A WEB-BASED DECISION SUPPORT SYSTEM FOR LEADERSHIP COMPETENCIES

By

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DISSERTATION CONFIRMATION AND APPROVAL

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SOKONGAN KEPUTUSAN WEB UNTUK KOMPETENSI KEPIMPINAN

ABSTRAK

Pada masa kini, teknologi semakin maju, kecekapan kepemimpinan untuk organisasi membangun atau reformasi adalah penting. Sebabnya, sistem kecekapan kepemimpinan, sering menggunakan kaedah yang lebih multidimensi dan komprehensif, termasuk pengurusan keupayaan, analisis jurang kemahiran, perancangan penggantian, dan analisis kemampuan. Sistem ini akan membantu mencari pemimpin untuk mematuhi piawaian organisasi. Selanjutnya, pandemi Covid-19 telah melanda seluruh negara, menyebabkan pergeseran dari tempat kerja di pejabat ke tempat kerja dari rumah, diperintahkan untuk mengurangkan gelombang orang semasa penutupan. Oleh itu, organisasi menghadapi masalah kompetensi kepemimpinan yang berkualiti dan kekurangan jurang kemahiran. Di samping itu, organisasi telah menghadapi masalah untuk menerima maklum balas daripada pengurus yang memerhatikan pemimpin mengenai kompetensi kepemimpinan yang tidak memenuhi syarat. Dalam krisis sekarang, organisasi dipaksa untuk menyesuaikan strateginya dan beralih ke kompetensi kepemimpinan pengurusan transformasi digital. Kajian ini bertujuan untuk mengenal pasti ciri kekuatan dan kelemahan sistem dari sistem yang serupa, dan merancang sistem berasaskan web berdasarkan keperluan. Seterusnya, sokongan keputusan web untuk sistem kompetensi kepemimpinan akan dikembangkan. Model kitaran hidup pengembangan perisian (SDLC) yang dilaksanakan dalam projek ini adalah model tangkas. Model tangkas terdiri dari lima fasa di mana kemajuan proyek akan berlangsung secara bertahap, yaitu perencanaan, analisis kebutuhan, rancangan, pelaksanaan, dan pengujian. Sistem kompetensi kepemimpinan diharapkan dapat menyediakan platform untuk mengumpulkan pengurus dan pemimpin untuk kepemimpinan menilai bentuk data, membuat analisis rata-rata untuk kecekapan berjalan, dan kualiti kompetensi kepemimpinan yang lebih baik dan meningkatkan nilai.

A WEB DECISION SUPPORT FOR LEADERSHIP COMPETENCIES

ABSTRACT

Nowadays, technology is more and more developed, leadership competencies for the developing or reform organization it's important. The reason, leadership competencie s system, often adopts more multidimensional and comprehensive methods, including capability management, skills gap analysis, succession planning, and capability analy sis. These systems will help to look for a leader to comply with an organization's stan dards. Furthermore, the pandemic Covid-19 has raged across countries, to cause a shi ft away from work at office toward work from home, ordered to reduce a tide of peop le during the lockdown. Therefore, the organization faced the problem of quality lead ership competencies and lack of skills gap. In addition, the organization has encount ered the problem of receiving feedback from managers observation the leader regardi ng leadership competencies not fulfil the requirement. In the present crisis, the organi zation is being forced to adapt its strategies and shift toward digital transformation m anagement leadership competency. This study aims to identify the system strength an d weakness features of a similar system, and design a web-based system based on the needed. Next, a web decision support for leadership competencies system will be dev eloped. The software development life cycle (SDLC) model implemented in this proj ect is the agile model. The agile model consists of five phases where the project progr ess will ongoing by stage, which is the planning, requirement analysis, design, imple mentation, and testing. The leadership competencies system is expected to provide a p latform to gather the manager and leader for leadership evaluate data form, make the average analysis to going efficiency, and better quality of leadership competencies an d increase the worth.

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LIST OF ABBREVIATIONS

Abbreviations	
BMC	Business Model Canva
Covid-19	Coronavirus disease
CSS	Cascading Style Sheets
ERD	Entity-Relationship Diagram
HTML5	Hypertext Mark-up Language 5
UML	Unified Modelling Language
SDD	Software Design Description
SDLC	Software Development Life Cycle
SPMP	Software Project Management Plan
SRS	Software Requirement *S*pecification
3NF	Third normal form

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CHAPTER 1

INTRODUCTION

1.1 Overview

A web decision support for leadership competencies for a leader in the organization. It aims to evaluate leadership competencies. Define leadership competencies in any career as responsibilities, attitude, skills, and behaviors and thinking that allows of leader best do in other and the excellent in their organization in a sustainable manner. The manager always asks any volunteer or suggestion who be a leader or human resources department interview job applicant. Even in any organization leader will choose by a manager who is a leader it is a not good solution to find a good leader. However, any organization manager has encountered the problem of receiving feedback from many employees or managers observation the leader regarding leadership competencies not fulfill the requirement. Therefore, this leadership competencies system is designed to gather the manager and leader for leadership evaluate data form, make the average analysis to going efficiency, and better quality of leadership competencies.

1.2 Problem Statement

Nowadays with the progress of the times, many organizations have begun to focus on the quality of their leader, effective management, and future development. However, organizations often face problems such as lack of experience and ability, lack of skills, etc, which lead to losses in the organization. The organization needs a group of good-quality and efficient leaders to lead the organization in the future. Bring the organization to the next level, and achieve reforms as soon as possible, and will not be eliminated by the times.

The first problem faced by the organization is cannot identify skills gaps. Within an organization, skills gaps are the difference between the skills leaders require and the skills that are available from the existing workforce or potential recruits.

Secondly, the organization does not have the alignment of training to reach corporate goals. Any organization may have specific goals but if your leader is not aligned with those goals, it will be difficult to reach them.

Besides that, problem of succession and promotion planning. When it's time for the keys leader to exit or retired an organization, those leadership positions should be filled by existing internal top talent. But an organization faces a big problem to find out talents to replace the leadership position.

1.3 Problem Solution

The solution to the above problem is to provide a leadership competencies self-assessment and evaluation form. These provide to the workforce or leader and manager to fill it up, and the system gets the data will process analysis and generate the average leadership competencies result.

Next, provide data on leadership competencies of skill gaps. An organization by regularly assessing, tracking, and measuring competencies, your organization can make intentional decisions to stay on track. Bridging skill gaps by training leaders or who be the next leader through any learning solution.

Last but not least, the system will help the manager identify good leadership competency. When an organization's manager knows their leader's skill sets and capabilities, they can better respond to market demands or trends and fulfill the better leadership competency requirements.

1.4 Objective

The objectives of the project are:

i. To investigate the strengths and weaknesses of the existing organization leadership competencies system.

ii. To analyses and design web decision support for leadership competencies that can benefit organizations and leaders.

iii. To develop a web decision support for leadership competencies system.

1.5 Scopes

The scopes for the system are:

i. This system is designed for people especially the leader in an organization (UMT).

ii. The system is available for every organization (UMT).

1.6 Commercial Potential

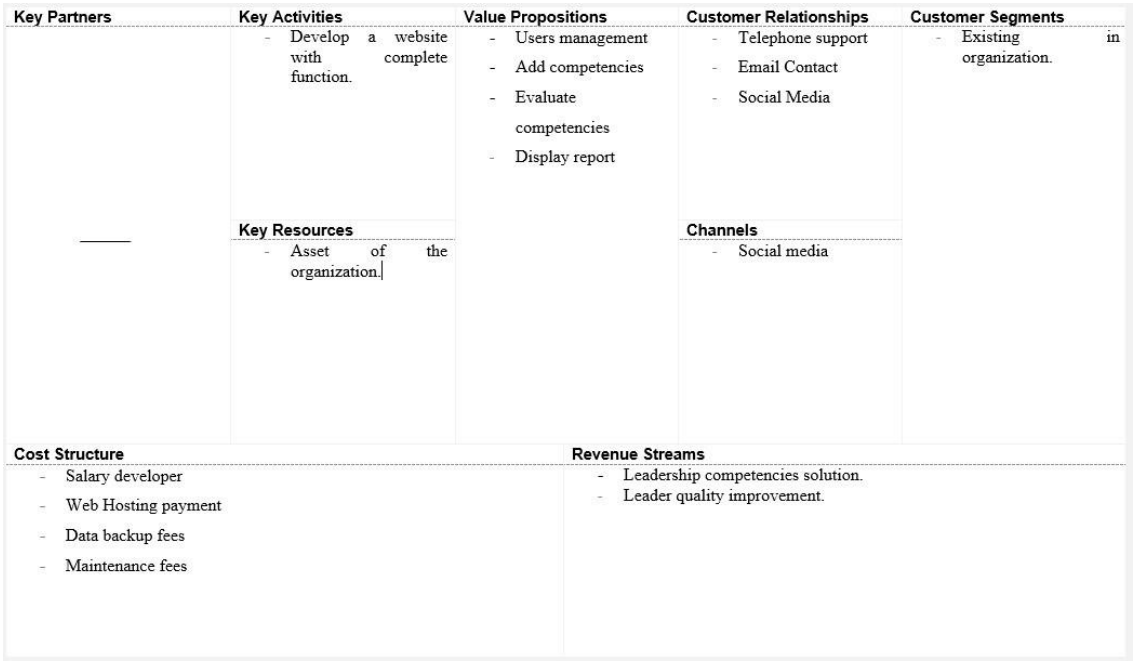


Figure 1.1: Business model canvas of web decision support for leadership competencies system.

Business Model Canva (BMC) usually use to represent the business idea and show the valuesof one organization. BMC includes 8 components which are Cost Structures, Revenue Streams, Key Resources, Key Activities, Key Partners, Value Proposition, Channels, and CustomerSegment. The left side of BMC focuses on the organization, while the right side focuses on the customer.

Key Activities

The key activities of this project are to develop a web-based leadership competencies system. The organization might also want to know leaders fulfil the requirement of leadership competencies, so it is important for the organization.

Key Resources

A key resource is a resource that an organization needs to achieve key activities. As for the leadership competencies system, the asset is the competencies of leaders.

Value Propositions

Regarding the value proposition is what can an organization provide to leaders need. All the leaders can update and edit profile and evaluate self-assessment. After that, the system will analyse the self-assessment and provide the report to the leader, it is performed or unperformed leadership competencies.

Customer Relationships

Good relationship management can help one organization to grow. In this case of a leadership competencies system, a good relationship with leaders is a must to develop an organization. Maintain this relationship, telephone support, email contact, and social media has provided the best communication to both leaders and the organization.

Channels

Channel meaning that how to promote the product. Social media such as Facebook, Instagram currently a famous platform to promote the product.

Cost Structures

To deploy a website, an organization must pay the hosting fee for the website to go online. A website also needs maintenance to chase business changes and reduce bug and error. Maintenance costs will be high because maintenance must be done as long as it is online and still in use. Besides that, the disaster recovery plan for system data backup to another server- side. Last is the salary of the developer to set up the website.

Revenue Stream

The revenue stream is the benefit get by value proposition. As this system can evaluate leadership competencies, it means that organizations can observe the leader's performance and quality. When necessary, organizations provide training to solve the weaknesses leadership competencies problem. It may help the organization in the future expansion plan.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The literature review is evaluating the previous research and documentation related to compare with the current research. The purpose of this literature review is to evaluate and analyze scholarly materials related to leadership competencies and to make better the completeness function system. Hence, it is important to study previous research to identify the problem and solutions that may have been stated by past researchers. This chapter will discuss the definition of leadership competencies and evaluation review of the existing market for the competencies management system.

2.2 Definition of Leadership Competencies

The definition of leadership competencies is leadership behaviours and skills are an underlying of a leader trait that contributes to job performance and organizational success.

2.3 Review on Existing System

2.3.1 Skills Base

Skills Base works on any device that supports a web browser. It is a utility that allows administrators, managers, and employees to add skill, add people by invitation, add a qualification. Also, this system provided access rights to different category users. This system also provides employee self-assessment and analyses the assessment display to data reports. Users also can search for specific employees based on competencies requirements.

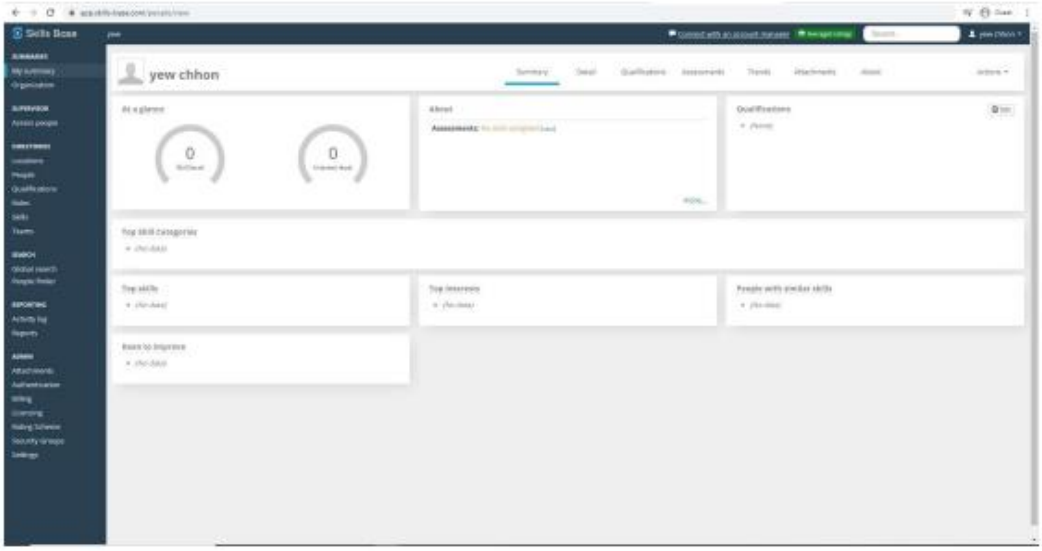


Figure 2.1 Screenshot of the personal summary

(Source: https://app.skills-base.com/people/view)

2.3.2 Skills DB Pro

Skills DB Pro works on any device that supports a web browser. It is a utility that allows users to add skill, add people by invitation. Besides that, this system provided competency targets to assign skills to the job role and assign people to the job role. The system also offers a learning plan setup that can Import/create training courses and specify a skill that can be acquired when completing a course. This system also provides a display for data reports. Users also can search for employees.

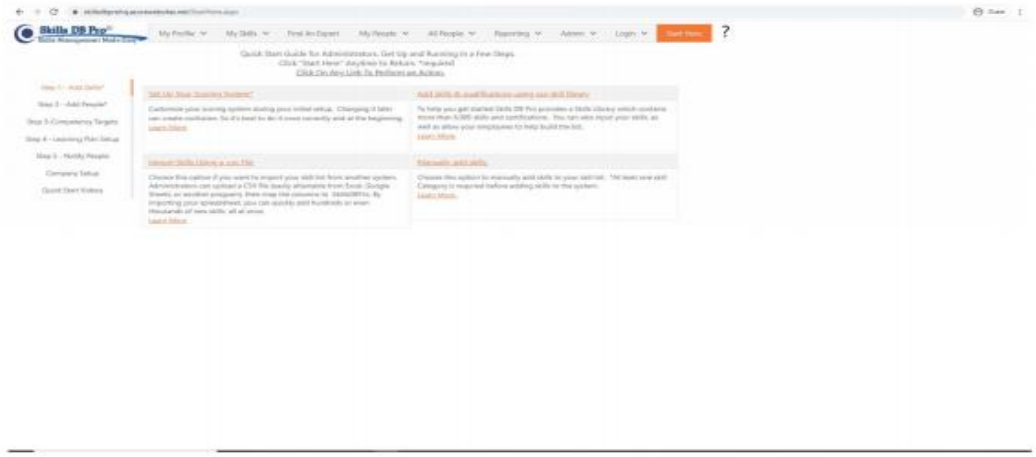


Figure 2.2 Screenshot of the start here

(Source: https://skillsdbprohq.azurewebsites.net/StartHere.aspx)

2.3.3 SoftExpert Competence

SoftExpert Competence works on any device that supports a web browser. It is a utility that allows users to add skill, add an employee. Moreover, this system provides a competency library that provides an easy-to-use, customizable set of competencies for assessing and developing leadership talent in an organization. Second gap analysis to determine those areas that have learning and development opportunities in place and where competencies need to be developed.

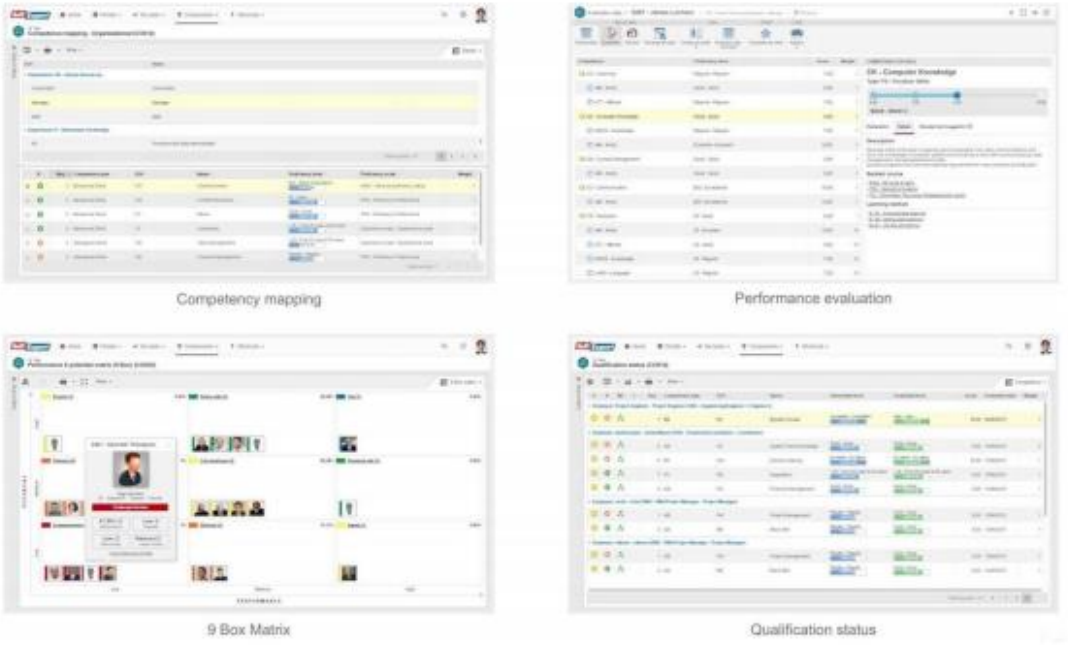


Figure 2.3 Screenshot of the features

(Source: https://www.softexpert.com/produto/competence-mapping-assessment/)

2.4 Discussion

Based on the review of existing systems, there can be discussed in table 2.1 below.

System / Features	Skills Base	Skills DB Pro	SoftExpert Competence	Leadership competencies
Strength	They provide evaluation self-assessment to users and analysis data display in many types of reports.	The organization is convenient to search for the employees' background.	The effective management of competencies in the human resources department.	Focus on leadership competencies and provide a comprehensive evaluation of leadership skills.
Weakness	Superior cannot evaluate leadership competencies for any leader.	Staff and superior are groupings.	No suitable leader wants ongoing training.	Specific for the leader, other than that, not a position of leadership cannot use to evaluate.

Setting Competency Module	✓	✓	✓	✓
Manage Users Module	✓	✓	✓	✓
Access Right Module	✓	✗	✗	✓
Learning Plan Module	✗	✓	✗	✓
Report Module	✓	✓	✓	✓
User Profile Module	✓	✓	✓	✓

Table 2.1: Discussion on the existing system

2.5 Summary

This chapter has provided a summary of a web decision support for leadership competencies system. It can help readers to quickly understand the module and features of the leadership competencies system. Studies conducted on the existing leadership competencies system have determined that it is best to develop a new web-based system. It is because most of the existed systems are design to meet the specific requirements of the organization. Furthermore, studying existing systems has to list several preliminary system requirements for the proposed leadership competencies system. It can be further analysed to construct interview questions for the later stage of gathering requirements with stakeholders.

CHAPTER 3

METHODOLOGY

3.1 Introduction

The software methodology and software architecture that fixes the development of softwarewill be discussed in this chapter. Software methodology is a framework and concept that control, structure, and plan the project development. The selection of the right model for software development is very important. However, there is no software development modelthat 100% fits all kinds of the software development project. Therefore, to listen to the International Software Testing Qualifications Board (ISTQB) suggested that the selection of software development methodology depends on the project's aims and goals. This chapter elaborates further on the software process model implemented in this project together with the software architecture and project management plan.

3.2 The Chosen Methodology

The web decision support for leadership competencies is developed by using an agile software development model. Agile software development is a group of software development methods based on iterative and incremental development, where requirements and solutions evolve through collaboration between self-organizing, cross-functional teams. 5 phases include an agile model which are planning, requirement analysis, design, implementation, and testing. The first version of this system has been built for the relevant stakeholders or customers for checking and testing. The process of iteration will continue until the final system is accepted by stakeholders or customers who will approve and accept or it.

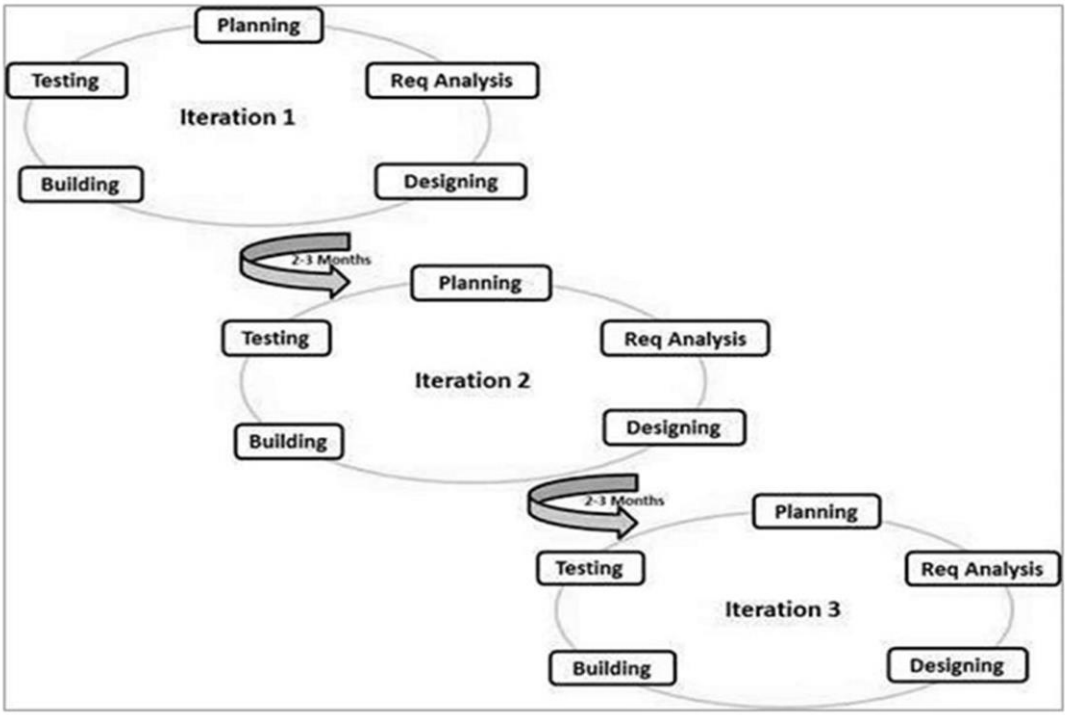


Figure 3.1: Agile software development model

(Source: https://www.tutorialspoint.com/sdlc/sdlc_agile_model.htm)

In the planning phase, to define the objective and scope and find out the problem. The existingsystem has been reviewed to identify the advantages and disadvantages of the existing systems.

In the second step requirement analysis phase, the requirements have been collected from the stakeholders. The stakeholders are responsible to elicit their ideas or features that they would like to see in the system. Any ideas will be documented as the requirement in this system. All the requirements will be translated into the developer's language which is Unified Modelling Language (UML). These are consisting of a use case diagram, activity diagram, and sequence diagram. The software requirement specification (SRS) will be bringing at this stage.

In the next step, the design phase is translating the requirements in the SRS document into the developer's language. The system database will be designed where all the data to be store will be listed down. The data will be normalized until the third normal form (3NF) to eliminate data repetition and partial dependency. The Entity-Relationship Diagram (ERD) will be constructed to show the relationship between tables in the database. All the requirements will sketch to the user interface design. The software design description (SDD) will be bringing at this stage.

After that, in the build phase, The SRS and SDD documentation will be served as input. The developer will start to code based on the modules.

The last is the testing phase, several testing like system test, unit test, integration test and, etc, performed to validate whether it meets the requirements. if the testing is passed, then the final system is completed, else repeat iteration.

3.3 Software Architecture

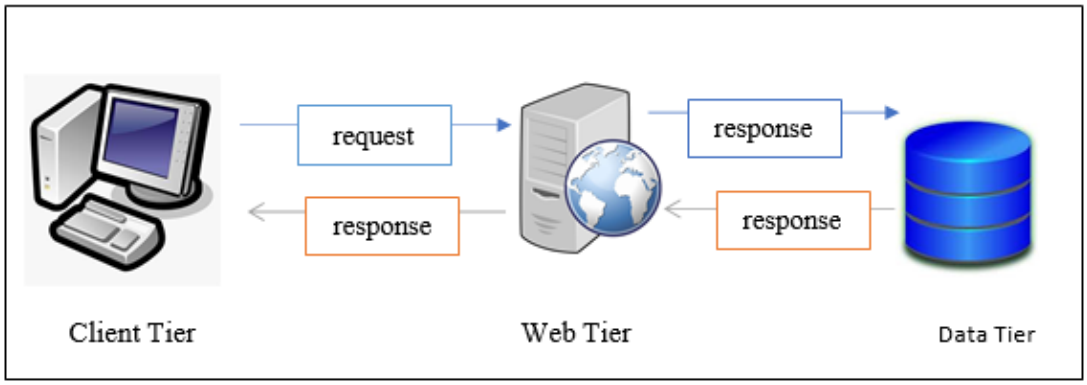


Figure 3.2: Web Decision Support for Leadership Competencies 3-tier architecture

Client Tier

The client tier also is known as the represent layer responsible for user interaction. This layer provides an interface for users to communicate with the system. The web decision support for the leadership competencies system will display via web browsers like Google Chrome, Mozilla Firefox, Microsoft Edge and, etc.

Web Tier

The web tier may be referred to as the logic layer. It manages the business logic and the core function. This system business logic will be implemented and hosted on the webserver. Besides that, this layer also receives the request from the client tier and probably interacts with the data tier. After getting the result from the data tier and the result will respond to the client tier.

Data tier

A data tier is a place where the system data store. This layer consists of a database and program managing it. The system database will be located in this layer and also operation CRUD, which includes create, retrieve, update, and delete. This layer will respond to the request of the web tier.

3.4 Project Planning Schedule

Start Date	End Date	Description	Duration(days)
10-Oct-20	30-Jun-21	A Complete System	263
10-Oct-20	14-Nov-20	**Planning**	35
10-Oct-20	17-Oct-20	Define Objectives and Sccope	2
18-Oct-20	21-Oct-20	Identify and Select Methodology	3
22-Oct-20	1-Nov-20	Review on Existing System	10
2-Nov-20	4-Nov-20	Business Plan	2
5-Nov-20	9-Nov-20	Develop Schedule	4
10-Nov-20	14-Nov-20	SPMP	4
15-Nov-20	12-Dec-20	**Requirement Analysis**	27
15-Nov-20	23-Nov-20	Collect Requirement	8
23-Nov-20	2-Dec-20	Review the requirement with stakeholders	9
2-Dec-20	4-Dec-20	Use Case Diagram	2
5-Dec-20	7-Dec-20	Activity Diagram	2
8-Dec-20	10-Dec-20	Class Diagram & Sequence Diagram	2
10-Dec-20	12-Dec-20	SRS	2
13-Dec-20	2-Jan-21	**Design**	20
13-Dec-20	23-Dec-20	Database Design	10
24-Dec-20	31-Dec-20	User Interface Design	7
1-Jan-21	2-Jan-21	SDD	1
3-Jan-21	3-Apr-21	**Development**	90
3-Jan-21	11-Feb-21	User Profile Management Module	39
12-Feb-21	22-Mar-21	Add Leadership Competencies Module	38
23-Mar-21	3-Apr-21	Report Management Module	11
4-Apr-21	30-Jun-21	**Testing**	87
4-Apr-21	24-Apr-21	Unit Testing & Integration Testing	20
25-Apr-21	22-May-21	User Acceptance Testing	27
23-May-21	12-Jun-21	System Testing	20
13-Jun-21	24-Jun-21	User Review	11
25-Jun-21	30-Jun-21	Deliver to End User	5

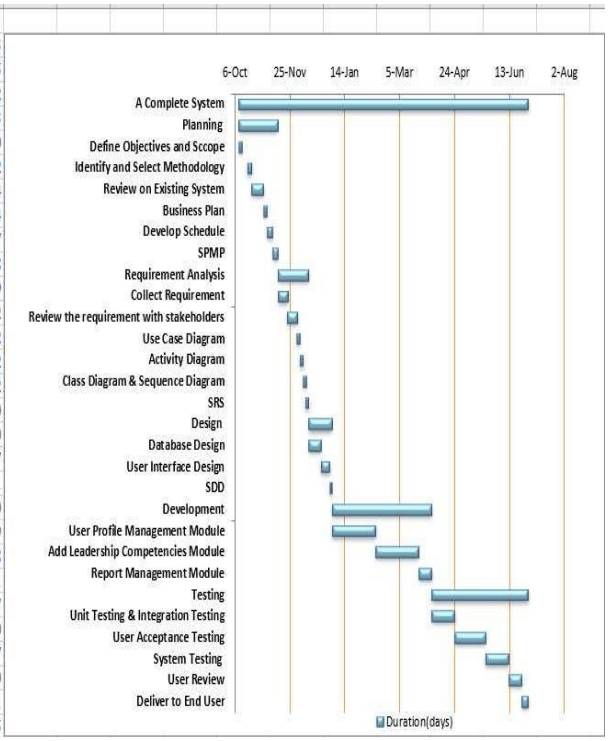


Figure 3.3: Gantt Chart for web decision support for leadership competencies

In this project, based on the Gantt chart, there are 5 phases which are project planning,requirement analysis, design, development, and testing.

In the planning phase, used about 24 days to finish. The developer decides the topic of the project. Besides that, this phase also needs to prepare to identify and select the methodologyfor about 3 days. It used 10 days to research and review the existing system. The business plan and development of schedule have used 2 and 4 days respectively. In milestones called submit Software Project Management Plan (SPMP) will have to submit on 14/11/2020.

In the process of requirement analysis, developers collect requirements and review the requirement with stakeholders it used about 8 and 9 days respectively. After that, 3 UML diagrams will be constructed which are the use case diagram, activity diagram, class, and sequence diagram, each diagram is used 2 days respectively to complete. There is one of the milestones called submit software requirement specification (SRS), which will complete and submit on 12-12-2020.

During the design phase, the total duration is 20 days. As follow to the Gantt chart will 10 days spent on database design. The next will sketch the user interface design, total days spent about 7 days to complete the design. The design phase will combine into a document called software design description (SDD) and submit on 2/1/2021.

At the development phase, the time spent is about 90 days. The user profile management module and add leadership competencies module to develop 40 and 38 days respectively. To develop the report management module will spend 11 days to develop.

The last phase is the testing, there is 4 types of testing are carried out which are unit testing, integration testing, system testing, and user acceptance testing are total used 79 days to be performed. Then, 11 days will be used for user review, and delivery to the end-user is used for5 days.

