report

The main purpose of the project is to construct software and to facilitate the preparation of reports for quality assurance of higher education in Thailand. To solve each indicator, not only gather the relevant information into database but also study about the quality assurance information to do the report. The quality assurance of Thai education have two types.

---

<sup>1</sup>Database system that provides a mechanism for storage and retrieval of data that is modeled in means other than the tabular relations used in relational databases.

### 3.3.1 CUPT QA assessment system

There are two types of element.

1. Thai Qualification Framework for Higher Education (TQF)

This element considers the independence and academic excellence of higher education in Thailand by preparing standards in higher education for encouraging to develop academically and improve all quality of standards in higher education in Thailand. Ministry of Education has announced a standard in each program level, in 2005 C.E. for maintaining academic and keeping professional standards. The announced standard is one of the criteria for accrediting and education standards. The institutions that implement new programs or program updates are also applied with the standard program in 2005 C.E. This element has only one indicator: the program management following program standards set by office of higher education commission, which has twelve indicators to be considered as following:

- The number of teacher of program.
- The qualification of main lecturer for the programs.
- The qualification of lecturer who has responsibility with the programs.
- The qualification of instructor.
- The qualification of thesis adviser.
- The qualification of thesis co-adviser.
- The qualification of the thesis examines.
- The published the works of graduate students.
- The adviser's works and independent research at the graduate level.
- The adviser's works and independent research at the graduate level, which are consistently and regularly.
- The modification of curriculum controlled by the period.
- The operation, which according to the indicator of results operations for quality assurance and teaching subjects on the National Qualifications Framework for Higher Education.

Doctoral, Master, Bachelor degree use the same set of evaluation criteria. Each degree is different in specific details of evaluation criteria.

2. The quality development of the programs is controlled by the standard of AUN QA. (Thai language) For programs can recognize the quality of programs in each criterion and can improve their quality, the report uses 7 levels of criteria as following:

7-Point Rating Scale

Score	Implication	Quality Improvement Interpretation
1	Nothing(no documents, no plans, no evidence present)	Absolutely inadequate; immediate improvement must be made
2	This subject is in the planning stage	inadequate; improvements are necessary
3	Document available, but no clear evidence that they are used	inadequate, but minor improvements will make it adequate
4	Documents available and evidence that they are used	Adequate as expected
5	TClear evidence on the e ciency of the aspect	Better than adequate
6	Examples of good practice	Examples of good practice
7	Excellent	Excellent, leading or world class good practice

There are 15 indicators

This material is reserved for educational use only, not allowed for commercial use.

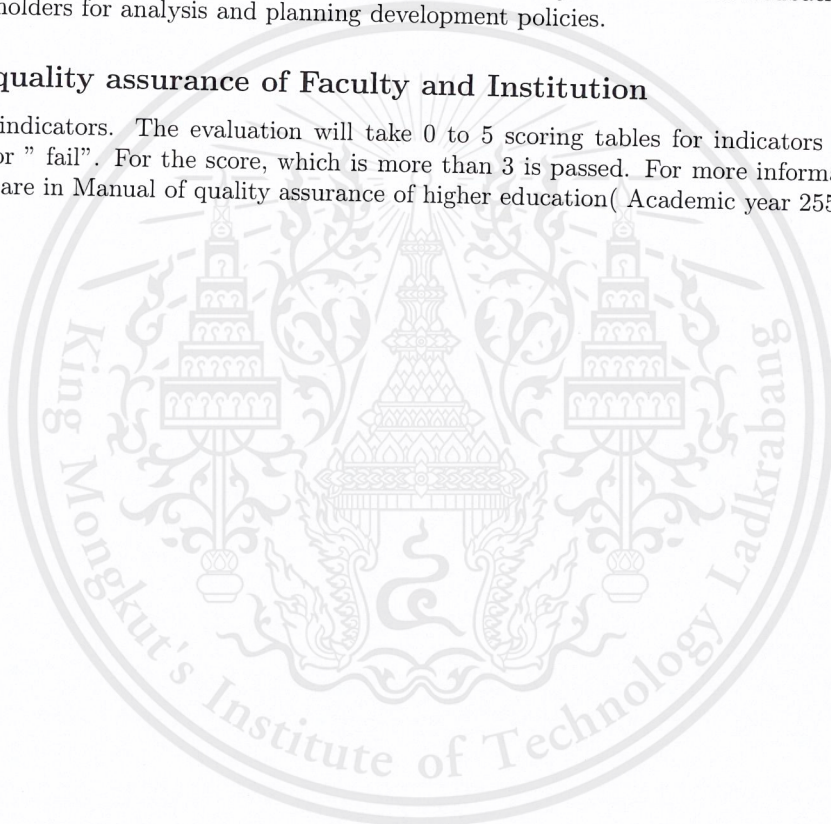
Forbidden to modify the content, and cite the document when use

- (a) Expected Learning Outcomes: To determine the expected learning outcomes of the program, qualification of graduate should be considered to meet the expectations of the program by considering the stimulation, which encourages the students to learn and make their long-life learning. Developed skills, practical training and keep up with the latest techniques are also in the process. These expectations should be prescribed in general subjects as well as specialist subjects.
- (b) Program Specification: The specifications of the program have to demonstrate the learning outcomes that are expected to gain from the program of higher education, which is included
- Knowledge and understanding that graduate students got
  - Main skills: communication, calculation and using information technology.
  - Intellectual skills: critical thinking skills and understanding the processes.
  - Specialized skills: operating skills and clinical skills.
- The program defines the teaching process to achieve the learning outcomes and has the total assessment method, which shows how to achieve results.
- (c) Program Structure and Content: The program should be modern. All subjects should be coherent and lead to expected learning outcomes. The structure and content of the program must be consistent with the vision of the University and have the right ratio between general programs with specialized programs. The curriculum management represents the breadth and depth of academic subjects in the program.
- (d) Teaching and Learning Strategy: The instructors of programs have to be considered and determined the strategy of the teaching program, which focuses on the quality learning of the students. The program is focused on the learners, who have to ready to learn and gain new knowledge by gathering new and old knowledge. Students are able to apply knowledge for learning solutions and learn from experience. Professors should create a flexible, collaborative teaching and learning to be lifelong learners.
- (e) Student Assessment: The evaluation of learners is an important mechanism in education. Evaluation results are effected directly to the future of students and reflected the success of lecturers in the teaching process and success of students based on expected learning outcomes. Students can appeal the evaluation results. Clarity of assessment criteria should include methods to evaluate and assess the time. It should cover the following details.
- Criteria and methods of student assessment: It should be based on a variety academic learning and expected learning outcomes, which are shown in each subject in the curriculum of programs. Moreover, the criteria mention the estimated weight of the subject, which must be disclosed to the students. It is verified credibility and objectivity of criteria and assessment methods.
  - Assessment period: The beginning of period is from admission until before graduation. The assessment period should be determined at the time and recognized in advance. The assessment result reflects back to those being evaluated to achieve for developing themselves
  - Assessment certification: The steps of action are clearly indicated in the assessment and the certification by an emphasis on the results of improvement and development.
- (f) Academic Staff Quality: The instructors are very important variable in teaching programs. Quality of instructors depends on qualifications that match the teaching programs and teaching experience. The results of the evaluation can be improved by the development of the teaching management system in order to determine the quality of academic staff.
- (g) Support Staff Quality: The support staff is important for managing the teachings to be better quality. They are necessary to have qualified and talented direct to their works. Each university must have enough support staff, which depends on a number of university's works.
- (h) Student Quality: The quality of students is an important variable, which affects the quality of the programs. The programs should give priority to the quality of the students in the admission policy. The policy must have clear criteria for admission. The program has to indicate those, who enroll and who were selected to study in Year 1 of each year. Moreover, the program has to collect all students in the program to formulate the policies for admission.
- (i) Student Advice and Support: Student advice and support are covered the academic, financial and scholarship, service learning, recreational, sport, health, and field of employment and occupation.
- (j) Facilities and Infrastructure: The facilities and infrastructure are essential to the management of the program to achieve goals and objectives. The programs should be provided classrooms with audiovisual equipment, computer lab, library, and safe environment, which is suitable, adequate and modern.

- (k) Quality Assurance of Teaching and Learning Process: The program should have committees, who have responsibility for implementing the programs and planning activities to achieve the improvement and the development of quality assurance.
- (l) Staff Development Activities: Academic staff and support staff of the programs should have enough knowledge and appropriate to do the task. They should have their own plans for developing themselves, which are clear and set with needs of programs and agencies.
- (m) Stakeholders Feedback: The programs have an effective system for receiving feedback from stakeholders of the programs (students, lecturers, supporting staff, alumni and graduates). This is an important tool that will enable the program to recognize the results of operations in order to be used to improve any system in programs.
- (n) Output: The quality of graduates is not based on only expected learning outcomes and needs of stakeholders, but also the research of professors and students has met the needs of stakeholders or not.
- (o) Stakeholders Satisfaction: The program should have a system to collect feedback and satisfaction of stakeholders for analysis and planning development policies.

### **3.3.2 The quality assurance of Faculty and Institution**

There are 14 indicators. The evaluation will take 0 to 5 scoring tables for indicators and the result will show as "pass" or "fail". For the score, which is more than 3 is passed. For more information about quality assurance, there are in Manual of quality assurance of higher education( Academic year 2557)



# Chapter 4

## Methodology

### 4.1 Requirement

#### User requirement: functional

- Users can view personal information- profile, works, and education
- Users can view quality assurance information by selecting indicators.
- Users can edit quality assurance information.
- Admin can add program and sub-program.
- Admin can view program and sub-program
- Admin can edit program and sub-program
- Admin can delete program and sub-program
- Admin can add new user accounts.
- Admin can view user accounts.
- Admin can edit user accounts information.
- Admin can delete user accounts.
- Admin can add new subjects.
- Admin can view subjects.
- Admin can edit subjects.
- Admin can delete subjects.

#### User requirement: non-functional

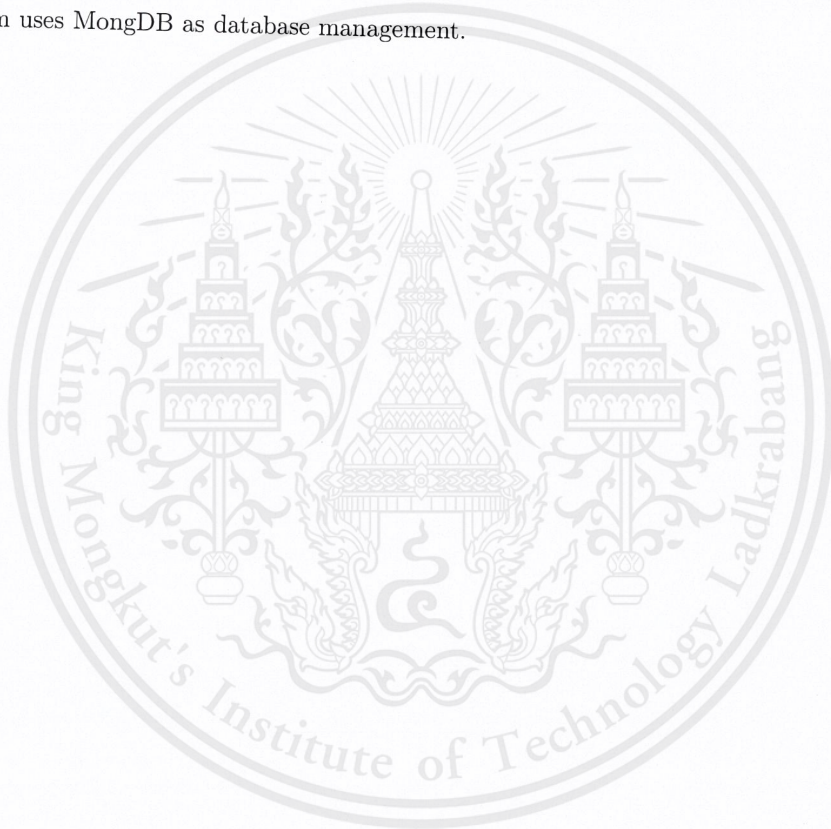
- The system supports at most 50 users at the same time.
- The system can respond to user as fast as possible
- The system has only English language.
- User interface is easy to learn and use.
- The system can show the information of Quality Assurance correctly.
- The system can show the personal information correctly.
- The system has a high security because a user has to log-in before access the website.
- When the user does something about information, the data that is concerned will be kept in the database correctly.
- The users who log-in into system could access the system only in their duty part.

**System requirement: functional**

- The system can show user' personal information- profile, works, and education.
- The system can keep the information, which is used for Quality Assurance in the database.
- The system allows users to enter, read, update and delete the information depends on their authorization in Quality Assurance system on a website.

**System requirement: non-Functional**

- The system is developed as website.
- The system is supported on every browser.
- The system is developed by using HTML, CSS, Bootstrap, Node.js
- The system uses NoSQL database.
- The system uses MongoDB as database management.



## 4.2 System analysis and design

### 4.2.1 Use case and description

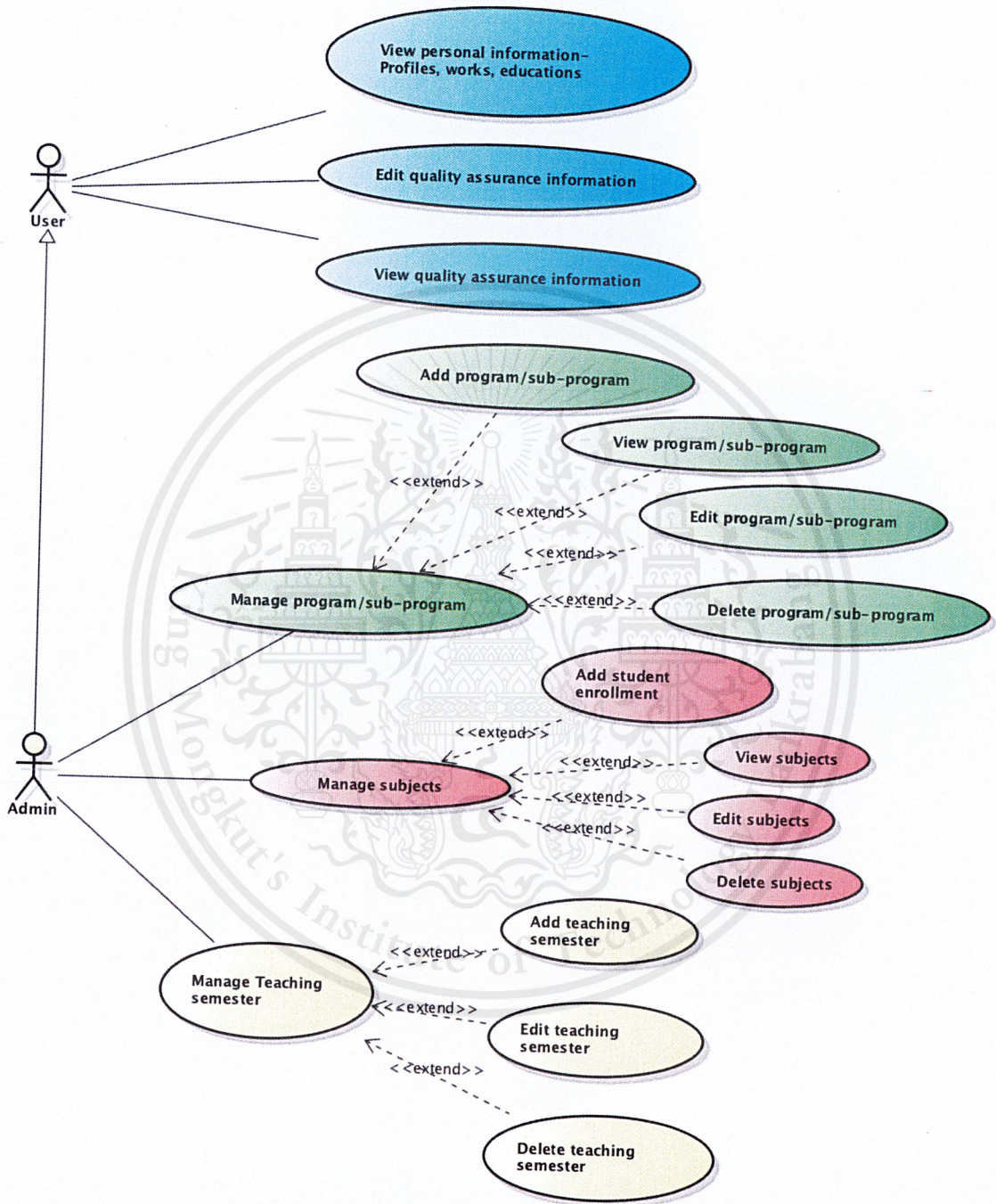


Figure 4.1: Use case diagram

<b>Usecase</b>	<b>View personal information- Profiles, works, educations</b>
<b>Primary actor</b>	Users
<b>Precondition</b>	When users are already in users personal information.
<b>Goal</b>	To view users personal information (profiles, works, and educations)
<b>Overview</b>	Users can view personal information, which displays on the website by select type of personal information such as profile, works, and educations.
<b>Flow of events</b>	
<b>Actor actions</b>	<b>System responses</b>
1. Users select type of personal information-profile, works, and educations.	2. The system shows users information screen.

Table 4.1: View personal information- Profiles, works, and educations use case description

<b>Usecase</b>	<b>View quality assurance information</b>
<b>Primary actor</b>	Users (Specific user)
<b>Precondition</b>	When users are already log-in to web-site.
<b>Goal</b>	To view information of quality assurance.
<b>Overview</b>	Users can view quality assurance information in table form by select each indications.
<b>Flow of events</b>	
<b>Actor actions</b>	<b>System responses</b>
1. Users select indicators	2. The system shows the information of quality assurance, which is selected indicators.

Table 4.2: View quality assurance information use case description

<b>Usecase</b>	<b>Edit quality assurance information</b>
<b>Primary actor</b>	Users (Specific user)
<b>Precondition</b>	When users are already log-in to web-site. User access to QASS page.
<b>Goal</b>	To edit information of quality assurance.
<b>Overview</b>	Users can view quality assurance information in table form by select each indications. Otherwise users can insert and edit new information in some tables.
<b>Flow of events</b>	
<b>Actor actions</b>	<b>System responses</b>
1. Users select indicators	2. The system shows the information of quality assurance, which is selected indicators.
3. Users select edit button to edit and change the quality assurance information.	4. The old information disappears and shows text fields for filling new information.
5. Users edit information in the tables.	6. The system shows text fields for filling new information.
7. Users fill quality assurance information and save	8. The system stores and records new information users and update new information on database.

