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DEVELOPMENT OF FINAL YEAR RESEARCH PROJECT (FYRP) ARCHIVE SYSTEM USING AGILE PROTOYPING METHODOLOGY

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Thesis submitted in fulfilment of requirements for Bachelor of Information Systems (Hons.) Information Systems Engineering College of Computing, Informatics and Media

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FINAL YEAR RESEARCH ARCHIVE SYSTEM

(FYRAS)

By

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2021126013

This thesis was prepared under the supervision of the project supervisor, Dr. Yuzi binti Mahmud. It was submitted to the Faculty of Computer and Mathematical Sciences and was accepted in partial fulfilment of the requirement for the degree of Bachelor of Information Technology (Hons.) Information System Engineering.

Approved by

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February 08, 2023

STUDENT DECLARATION

I certify that any ideas or quotations from the work of others, whether they are found in this thesis or the project to which it refers, are adequately acknowledged in compliance with the discipline's standard referencing norms.

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ABSTRACT

In recent years, the administration of research project documents has developed into a significant concern for the Faculty of Sport Science and Recreation (FSR). Therefore, resulted in the development of this thesis. This thesis addressed the problem of using the traditional methods that are now in place for storing and managing research projects. In order to achieve the objective that has been set for this project, requirements have been gathered, analysed, and a prototype has been developed. Final Year Research Archive System (FYRAS) was chosen to be the name of the prototype. These actions were carried out by according to the instructions provided by the agile prototyping methodology. During the process of developing this project, stakeholders have been providing a significant amount of contribution. The technique, the experiences of the students, the evaluation of the systems, as well as their limitations and the possibility for future enhancements, are all investigated throughout the thesis.

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LIST OF ABBREVIATIONS

FYP	FINAL YEAR PROJECT
FYRP	FINAL YEAR RESEARCH PROJECT
FSR	FACULTY OF SPORT SCIENCE AND RECREATION
FYAS	FINAL YEAR ARCHIVE SYSTEM
SRS	SYSTEM REQUIREMENT SPECIFICATION
SDD	SOFTWARE DESIGN DOCUMENT
ERD	ENTITY RELATIONSHIP DIAGRAM
SSD	SYSTEM SEQUENCE DIAGRAM
UC	USE CASE
UI	USER INTERFACE
RP	Research Project

CHAPTER 1

INTRODUCTION

This chapter provides a fundamental knowledge for this project. This chapter discusses project information, such as a problem statements, the project's aim, and its objective. The project's scope, participants, and significance are all explained in this section.

1.1 PROJECT BACKGROUND

In University Technology Mara (UiTM) student that enrolled in Bachelor's, Master's, and Philosophy studies are obliged to write a thesis. Note that these requirements are based on the course that they are currently majoring. Based on the Interview that has been done on the 1st of November 2022 with one of the Head of Study from Faculty of Sports Science and Recreation (FSR) informs that students currently enrolled in the bachelor's programme under FSR are obligated to write a thesis for their research study. For students, a thesis serves as a primary source of evidence to support their claims of expertise in their chosen subject of study (Mohamed, 2012).

Final Year Project (FYP) is a project that all bachelor students in a specific course must complete to finish their studies. In most cases, there will be a large amount of research done by past students, making it difficult for upcoming students to identify a current thesis research that they may use as a reference for their ongoing thesis research. New methods of communication between students, and supervisors have long been needed to prevent misunderstandings and mishaps that could otherwise slow down research projects.

The necessity for information systems within educational institutions to store student thesis has increased. Therefore, with the current method of storing thesis

requires a lot of physical size and locations. Especially if the quantity of thesis that have been submitted by past students are massive. To solve this issue, the best way is to store the thesis by using information system technology. By implementing Information system technology, for example a web-based information system we can store softcopy version of the thesis without worrying about the physical storage size and locations.

1.2 PROBLEM STATEMENT

FSR has utilised the conventional method of keeping Final Year Research Project (FYRP) for a considerable amount of time. According to stakeholder, a physical location to store research project report for FYRP are required. The quantity of research project is increasing every year because of the new submission from students. As a result, the conventional method of managing FYRP report is becoming less practical. According to stakeholder the current conventional approach of storing research project has a few significant flaws such as the following:

- The existing approach of archiving research project needs a huge physical space to accommodate hardcopy version.
- The process of searching for and organising research project takes a lot of time under the current system, some might take hours, days, or even weeks.
- Because there is only one copy of the past research project, students are required to queue in order to get access to the same research project.

1.3 PROJECT AIM

The aim of this project is to develop a web-based archive system for Final Year Research Archive System (FYRAS) for FSR. The goal of this system is to enable supervisors to manage past research project with less hassle, by allowing supervisor to store, find, and manage research project that have been submitted into the system. Students can also use this system to search, view and download past research project from the system archives.

1.4 OBJECTIVES

The following are the goals of this project:

- To identify and analyse the requirements from FSR for FYRAS.
- To design FYRAS based on the analysed requirements.
- To develop a web based FYRP system for FSR.

1.5 PROJECT SCOPE / LIMITATIONS

This system is designed for supervisors (lecturers of FSR) and students from FSR. The system will allow supervisors to store and manage research project that have been graded so it can be search and viewed by students through the system. Students may also download the document attached to the research project.

The limitation of this system is both the server-side and client-side requires an internet connection to allow user to access into the system. This system also might not be able to handle the stress load if there are more than 100 users connected into the system at the same time.

1.6 PROJECT SIGNIFICANCE

Significance of this project will be useful to this kind of group such as: -

- **Student**

  Students can search for past research project without wasting much time. Students also can sort and access each research project, and the attached document within the research project can be downloaded by students.

- **Lecturer and supervisor**

  The previous research project can be stored, managed, and located by the supervisor. This will shorten the time needed for the supervisors to access the research project that are kept within the system. The system will maintain track of the most popular thesis paper, so it can be used as example in each field of expertise.

1.7 Summary

In conclusion, this chapter has explained in detail about the development of FYRAS project background, problem statement, project aim, objectives, project scope, and project significance. In addition, this chapter also justifies the needs to conduct the projects.

CHAPTER 2

LITERATURE REVIEW

In today's world, many types of information must be managed. It's hard to envision society progressing without a mechanism to manage data swiftly and easily (Dedk. V., 2013). Because of so-called information systems, computer technology advances every day. The goal of this literature review is to implement data management technologies. This thesis will focus on Document Management Systems (DMS). Digital documents uploaded are stored, tracked, and managed by a DMS. The majority of DMS can monitor different user versions of digitalized documents. Digital documents are managed by these computer-based systems.

2.1 Software Development Methodology

A software development process is a method of splitting software development process into smaller, parallel, or sequential steps to improve design and product management. A software development life cycle is another name for it.

2.1.1 Definition of SDLC

The Software Development Life Cycle (SDLC) is a well-defined procedure for producing high-quality, low-cost software in the shortest amount of time possible. The SDLC's purpose is to create excellent software that satisfies all customer expectations and demands. According to Gillian Lemke (2018), The Software Development Life Cycle (SDLC) is a concept that is incredibly important to have a deep understanding of as a software engineer. The SDLC is divided into phases to provide software engineers with a clear goal for how to work.

2.1.2 SDLC Approach

2.1.2.1 Waterfall model

Waterfall model is considered the traditional model within the SDLC approach, it is the most well-known SDLC model because it is the first model process to be introduced. Alshamrani & Bahattab (2015) mentioned that This waterfall approach is used extensively in a variety of governmental projects as well as in many big enterprises. The term "Waterfall" is mainly because the sequence in the model phase will not go back to the earlier one, and it will keep going towards the next phase. The waterfall model consists of 7 phases which is system requirements, software requirements, analysis, program design, coding, testing, and lastly operation or maintenance. This model requires the 100% completion of current phase before continuing to the next one. The process in the waterfall model is illustrated in the figure 2.1.2.1.

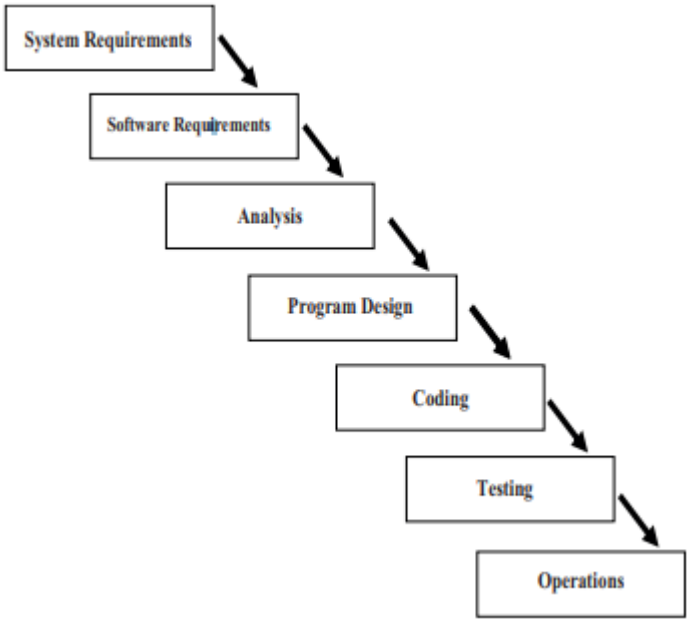

Figure 2.1.2.1 Waterfall Model [3]

2.1.2.2 Agile model

Agile methodology is a set of progressive and incremental techniques for software development that are built on opportunistic and iterative enhancement procedures (Altameem, 2015, as cited in Williams, 2007). According to (Altameem, 2015, as cited in Waters, 2014) Scrum, Lean Software Development, Dynamic Systems Development Method (DSDM), and Extreme Programming (XP) are some of the most popular methodologies.

2.1.2.2.1 SCRUM

Primarily focus on management of agile and how to organize development teams strategically. According to (Altameem, 2015, as cited in Tore & Torgeir, 2008), because of its flexibility and simplicity, scrum is the most well-known approach of introducing agility. Scrum gain popularity because in development of agile software, it can be used as a cover for variety of engineering practices. The product owner can collaborate closely with developers to identify and prioritise system functionality in a product backlog using the Scrum approach (Altameem, 2015, as cited in Mike, 2014). According to (Altameem, 2015), Bug fixes, features, non-functional requirements, and other tasks that must be completed to provide effective and efficient software are included in the product backlog.

2.1.2.2.2 Extreme Programming (XP)

Extreme programming is primarily concerned with software development rather than project management (Altameem, 2015). Extreme programming started with the release of planning stages, followed by different iterations that will conclude with acceptance testing based on the requirements of the user. Users give specification for the software they require, that will assist the team to distribute resource and time necessary required for completing the development.

2.1.2.2.3 Lean Software Development

The importance of teams delivering value to the owner, as well as the effectiveness of the systems that assist them do so, is emphasised in lean software development. Lean software development also emphasises on workflow development efficiency and speed, and it relies on consistent and prompt feedback from consumers and programmers.

2.1.2.2.4 Agile Prototyping

Agile prototyping is use for embedded software development and testing as early as possible. The so called, early prototype does not resemble the design of the final product. Prototypes help in simulating the working software way earlier in the software development cycle, Users do not have to spend more time and effort before they can truly experience the software and provide feedback. Developers can save time, reduce wasted effort and avoid frustration during the development process as a cross-functional teams won't need to communicate back and forth as much to verify interactions and flows. There is various type of prototyping models such as, Rapid Throwaway prototypes, Evolutionary prototype, Incremental prototype, and Extreme prototype.

2.1.2.3 Iterative /Incremental model

Figure 2.2.2.2 Iterative and Incremental model

Source: (Chowdhury et al., 2017)

This approach integrates components of the waterfall model. The first increment addresses the most fundamental requirements and represents the core product; nonetheless, many supplemental features are still undeliverable at this point. This model develop is used to develop a partial implementation of a complete system. After that it will increase functionality gradually (Alshamrani & Bahattab, 2015.).

2.1.2.4 Spiral model

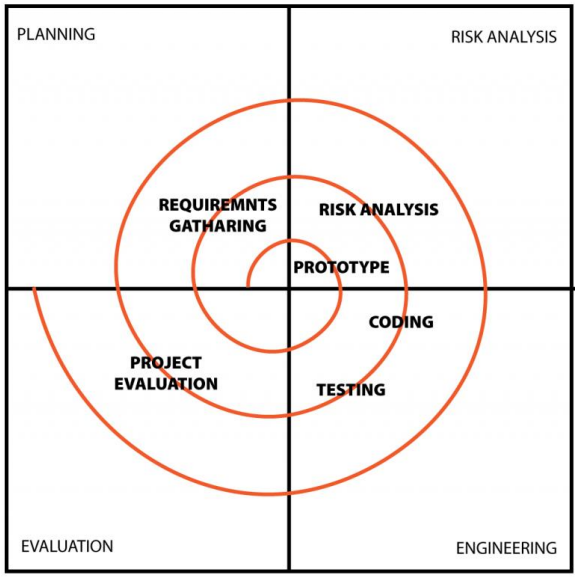

Figure 2.1.2.3 Spiral Model

Source: (Vishnu, 2019)

Boehm proposed the spiral model, which is an essential software development life cycle model (Doshi et al., 2021). The spiral model is typically implemented in projects that are too broad, too costly, or too complicated to manage. Because of its unique ability to control risk, the spiral model is well-known. The spiral model shown in a figure 2.1.2.3 looks like a spiral structure made up of multiple loops, the exact number of which is unknown and may vary depending on the project. Each spiral loop is referred to as a step of the software development process phase (Doshi et al., 2021). The set of actions needed for product development may be adjusted by the project's administrator based on the project's risk level. Spiral models are commonly used when risk assessment is critical and there is a budget constraint, in projects with medium to elevated risk, and in projects with compound needs.

2.2 Platform

World Wide Web (WWW) is a platform that allows individuals from all over the world to access and share information and knowledge. When a user's device is connected to the internet, the web acts as a global database via which the user can share information (Karwan Jacksi & Abass, 2019). According to Karwan Jacksi & Abass (2019), day by day the evolution of web is getting bigger and better, from the basic that has very few tools into a highly technological website that has database of information. A Web portal is a sort of website that allows users to browse other websites by giving a link to them. It was built for a variety of purposes, including distributed applications and information sharing amongst users (Karwan Jacksi & Abass, 2019 as cited in Choudhury, N. 2014.). Example of web portal is iGoogle, and MSN. The document management system requires a web platform in order to share information with other user, it also requires a search engine to help user find the information required faster.

2.3 User Interface

Hypertext Markup Language is the standard markup language for producing web pages and web applications. The Hypertext Markup Language (HTML), Cascading Style Sheets (CSS), and JavaScript work together to form a triangle of foundation technologies for the World Wide Web (WWW). HTML was created as a basic manner of presenting information, with the aesthetics of a web page being secondary to the content. As the number of users that are using the web increases, the way a website's content is presented has become a critical aspect in its success. When it comes to the presentational aspects of websites, the most important technology is CSS. CSS determines how HTML elements should appear on a computer screen or in other media. There is various type of CSS framework can be used to represent a website content. Example of CSS framework is Bootstrap, Susy, Semantic UI, and many more. The most popular framework for HTML, CSS, and JavaScript for producing a responsive, mobile-friendly, and user-friendly website is Bootstrap (Shahu Gaikwad & Adkar, 2019). The reason why Bootstrap are widely known is because it is supported by various browser, and the requirement to learn Bootstrap is only basics of HTML and CSS.

Bootstrap enables quick, responsive development that is both standardised and well supported by the development and design communities.

2.4 Programming Language

Another aspect that are required in order to develop a web page is to select a suitable programming language to be used. A language that is used to communicate and interact with a computer is referred to as a programming language. There is various type of programming language that can be used to interact with computer, but in this we are primarily focusing on Scripting programming language. Scripting language is a language that uses an interpreter instead of a compiler to perform tasks in a particular run-time environment. They are generally short, fast, and interpreted from source code. Example of scripting language are, Hypertext Preproccessor (PHP), Python, Perl, Ruby, and many more.

2.4.1 Client-side Scripting

Web programming which occurs on the client side is referred to as client-side scripting. Client-side scripting is essential to dynamically respond with different and modifying content based on user input and other variables. Client-side scripts are simply the form of communication between both the web server and the user on the front end.

2.4.2 Server-side Scripting

Hypertext Preprocessor (PHP) is one of the most common scripting languages to use for communicating with the server on the back-end side. PHP or core PHP is a basic programming language which could also be used to develop dynamic web pages. PHP framework, on the other hand, is a set of arranged source codes organised in a certain architecture to facilitate the building of dynamic websites, apps, and services. According to Haris & Hasim (2019), researchers have undertaken a few comparative studies to determine which PHP frameworks would provide developers with superior performance, development process, and code maintenance features. Server-side scripting is commonly used to create

interactive websites with databases or other data stores. The fundamental purpose of scripting is to dynamically modify the response to the user's needs.

2.5 Database

Database Management System (DBMS) is a software and language tools that allow database administrator to create, organize, monitor, and manage data in the database. To solve various type of problems, different type of DBMS was introduced and divided into several parts. This paper mainly focuses on Relational database. A relational database is created using the relational model (Yertay, 2020). The best way to archive document on the management system is by using the Relational Database management System (RDBMS). To manage data in the relational database the Structure Query Language (SQL) was introduced. SQL language is commonly use on relational type database such as MS SQL Server, Oracle, DB2, and MySQL.

2.6 Agile Prototyping Methodologies

Agile prototyping is a methodology used to develop a prototype faster, and cost-effective. In order to display ideas in front of client as soon as possible, agile prototyping is used to achieve this goal. The reason being is, the development team requires feedback from the client to improve the prototyping to fulfil the requirement of the stakeholder at highest quality. The pros of using this type of methodology is, stakeholder may request a change of requirements during the development process without interrupting much. Agile prototyping is a flexible and thus satisfying the requirements on basis of iterative and incremental development with contribution from both stakeholder and development team. According to Tanvir et al., 2017, Agile development is used by many firms to create software projects because it is flexible, and software engineers can do research in this area. Next, Agile methodologies differ in their practises and emphasis, but they share common characteristics, such as iterative development and an emphasis on communication between stakeholders and the development team. The reason why this project use agile prototyping is to get the

feedback from stakeholder so that the final version of the prototype will satisfy all the requirements from stakeholder.

2.7 Related Work

There are a lot of existing systems that have applied document management system structure to their system. For example, Thesis management system for industrial partner Red Hat, Web-based archive management and student guidance for final year projects, and Smart Final Year Project Archive System using Laravel framework with email notification (SFYPAS). These are the top 3 system that are most related with Final Year Research Archive System (FYRAS), these systems are choose based on the functionality, and similarity of the system related to the FYRAS.

Firstly, for Thesis management system for industrial partner Red Hat. The client wish to be involved during the development of Thesis management system, with an update every month to assess the implementation part of the system. The system was developed by three students, each of which developed different functionalities in the system. There are several functions in the Thesis management system. For example, manage users, register student, topic filtration, manage thesis topic, manage thesis, manage university, and the comment feature on every thesis paper that has been stored in the system.

For the next related work which is, Web-based archive management and student guidance for final year projects. This system is used to store final year projects and guide students for their final year project. The system also allows the communication between student and supervisor, and supervisor and administrator. Students also may search past final year project to use as reference.

Last but not least, Smart Final Year Project Archive System using Laravel framework with email notification (SFYPAS). SFYPAS was developed to store and manage FYP thesis that has been submitted by previous FYP students from FSKM in UiTM Perlis. By providing an archive system, this will help filter the past FYP thesis. This system can be accessed by four different user which is students, lecturers, examiners and administrators (only a few lecturer and supervisor can be admin). One of the most noticeable feature of this system is the ability to receive notification through email if the student thesis was rejected by the supervisor.

Table 1 that's has been provided below show the summary comparison between all the system.

Table 2.1 Comparison of Related Works with FYRAS

System Functionality / Features	**Related Work**			
	Thesis Management System for Industrial Partner Red Hat (Brno, 2013)	Smart Final Year Project Archive System using Laravel Framework with Email Notification (SFYPAS) (Mat Taib et al., 2020)	Web-based Archive Management and Student Guideance for Final Year Project (Malik et al., 2018)	Final Year Project (FYP) Archive System
Login	✓	✓	✓	✓
Register	✓	✓	✓	✓
User Management	✓	✓		✓
Category Management	✓			✓
University Management	✓			
Title Search	✓	✓	✓	✓
Field of Expertise / Research Area Search		✓		✓
Supervisor Search				✓
Title History Search		✓	✓	✓
Sort by Category / Field Expertise				✓
Sort by Year				✓
Sort by Supervisor				✓
Topic Filtration Based on field expertise, year, or supervisor name	✓			✓
Communication (Chat box)			✓	
Generate Certificate				✓
Provide Guideline Template			✓	
Downloadable Content		✓		✓

2.8 Summary

To summarise, this chapter can compile all this project's literature reviews together. Additionally, this chapter goes into detail about the Software Development Life Cycle (SDLC), issues with the SDLC, the platform that will be used to construct the system, the preferred language, the database management system that is proper for the Archive management system, and analogous work that is similar to this project. Further discussion about Agile Prototyping methodology can be found in Chapter 3.

CHAPTER 3

METHODOLOGY

This chapter discusses the Agile Prototyping methodology that will be implemented in the FYRAS. It starts off with an introduction to the various stages and procedures involved, starting from requirements gathering and analysis, quick design, prototype building, initial user evaluation, refining prototype and lastly implement product and maintain. But for this project we are going to use until the 5th phase which is refining product. For each phase of the project the methodologies, tools, hardware, and software used are described in more details. This methodology's objective is to present the flow of the project to create a better understanding of what this project is all about.

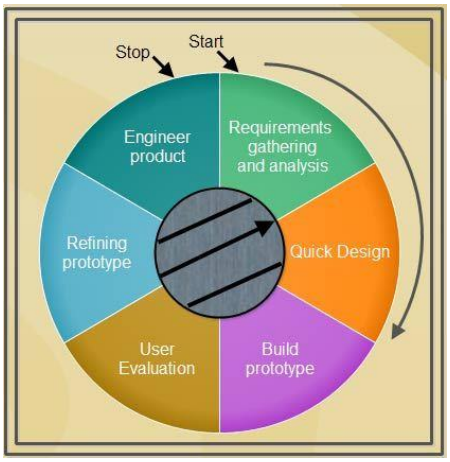

Figure 3.2.1 Agile Prototyping Model Phases

Source: (Martin, 2020)

3.1 Overview of Agile Prototyping Methodology

Prototyping Approach is a software development model in which prototypes are constructed, evaluated, and changed until an acceptable prototype is reached (Martin, 2020). It also lays the groundwork for the finalized system or program. It is most effective in situations where the project's precise requirements are unknown. The process is iterative and based on trial and error between the client and developer.

3.2 Activities and Deliverables in Methodology

Table below shows the phase of the project methodology, which is requirements gathering and analysis, quick design, prototype building, initial user evaluation, and refining prototype. Each phase will have a few activities and deliverables.

Table 3.1 The project Methodology Phase, Activity, Deliverables, and Research Objective

Research Objective	Phase	Activity	Deliverables
RO1: To identify and analyze the requirements from FSR for FYRAS.	Requirement Gathering and Analysis	• Interview with product owner • Identify project objectives and goals • Analyze data gathered from interview	• System requirements from product owners • Business activity, objectives, and problem statement for system development

	Quick Design	• Design an activity diagram to illustrate the system flow • Design User Interface (U.I) for the system	• Activity Diagram • Use Case Diagram • Document all the diagram into the Software Requirement Specification (SRS)
RO2: To design FYRAS based on the analyzed requirements.	Build Prototype	• Design Entity Relationship Diagram (ERD) for database structure. • Develop a simple prototype for based on analyzed requirements	• First version prototype of Final Year Project (FYP) Archive System • System Design Document (SDD)

RO3: To develop a web-based archive system for FSR.	Initial User Evaluation	• Gather and analyze feedback from users and product owner	• Updated Software Requirement Specification (SRS) • Updated System Design Document (SDD)
	Refining Prototype	• Modify the current prototype based on gathered feedback from users	• Latest prototype version of Final Year Project (FYP) Archive System • Latest version of Software Requirement Specification (SRS) • Latest version of System Design Document (SDD)

3.2.1 Phase 1: Requirement Gathering and Analysis

Requirements analysis is the first step in creating a prototyping model, and then the system's requirements are thoroughly stated. To determine the system's requirements, an interview with the stakeholder is conducted.

3.2.2 Phase 2: Quick Design

An initial design, also known as a fast design, is made for the system once the requirements are determined. Only the most relevant components of the system are included in this design, which gives the user an understanding of how the system works. The prototype can be developed more quickly with a straightforward design.

3.2.3 Phase 3: Build Prototype

During this phase, the knowledge obtained from the quick design phase is being used to inform the design of the actual prototype. It is a simplified, fully functional model of the necessary computer system.

3.2.4 Phase 4: Initial User Evaluation

During this stage, the client is given the opportunity to provide first feedback on the proposed system. Finding out the benefits and drawbacks of the functioning model is helpful in this regard. The customer's feedback and ideas are taken into consideration before being passed on to the developer.

3.2.5 Phase 5: Refining Prototype

After the user has evaluated the prototype, if the user is dissatisfied with it, the existing prototype will be changed so that it adequately satisfies the requirements. In other words, the user's added input is incorporated into the development of a new prototype. Like the prior prototype, the new prototype is also assessed. Until all the user's criteria are satisfied, this procedure keeps going. A final system is produced based on the final prototype once the user is happy with the developed prototype.

3.3 System Specification

Utilizing high-quality software and hardware is essential to the production of a reliable system. This could have a positive effect on the system's performance. Table 3 lists the hardware requirements for the development of the project, whereas Table 3 lists the software requirements.

Table 3.2 Hardware Specification

No	Item	Description
1	Model	HP Pavilion Gaming Laptop
2	RAM	20 GB
3	System Type	64-bit operating system, x64-based processor
4	Processor	Intel(R) Core(TM) i5-9300H CPU @ 2.40GHz 2.40 GHz

Table 3.3 Software Specification

No	Item	Description
1	Operating System	Windows 10 Home
2	Design Tool	Draw.io, MySQL workbench, LucidChart
3	Presentation	Microsoft Powerpoint, Canva
4	Documentation	Microsoft Office, Microsoft Excel
5	Development Platform	Microsoft Visual Studio Code, Notepad++
6	Database Platform	MySQL, MariaDB
7	Local Server	Apache Tomcat (Xampp)

3.4 Project Milestone

Project milestones are essential in project planning to organize and provide appropriate timeframes for each step of development. A project milestone is also used to illustrate the entire project's timeframe from the beginning to the end. The Gantt chart for this project milestone can be referred on Appendix A.

3.5 Summary

In this chapter, the Agile Prototyping methodology that will be used during this project development has been explained. The five phases that consist of requirements gathering and analysis, quick design, prototype building, initial user evaluation, and refining prototype will be used to complete this project. There might be iteration for this project if there are changes to the requirement gathered from users and product owner. Product owner can request for requirement changes during the initial user evaluation phase, because during that phase there will be a session conducted between developer, users, and product owner.

CHAPTER 4

RESULT AND ANALYSIS

This chapter discuss about the result and findings of Final Year Research Archive System (FYRAS). This chapter will also cover the process of developing the system, which will comprise of architectures, modules, components, features, an environment, and a database that meet all of the stakeholders' criteria. The results of this chapter will reveal the scope and importance of the project, whether it has been finished or not.

4.1 Requirement Gathering and Analysis Phase

The primary goal of this project is to collect and analyse the requirements of the FYRAS. According to the methodology that was explained on Chapter 3. For this project, the requirement was gathered through an interview with the stakeholder.

Dr. Azlina zid is a programme coordinator of sports management in the FSR. Due to her experience, Dr Azlina was chosen as the stakeholder for this project.

She has contributed significantly in terms of ideas and giving adequate information to meet and overcome obstacles and constraints that had to be addressed in order to confirm that the project achieved its goals.

4.1.1 Interview Data

Table 4.1 below contains a list of questions and the response to each. The prepared interview questions were as follows:

Table 4.1 Interview Questions and Answers

No.	Question	Answer
1	Can you tell me more about yourself? and what are your position currently?	My name is Dr Azlina Zid, I am a programme coordinator for sports management.
2	How many programs that are currently available in Faculty of Sport Science and Recreation?	There are 2 programs that are available for this faculty. Which is Bachelor of Sport Science, and Bachelor of Sport Management.
3	How many fields of expertise that are available for the past research project?	Currently there are 4 field of expertise for each program, and soon there might be a new addition to the field.
4	What is the current problem of storing research project document?	The current problem of storing research project is the management of document, and the storage location required to store the hardcopy of the research project.
5	How are the past research project document being stored currently? Is there any issue recently?	The past research project document is currently being stored in each supervisor's room. Recently there is an issue where, there is water leakage inside one of the supervisors room, and due to that some of the past thesis paper was damaged.

6	Do the research project only available in hard copy?	No, the research project is stored in hard copy and soft copy, but the soft copy are stored inside a Compact Disc (CD)".
7	In a situation where there is multiple students wants to access the document of the past research project, how do they get to access the papers?	The students must message and inform each of the supervisors and wait for their scheduled time slot, since there is only one copy of research project document for each title.
8	How many students and supervisors that are involved in final year subjects?	Currently there are average of 120 students involved in FYP subjects for each semester, and 45 supervisors that are able to supervise.
9	Is there any additional document or process that happen when student research project has been graded?	Yes, when the research project of the student has been graded, they will receive certificate based on their research project title.

All of the requirements have been determined and referred to in order to construct the applications based on the interview. According to Dr Azlina, the students need to wait in queue when accessing the past research project document. They also had issue where the research project document was lost or damaged. The gathered data was used as a reference during project development to keep the project on schedule with the requirements of the stakeholders.

4.1.2 Requirement Analysis

The project requirement has been defined according to the results of the stakeholder interview session. The requirements were examined to find potential application development strategies. To address the concerns highlighted by the stakeholders, some features can be implemented based on the requirements collected. It is important to design a system that users can access from anywhere. Table 4.2 below shows the list of requirements has been analysed.

Table 4.2: Analysed Requirements

Questions	Answers	Findings
Average number of students and supervisors?	A total of 120 students for each semester and 45 supervisors able to supervise.	Use Case (Manage User) - Register supervisor Use Case (Register) - Student register
Briefly explain on how the process of submitting research project.	Students need to finish and submit the research project to their own supervisor. Then, supervisor and examiner will grade the research project. After that the students will receive a certificate based on their research project title.	Use Case (Generate Certificate) - Certificate Generate Use Case (Manage Research Project) - Manage Research project
How many fields of expertise that are available currently?	There is a total of 4 field of expertise, and soon there will be a new additional field of expertise.	Use Case (Manage Field of expertise) - Manage Field of Expertise

How many programmes that are currently available in Faculty of Sport Science and Recreation in UiTM Shah Alam?	There is only 2 programme that is available for this faculty in shah alam branch. There is more programme in other campus.	Use case (Manage Programme) - Manage Programme
Can you briefly explain on how student can get their access to the past research project?	In order for students to get access into the past research project, they need to contact and inform their supervisor. There are some cases where there are multiple students want to get access to the same research paper at the same time.	Use Case (View Research Project) - View Research Project

After the results were analysed, requirement models were created. The results must be recorded so that during the development, developers may use them to build an application that includes all of the recommended fixes. In the documentation, requirement models were created for each requirement that matched the findings. examples of requirement models include use cases, activity diagrams, domain class diagrams, system sequence diagram and more.