No.	Description	Date
1	Presentation of topic literature review.	4/11/2020
2	Submit SPMP	14/11/2020
3	Submit SRS	12/12/2020
4	Submit SDD	2/01/2021
5	Final Year Project 1 Presentation	3/02/2021
6	Prototype	22/04/2020
7	Testing and Review	10/07/2020
8	Final Year Project 2 Presentation	11/07/2021
9	Submit Thesis	15/07/2021

Table 3.1: Milestones for web decision support for leadership competencies

3.5 Summary

This chapter is the discussion regarding what methodology was used for this project. The agile method was chosen for this project because this system has iterative and incremental development, where requirements and solutions evolve through collaboration between self-organizing, cross-functional teams. Moreover, this method is easier to manage the system module development. As a result, the agile method is more suitable compare to other methods.

CHAPTER 4

SYSTEM REQUIREMENTS

4.1 Introduction

In this system requirements chapter is to defines the specifications for the software development. It can be categorized into three parts which are software requirements, hardware requirements, and programming language for software development requirements. The software requirements are described about the software or tools use to develop the system. Secondly, hardware requirements are focus more on the system hardware components or physical resources to present on a computer. While the programming language for software development is use to develop in the system.

4.2 System Requirements Gathering Technique

The data and requirement gathering technique is essential and is often used to define the functionality and non-functionality of the system. The ways of data and requirement gathering technique include interviews, survey forms, observation, and other relevant methods to collect the data. The online interviewed was the best approach to obtain the relevant requirements to carry out the elicitation with the stakeholder in the worst pandemic Covid-19 condition. Regarding sample questions such as user group of this system, system management group, report method, and leadership competencies requirements in this system were asked to the stakeholder.

4.3 System Requirements

Software Requirements

Table 4.1 is showing list software application that are using in development of a web decision support for leadership competencies. It also describes the function of the software respectively.

Software Application	Function
Microsoft Word 2019	Documentation writer
Microsoft PowerPoint 2019	Presentation
Microsoft Excel 2019	Gantt Chart
Google Chrome	Web browser for desktop running system
Microsoft Visio 2016	Modelling UML diagram
Moqups	Interface design
MYSQL	Database Management System
Notepad++	Coding writer

Table 4.1: software application that used in Web Decision Support for Leadership Competencies and function.

Hardware Requirements

Table 4.2 is listing the hardware requirements for the development of web decision support for leadership competencies. It describes the minimum requirement of the computer and function of each hardware.

Hardware	Hardware Specifications
Processor	1.8GHz Quad-core
Memory	4GB RAM
Storage	128GB
Operating System	Window 8 and above

Printer	Print the documentation
DVD Writer	Write and burn the DVD

Table 4.2: hardware that used in Web Decision Support for Leadership Competencies.

Software Development Language Requirements

Table 4.3 list the programming language with the function respectively that use to develop the Web Decision Support for Leadership Competencies.

Programming Language	Function
Hypertext Mark-up Language (HTML5)	To present the content of the Web Decision Support for Leadership Competencies on the browser view.
Cascading Style Sheets (CSS)	The design and control the layout of HTML element displays on browser.
JavaScript	Make it more interactive for Web Decision Support for Leadership Competencies.
PHP	PHP using to link HTML and database send request and receive request.
MYSQL	To provide create, retrieve, update and delete data in the Web Decision Support for Leadership Competencies database.

Table 4.3: list the programming language used in Web Decision Support for Leadership Competencies.

4.3.1 Functional Requirements

I. The system should allow users manage account.
II. The system should allow superior, admin, superadmin manage leadership competencies.
III. The system should allow users manage report.
IV. The system should allow user, superadmin manage assessment leadership.
V. The system should allow superior, admin, superadmin manage evaluate leadership.
VI. The system should allow superior, admin, superadmin manage search user.
VII. The system should allow superior, admin, superadmin manage roles.

4.3.2 Non-Functional Requirements

a) Performance
   The system loading will not more than 10 seconds.
b) Usability
   The instructions of system and user interface are easy to user and understand.
c) Security
   The users provide to the username and password to login system.
   The system provides the access right to different level users.
d) Reliability
   The system must be available 90% and above of the time.

4.4 Discussion

Through the interview with stakeholders, the Leadership Competencies system was designed to solve the problem statement. This system contains seven modules where it is the function to build up the website. The system requirements for running and developing a Web-Based Leadership Competencies System are low.

4.5 Summary

In the summary of this chapter, the seven modules that were developed, user, superior, admin, and super admin could have a good experience using it. The superior, admin and super admin can manage competencies questions, manage roles, evaluate users, and etc, user can self-assessment. Last but not least, the non-functional requirements of this system which are performance, usability, security, and reliability can reach the standard.

CHAPTER 5

SYSTEM ANALYSIS AND DESIGN

5.1 Introduction

This chapter is to the description of a software product, that a software designer writes in order to give guidance to the architecture of the web decision support for leadership competencies. It will focus to describe 5 fundamental design components which are Use case diagram, activity diagram, class diagram, sequence diagram, and database design. The targeted reader of this document is the project stakeholder, project developer, and is reviewed by a supervisor, Profesor Ts. Dr. Noor Maizura Binti Mohamad Noor.

5.2 System Analysis

This section shows the system requirement gathering from stakeholders and translate the system requirement to flow in the form of Unified Modelling Language (UML) diagrams.

5.2.1 Use Case Diagram

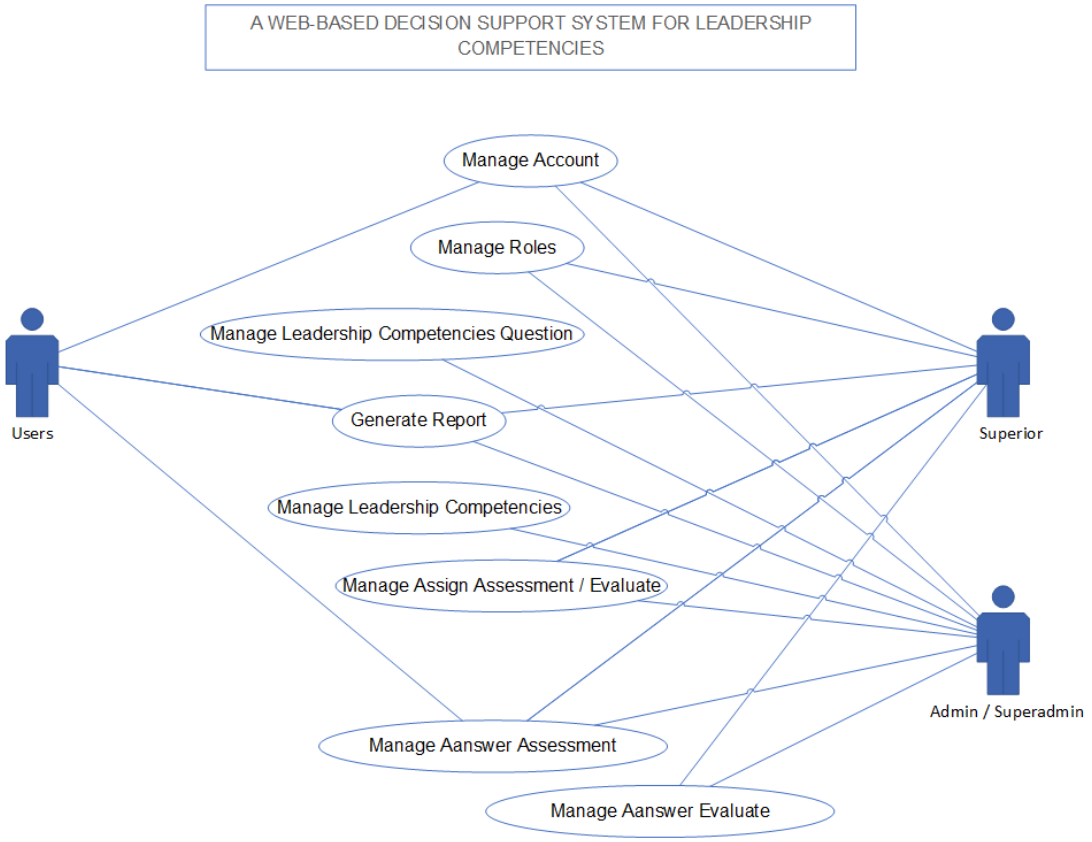


Figure 5.1: Use case diagram for web decision support for leadership competencies.

5.2.2 Use Case Description

The use case description will separate the use case into the part, explaining each part of the situation with the help of the scenario, determining the pre-condition process, post-condition process, and procedures of the system.

I. Manage Account

Use Case ID	UD_1
Use Case Name	Manage Account

Actor	I. User II. Superior III. Admin IV. Superadmin
Description	In this use case describes the process of users to manage their own account.
Event Trigger	Users want to manage their own account.
Relationships	Association: User, Superior, Admin, Superadmin
Flow of Events	1. User and superior register account by entering the information. I. Then, the description will be stated in SF_1 create an account sub-flow. 2. Users enter the username and password to login. 3. Superadmin can assign admin, superior and user an account. 4. Users view the information of their own account at the profile page. 5. Users can edit the information of the account. I. Then, the description will be stated in SF_2 update account sub-flow. 6. Superior, admin and superadmin may delete the account. II. Then, the description will be stated in SF_3 delete account sub-flow. 7. Users logout the system.

Sub-Flow	SF_1: Create an account 1. The users click the register button. 2. The system displays of registration which are user and superior. 3. The system will display a form to request user or superior fill up. 4. The user or superior complete to fill up the form and click the registration button. 5. The system displays the “successful message”. 6. Process End. SF_2: Update Account 1. The users go to his or her profile page. 2. The system displays the personal information 3. The users click edit button to edits the own account information. 4. The users click the save button. 5. The system display “update successful message”. 6. Process End. SF_3 Delete an account 1. The superior go to the user name list page. 2. The superior clicks the delete button. 3. The system pops out an alert message and confirm with the superior. 4. The superior click confirm button. 5. The account has been deleted. 6. Process End. 7. The admin goes to the user or superior name list page. 8. The admin clicks the delete button. 9. The system pops out an alert message and confirm with the admin. 10. The admin clicks confirms button. 11. The account has been deleted.

	12. Process End. 13. The superadmin goes to the user or superior or admin name list page. 14. The superadmin clicks the delete button. 15.The system pops out an alert message and confirm with the superadmin. 16.The superadmin clicks confirm button. 17.The account has been deleted. 18. Process End
Alternative Flows	-

Table 5.1: Use case description for manage account.

II. Manage Roles

Use Case ID	UD_2
Use Case Name	Manage Roles
Actor	I. Superior II. Admin III. Superadmin
Description	In this use case describes the process of manage roles.
Event Trigger	Users want to access the system.
Relationships	Association: User, Superior, Admin, Superadmin
Flow of Events	1. The superadmin can assign superadmin, admin, superior and user. 2. The admin can assign superior and user. 3. The superior can assign user. 4. The Superadmin can view, update and delete superadmin, admin, superior, and user. 5. The admin can view, update and delete superior, and user. 6. The superior can view, update and delete user.

	7. The Superadmin, admin can create, view, update, delete department. 8. Process End.
Sub-Flow	SF_1: Create an account 1. The Superior, Admin, Superadmin click the register button. 2. The system displays of registration which are user and superior. 3. The system will display a form to request fill up. 4. Complete to fill up the form and click the registration button. 5. The system displays the "successful message". 6. Process End. SF_2: Update Account 1. The Superior, Admin, Superadmin go to his or her profile page. 2. The system displays the personal information 3. Click edit button to edits the own account information. 4. Click the save button. 5. The system display "update successful message". 6. Process End. SF_3 Delete an account 1. The Superior, Admin, Superadmin go to the name list page. 2. The Superior, Admin, Superadmin clicks the delete button. 3. The system pops out an alert message and confirm with the superior. 4. The superior click confirm button. 5. The account has been deleted. 6. Process End.
Alternative Flows	-

Table 5.2: Use case description for login account.

III. Manage Leadership Competencies Question

Use Case ID	UD_3
Use Case Name	Manage Leadership Competencies Question
Actor	I. Admin II. Superadmin
Description	In this use case describes the process of Leadership Competencies question.
Event Trigger	Superadmin, Admin want to create Leadership Competency Question.
Relationships	Association: Admin, Superadmin
Flow of Events	1. The admin or superadmin click on the Manage Leadership Competencies Question function. 2. Retrieve leadership competencies question list. 3. Process End.
Sub-Flow	SF_1: Create a question 1. The Admin, Superadmin click the manage Leadership Competencies add question Icon. 2. The system will display a form to request Superadmin or admin fill up. 3. The Superadmin or Admin complete to fill up the form and click the add button. 4. The system displays the "successful message". 5. Process End.

Sub-Flow	SF_2: Update a question 1. The Admin, Superadmin go to question page. 2. The system displays the question information 3. The Admin, Superadmin click edit button to edits. 4. The Admin, Superadmin click the save button. 5. The system display “update successful message”. 6. Process End. SF_3 Delete a question 1. The Admin, Superadmin go to the question page. 2. The Admin, Superadmin clicks the delete button. 3. The system pops out an alert message and confirm with the Admin, Superadmin. 4. The Admin, Superadmin click confirm button. 5. The question has been deleted. 6. Process End.
Alternative Flows	-

Table 5.3: Use case description for self-assessment leadership competencies.

IV. Generate Report

Use Case ID	UD_4
Use Case Name	Generate Report
Actor	I. User II. Superior III. Admin IV. Superadmin
Description	In this use case describes the process of users to view the result of leadership competencies.
Event Trigger	Users want to receive the report of leadership competencies.
Relationships	Association: User, Superior, Admin, Superadmin
Flow of Events	1. When User or superior complete the question form and submit, the report will receive the data. 2. The system will analyse the data and generate the data to visualisation results. 3. Superior, admin and superadmin click to view on their Evaluate, Assessment, Average report. 4. User click to view on their own Assessment, Evaluate report. 5. Process End.
Sub-Flow	-
Alternative Flows	-

Table 5.4: Use case description for generate report.

V. Manage Leadership Competencies

Use Case ID	UD_5
Use Case Name	Manage Leadership Competencies
Actor	I. Superior II. Admin III. Superadmin
Description	In this use case describes the process of users to edit the condition of leadership competencies.
Event Trigger	Admin and superadmin wants to edit the leadership competencies condition.
Relationships	Association: Admin, Superadmin
Flow of Events	1. The admin or superadmin clicks the manage leadership competencies function to display the menu. I. Then, the description will be stated in SF_1 create a question on sub-flow. 2. The admin or superadmin view the competencies. 3. The admin or superadmin can edit the leadership competencies. I. Then, the description will be stated in SF_2 update a competency on sub-flow. 4. The admin or superadmin can delete the competencies of leadership competencies. I. Then, the description will be stated in SF_3 delete a competency on sub-flow. 5. Process End.

Sub-Flow	SF_1 Create Competency 1. The admin or superadmin clicks the add new competency. 2. The new competency display and admin or superadmin can fill up. 3. After fill up the form, click add. 4. Display a message to admin or superadmin add new leadership competencies success. 5. Process End. SF_2 Update Competency 1. The admin or superadmin clicks the edit competency button. 2. The admin or superadmin edits the competency on the form. 3. After admin or superadmin edit complete, click the save button. 4. The system displays the update successfully message to admin or superadmin. 5. Process End. SF_3 Delete Competency 1. The admin or superadmin go to competency list. 2. The admin or superadmin clicks the delete button. 3. The system pops out an alert message and confirm with the admin or superadmin. 4. The admin or superadmin click confirm button. 5. The competency has been deleted. 6. Process End.
Alternative Flows	-

Table 5.5: Use case description for manage leadership competencies.

VI. Manage Assign Assessment/ Evaluate

Use Case ID	UD_6
Use Case Name	Manage Assign Assessment/ Evaluate
Actor	I. Superior II. Admin III. Superadmin
Description	In this use case describes the process of assign assessment, evaluate.
Event Trigger	Superior, admin or superadmin wants to select candidate for the assessment.
Relationships	Association: Superior, Admin, Superadmin
Flow of Events	1. The superior, admin or superadmin click the assign page. 2. The system will display a list of question. 3. The superior, admin or superadmin can select question based on the table provide. 4. The superior, admin or superadmin after select question, go to second table select candidate. 5. The superior, admin or superadmin click assign button. 6. The system will display assign successful message. 7. Process End.
Sub-Flow	-
Alternative Flows	-

Table 5.6: Use case description for manage assign assessment/ evaluate.

VII. Manage Answer Assessment

Use Case ID	UD_7
Use Case Name	Manage Answer Assessment
Actor	I. Superior II. User III. Admin IV. Superadmin
Description	In this use case describes the process of answer assessment.
Event Trigger	Superior, users, admin or superadmin answer for the assessment.
Relationships	Association: User, Superior, Admin, Superadmin
Flow of Events	1. The users, superior, admin or superadmin click the assessment page. 2. The system will display an instruction box and start button. 3. The user, superior, admin or superadmin click start assessment question will be display. 4. The users, superior, admin or superadmin complete to select answer based on question, go to bottom table click submit. 5. The system will display submit successful message. 6. Process End.
Sub-Flow	-
Alternative Flows	If submit fails, the system will alert the users, superior, admin and superadmin to check again the question assessment.

Table 5.7: Use case description for manage answer assessment.

VIII. Manage Answer Evaluate

Use Case ID	UD_8
Use Case Name	Manage Answer Evaluate
Actor	I. Superior II. Admin III. Superadmin
Description	In this use case describes the process of answer evaluate.
Event Trigger	Superior, admin or superadmin answer for the evaluate.
Relationships	Association: Superior, Admin, Superadmin
Flow of Events	1. The superior, admin or superadmin click the evaluate page. 2. The system will display an instruction box and start button. 3. The superior, admin or superadmin click start evaluate question will be display. 4. The superior, admin or superadmin complete to select answer based on question, go to bottom table click submit. 5. The system will display submit successful message. 6. Process End.
Sub-Flow	-
Alternative Flows	If submit fails, the system will alert the superior, admin and superadmin to check again the question evaluate.

Table 5.8: Use case description for manage answer evaluate.

5.2.3 Activity Diagram

This section is outlining the graphical to representation of the set of procedural activities forthe 8-use case.

a.) This activity diagram for manage account to show the process managing their account.

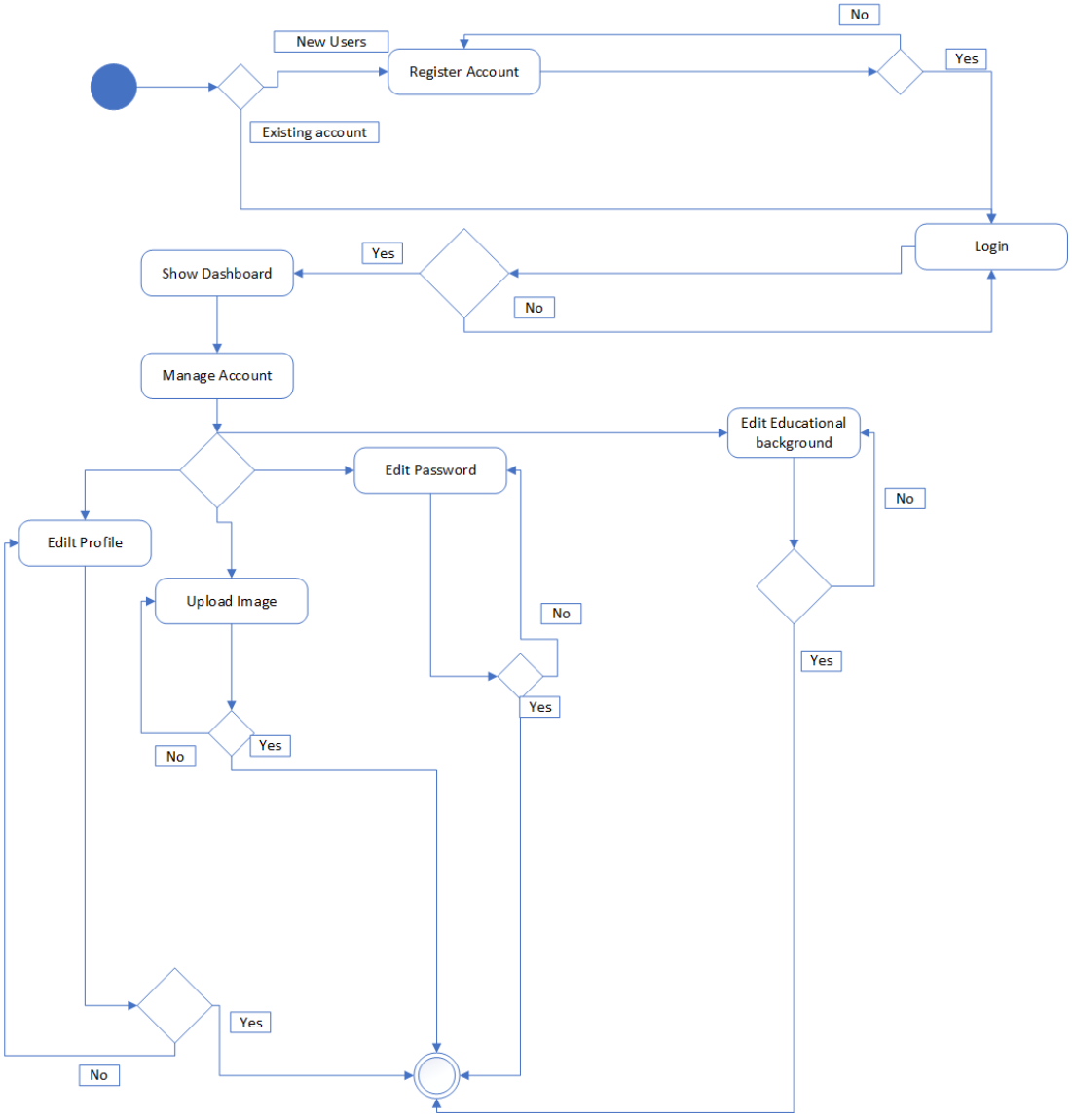


Figure 5.2: Activity diagram for manage account.

b.) This activity diagram to show the process of the manage roles.

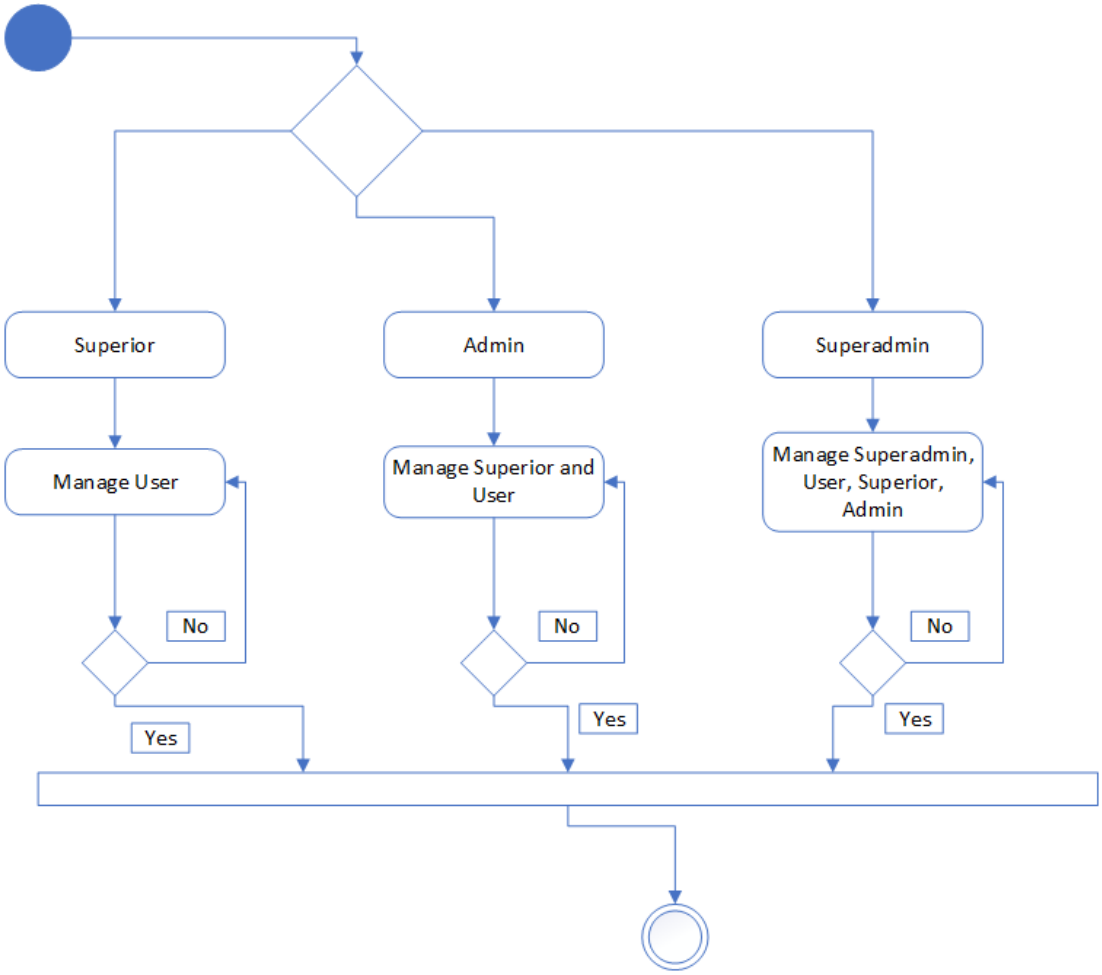


Figure 5.3: Activity diagram for manage roles.

c.) This activity diagram to show the process of the manage leadership competencies question.

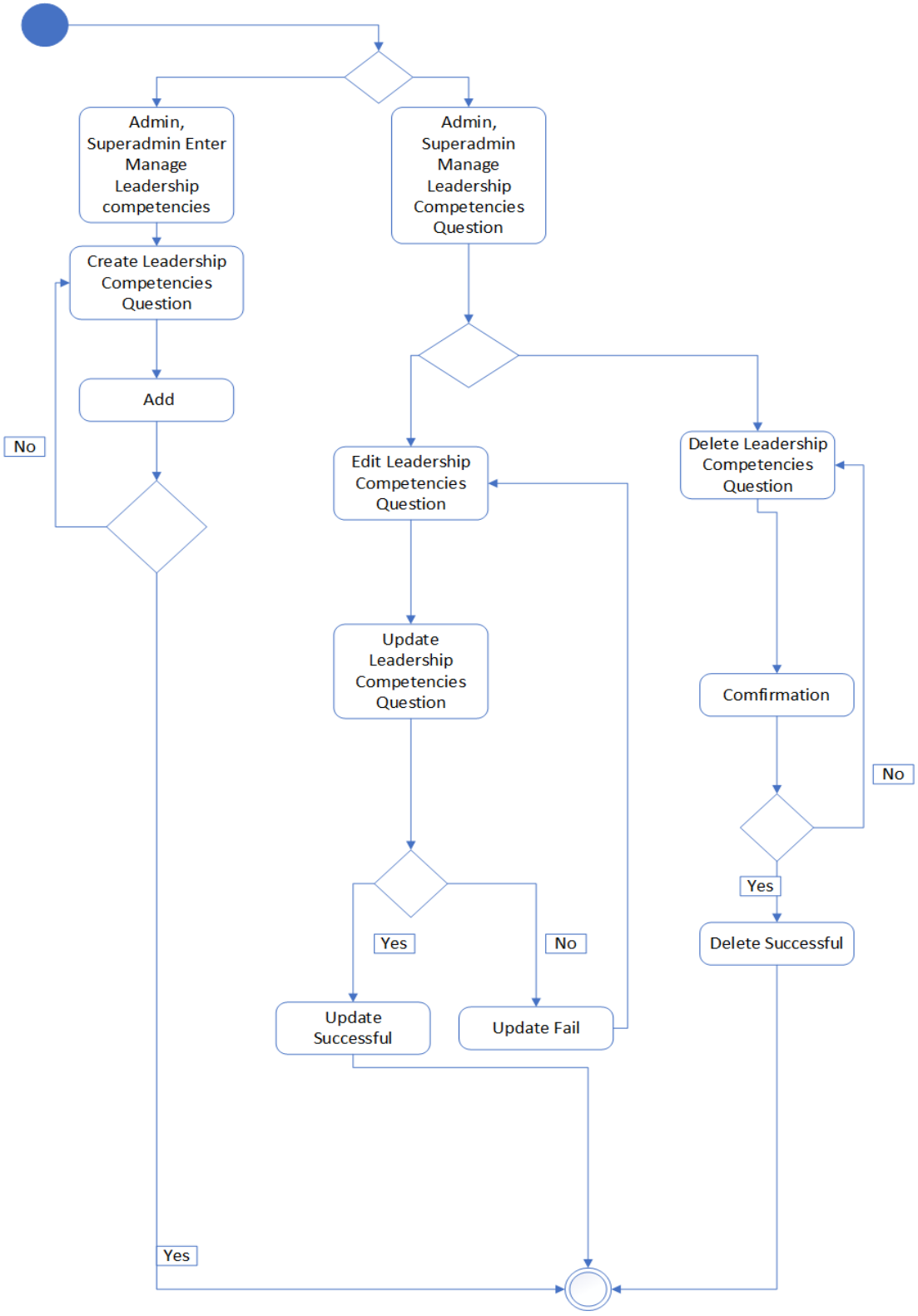


Figure 5.4: Activity diagram for manage leadership competency question.

d.) This activity diagram to show the process of the generate report.

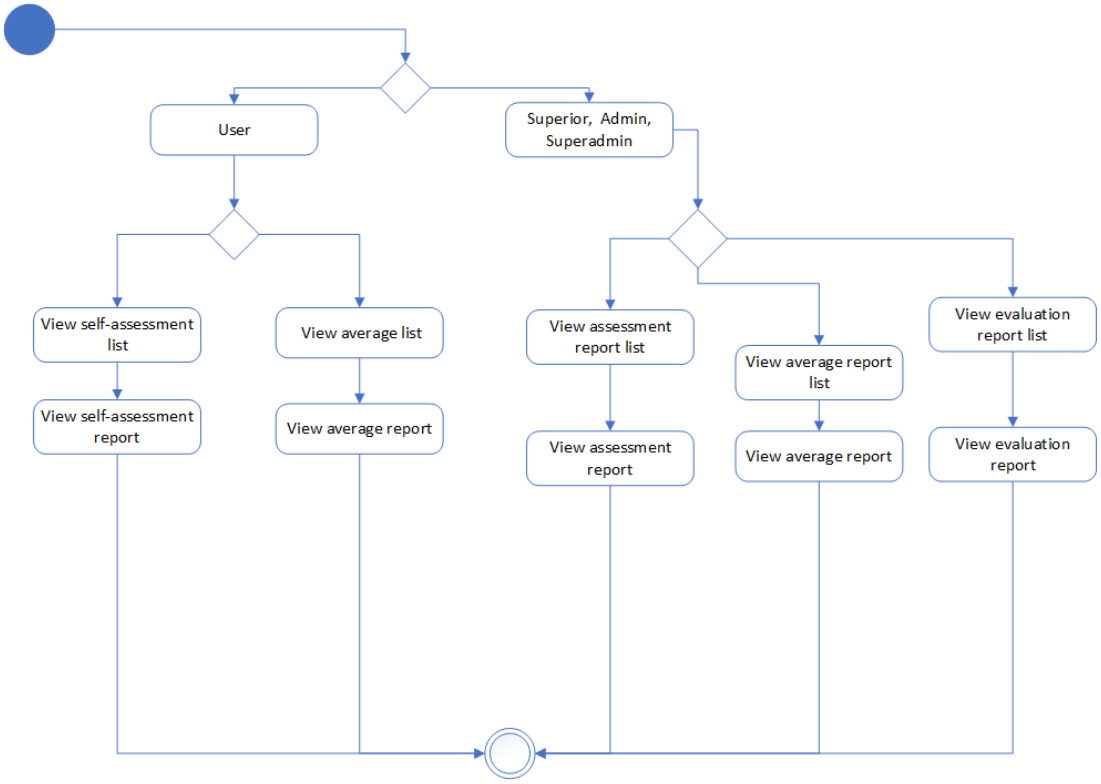


Figure 5.5: Activity diagram for generate report.

e.) This activity diagram to show the process of the manage leadership competencies.