Table 4.3: Edit quality assurance information use case description

<b>Usecase</b>	<b>Add programs and sub-programs</b>
<b>Primary actor</b>	Admin
<b>Precondition</b>	When users are already log-in as admin.
<b>Goal</b>	To add programs and sub-programs of faculty
<b>Overview</b>	Admin can add programs and sub-programs of faculty. The information about name, graduate level and lecturer are required for adding for create new programs and sub-programs.
<b>Actor actions</b>	<b>Flow of events</b>
1. Users select Admin function on the middle of navigator bar and select programs in drop-down.	<b>System responses</b>
3. User select add button.	2. The system shows the program screen in form of table with the detail.
5. Users fill information and save.	4. The system shows drop-down selection and text fields for filling information.
	6. The system stores and records new information users have edited. The system also update new information on database.

Table 4.4: Add programs and sub-programs use case description

<b>Usecase</b>	<b>View programs and sub-programs</b>
<b>Primary actor</b>	Admin
<b>Precondition</b>	When users are already in Admins program page.
<b>Goal</b>	To view information of program and sub-program
<b>Overview</b>	Users can view program/sub-program information.
<b>Actor actions</b>	<b>Flow of events</b>
1. Users select drop down selection about program, program track, and academic year, then click search.	<b>System responses</b>
3. User select table cell for view program details.	2. The system shows the information of program in form of table.
	4. The system shows the program and sub program with the detail.

Table 4.5: View programs and sub-programs use case description

<b>Usecase</b>	<b>Edit programs and sub-programs</b>
<b>Primary actor</b>	Admin
<b>Precondition</b>	When users are already in Admins program page.
<b>Goal</b>	To edit information of program and sub-program
<b>Overview</b>	Users can create new program and sub-program. Otherwise users can also edit and change new information of program and sub-program.
<b>Flow of events</b>	
<b>Actor actions</b>	<b>System responses</b>
1. Users select drop down selection about program, program track, and academic year, then click search.	2. The system shows the information of program in form of table.
3. User select table cell and click edit button to edit and change the information.	4. The old information disappears and shows text fields for filling new information.
5. Users fill new information and then press save button.	6. The system stores and records new information users and update new information on database.

Table 4.6: Edit programs and sub-programs use case description

<b>Usecase</b>	<b>Delete programs and sub-programs</b>
<b>Primary actor</b>	Admin
<b>Precondition</b>	When users are already in Admins program page and select program
<b>Goal</b>	To delete information of program and sub-program
<b>Overview</b>	Users can delete the program and sub-program.
<b>Flow of events</b>	
<b>Actor actions</b>	<b>System responses</b>
1. Users click table cell to delete the contact.	2. The system shows the delete icon on the right of table cell.
3. Users press delete icon.	4. The system deletes the deleted the program information.

Table 4.7: Delete programs and sub-programs use case description

<b>Usecase</b>	<b>Add student enrollment</b>
<b>Primary actor</b>	Admin
<b>Precondition</b>	When users are already in Admins program page and select program
<b>Goal</b>	To add students enroll in each subject of program.
<b>Overview</b>	User as Admin can add student id to registers course.
	<b>Flow of events</b>
<b>Actor actions</b>	<b>System responses</b>
1. Users select drop down choose setting then click subject then choose program and program track then click search.	2. The system shows the information of program in showprogram page.
3. User select enroll button to add student id in each subject.	4. Program prompt the user to add student id that want to registered subject.
5. User fill the information and then press the submit button.	6. The system add student id and update to studentenrollsubject database and subjectenrollstudent database.
	7. Program show student id and number of student that registered in subject.

Table 4.8: Add student enrollment

<b>Usecase</b>	<b>View subjects</b>
<b>Primary actor</b>	Admin
<b>Precondition</b>	When users are already in Admins program page and select program
<b>Goal</b>	To view information of the user account.
<b>Overview</b>	Users can view the user information.
	<b>Flow of events</b>
<b>Actor actions</b>	<b>System responses</b>
1. Users select drop down choose setting then click subject then choose program and program track then click search.	2. The system shows the information of subject in form of table.

Table 4.9: View subjects

<b>Usecase</b>	<b>Edit subjects</b>
<b>Primary actor</b>	Admin
<b>Precondition</b>	When users are already in Admins program page and select program
<b>Goal</b>	To edit subject information.
<b>Overview</b>	Admin can edit information of subject.
	<b>Flow of events</b>
<b>Actor actions</b>	<b>System responses</b>
1. Users select drop down choose setting then click subject then choose program and program track then click search.	2. The system shows the information of subject in form of table.
3. User select table cell and click edit button to edit and change the information.	4. The old information disappears and shows text fields for filling new information.
5. Users fill new information and then press save button.	6. The system stores and records new information users and update new information on database.

Table 4.10: Edit subjects

<b>Usecase</b>	<b>Delete subjects</b>
<b>Primary actor</b>	Admin
<b>Precondition</b>	When users are already in Admins program page and select program
<b>Goal</b>	To delete subject information.
<b>Overview</b>	Admin can delete information of subject.
<b>Actor actions</b>	<b>Flow of events</b>
	<b>System responses</b>
1. Users select drop down choose setting then click subject then choose program and program track then click search.	2. The system shows the information of subject in form of table.
3. User select table cell and click delete button to delete the information.	4. The system delete the information of the selected user from the database.

Table 4.11: Delete subjects

<b>Usecase</b>	<b>Add teaching semester</b>
<b>Primary actor</b>	Admin
<b>Precondition</b>	When users are already in Admins program page and select program
<b>Goal</b>	To add subjects in each semester of program.
<b>Overview</b>	User as admin can create new subjects in each semester of program.
<b>Actor actions</b>	<b>Flow of events</b>
	<b>System responses</b>
1. Users select drop down choose setting then click subject then choose program and program track then click search.	2. The system shows the information of program in showprogram page.
3. User select Add program subjects button to add new subject.	4. Program prompt the user to add new information of subjects(plan,year level,semester,subject code,subject name,subject lecturer,subject credit).
5. User fill the information and then press the submit button.	6. The system create new subject information and record to teaching semester database.
	7. Program show information that user has add already in showprogram page.

Table 4.12: Add teaching semester

<b>Usecase</b>	<b>Edit teaching semester</b>
<b>Primary actor</b>	Admin
<b>Precondition</b>	When users are already in Admins program page and select program
<b>Goal</b>	To edit subjects in each semester of program.
<b>Overview</b>	User as Admin can edit subjects in each semester of program.
<b>Flow of events</b>	
<b>Actor actions</b>	<b>System responses</b>
1. Users select drop down choose setting then click subject then choose program and program track then click search.	2. The system shows the information of program in showprogram page.
3. User select edit button to edit subjects in each semester of program.	4. Program prompt the user of old information of subjects(plan,year level,semester,subject code,subject name,subject lecturer,subject credit).
5. User edit the information and then press the submit button.	6. The system update subject information and record to teaching semester database.
	7. Program show information that user has edit already in showprogram page.

Table 4.13: Edit teaching semester

<b>Usecase</b>	<b>Delete teaching semester</b>
<b>Primary actor</b>	Admin
<b>Precondition</b>	When users are already in Admins program page and select program
<b>Goal</b>	To delete subjects in each semester of program.
<b>Overview</b>	User as Admin can delete subjects in each semester of program.
<b>Flow of events</b>	
<b>Actor actions</b>	<b>System responses</b>
1. Users select drop down choose setting then click subject then choose program and program track then click search.	2. The system shows the information of program in showprogram page.
3. User select delete button to remove subjects in each semester of program.	4. The system remove subject information and update to teaching semester database.
	5. Program show information that user has edit already in showprogram page.

Table 4.14: Delete teaching semester

### 4.2.2 Activity diagram

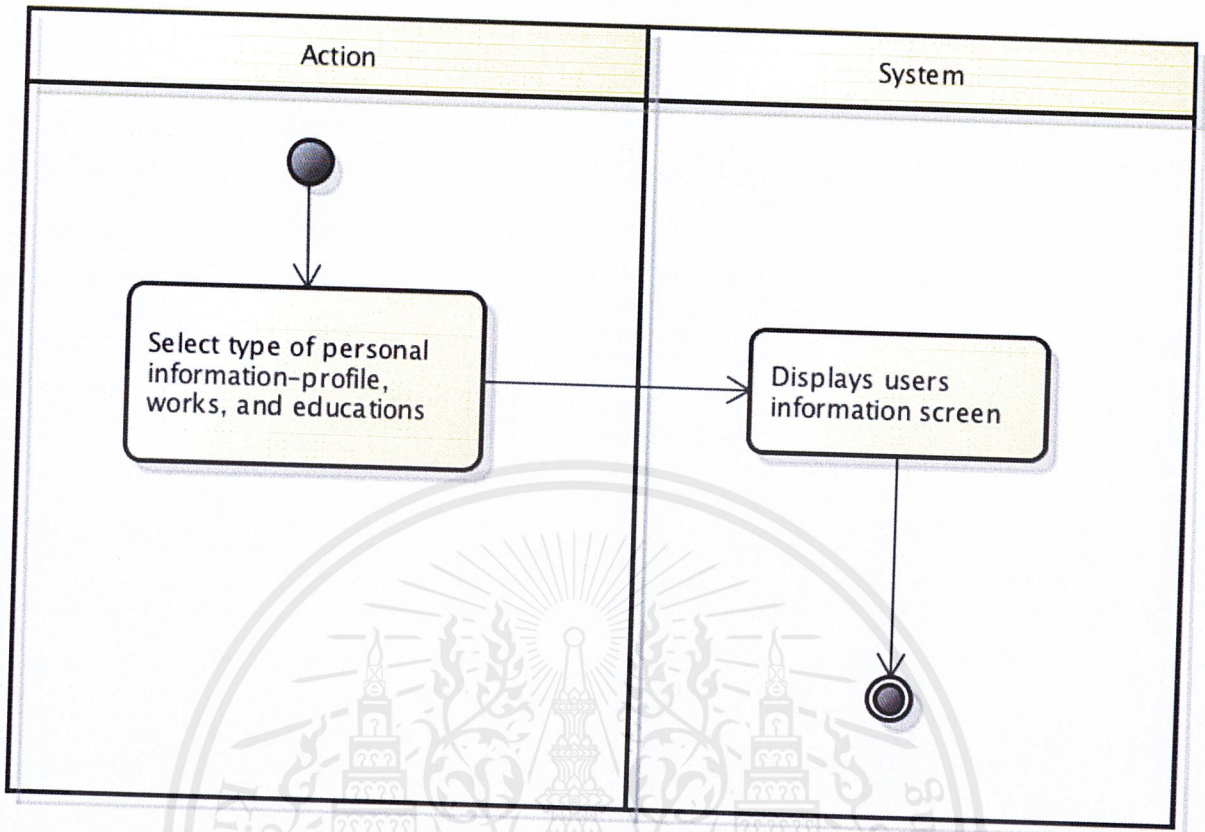


Figure 4.2: Activity diagram: View personal information- Profiles, works, educations