4.2 Quick Design Phase

Based on the results, models such as use case diagrams and use case descriptions have been developed from the analysis phase. There are two more models that have been created to represent the system flow, the domain class diagram and the system sequence diagram.

4.2.1 Use Case Diagram

One of the first models that must be examined is the use case diagram. The figure below shows the user and use case for the Final Year Research Archive System (FYRAS).

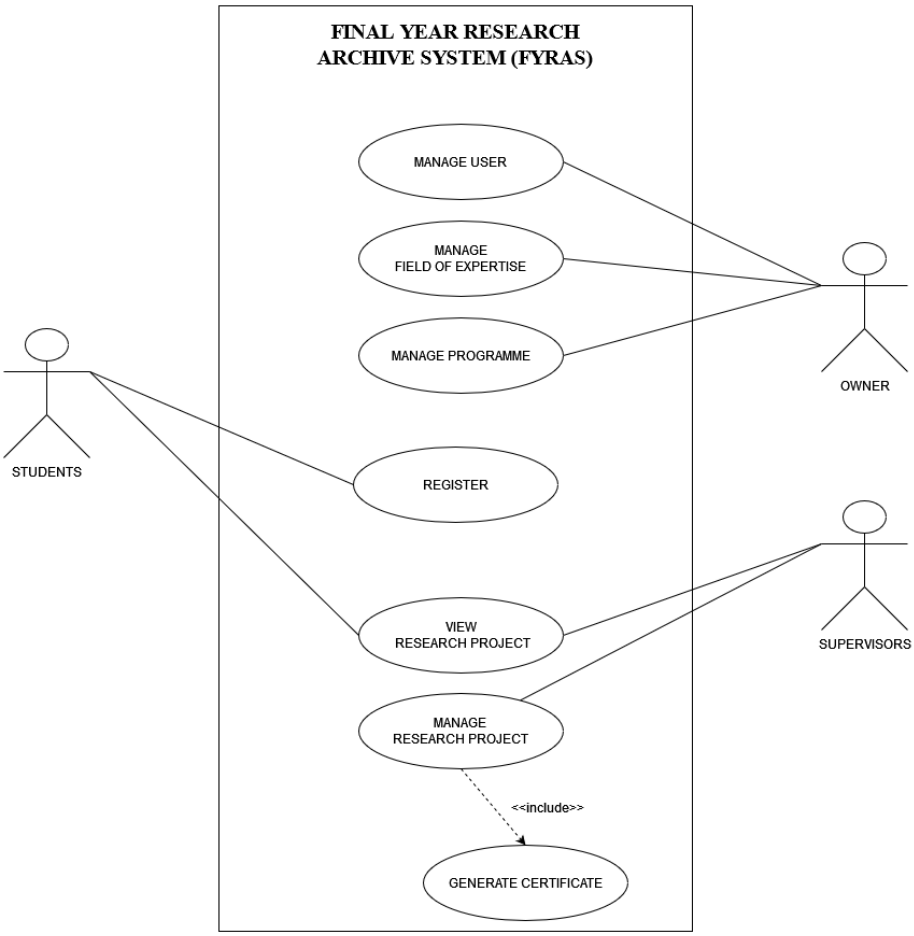

Figure 4.1 Use Case Diagram

The figure above shows the use case that will be used in the FYRAS. The owner can manage user, field of expertise and programme. While supervisor can manage and view research project. Lastly, student may register to the system to view the research project that has been uploaded into the system.

4.2.2 Use Case Description

UCD 600 – Manage Research Project

Table 4.3 Use case description for Manage Research Project

Use Case ID	**UC 600**	Created by	Muhd Aidid Aizad Bin Abd Rahim
Use Case Name	Manage Research Project		
Brief Description	Supervisor will be able to: 1. Create new Research Project • Supervisor can create new research project after the research project that student submitted have been graded. 2. Update Research Project information • If there is any wrong information about the research project that has been added in the system, supervisor can update the research project information. 3. Delete Research Project • Supervisor can delete any research project information that has been stored in the system.		
Actors	Supervisor		
Related Use Cases	N/A		

Criticality of Use	Medium	
Preconditions	1. Supervisor login into the system. 2. Supervisor opens a research project list page.	
Post conditions	1. New Research Project will be created. 2. Research Project information will be updated.	
Normal Course of Event (MSS)	**Actor**	**System**
	<u>Add new Research Project</u> 1. Supervisor open the research project list page. 2. Supervisor click the "Add New Research Project" button. 3. Supervisor fill the form with the required field. 4. Supervisor submit the research project creation form. **<u>Update Research Project</u>** 5. Supervisor open the research project list page. 6. Supervisor click "Edit" button beside the	1.1 System display research project list page. 2.1 System display a form to be filled. 4.1 System validate the research project details. 4.2 System creates and store new research project information. 5.1 System display research project list page. 6.1 System display research project information form. 8.1 System validates the research project details. 8.2 System successful update research project information. 9.1 System display research project list page.

	selected research project that want to be updated. 7. Supervisor fill the research project detail form. 8. Supervisor submit the update form. **<u>Delete Research Project</u>** 9. Supervisor open the research project list page. 10. Supervisor click "Delete" button beside the selected programme. 11. Supervisor confirms the deletion.	10.1 System show dialog confirmation box. 11.1 System validates and delete research project from the database.
Business Rules	- Owner cannot manage research project. - Supervisor can manage research project.	
Assumptions	None	
Notes and issues	None	

4.2.3 System Sequence Diagram

Figure 4.2.2.1 below shows the sequence diagram for manage research project on use case description in table 4.2.2.1. The purpose of a sequence diagram is to demonstrate the relationships between objects in a single use case. In this use case diagram will be illustrated how the different parts in the system will connect to each other to perform a use case.

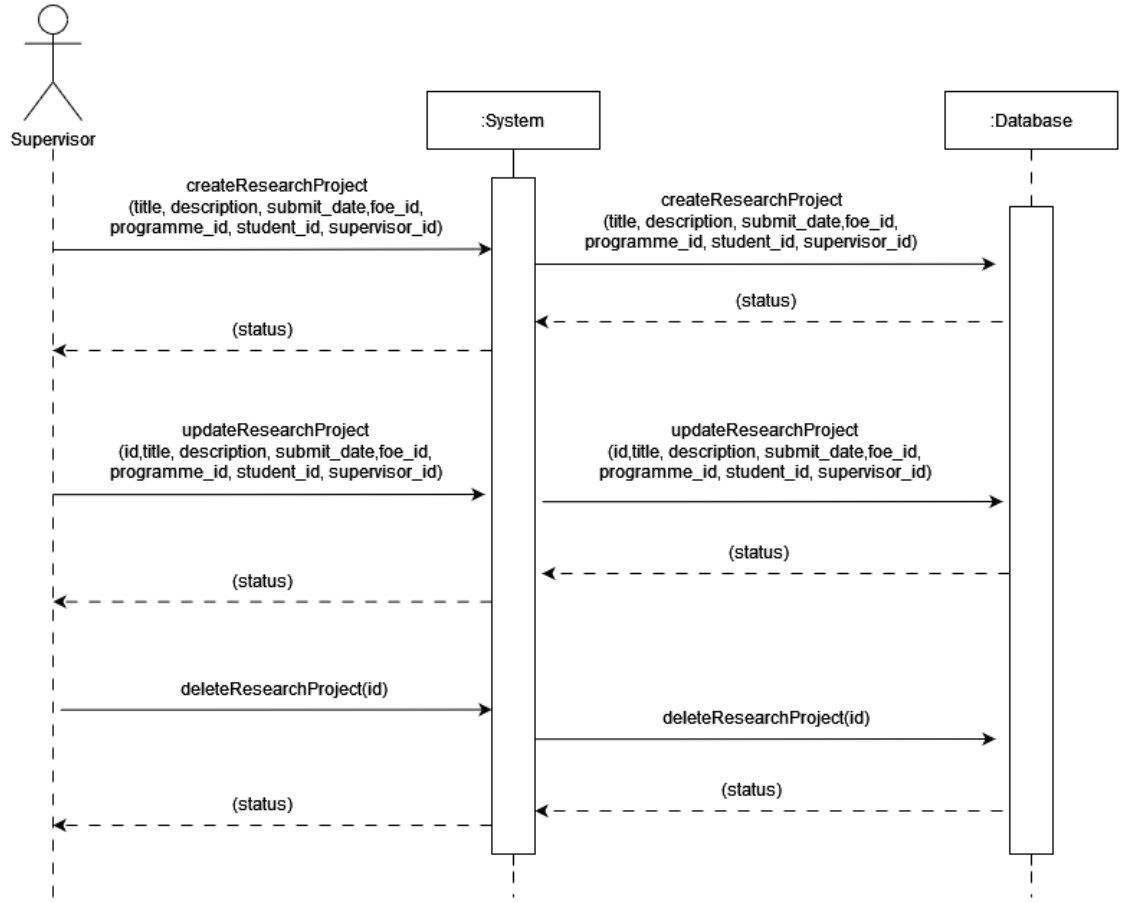

Figure 4.2 Sequence Diagram for Manage Research Project

The FYRAS domain class diagram will be discussed in the following section. The domain class diagram is designed to display how the tables relate to one another. The attributes of each table that will be stored in the database are also included in the class diagram.

4.2.4 Domain Class Diagram

Figure below shows the class diagram for Final Year Research Archive System

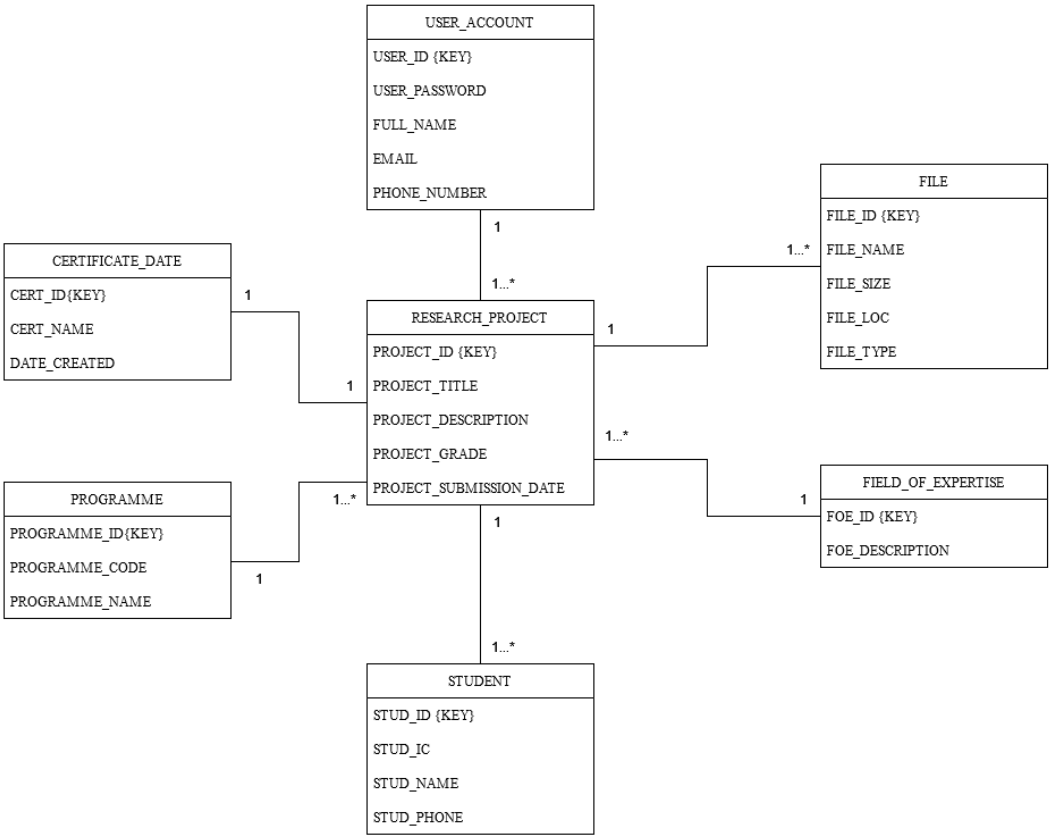

Figure 4.3 Domain Class Diagram

Based on the figure above, there are seven classes which contain different attributes which are the user_account, student, field_of_expertise, programme, research_project, file, and certificate_data. A supervisor may manage one or many research project, and a student can submit or many research project.

4.3 Chapter Summary

This chapter highlights the overall goal of the project, which was to determine the specifications for the Final Year Research Archive System. Examine the FYRAS requirements and confirm what the stakeholders have stated about it. This chapter presents the system prototype as well as all the findings and outcomes for the needs from the user requirement analysis.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

This chapter concludes all chapter from this research paper. This chapter also summarize, discuss on limitations and recommendation for future enhancement of project.

5.1 Conclusion

With the completion of this research, the Final Year Research Archive System will be able to help supervisors and students on managing and accessing the research project. All of the objectives of this project have been met, as the FYRAS system has been developed. This project uses Agile prototyping methodology in order to focus on developing the FYRAS system. Prototypes were created during this study to ensure that users were satisfied with the capabilities of the FYRAS system. This study was able to solve the problems stated and provide FSR users with a variety of useful information despite various research-related limitations.

5.2 Limitation of Research

As this research period progresses, its limitations become clear. The first limitation is its sole focus on web-based application solutions. As a result, mobile application users cannot utilise this system to its full potential. The second limitation is these systems only cover the expertise inside FSR only. If there is another faculty that is interested in using this system, they need to customize the database and system structure to fully meet their requirement. The final limitation is that this research was unable to fulfil all of the recommendations made by the user during the requirement analysis phase. It turns into a limitation because some of the user-made suggestions do not relate to this project and do not fall under the scope of the research.

5.3 Recommendation for Future Work

Several areas of this project can be improved for future research. It has been pointed out that this research has a number of limitations, including the inability to fully customizable to meet the flexibility of usage and the impossibility to implement all user recommendations. To improve usability in the future, it is advised that more research to be done based on mobile applications and customizable system.

The next area that may be enhanced is to keep the system more useful is to implement a plagiarism checker module, where the module will check with existing research project that has been submitted into the system and produce report based of the plagiarism.

The last area for improvement is the implementation of all the recommendations that could not be carried out during this research, including the deployment of the plagiarism module. If the suggestion is considered, the user will be happy with this system.

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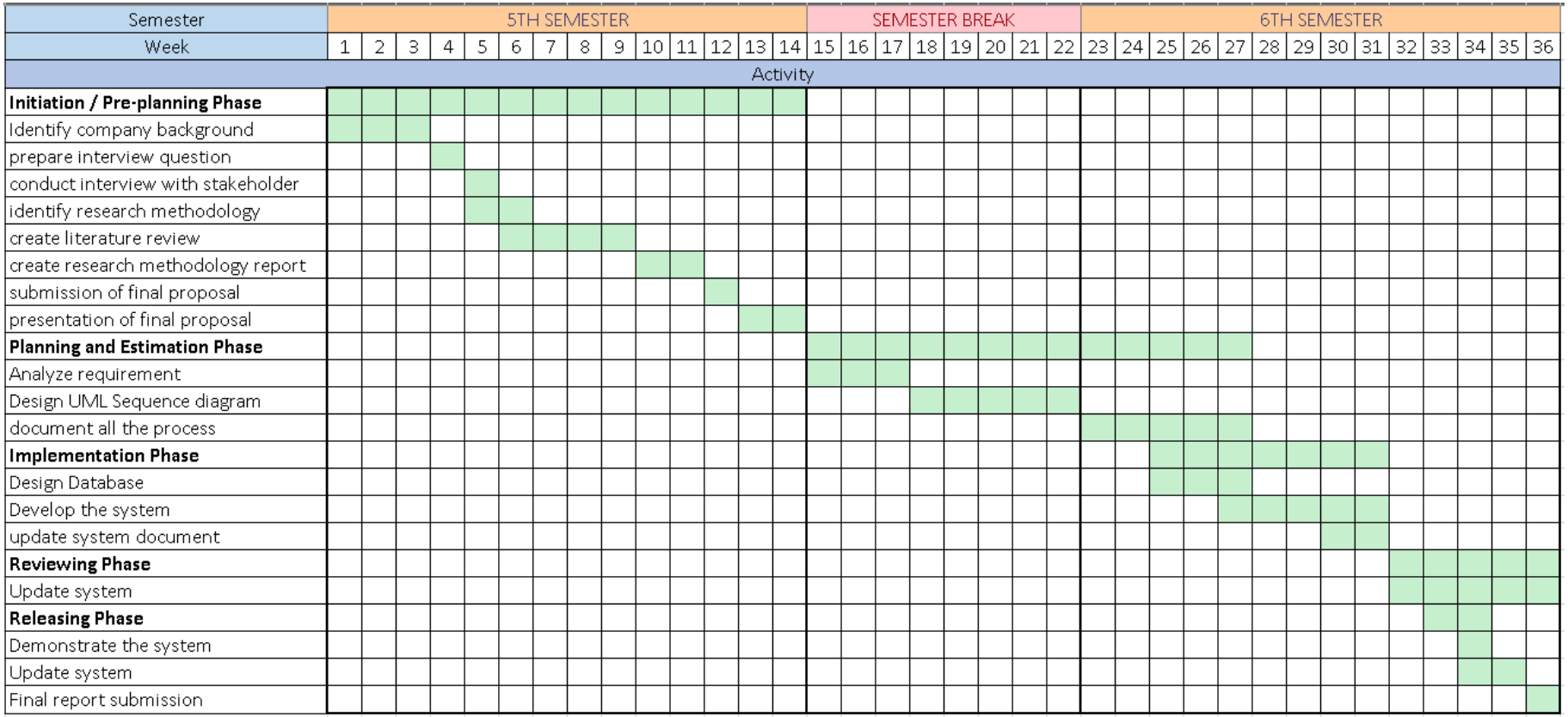
APPENDICES

Appendix A



Software Requirements Specification

for

FINAL YEAR RESEARCH ARCHIVE SYSTEM (FYRAS)

Version 1.0

Prepared by:

MUHAMMAD AIDID AIZAD BIN ABD RAHIM

01/12/2022

Revision History

Name	Date	Reason For Changes	Version
Muhammad Aidid Aizad Bin Abd Rahim	12/12/2022	Initial Document for Software Requirement Specification	1.0

Table of Contents

1. Introduction

1.1 Purpose

The purpose of this document is to describe the intricate details and preparations to ensure the
requirement of Final Year Research Archive System (FYRAS) for Faculty of Sports Science and Recreation (FSR), UiTM Shah Alam.

This system is to help the owner to manage Thesis paper more systematically on top of high efficiency with full effectiveness of the system. The purpose of this system is to prevent the loss of Thesis paper issues and accessibility issues by making a more reliable and usable system.

The system's goal is to keep track of all thesis paper that have been submitted by students to their supervisor respectively. The system will also save thesis paper under each of the supervisor field of expertise, and student with different supervisor need to request permission in the system if they want to access the paper. This replaces the faculty previous storing method, which was a handwritten logbook in which they will be stored in each supervisor room and can only be access by one person at a time.

1.2 Document Conventions

The document focuses on the high-priority requirements which will be implemented for the final
deliverable.

- Printed on A4 paper.
- Normal text size is 12 Times New Roman black.
- Section heading is 18 bolded Arial white against grey backgrounds.
- Subheadings are bolded size 14 Arial black.
- Document text are single-spaced and maintained 1” margins.

1.3 Intended Audience and Reading Suggestions

This system is used for the students, supervisors, and owner of FSR. It is highly recommended to read the viewing documents to have an overview of the product before reading this page.

1.4 Project Scope

The goal of this project is to efficiently manage the Final Year Project thesis paper for FSR. The problem that are currently that they are currently facing is to manage the thesis paper properly. Because of the current method of managing past thesis paper, some papers might be damaged or loss due to the poor management of thesis paper by some supervisor. Other than that, for student to access the thesis paper, they need to come to the supervisor office and retrieve them, but if the supervisor is absent or fall ill, students are not able to access it.

Objectives of the system:

- To identify and analyze the requirements from Faculty of Sports Science and Recreation (FSR) for Final Year Research (FYR) Archive System.
- To design the Final Year Research (FYR) Archive System based on the analyzed requirements.
- To develop a web-based system for Faculty of Sports Science and Recreation (FSR).

1.5 References

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2. Overall Description

2.1 Product Perspective

FYRAS is a web-based system that assists the supervisor in storing and managing research project. Students also can use this system to find for past student research project. The system will benefit both supervisor and student by saving the time require to access the research project document. This will reduce the stress load of a supervisor in managing research project.

2.2 Product Features

- **Manage User –** Owner will be able register new supervisors, update supervisor's details, view and delete supervisor data from the system if necessary.
- **Manage Field of Expertise –** Owner able to add new field of expertise data when required, update data of field of expertise if there are changes, view and delete the field of expertise when required.
- **Manage Programme –** Owner also able to
- **Register –** Student and supervisor can register to access the system.
- **View File –** After supervisor has uploaded student research project successfully, all the user within the system can view the file of the research project.
- **Manage Supervisee –** Supervisor can update, view, and delete supervisee that are registered under them.
- **Upload File –** Supervisor can only upload research project that has been graded upon submission from the student.
- **Generate Certificate –** When the supervisor has successfully upload file of research project into the system. The system will generate a certificate of completion for the students based on their research project title.

2.3 User Classes and Characteristics

No.	Users	Characteristic
1.	Owner	• Owner of the system. • The one who will manage users, field of expertise, programme and any error that might appear. • Frequency is low.
2.	Supervisors	• Lecturers of the Faculty of Sport Science and Recreation (FSR). • Supervisors are responsible for uploading their past supervisee thesis. • Supervisors are also needed to Accept or Deny permission for the document access that are requested by students. • Frequency is Medium.
3.	Students	• Students that are currently enrolled for programs under the Faculty of Sport Science and Recreation (FSR). • Students need to request permission to supervisors to gain a full access on the past thesis paper. • Frequency is Medium.

2.4 Operating Environment

The FYR Archive System will run in a web-based environment.

Operating environment for the FYR Archive System is as listed below:

Item	Description
Users	Admin, Supervisors, Students
Operating System	Windows 10 or latest, Mac OS
Web Browser	Google Chrome, Firefox, Microsoft Edge, Safari
Tools	MySQL Workbench, Visual Studio Code,
Language	HTML, CSS, JS, PHP, SQL
Database	PhpMyAdmin / MariaDB (SQL)
Server	Xampp Control Panel

2.5 Design and Implementation Constraints

The Internet is required for the system to access to the database. The FYR Archive System (FYRAS) will run on PCs and work with supported web browsers over the Internet and Intranet. To ensure that everything operates as expected, MySQL will be integrated with the system. The system's primary language will primarily be in English. To use the system effectively, users must have a basic understanding of English language.

2.6 User Documentation

The user manual will be delivered to provide the help needed by the user to run this system. It will

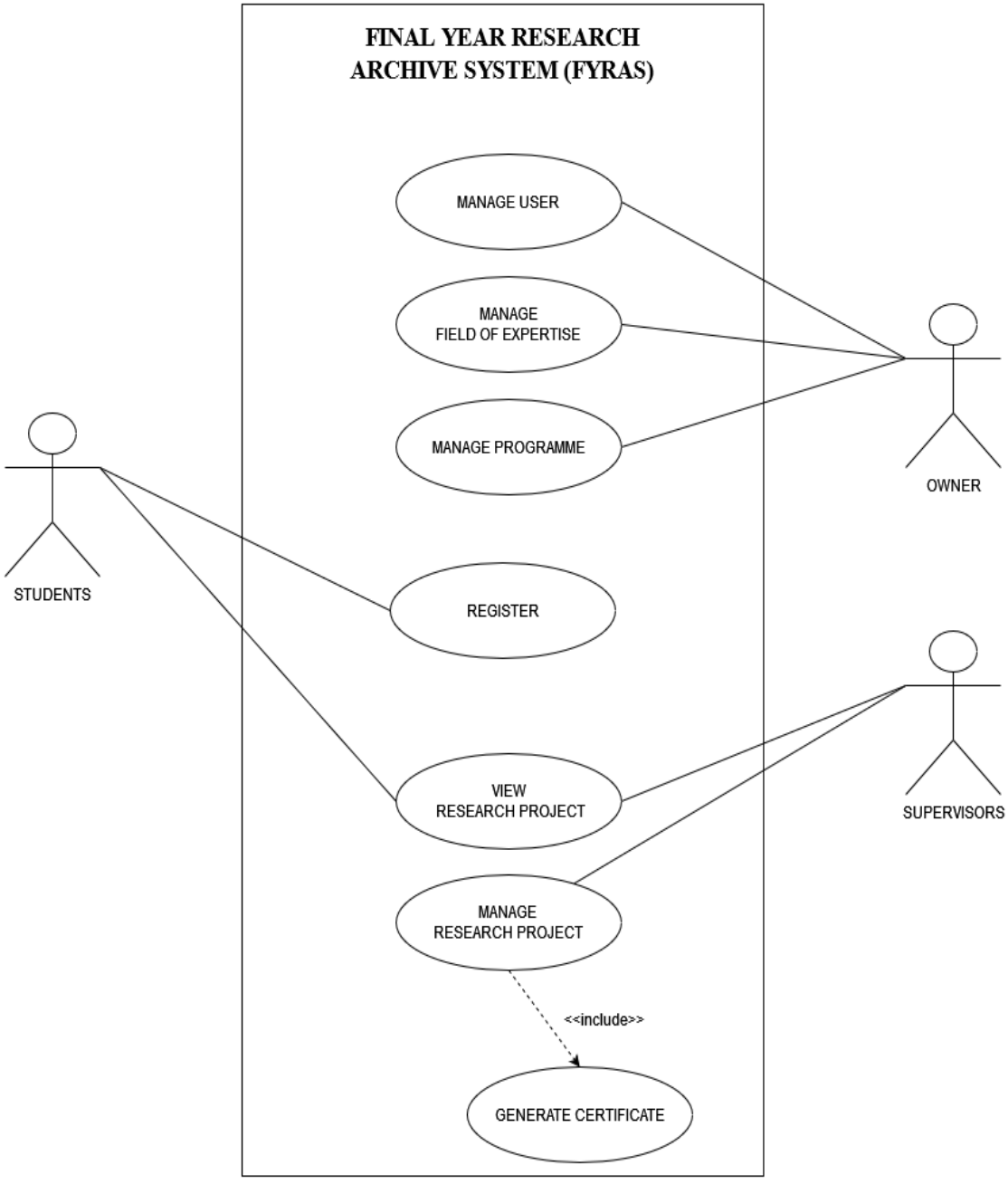
guide the user through this system to make sure the user can use this system efficiently.

2.7 Assumptions and Dependencies

Dependencies	Assumptions
Internet Connections	Users will need a stable internet connection to use the FYR Archive System. If the internet somehow unstable and lost connection, there might be an error occurred during the process of using the system.
Hardware	To operate and run the website, the hardware needs to be reliable. If the hardware fails, the user won't be able to use the website.
Server	For things to function properly, the connections to the server must be stable.
Web Browser	The web browser in the user's pc or laptop must be up to date, so that there won't be any malfunction feature in the system.

3. System Features

3.1 Use Case Diagram



3.2 Use Case Description

System User	Use Case
Owner	- Manage User - Manage Field of Expertise - Manage Programme - Register
Supervisor	- View Research Project - Manage Research Project - Generate Certificate
Student	- Register - View Research Project

3.2.1 UCD 100 - Manage User

Use Case ID	**UC 100**	Created by	Muhd Aidid Aizad Bin Abd Rahim
Use Case Name	Manage User		
Brief Description	The owner will be able to: 1. Register New Supervisor • When a new supervisor is eligible to take part as a supervisor for students, the owner needs to register the new supervisor into the system. 2. Update Supervisor information • If the supervisor has any problem with their information that has been saved in the system, the owner can change it for them. Owner also can reset supervisor password back to default which is their staff id. 3. View Supervisor Information • Owner can view supervisor details such as id, name, email, phone number, and field of expertise that the supervisor are majoring in.		
Actors	Owner		
Related Use Cases	N/A		
Criticality of Use	Low		
Preconditions	1. Owner login into the system. 2. Owner opens a supervisor list page.		
Post conditions	1. Supervisor's account will be created. 2. Supervisor's account will be updated.		
Normal Course of Event (MSS)	**Actor**	**System**	
	<u>Register Supervisor</u> 1. Owner open the list of data of supervisor.	1.1 System display list of supervisors. 2.1 System display a form to be filled.	

	2. Owner click the "Add New Supervisor" button. 3. Owner fill the form with the required field. 4. Owner submit the registration form. **<u>Update Supervisor</u>** 5. Owner open the list of data of supervisor. 6. Owner click "Edit" button beside the supervisor's name that want to be edited. 7. Owner fill the update supervisor detail form. 8. Owner submit the update form. **<u>View Supervisor</u>** 9. Owner open the list of data of supervisor. 10. Owner search supervisor ID, name, email, or phone number.	4.1 System validate the supervisor details. 4.2 System creates supervisor account. 5.1 System display list of supervisors. 6.1 System display supervisor information form. 8.1 System validates the supervisor details. 8.2 System successful update supervisor information. 10.1 System filter the supervisor information.
Business Rules	- Owner can manage supervisor information. - Supervisor cannot manage owner information	
Assumptions	None	
Notes and issues	- Owner can only reset supervisor password into default. - Owner cannot set supervisor password, because the system will register new supervisor password the same as the supervisor ID.	

3.2.2 UCD200 – Manage Field of Expertise

Use Case ID	**UC 200**	Created by	Muhd Aidid Aizad Bin Abd Rahim
Use Case Name	Manage Field of Expertise		
Brief Description	The owner will be able to: 1. Add New Field of Expertise • When there is a new field of expertise category, owner can add it into the system. 2. Update Field of Expertise information • If there is any wrong information about the field of expertise that has been added in the system, owner can update the information for the field of expertise. 3. Delete Field of Expertise • Owner can delete the information about field of expertise when there is no more use of the data.		
Actors	Owner		
Related Use Cases	N/A		
Criticality of Use	Low		
Preconditions	1. Owner login into the system. 2. Owner opens a field of expertise list page.		
Post conditions	1. New Field of Expertise will be created. 2. Field of Expertise information will be updated.		
Normal Course of Event (MSS)	**Actor**	**System**	
	<u>Add new Field of Expertise</u> 1. Owner open the field of expertise list page.	1.1 System display list of field of expertise. 2.1 System display a form to be filled. 4.1 System validate the field of expertise details.	