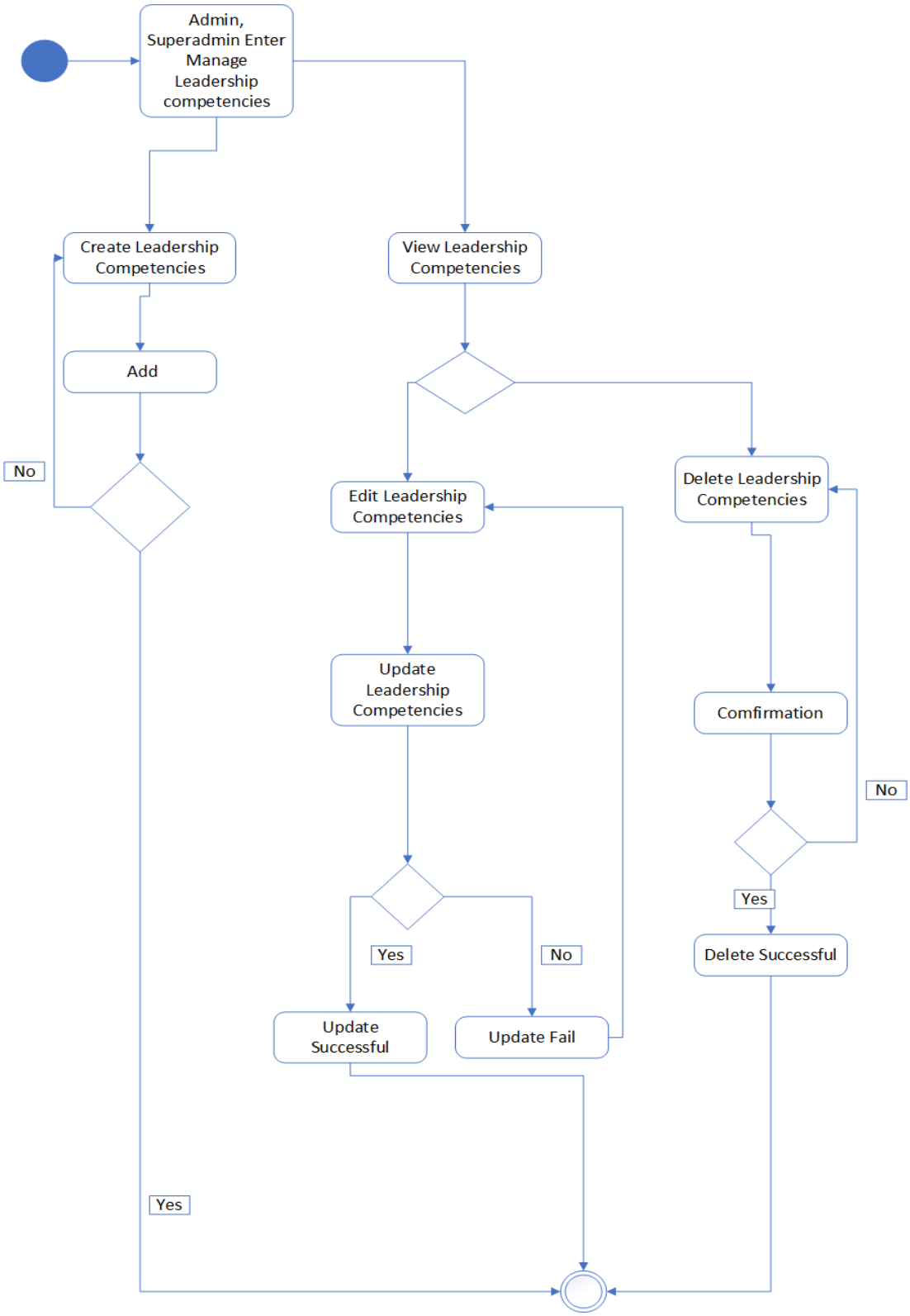


Figure 5.6: Activity diagram for manage leadership competencies.

f.) This activity diagram to show the process of the manage leadership competencies.

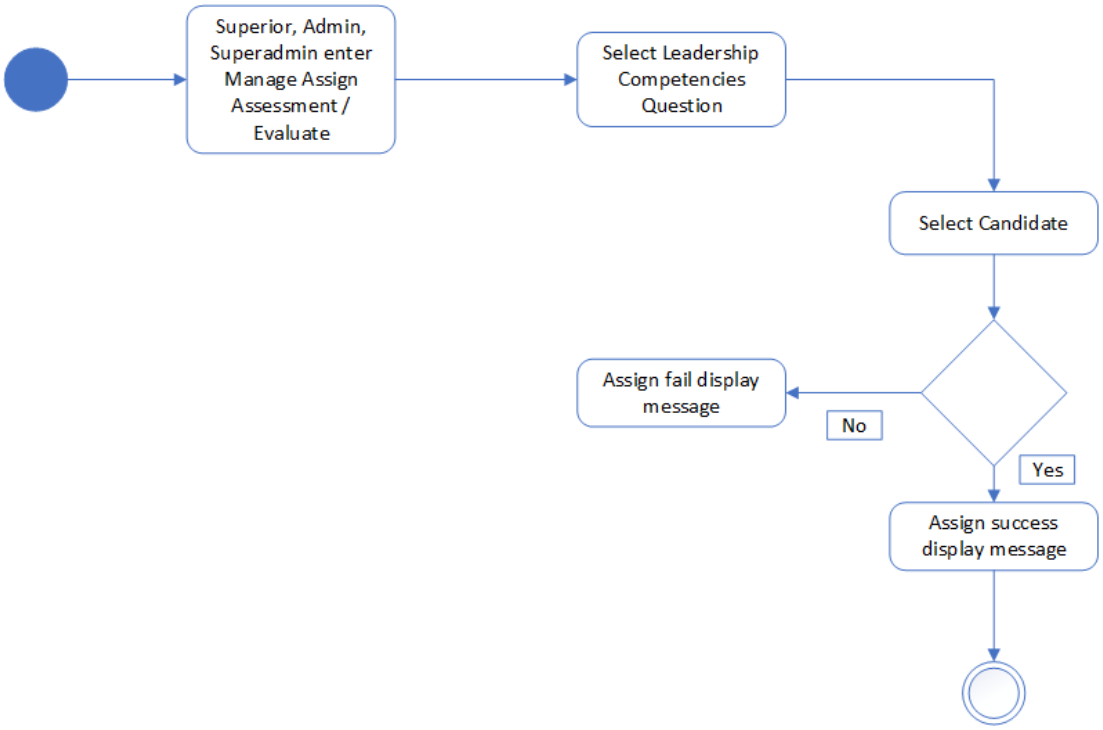


Figure 5.7: Activity diagram for manage assign assessment/ evaluate.

g.) This activity diagram to show the process of the manage answer assessment.

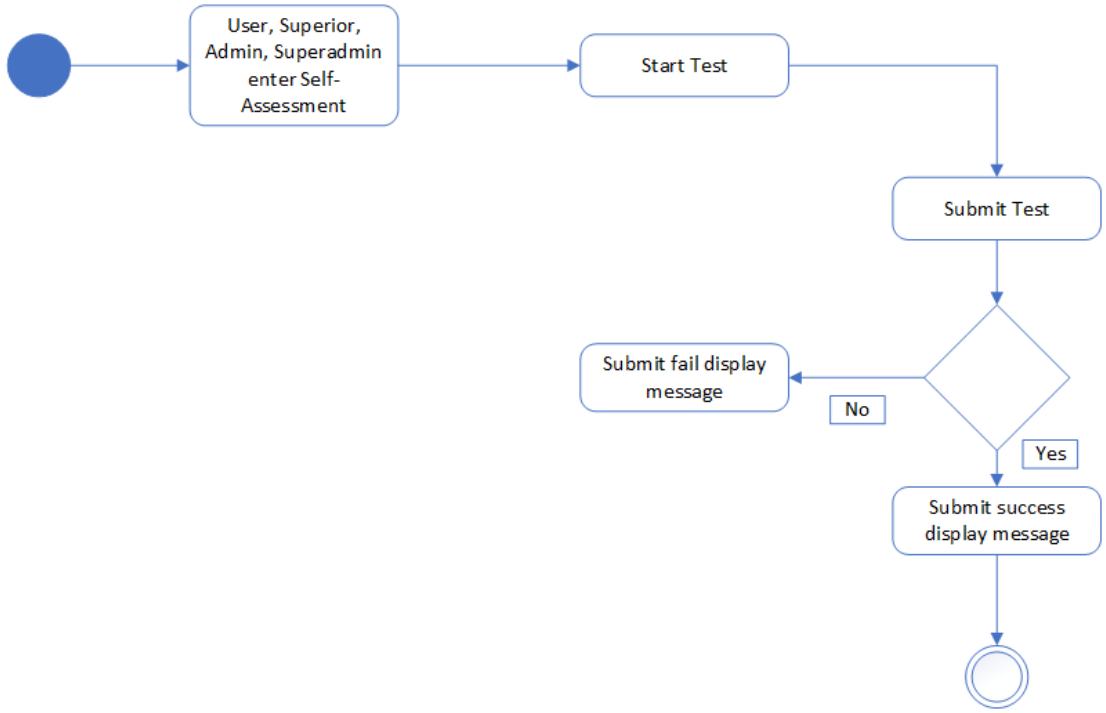


Figure 5.8: Activity diagram for manage answer assessment.

h.) This activity diagram to show the process of the manage evaluate.

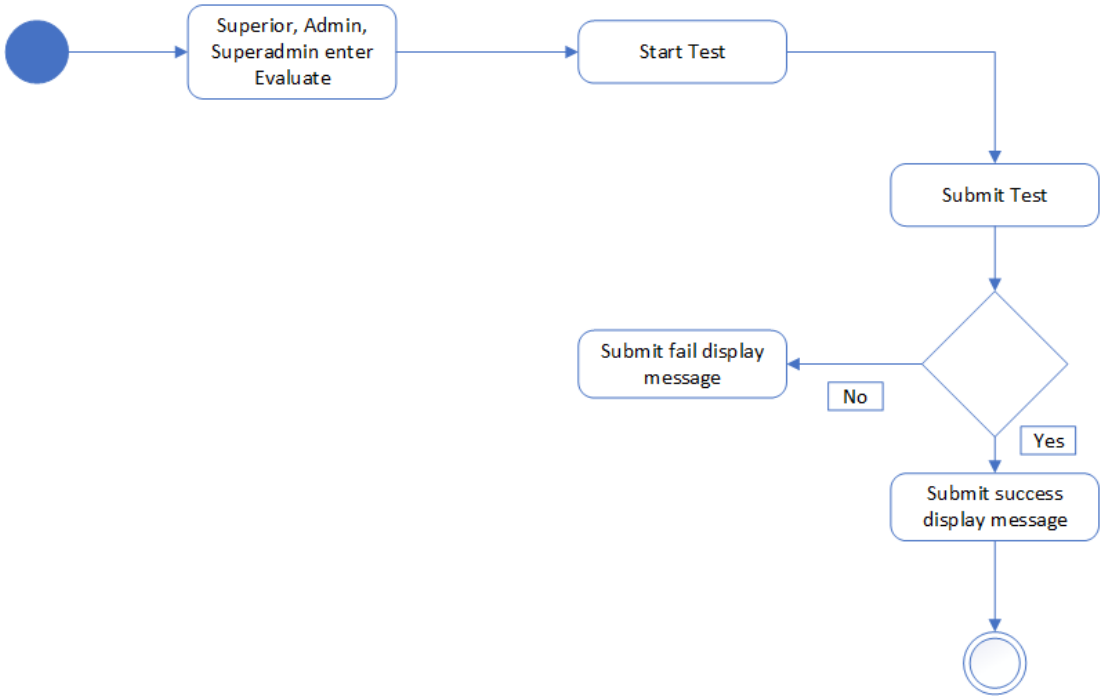


Figure 5.9: Activity diagram for manage answer evaluate.

5.2.4 Class Diagram

The figure below shows the class diagram for the web decision support for leadership competencies system. It also to demonstrates the interactions between the objects for this system.

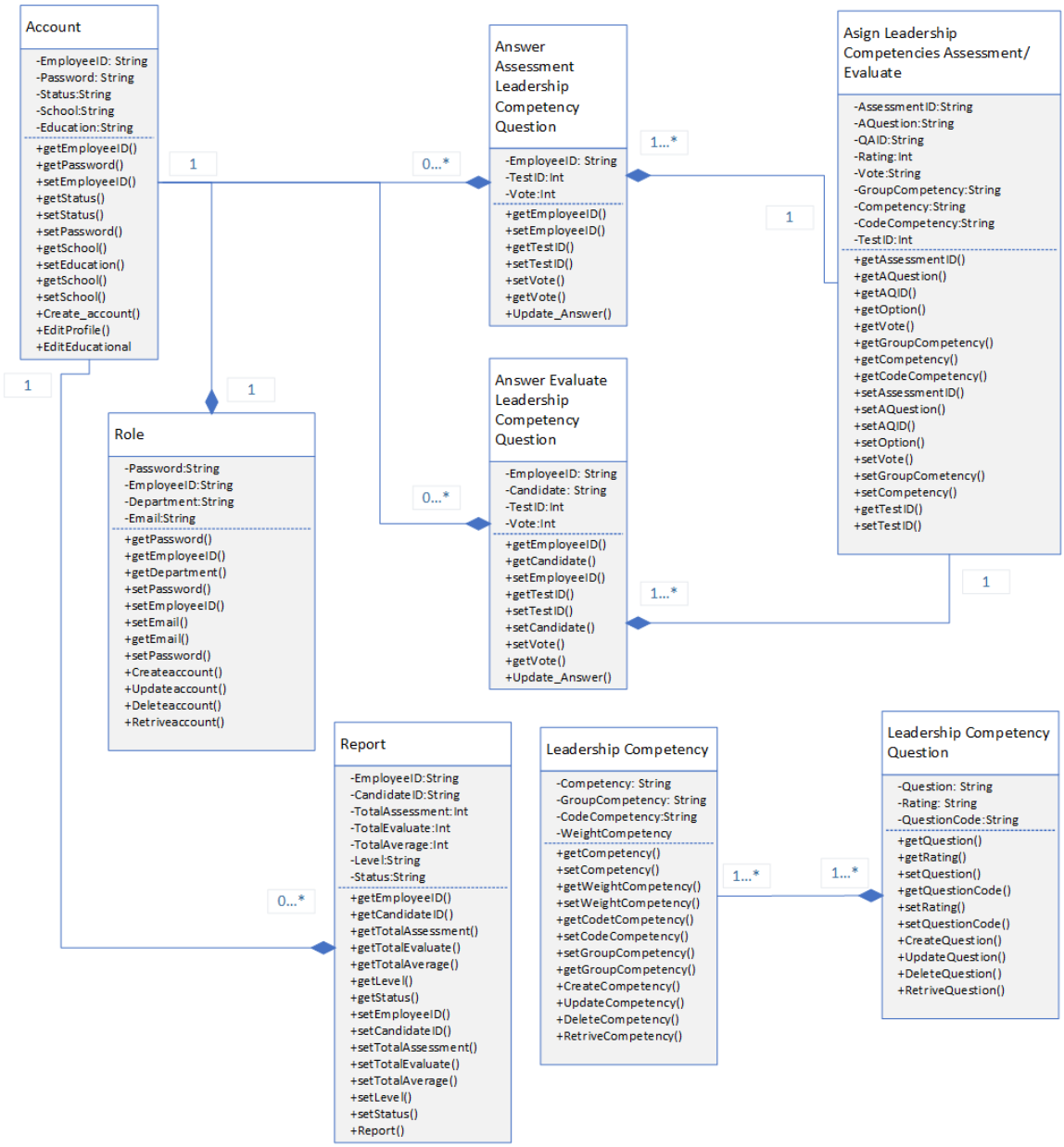


Figure 5.10: Class diagram for A Web-Based Decision Support System for Leadership Competencies.

5.2.5 Sequence Diagram

The sequence diagrams below show the interactions between object sequentially in the systemof web decision support for leadership competencies.

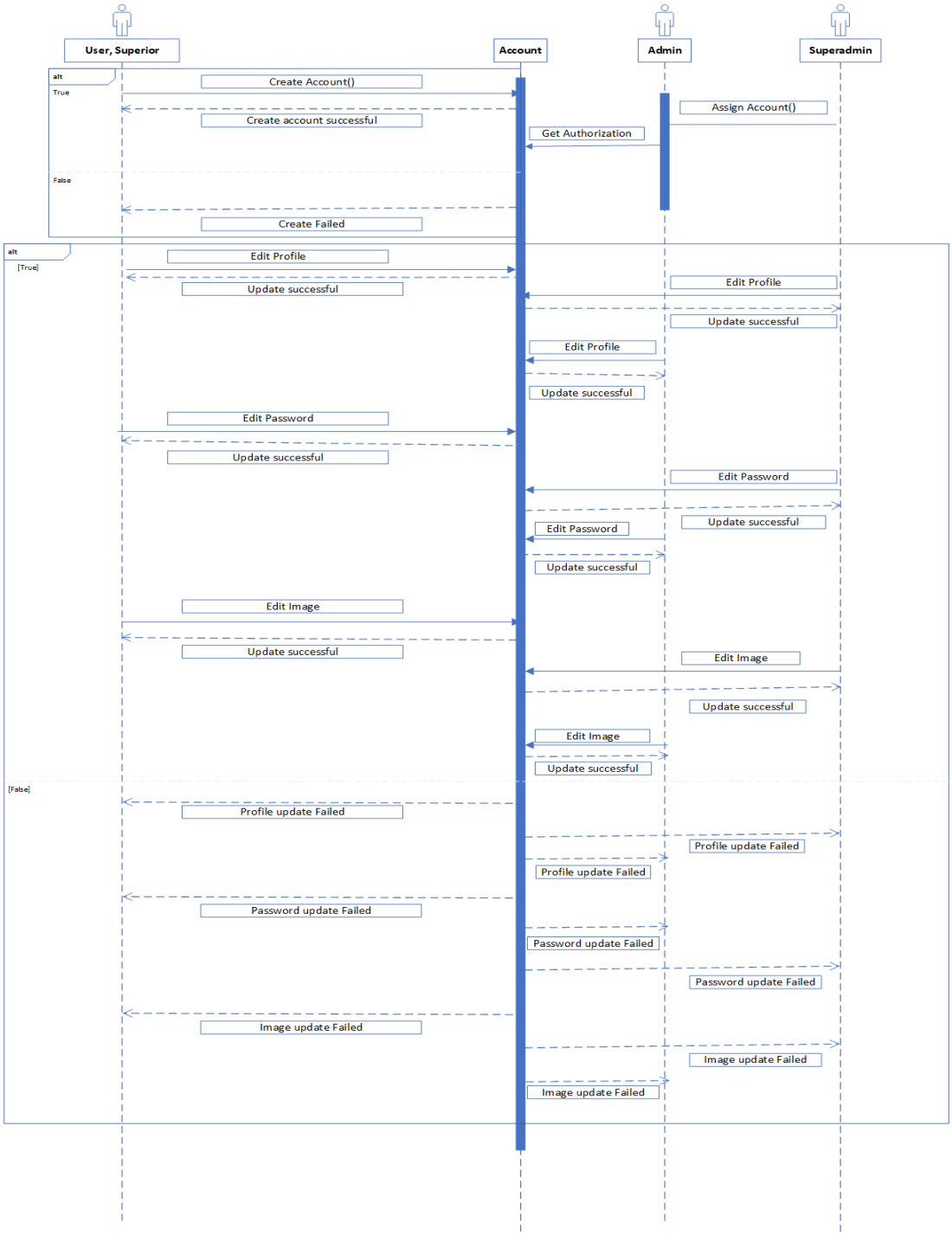


Figure 5.11: Sequence diagram for manage account.

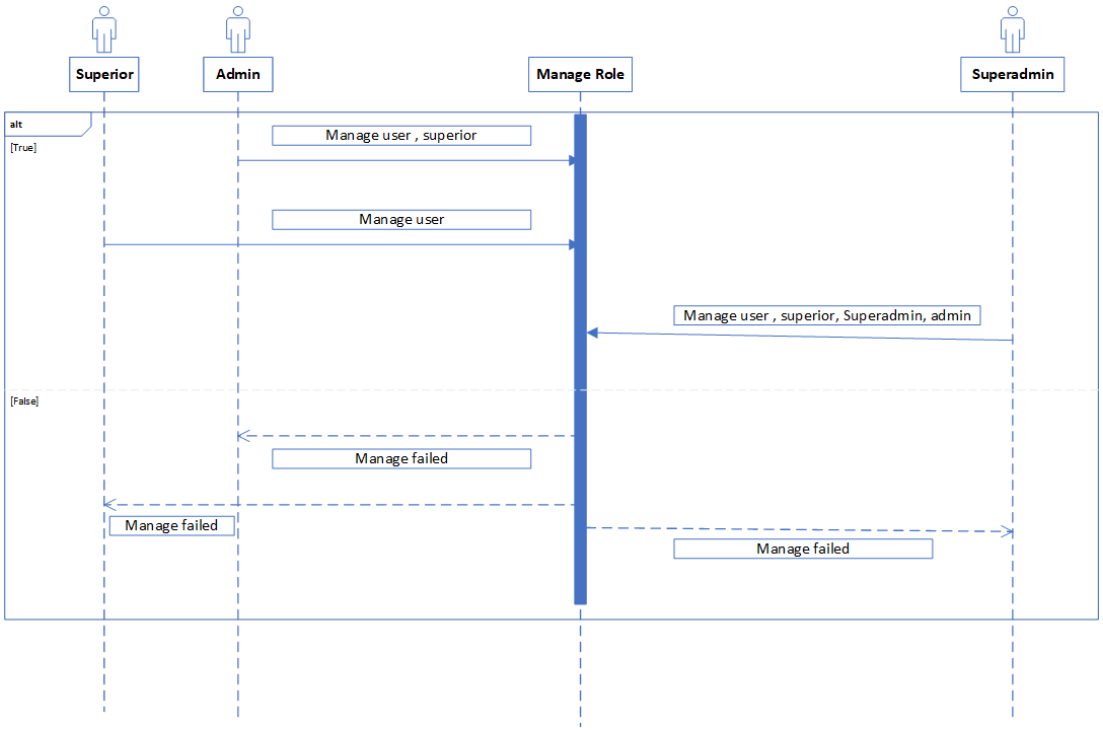


Figure 5.12: Sequence diagram for manage roles.

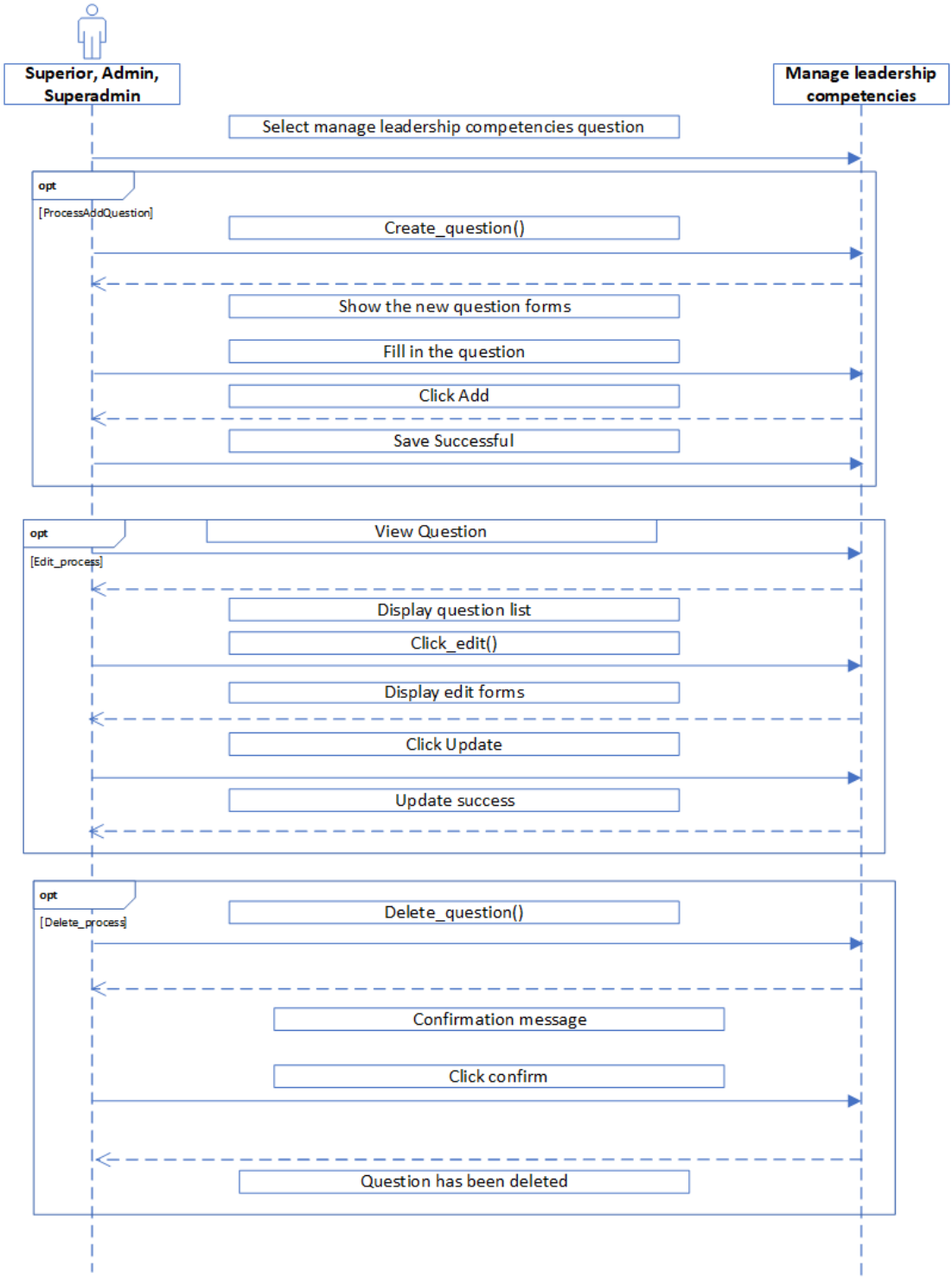


Figure 5.13: Sequence diagram for manage leadership competencies question.

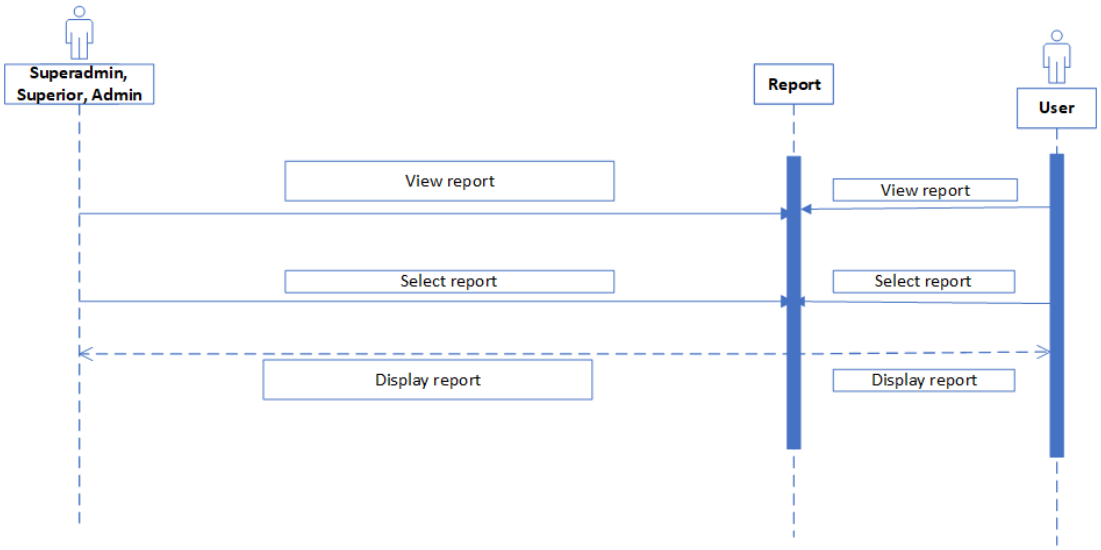


Figure 5.14: Sequence diagram for generate report.

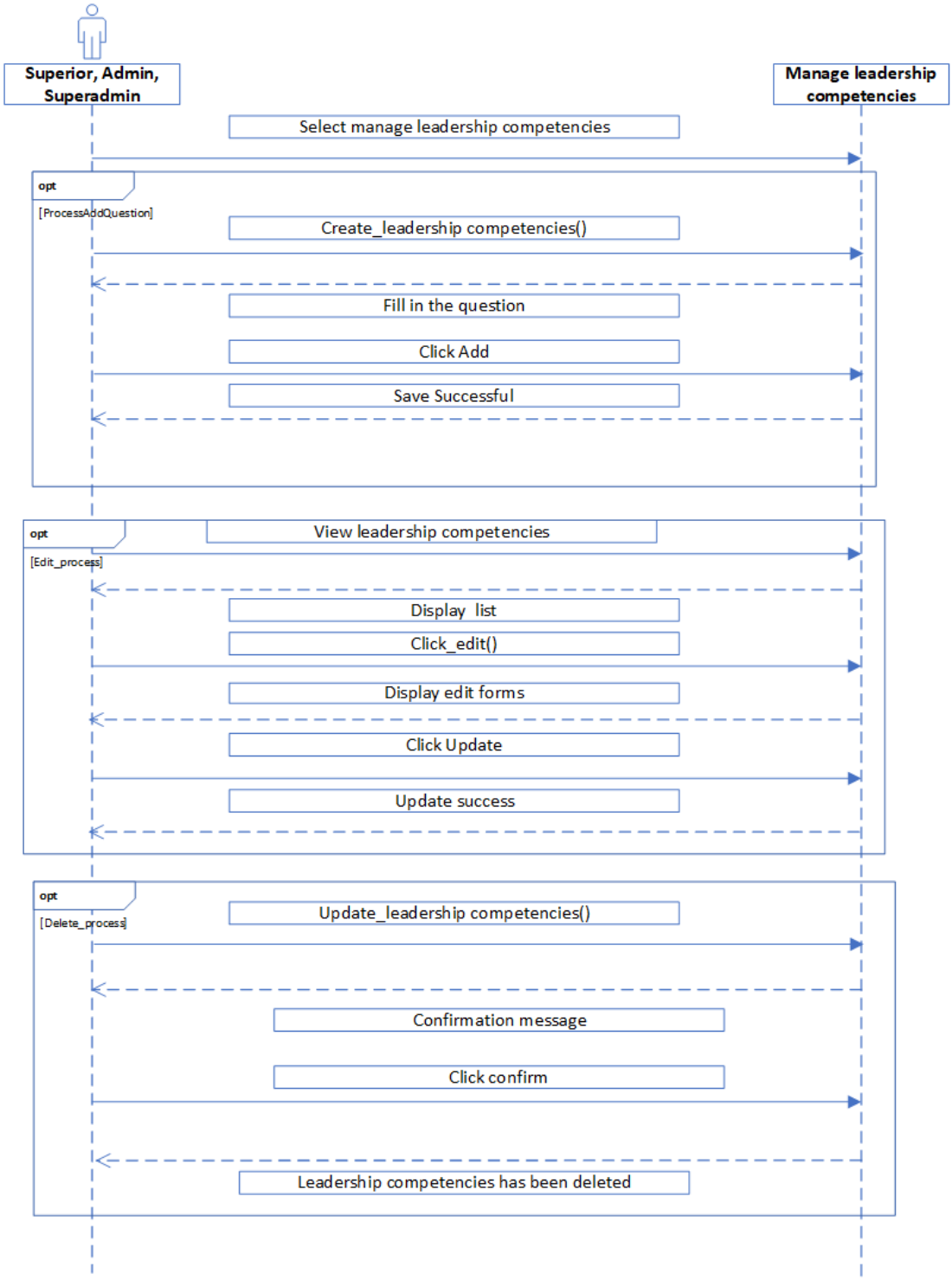


Figure 5.15: Sequence diagram for manage leadership competencies.