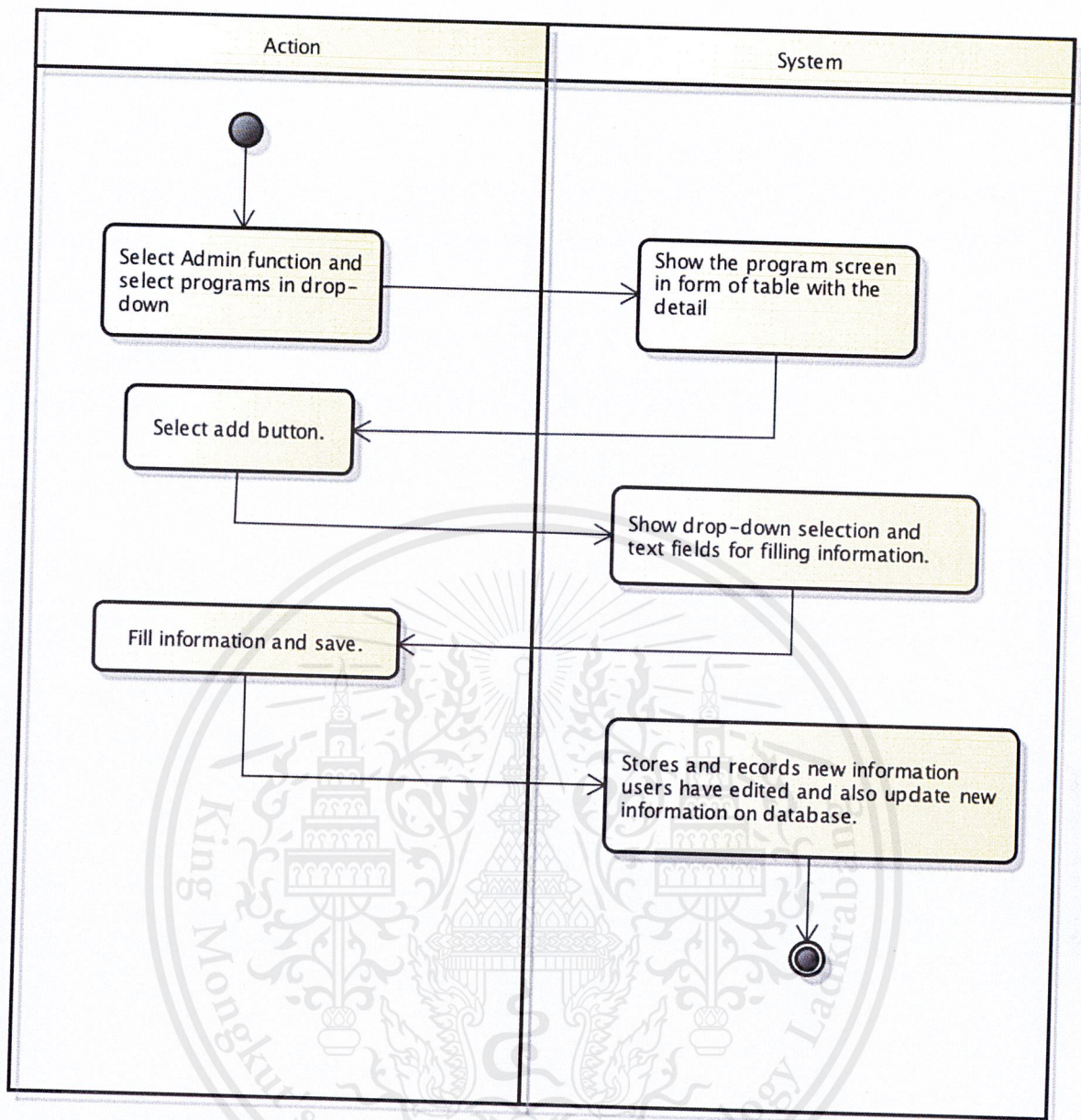


Figure 4.3: Activity diagram: Add program and sub-programs

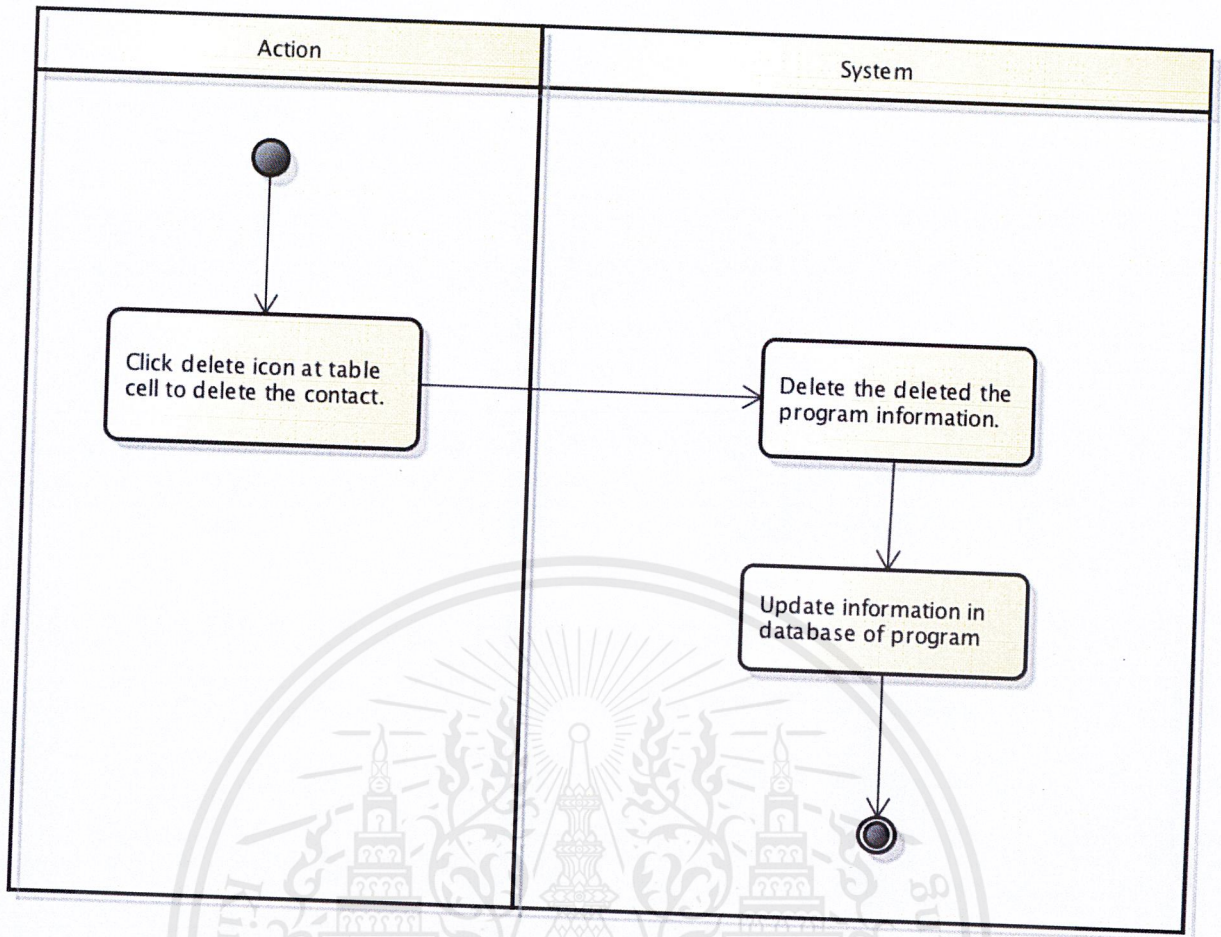


Figure 4.4: Activity diagram: Delete program and sub-programs

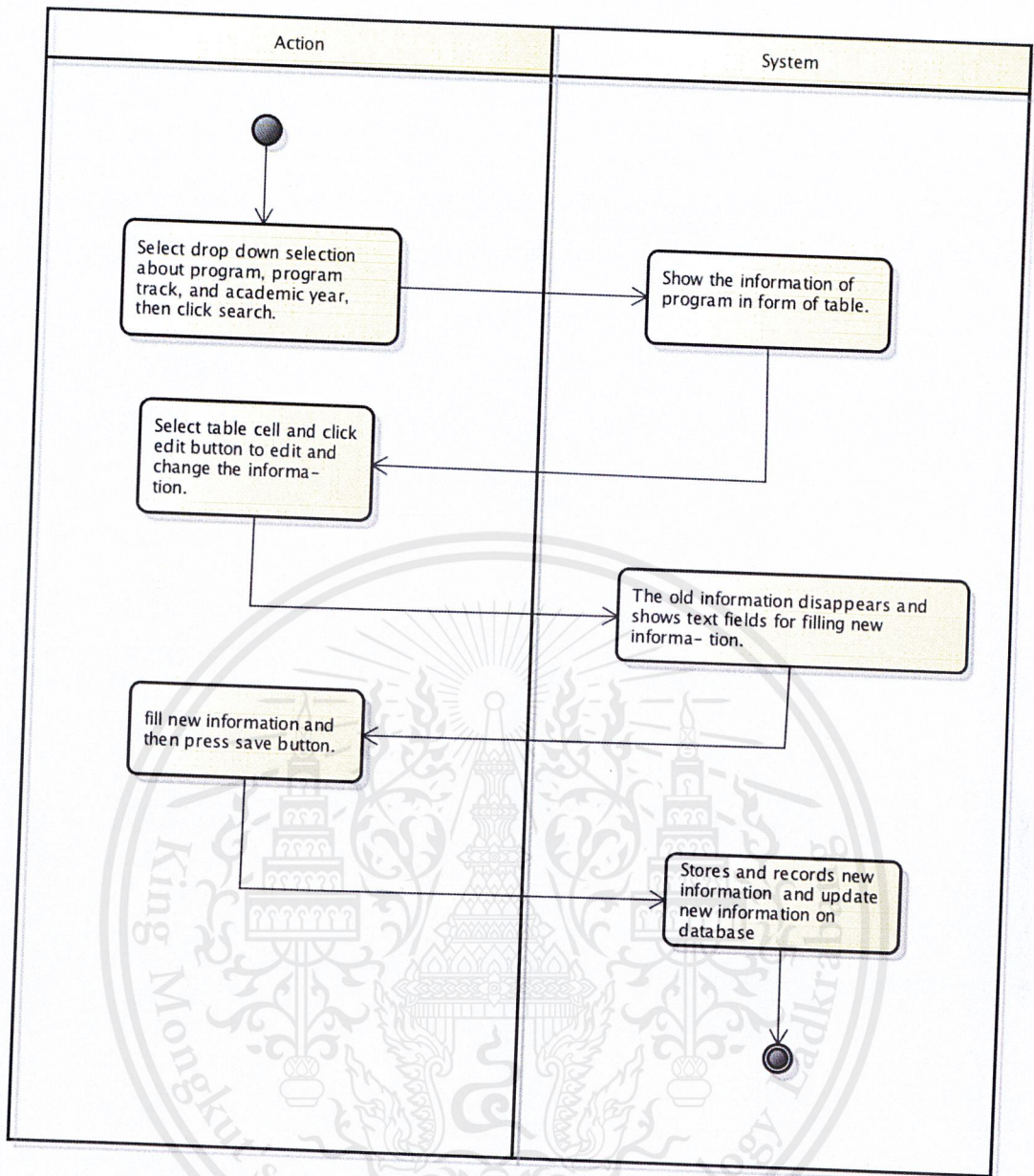


Figure 4.5: Activity diagram: Edit program and sub-programs

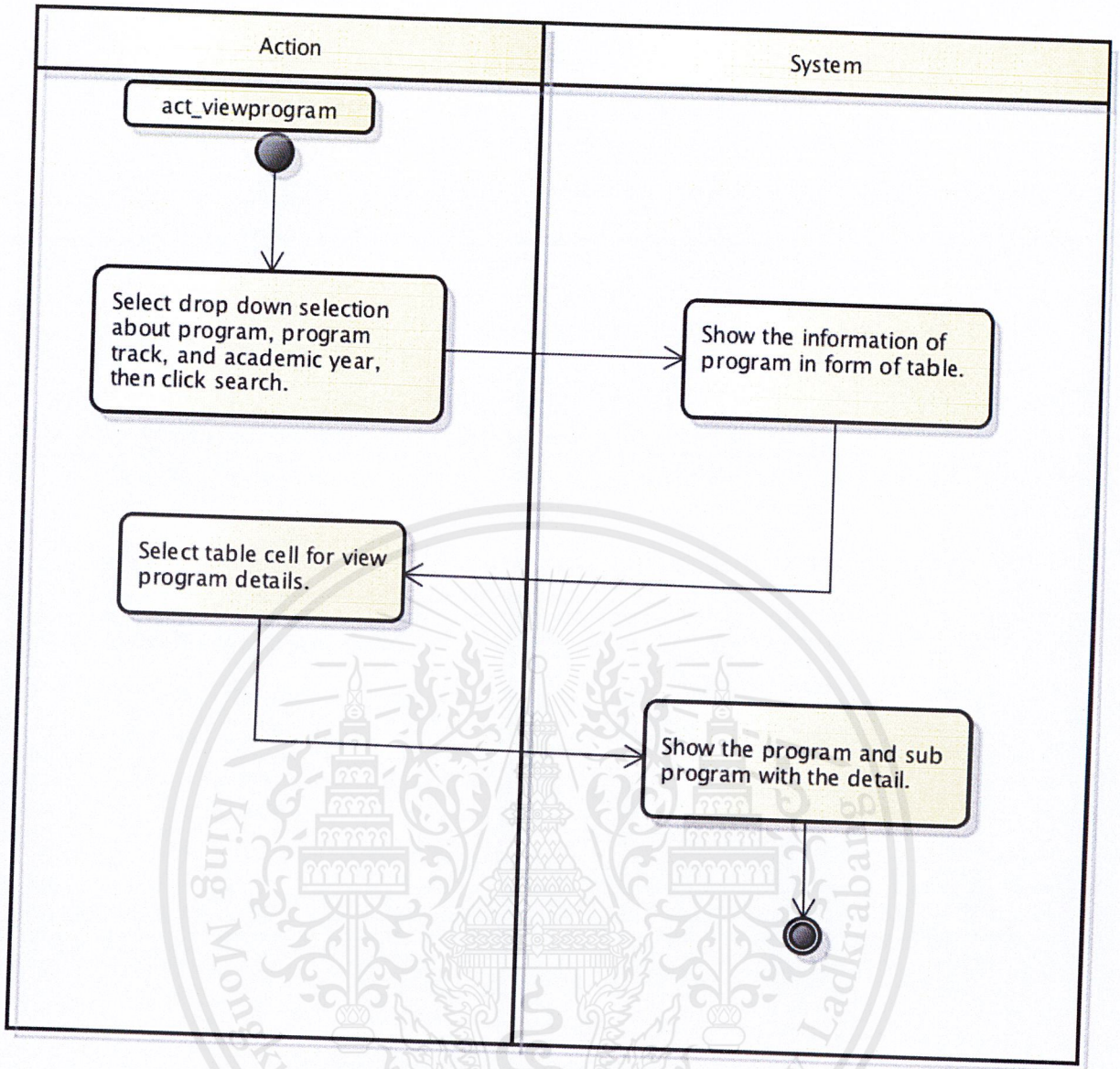
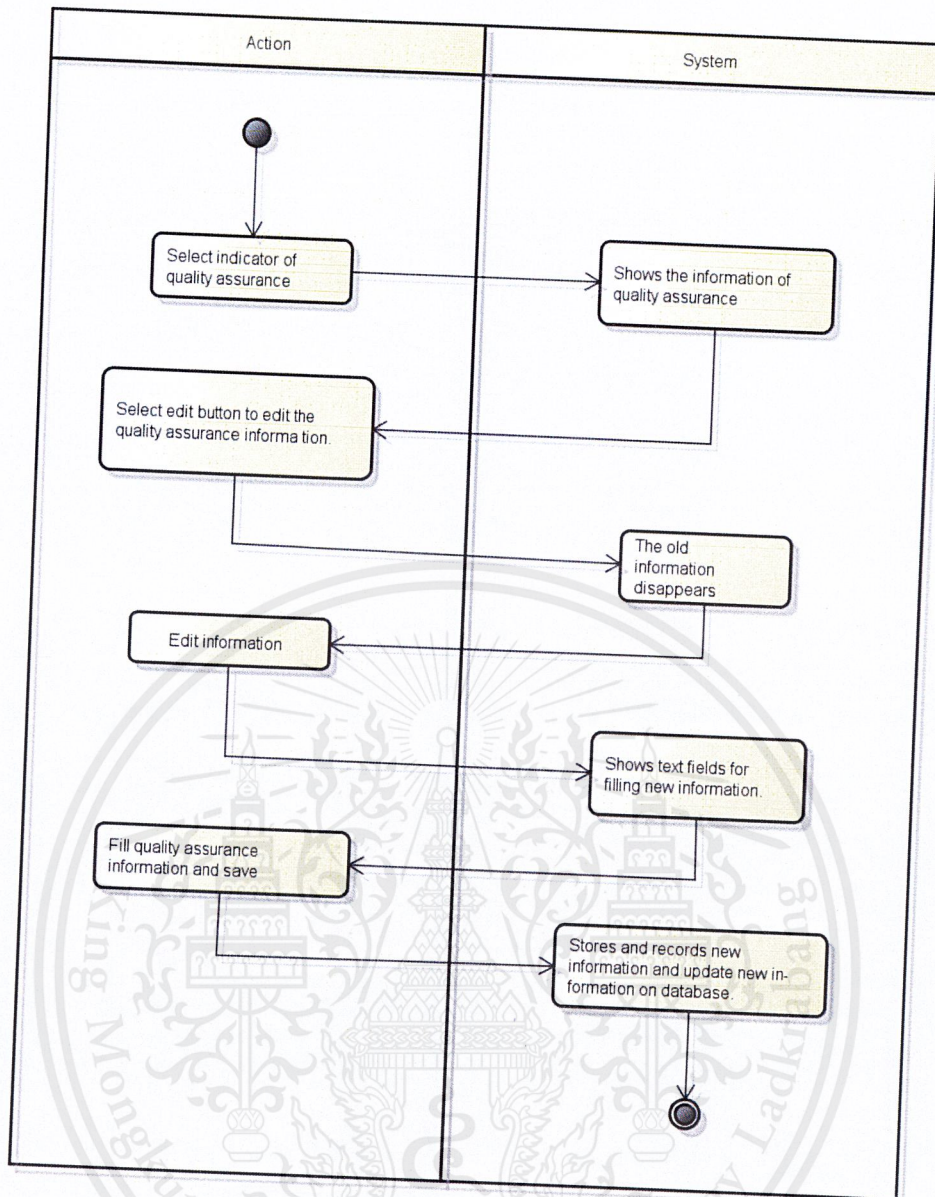