	2. Owner click the "Add New field of expertise" button. 3. Owner fill the form with the required field. 4. Owner submit the registration form. **<u>Update Field of Expertise</u>** 5. Owner open field of expertise list page. 6. Owner click "Edit" button beside the desired field of expertise that want to be updated. 7. Owner fill the update field of expertise detail form. 8. Owner submit the update form. **<u>Delete Field of Expertise</u>** 9. Owner open field of expertise list page. 10. Owner click “Delete” button beside the selected field of expertise. 11. Owner confirms the deletion.	4.2 System stores field of expertise information. 5.1 System display list of field of expertise. 6.1 System display field of expertise information form. 8.1 System validates the field of expertise details. 8.2 System successful update field of expertise information. 9.1 System display list of field of expertise. 10.1 System show dialog confirmation box. 11.1 System validates and delete field of expertise from the database.
Business Rules	- Owner can manage field of expertise information. - Other user cannot manage field of expertise information.	

Assumptions	None
Notes and issues	None

3.2.3 UCD 300 – Manage Programme

Use Case ID	**UC 300**	Created by	Muhd Aidid Aizad Bin Abd Rahim
Use Case Name	Manage Programme		
Brief Description	The owner will be able to: 1. Add New Programme • When there is a new programme for student, owner can add it into the system. 2. Update Programme information • If there is any wrong information about the programme details that has been added in the system, owner can update the information. 3. Delete Programme • Owner can delete the information about student programme when there is no more use of the data.		
Actors	Owner		
Related Use Cases	N/A		
Criticality of Use	Low		
Preconditions	3. Owner login into the system. 4. Owner opens a programme list page.		
Post conditions	3. New programme will be created. 4. Programme information will be updated.		
Normal Course of Event (MSS)	**Actor**	**System**	
	<u>Add new Programme</u> 1. Owner open the programme list page. 2. Owner click the "Add New Programme" button.	1.1 System display list of programme. 2.1 System display a form to be filled. 4.1 System validate the programme details. 4.2 System stores programme information.	

	3. Owner fill the form with the required field. 4. Owner submit the registration form. **<u>Update Programme</u>** 5. Owner open programme list page. 6. Owner click "Edit" button beside the desired programme that want to be updated. 7. Owner fill the update programme detail form. 8. Owner submit the update form. **<u>Delete Field of Expertise</u>** 9. Owner open programme list page. 10. Owner click “Delete” button beside the selected programme. 11. Owner confirms the deletion.	5.1 System display list of programme. 6.1 System display programme information form. 8.1 System validates the programme details. 8.2 System successful update programme information. 9.1 System display list of programme. 10.1 System show dialog confirmation box. 11.1 System validates and delete programme information from the database.
Business Rules	- Owner can manage programme information. - Other user cannot manage programme information.	
Assumptions	None	
Notes and issues	Owner must have programme information such as programme code and name before adding it into the system.	

3.2.4 UCD400 - Register

Use Case ID	**UC 400**	Created by	Muhd Aidid Aizad Bin Abd Rahim
Use Case Name	Register		
Brief Description	Student will be able to: - Register new account before login into the system.		
Actors	Student		
Related Use Cases	N/A		
Criticality of Use	Low		
Preconditions	1. Student open the login page. 2. Student click into registration page.		
Post conditions	1. New student account is created. 2. Student can now login to the system.		
Normal Course of Event (MSS)	**Actor**	**System**	
	<u>Register new account</u> 1. Student open login page. 2. Student click the "Register here" button. 3. Student fill the required information based on the form. 4. Student submit the registration form.	1.1 System display login page. 2.1 System display registration page. 4.1 System validate the student details. 4.2 System create and store new student account information.	
Business Rules	- Supervisor cannot manage student account. - Student can manage their own account.		
Assumptions	None		

Notes and issues	None

3.2.5 UCD500 – View Research Project

Use Case ID	**UC 500**	Created by	Muhd Aidid Aizad Bin Abd Rahim
Use Case Name	View Research Project		
Brief Description	Student and supervisor will be able to: - Search for research project based on title, year, field of expertise, supervisor name, and student name. - Sort research project into their desired choice. Example: ascending sort, or descending sort based on the year.		
Actors	Student, Supervisor		
Related Use Cases	N/A		
Criticality of Use	High		
Preconditions	1. Student login to the system. 2. Student open research project page. 3. Student click on search bar. 4. Supervisor login to the system. 5. Supervisor open research project page. 6. Supervisor click on search bar.		
Post conditions	Student and supervisor found the research project their wanted.		
Normal Course of Event (MSS)	**Actor**	**System**	
	<u>Supervisor</u> 1. Supervisor login to the system. 2. Supervisor open research project page. 3. Supervisor search the research project title on the search bar.	1.1 System display home page 2.1 System display research project list page. 3.1 System shows the result based on the search query. 4.1 System show more information about the selected research project.	

	4. Supervisor view the research project information. **<u>Student</u>** 5. Student login to the system. 6. Student open research project page. 7. Student search the research project title on the search bar. 8. Student view the research project information.	 5.1 System display home page 6.1 System display research project list page. 7.1 System shows the result based on the search query. 8.1 System show more information about the selected research project.
Business Rules	- Supervisor cannot manage student account. - Student can manage their own account.	
Assumptions	None	
Notes and issues	None	

3.2.6 UCD600 – Manage Research Project

Use Case ID	**UC 600**	Created by	Muhd Aidid Aizad Bin Abd Rahim
Use Case Name	Manage Research Project		
Brief Description	Supervisor will be able to: 1. Create new Research Project • Supervisor can create new research project after the research project that student submitted have been graded. 2. Update Research Project information • If there is any wrong information about the research project that has been added in the system, supervisor can update the research project information. 3. Delete Research Project • Supervisor can delete any research project information that has been stored in the system.		
Actors	Supervisor		
Related Use Cases	N/A		
Criticality of Use	Medium		
Preconditions	1. Supervisor login into the system. 2. Supervisor opens a research project list page.		
Post conditions	1. New Research Project will be created. 2. Research Project information will be updated.		
Normal Course of Event (MSS)	**Actor**		**System**
	<u>Add new Research Project</u> 1. Supervisor open the research project list page.		1.1 System display research project list page. 2.1 System display a form to be filled. 4.1 System validate the research project details.

	2. Supervisor click the "Add New Research Project" button. 3. Supervisor fill the form with the required field. 4. Supervisor submit the research project creation form. **<u>Update Research Project</u>** 5. Supervisor open the research project list page. 6. Supervisor click "Edit" button beside the selected research project that want to be updated. 7. Supervisor fill the research project detail form. 8. Supervisor submit the update form. **<u>Delete Research Project</u>** 9. Supervisor open the research project list page. 10. Supervisor click “Delete” button beside the selected programme. 11. Supervisor confirms the deletion.	4.2 System creates and store new research project information 5.1 System display research project list page. 6.1 System display research project information form. 8.1 System validates the research project details. 8.2 System successful update research project information. 9.1 System display research project list page. 10.1 System show dialog confirmation box. 11.1 System validates and delete research project from the database.

Business Rules	- Owner cannot manage research project - Supervisor can manage research project
Assumptions	None
Notes and issues	None

3.2.7 UCD 700 – Generate Certificate

Use Case ID	**UC 700**	Created by	Muhd Aidid Aizad Bin Abd Rahim
Use Case Name	Generate Certificate		
Brief Description	When supervisor successfully added new research project into the system, the system will generate a certificate for the student that owns the research project.		
Actors	Supervisor		
Related Use Cases	Manage Research Project		
Criticality of Use	Low		
Preconditions	3. Student open the login page. 4. Student click into registration page.		
Post conditions	New certificated will be generated		
Normal Course of Event (MSS)	**Actor**	**System**	
	<u>Generate Certificate</u> 1. Supervisor open research project page. 2. Supervisor click the "Add New Research Project" button. 3. Supervisor fill the form with the required field. 4. Supervisor submit the research project creation form.	1.1 System display research project list page. 2.1 System display a form to be filled. 4.1 System validate the research project details. 4.2 System creates and store new research project information 4.3 System generate certificate based on information from the newly created research project.	
Business Rules	- Only supervisor can create new research project. - Student may view or download the generated certificate.		

Assumptions	None
Notes and issues	None

4. External Interface Requirements

4.1 User Interfaces

In the graphic user interface (GUI) of FYRAS, features like buttons, tabs, drop-down menus, and tables will be available (to display list of research project and certificate). The user must sign into their account to access the login interface. If they don't have any, the owner must first register for supervisor and the student must register first. The system's whole user interface is depicted in the figure below.

4.1.1 OWNER & SUPERVISOR ACCOUNT

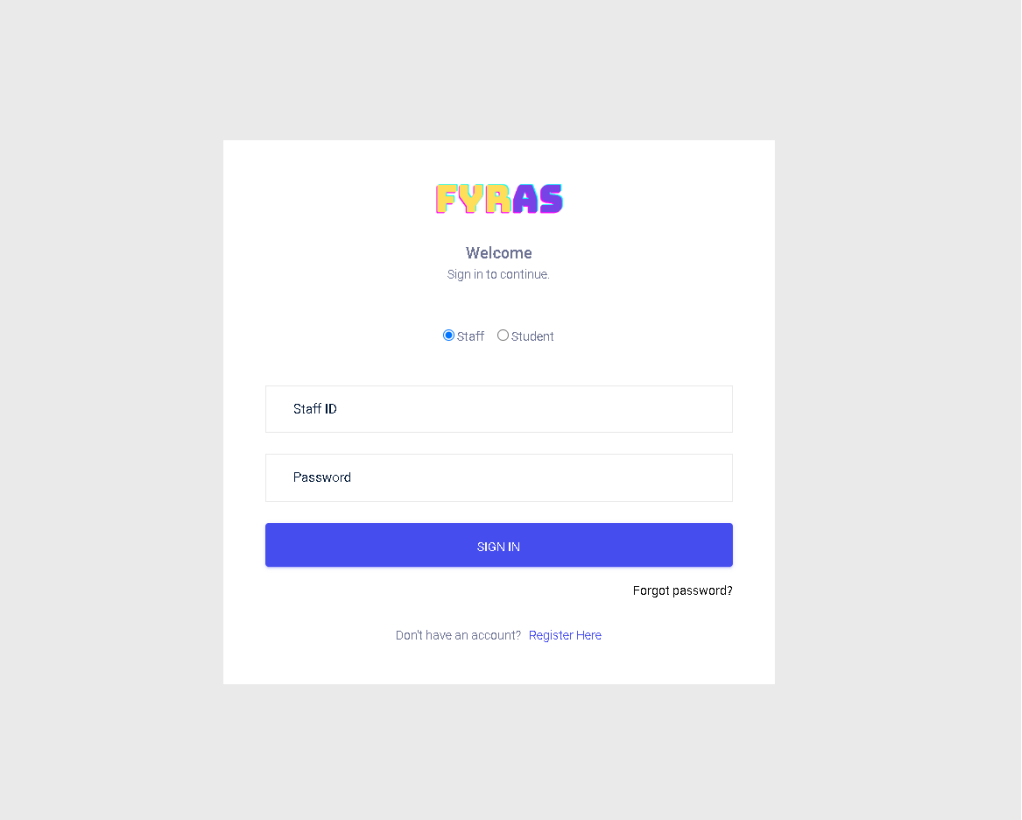


Figure 4.1.1 Login Page (Owner & Supervisor)

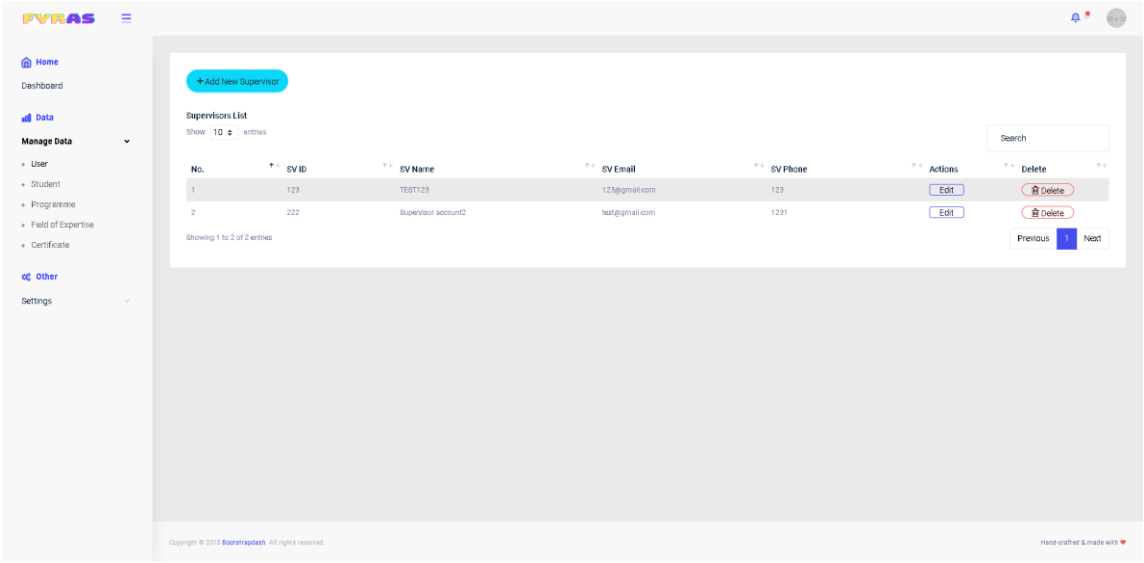


Figure 4.1.2 Manage User Page

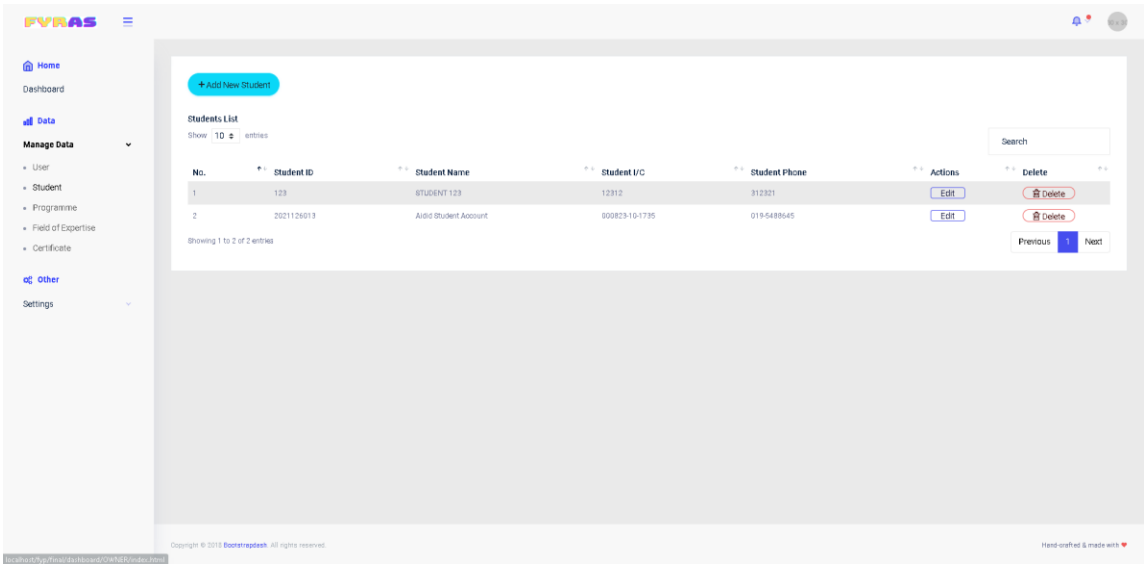


Figure 4.1.3 Manage Student Page

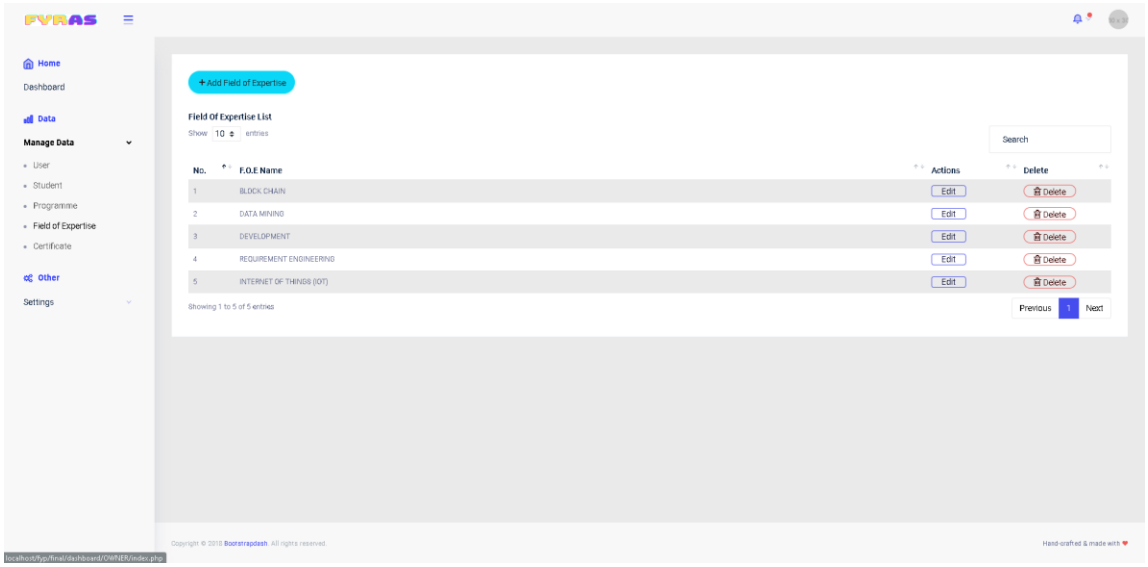


Figure 4.1.4 Manage Field of Expertise page

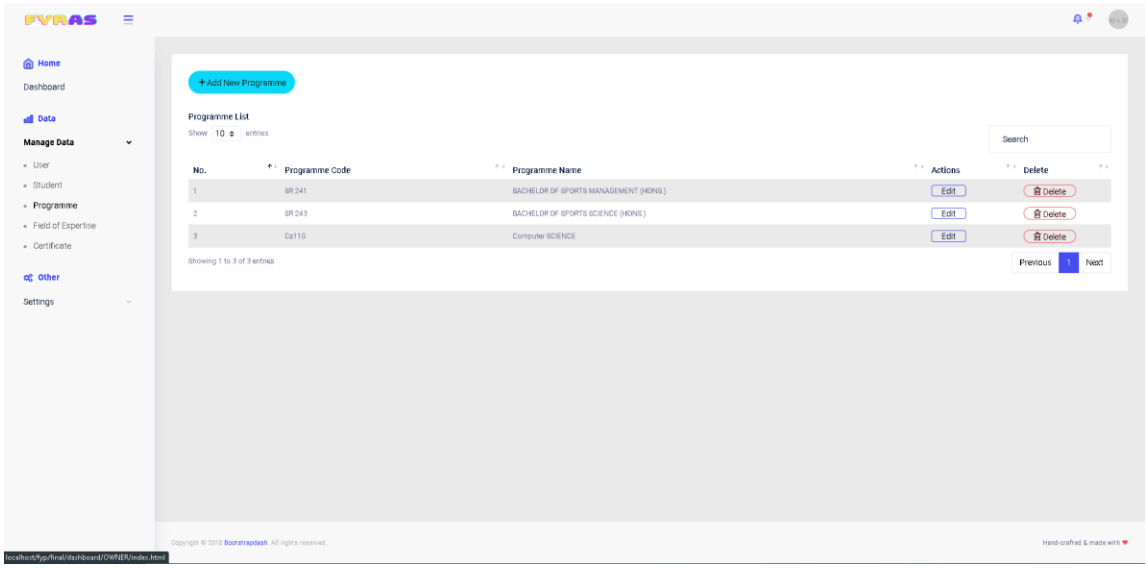


Figure 4.1.5 Manage Programme page

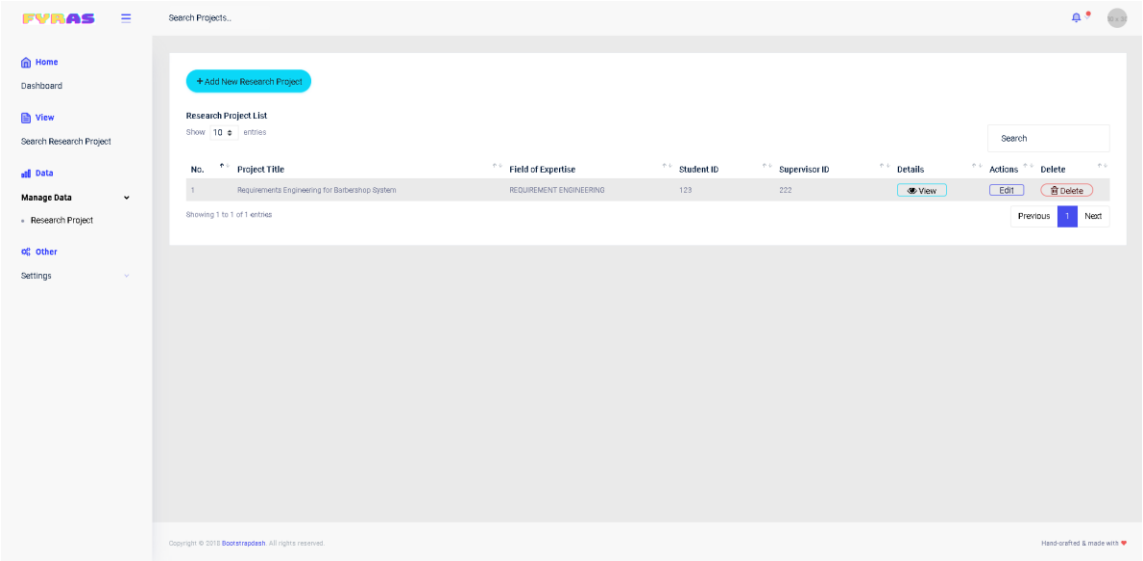


Figure 4.1.6 Supervisor Manage Research Project page

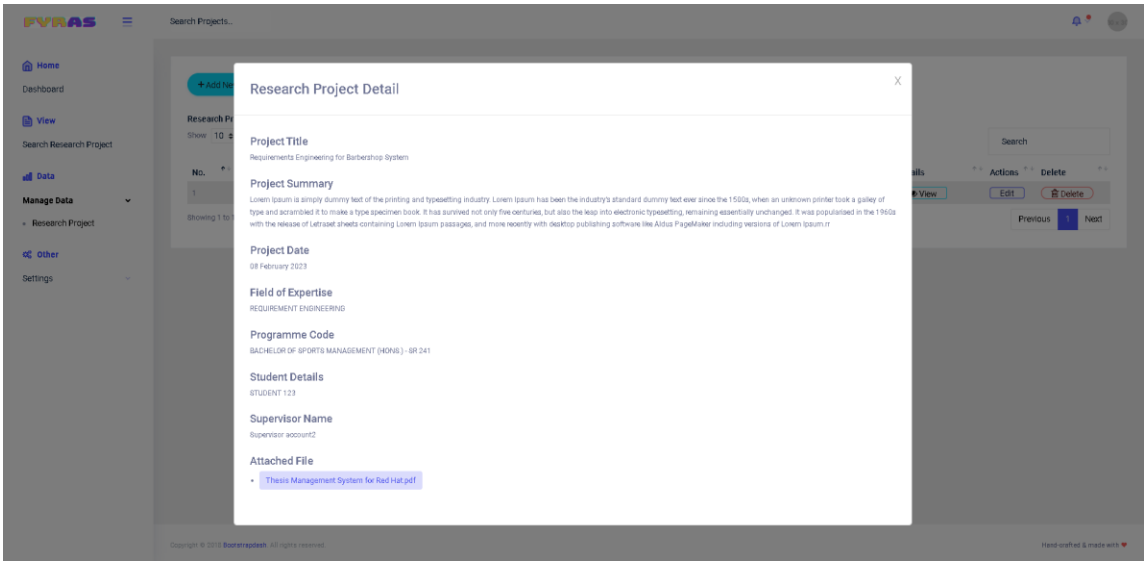


Figure 4.1.7 Supervisor view Research Project details

4.1.2 STUDENT ACCOUNT

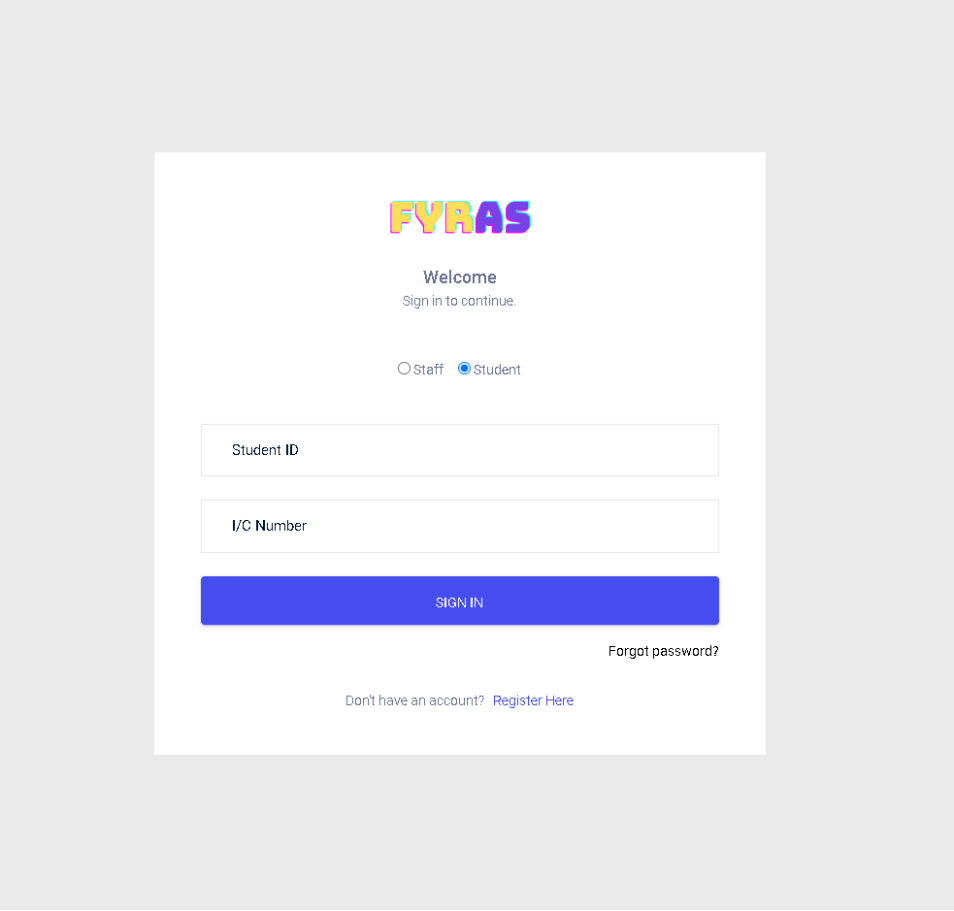


Figure 4.1.8 Login page for Student

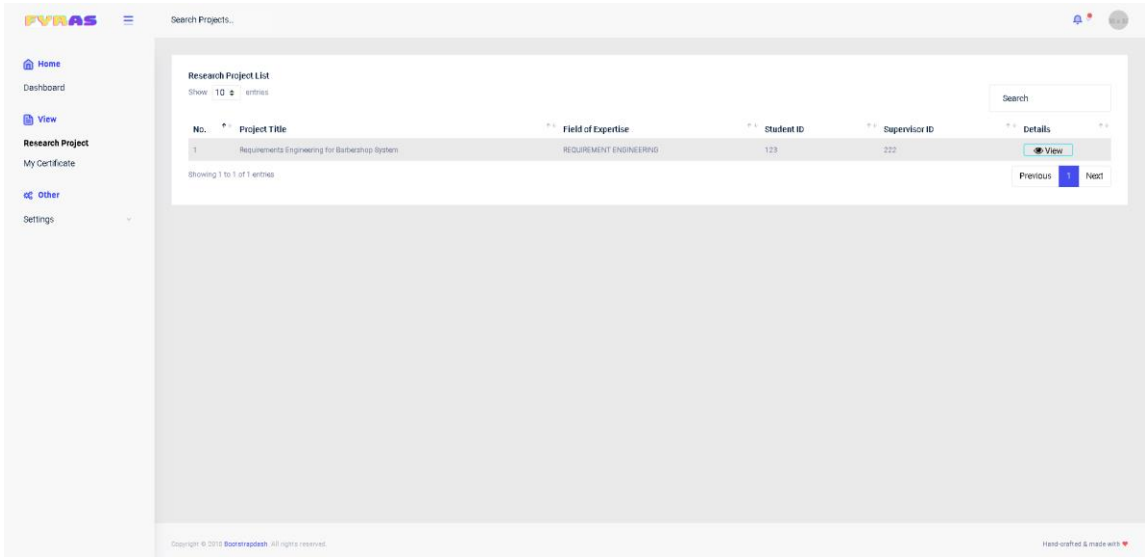


Figure 4.1.9 Student search Research Project page

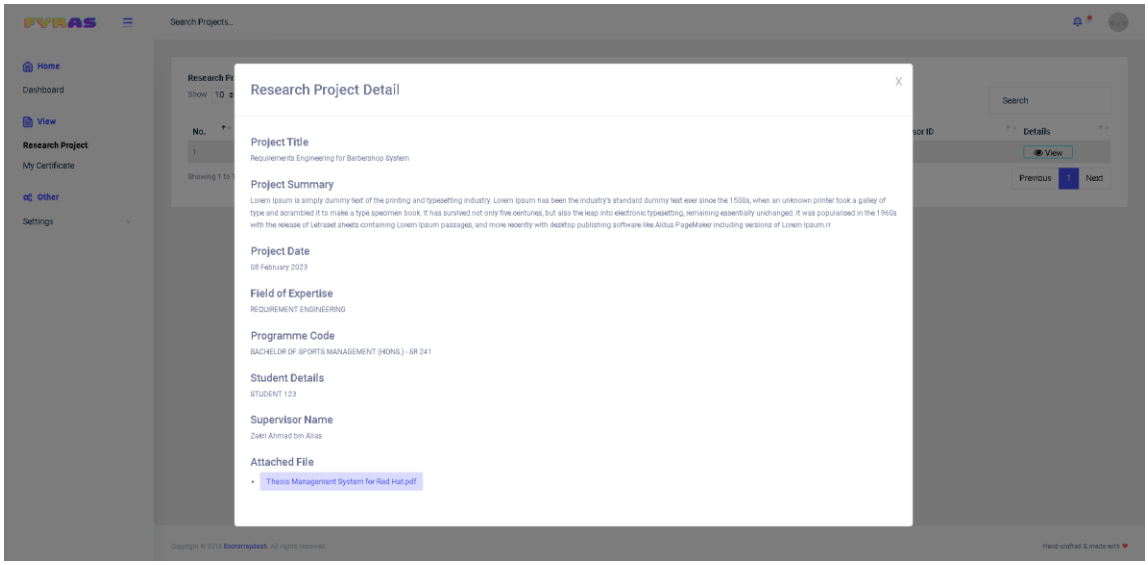


Figure 4.1.10 Student view Research Project details

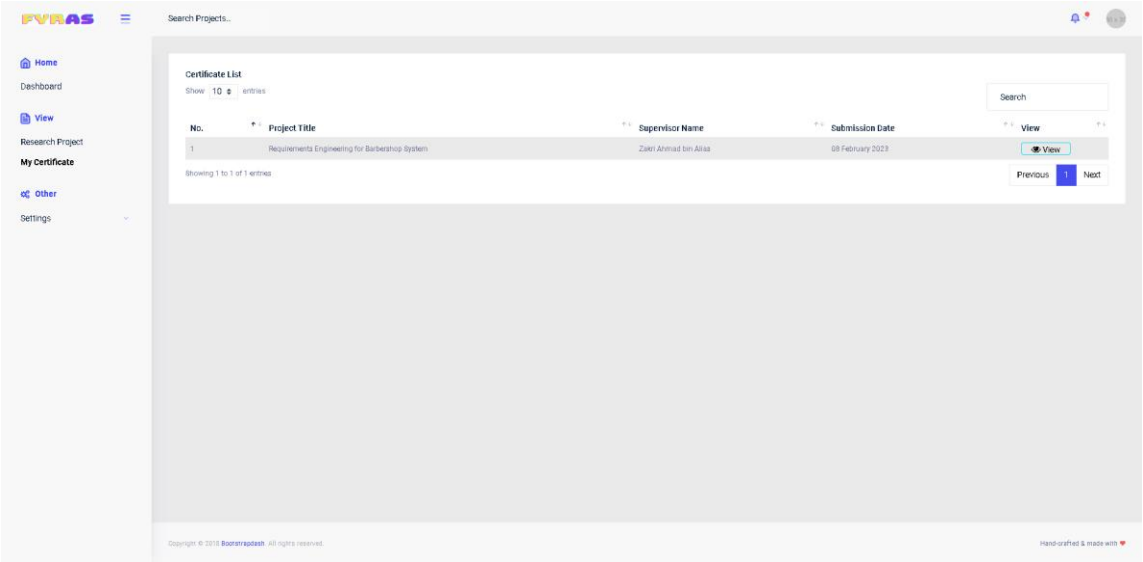


Figure 4.1.11 Student view Certificate List page

4.2 Hardware Interfaces

To engage with the system, user will need a PC or laptop with internet access, a keyboard, and a mouse. A hard drive will also be required to ensure comprehensive data redundancy, record keeping, and an emergency backup system. Aside from that, any user can access this system through their smartphone or smart device, which can run any web browser.