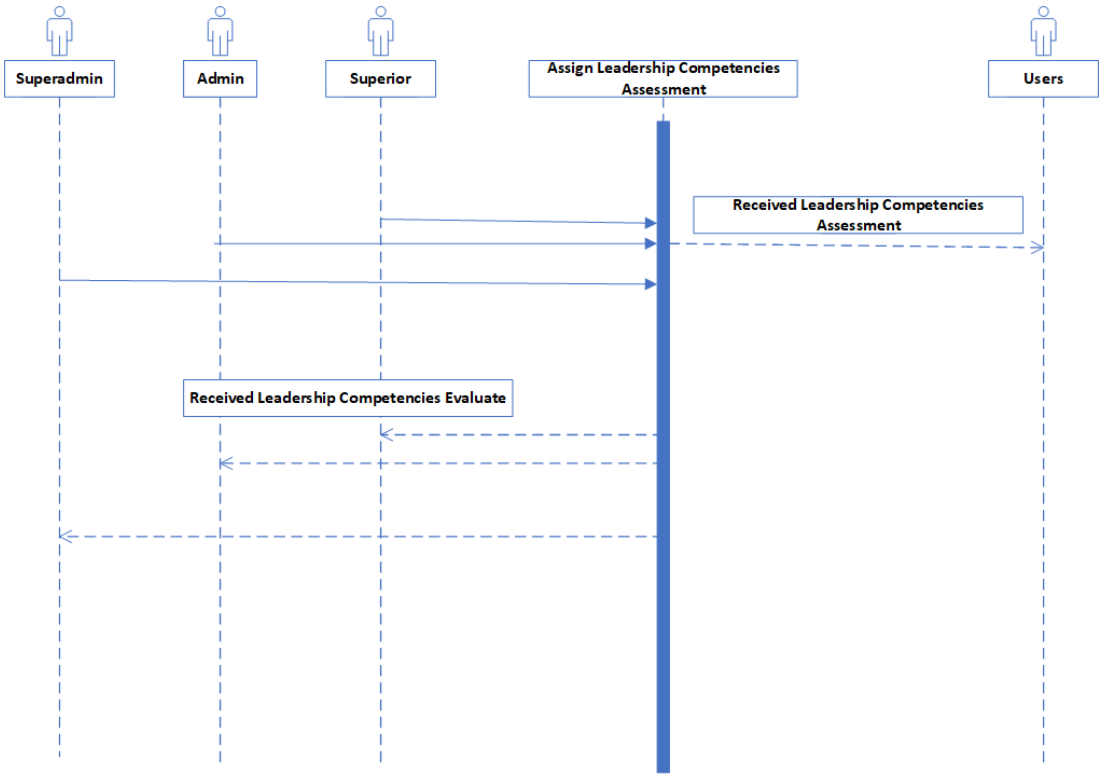


Figure 5.16: Sequence diagram for manage assign assessment/ evaluate.

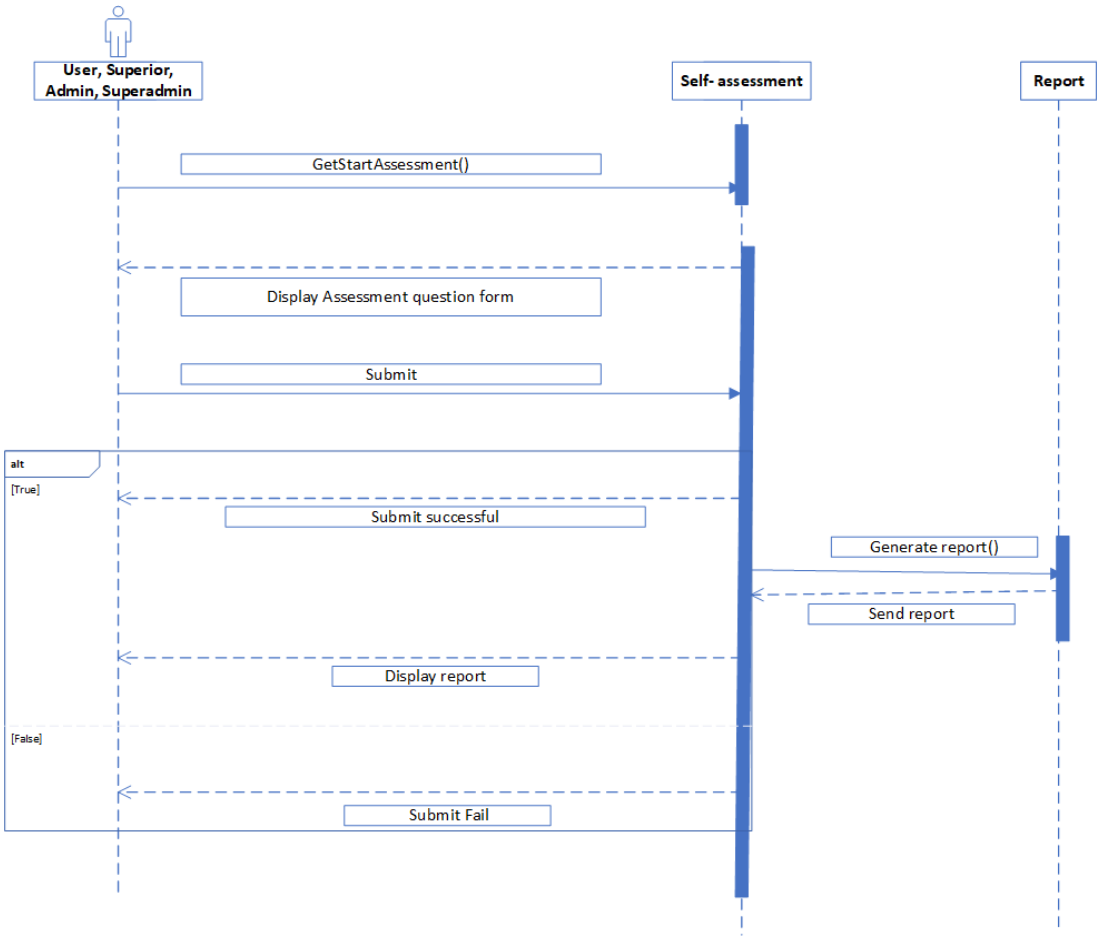


Figure 5.17: Sequence diagram for manage answer assessment.

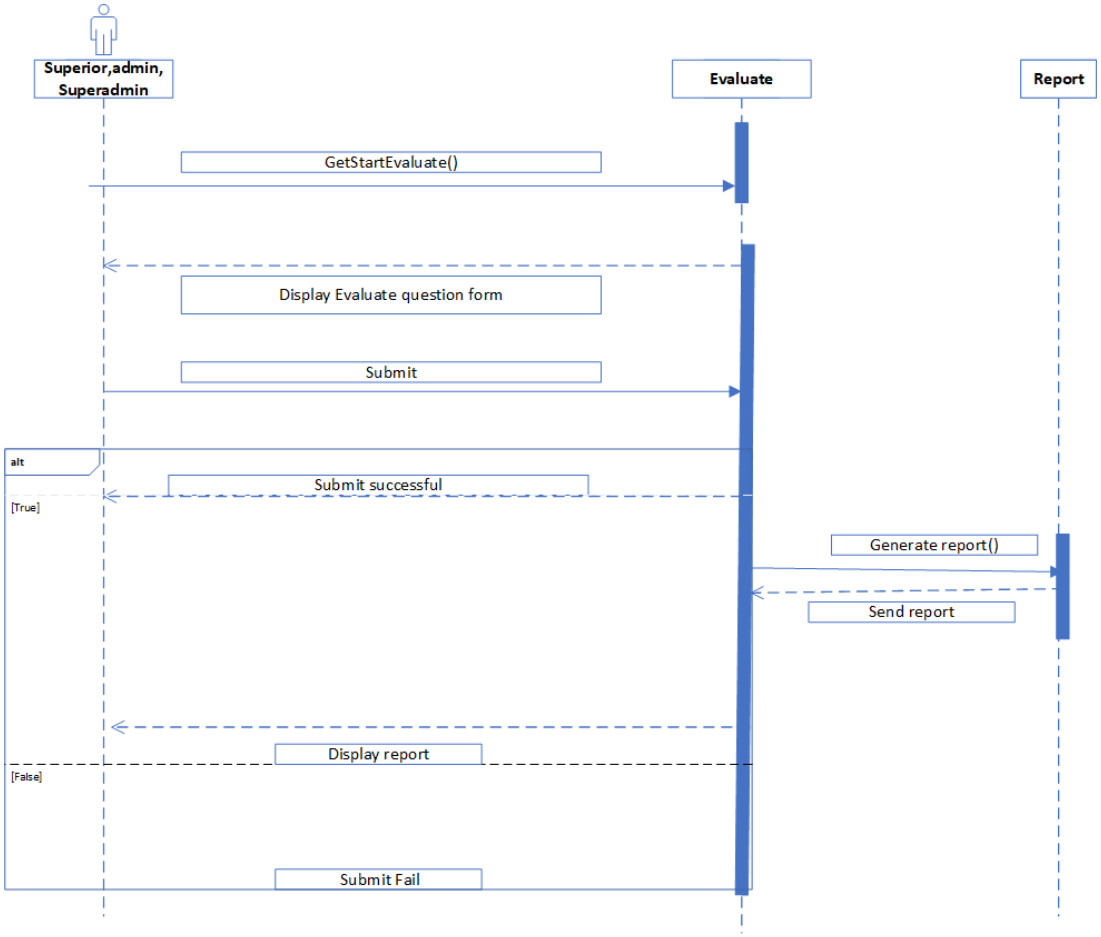


Figure 5.18: Sequence diagram for manage answer evaluate.

5.2.6 CRUDE Analysis

The crude matrix, which is used to identify the tables in a database whichare used in any user interaction with a web decision support for leadership competencies.

	User	**Superior**	**Admin**	**Super admin**
Manage Account	Create, Update, View	Create, Update, View	Create, Update, View	Create, Update, View
Manage Roles	-	Create, Update, View, Delete	Create, Update, View, Delete	Create, Update, View, Delete
Manage Assign Assessment/ Evaluate Leadership Competencies	-	Create, View, Delete	Create, View, Delete	Create, View, Delete
Manage Leadership Competencies Question	-	-	Create, View, Update, Delete	Create, View, Update, Delete
Manage Leadership Competencies	-	-	Create, View, Update, Delete	Create, View, Update, Delete
Generate Report	View (retrieve)	View (retrieve)	View (retrieve)	View (retrieve)
Manage Answer Assessment	View (retrieve), Update	View (retrieve), Update	View (retrieve), Update	View (retrieve), Update
Manage Answer Evaluate	-	View (retrieve), Update	View (retrieve), Update	View (retrieve), Update

Table 5.9: Operation can be made by User, Superior, Admin and Super admin.

5.3 Database Design

In this part discuss about database design of web decision support for leadership competencies which are database normalization, Entity Relationship Diagram (ERD) and data dictionary.

Normalization is the process of decomposing relations with anomalies to produce smaller, well-structured relation and assigning attributes to entities to determine whether our chosen entities, attributes and primary keys are appropriate and suitable for the system. Normalization process can be divided into a few levels called Normal Forms (NF). The NF that will be covered in this subject are 1NF, 2NF, and 3NF.

Unnormalized Form (UNF)

Account	ID, Name, IC, Contact_number, Gender, dob, Address, Department, EmployeeID, Usertype, City, Zip_code, State, Password, Image, Position, Roles, Status, School, Education, Specialize

Question	ID, AQuestion, A_QID, code_competency, competency, Rating, Group_competencies, Status

Competencies	ID, Code_competency, Competency, Weightcompetency, Group_competencies, Status

Answer	ID, TestID, Vote, QuestionCode, Satus, EmployeeID, Candidate

Table 5.10: Unnormalized form of table.

First Normalized Form

Account

Name, IC, Contact_number, Gender, dob, Address, Department, EmployeeID, Position, Image

Login

ID, EmployeeID, Password, Roles, Status

Question

ID, AQuestion, A_QCode, Status, CompetencyCode, Rating

Answer

Candidate, EmployeeID, Vote, Status, Question_Code

Competency

ID, Code_competency, Competency, Weightcompetency, Group_competencies, Status

Table 5.11: First Normalized form of table.

Second Normalized Form

Account

Name, IC, Contact_number, Gender, dob, Address, Department, EmployeeID, Position, Image

Login

ID, EmployeeID, Password, Roles, Status

Background

ID, EmployeeID, Education1, Education2, Education3, School1, School2, School3 Field

Question

ID, AQuestion, A_QCode, Rating, CodeACompetency, Status

Competency

ID, CodeCompetency, Competency, GroupCompetency, Weightcompetency,Status

Assessment_Answer

ID, EmployeeID, A_QCode, TestID, Vote, DateTime, Status

Evaluate_Answer

ID, EmployeeID, CandidateID, E_QCode, TestID, VoteE, DateTime, Status

Table 5.12: Second Normalized form of table.

Third Normalized Form

Account

Name, IC, Contact_number, Gender, dob, Address, Department, EmployeeID, Position, Image

Login

ID, EmployeeID, Password, Roles, Status

Background

ID, EmployeeID, Education1, Education2, Education3, School1, School2, School3 Field

Question

ID, AQuestion, A_QCode, Rating, CodeACompetency, Status

Competency

ID, CodeCompetency, Competency, GroupCompetency, Weightcompetency,Status

Assessment_Answer

ID, EmployeeID, A_QCode, TestID, Vote, DateTime, Status

Evaluate_Answer

ID, EmployeeID, CandidateID, E_QCode, TestID, VoteE, DateTime, Status

Assign Assessment

ID, EmployeeID, TestID, Question_Code, CodeCompetency, AssignTime, Status

Assign Evaluate

ID, EmployeeID, CandidateID, Question_Code, TestID, Codecompetency, AssignTime, Status

Department

ID, Department

Table 5.13: Third Normalized form of table.

5.3.1 Entity-Relationship Diagram

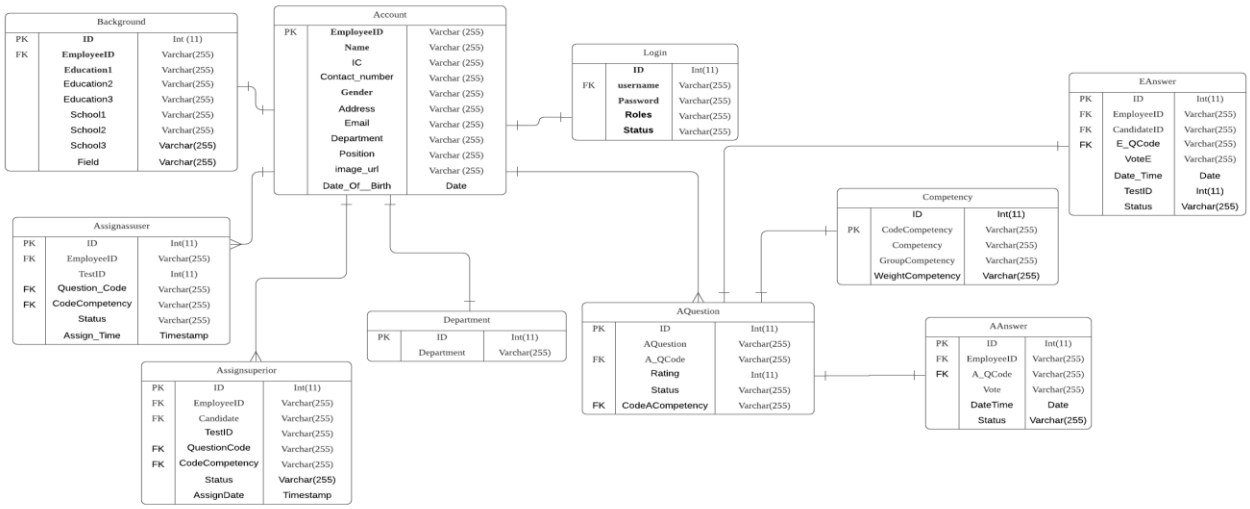


Figure 5.19: Entity-relationship diagram for A Web-Based Decision Support System for Leadership Competencies.

5.3.2 Data Dictionary

This purpose of data dictionary is a collection of attributes, data type, length, constraints and description that are being used in database of system.

Attribute	Type	Length	Constraints	Description
EmployeeID	Varchar	255	PK	Employee identity
Name	Varchar	255	-	Name of user
IC	Varchar	255	-	User identity
Contact_number	Varchar	255	-	Contact number of users
Email	Varchar	255	-	Email of user
Gender	Varchar	255	-	Identity gender of user
Date of Birth	Date	-	-	Date of birth user
Address	Varchar	255	-	Address of user
Department	Varchar	255	-	Employee department identity
Position	Varchar	255	-	Employee position identity

image_url	Varchar	255	-	Employee Image

Table 5.14: Data Dictionary for Account Table.

Attribute	Type	Length	Constraints	Description
ID	Int	11	PK	Identity login ID
EmployeeID	Varchar	255	FK	Employee identity
Password	Varchar	255	-	Password for login
Roles	Varchar	255	-	Identity role for login
Status	Varchar	255	-	Login status

Table 5.15: Data Dictionary for Login Table.

Attribute	Type	Length	Constraints	Description
ID	Int	11	PK	Identity answer ID
EmployeeID	Varchar	255	FK	Employee identity
A_QCode	Varchar	255	FK	Identity question
TestID	Int	11	-	Identity assessment
Vote	Varchar	255	-	Answer
DateTime	timestamp	-	-	Complete date
Status	Varchar	255	-	Complete status

Table 5.16: Data Dictionary for Aanswer Table.

Attribute	Type	Length	Constraints	Description
ID	Int	11	PK	Identity answer ID
EmployeeID	Varchar	255	FK	Employee identity
CandidateID	Varchar	255	FK	Candidate identify
E_QCode	Varchar	255	FK	Identity question
TestID	Int	11	-	Identity assessment
VoteE	Varchar	255	-	Answer
DateTime	timestamp	-	-	Complete date
Status	Varchar	255	-	Complete status

Table 5.17: Data Dictionary for Eanswer Table.

Attribute	Type	Length	Constraints	Description
ID	Int	11	PK	Identity assign ID
Question_Code	Varchar	255	FK	Question identity
CodeCompetency	Varchar	255	FK	Competency identify
EmployeeID	Varchar	255	FK	Identify Employee
TestID	Int	11	-	Identity assessment
Assign_Time	timestamp	-	-	Assign date
Status	Varchar	255	-	Assign status

Table 5.18: Data Dictionary for Assignassuser Table.

Attribute	Type	Length	Constraints	Description
ID	Int	11	PK	Identity assign ID
Question_Code	Varchar	255	FK	Question identity
CodeCompetency	Varchar	255	FK	Competency identify
EmployeeID	Varchar	255	FK	Identify Employee
Candidate	Varchar	255	FK	Identify Candidate
TestID	Int	11	-	Identity assessment
Assign_Time	timestamp	-	-	Assign date
Status	Varchar	255	-	Assign status

Table 5.19: Data Dictionary for Assignsuperior Table.

Attribute	Type	Length	Constraints	Description
ID	Int	11	PK	Identity department ID
Department	Varchar	255		Department identity

Table 5.20: Data Dictionary for Department Table.

Attribute	Type	Length	Constraints	Description
ID	Int	11	-	Identity competency ID
CodeCompetency	Varchar	255	PK	Competency identity
Competency	Varchar	255	-	Competency identify
GroupCompetency	Varchar	255	-	Identify Category Competency
Weightcompetency	Varchar	255	-	Identify weight competency
Status	Varchar	255	-	Competency status

Table 5.21: Data Dictionary for Competency Table.

Attribute	Type	Length	Constraints	Description
ID	Int	11	PK	Identity question ID
AQuestion	Varchar	255	-	Competency question
A_QCode	Varchar	255	FK	question identify
Rating	Int	11	-	Question rating
CodeACompetency	Varchar	255	FK	Identify competency
Status	Varchar	255	-	question status

Table 5.22: Data Dictionary for Question Table.

Attribute	Type	Length	Constraints	Description
ID	Int	11	PK	Identity background ID
EmployeeID	Varchar	255	FK	Identify employee
Education1	Varchar	255	-	Education title identify
Education2	Varchar	255	-	Education title identify
Education3	Varchar	255	-	Education title identify
School1	Varchar	255	-	Identify school
School2	Varchar	255	-	Identify school
School3	Varchar	255	-	Identify school
Field	Varchar	255	-	Identify Specialties

Table 5.23: Data Dictionary for Background Table.

5.4 Interface Design

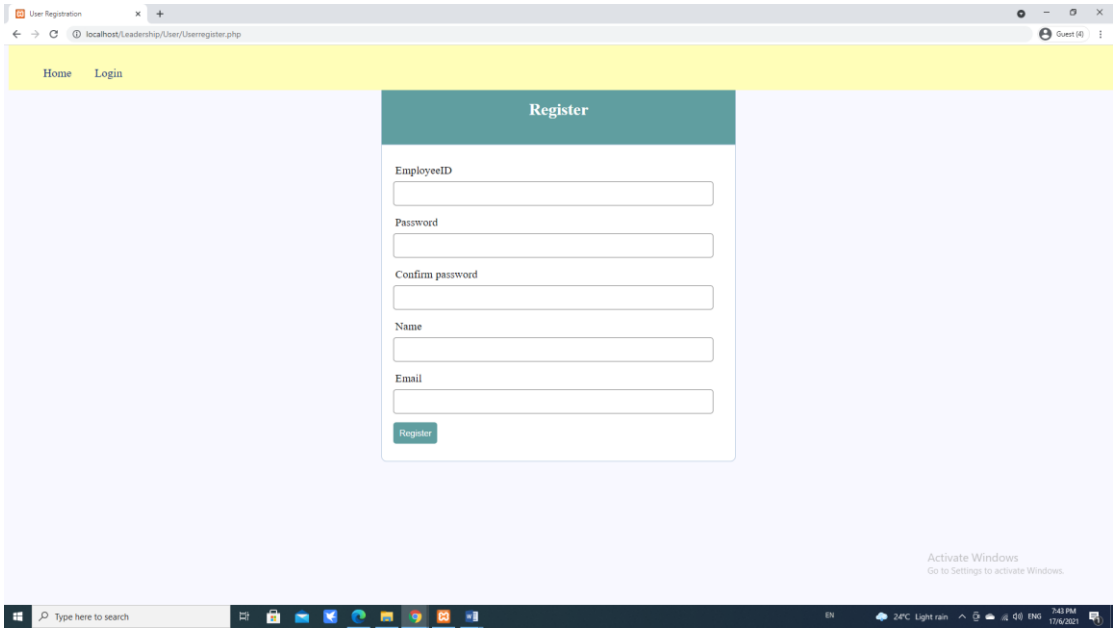


Figure 5.20: User Register

Figure 1 shows the interface of user registration page. User has to provide some information to create an account. If customer has an existing account, just click on the "login" link that will redirect to the login page.

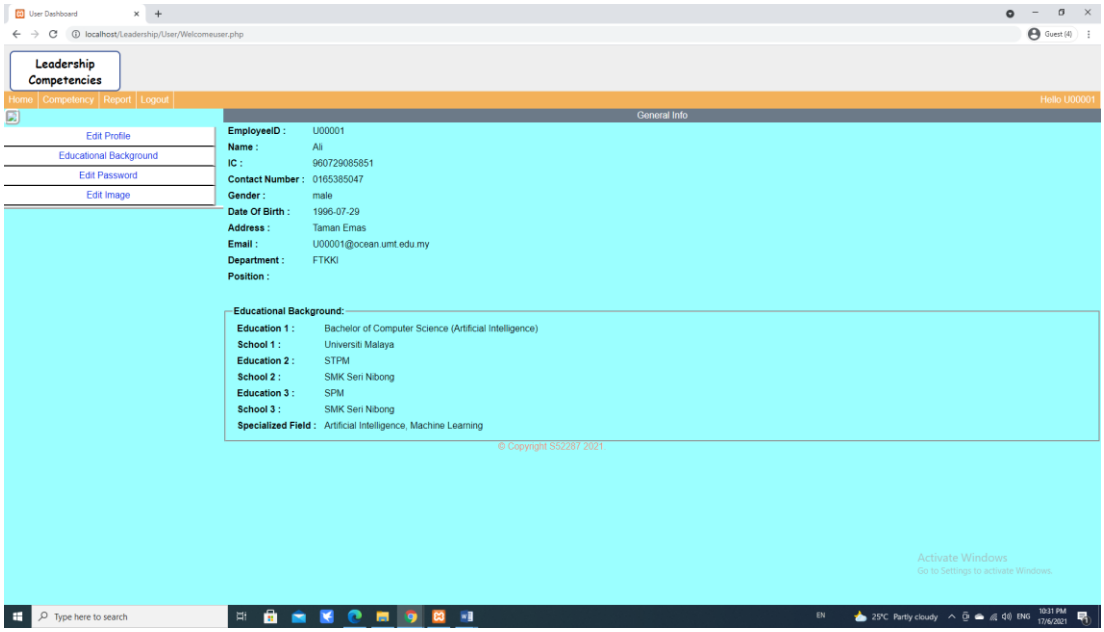


Figure 5.21: User Profile

User details can be found in Figure 2. User can edit and update profile, educational background, change password and upload profile picture.

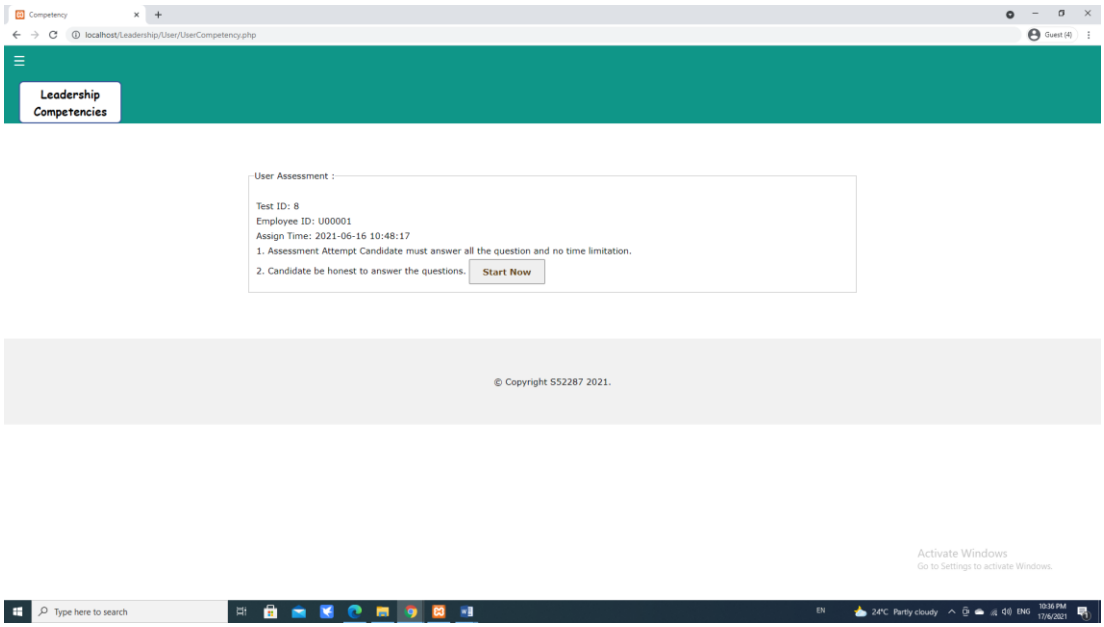


Figure 5.22: Self-assessment pending message

Figure 3 shows the user receive the self-assessment pending message and click on the "Start Now" to doing it.

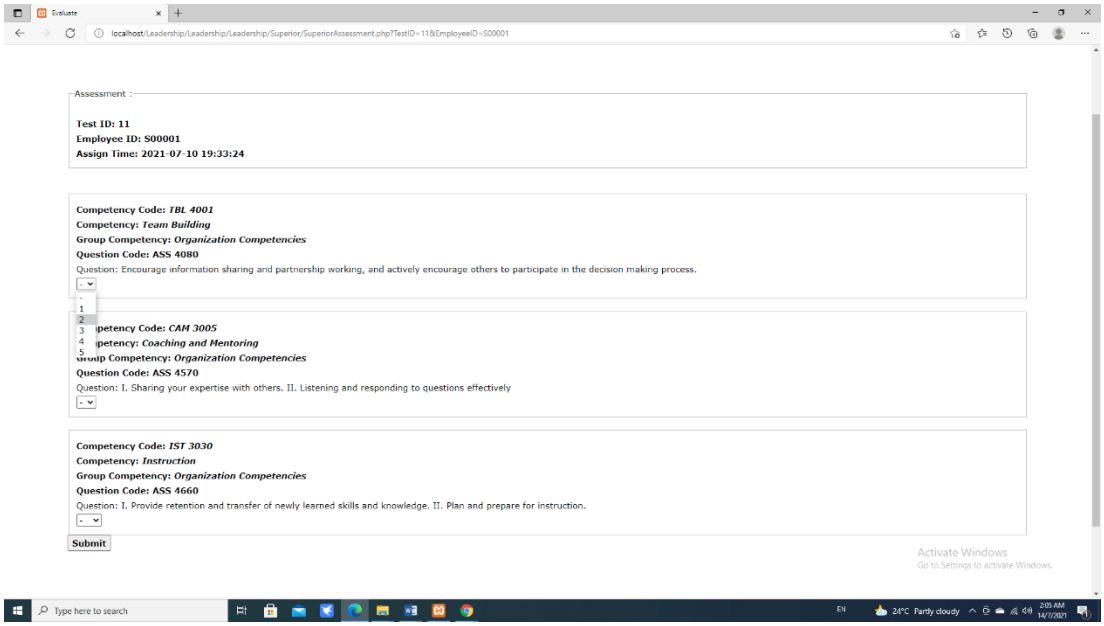


Figure 5.23: Self-assessment Page

Figure 4 shows the interface of self-assessment question. User can based on the question and selecting the answer here.