Figure 4.6: Activity diagram: View program and sub-programs



powered by Astah

Figure 4.7: Activity diagram: Edit quality assurance information

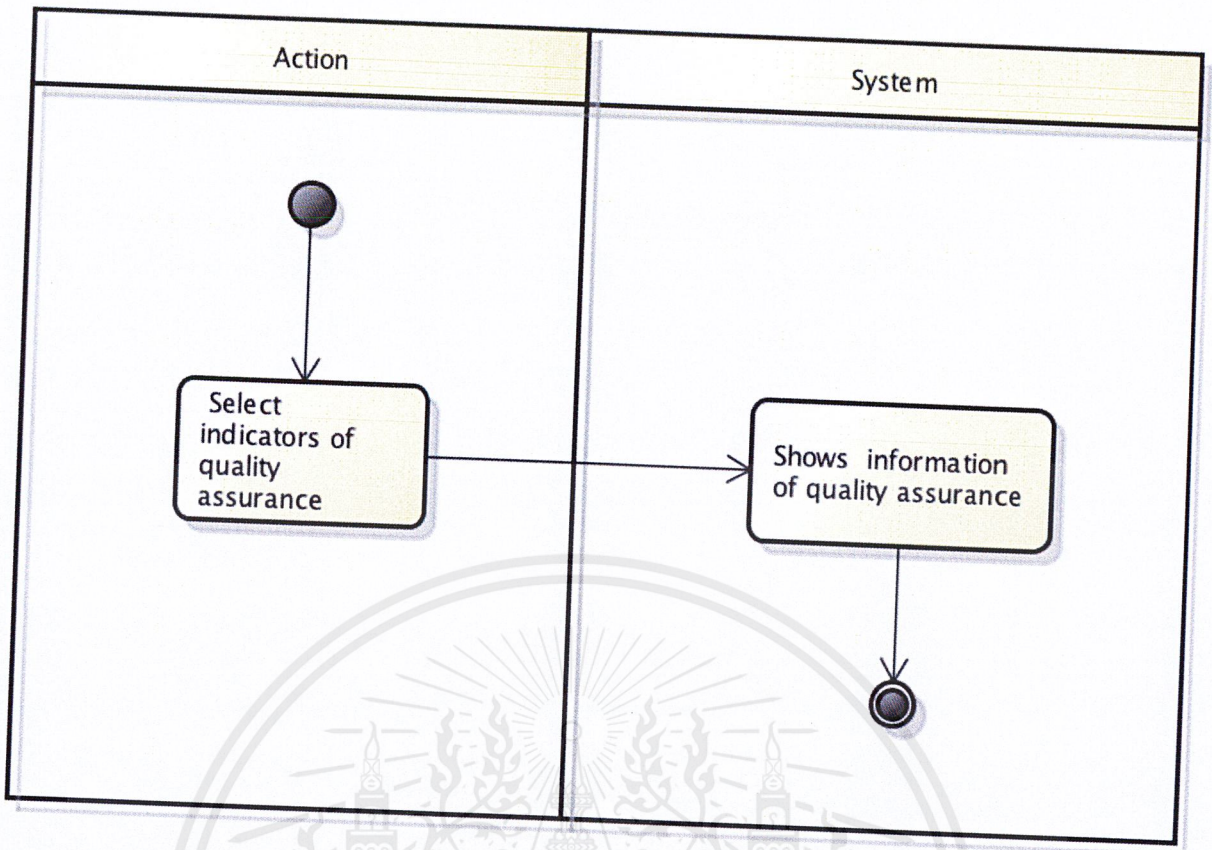


Figure 4.8: Activity diagram: View quality assurance information

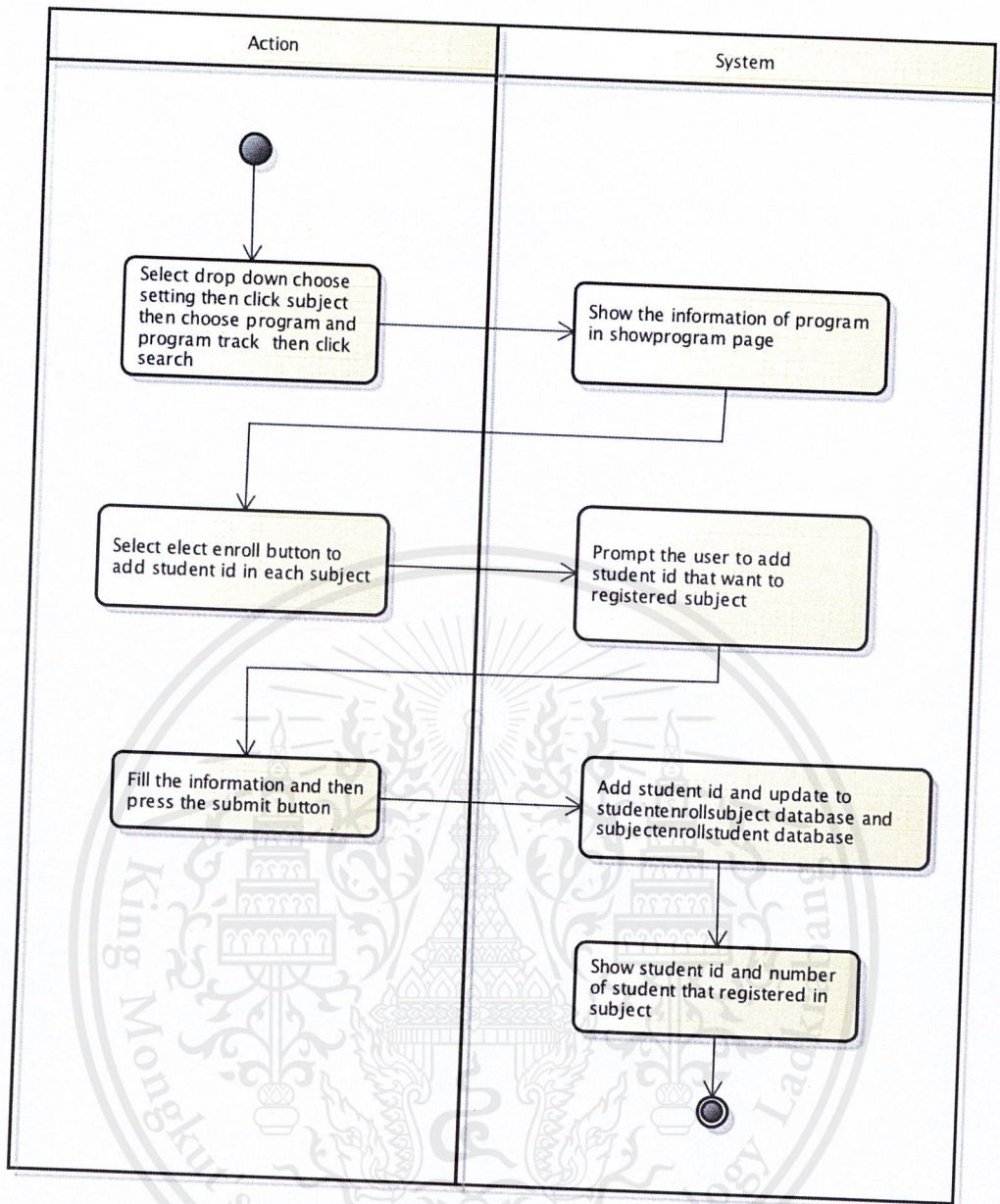
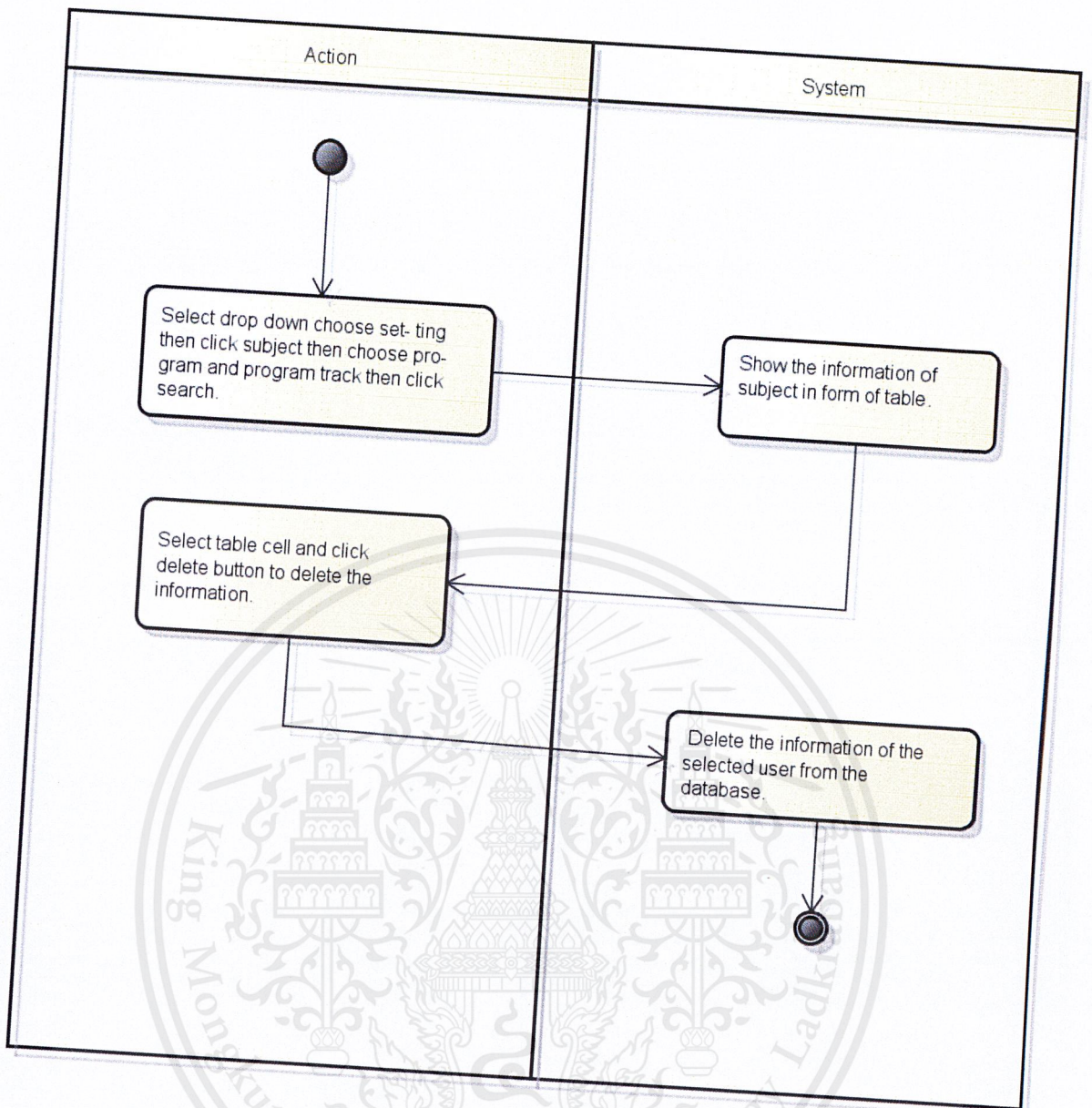
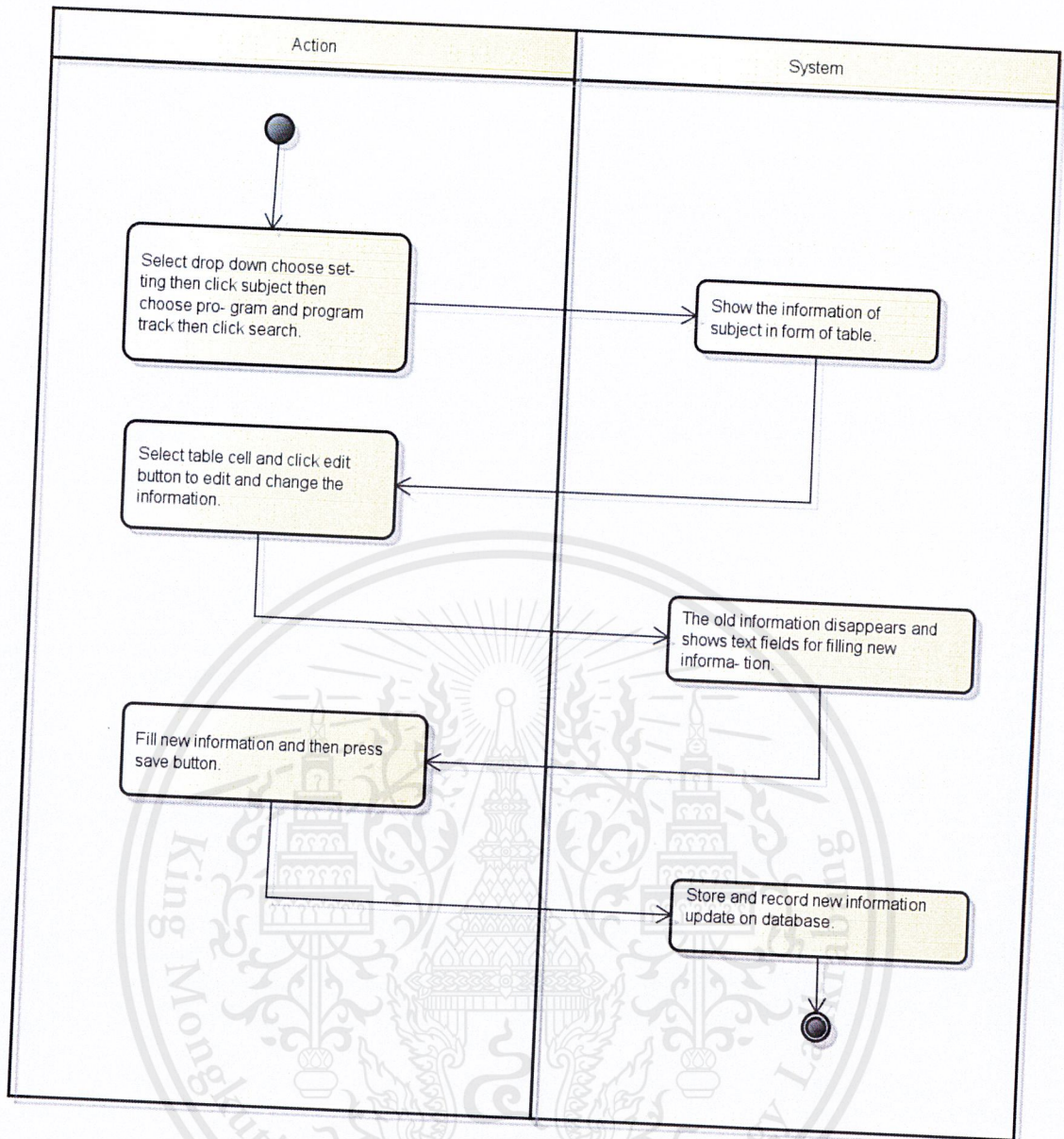