4.3 Software Interfaces

The system should be compatible with the most common operating systems. This could include Windows 7, 10, or 11. The system would be created using Visual Studio code, with most of the coding done in PHP. An internet connection is required.

4.4 Communications Interfaces

The system would interact with the user via a web browser. Most popular online browsers, including Google Chrome, Firefox, and Microsoft Edge, would also support the system.

Figure 4.4.1 Browser that supports the system.

5. Other Nonfunctional Requirements

5.1 Performance Requirements

System requirement is the most important part of the system for the user to use the system efficiently and reduce the cost of running the system.

These are the list of performance requirements for the system:

Module	Requirement
Web Application	- Must be able to load under 10 seconds or lower. - Able to show any error if there is any problem within the system. - Must be able to store research project. - Must be able to generate certificate. - Able to be used by multiple users at the same time. - Must be able to connect to database. - Able to show the data that users want to see.
Database	- Able to access and retrieve data for multiple users at the same time

5.2 Safety Requirements

Data that is stored inside the system's database will not leak nor damage any information that was stored inside the system.

5.3 Security Requirements

Module	Requirement
Web Application	- Able to identify the owner by input the right id and password during login. - Confidential information is safe from the other users. - Users' information is also safe from the other users.
Database	- Sensitive information is encrypted safely within the database. - Only accessible by authorized users.

5.4 Software Quality Attributes

Attributes	Requirement
Availability	The system should be able to be used anytime the user needs or wants.
Performance	This system is able to load quickly.
Useability	Able to teach user how to use the system properly, and effectively.

6. Other Requirements

No other requirements needed in this system.

Appendix A: Glossary

SRS – Software Requirements Specification

FYRAS – Final Year Research Archive System

ERD – Entity Relationship Diagram

SSD – System Sequence Diagram

PC – Personal Computer

FYR – Final Year Research

PHP – Hypertext Preprocessor

HTML – Hypertext Markup Language

CSS – Cascading Style Sheet

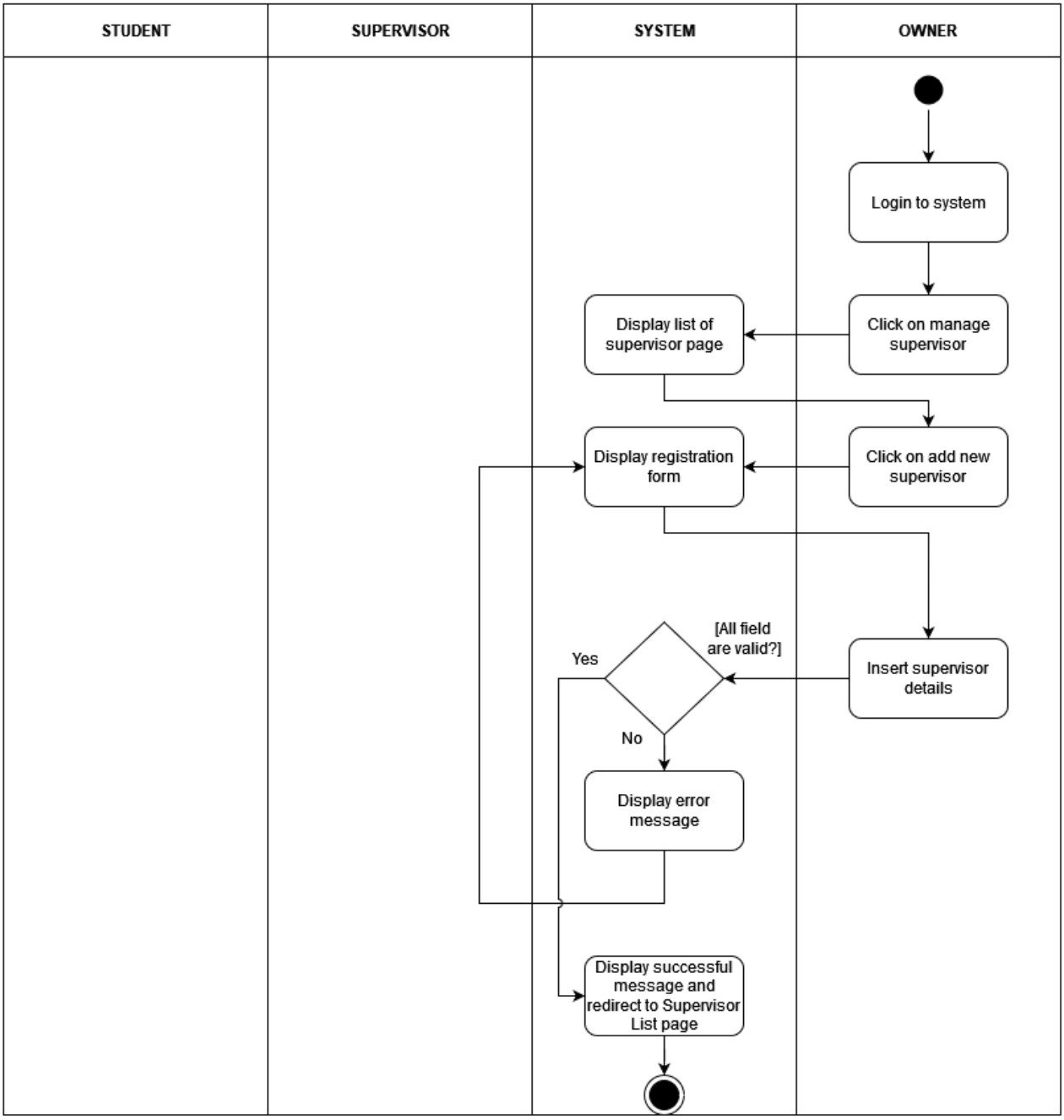
JS – JavaScript

SQL – Structured Query Language

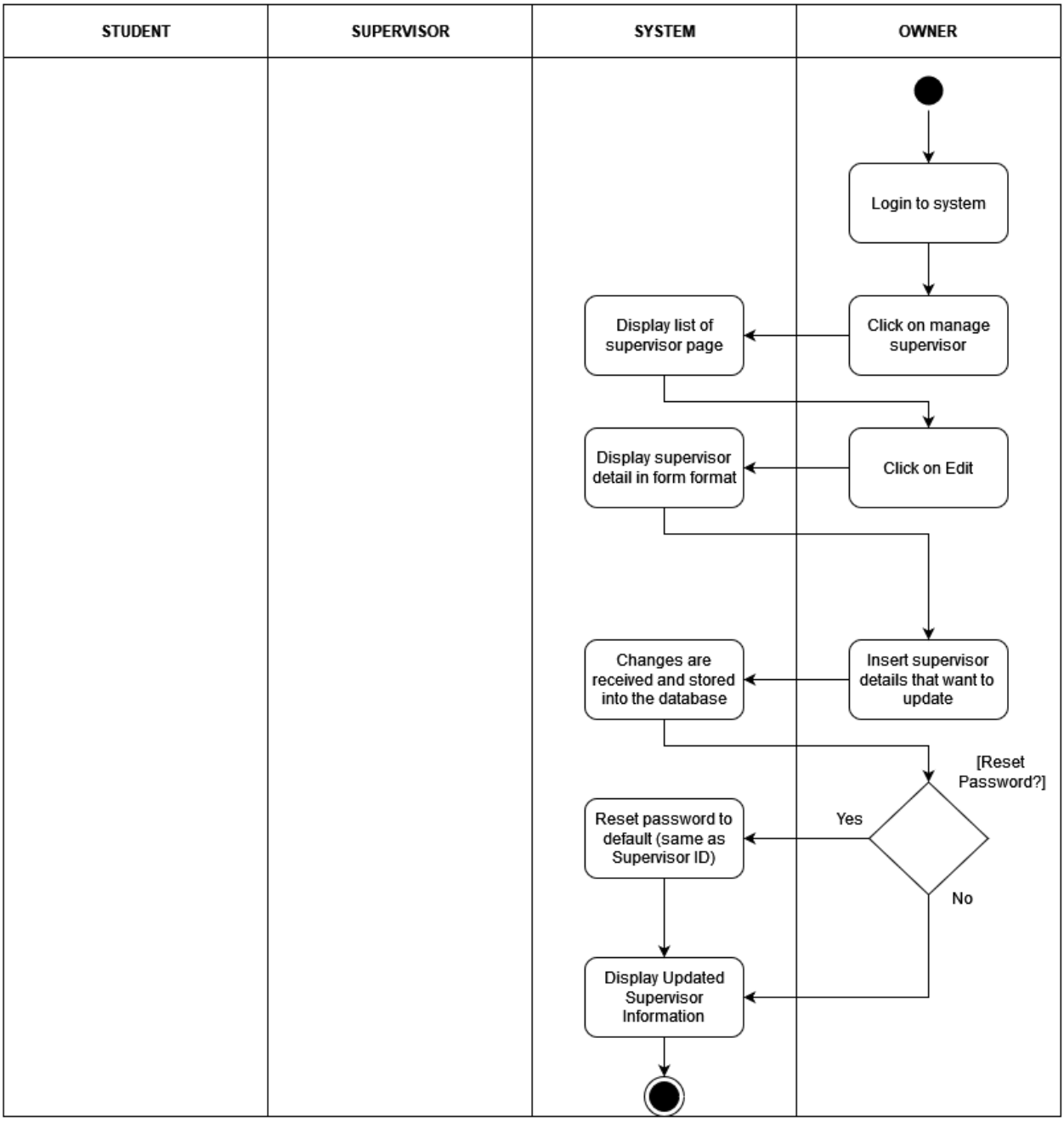
Appendix B: Analysis Models

6.1 Business Activity Diagram

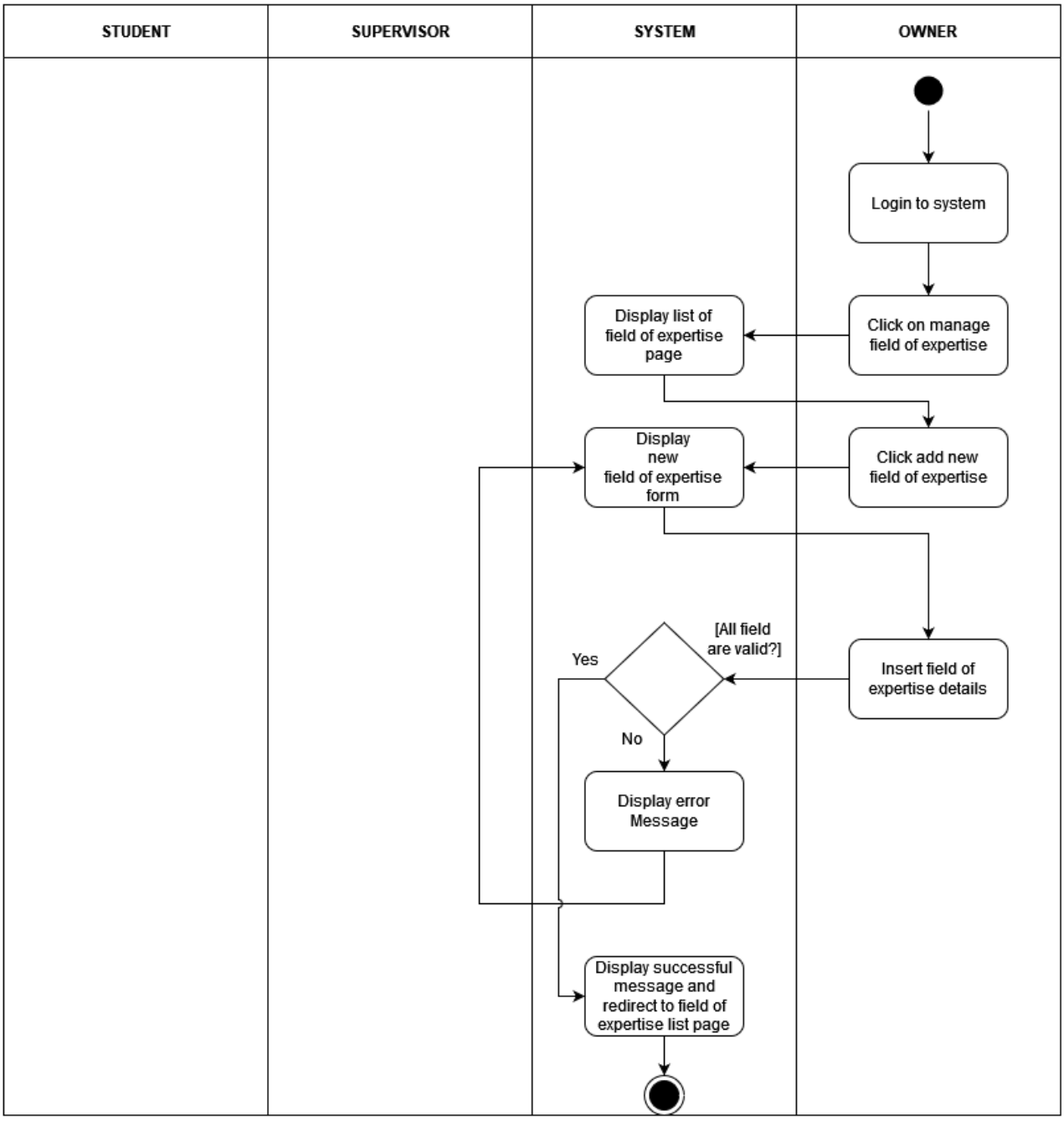
6.1.1 Manage User (Register Supervisor)



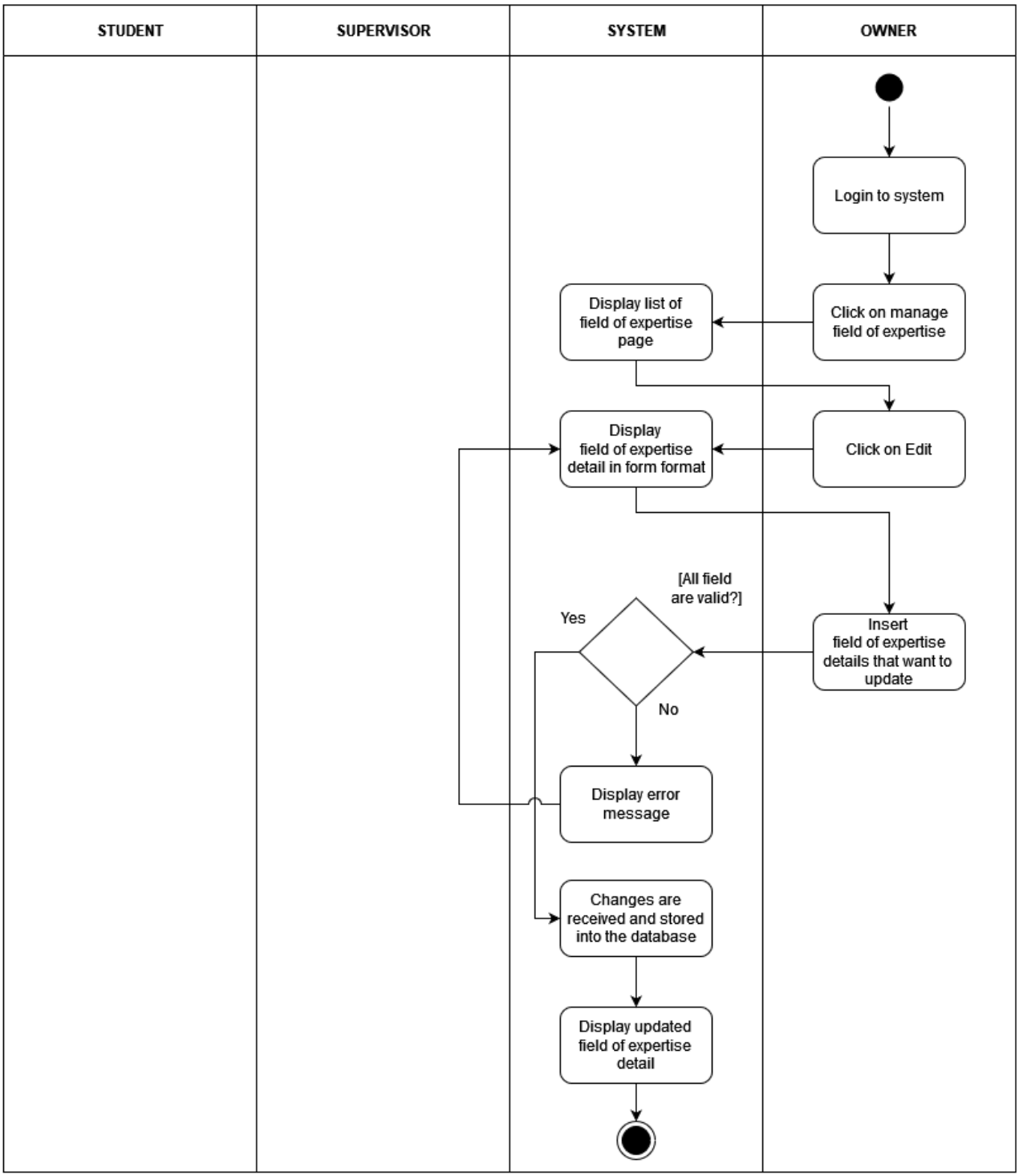
6.1.2 Manage User (Update)



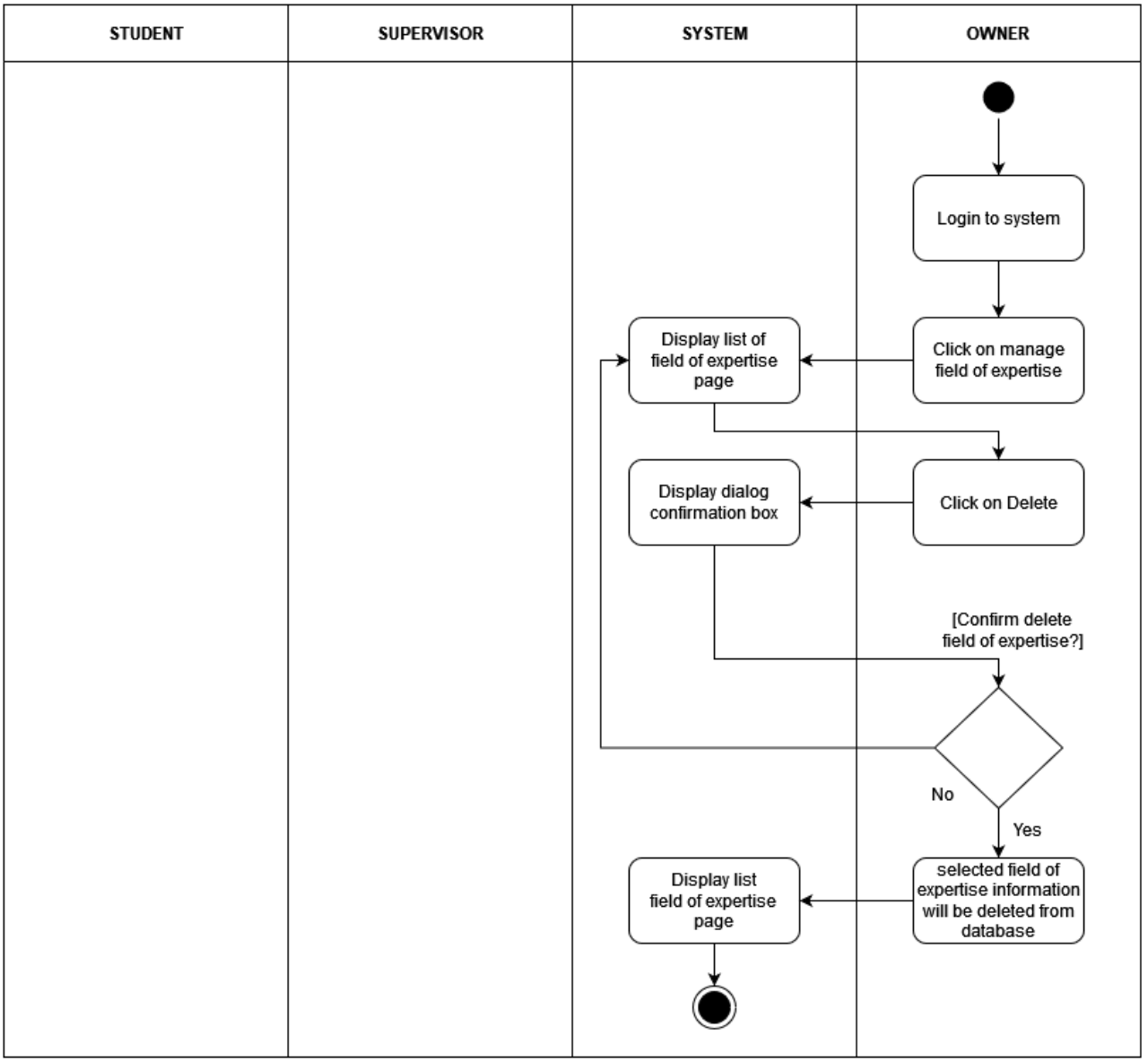
6.1.3 Manage Field of Expertise (Create)



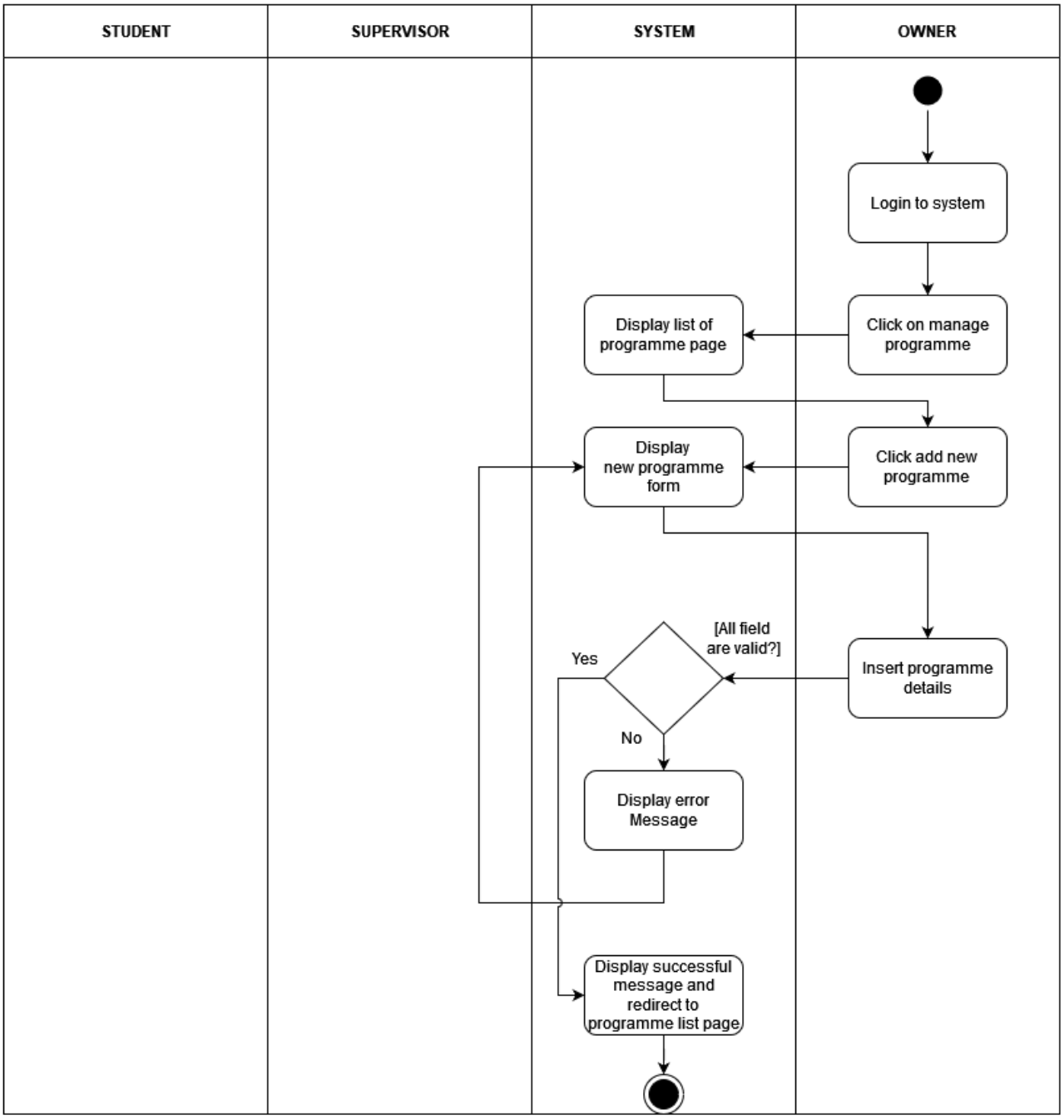
6.1.4 Manage Field of Expertise (Update)



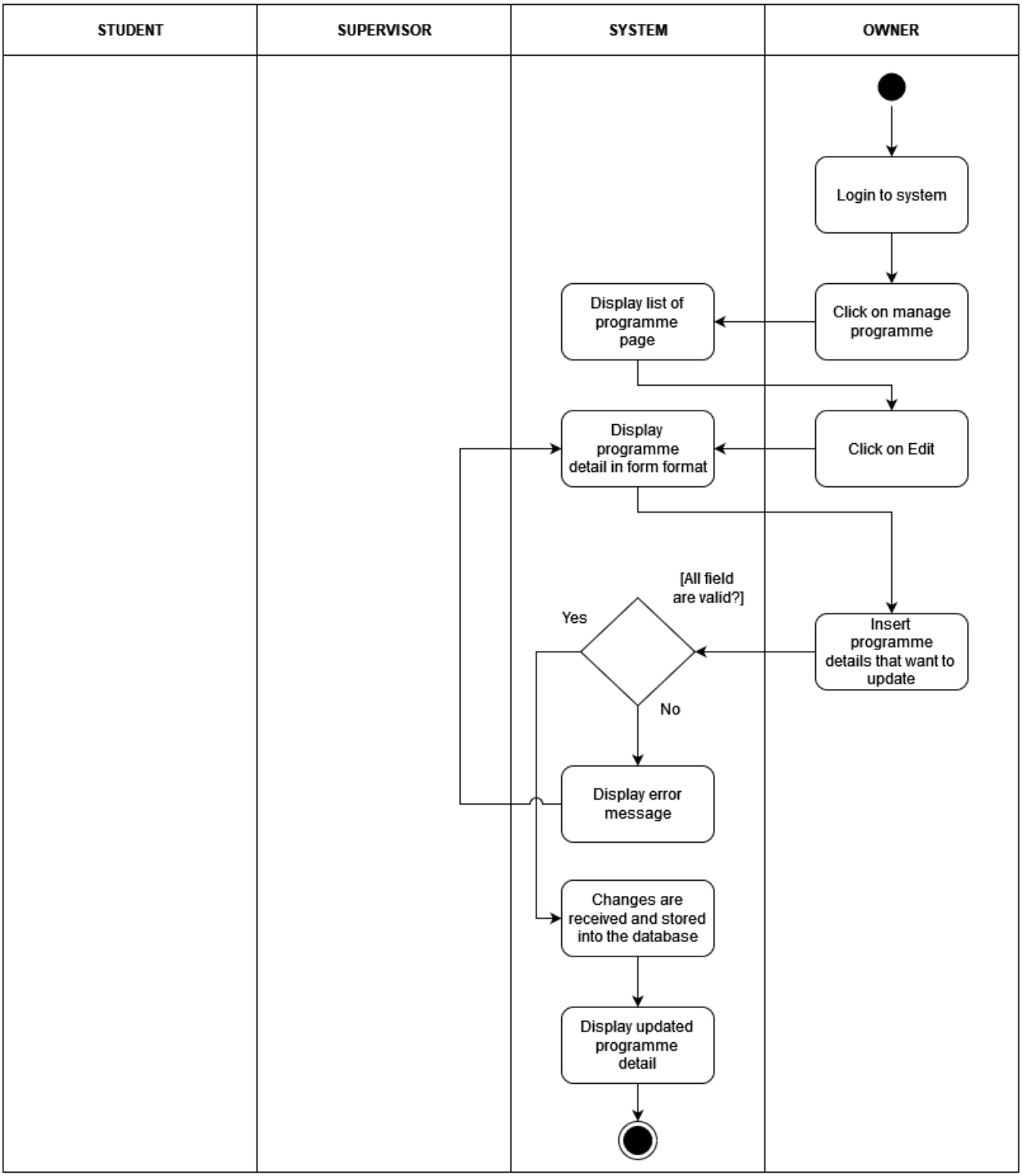
6.1.5 Manage Field of Expertise (Delete)