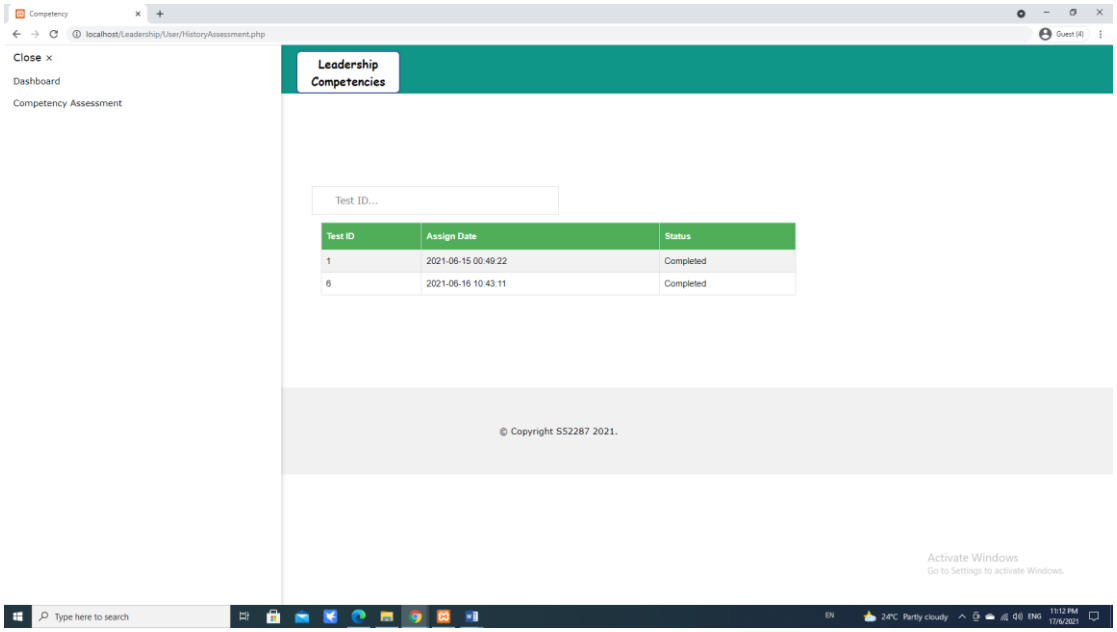


Figure 5.24: History page

Next, figure 5 shows history page that the user had already complete self-assessment. Superior, Admin and Super admin view.

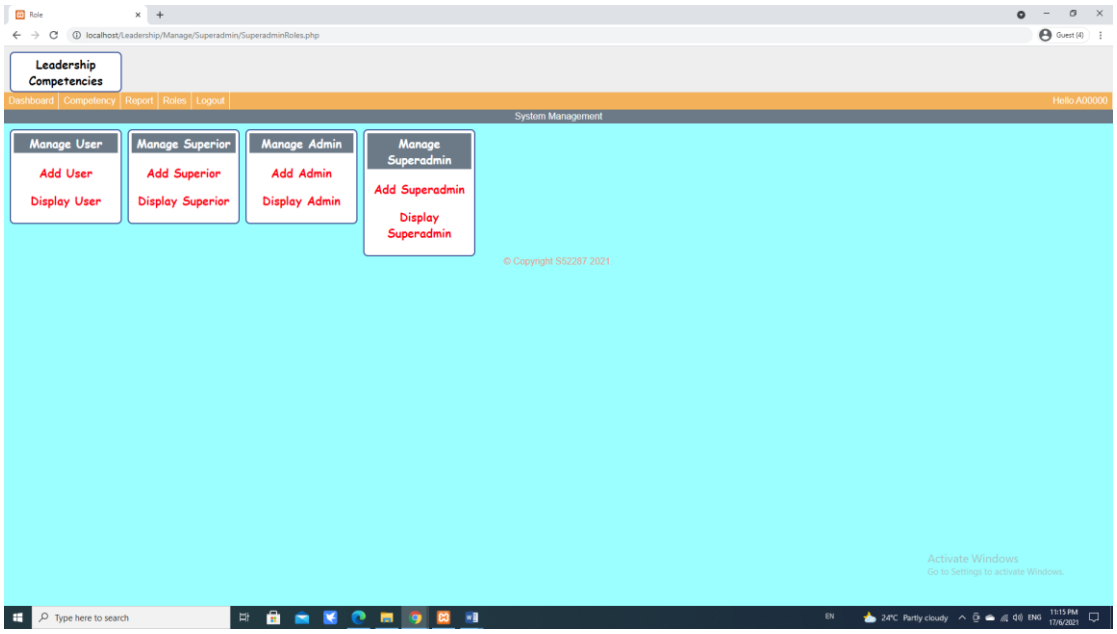


Figure 5.25: Superior, admin and super admin manage roles

Figure 6 shows the interface of manage roles. Roles can be separated into 4 categories, which is user, superior, admin, super admin. The superior, admin, super admin can add, delete view, update roles here.

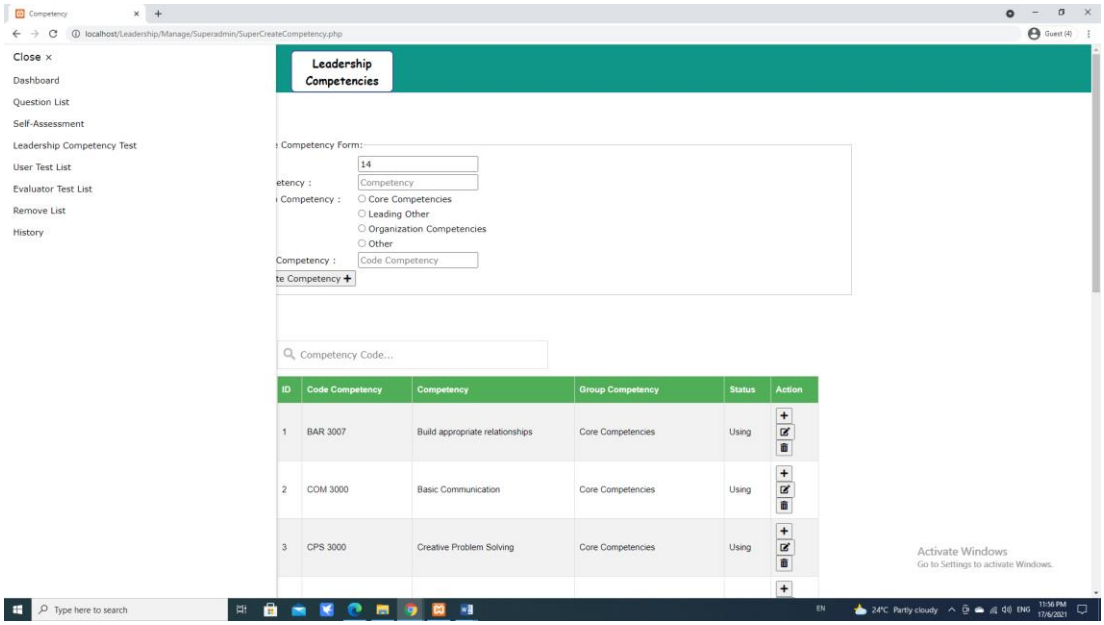


Figure 5.26: Manage leadership competencies page

Figure 7 shows the manage leadership competencies. Superior, admin, super admin can create, receive, edit update, and delete here. This page also provides create competencies question here.

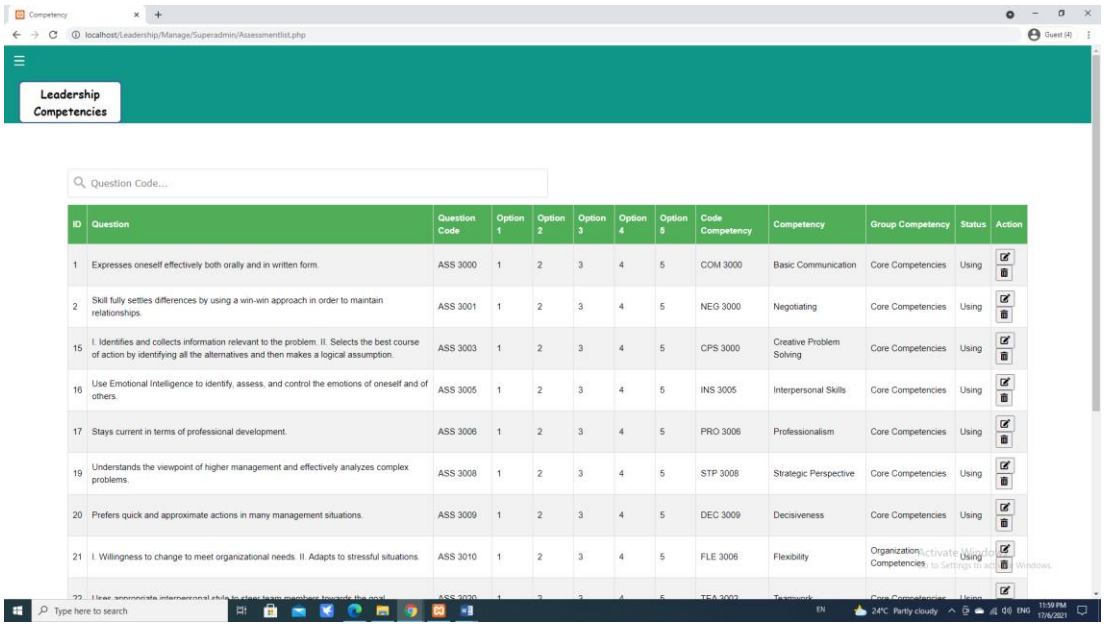


Figure 5.27: Competencies Question Page

Figure 8 shows the manage competencies question page. Superior, admin, super admin can receive, edit update, and delete here.

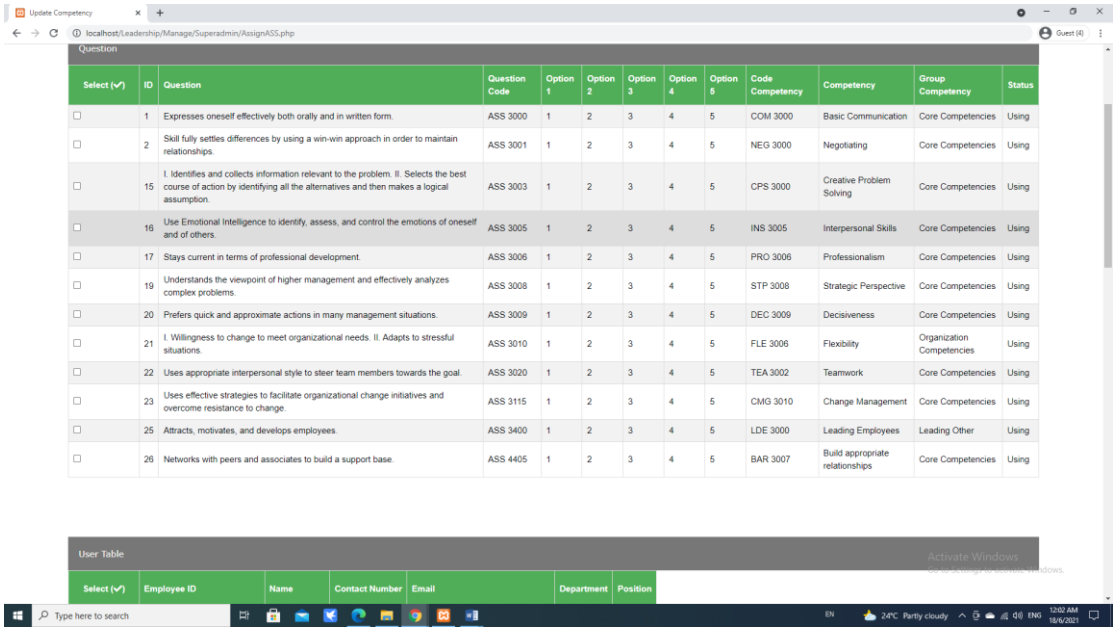


Figure 5.28: Assign self-assessment page

Figure 9 shows the assign self-assessment page. Superior, admin, super admin can assign to user doing the self-assessment.

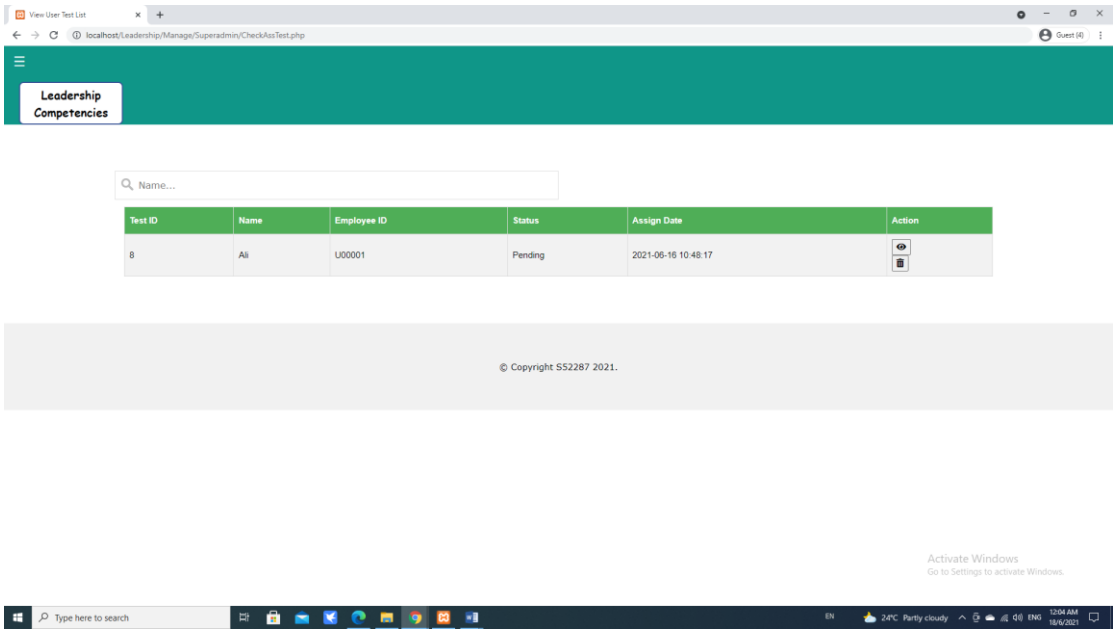


Figure 5.29: Assign self-assessment pending page

Figure 10 shows the assign self-assessment pending page. Superior, admin, super admin can view the assign pending status here.

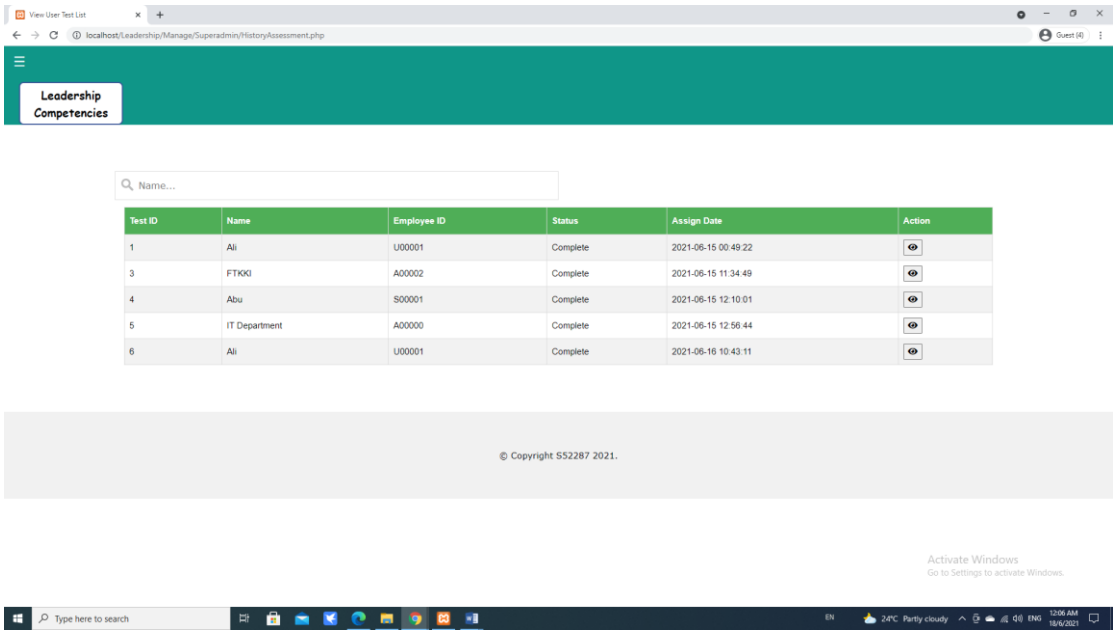


Figure 5.30: Complete self-assessment history page

Figure 11 shows the user complete self-assessment history page. Superior, admin, super admin can view the complete history here.

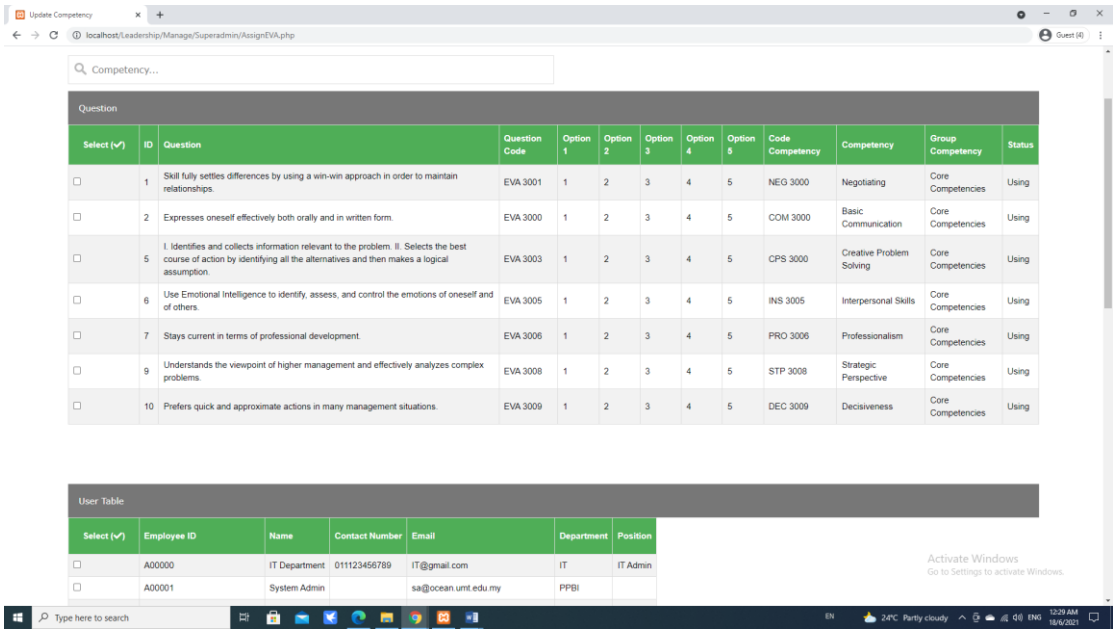


Figure 5.31: Superior, admin and super admin select evaluate question page

Figure 12 shows the superior, admin and super admin select evaluate question page. Superior, admin, super admin can view question and select evaluate to user here.

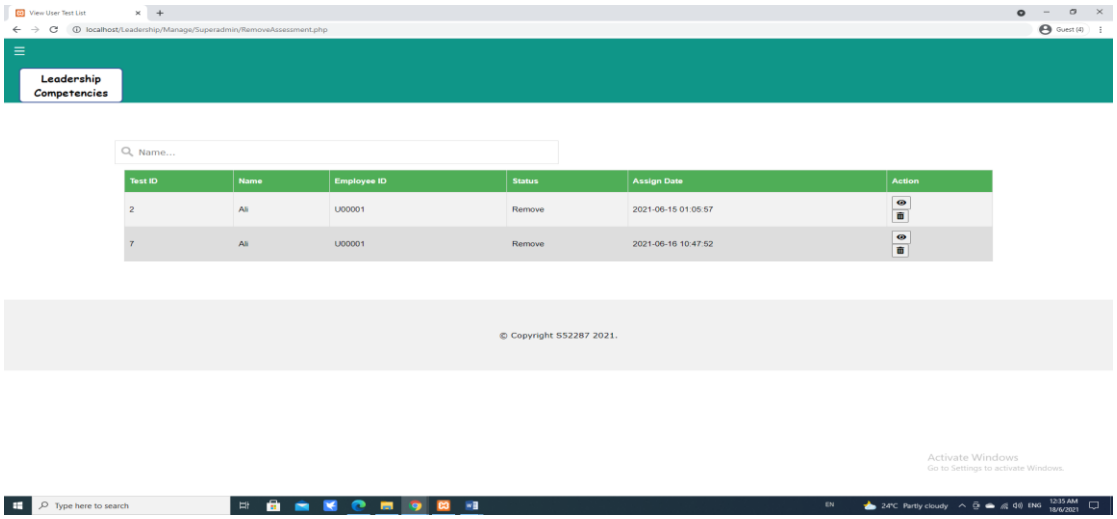


Figure 5.32: Super admin view remove list page

Figure 13 shows the super admin view remove list page. super admin can view the superior and admin remove assessment and evaluation in here.

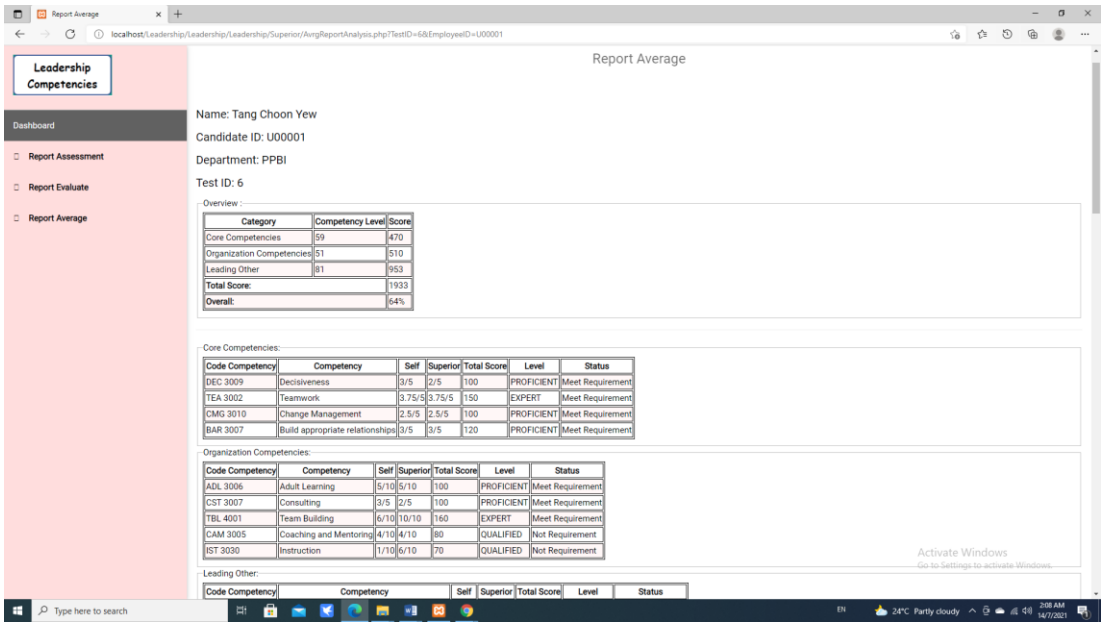


Figure 5.33: Report Average page

Figure 14 shows the user and the superior after complete the assessment and evaluate, the system will generate the report average to refer the leader skill gap and which part of skill need improve.

5.5 Discussion

Throughout this section, the A Web-Based Decision Support System for Leadership Competencies is said to be a complete system with the interface design and database design. All the system data attribute was recorded in database. The interface of the system was record at Interface Design section.

5.6 Summary

This project is a web-based system called A Web-Based Decision Support System for Leadership Competencies, comprises of eight modules. From the developed module, users gather data assessment and evaluate analysis and result convert to data visualization to assist superior to determine skill gap for users. In conclusion, this project aims to create a platform that simplifies user's self-assessment.

CHAPTER 6

SYSTEM IMPLEMENTATION

6.3 Introduction

This section comprises of the hierarchical menu and the detail of system development of A Web-Based Decision Support System for Leadership Competencies.

6.4 System Hierarchical Menu

6.2.1 The figure below shows menu hierarchy of the user.

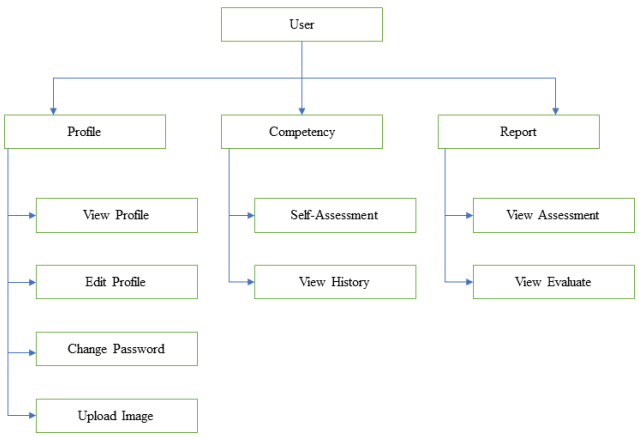


Figure 6.1: User Menu Hierarchy

6.2.2 The figure below shows menu hierarchy of the superior.

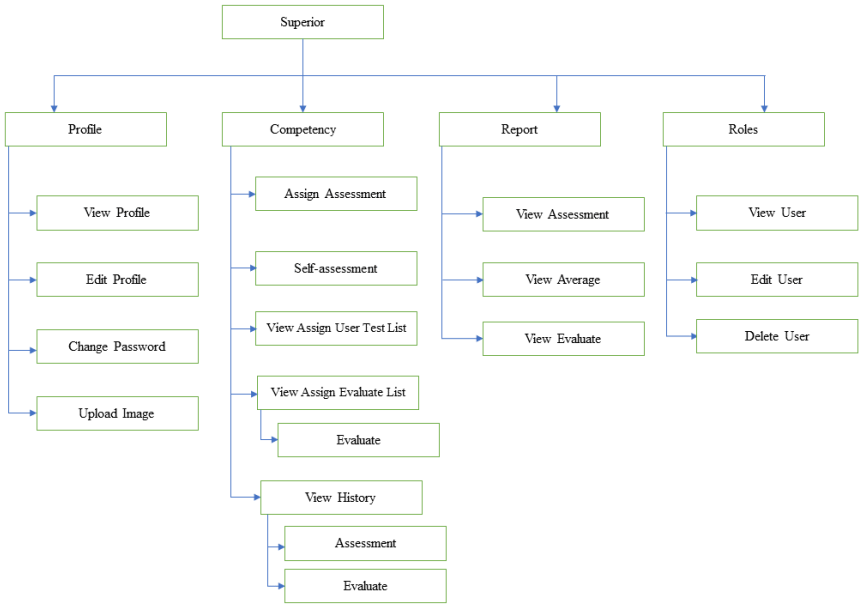


Figure 6.2: Superior Menu Hierarchy

6.2.3 The figure below shows menu hierarchy of the admin.

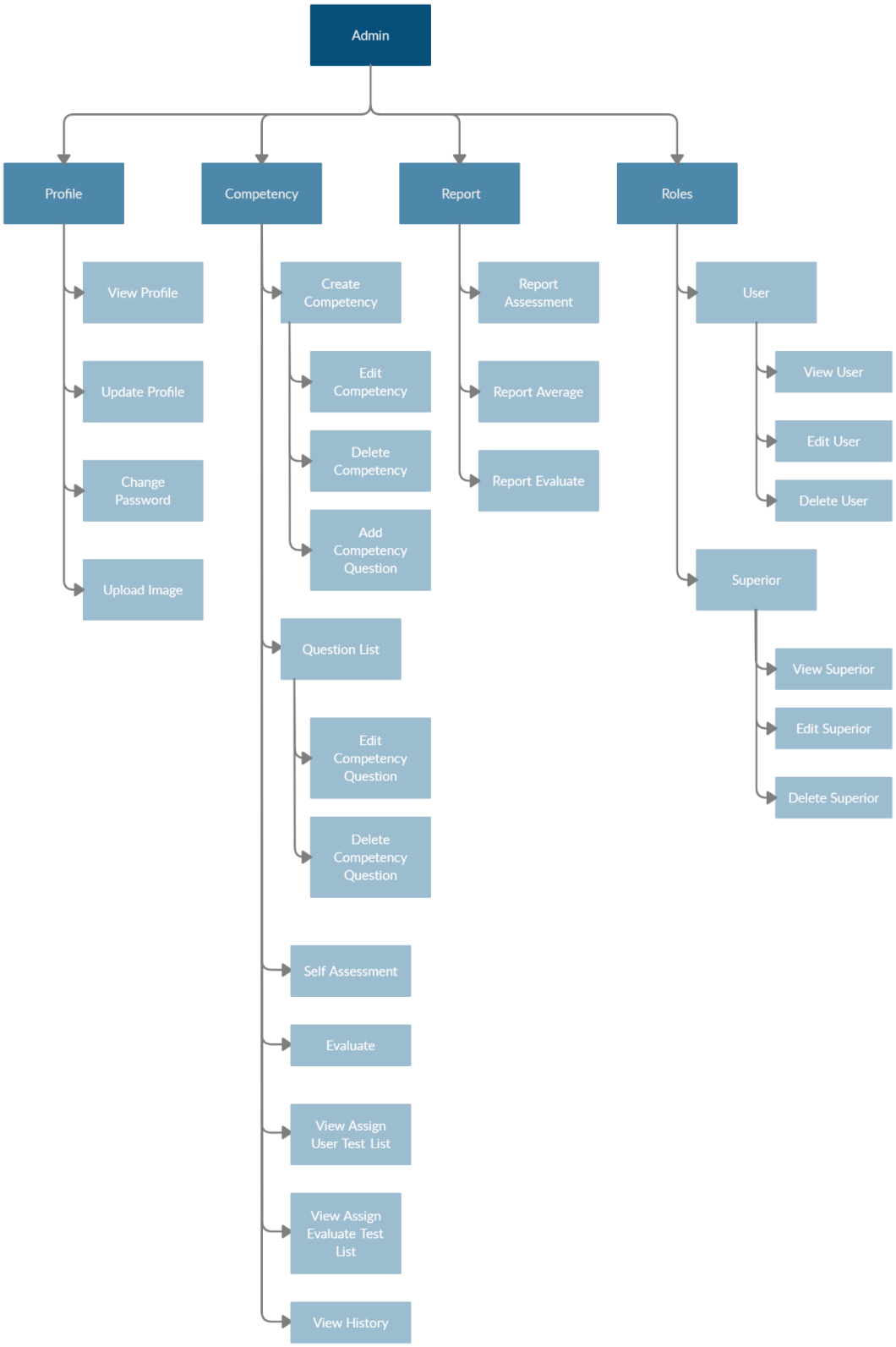


Figure 6.3: Admin Menu Hierarchy

6.2.4 The figure below shows menu hierarchy of the superadmin.

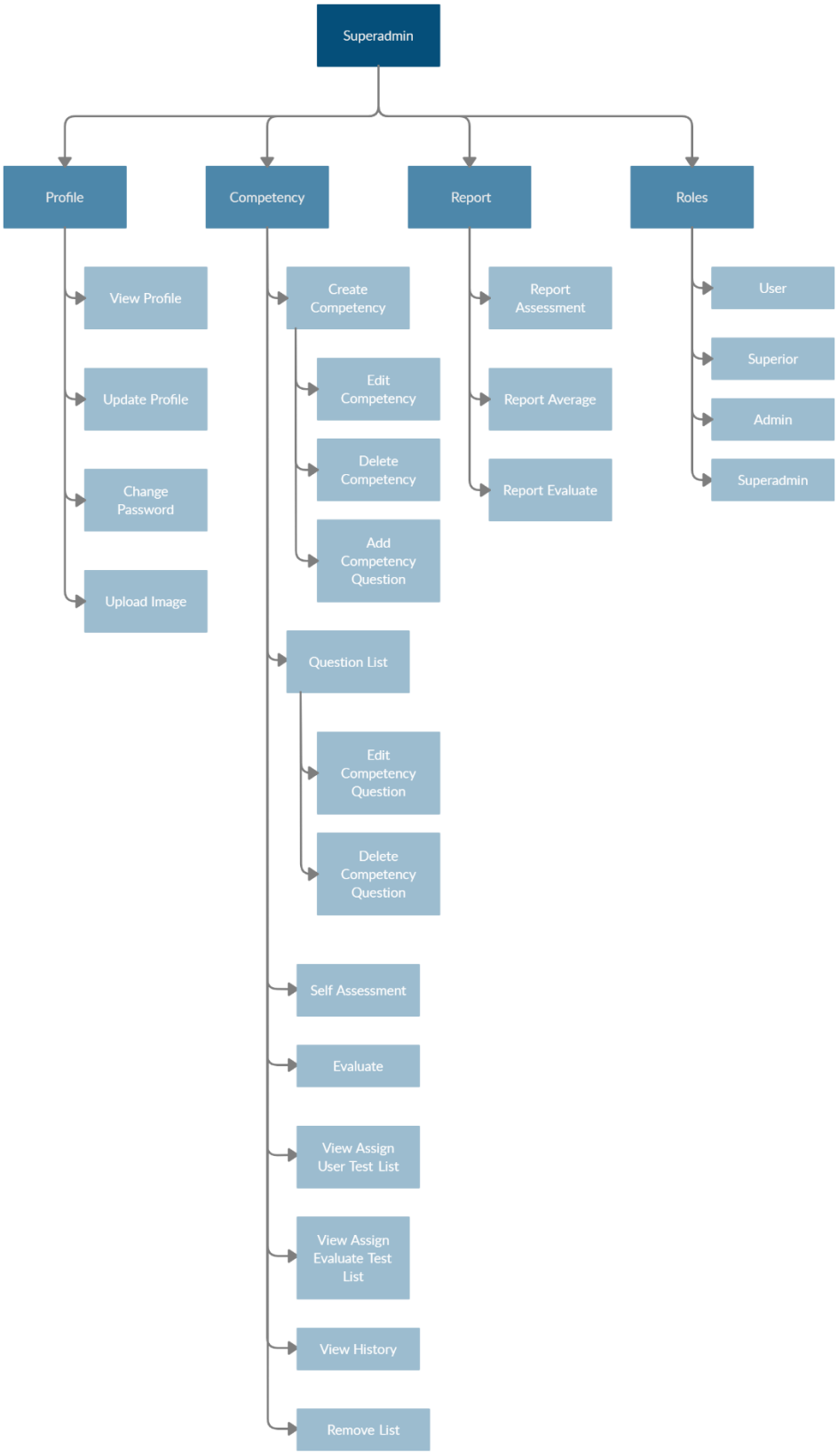


Figure 6.4: Superadmin Menu Hierarchy

6.5 System Development

This section explains the development of A Web-Based Decision Support System for Leadership Competencies using the architecture design established in Chapter 3 as each layer utilises different technologies of implementation.