Figure 4.9: Activity diagram: Add student enroll subject



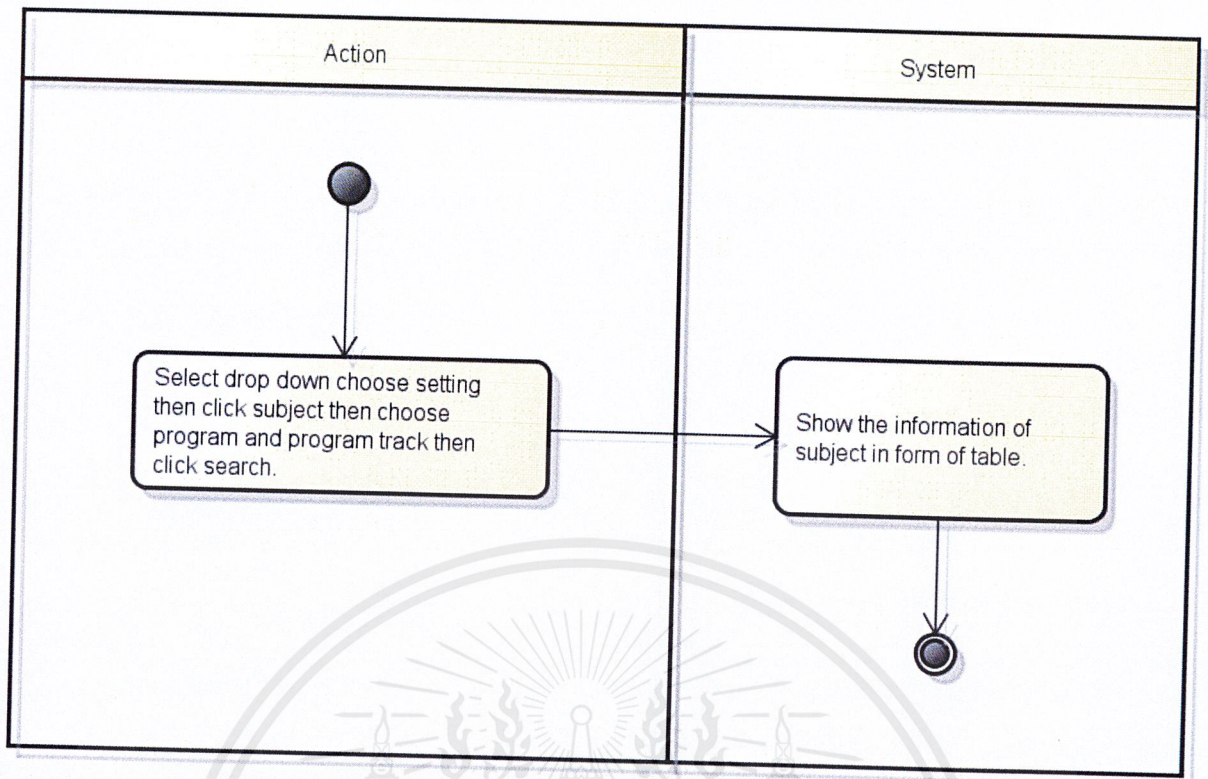
powered by Astah

Figure 4.10: Activity diagram: Delete subjects



powered by Astah

Figure 4.11: Activity diagram: Edit subject



powered by Astah

Figure 4.12: Activity diagram: View subject

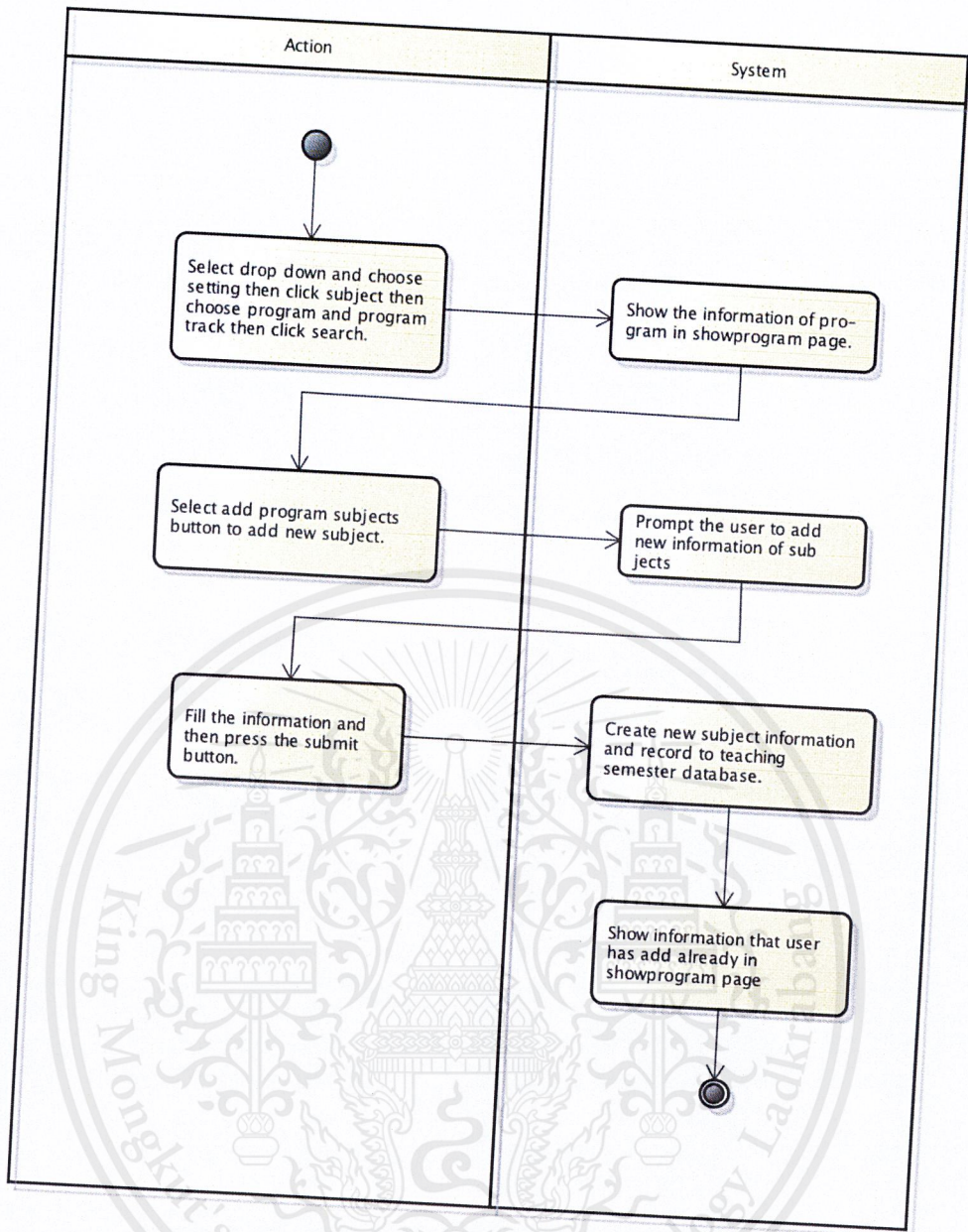


Figure 4.13: Activity diagram: Add teaching semester

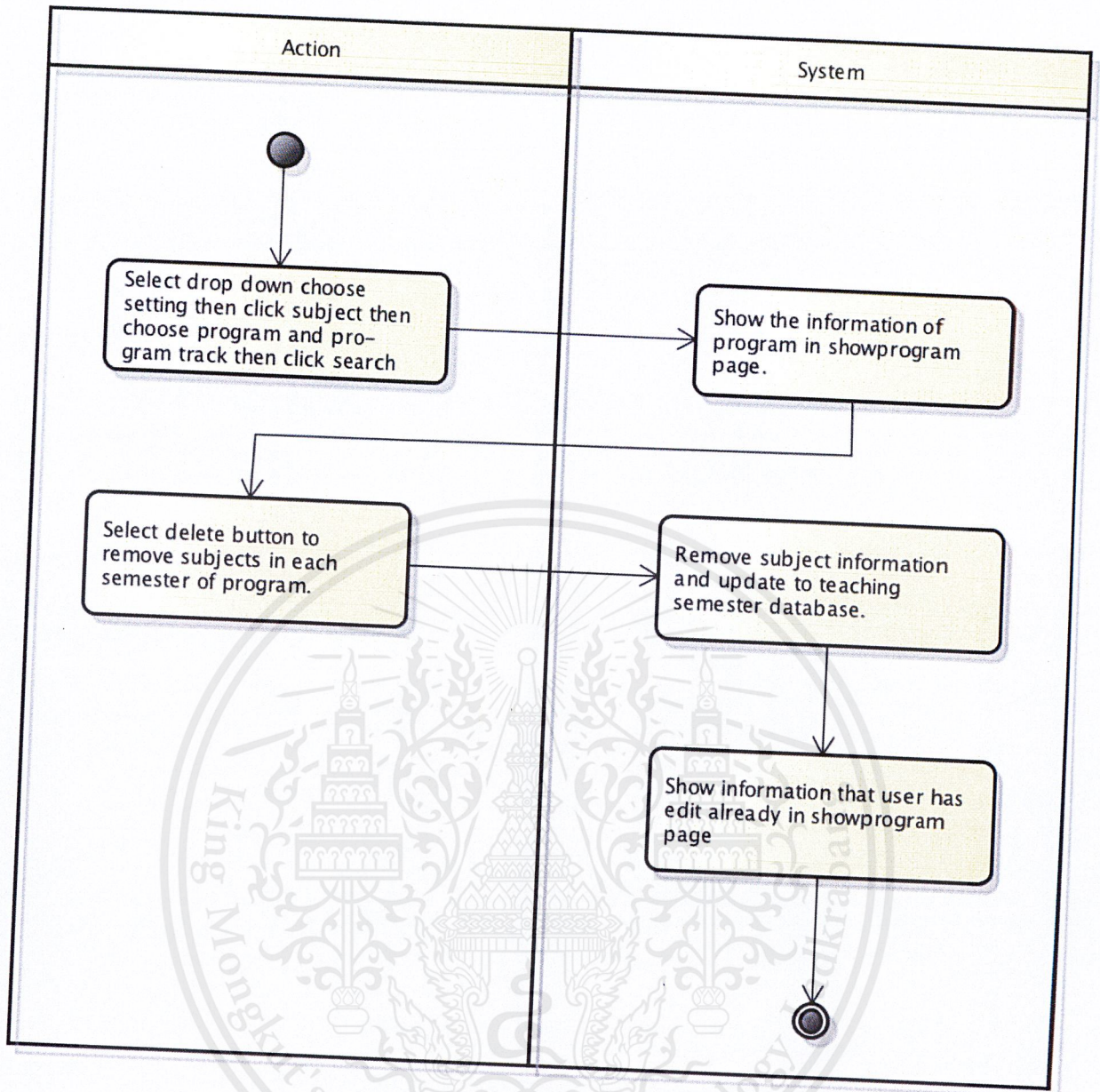


Figure 4.14: Sequence diagram: Delete teaching semester

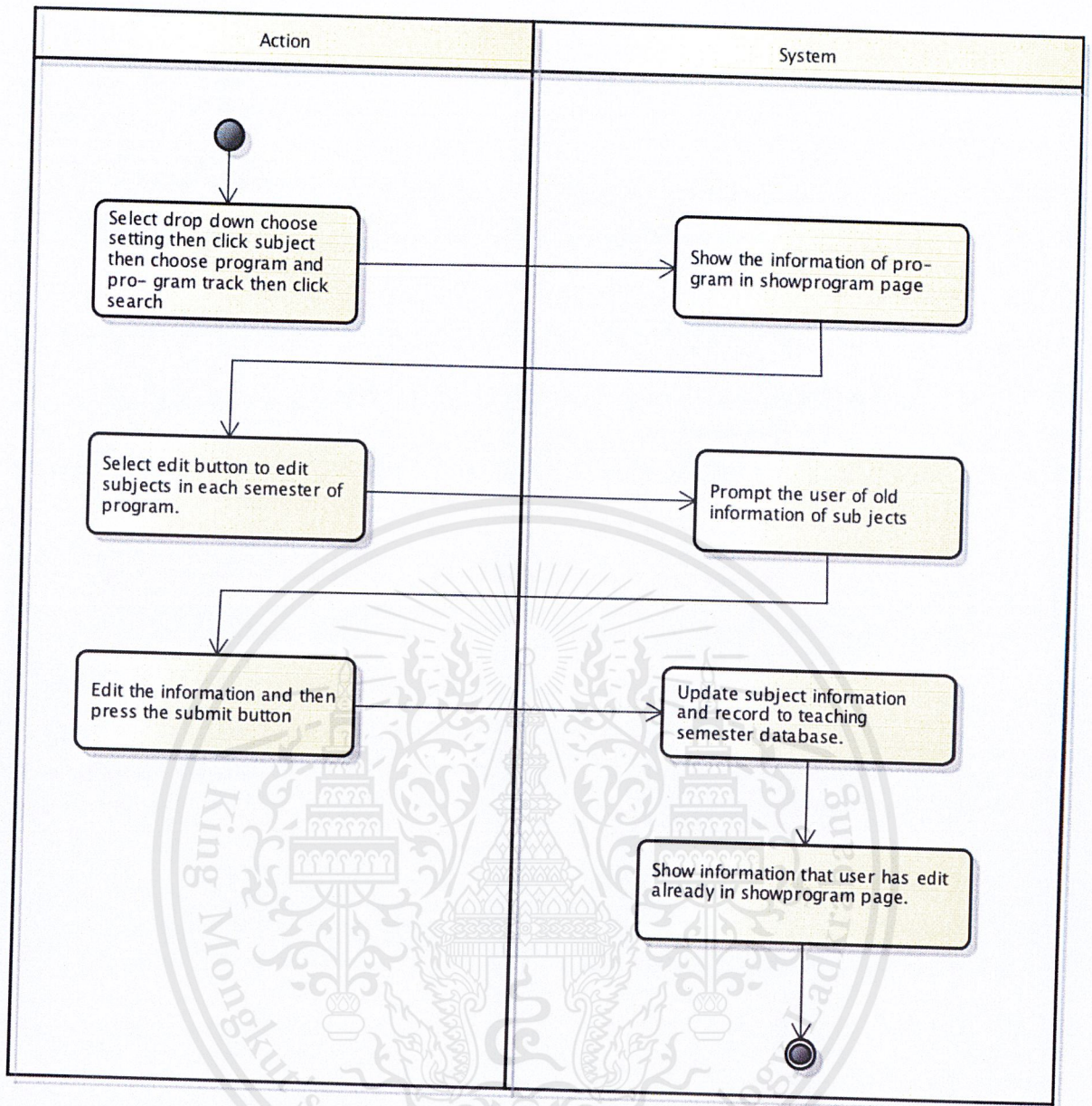


Figure 4.15: Sequence diagram: Edit teaching semester

### 4.2.3 Class diagram and Sequence diagram

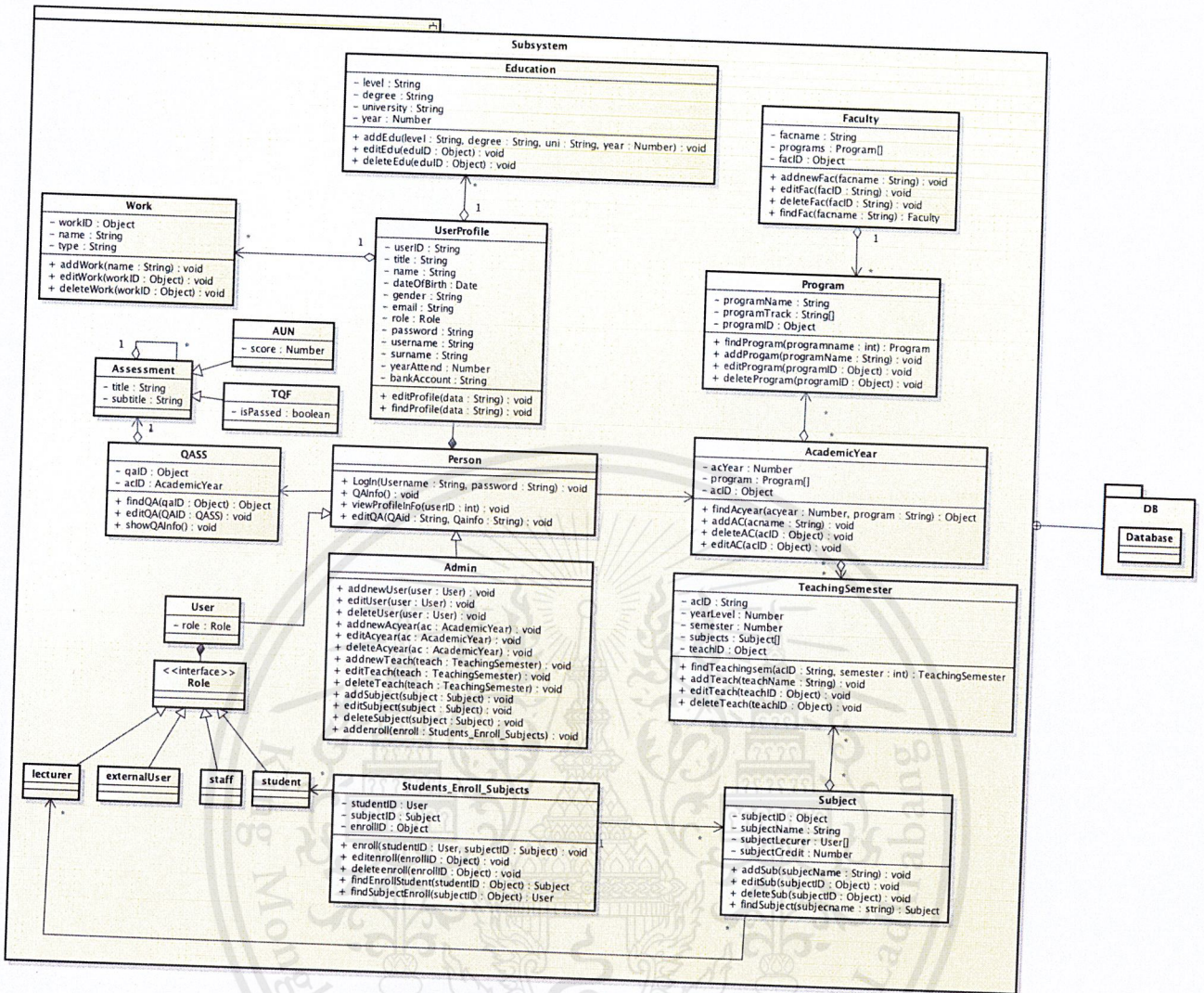


Figure 4.16: Overview of Class diagram

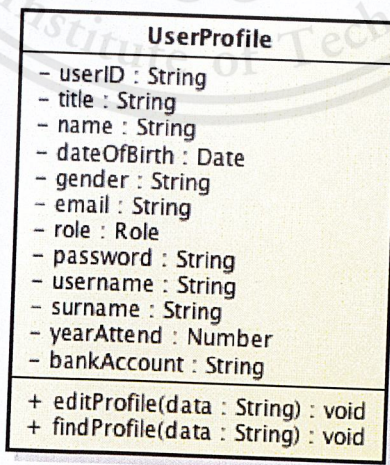


Figure 4.17: UserProfile class diagram

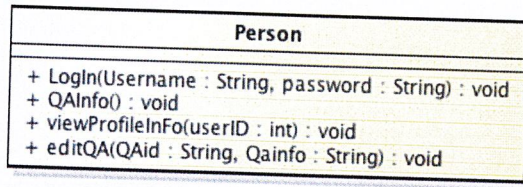


Figure 4.18: Person class diagram

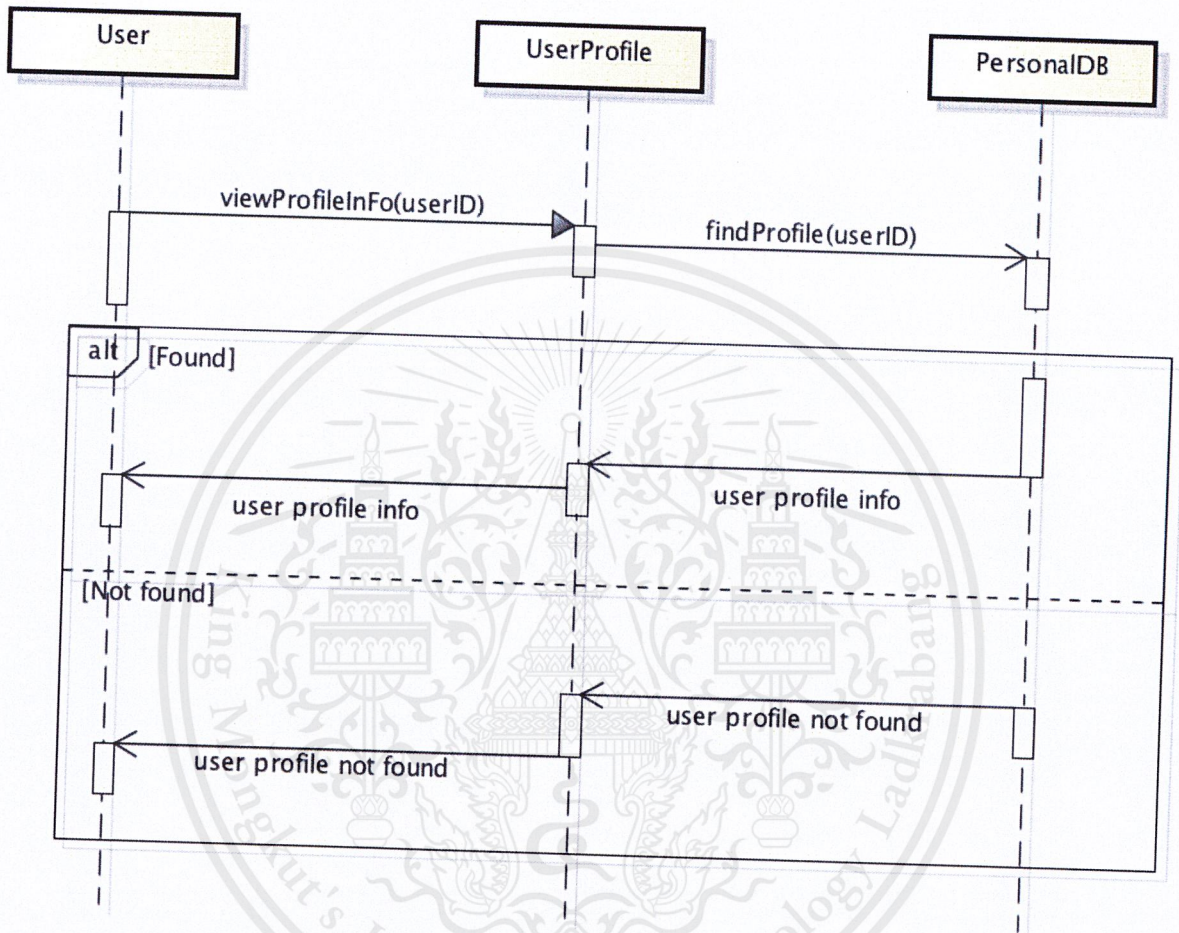


Figure 4.19: Sequence diagram: View personal information- Profiles, works, educations

For the view personal information, we mainly focus on Person and UserProfile. The class and property are shown in Figure: 4.17 and Figure: 4.18. User is used viewProfileInFo(userID) for call the UserProfile. UserProfile will find user information by use findProfile(userID) to retrieve information from the database. Database will call back for return result.

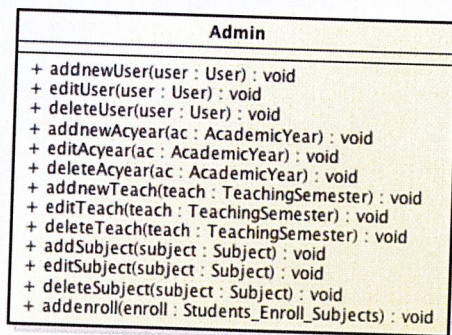


Figure 4.20: Admin class diagram

This material is reserved for educational use only, not allowed for commercial use.

Forbidden to modify the content, and cite the document when use

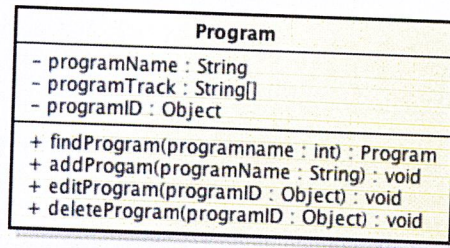


Figure 4.21: Program class diagram

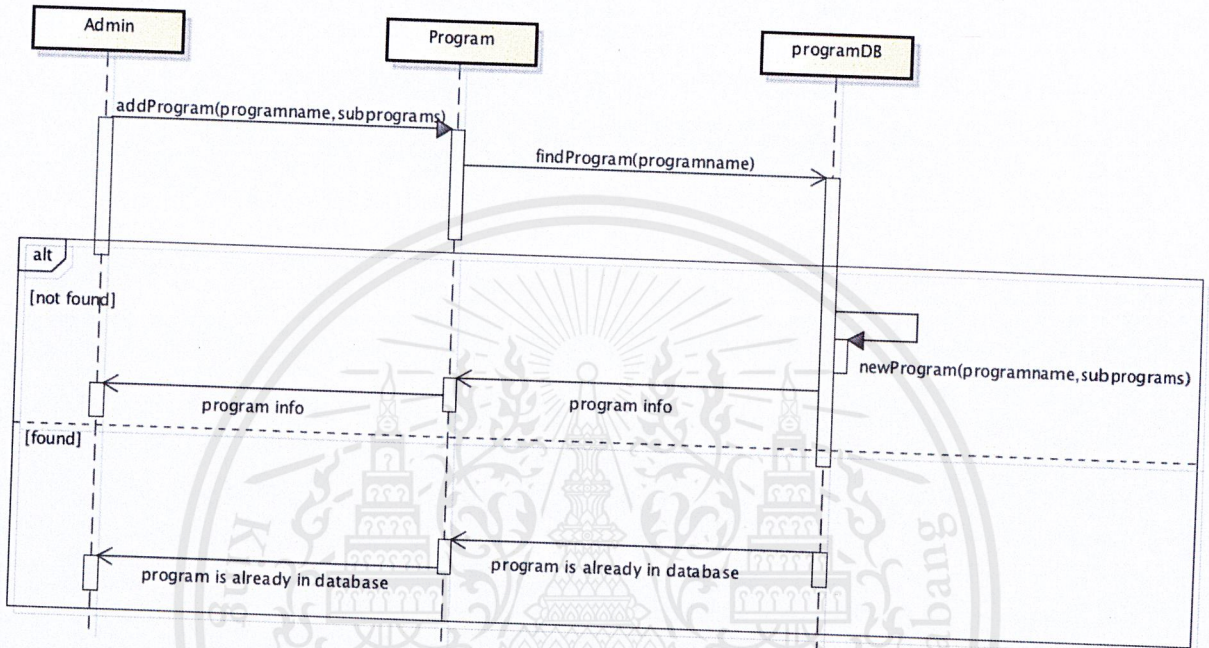


Figure 4.22: Sequence diagram: Add program and sub-programs

To add program and sub-program, The system shows the list of program and sub-program to select. Program and Admin class are used to implement. The class diagram and property are shown in Figure 4.20 and Figure: 4.21. We use addProgram(programname, subprograms) for call the Program. Program will find program by use findProgram(programname) to check that program and sub-program are in the database or not. If the program and sub-program are new, database is called newProgram(programname, subprogram) After that, database calls function back for return result.

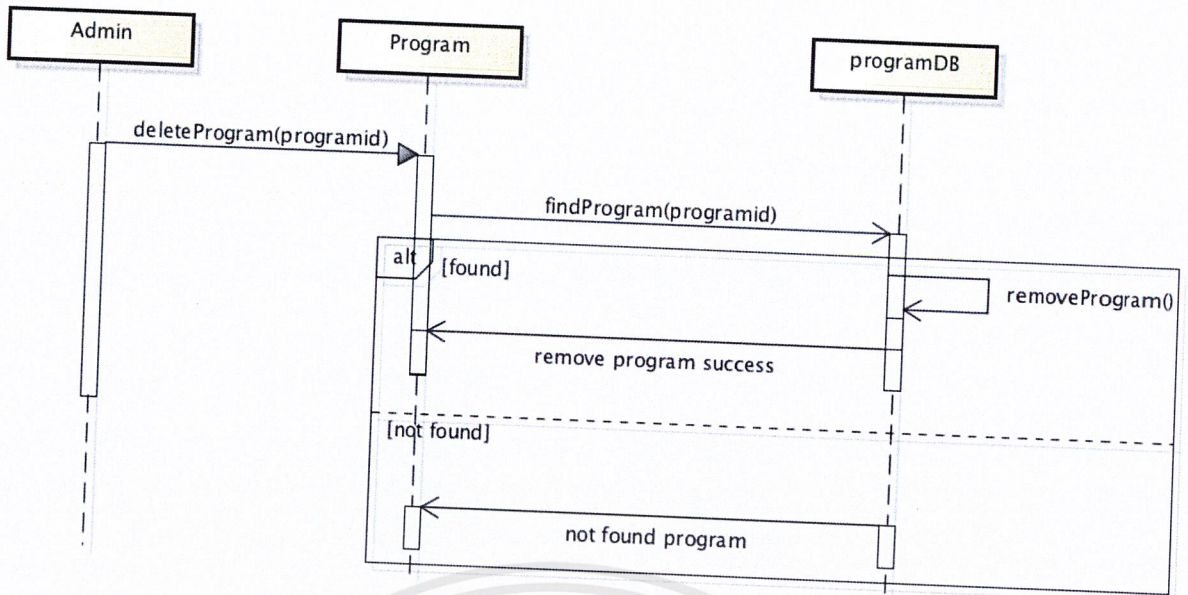


Figure 4.23: Sequence diagram: Delete program and sub-programs

To delete program and sub-program, this is looking like add and delete programs. But it is also different in details of the function. The system shows the list of program and sub-program to select. Program and Admin class is used to implement. The class diagram and property are shown in Figure: 4.20 and Figure: 4.21. We use deleteProgram(programid) for call the Program. Program will find a program by use findProgram(programid) to check that program and sub-program is in the database or not. If the program and sub-program are in the database, the database is called to remove by using removeProgram(). After that, database calls function back for return result.