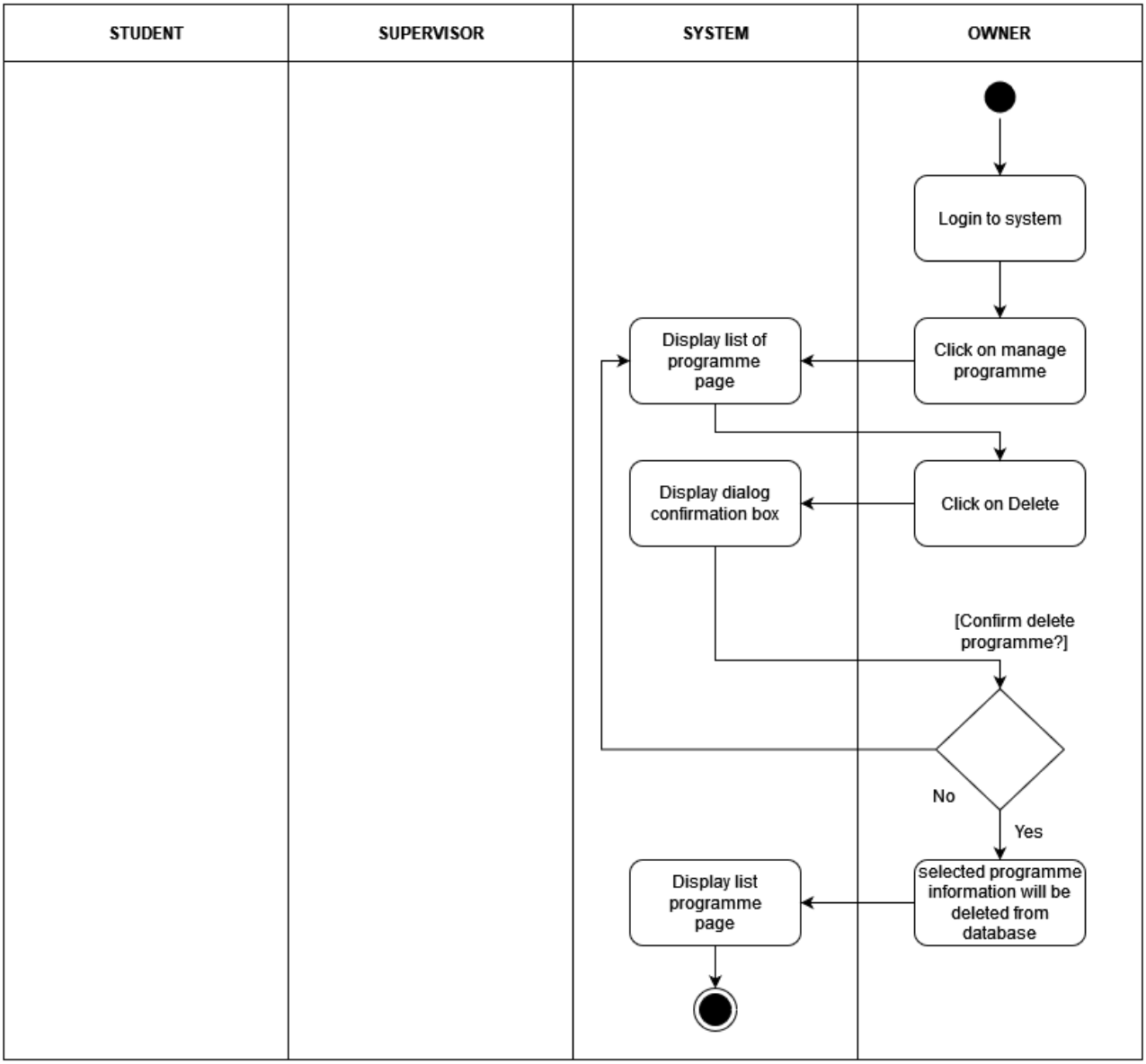
6.1.6 Manage Programme (Create)



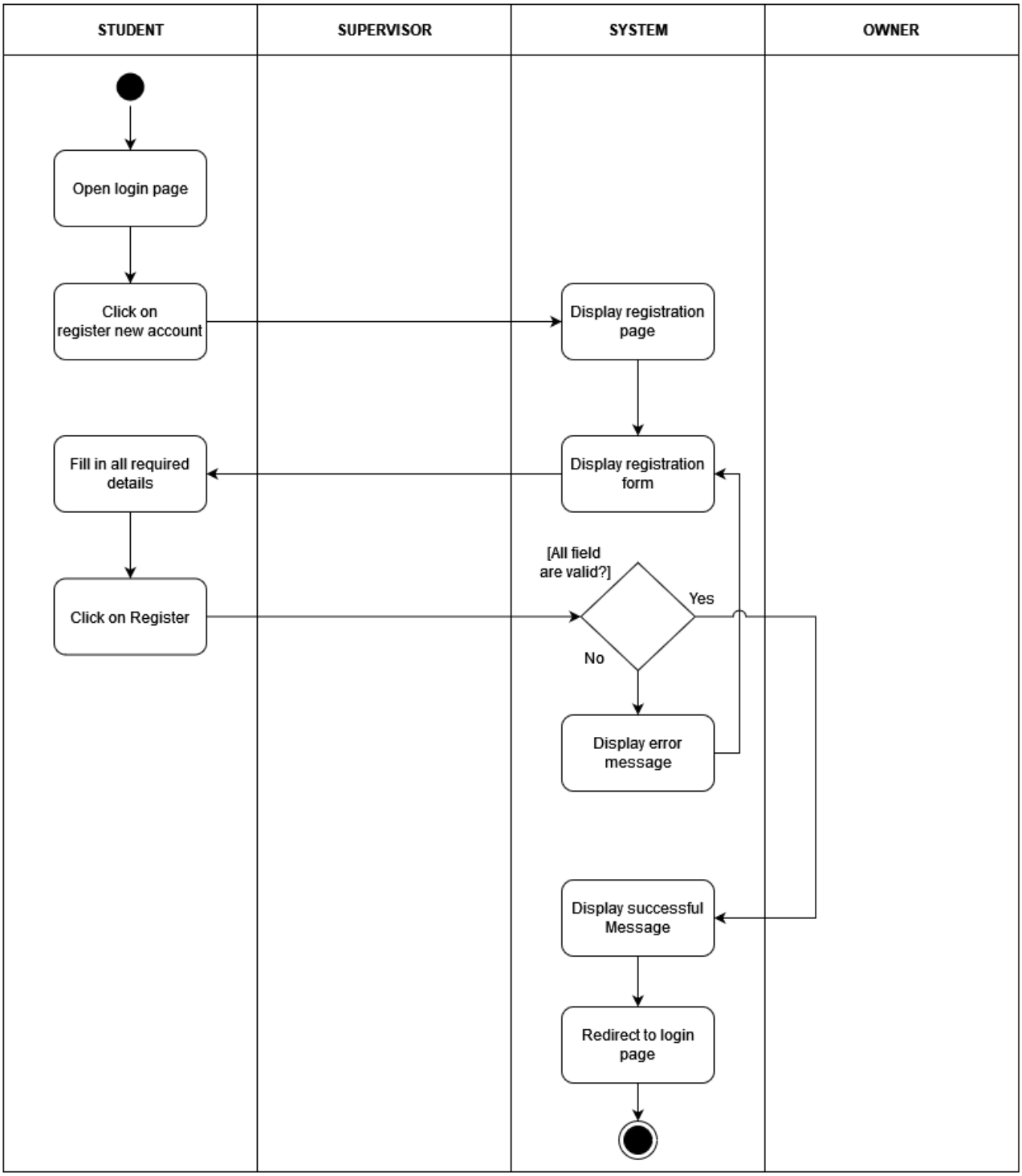
6.1.7 Manage Programme (Update)



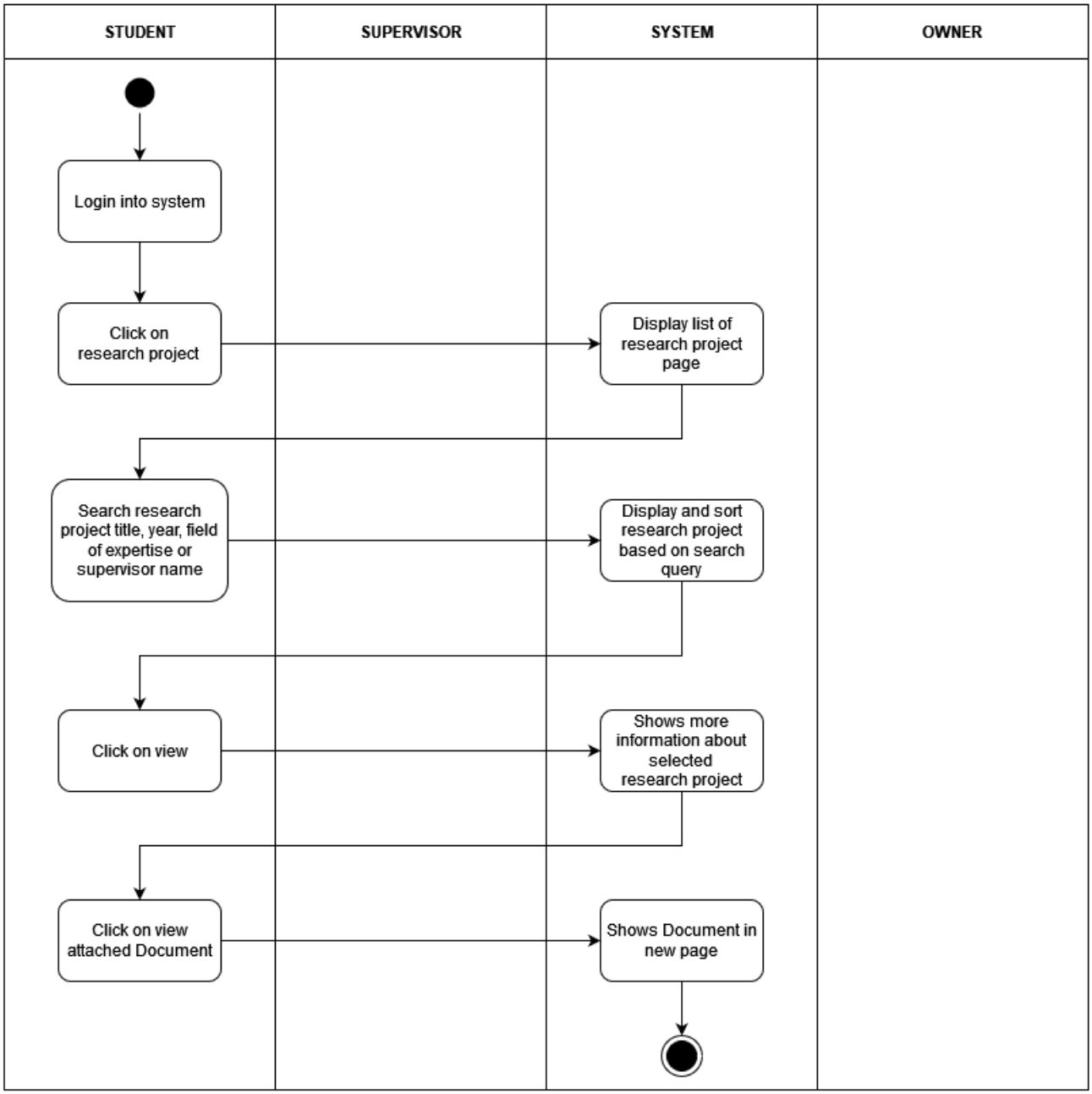
6.1.8 Manage Programme (Delete)



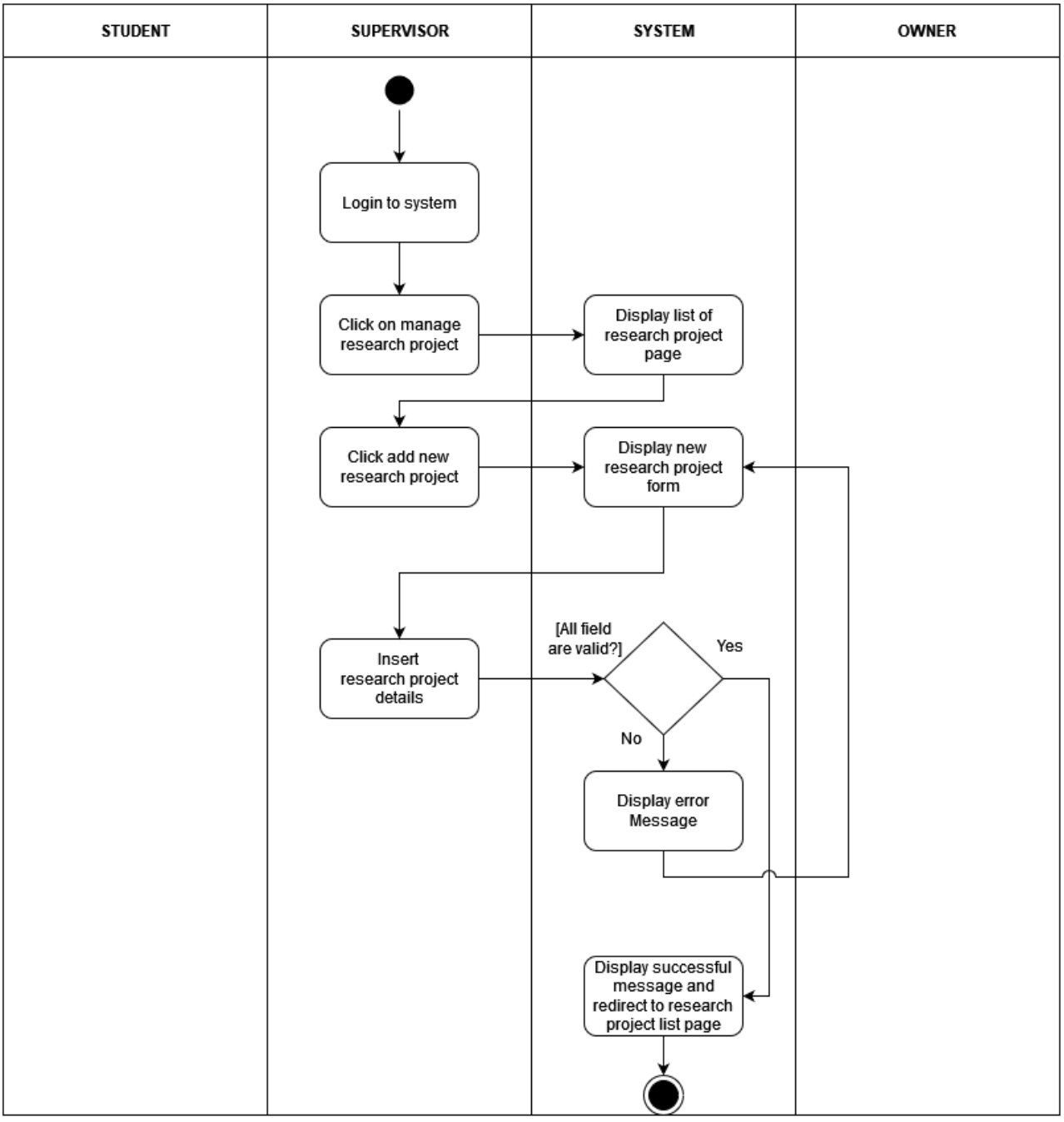
6.1.9 Register (student account)



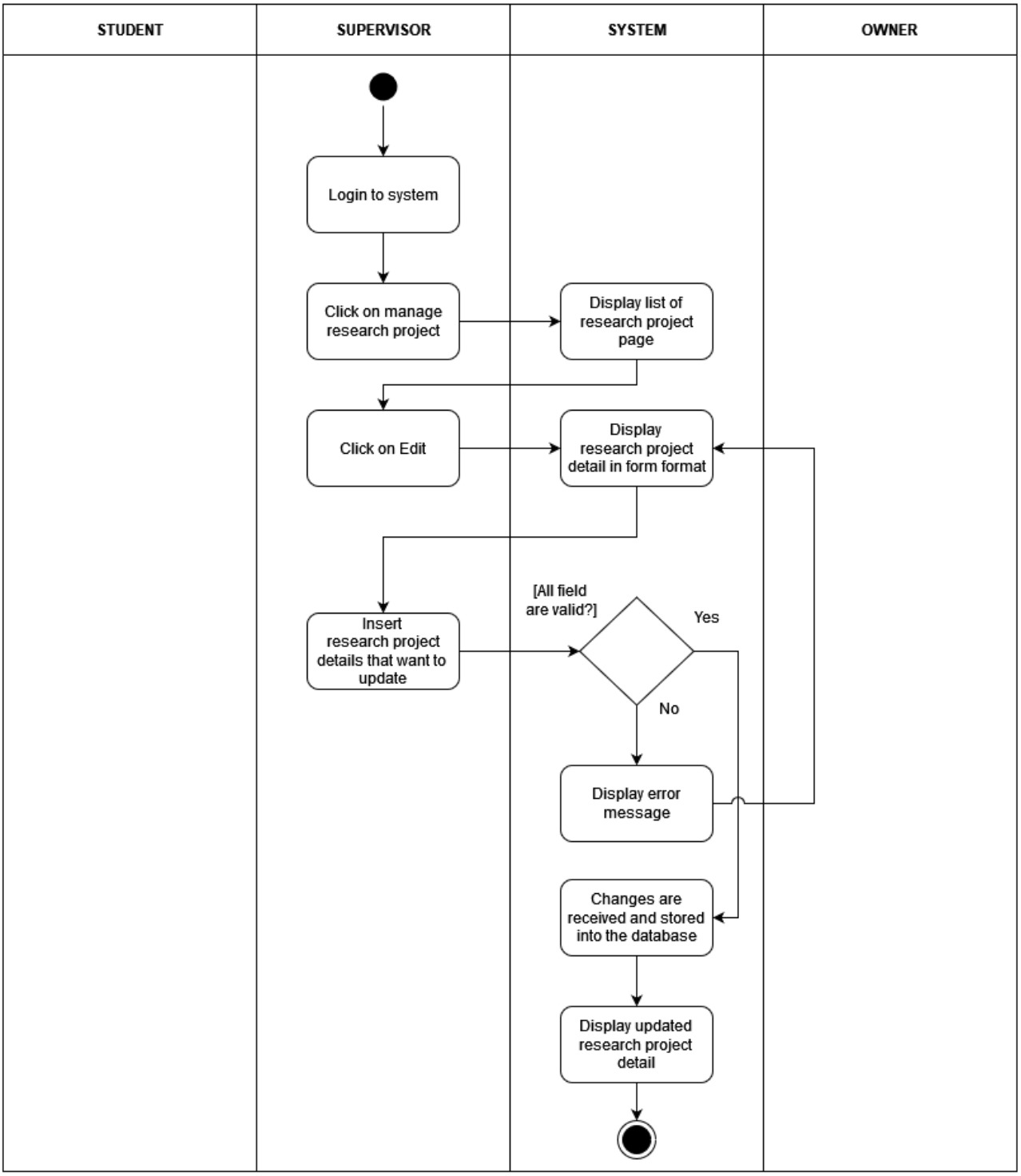
6.1.10 View Research Project



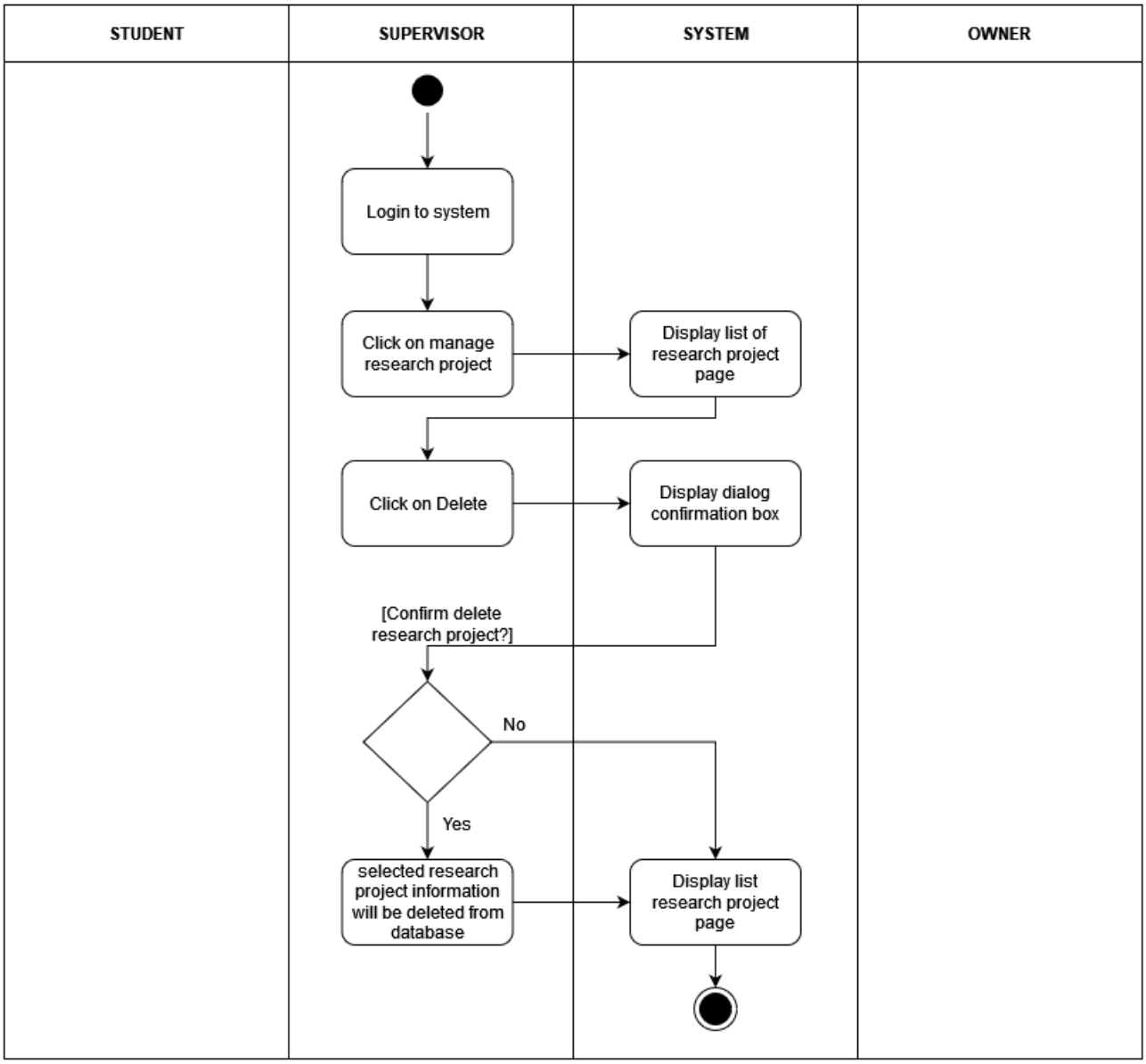
6.1.11 Manage Research Project (Create)



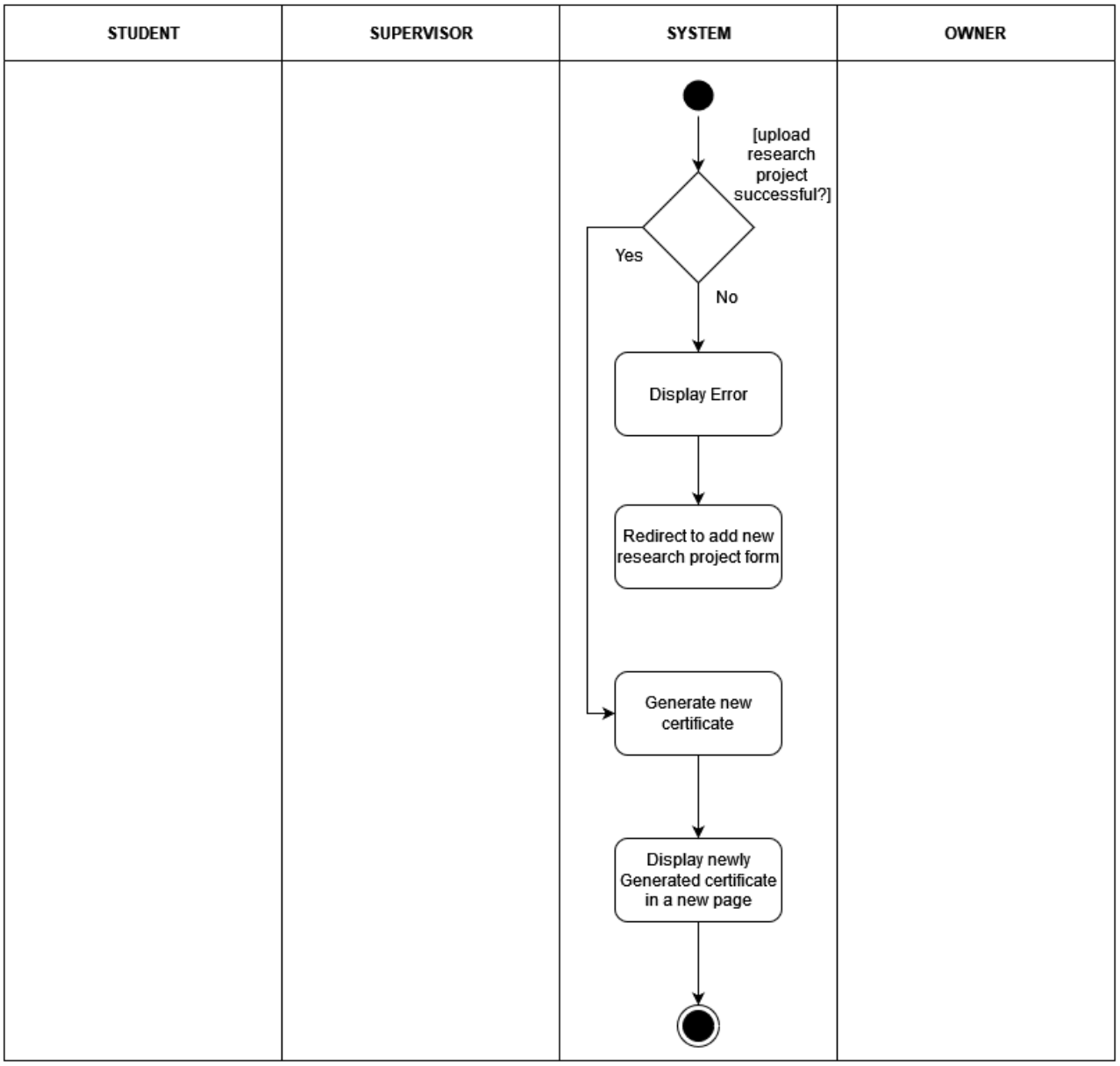
6.1.12 Manage Research Project (Update)



6.1.13 Manage Research Project (Delete)



6.1.14 Generate Certificate

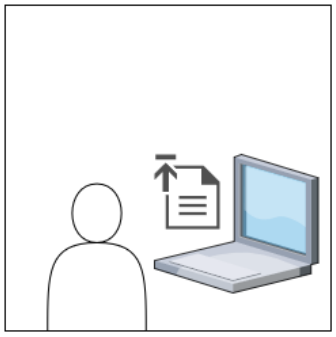


6.2 Storyboard (Event Decomposition)

STORYBOARD (EVENT DECOMPOSITION)

Student submit research project to supervisor

Supervisor and examiner grade student research project



Supervisor upload graded research project into the system

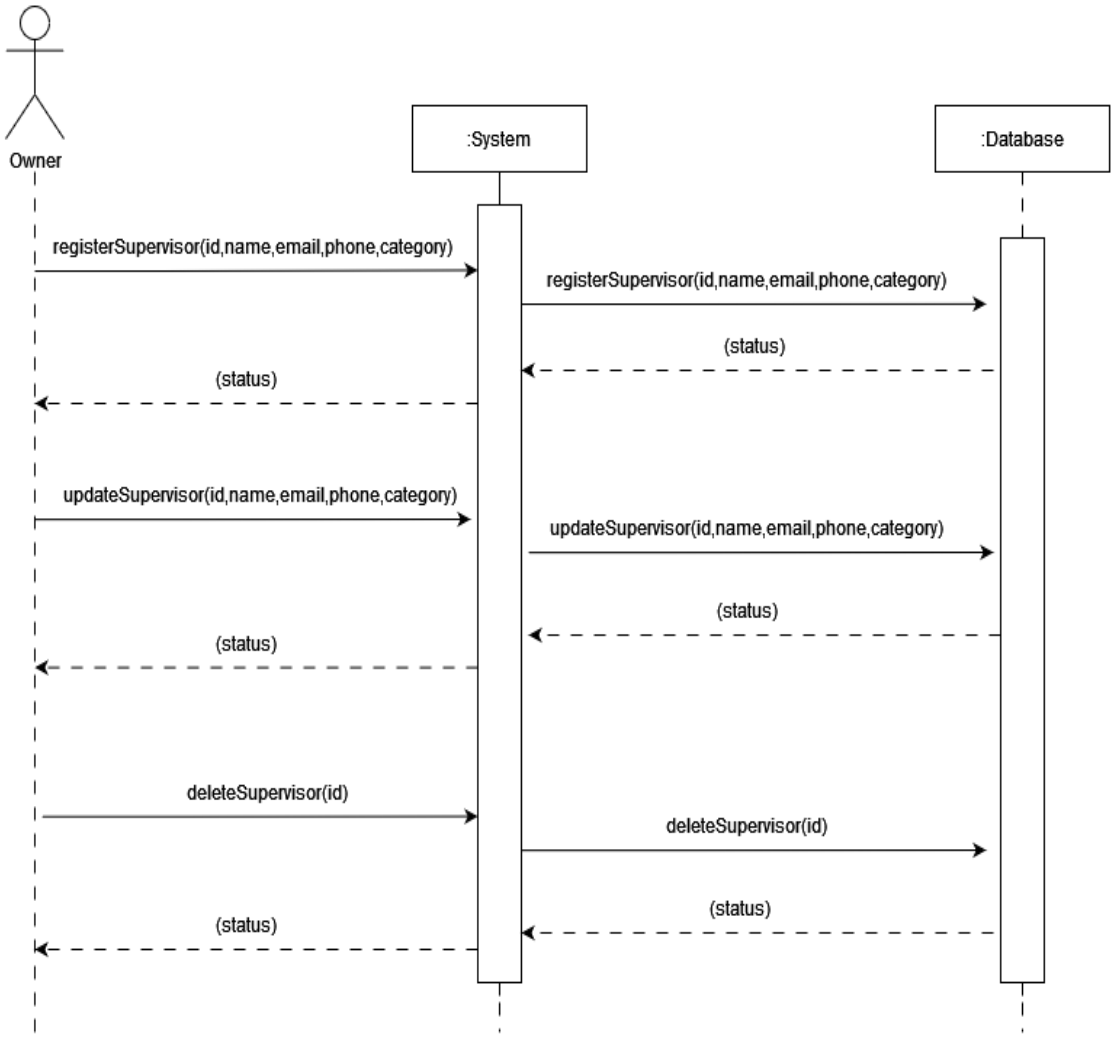
Student want to check their research project