6.3.1 Client Tier

Implementation of the client tier mainly focuses on the user interface (UI) and presentation logic which is important to provide an interface for system users to interact with the system. Hypertext Markup Language 5 (HTML5) is used to structure the layout of the content, Cascading Style Sheets 3 (CSS3) is used to style the presentation of the UI and JavaScript is embedded to extend dynamic functionality in the web pages. Several external jQuery plugins and libraries have been imported into the system to simplify and enhance the development process for the client tier. Some of the major plugins and libraries imported are (i) jQuery validate input v2.1.1, (ii) gstatic for chart, (iii) jQuery v3.2.1 and (iv) anychart v8 (v) font-awesome v4.7.0 (vi) font-awesome v5.13.0.

I. jQuery validate input

```
function testInput(event) {
    var value = String.fromCharCode(event.which);
    var pattern = new RegExp(/[a-zääö ]/i);
    return pattern.test(value);
}

$('#my-field').bind('keypress', testInput);
```

Figure 6.5: Code input validation using jQuery.

II. gstatic for chart

```
<script type="text/javascript">
      google.charts.load('current', {'packages':['bar']});
      google.charts.setOnLoadCallback(drawChart);

      function drawChart() {
        var data = google.visualization.arrayToDataTable([
          ['Competency', 'Assessment', 'Evaluate', 'Average'],
<?php
$result = Averagegraph();
while($row = mysqli_fetch_array($result))
{
$point=$row['Vote'];
$rating=$row['Rating'];
$percentage=($point/$rating)*$row['Weightcompetency'];
$marks=$percentage/$row['Weightcompetency']*100;
$point2=$row['VoteE'];
$percentage2=($point2/$rating)*$row['Weightcompetency'];
$marks2=$percentage2/$row['Weightcompetency']*100;
$Average=($marks+$marks2)/2;
echo "['".$row['Competency']."',".$marks.",".$marks2.",".$Average."],";
}
?>
        ]);

        var options = {
          chart: {
            title: 'Bar Chart',
            subtitle: 'Leadership Competencies Report',
          }
        };

        var chart = new google.charts.Bar(document.getElementById('columnchart_material'));

        chart.draw(data, google.charts.Bar.convertOptions(options));
      }
</script>
```

Figure 6.6: Code gstatic for Bar Chart.

III. jQuery v3.2.1

```
<script>
function w3_open() {
  document.getElementById("main").style.marginLeft = "25%";
  document.getElementById("mySidebar").style.width = "25%";
  document.getElementById("mySidebar").style.display = "block";
  document.getElementById("openNav").style.display = 'none';
}
function w3_close() {
  document.getElementById("main").style.marginLeft = "0%";
  document.getElementById("mySidebar").style.display = "none";
  document.getElementById("openNav").style.display = "inline-block";
}

document.getElementById("myRadio").disabled = true;
document.getElementById("myRadio2").disabled = true;
document.getElementById("myRadio3").disabled = true;
document.getElementById("myRadio4").disabled = true;
</script>
```

Figure 6.7: Code jQuery for sidebar control.

IV. anychart v8

```
<script>
   anychart.onDocumentReady(function () {
     // create data set on our data
     var dataSet = anychart.data.set([
<?php
$result = Averagegraph();
while($row = mysqli_fetch_array($result))
{
$point=$row['Vote'];
$rating=$row['Rating'];
$percentage=($point/$rating)*$row['Weightcompetency'];
$marks=$percentage/$row['Weightcompetency']*100;
$point2=$row['VoteE'];
$percentage2=($point2/$rating)*$row['Weightcompetency'];
$marks2=$percentage2/$row['Weightcompetency']*100;
$Average=($marks+$marks2)/2;
echo "['".$row['Competency']."',".$marks.",".$marks2.",".$Average."],";
}
?>
     ]);

     // map data for the first series, take x from the zero column and value from the first column of data set
     var data1 = dataSet.mapAs({ x: 0, value: 1 });
     // map data for the second series, take x from the zero column and value from the second column of data set
     var data2 = dataSet.mapAs({ x: 0, value: 2 });
     // map data for the third series, take x from the zero column and value from the third column of data set
     var data3 = dataSet.mapAs({ x: 0, value: 3 });

    // create radar chart
     var chart = anychart.radar();

     // set chart title text settings
     chart.title(
       'Radar Average Analysis'
     );

     // set chart yScale settings
```

Figure 6.8: Anychart code for the analysis chart.

V. font-awesome v4.7.0

Figure 6.9: Plugin font-awesome Icon as a functional button.

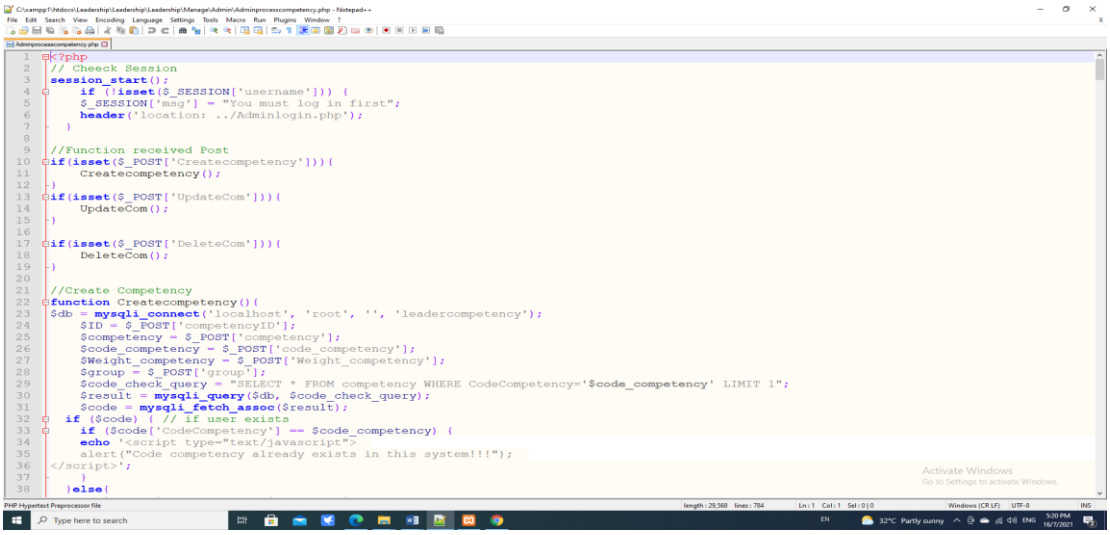
VI. font-awesome v5.13.0

Figure 6.10: Plugin font-awesome Icon as a functional button.

6.3.2 Web Tier

Generally, a web tier is sets of logics and operations which are needed by system users to complete a task. This section outlines several important backend of A Web-Based Decision Support System for Leadership Competencies implemented in the system such as competency module, report module, manage account module, manage roles module.

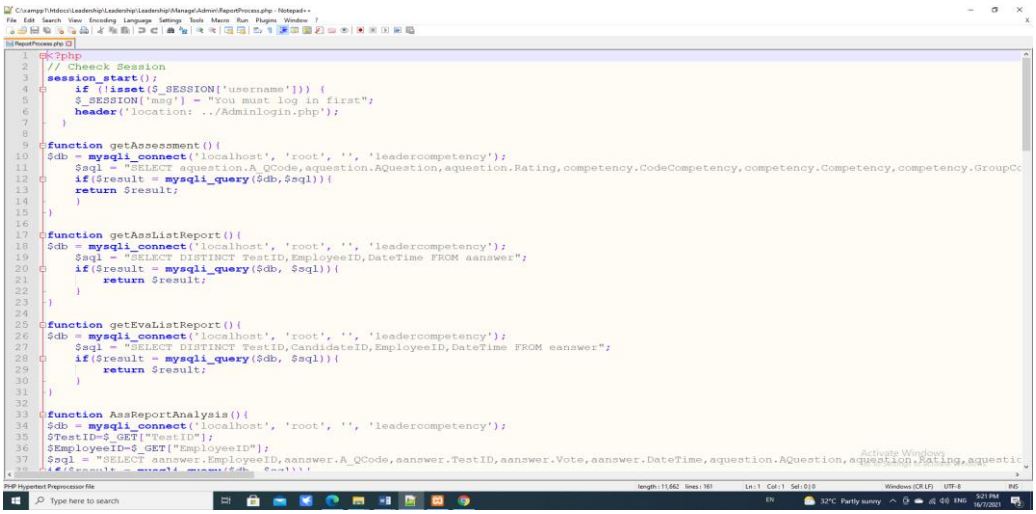
I. Competency module



```php
<?php
// Cheeck Session
session_start();
    if (!isset($_SESSION['username'])) {
    $_SESSION['msg'] = "You must log in first";
    header('location: ../Adminlogin.php');
}

//Function received Post
if(isset($_POST['Createcompetency'])){
    Createcompetency();
}
if(isset($_POST['UpdateCom'])){
    UpdateCom();
}

if(isset($_POST['DeleteCom'])){
    DeleteCom();
}

//Create Competency
function Createcompetency(){
$db = mysqli_connect('localhost', 'root', '', 'leadercompetency');
    $ID = $_POST['competencyID'];
    $competency = $_POST['competency'];
    $code_competency = $_POST['code_competency'];
    $Weight_competency = $_POST['Weight_competency'];
    $group = $_POST['group'];
    $code_check_query = "SELECT * FROM competency WHERE CodeCompetency='$code_competency' LIMIT 1";
    $result = mysqli_query($db, $code_check_query);
    $code = mysqli_fetch_assoc($result);
  if ($code) { // if user exists
    if ($code['CodeCompetency'] == $code_competency) {
    echo '<script type="text/javascript">
    alert("Code competency already exists in this system!!!");
</script>';
    }
    }else{
```

Figure 6.11: Backend source code for competency module.

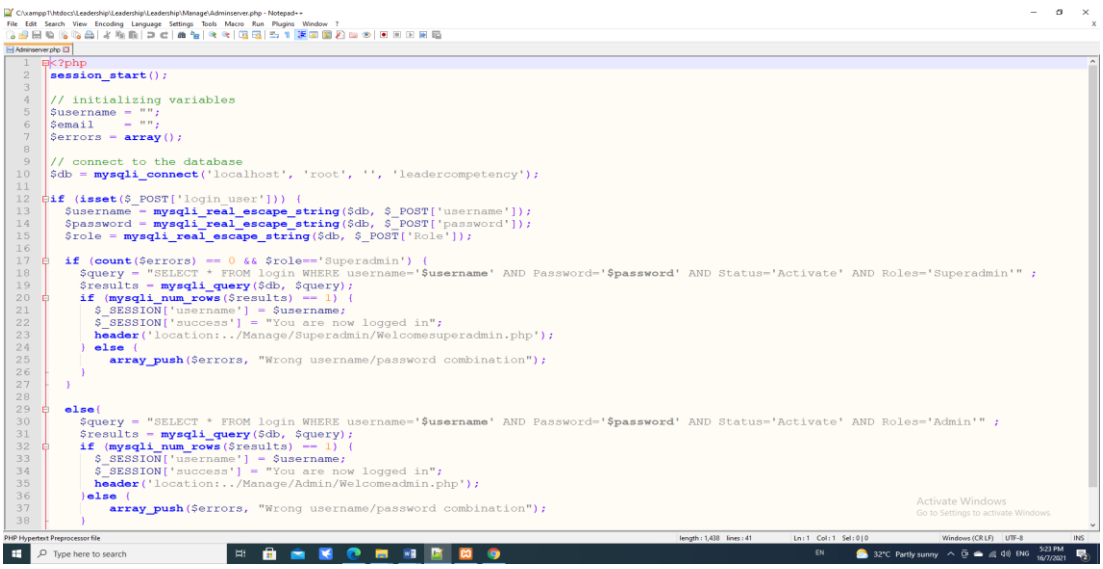
II. Report module



```php
<?php
// Cheeck Session
session_start();
    if (!isset($_SESSION['username'])) {
    $_SESSION['msg'] = "You must log in first";
    header('location: ../Adminlogin.php');
}

function getAssessment(){
$db = mysqli_connect('localhost', 'root', '', 'leadercompetency');
    $sql = "SELECT aquestion.A_QCode,aquestion.AQuestion,aquestion.Rating,competency.CodeCompetency,competency.Competency,competency.GroupCo
    if($result = mysqli_query($db,$sql)){
    return $result;
    }
}

function getAssListReport(){
$db = mysqli_connect('localhost', 'root', '', 'leadercompetency');
    $sql = "SELECT DISTINCT TestID,EmployeeID,DateTime FROM aanswer";
    if($result = mysqli_query($db, $sql)){
        return $result;
    }
}

function getEvaListReport(){
$db = mysqli_connect('localhost', 'root', '', 'leadercompetency');
    $sql = "SELECT DISTINCT TestID,CandidateID,EmployeeID,DateTime FROM eanswer";
    if($result = mysqli_query($db, $sql)){
        return $result;
    }
}

function AssReportAnalysis(){
$db = mysqli_connect('localhost', 'root', '', 'leadercompetency');
$TestID=$_GET["TestID"];
$EmployeeID=$_GET["EmployeeID"];
$sql = "SELECT aanswer.EmployeeID,aanswer.A_QCode,aanswer.TestID,aanswer.Vote,aanswer.DateTime,aquestion.AQuestion,aquestion.Rating,aquestic
```

Figure 6.12: Backend source code for report module.

III. Manage account module



```php
<?php
session_start();

// initializing variables
$username = "";
$email    = "";
$errors = array();

// connect to the database
$db = mysqli_connect('localhost', 'root', '', 'leadercompetency');

if (isset($_POST['login_user'])) {
  $username = mysqli_real_escape_string($db, $_POST['username']);
  $password = mysqli_real_escape_string($db, $_POST['password']);
  $role = mysqli_real_escape_string($db, $_POST['Role']);

  if (count($errors) == 0 && $role=='Superadmin') {
    $query = "SELECT * FROM login WHERE username='$username' AND Password='$password' AND Status='Activate' AND Roles='Superadmin'" ;
    $results = mysqli_query($db, $query);
    if (mysqli_num_rows($results) == 1) {
      $_SESSION['username'] = $username;
      $_SESSION['success'] = "You are now logged in";
      header('location:../Manage/Superadmin/Welcomesuperadmin.php');
    } else {
        array_push($errors, "Wrong username/password combination");
    }
  }

  else{
    $query = "SELECT * FROM login WHERE username='$username' AND Password='$password' AND Status='Activate' AND Roles='Admin'" ;
    $results = mysqli_query($db, $query);
    if (mysqli_num_rows($results) == 1) {
      $_SESSION['username'] = $username;
      $_SESSION['success'] = "You are now logged in";
      header('location:../Manage/Admin/Welcomeadmin.php');
    }else {
        array_push($errors, "Wrong username/password combination");
    }
```

Figure 6.13: Backend source code for manage account module.

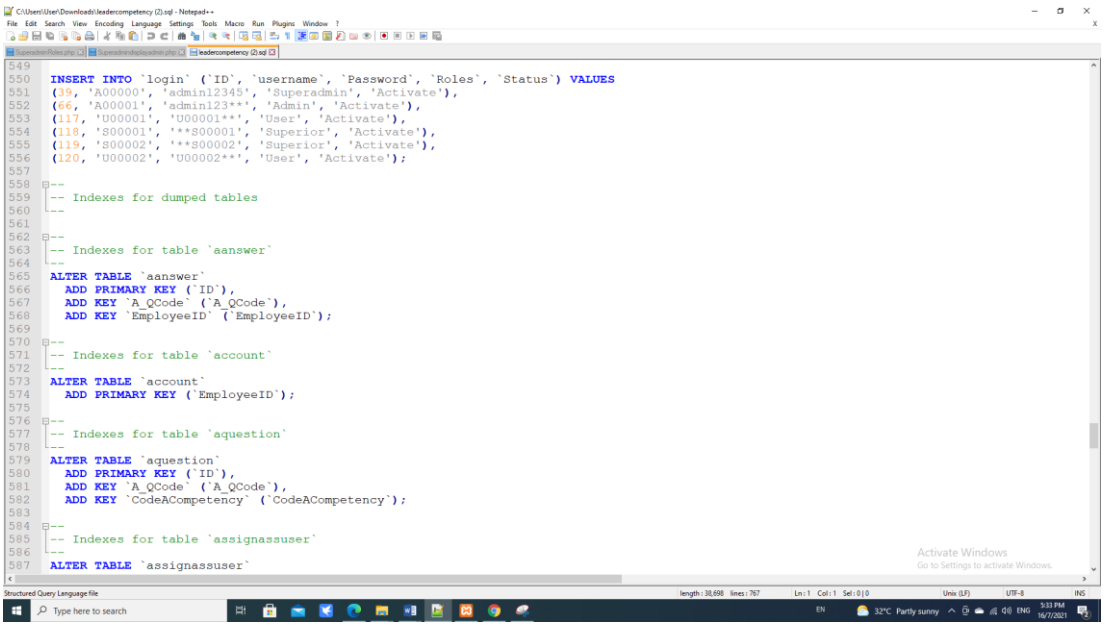
IV. Manage roles module

```php
    <?php
$conn = mysqli_connect("localhost", "root", "", "leadercompetency");
// Check connection
if ($conn->connect_error) {
die("Connection failed: " . $conn->connect_error);
}
$sql = "SELECT account.EmployeeID,account.Name,account.IC,account.Contact_Number,account.Gender,account.Date_of_Birth,account.Address,accour
$result = $conn->query($sql);
if ($result->num_rows > 0) {
// output data of each row
while($row = $result->fetch_assoc()) {
    $imageURL = 'imagesuploadadmin/'.$row["image_url"];
echo "<tr><td>" . $row["EmployeeID"]. "</td><td>" . $row["Name"] . "</td><td>". $row["IC"]. "</td><td>" . $row["Contact_Number"]. "</td><td>

}
echo "</table>";
} else { echo "0 results"; }
$conn->close();
?>
```

Figure 6.14: Backend source code for manage roles module.

6.3.3 Data Tier

Data tier is implemented using phpMyAdmin tool. The data tables are created according to the ERD which has been designed in the earlier phase and the key attributes, primary key and foreign key are defined. The figure below shows code A Web-Based Decision Support System for Leadership Competencies to create database table and define key attributes primary key and foreign key using MySQL.



```
INSERT INTO `login` (`ID`, `username`, `Password`, `Roles`, `Status`) VALUES
(39, 'A00000', 'admin12345', 'Superadmin', 'Activate'),
(66, 'A00001', 'admin123**', 'Admin', 'Activate'),
(117, 'U00001', 'U00001**', 'User', 'Activate'),
(118, 'S00001', '**S00001', 'Superior', 'Activate'),
(119, 'S00002', '**S00002', 'Superior', 'Activate'),
(120, 'U00002', 'U00002**', 'User', 'Activate');

--
-- Indexes for dumped tables
--

--
-- Indexes for table `aanswer`
--
ALTER TABLE `aanswer`
  ADD PRIMARY KEY (`ID`),
  ADD KEY `A_QCode` (`A_QCode`),
  ADD KEY `EmployeeID` (`EmployeeID`);

--
-- Indexes for table `account`
--
ALTER TABLE `account`
  ADD PRIMARY KEY (`EmployeeID`);

--
-- Indexes for table `aquestion`
--
ALTER TABLE `aquestion`
  ADD PRIMARY KEY (`ID`),
  ADD KEY `A_QCode` (`A_QCode`),
  ADD KEY `CodeACompetency` (`CodeACompetency`);

--
-- Indexes for table `assignassuser`
--
ALTER TABLE `assignassuser`
```

Figure 6.15: A Web-Based Decision Support System for Leadership Competencies to create database table and defining primary key and foreign key.

6.6 Discussion

This section discusses the implementation of A Web-Based Decision Support System for Leadership Competencies by presenting a series of walkthroughs to demonstrate system. This section covers system walkthrough for two core modules which are Self-Assessment module and Evaluate module; the rest of the features will be presented in Appendix.

I. Self-Assessment module

When superior assign an assessment to user, it means the user are selected to do a test for leadership competencies to skills gap and self-acknowledge for the user. The figure below shows the self- assessment process.

Self-Assessment start page user read the instruction and click start button go to the question page.

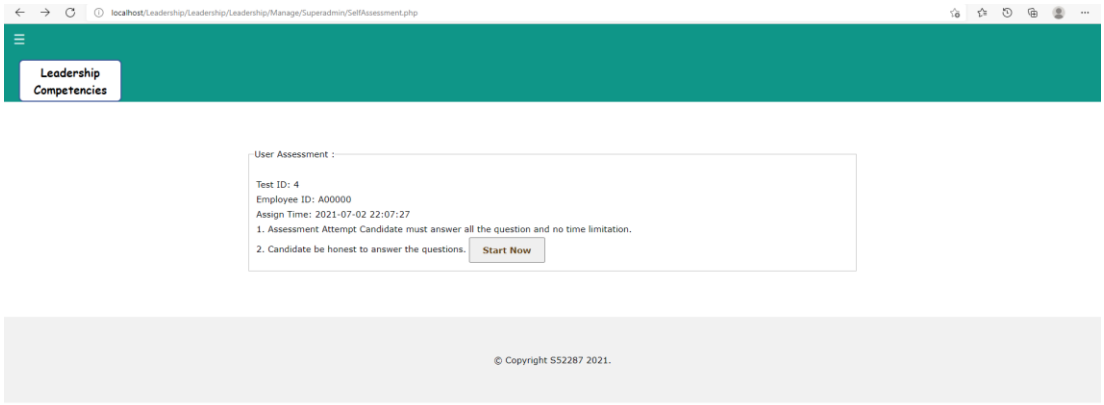


Figure 6.16: Self-Assessment start page.

The question page, user read the question and select the answer. Complete the self-assessment, user click submit and go to report module to check the result and view the analysis.

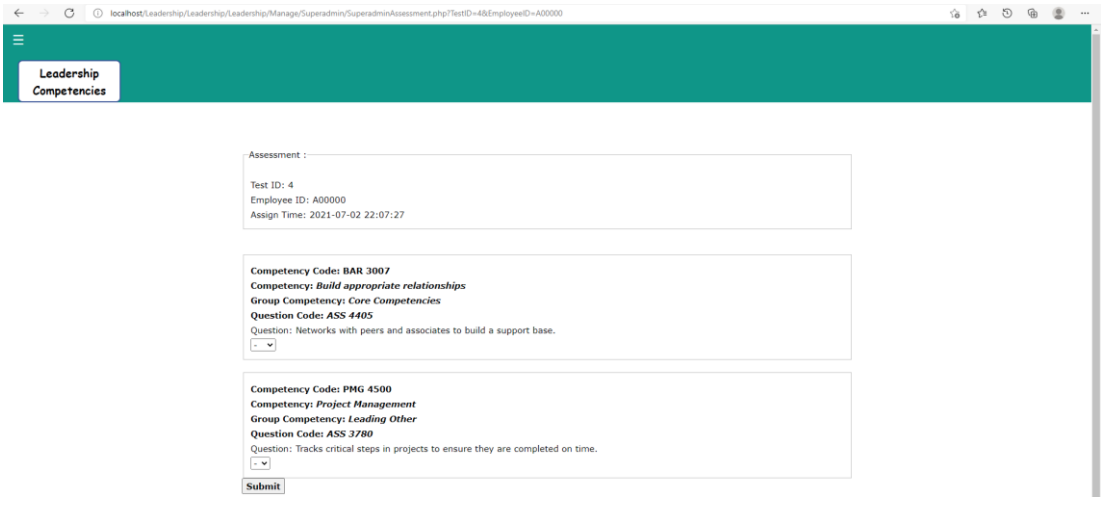


Figure 6.17: Question page.

II. Evaluate module

When superior assign an assessment to user at the same process the evaluate will pass to the superior assign, it means the superior do a test for leadership competencies to evaluate skills gap and acknowledge for the user. The figure below shows the evaluate process.

Evaluate start page superior read the instruction and click start button go to the question page.

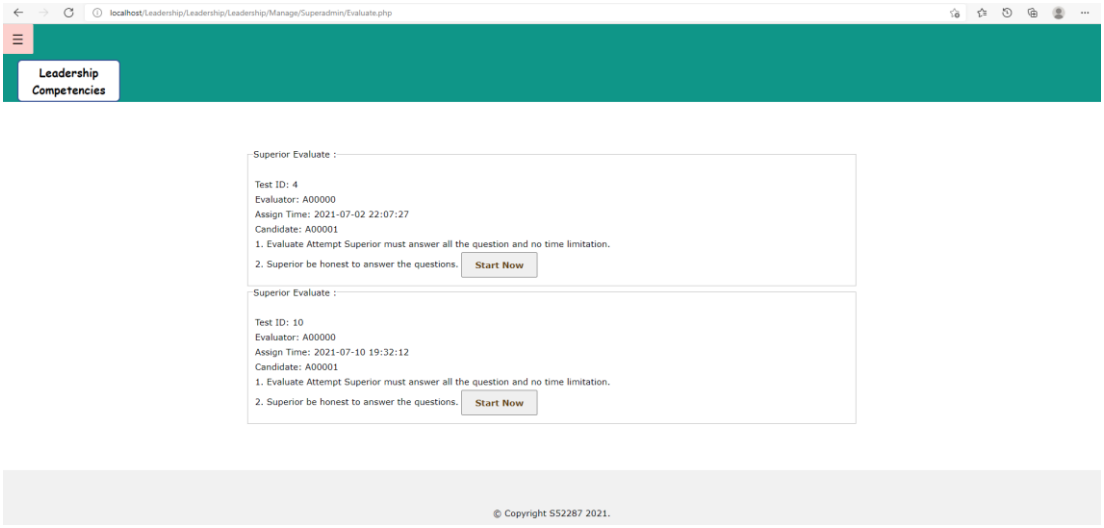


Figure 6.18: Evaluate start page.

The question page, superior read the question and select the answer. Complete the evaluate, superior click submits and go to report module to check the result and view the analysis and the report average will auto generate after assessment and evaluate complete.

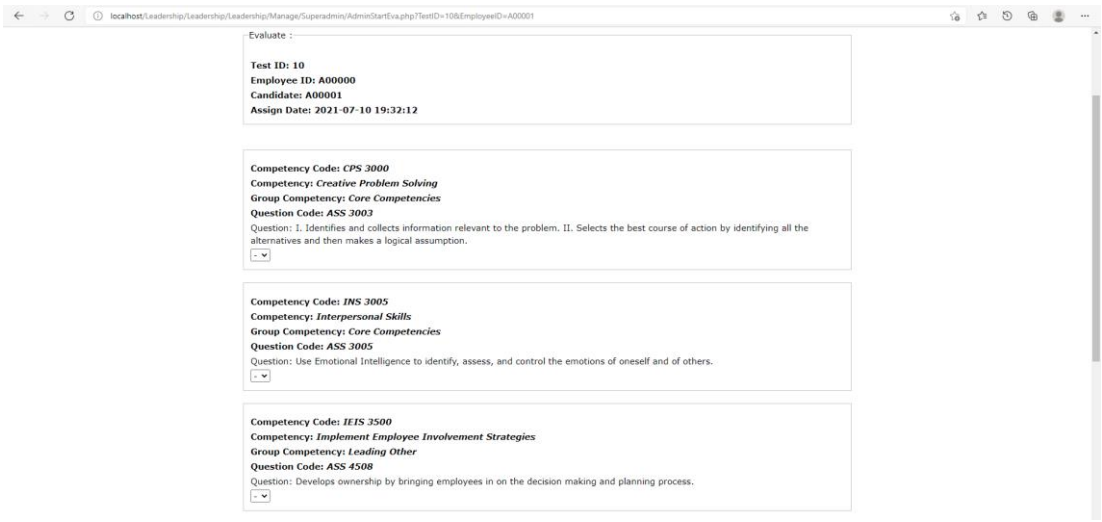


Figure 6.19: Question page.

6.7 Summary

This chapter has provided a summary on the system hierarchical menu for each user and covered the core concepts and technologies to develop and implement A Web-Based Decision Support System for Leadership Competencies. Segregating the implementation into different software architecture layers has reduces the complexity of the development process significantly. For instance, the business logic can be amended without affecting the presentation layer. Overall, the implementation phase is completed.

CHAPTER 7

CONCLUSION

7.3 Introduction

In this chapter, I will conclude all what I have done in this project. The prototype of system has been done and tested. The system works and function as I thought before.

7.4 System Contribution

The contribution of my system to the workplace is to reduce the skill gap problem and quality leadership. Superior can assign the assessment to users gather the data and system analysis. The organization will take the result as a reference material to plan the next action for leader. The evaluate from superior also is part of the reference material for the promotion career. The system flexibility of create competency and competency question, superior also can delete the assessment, this system is convenient upper management to monitor and use it.