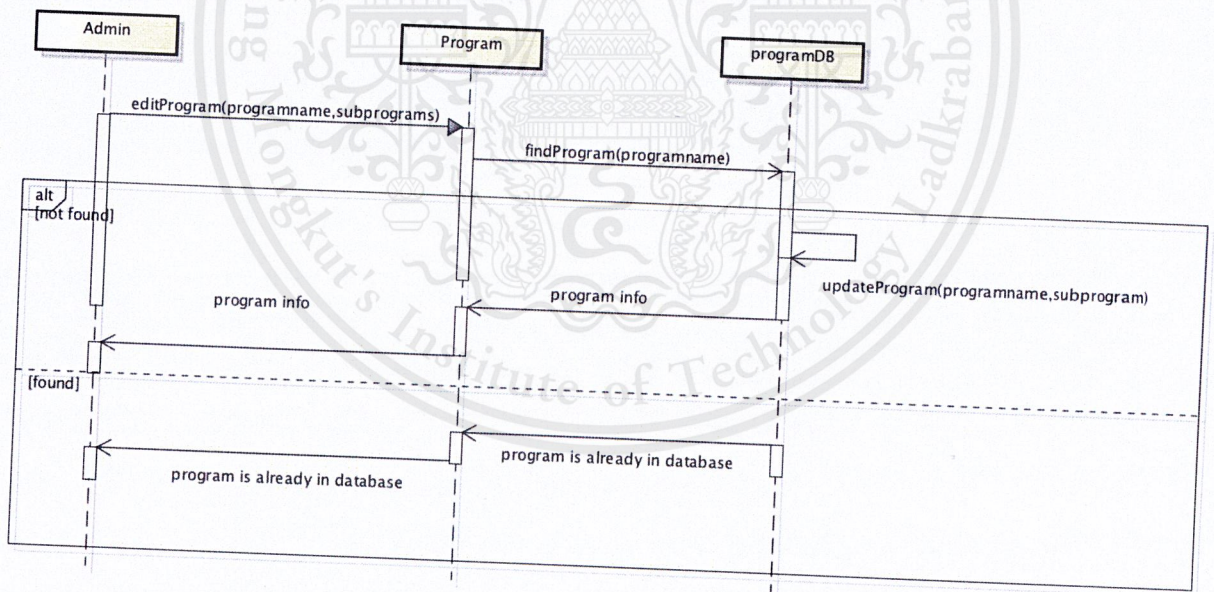


Figure 4.24: Sequence diagram: Edit program and sub-programs

To edit program and sub-program, this is looking like add and delete programs. But it is also different in details of the function. The system shows the list of program and sub-program to select. Program and Admin class is used to implement. The class diagram and property are shown in Figure: 4.20 and Figure: 4.21. We use editProgram(programname, subprograms) for call the Program. Program will find a program by use findProgram(programname) to check that program and sub-program is in the database or not. If the program and sub-program are in the database, the database is called to remove by using updateProgram(programname, subprograms) After that, database calls function back for return result.

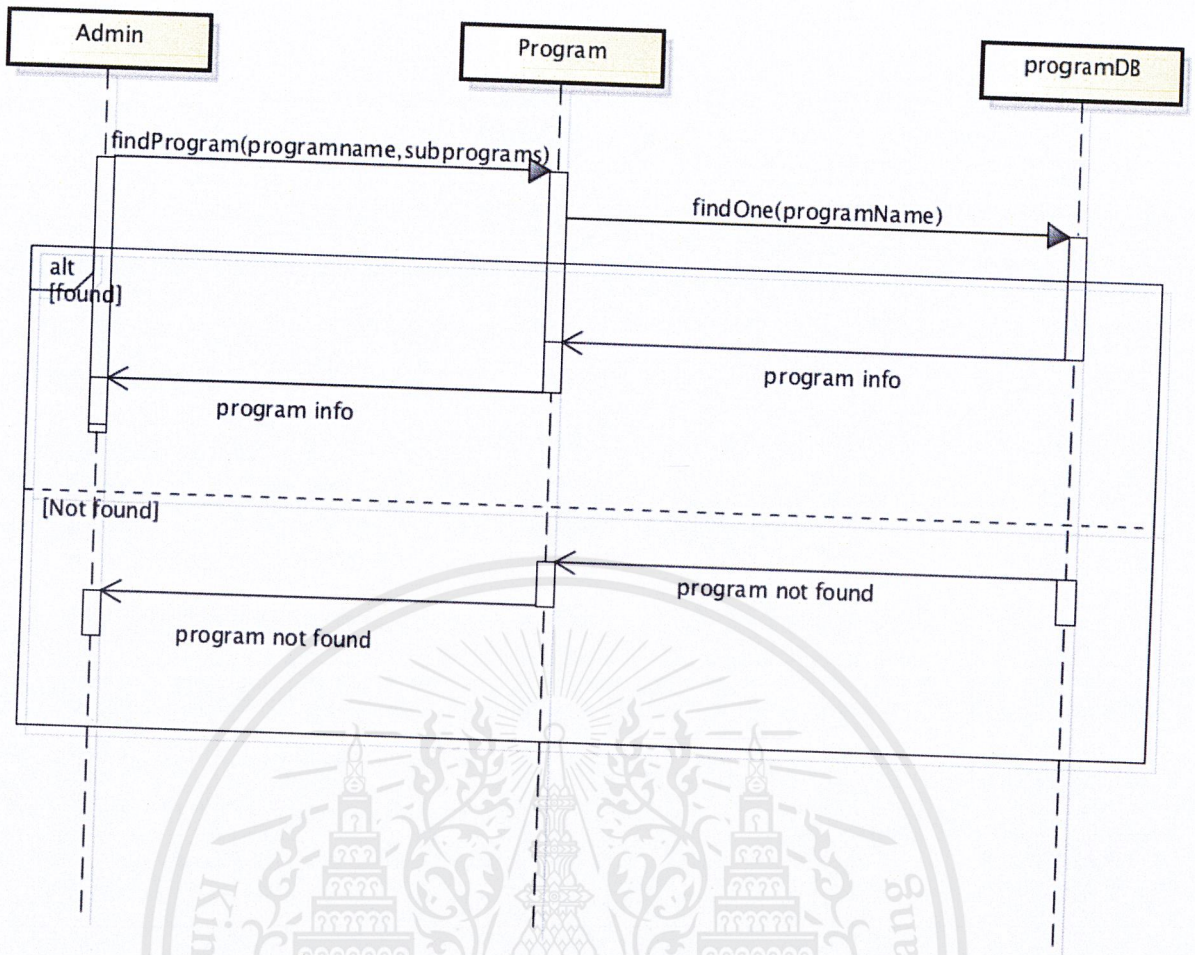


Figure 4.25: Sequence diagram: View program and sub-programs

For view information of program and sub-program, admin has to search information and program will show list of program for select. From the Figure: 4.20 Admin calls findProgram(programname) function for find program and from Figure: 4.21. Program uses findOne(programName) for show details of each programs.

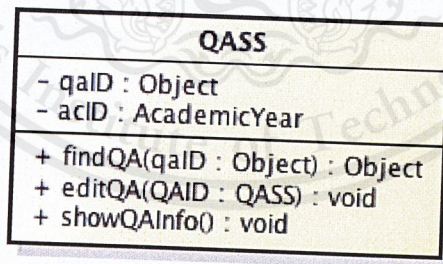


Figure 4.26: QASS class diagram

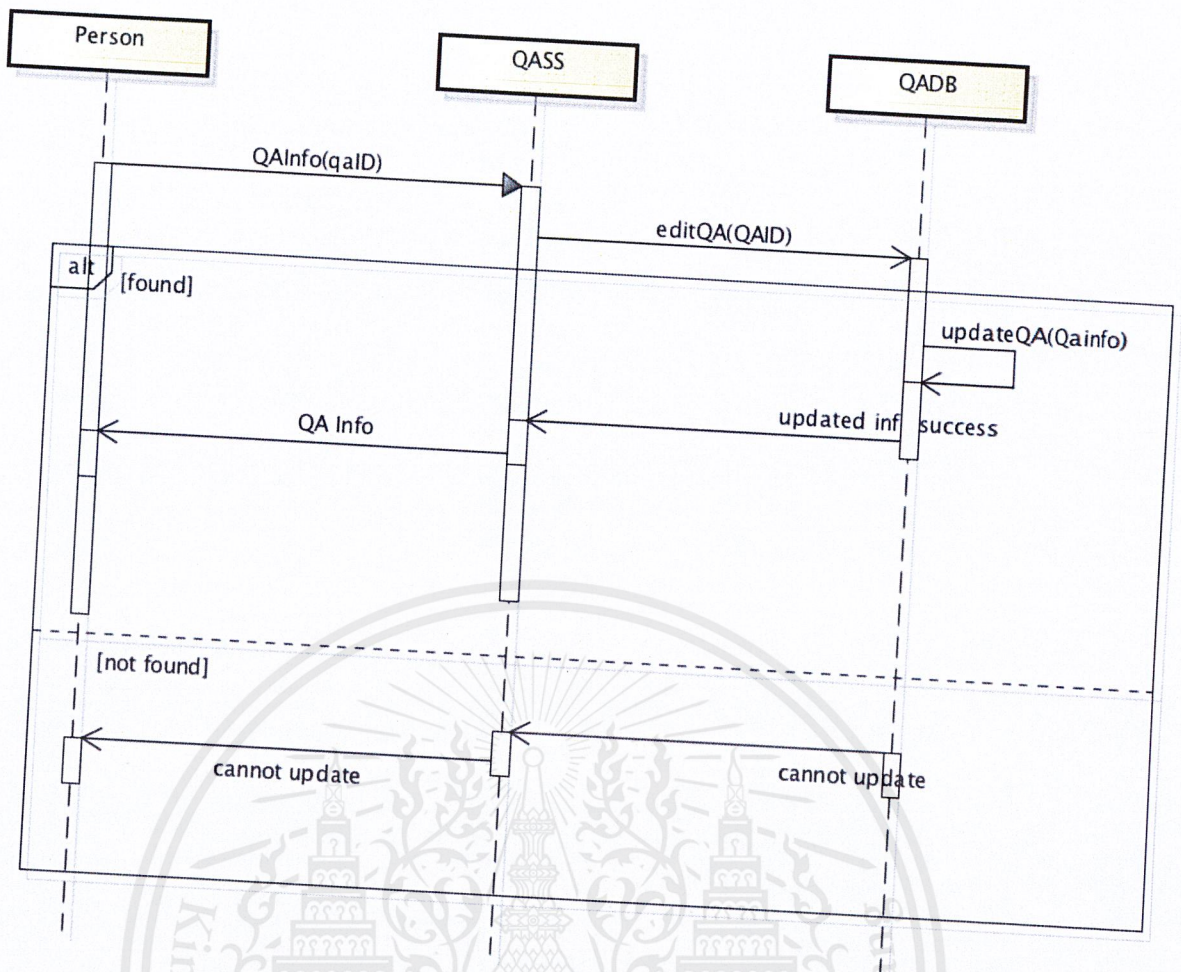


Figure 4.27: Sequence diagram: Edit quality assurance information

To edit the quality assurance information, we focus on 2 classes. There are QASS class as shown in Figure: 4.26 and Person in Figure: 4.18. Person calls QASS by QAInfo(qaID) QASS uses editQA(QAID) for find quality assurance information in database.

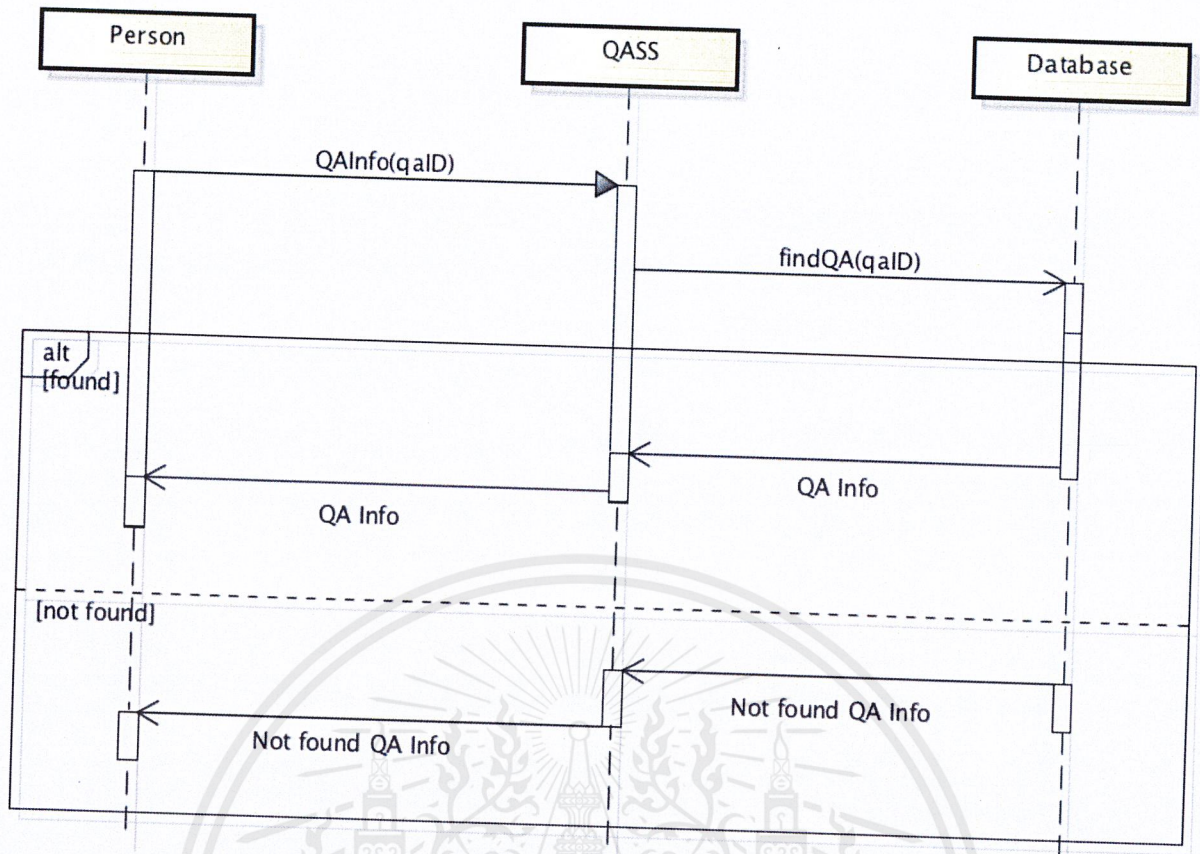


Figure 4.28: Sequence diagram: View quality assurance information

To edit the quality assurance information, we also focus on 2 classes as edit quality assurance. There are QASS class as shown in Figure: 4.26 and Person in Figure: 4.18. Person calls QASS by QAInfo(qaID) QASS uses findQA(qaID) for find quality assurance information in database.

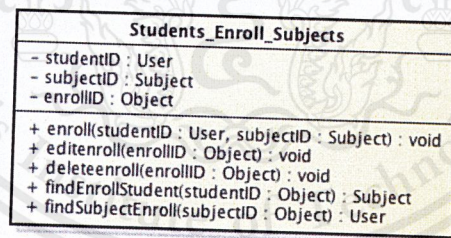


Figure 4.29: Student Enroll class diagram

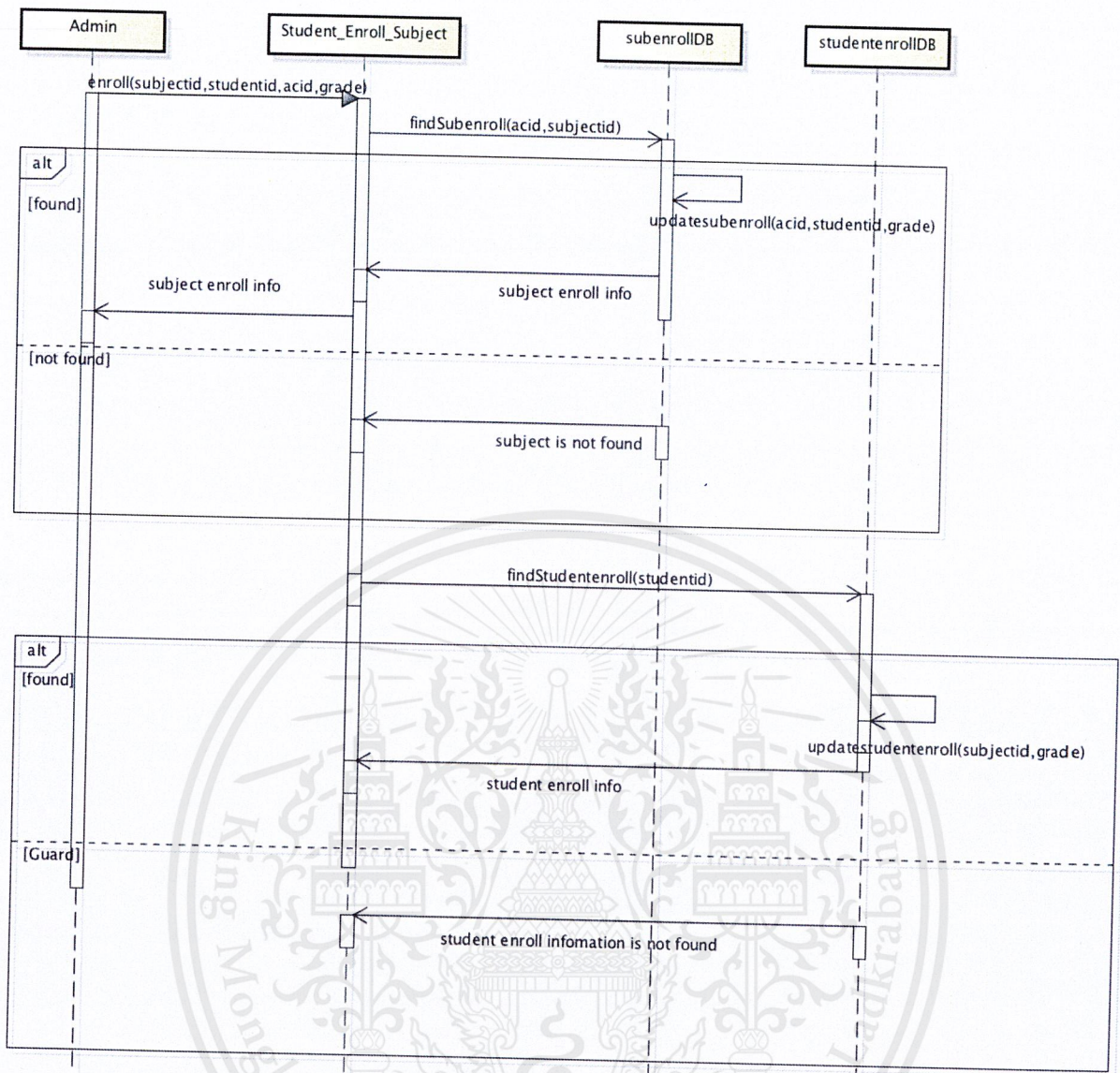


Figure 4.30: Sequence diagram: Add student enroll subject

To enroll student in each subjects, there are 2 classes to implement. There are Student\_Enroll\_Subject as shown in Figure: 4.29 and Admin in Figure: 4.20 Admin calls Student\_Enroll\_Subject by using enroll(subjectid, studentid, acid, grade). Student\_Enroll\_Subject will find subject enroll in subenrollDB. If subject is found, database will call function updatesubenroll(acid, studentid, grade).