Student view and download certificate of achievement generated by the system

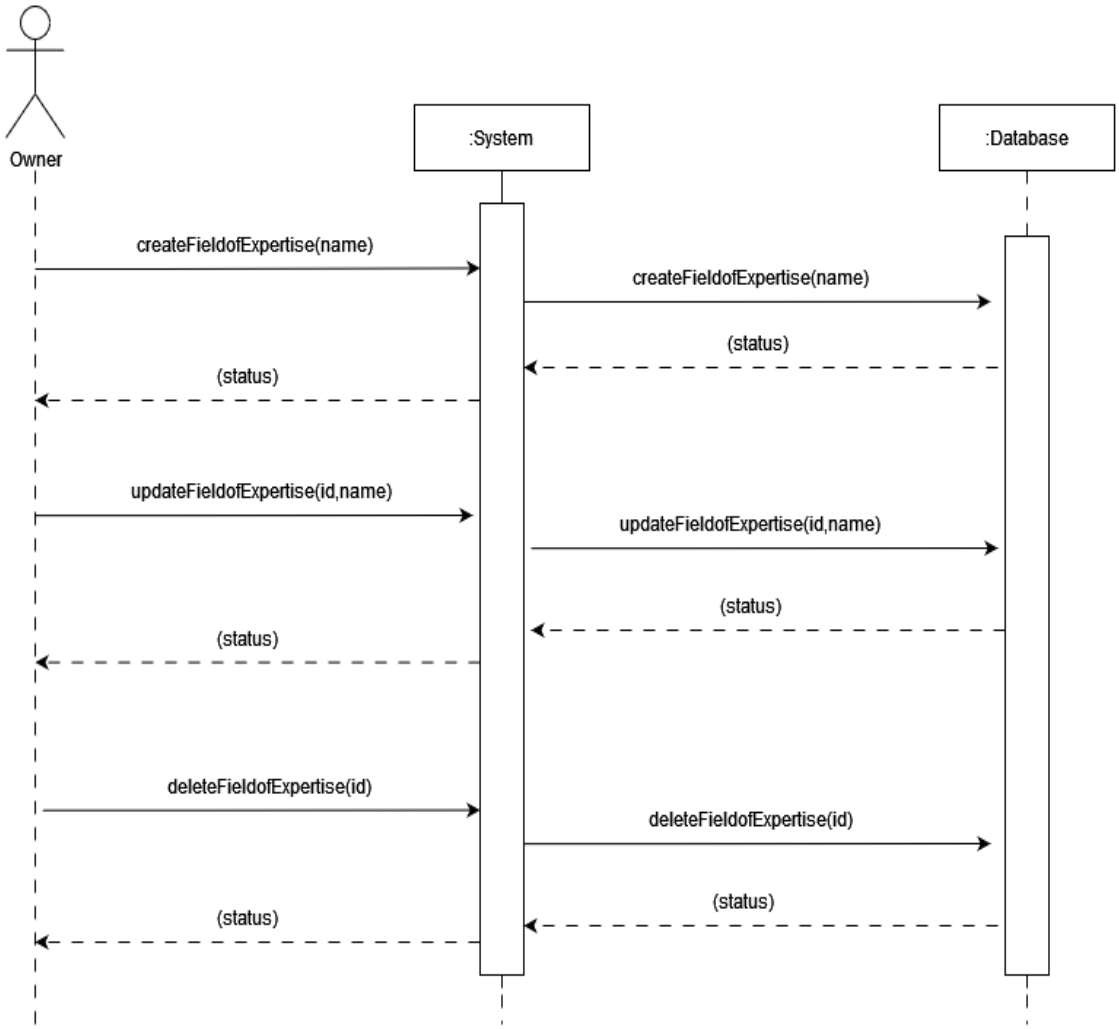
Student search for other research project that has been submitted into the system

6.3 SSD Notation

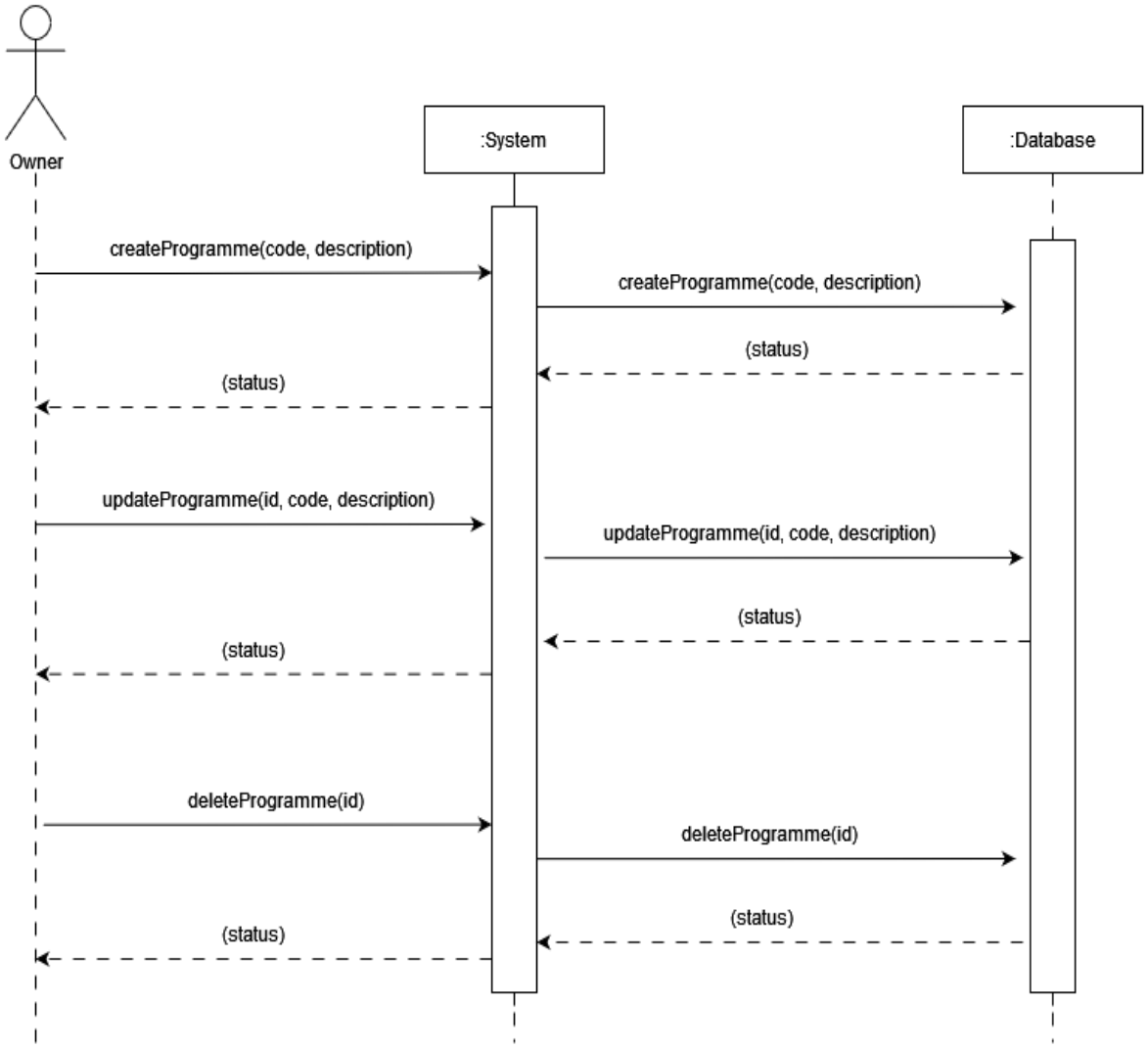
6.3.1 Use case 1: Manage User



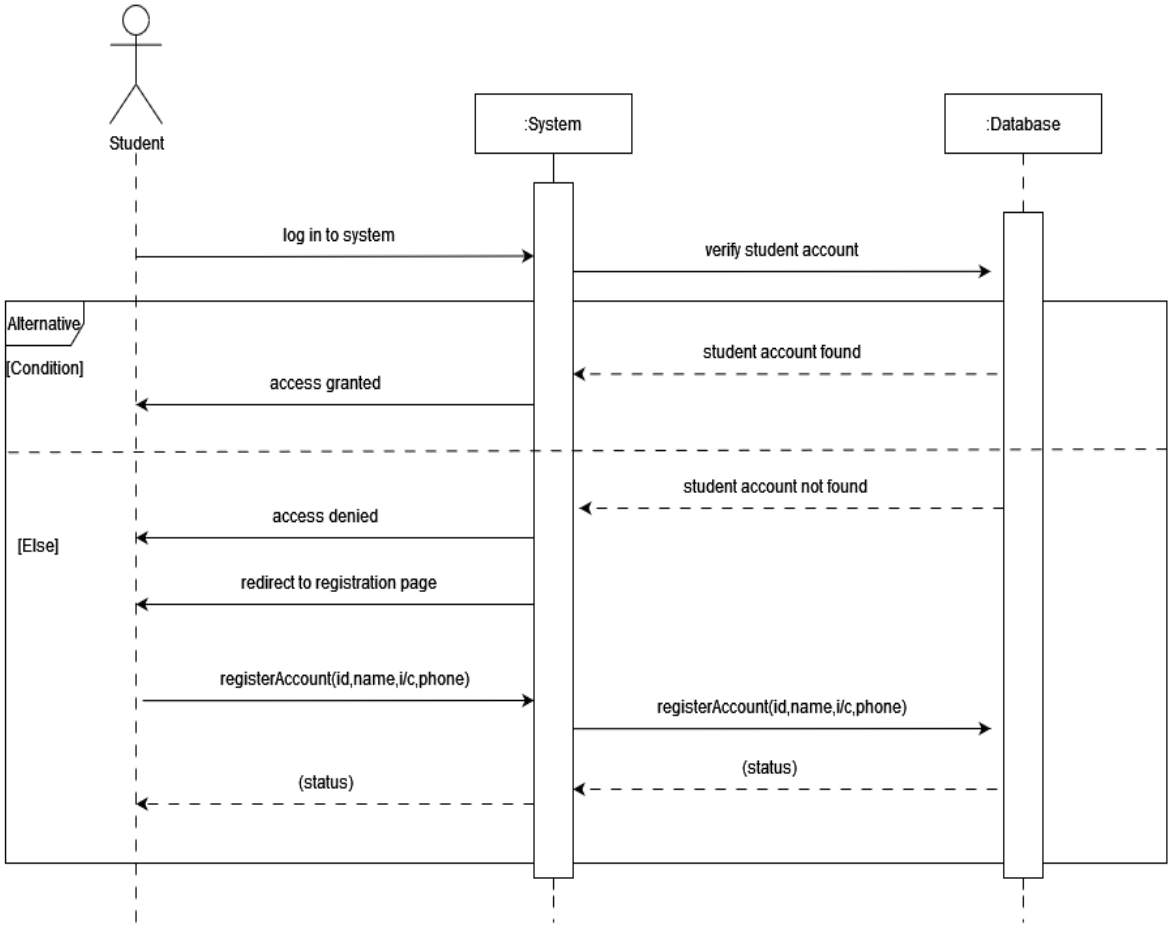
6.3.2 Use Case 2: Manage Field of Expertise



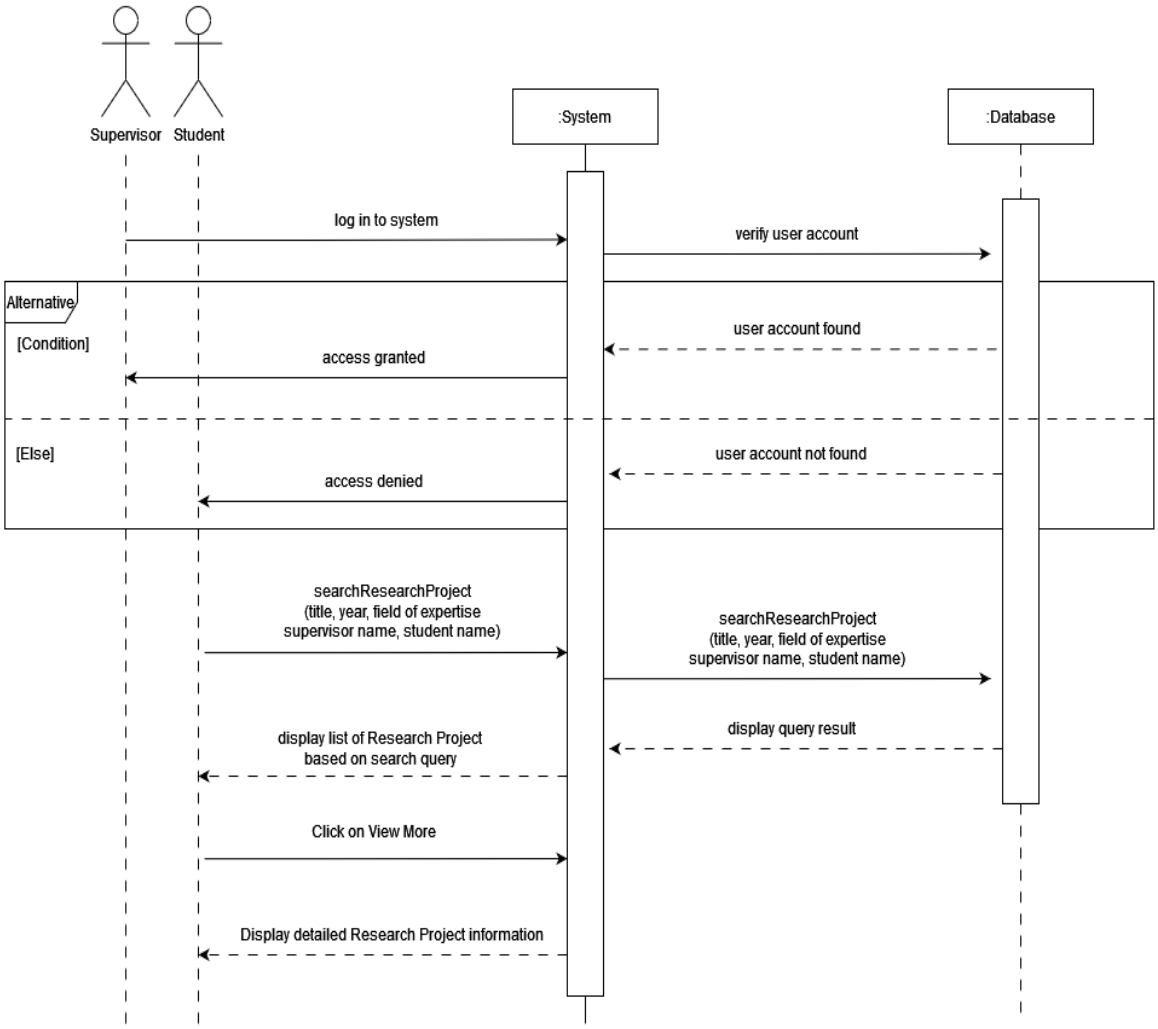
6.3.3 Use Case 3: Manage Programme



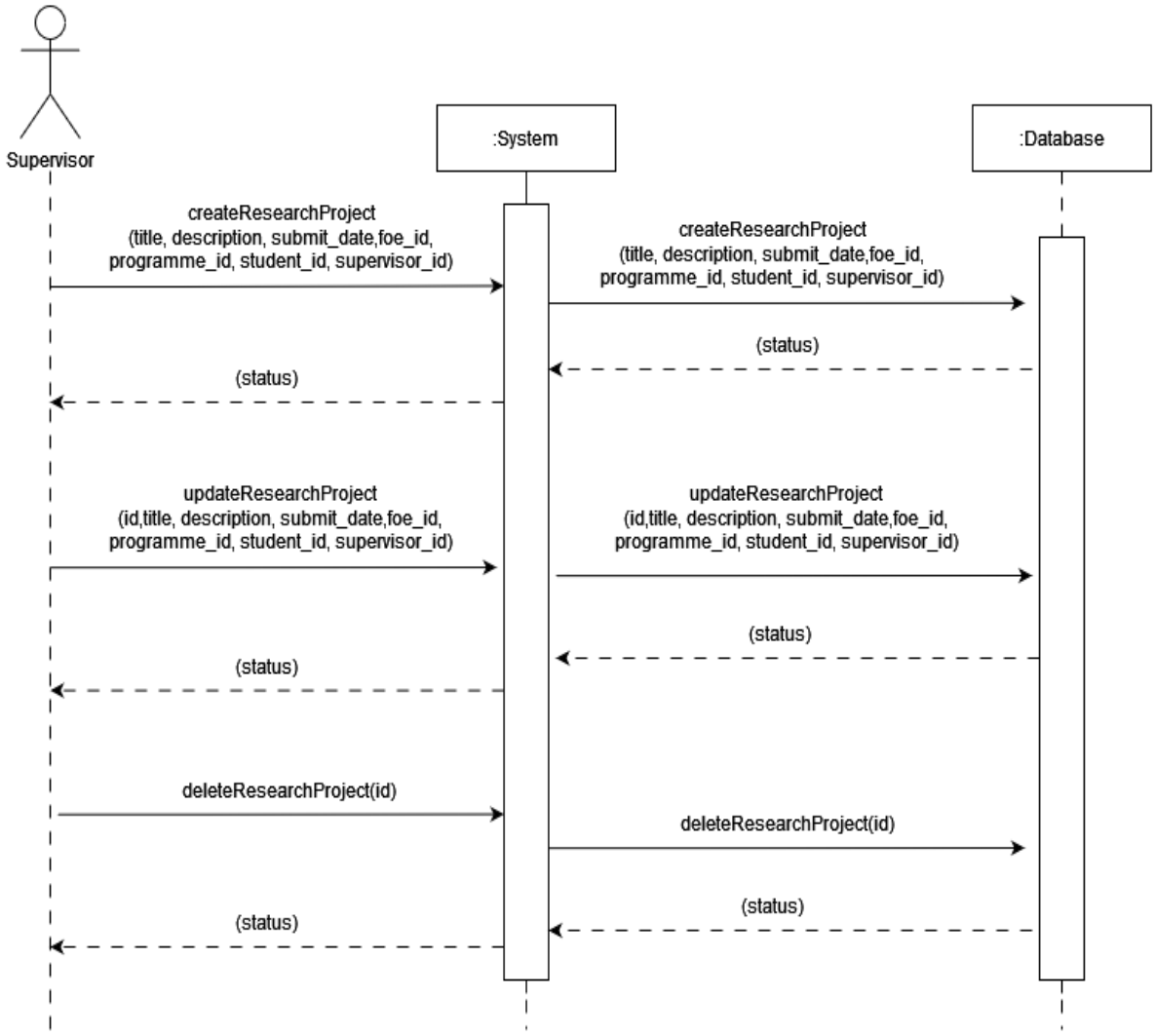
6.3.4 Use Case 4: Register



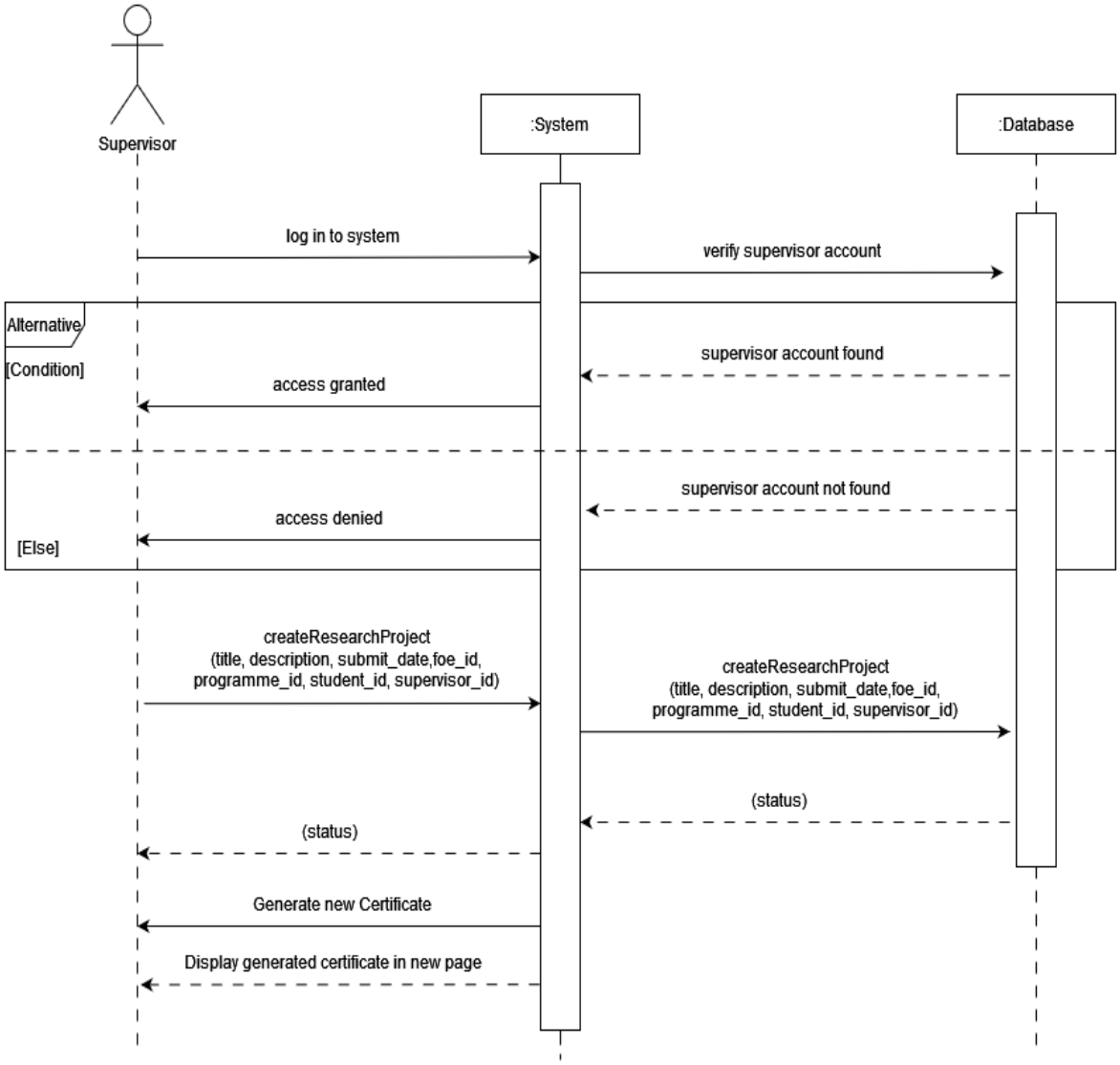
6.3.5 Use Case 5: View Research Project



6.3.6 Use Case 6: Manage Research Project



6.3.7 Use Case 7: Generate Certificate



Appendix C: Issues List

There is no issue of indecisive for the time being.

Software Design Document

for

Final Year Research Archive System

Version 1.0

Prepared by

Muhammad Aidid Aizad Bin Abd Rahim 2021126013

20/01/2023

Revision History

Name	Date	Reason For Changes	Version
Muhammad Aidid Aizad Bin Abd Rahim	25/01/2023	Initial Document for Software Design Document	1.0

Table of Contents

1. Introduction

1.1 Purpose

This Software Design Document (SDD) provides the design details for Faculty of Sport Science and Recreation (FSR) and Final Year Research Archive System (FYRAS). The implementation detailed required to satisfy the requirements as specified in the Software Requirements Specification (SRS).

1.2 Scope

FYRAS is the system that will be used by stakeholder which are FSR supervisor. The system also can be used by FSR students to search, view, and download past research project from previous students. The current method of storing hard copy version of research project is not efficient and became a nuisance for supervisors, because it requires space to store the past research project. Students also are having problem on accessing the same research project at the same time, because there is only 1 hard copy available. Hence, FYRAS will be developed to overcome the problems.

1.3 References

- Satzinger, W.J, Jackson, B.R, Burd, D.S. (2016). Systems Analysis and Design in a Changing World 7th Edition McElarth, R. (2007). XML Legal Document Utility Software Design Document,
- Software Design Document (oasis-open.org) Team1, COMP 5541, Winter 2010. Software Design Document, Testing, and Deployment and Configuration Management,
- https://arxiv.org/ftp/arxiv/papers/1005/1005.0595.pdf

1.4 Document Structure

This document is written similarly according to the standards for the Software Design Documentation explained in "IEEE Recommended Practice for Software Design Documentation". The Software Design Document is divided into 4 sections with different subsections. The sections of this Software Design Document for the FYRAS are:

1. Introduction
2. System Architecture
3. Data Design
4. Human Interface Design

1.5 Definitions, Acronyms and Abbreviations

Acronyms	Description
SDD	Software Design Document
SRS	System Requirement Specification
UC	Use Case
FSR	Faculty of Sport Science and Recreation
FYRAS	Final Year Research Archive System
M	Mandatory
U	Unique

1.6 System Overview

FYRAS is an online web-based system developed to help FSR supervisor in uploading and storing research project that has been graded by both supervisor and examiner. The system has three actors which is owner, supervisor, and student. The system provides the functionality to create, view, and update research project and supervisor can manage the research project. Supervisor also can upload the research project information together

with the softcopy document. Student will receive certificate of achievement when supervisor has uploaded the research project into the system. Student also can use the system to find the research project of other students.

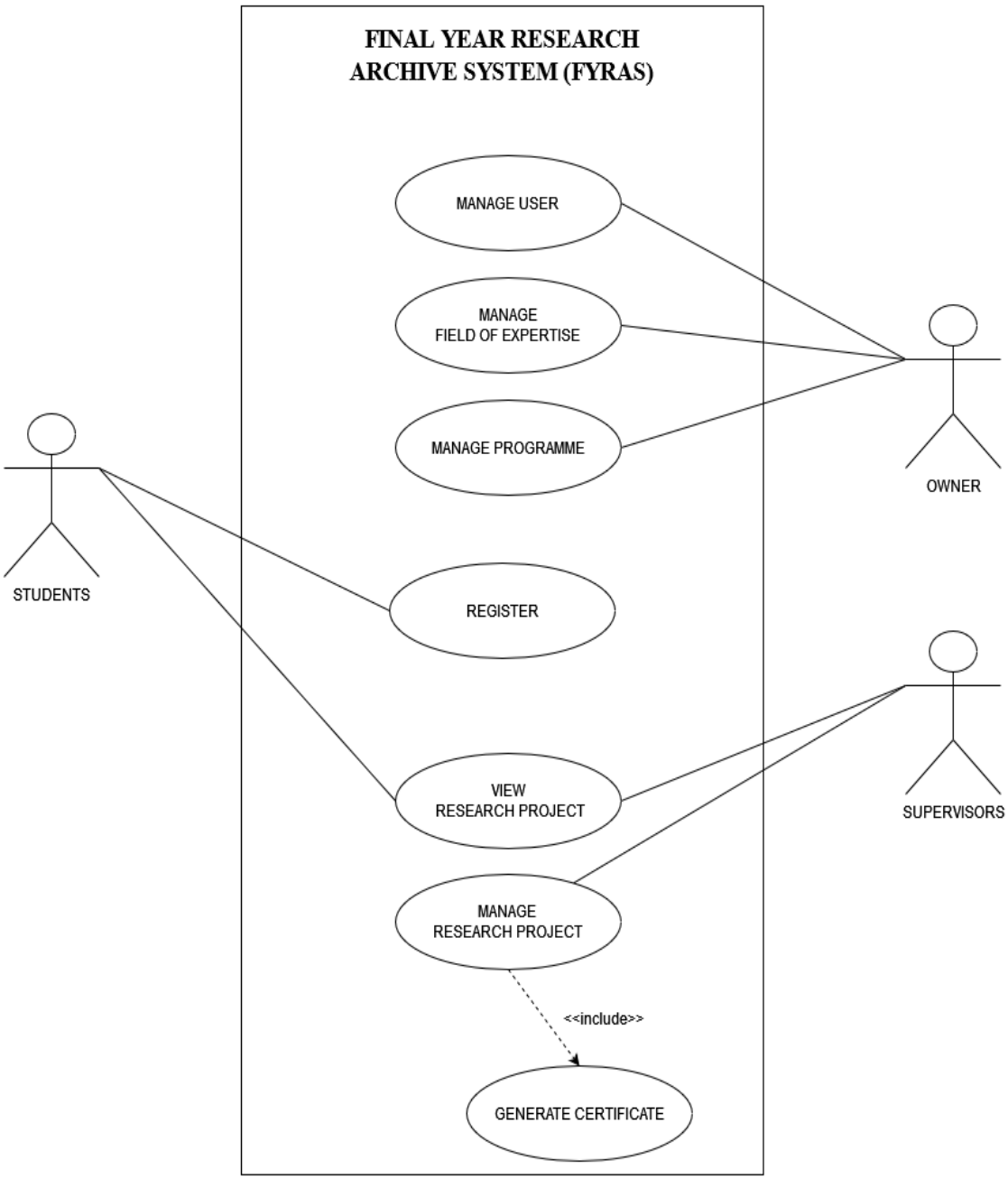


Figure 1.1 Use Case Diagram

2. System Architecture

2.1 Architectural Description

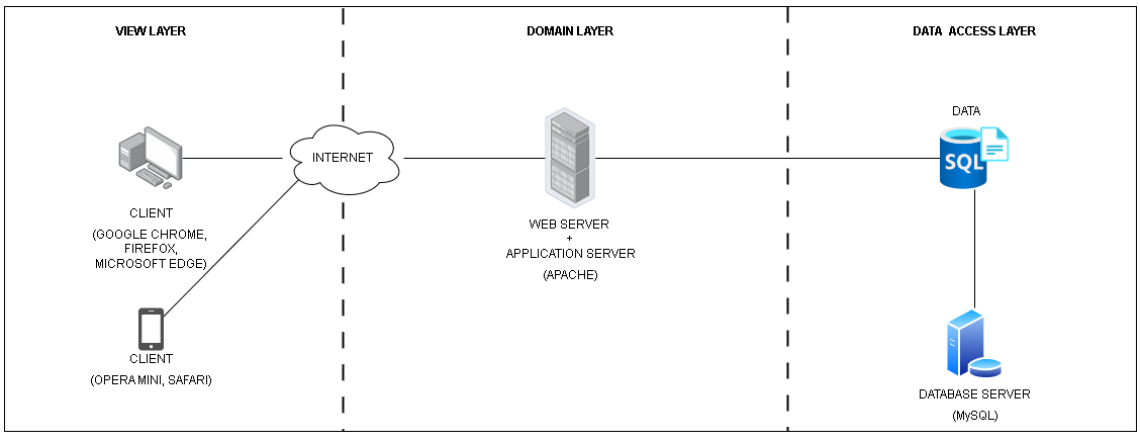


Figure 2.1 Architecture Design for FYRAS

This system employs a three-layer internet architecture consisting of the Model View Control Layer (MVC). Users will require an internet connection to use this system. The view layer is shown in the client or user view, whereas the domain and data access layers are handled by the server.