7.5 System Constraint

The constraints of A Web-Based Decision Support System for Leadership Competencies are the system have to log in every time for mange profile and change password process after execute users must relog in to the system using the new password. Next constraint is that the self-assessment and evaluate must complete to answer question before submit whereas users will submit fail. The third constraint is that the personal date of birth date users not allow to selected the future date. After that, the competency ID and test ID is system generate user not allow to change the ID. The last constraint is the competency code, users cannot duplicate the same code with each other, the system detected competency code duplicated in database will fail users execute.

7.6 Future Suggestion

The main suggestion for this system is add 9 box matrix analytics. Besides that, the system can add Artificial Intelligence (AI) Machine Learning for Machine learning strategy and leadership Predictive Analytics and Potential leader skill Analytics. Next suggestion is adding a notification function for superior when assign assessment to users' alert users to do assessment. Last the system can add a search function, it convenient another department to search another department user.

7.7 Summary

In conclusion, the features and constraints of the system can be seen in the system development. There are some improvements suggested the system for further upgrade or maintenance. A Web-Based Decision Support System for Leadership Competencies is expected to provide a platform to gather the manager and leader for leadership evaluate data form, make the average analysis to going efficiency, and better quality of leadership competencies and increase the worth.

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APPENDIX A: Manage account module