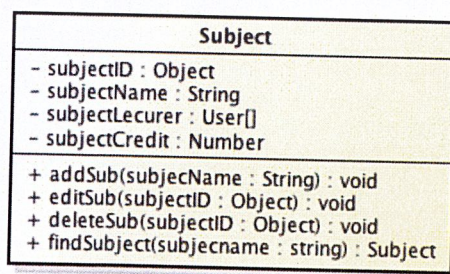


Figure 4.31: Subject class diagram

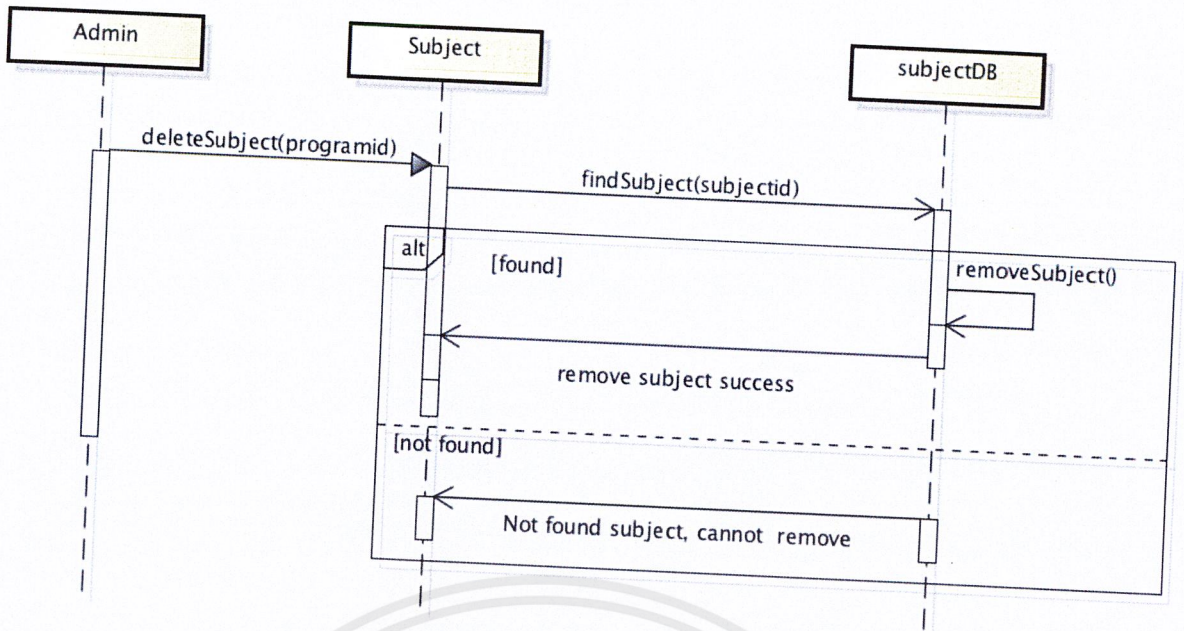


Figure 4.32: Sequence diagram: Delete subjects

This action is a part of admin section. For delete subject, we mainly focus on Admin and Subject. The class and property are shown in Figure: 4.20 and Figure: 4.31. Admin is used deleteSubject(programid) for call the Subject to delete. Subject is used to find by use findSubject(subjectid) to subject from the database. If there is in the database, it will call removeSubject() for delete and call back for return the result.

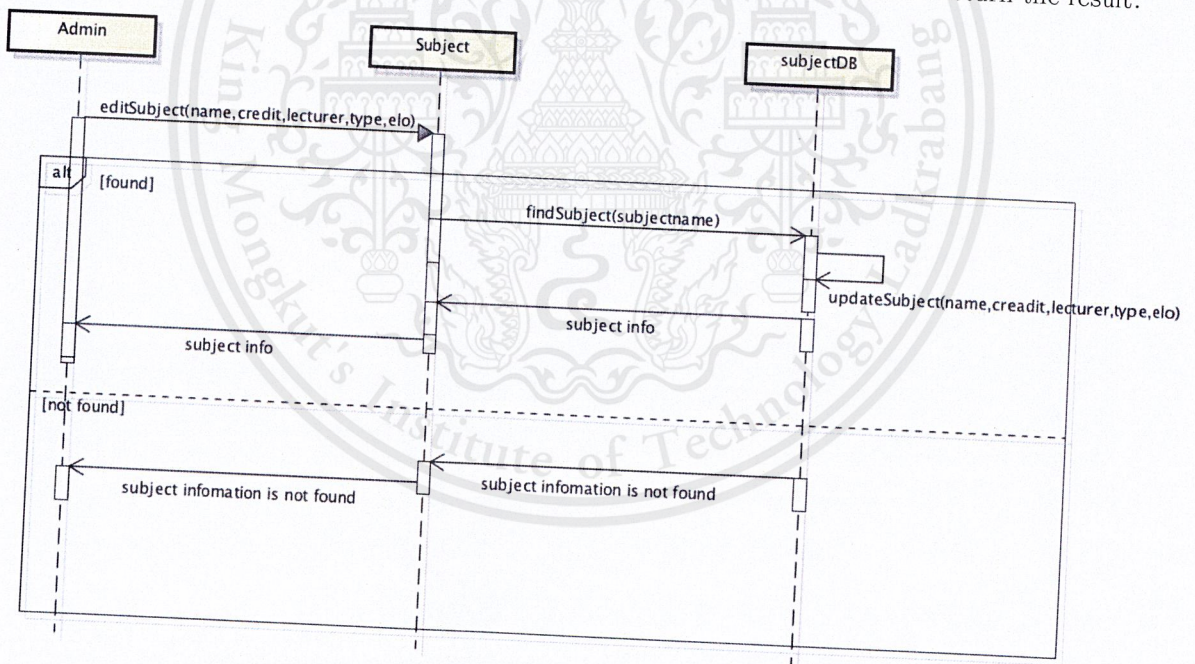


Figure 4.33: Sequence diagram: Edit subject

To edit subject this is looking like add and delete subject. But it is also different in details of the function. The system shows the list of select. Subject and Admin class is used to implement. The class diagram and property are shown in Figure: 4.20 and Figure: 4.31. We use editPSubject(name, credit, lecturer, type, ELO) for call the Subject. Subject will find a subject by use findSubject(subjectname) to check that subject is in the database or not. If the program subject is in the database, it is called to remove by using updateSubject(name, credit, lecturer, type, ELO) After that, database will call function back for return result.

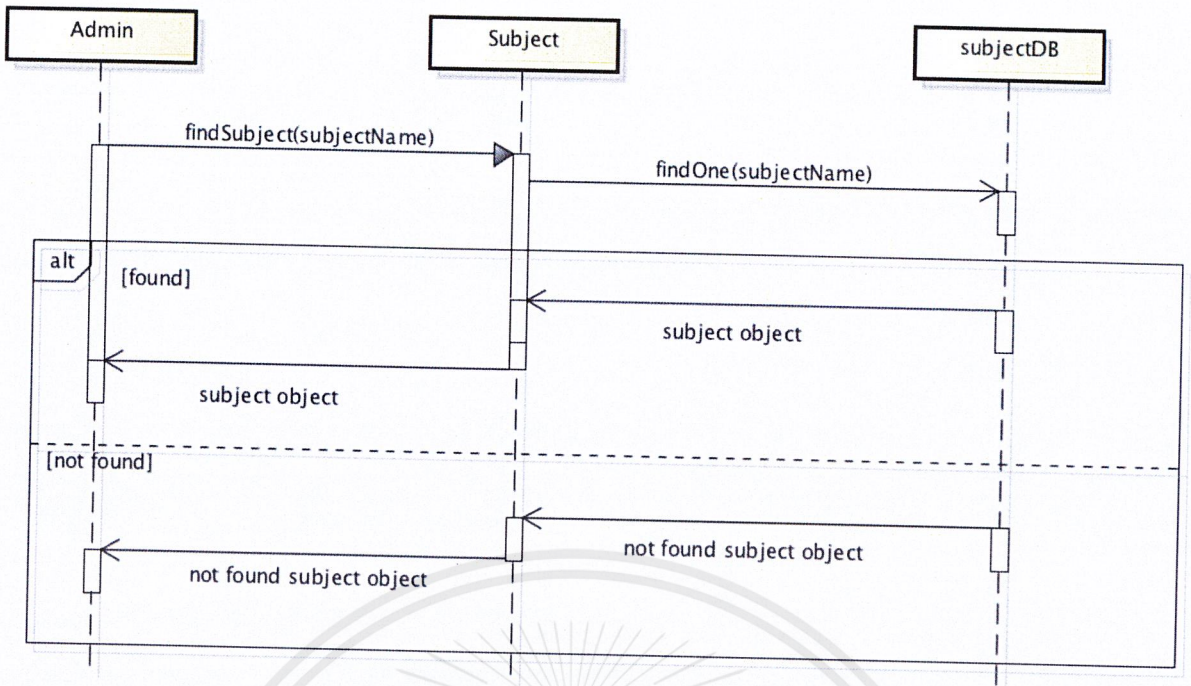


Figure 4.34: Sequence diagram: View subject

For view subject, there are 2 classes to implement. From the Figure: 4.20, Admin calls `findSubject(subjectname)` function for find subject and from Figure: 4.31 Subject uses `findOne(subjectName)` for show details of each subjects.

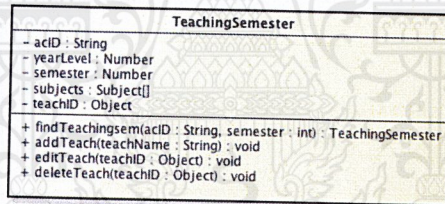


Figure 4.35: Teaching semester class diagram

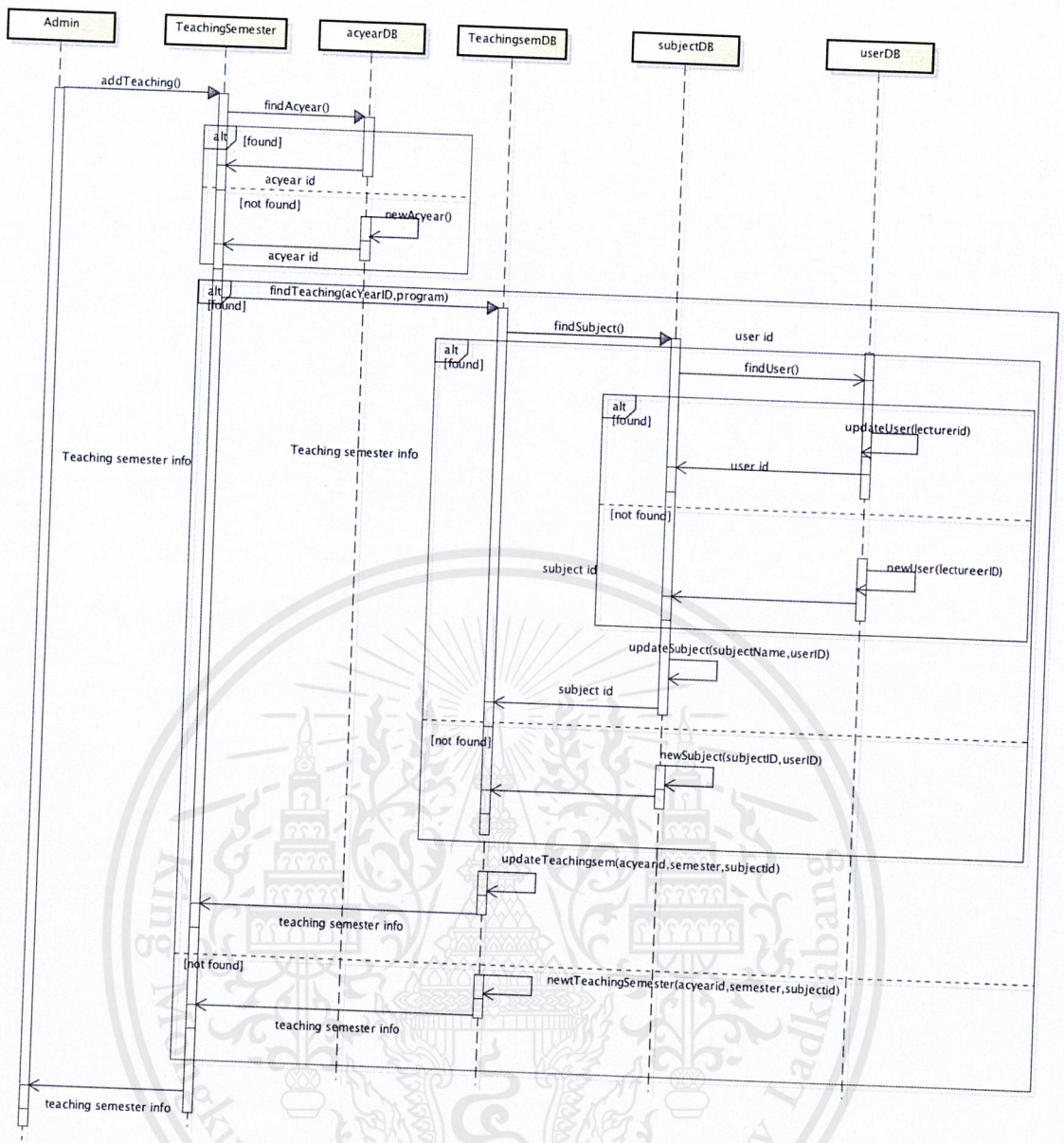


Figure 4.36: Sequence diagram: Add teaching semester

To add teaching semester, there are 2 classes to implement: `TeachingSemester` and `Admin`. The class diagram and property are shown in Figure 4.20 and Figure: 4.36. We use `addTeaching()` for call the `TeachingSemester`. `TeachingSemester` will find academic year by use `findAcyear()` to check that academic year is in the database or not. If the academic year is in the database, it will call back to `TeachingSemester`. `TeachingSemester` use function `findTeaching(acYearID,program)` to call `TeachingsemDB` and `TeachingsemDB` finds the subject in `subjectDB` by call `findSubject()`. After that, `subjectDB` finds user in `userDB` by function `findUser()`. If user is found, `userDB` will call `updateUser(lecturerid)`. If user is not found, `userDB` will call `newUser(lecturerid)` and `updateTeachingsem(acyearid,semester,subjectid)` and `updateTeachingsem(acyearid,semester,subjectid)`

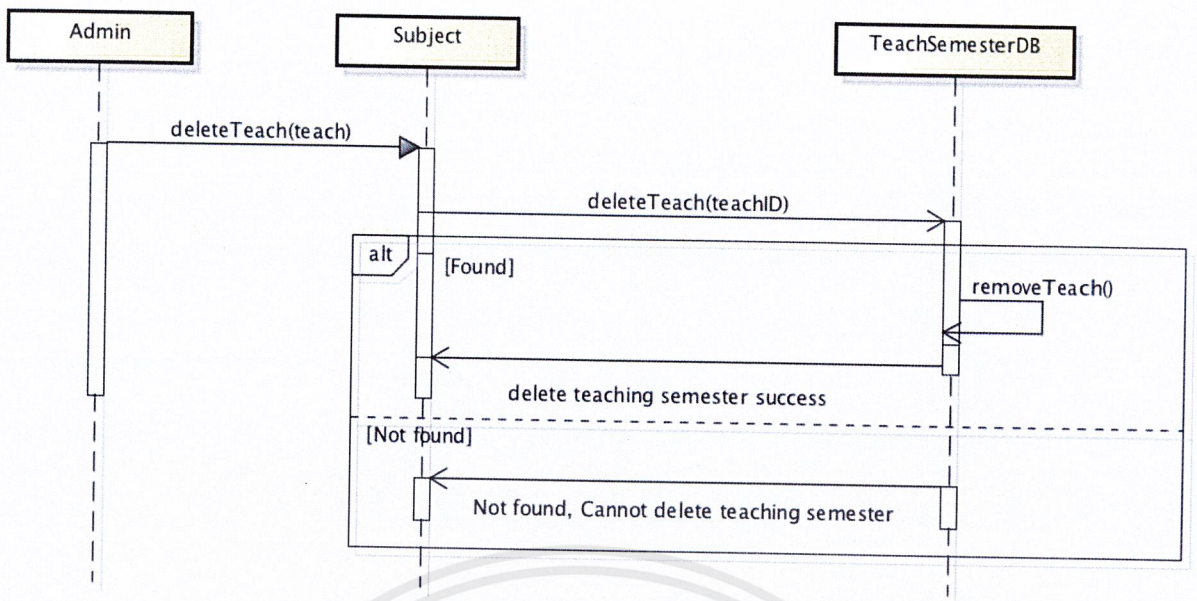


Figure 4.37: Sequence diagram: Delete teaching semester

For delete subject, we mainly focus on Admin and Subject. The class and property are shown in Figure: 4.20 and Figure: 4.31. Admin is used `deleteTeach(teach)` for call the Subject to delete. Subject is used to delete by use `deleteTeach(teachID)` to find subject for delete from the database. If there is in the database, it will call `removeTeach()` for delete and call back for return the result.