2.2 Decomposition description

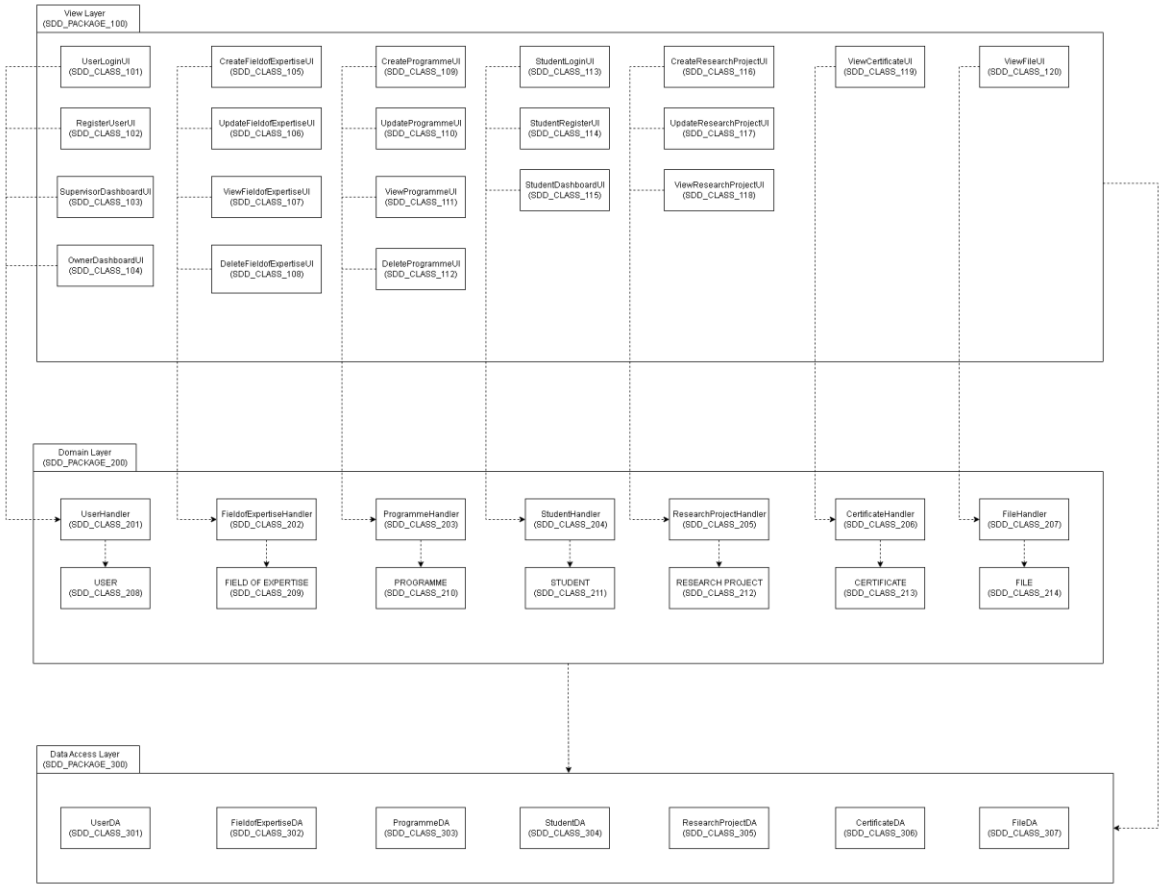


Figure 2.2 Package Diagram

The view layer has 20 packages (SDD_PKG_100). This layer oversees the user interface, which includes displaying information and communicating with end users including owners, supervisors, and students. The owner has access to the data of the field of expertise, the programme, and the supervisor account. While the supervisor is only capable of managing the research project. Finally, students can not only look for and access research projects, but they can also download a certificate issued by the system under their name. Users send data requests to the domain layer, which forwards them to the next tier.

The next layer is the domain layer (SDD_PKG_200), which serves to isolate sophisticated business logic from the end-user. This layer was separated into seven categories: USER, FIELD OF EXPERTISE, PROGRAMME, STUDENT, RESEARCH PROJECT, CERTIFICATE, and FILE. Each of these groups has a certain purpose and plays a specific role. This layer improves readability by categorizing all the packages in the view layer. The domain layer will submit a request to the data access layer to obtain the data.

Finally, the Data Access Layer (SDD PKG 300) contains the system's data and business login. This database stores all information on the user account, students, research project, programme, field of expertise, file, and certificate. The domain layer will send a request to the Data layer, which will respond by returning the data to the domain layer for processing before forwarding it to the view layer for end-user viewing.

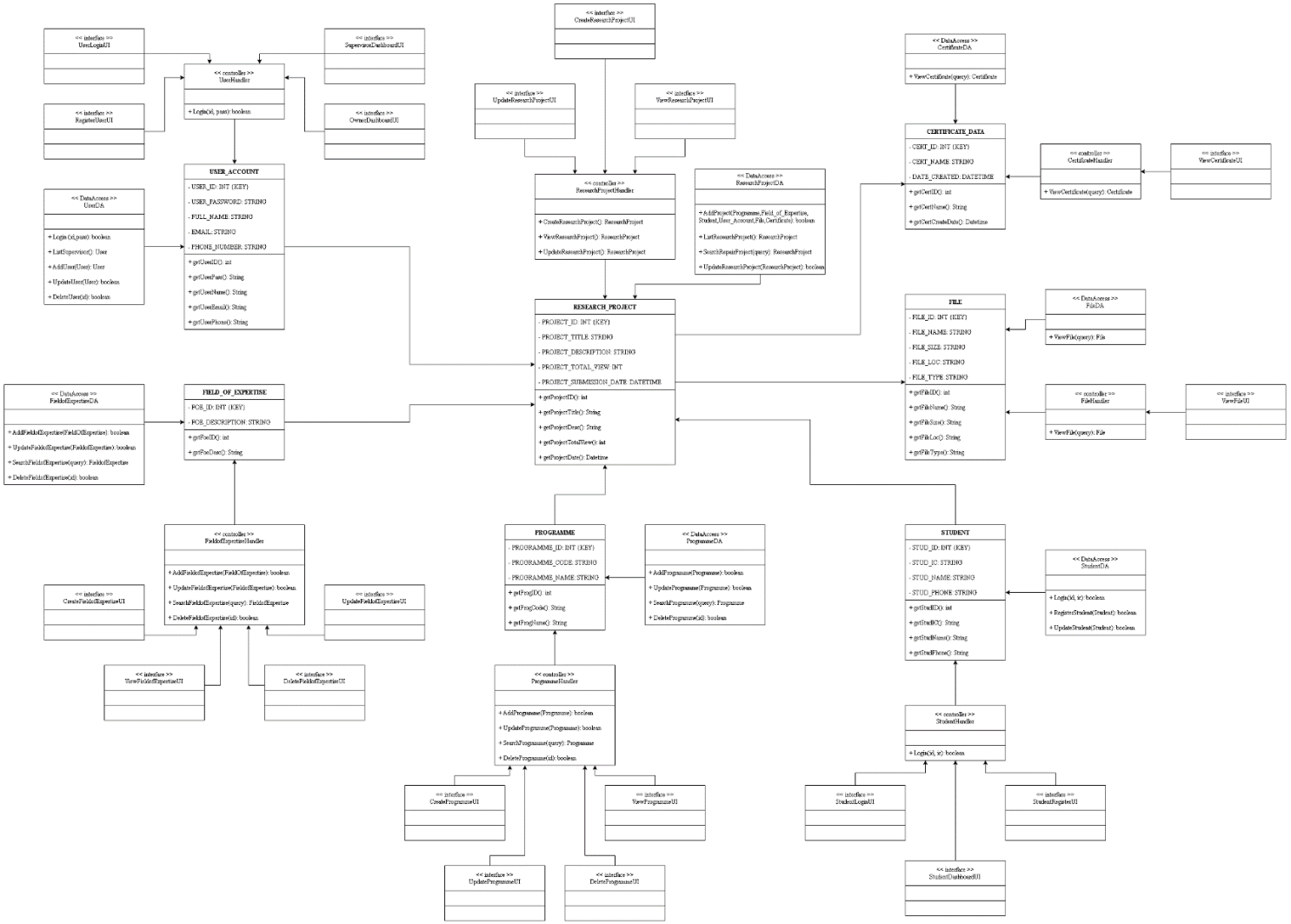


Figure 2.3 Detail Design Class Diagram

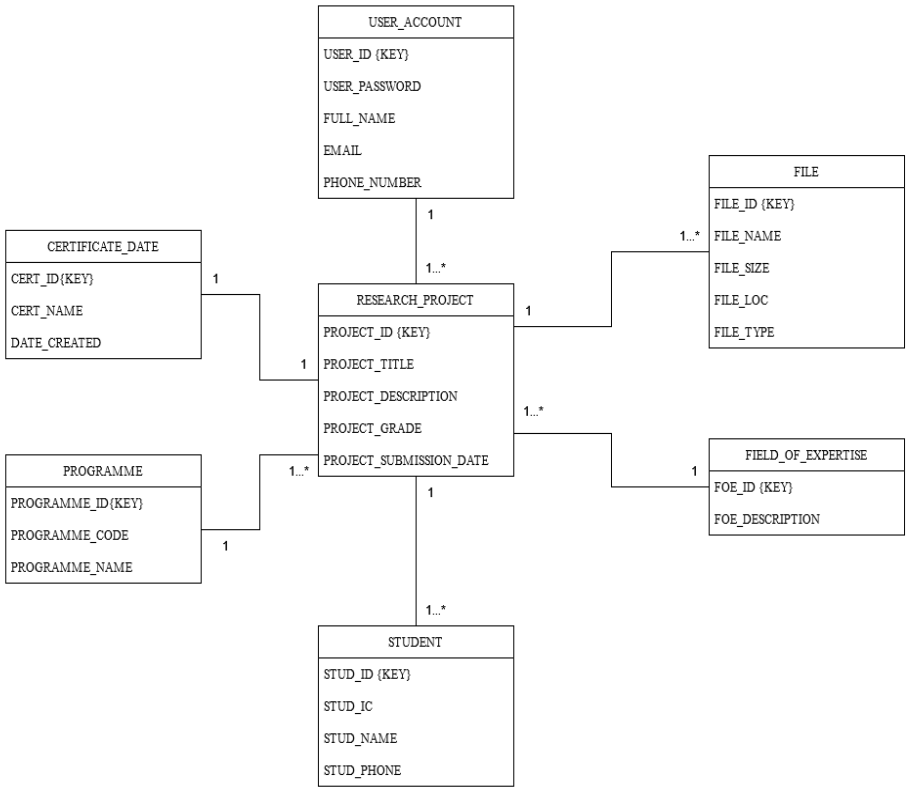


Figure 2.4 Domain Class Diagram

2.3 Design Rationale

As a result, for this system, we chose a three-tier software architecture, which separates the programme into three tiers: view layer, domain layer, and data access layer. This method is suitable for client-server and web-based applications since each layer may be designed independently without influencing the other levels because it runs on its own infrastructure. If the development team decided to scale or upgrade, the view layer, for instance, would not be impacted.

3. Data Design

3.1 Database Description

Database for FYRAS consist of seven tables in total which are user account, student, programme, field of expertise, research project, file, and certificate data.

- Table user account is used to store the data of supervisor and owner information.
- Table student is used to store the data of student information.
- Table programme is used to store programme information for FSR.
- Table field of expertise is used to store field of expertise data for research project.
- Table research project is used to store the student research project that will be uploaded by supervisor.
- Table file is used to store the data about research project softcopy document.
- Table certificate data is used to store the data of generated certificate after research project has been submitted in the system.

Figure 3.1 Entity Relationship Diagram (ERD)

3.2 Data Dictionary

STUDENT						
Attribute Name	Description	Type	Additional Type Information	Default value	M	U
STUD_ID	Unique Student Id that has been provided by university	INTEGER	MAX = 20	-	Y	Y
STUD_NAME	Student Full Name	VARCHAR	MAX = 255	-	Y	N
STUD_IC	Student I/C Number	VARCHAR	MAX = 50	-	Y	Y
STUD_PHONE	Student Phone Number	VARCHAR	MAX = 50	-	N	Y

M = Mandatory? U = Unique? Y = Yes, N = No

USER_ACCOUNT						
Attribute Name	Description	Type	Additional Type Information	Default value	M	U
USER_ID	Unique Staff ID that has been provided by university	INTEGER	MAX = 11	-	Y	Y
USER_PASSWORD	Staff Password to be accessed	VARCHAR	MAX = 255	-	Y	N
USER_NAME	Staff Full Name	VARCHAR	MAX = 255	-	Y	N
USER_EMAIL	Staff Email Address	VARCHAR	MAX = 255	-	Y	N
USER_PHONE	Staff Phone Number	VARCHAR	MAX = 15	-	N	Y
USER_CATEGORY	To differentiate between supervisor and owner account	VARCHAR	MAX = 100	-	Y	N

M = Mandatory? U = Unique? Y = Yes, N = No

FIELD_OF_EXPERTISE						
Attribute Name	Description	Type	Additional Type Information	Default value	M	U
FOE_ID	ID Generated by Database when new Field of expertise is added	INTEGER	MAX = 11	-	Y	Y
FOE_DESCRIPTION	Field of expertise full detail	VARCHAR	MAX = 255	-	Y	N

M = Mandatory? U = Unique? Y = Yes, N = No

PROGRAMME						
Attribute Name	Description	Type	Additional Type Information	Default value	M	U
PROGRAMME_ID	ID Generated by Database when new Programme is added	INTEGER	MAX = 11	-	Y	Y
PROGRAMME_CODE	Programme code (ex: CS 110)	VARCHAR	MAX = 100	-	Y	N
PROGRAMME_NAME	Programme full name	VARCHAR	MAX = 255	-	Y	N

M = Mandatory? U = Unique? Y = Yes, N = No

RESEARCH_PROJECT						
Attribute Name	Description	Type	Additional Type Information	Default value	M	U
PROJECT_ID	Project ID generated by the database when new research project is added	INTEGER	MAX = 11	-	Y	Y
PROJECT_TITLE	Research project title	VARCHAR	MAX = 255	-	Y	N
PROJECT_DESCRIPTION	Summary detail research project	VARCHAR	MAX = 255	-	N	N
PROJECT_SUBMISSION_DATE	Current time and date when the research project is added	DATETIME	CURRENT TIMESTAMP	-	Y	N
FOE_ID	Field of expertise category id	INTEGER	MAX = 11	-	Y	N
PROGRAMME_ID	Student programme id	INTEGER	MAX = 11	-	Y	N
STUDENT_ID	Student id for ownership of research project	INTEGER	MAX = 20	-	Y	N
SUPERVISOR_ID	Supervisor id of the student research project	INTEGER	MAX = 11	-	Y	N

M = Mandatory? U = Unique? Y = Yes, N = No

FILE						
Attribute Name	Description	Type	Additional Type Information	Default value	M	U
FILE_ID	File id generated by the database when new file is submitted into the system	INTEGER	MAX = 11	-	Y	Y
FILE_NAME	File name based on the submitted file	VARCHAR	MAX = 255	-	Y	N
FILE_SIZE	Size of the file in Byte size	VARCHAR	MAX = 255	-	Y	N
FILE_LOC	Location of where the file is stored	VARCHAR	MAX = 255	-	Y	N
FILE_TYPE	Type of file (system only allowed to save in pdf)	VARCHAR	MAX = 255	-	Y	N
PROJECT_ID	Project id reference	INTEGER	MAX = 11	-	Y	Y

M = Mandatory? U = Unique? Y = Yes, N = No

CERTIFICATE_DATA						
Attribute Name	Description	Type	Additional Type Information	Default value	M	U
CERT_ID	Certificate id generated by database when new research project is added	INTEGER	MAX = 11	-	Y	Y
CERT_NAME	Name of the certificate	VARCHAR	MAX = 255	-	Y	N
DATE_CREATED	Current time and date when the certificate is created	DATETIME	CURRENT TIMESTAMP	-	Y	N
PROJECT_ID	Project id reference	INT	MAX = 11	-	Y	Y

M = Mandatory? U = Unique? Y = Yes, N = No

4. Component Design

4.1 Package Identifier

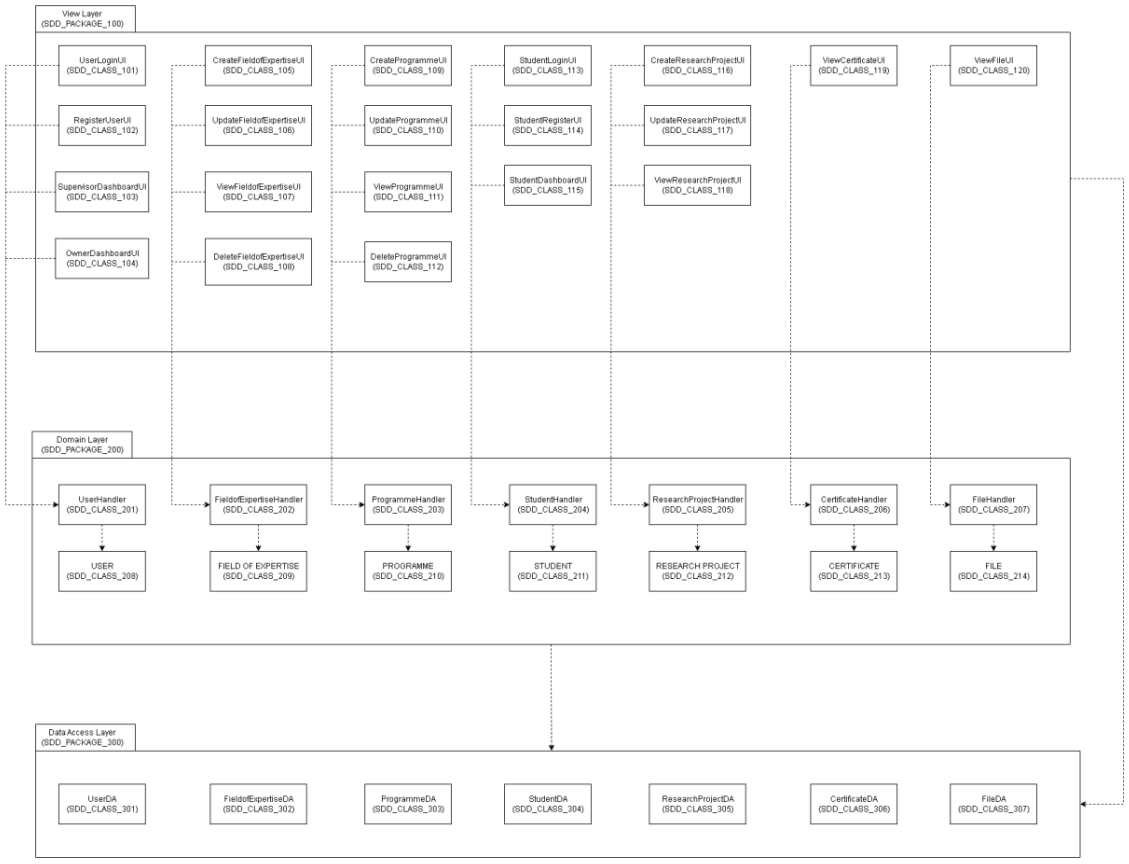


Figure 4.1 Package Diagram

4.2 Package Purpose

PKG_100	CLASS_ID	CLASS_NAME
View Layer	(SDD_CLASS_101)	UserLoginUI
	(SDD_CLASS_102)	RegisterUserUI
	(SDD_CLASS_103)	SupervisorDashboardUI
	(SDD_CLASS_104)	OwnerDashboardUI
	(SDD_CLASS_105)	CreateFieldofExpertiseUI
	(SDD_CLASS_106)	UpdateFieldofExpertiseUI
	(SDD_CLASS_107)	ViewFieldofExpertiseUI
	(SDD_CLASS_108)	DeleteFieldofExpertiseUI
	(SDD_CLASS_109)	CreateProgrammeUI
	(SDD_CLASS_110)	UpdateProgrammeUI
	(SDD_CLASS_111)	ViewProgrammeUI
	(SDD_CLASS_112)	DeleteProgrammeUI
	(SDD_CLASS_113)	StudentLoginUI
	(SDD_CLASS_114)	StudentRegisterUI
	(SDD_CLASS_115)	StudentDashboardUI
	(SDD_CLASS_116)	CreateResearchProjectUI
	(SDD_CLASS_117)	UpdateResearchProjectUI
	(SDD_CLASS_118)	ViewResearchProjectUI

	(SDD_CLASS_119)	ViewCertificateUI
	(SDD_CLASS_120)	ViewFileUI
PKG_200		
Domain Layer	(SDD_CLASS_201)	UserHandler
	(SDD_CLASS_202)	FieldofExpertiseHandler
	(SDD_CLASS_203)	ProgrammeHandler
	(SDD_CLASS_204)	StudentHandler
	(SDD_CLASS_205)	ResearchProjectHandler
	(SDD_CLASS_206)	CertificateHandler
	(SDD_CLASS_207)	FileHandler
	(SDD_CLASS_208)	USER
	(SDD_CLASS_209)	FIELD OF EXPERTISE
	(SDD_CLASS_210)	PROGRAMME
	(SDD_CLASS_211)	STUDENT
	(SDD_CLASS_212)	RESEARCH PROJECT
	(SDD_CLASS_213)	CERTIFICATE
	(SDD_CLASS_214)	FILE
PKG_300		
Data Access Layer	(SDD_CLASS_301)	UserDA

	(SDD_CLASS_302)	FieldofExpertiseDA
	(SDD_CLASS_303)	ProgrammeDA
	(SDD_CLASS_304)	StudentDA
	(SDD_CLASS_305)	ResearchProjectDA
	(SDD_CLASS_306)	CertificateDA
	(SDD_CLASS_307)	FileDA

4.3 Package Function

Package	Function
View Layer (SDD_PACKAGE_100)	• To accept input data. • To validate data. • To register supervisor, student, programme, field of expertise, and research project into the system. • Only Owner can register new supervisor. • Student can register on their own. • Only supervisor has the access to manage research project.
Domain Layer (SDD_PACKAGE_200)	• To store updated information of supervisor. • To store updated information of student. • To store updated information of field of expertise. • To store updated information of programme. • To store updated information of research project. • To store updated information of file and certificate.

Data Access Layer (SDD_PACKAGE_300)	• To provide data for required fields. • To establish and maintain connection of the database. • To process result sets into appropriate domain objects.

5. Human Interface Design (Screens)

5.1 Overview of the User Interface

The system involves three users which are Owner, Supervisor, and Student.

Owner

- User can login into the system, register supervisor, update own profile, and update supervisor profile, reset supervisor password.
- User can create, edit, and delete field of expertise for the system.
- User can create, edit, and delete programme for the system.

Supervisor

- User can login into the system view and update their own account.
- User can upload graded research project into the system.
- User can search, view, update, and delete research project in the system.
- User can view or download certificate based on research project under their own supervisor ID.

Student

- User can register, login into the system.
- User can update and view their own account.
- User can search, view, and download research project.
- User can view and download certificate that has been generated under their own student id.

5.2 Screen Images

5.2.1 Owner Screens

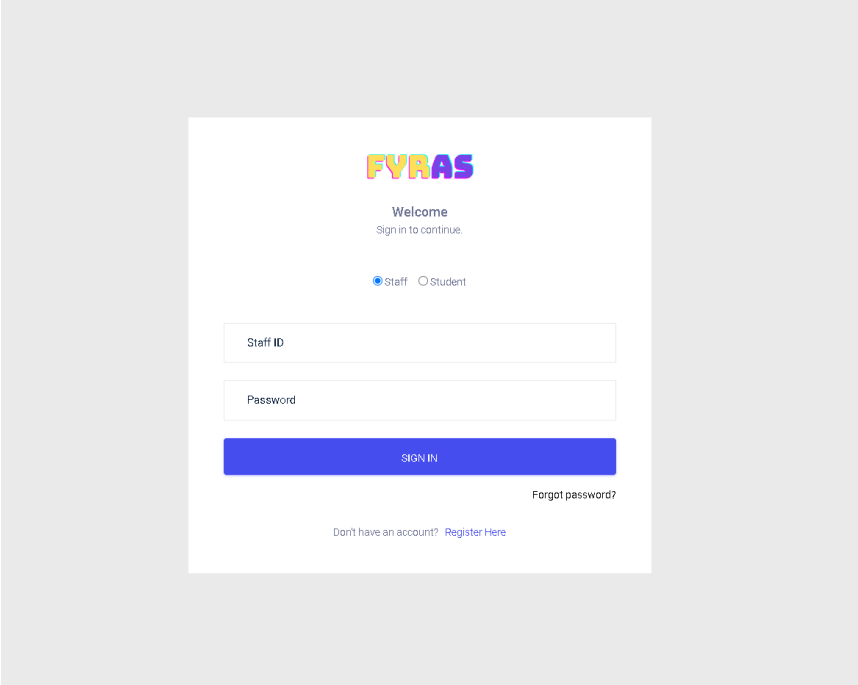


Figure 5.2.1 Login Page

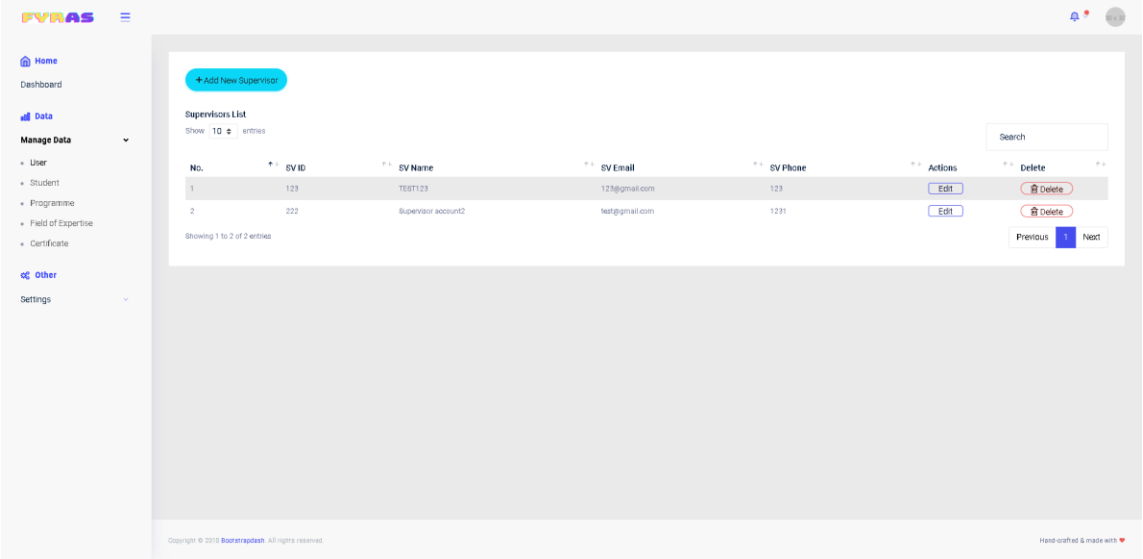


Figure 5.2.2 Manage User
(List page)

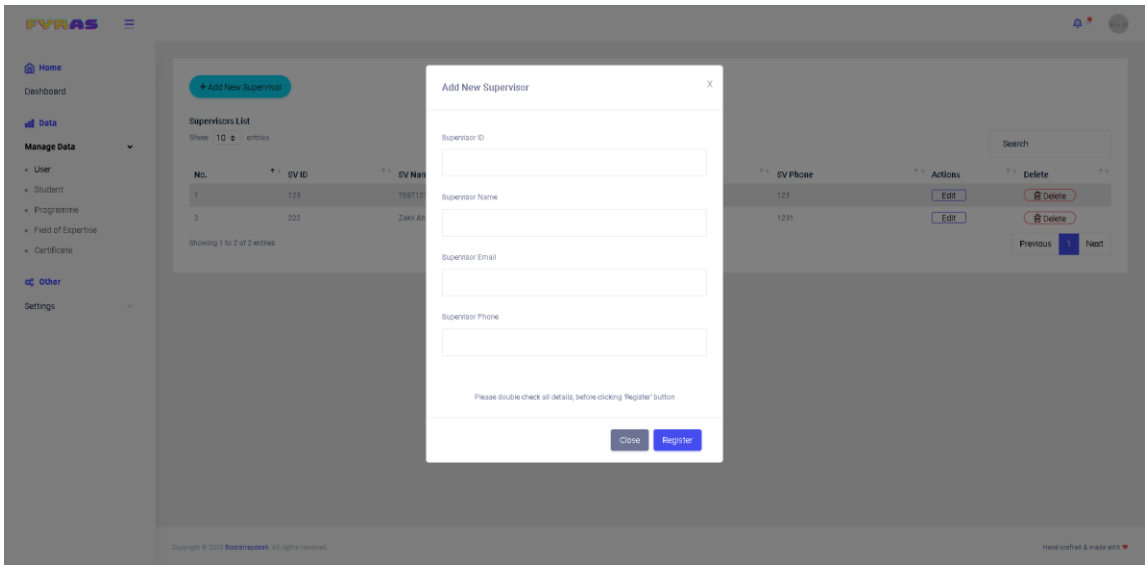


Figure 5.2.3 Manage User
(Register New User Form)

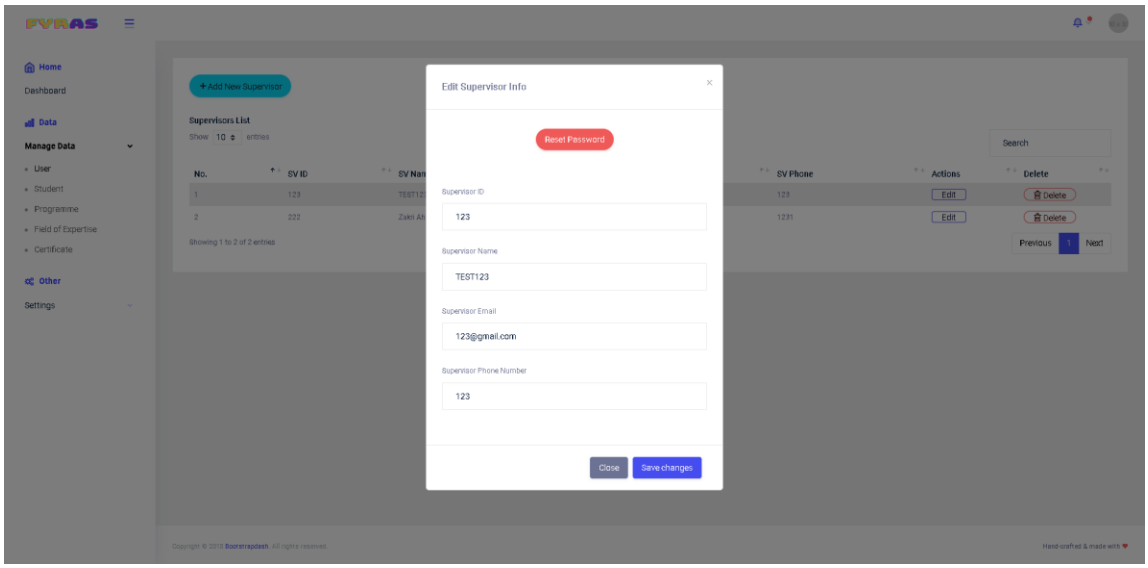


Figure 5.2.4 Manage User
(Update User Details Form)