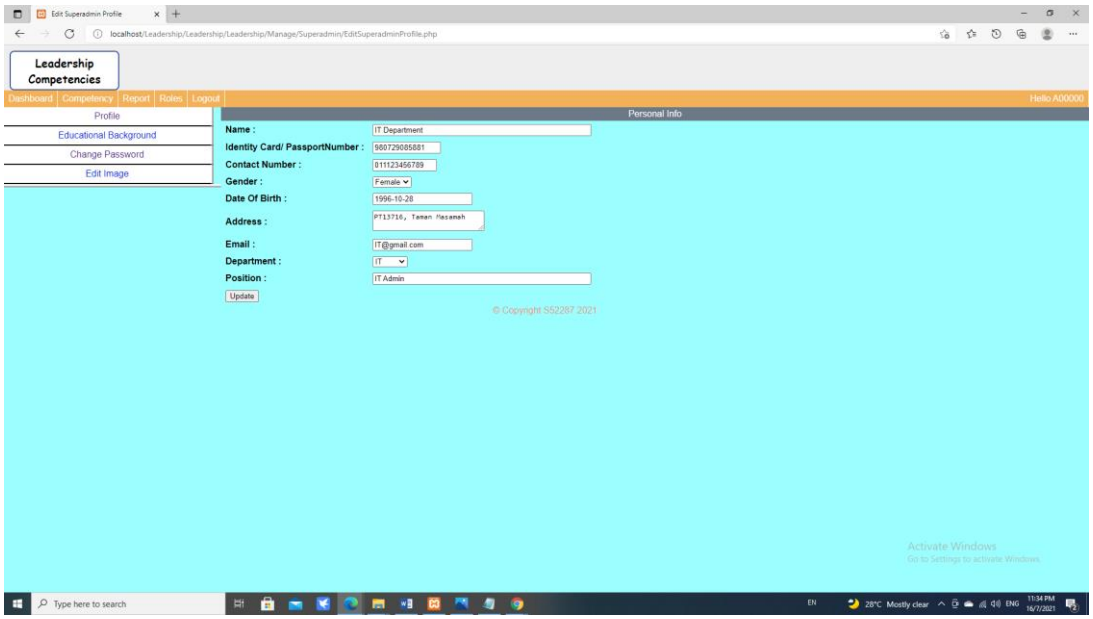


Figure A-1: Update profile page

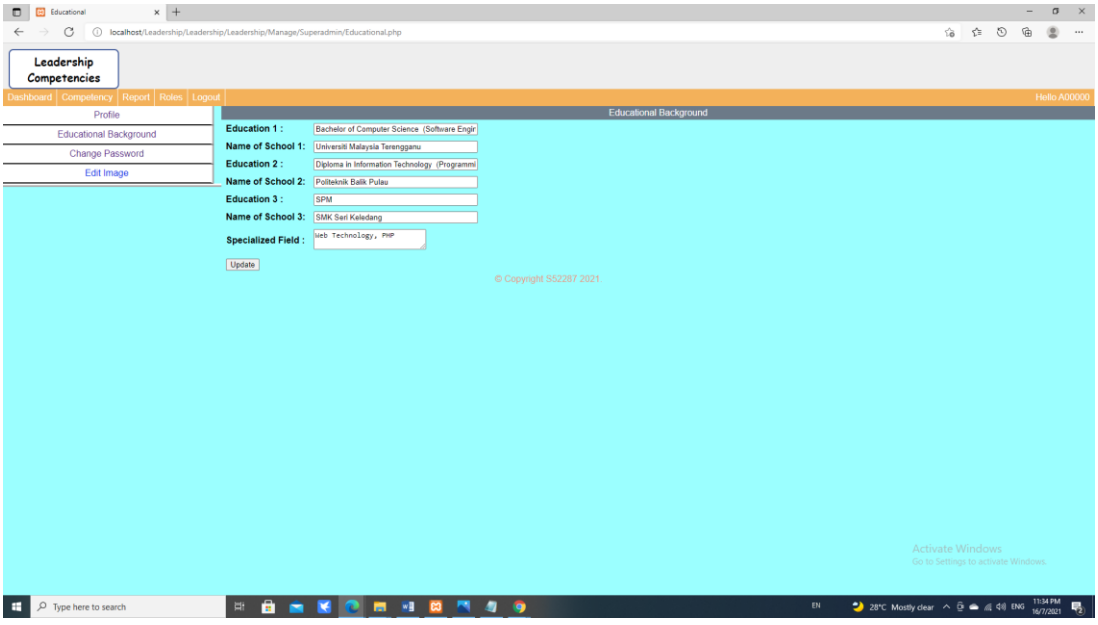


Figure A-2: Update educational background page

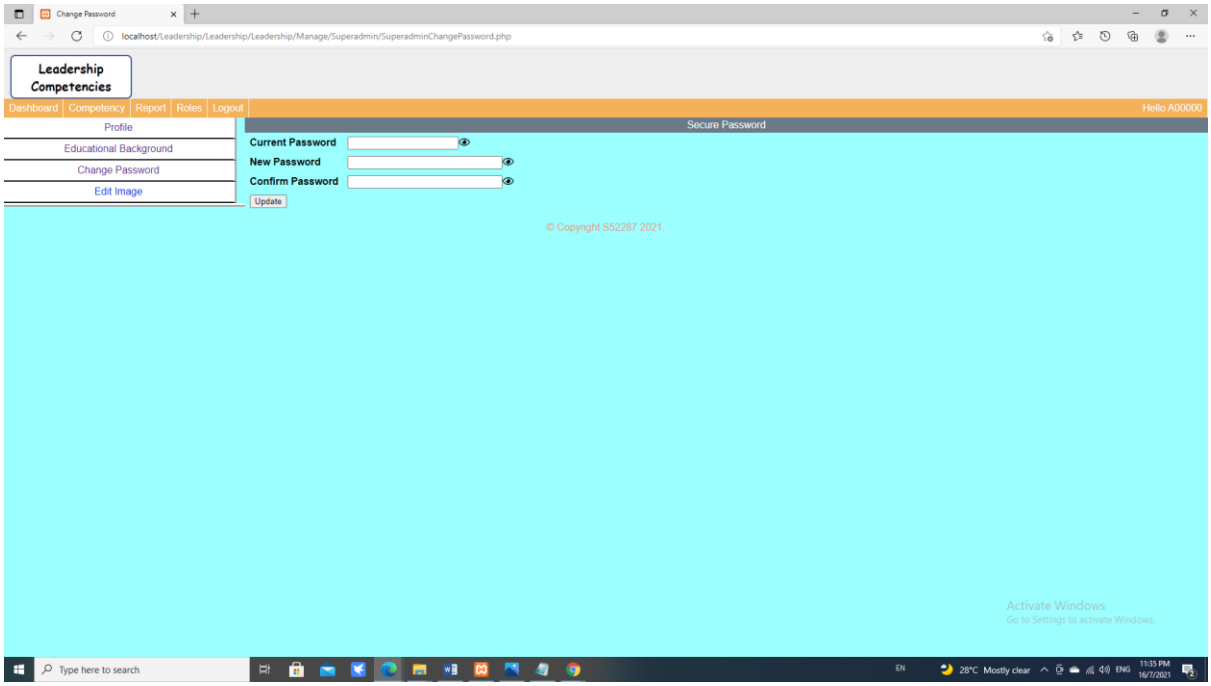


Figure A-3: Change password page

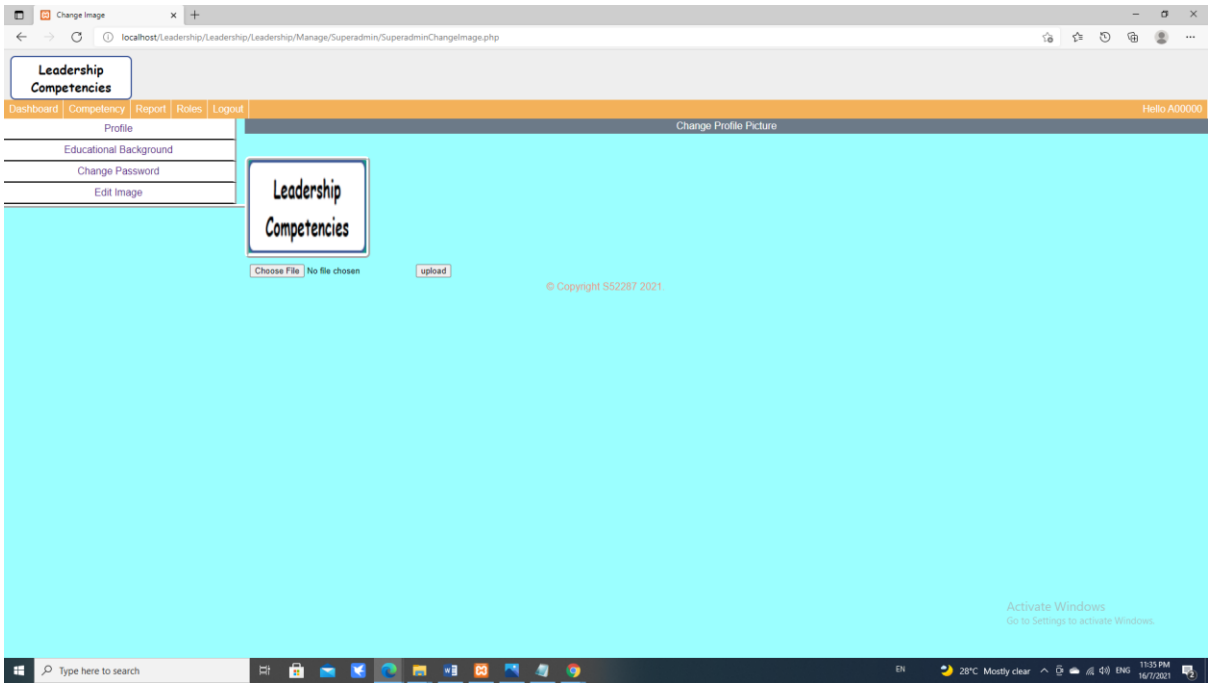


Figure A-4: Update image page

APPENDIX B: Manage roles module

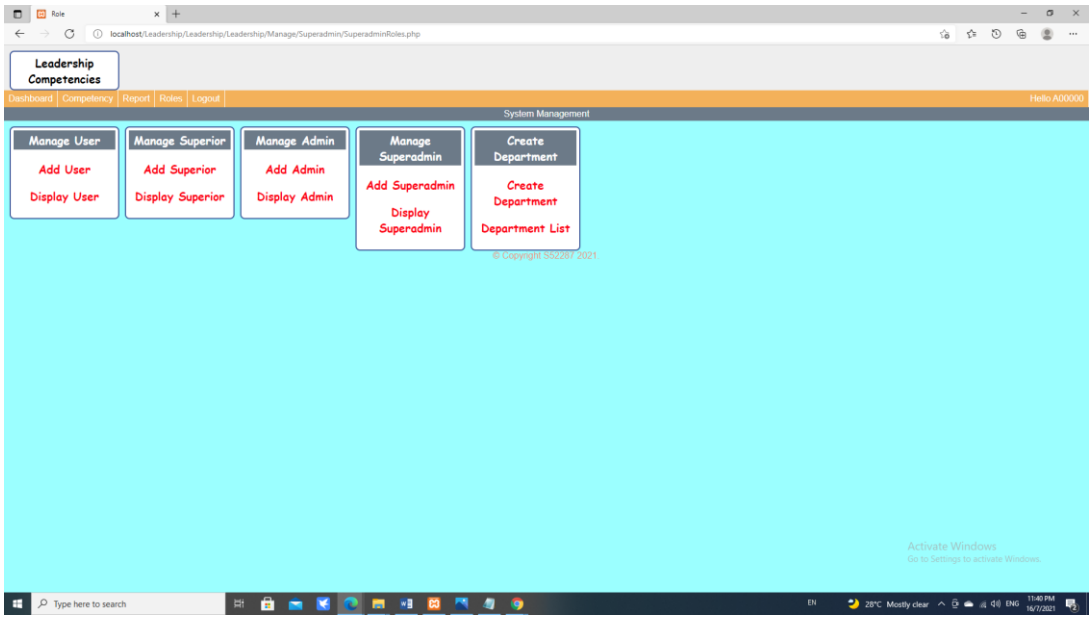


Figure B-1: Manage Role main page

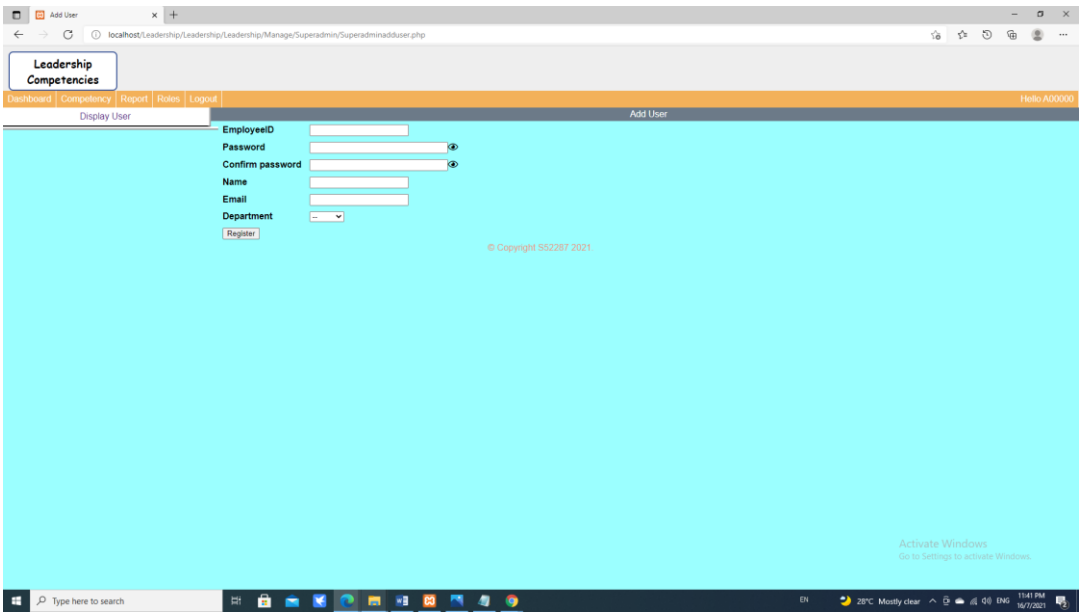


Figure B-2: Add new user page

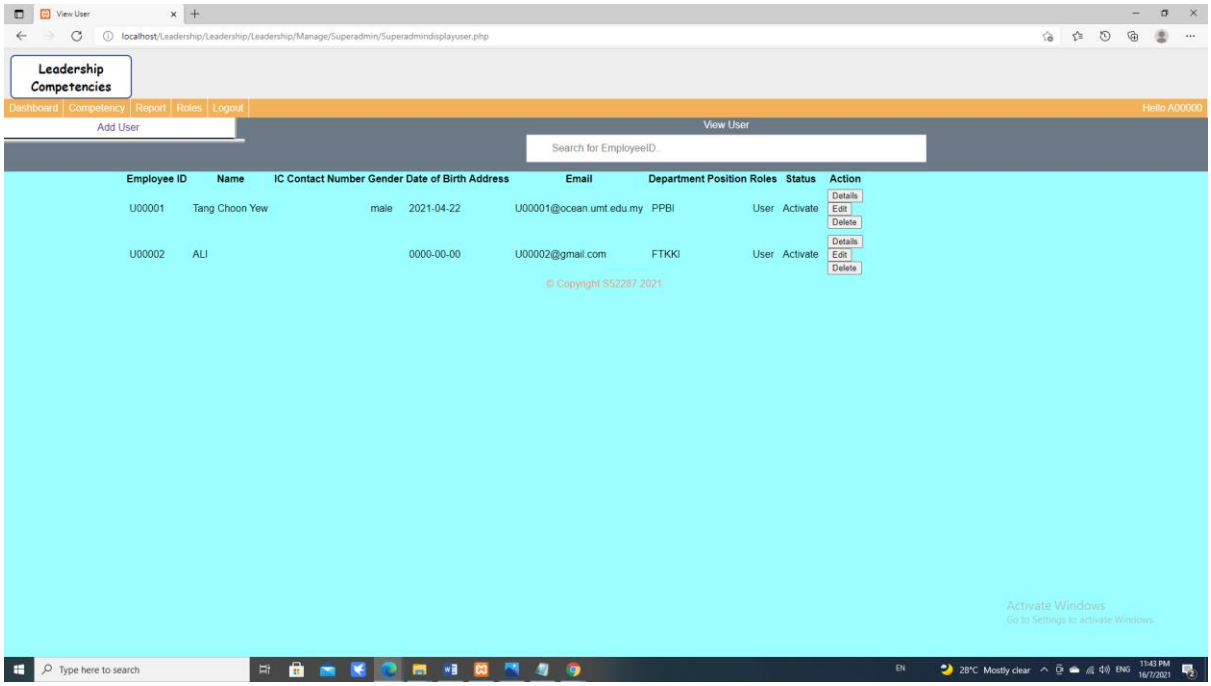


Figure B-3: View users list page

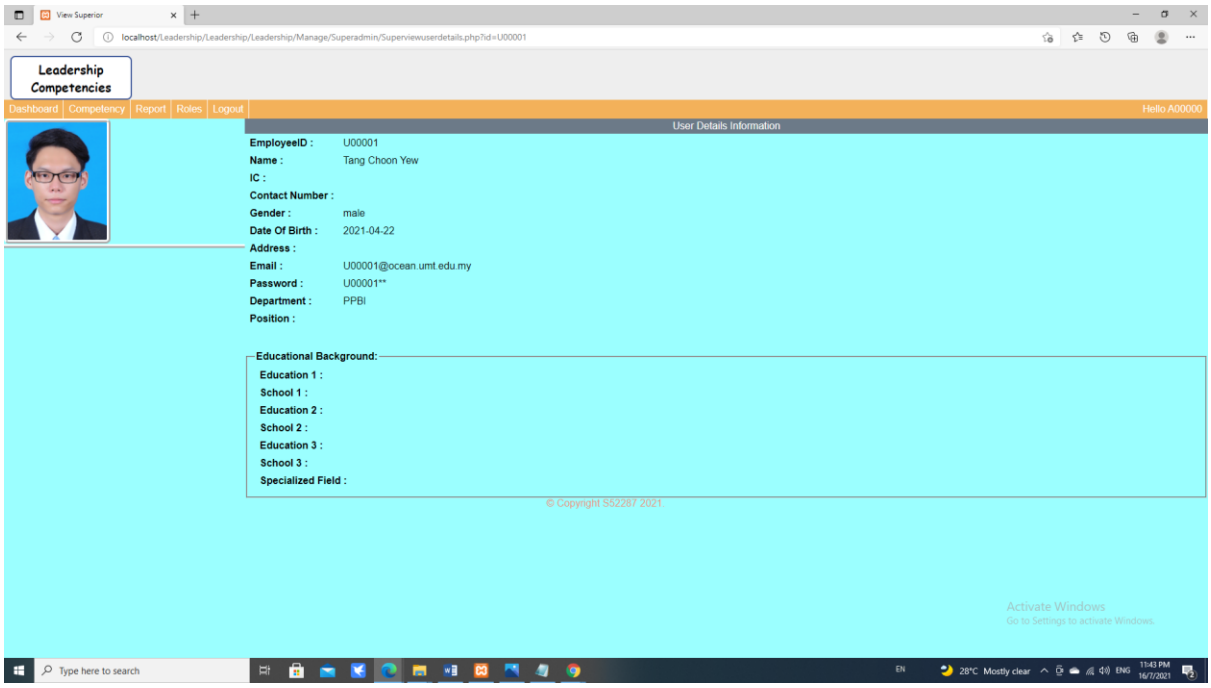


Figure B-4: View users details page

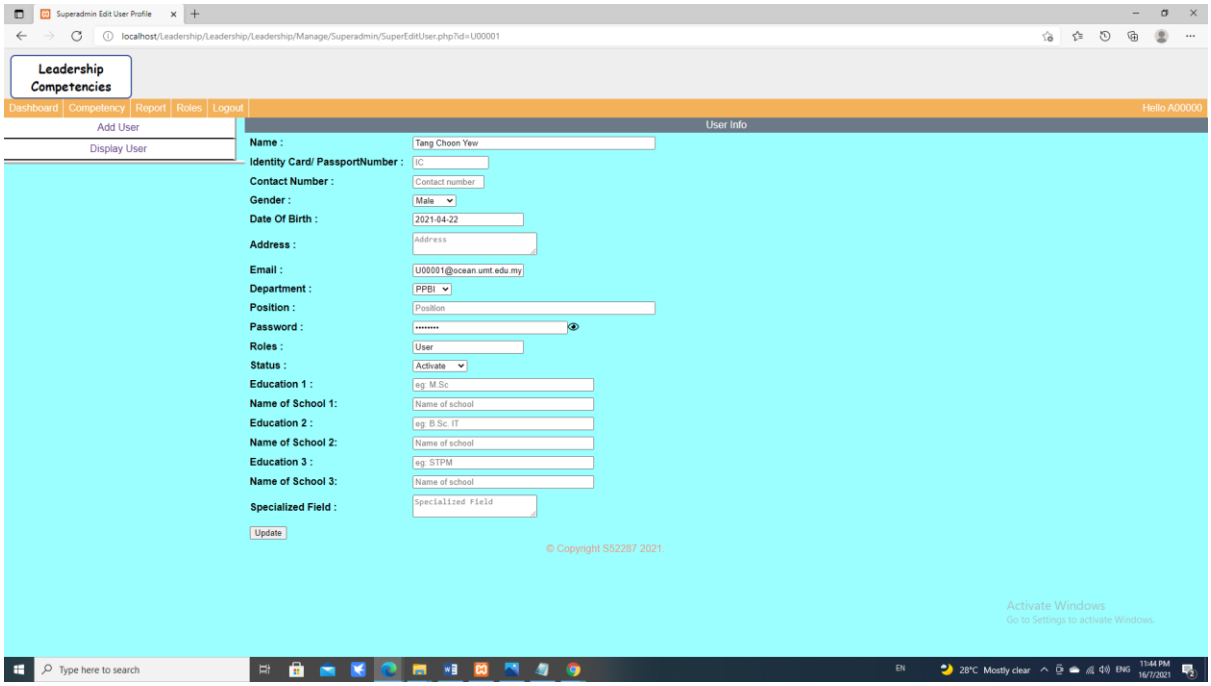


Figure B-5: Edit users information page

APPENDIX C: Manage report module

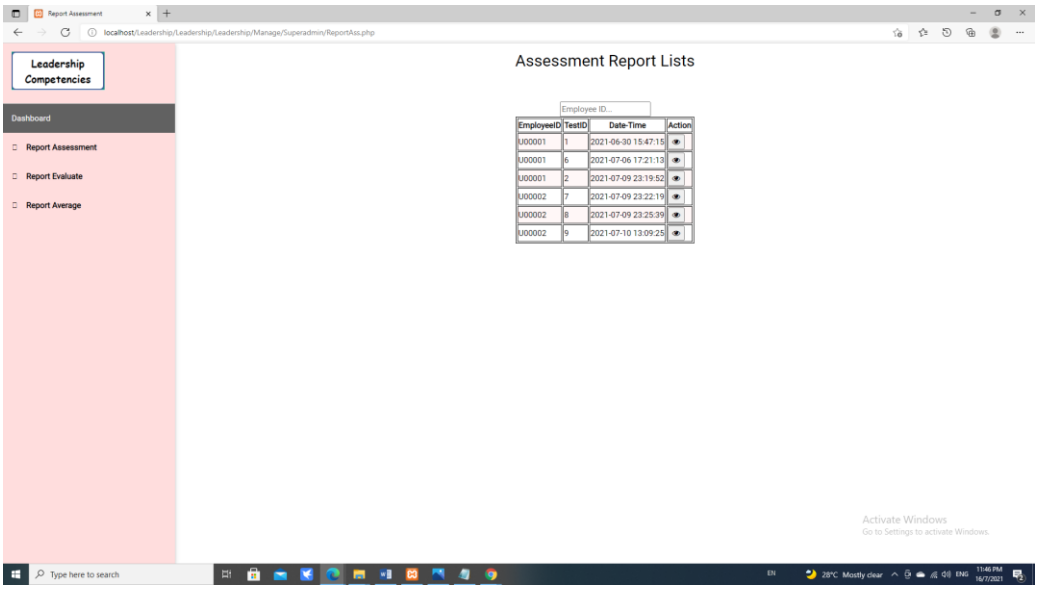


Figure C-1: Assessment report list page

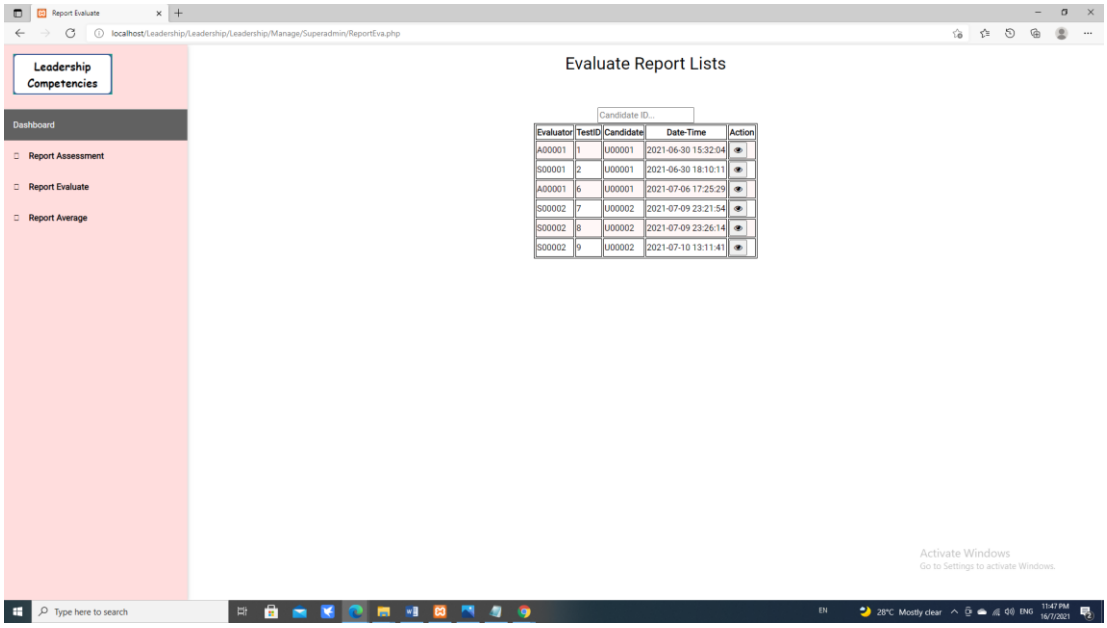


Figure C-2: Evaluate report list page

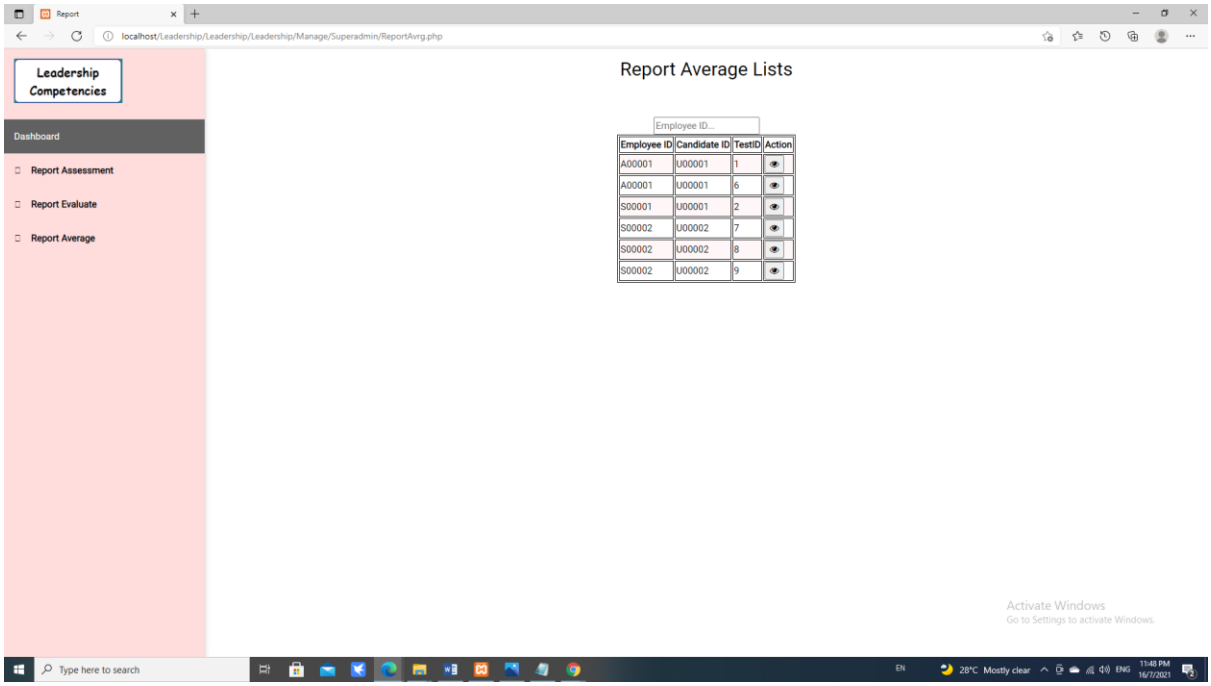


Figure C-3: Average report list page

APPENDIX D: Manage leadership competencies module

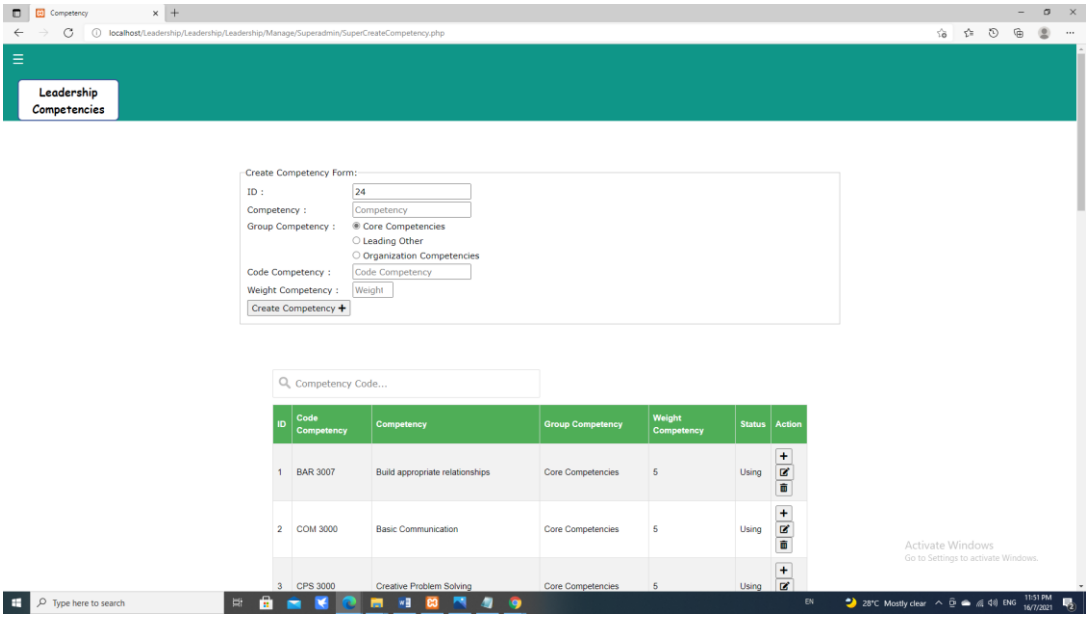


Figure D-1: Create Competency and competency list page

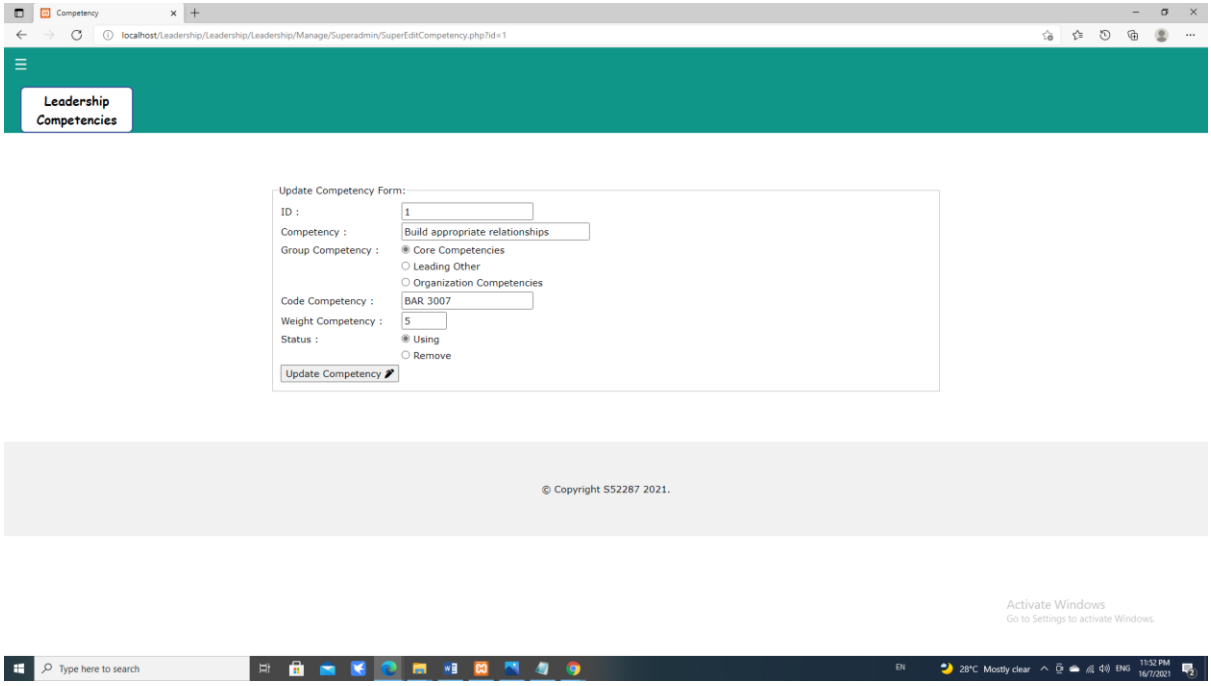


Figure D-2: Edit Competency page

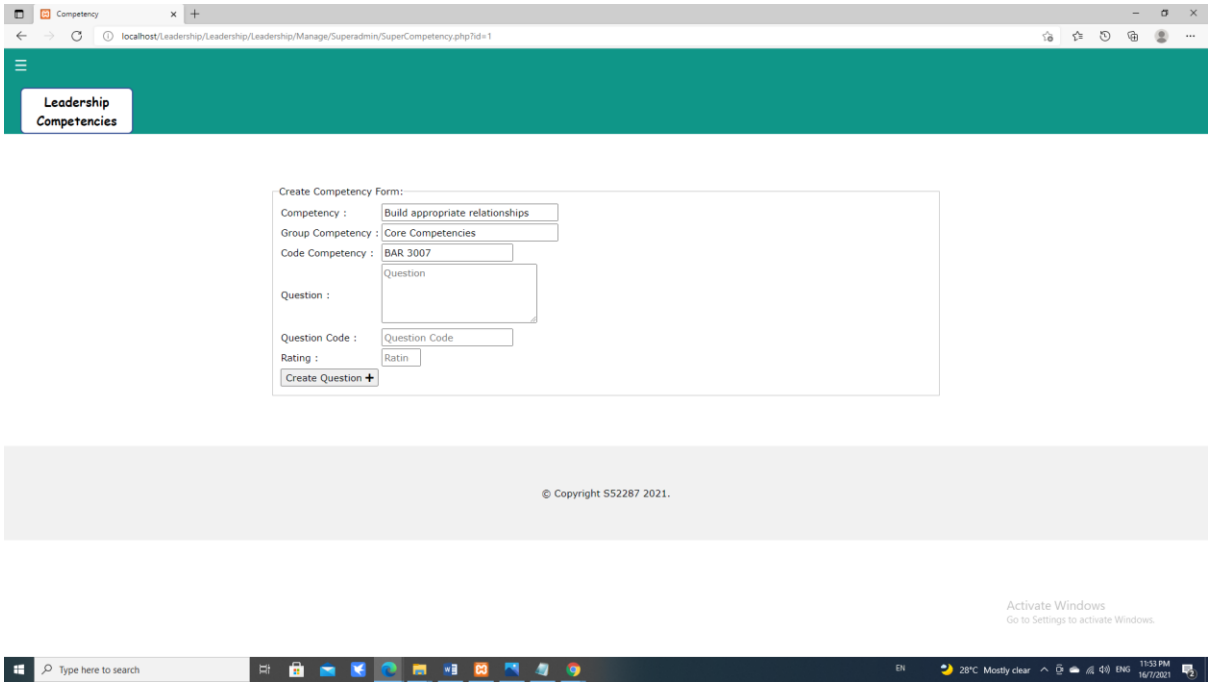


Figure D-3: Create Competency question page

APPENDIX E: Manage leadership competencies question module

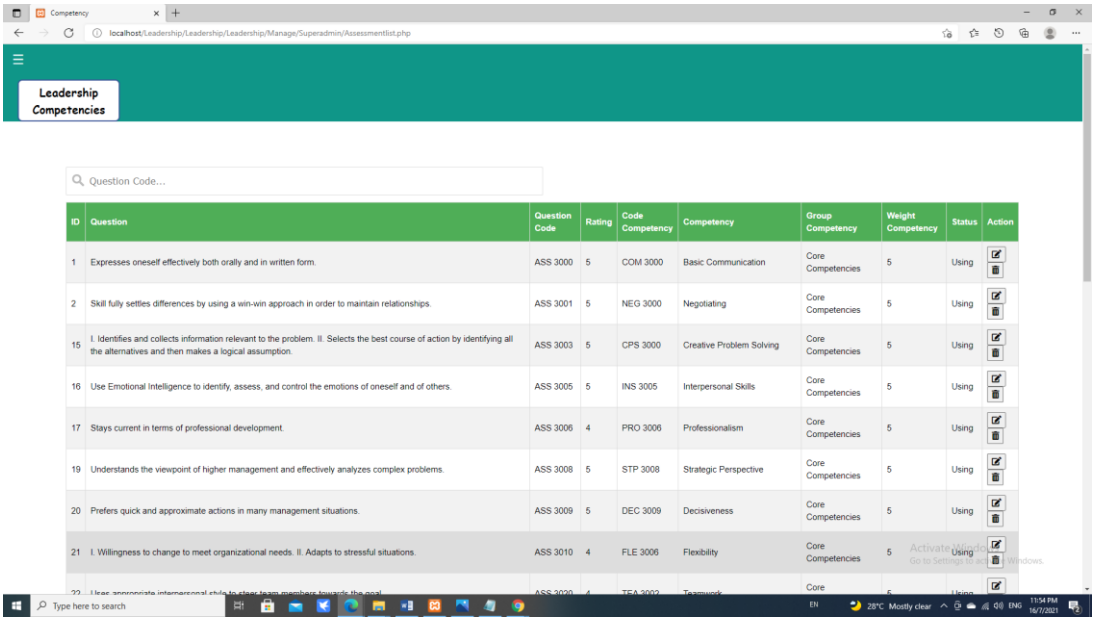


Figure E-1: Competency question list page

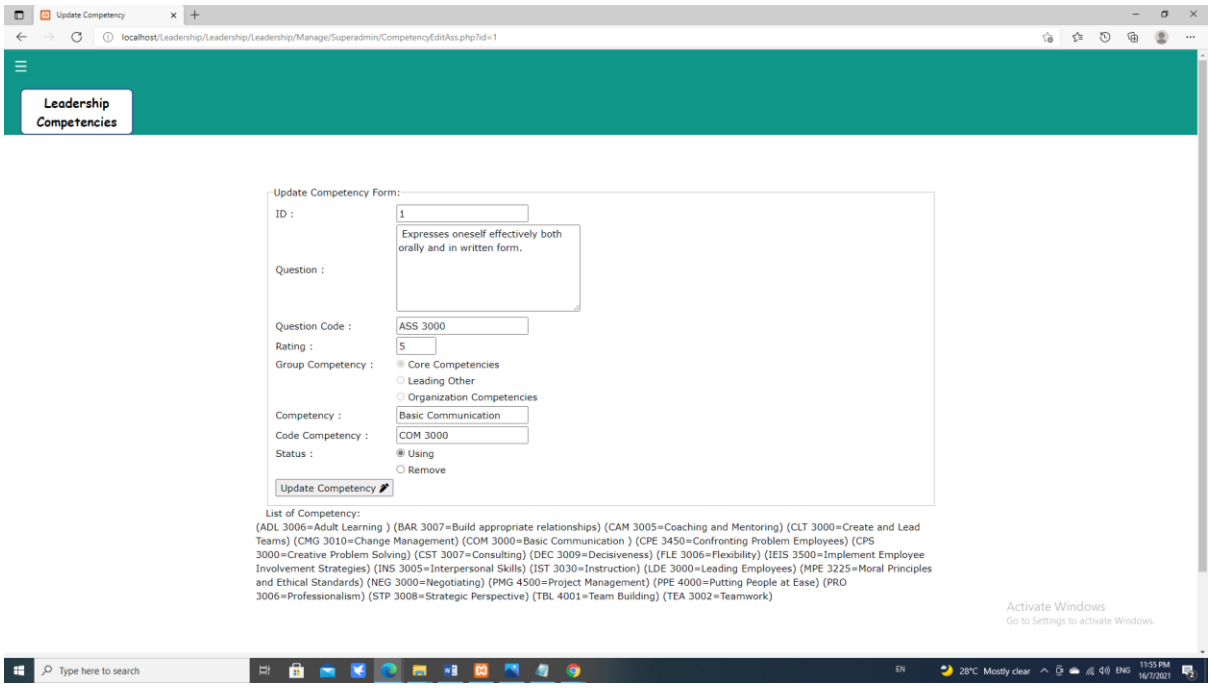


Figure E-2: Competency question edit page

APPENDIX F: Manage assign assessment/ evaluate module

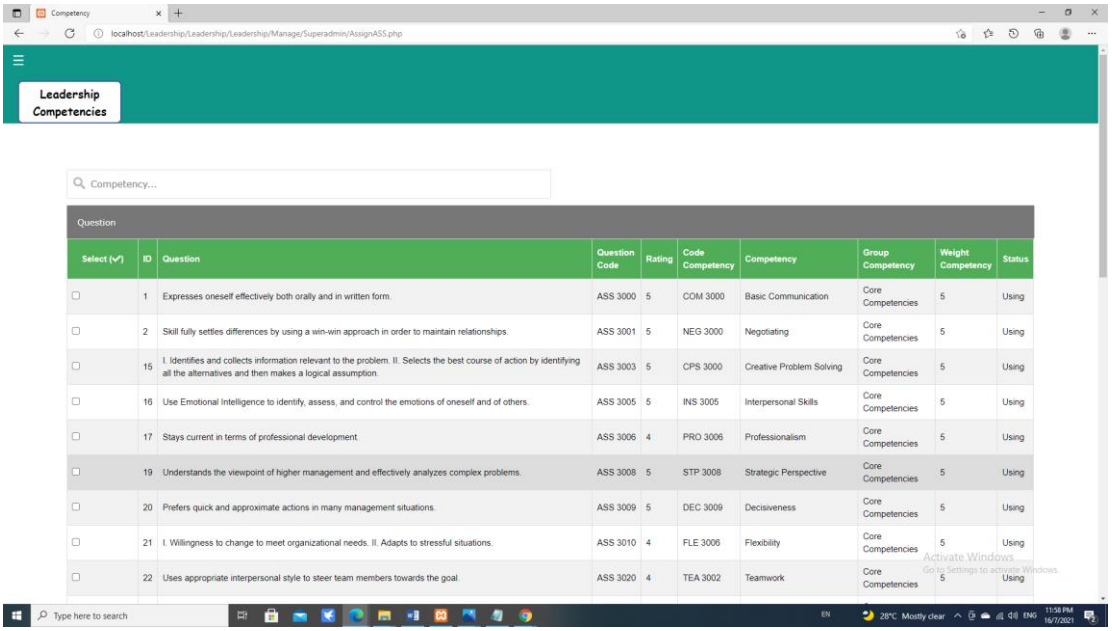


Figure F-1: Select question to assign

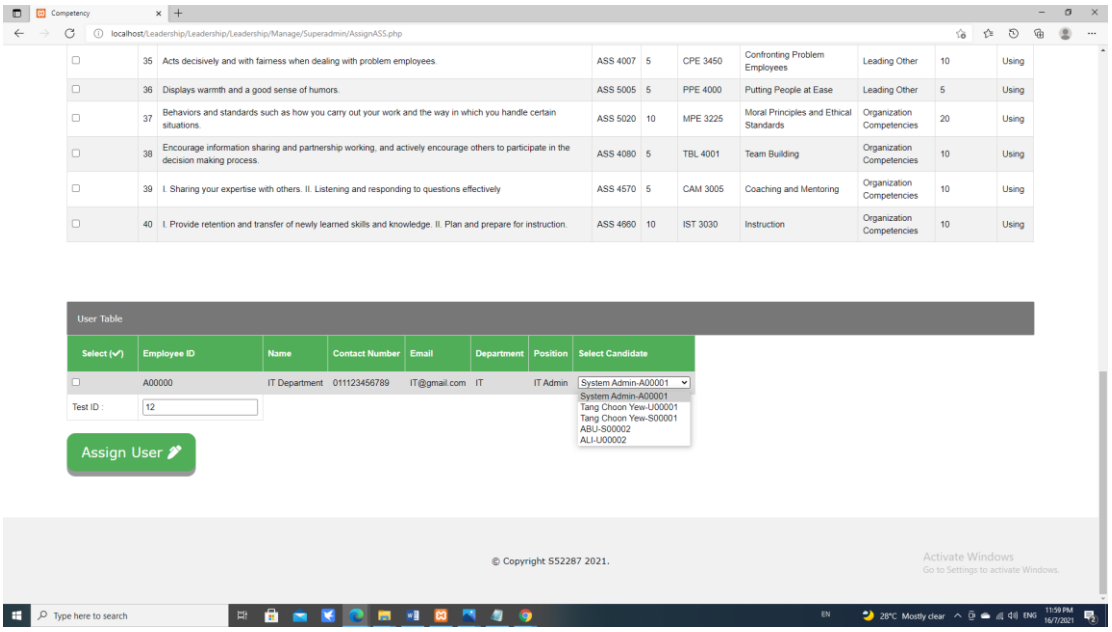
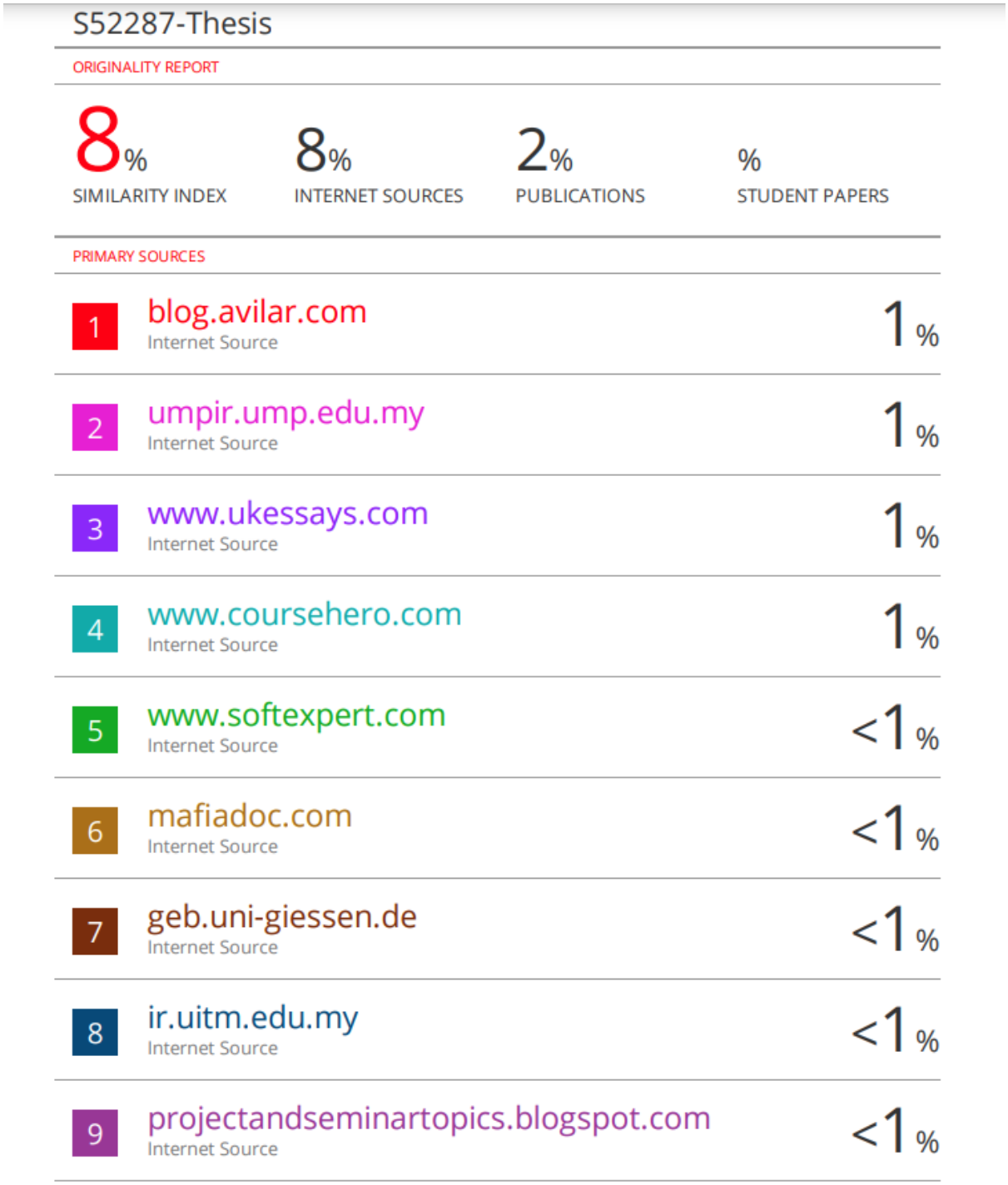


Figure F-2: Select candidate

APPENDIX G: Plagiarism report



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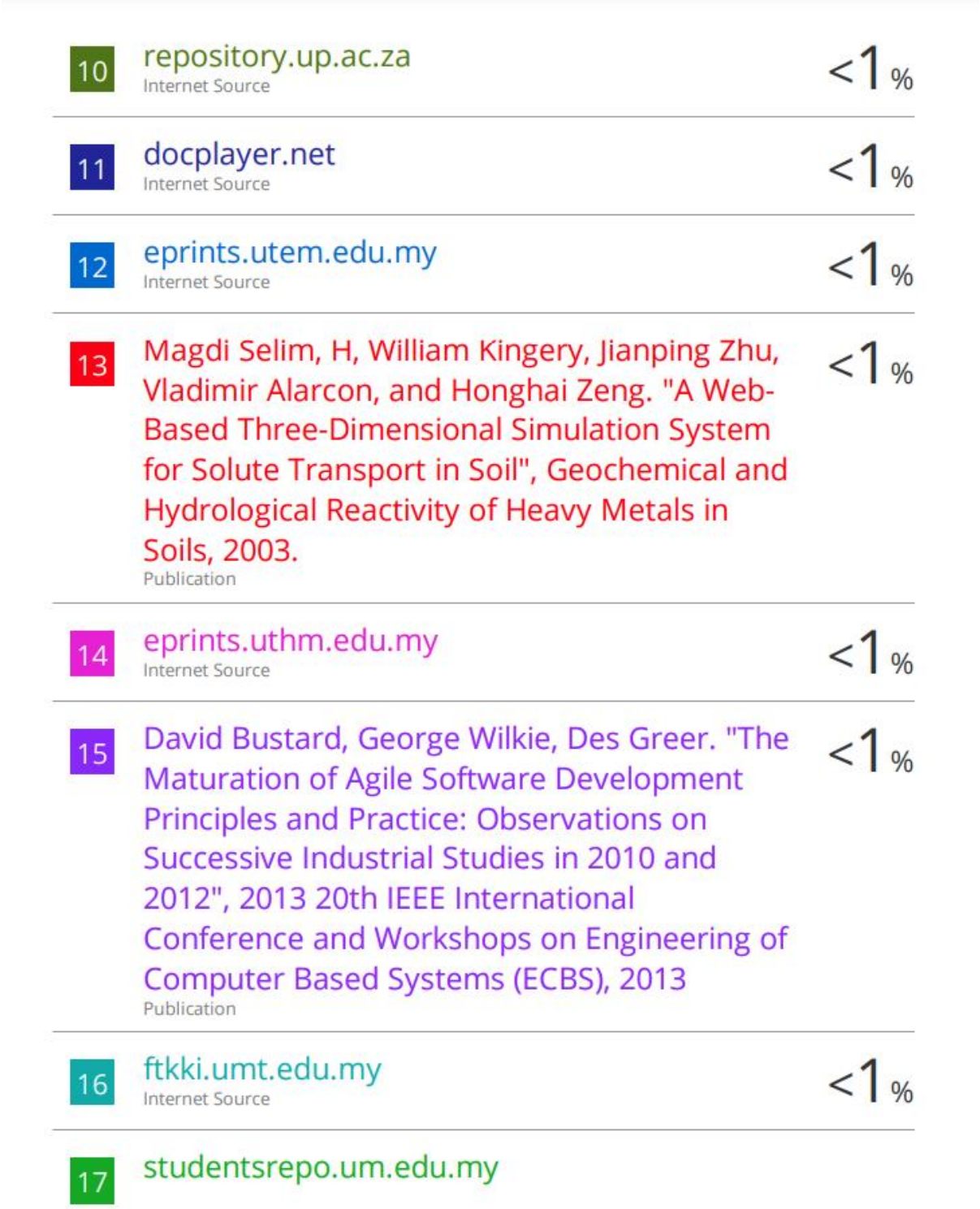

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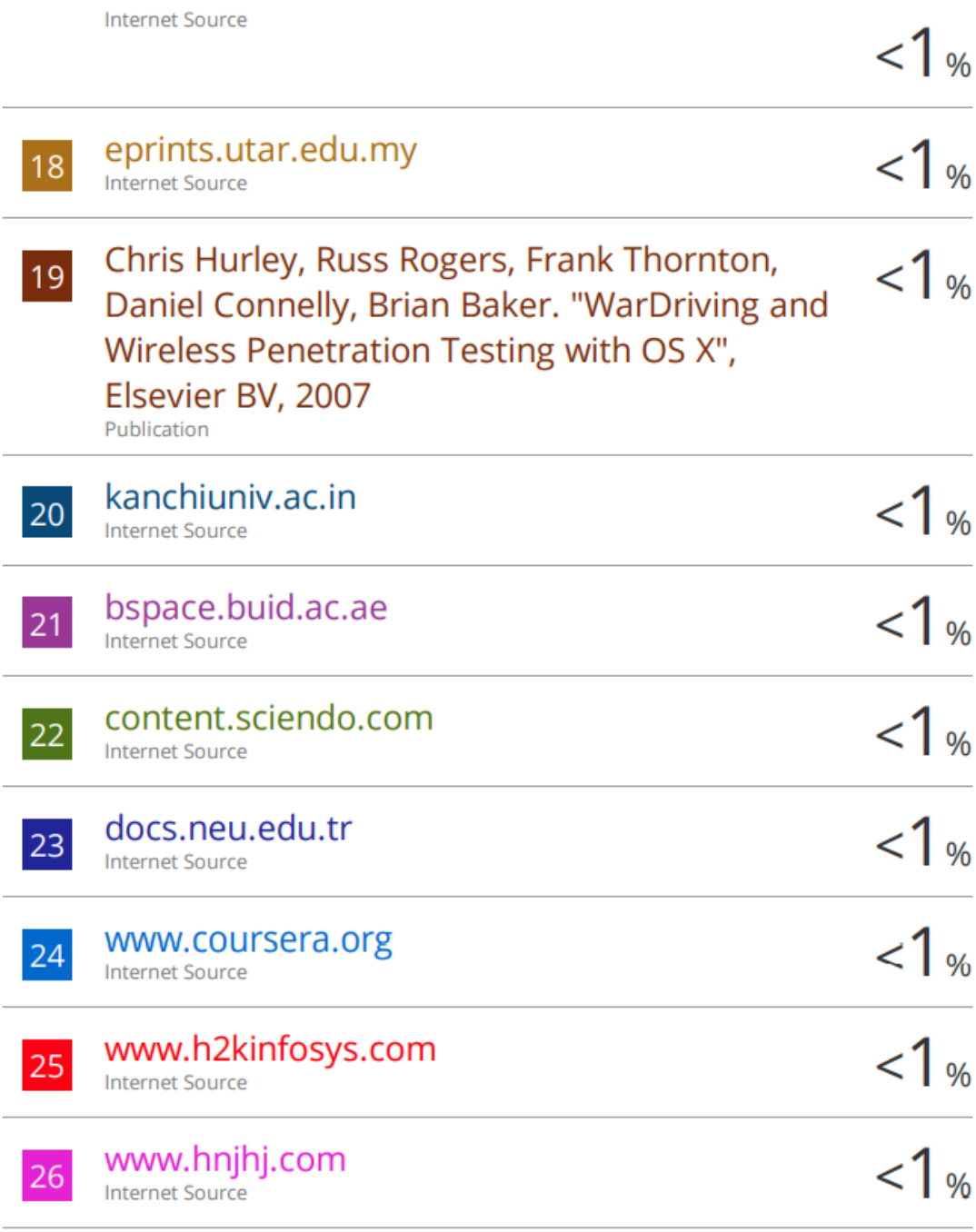

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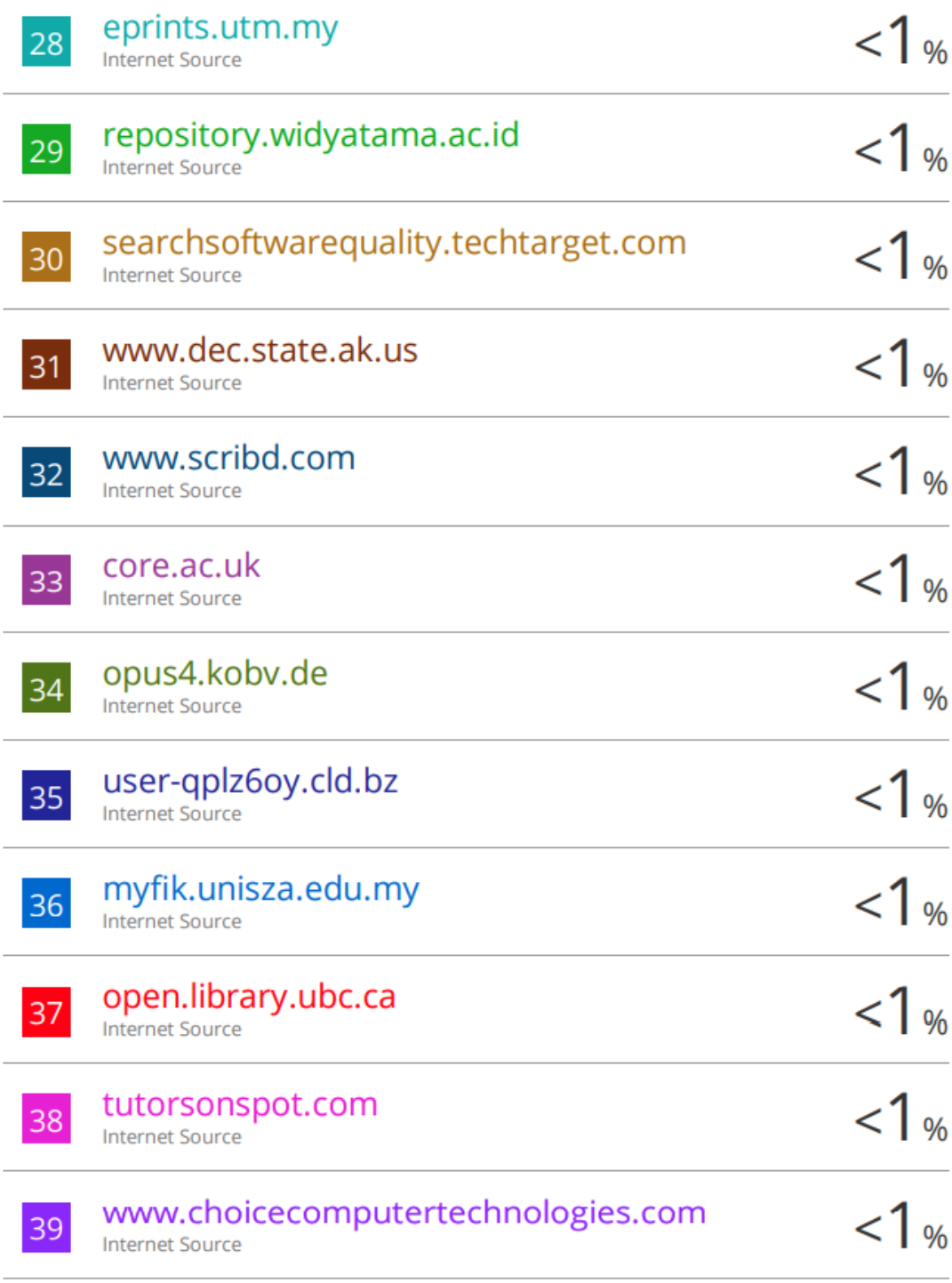

Figure G-4: Dissertation plagiarism report

Figure G-5: Dissertation plagiarism report