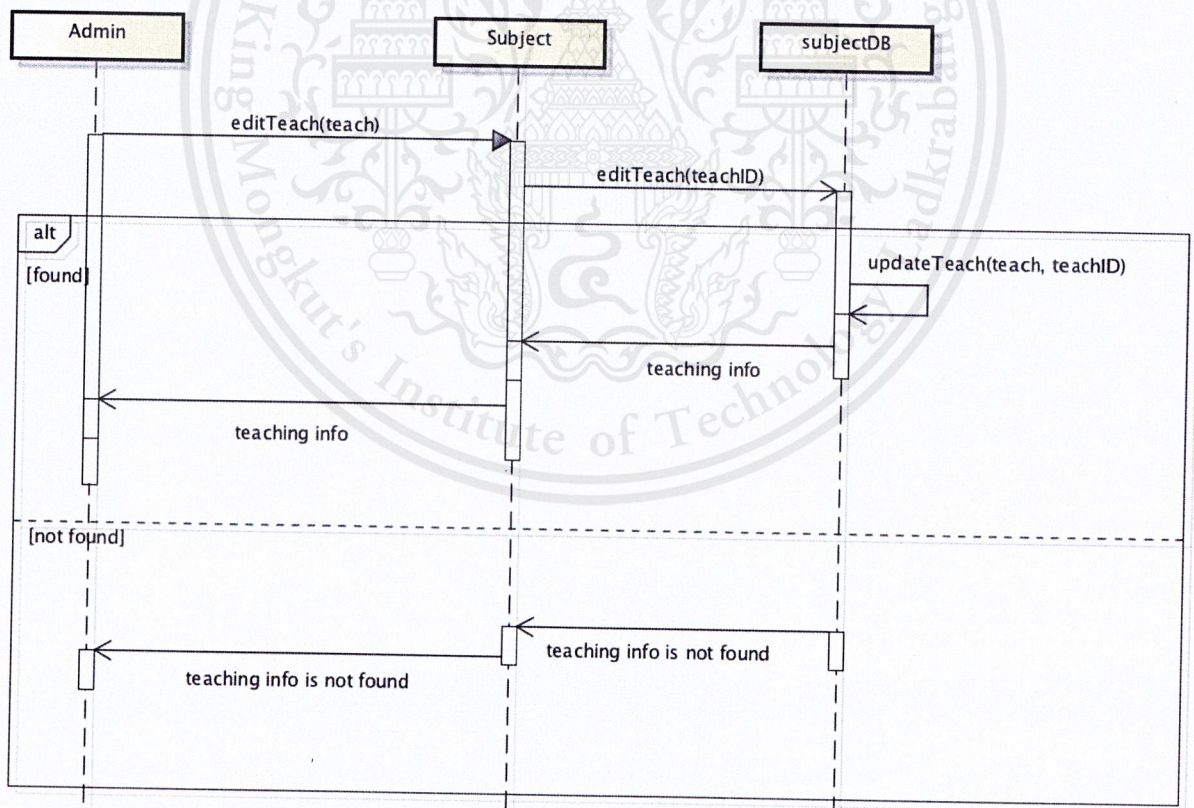


Figure 4.38: Sequence diagram: Edit teaching semester

To edit teaching semester, this is looking like add and delete teaching semester. But it is also different in details of the function. The system shows the list of teaching semester to select. Subject and Admin class are used to implement. The class diagram and property are shown in Figure: 4.20 and Figure: 4.31. We use `editTeach(teach)` for call the Subject. Subject will find a subject to delete by use `editTeach(teachid)` to

check that subject is in the database or not. If the program subject is in the database, it is called to edit by using `updateTeach(teach, teachID)` After that, database will call function back for return result.

#### 4.2.4 Data modeling

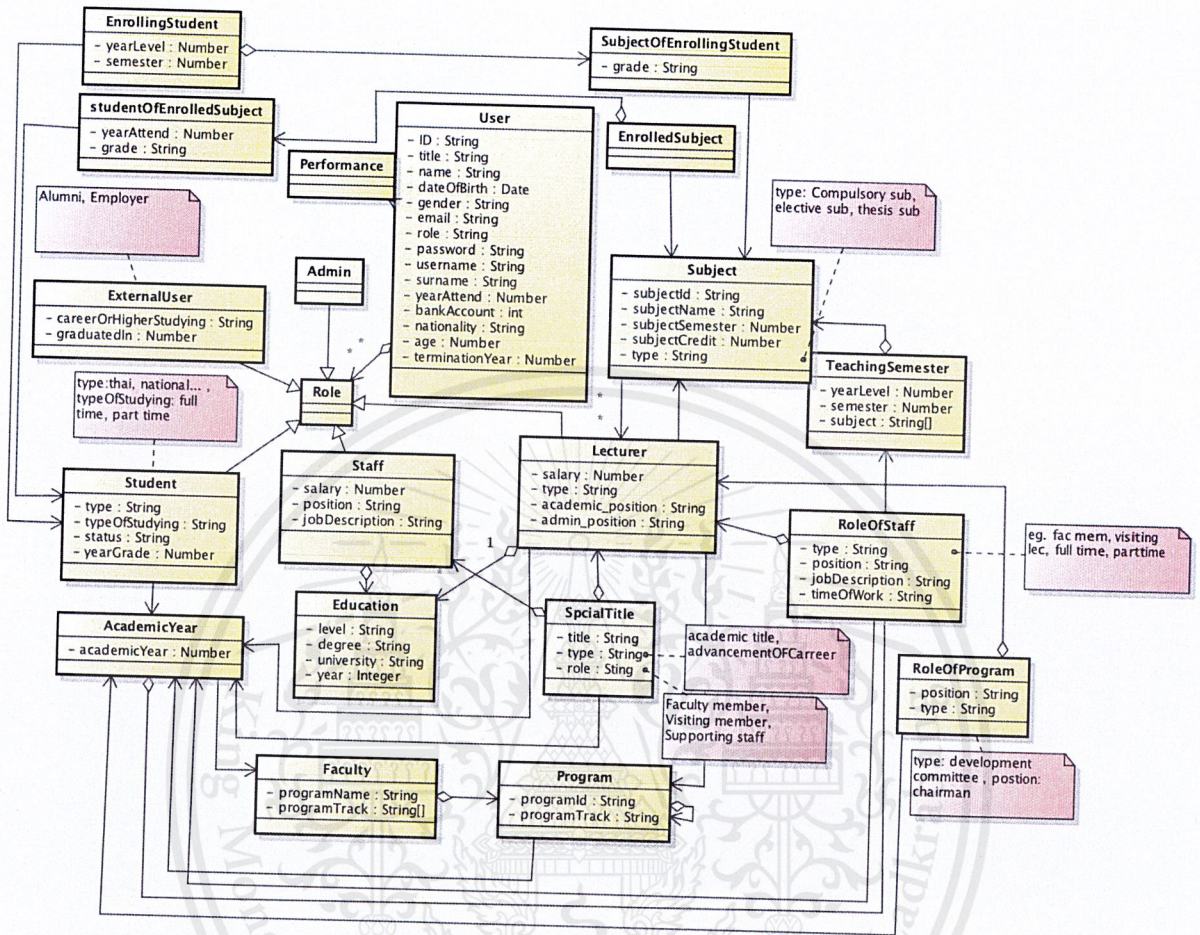


Figure 4.39: Data modeling of User role

The project is divided User into four roles: ExternalUser, Student, Staff and Lecturer. Every Lecturer and Staff would have their own Education. Lecturer and Student would be kept in each academic year and each Lecturer is also consist of RoleOfProgram and RoleOfFaculty. For faculty part, Faculty is consist of AcademicYear. Every AcademicYear is including TeachingSemester which is the class that kept Subject that teaches in the semester and the subject is also including the user who is the Lecturer. For the enrolled subject part, this part would consist of two classes: EnrollingStudent and Enrolled subject. That two classes would keep a Student who enrolls this course, a Subject that these student enrolls and grade that student has got.

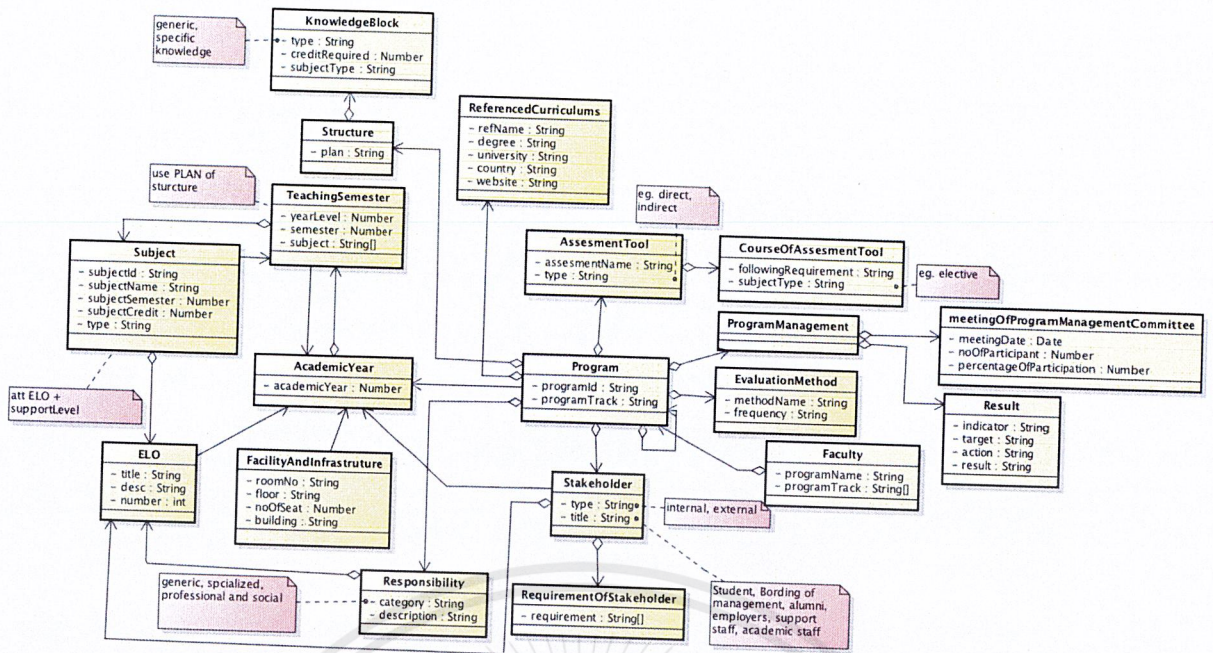


Figure 4.40: Data modeling of quality assurance-aun

For doing QA report, the users have to use much information that related to their program, therefore, Figure 4.40 shows that Program has many components which are Structure, ReferencedCurriculums, AssessmentTool, ProgramManagement, EvaluationMethod, Stakeholder and Responsibility. Each component would has its own details or specific details that is given to the user. It helps the user get more specific information. So, the user can use these information in this model to do the report easily. Moreover, some component of the system has to be mapped with QA information. For example, the model that shows 'ELO' will map with each Subject under the AcademicYear.

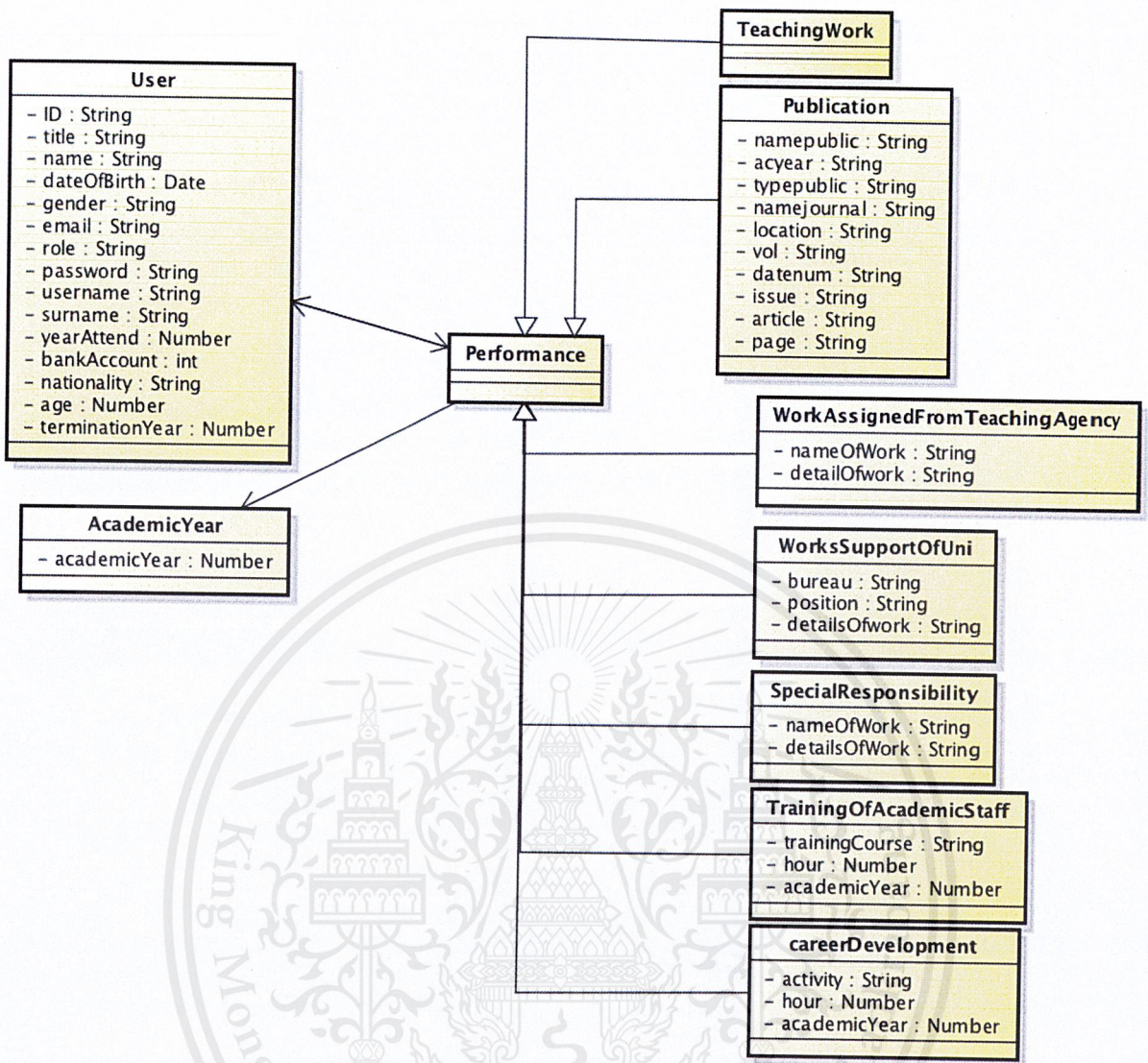


Figure 4.41: Data modeling of performance

From figure: 4.41 performance of each user, the users would have their Performance of each AcademicYear. The performance has twelve categories which is TeachingWork, Publication WorkAssignedFromTeachingAgency WorksSupportOfUni, SpecialResponsibility, TrainingOfAcademicStaff and careerDevelopment. Each category has its own detail and sub-category of itself.

### 4.3 Development Methodology

The project is developed by using scrum as development methodology. Scrum is an Agile framework, fast way to manage and develop in software project. The reasons that we decided to use this method are that it increases the quality of the deliverable and cope better with the change. Every week before we meet the advisor, we have to meet and integrate every part that we have already done together after that we have to discuss about works, problems ,progresses and reschedule plans. This method help us to manage with changeable requirement, save the time to develop and daily meeting makes the project more efficient.

## Chapter 5

# Experiment

### 5.1 Experiment

The project evaluates the proposed website in two aspects: performance and convenience as follows

**Performance** is one of experiment tools for measuring to efficiency of the website and any functions. There are about logging in, signing up, accessing personal information (profile, work and education), managing personal information, managing quality assurance (add, edit, delete), managing program, managing subject, and managing user.

**Convenience** is used for measuring the overall of website that is not only good and comfortable to users or not but also about user-interface design which is appropriate for each feature on website or not. These are the rate for the satisfaction level for users as follows

Very satisfied = 5 points

Satisfied = 4 points

OK = 3 points

Dissatisfied = 2 points

Very dissatisfied = 1 point

### 5.2 Result

We ask 9 IC KMITL students who are developing the Monkey Office website to perform evaluation. The results are as shown in table 5.1

From table 5.1, the average value of satisfaction level for websites performance is 4.2, which is satisfied. The average value of satisfaction level for convenience is 4, which is satisfied. So the overall of efficiency of the application is satisfied.

Evaluation	Efficiency		
	Average	Standard deviation	Qualitative
<b>1. Performance</b>			
1.1 Ability to log in	3.8	0.78	Satisfied
1.2 Ability to access personal information-(profile, work, and education)	4.3	0.86	Satisfied
1.3 Ability to manage personal information (add, edit, delete)	4.4	0.72	Satisfied
1.4 Ability to manage quality assurance(add, edit, delete)	4.6	0.5	Very Satisfied
*1.5 Ability to manage programs (add, edit, delete)	4.1	0.78	Satisfied
*1.6 Ability to manage subjects (add, edit, delete)	4.2	0.66	Satisfied
*1.7 Ability to manage users (add, edit, delete)	3.8	0.92	Satisfied
<b>The overall average</b>	4.2	0.29	Satisfied
<b>2. Convenience</b>			
2.1 The website provides easy-to-use interface.	3.2	0.78	OK
2.2 The website provides accurate information.	4.4	0.51	Satisfied
2.3 The application helps user about user's tasks.	4.6	0.51	Satisfied
<b>The overall average</b>	4	0.75	Satisfied

Table 5.1: The result of efficiency evaluation of website from group of IC KMITL students.

Remark : the \* signal before each evaluation is shown that the evaluation is for admin.

## Chapter 6

# Conclusion

### 6.1 Conclusion

The project is to develop a program called Quality Assurance Support System for education purpose. It is the subsystem of the Monkey office system. As the objective, the website can keep the information, which is used for Quality Assurance report in the database. It allows users to enter, read, update and delete the information that depends on their authorization in Quality Assurance system to do the Quality Assurance report easily. Our group also develops in logging-in, sign-up and register part of Monkey office system and also admin function. The website provides special functions for the admin to manage programs and subjects of faculty. Moreover, admin can manage user account of website. The evaluation results in previous chapter would show that its performance and convenience are...on average.

### 6.2 Suggestion

Even though the developed project meets its objective. There are some ways for improvement as follows. Because of the system that we developed is about the quality assurance for high level Thai education. The indicators of the quality assurance is not static. For improved, the matching and adding function of each indicators with quality assurance information should provide for fulfill system.

# Bibliography

- [1] Literature Review. “Bannantantai School” Available:<https://www.gotoknow.org/posts/546420>
- [2] Literature Review. “Rajabhat Phuket University” Available:<http://qa.pkru.ac.th/fileuploadtemp/5B8ACF32M>.
- [3] Literature Review. “Suranaree University of Technology” Available : <http://boffice.sut.ac.th/epersonal/help/>
- [4] Literature Review. “faculty of Veterinary Science Kasetsart University” Available : <http://www.qa.ku.ac.th/>
- [5] Literature Review. “Rajamangala University of Technology Rattanakosin” Available : <http://journal.rmutt>
- [6] Literature Review. “Faculty of Industrial Education, King Mongkut’s Institute of Technology Ladkraban” <http://www.indeed.kmitl.ac.th/journal/images/stories/year112/vol110219.pdf>