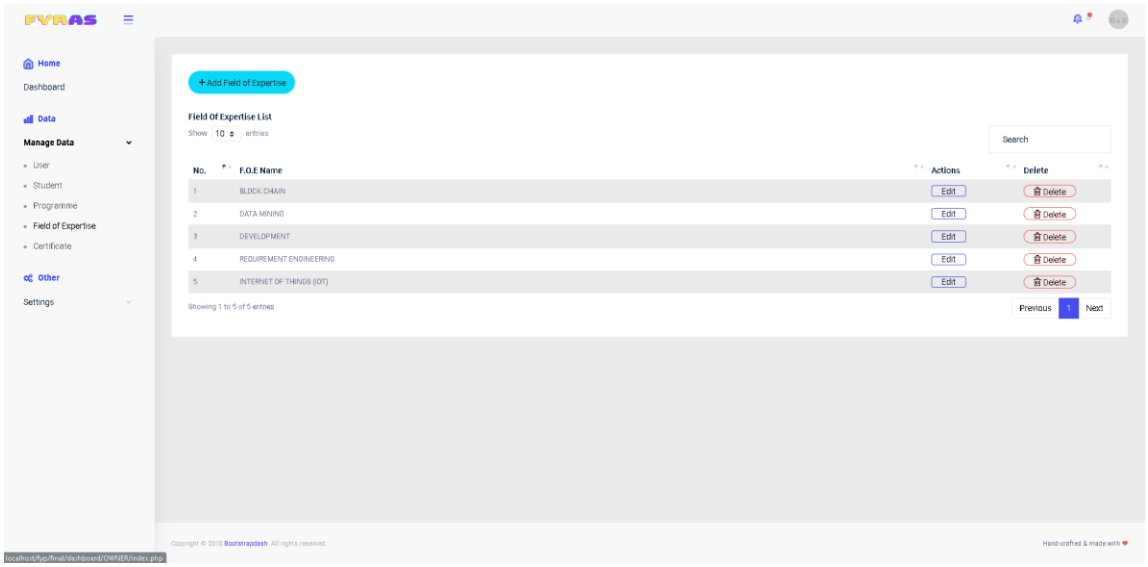


Figure 5.2.5 Manage Field of Expertise
(List page)

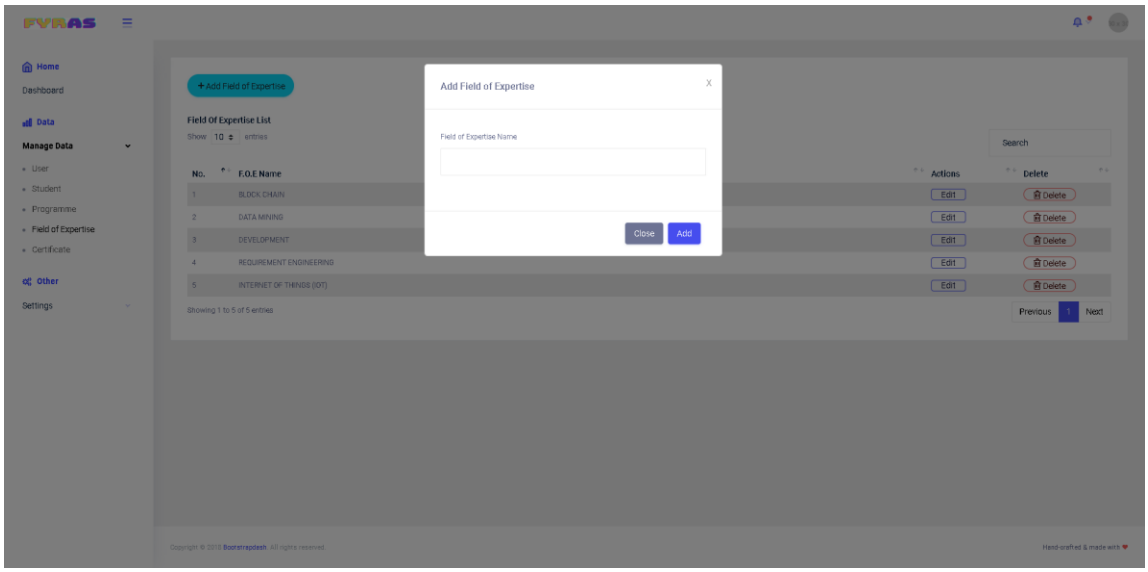


Figure 5.2.6 Manage Field of Expertise
(Add New Field of Expertise Form)

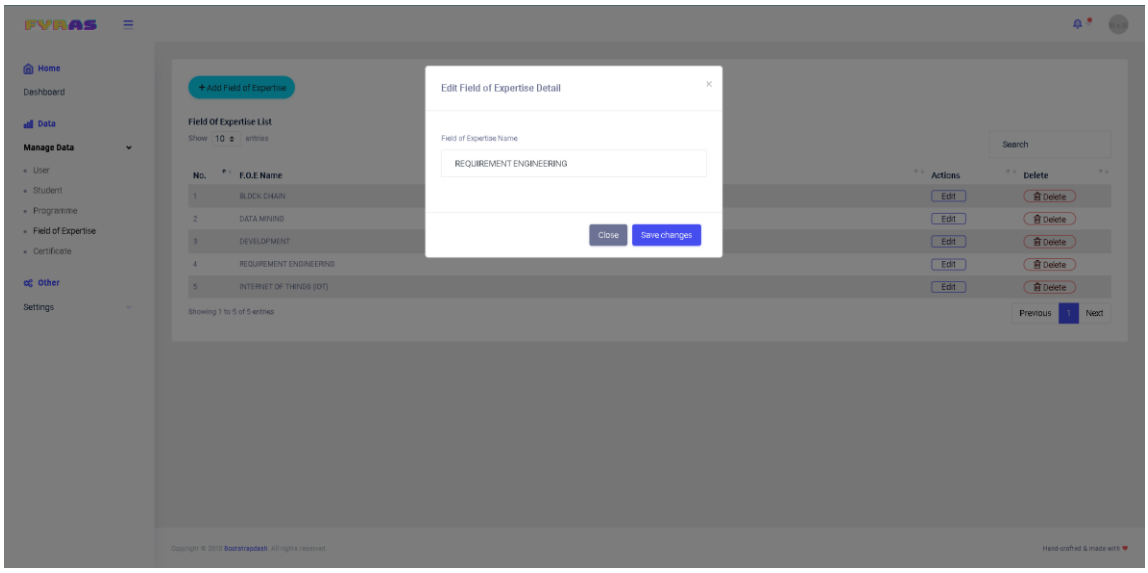


Figure 5.2.7 Manage Field of Expertise
(Update Field of Expertise Detail Form)

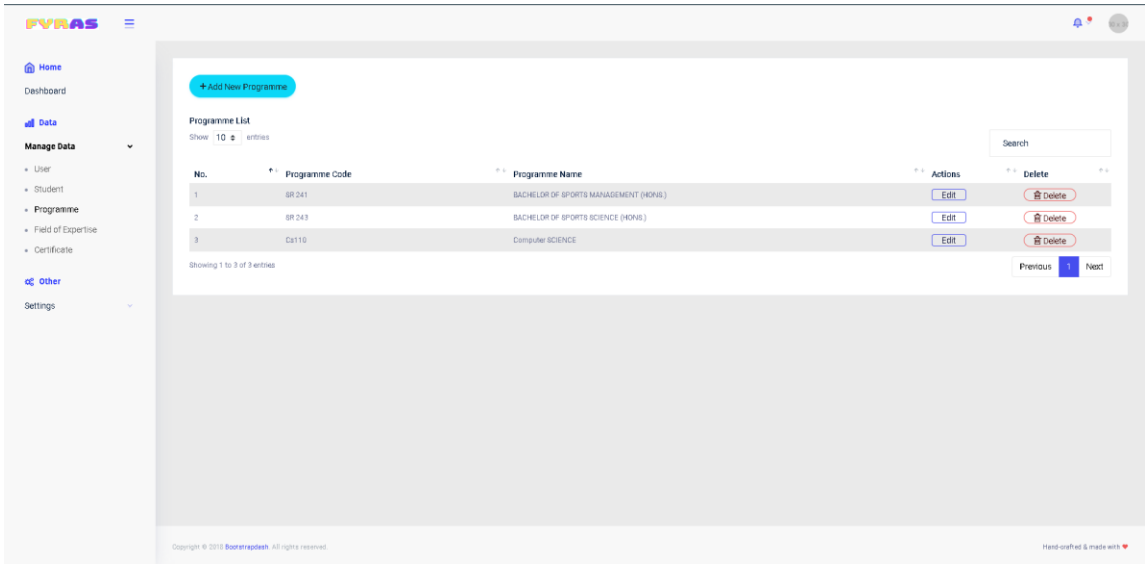


Figure 5.2.8 Manage Programme
(List page)

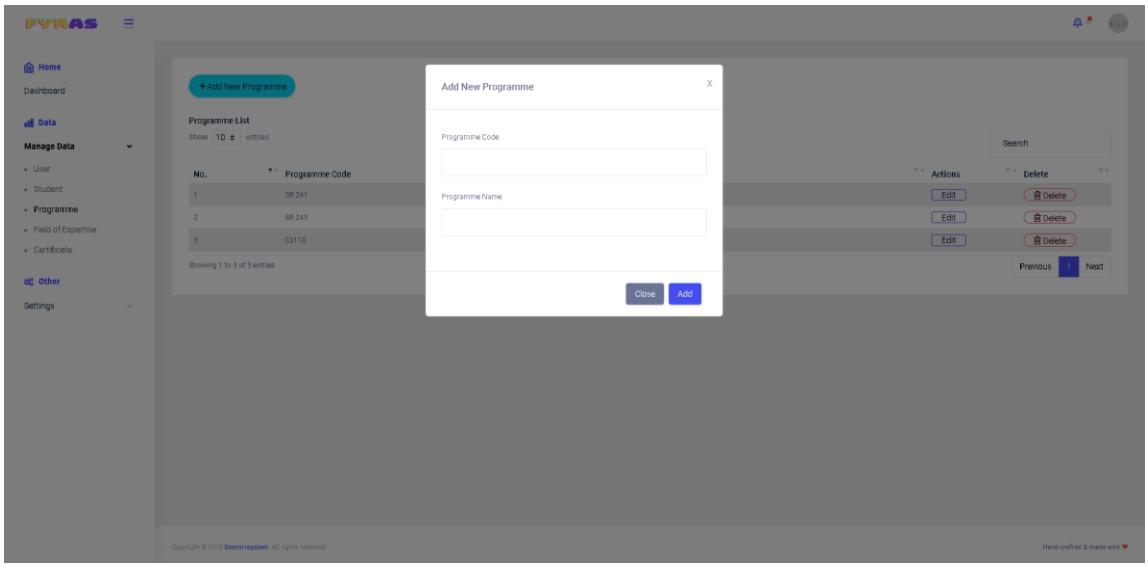


Figure 5.2.9 Manage Programme
(Add New Programme Form)

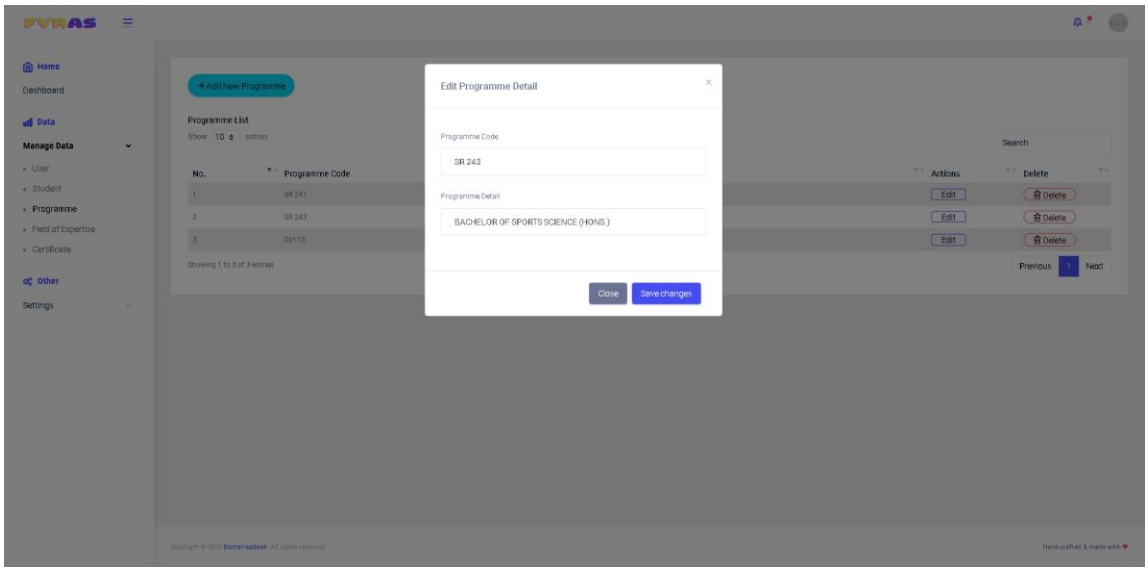


Figure 5.2.10 Manage Programme
(Update Programme Details Form)

5.2.2 Supervisor Screens

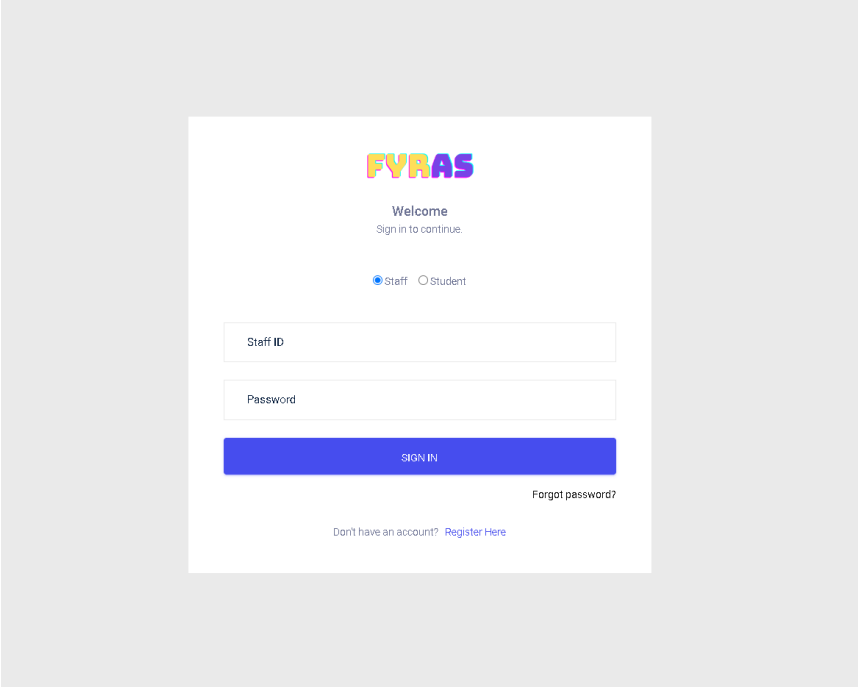


Figure 5.2.11 Login Screen

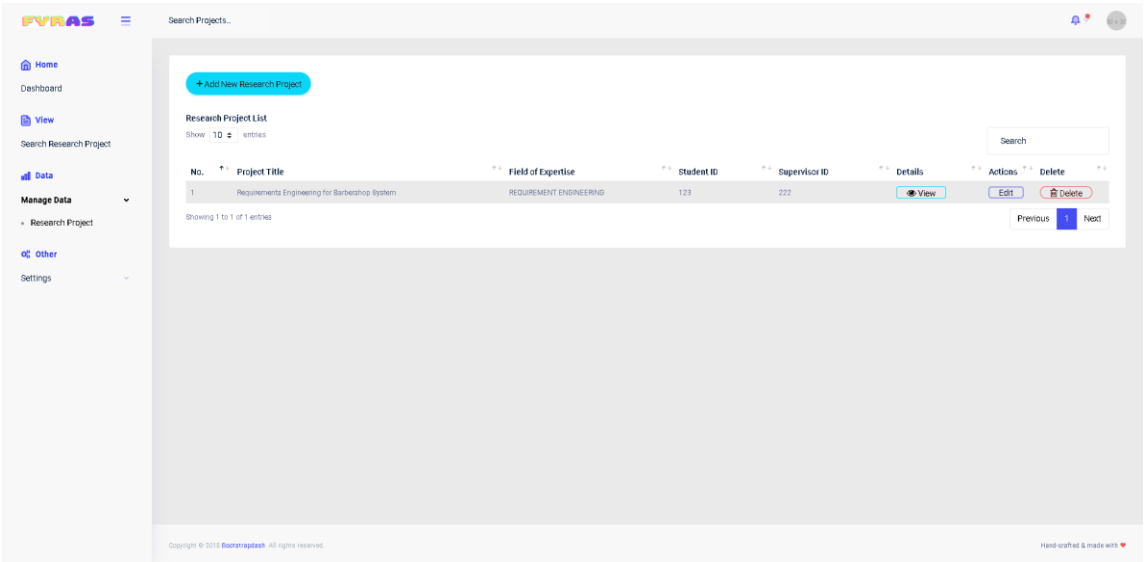


Figure 5.2.12 Manage Research Project (List page)

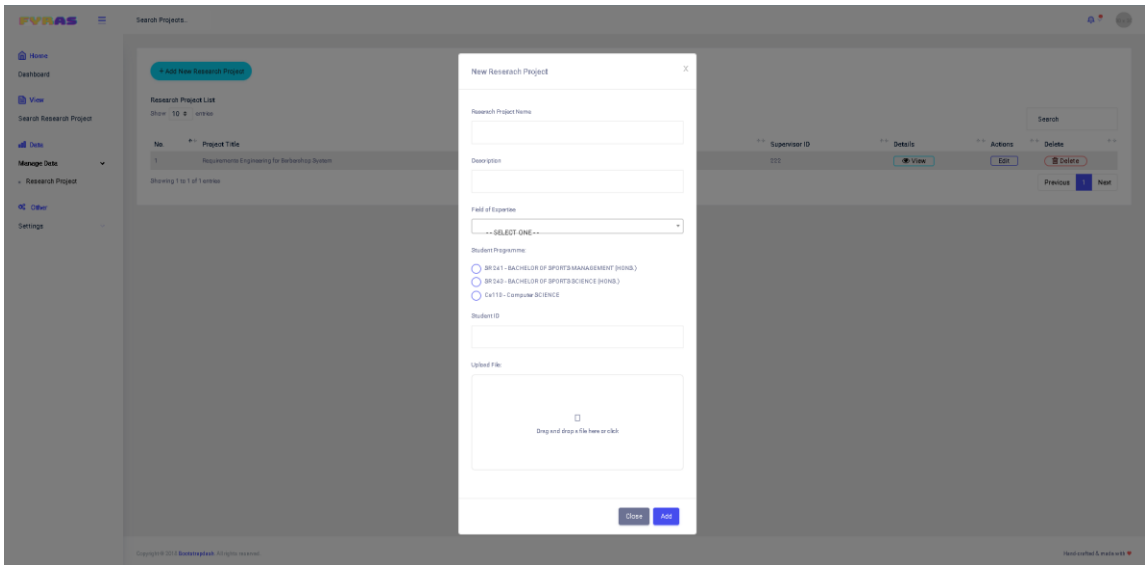


Figure 5.2.13 Manage Research Project
(Add New Research Project Form)

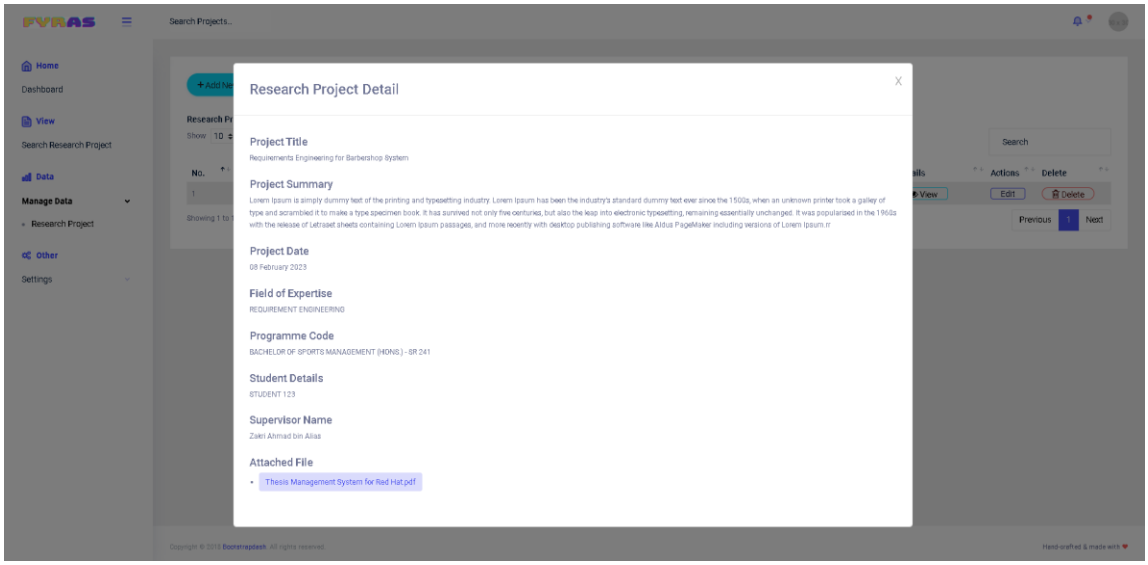


Figure 5.2.14 Manage Research Project
(View Research Project Details)

5.2.3 Student Screens

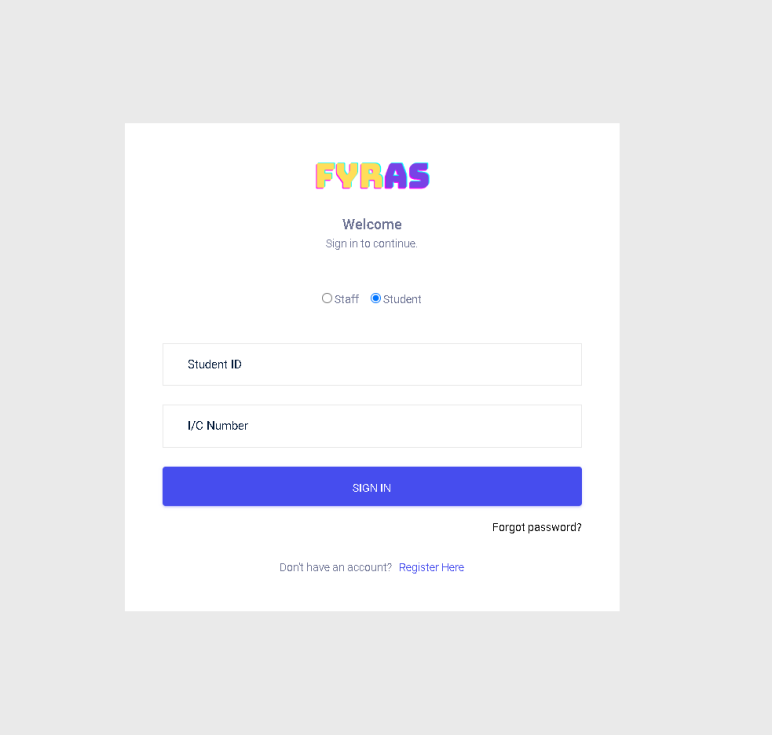


Figure 5.2.15 Login Page (Student)

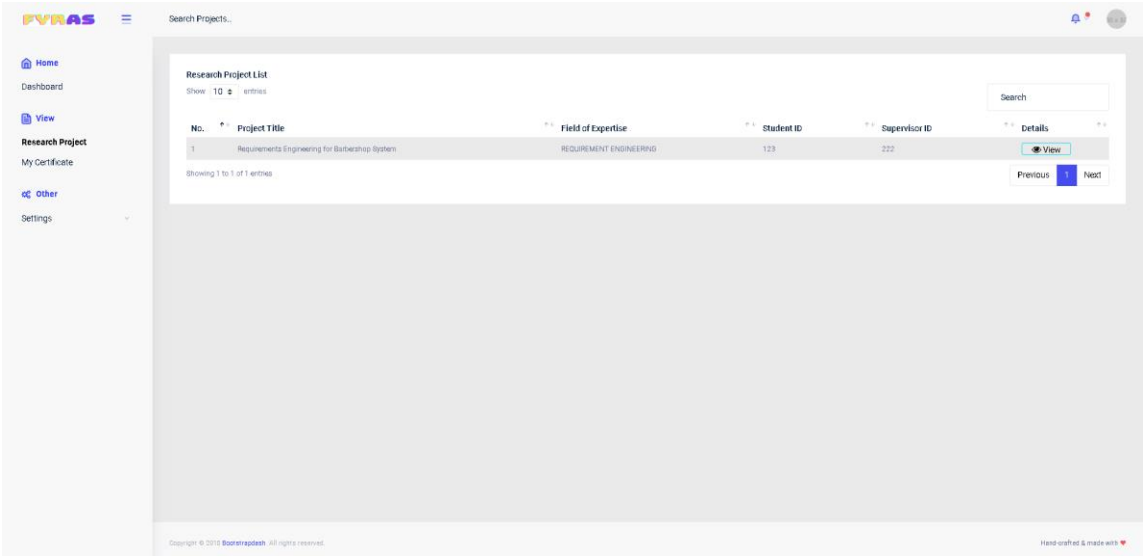


Figure 5.2.16 View Research Project (List page)

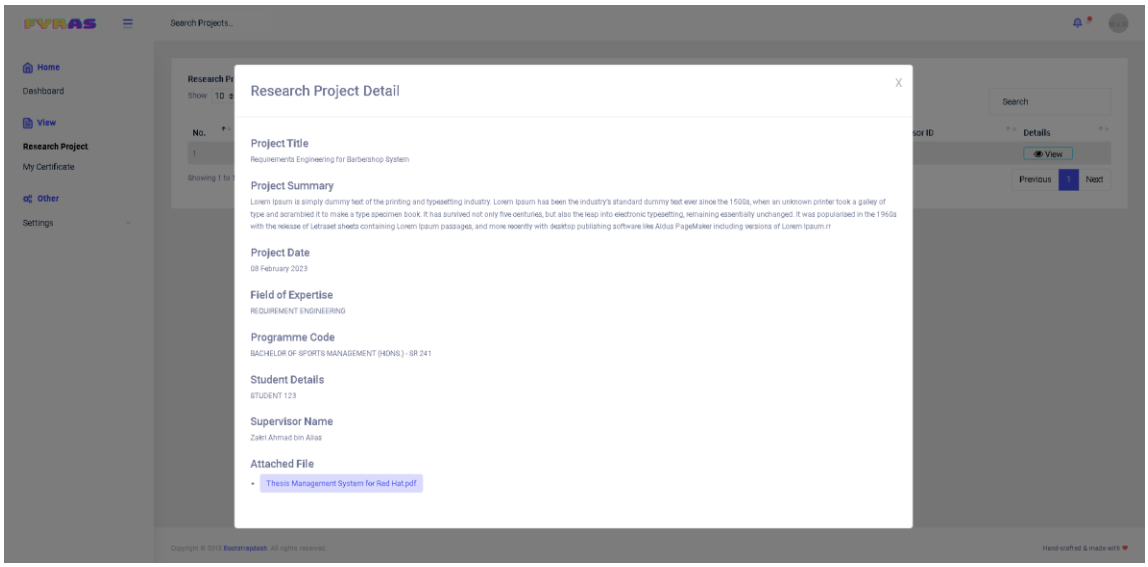


Figure 5.2.17 View Research Project Details

6. Traceability Requirement Matrix

	PACKAGE	PKG_100																				PKG_200														PKG_300						
	CLASS	SDD_CLASS_101	SDD_CLASS_102	SDD_CLASS_103	SDD_CLASS_104	SDD_CLASS_105	SDD_CLASS_106	SDD_CLASS_107	SDD_CLASS_108	SDD_CLASS_109	SDD_CLASS_110	SDD_CLASS_111	SDD_CLASS_112	SDD_CLASS_113	SDD_CLASS_114	SDD_CLASS_115	SDD_CLASS_116	SDD_CLASS_117	SDD_CLASS_118	SDD_CLASS_119	SDD_CLASS_120	SDD_CLASS_201	SDD_CLASS_202	SDD_CLASS_203	SDD_CLASS_204	SDD_CLASS_205	SDD_CLASS_206	SDD_CLASS_207	SDD_CLASS_208	SDD_CLASS_209	SDD_CLASS_210	SDD_CLASS_211	SDD_CLASS_212	SDD_CLASS_213	SDD_CLASS_214	SDD_CLASS_301	SDD_CLASS_302	SDD_CLASS_303	SDD_CLASS_304	SDD_CLASS_305	SDD_CLASS_306	SDD_CLASS_307
UCD 100	UC 100	/	/		/																	/							/							/						
UCD 200	UC 200	/			/	/	/	/	/														/							/							/					
UCD 300	UC 300	/			/					/	/	/	/											/							/							/				
UCD 400	UC 400													/	/	/									/							/							/			
UCD 500	UC 500	/		/										/		/			/		/					/		/				/		/					/		/
UCD 600	UC 600	/		/													/	/								/	/	/				/	/	/					/		/
UCD 700	UC 700																			/							/						/							/	

Indicator:

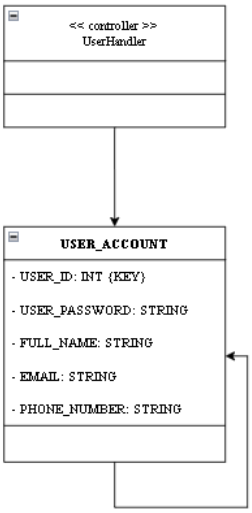
- UCD 100 - Manage User
- UCD 200 - Manage Field of Expertise
- UCD 300 - Manage Programme
- UCD 400 - Register
- UCD 500 - View Research Project
- UCD 600 - Manage Research Project
- UCD 700 - Generate Certificate

7. Appendices

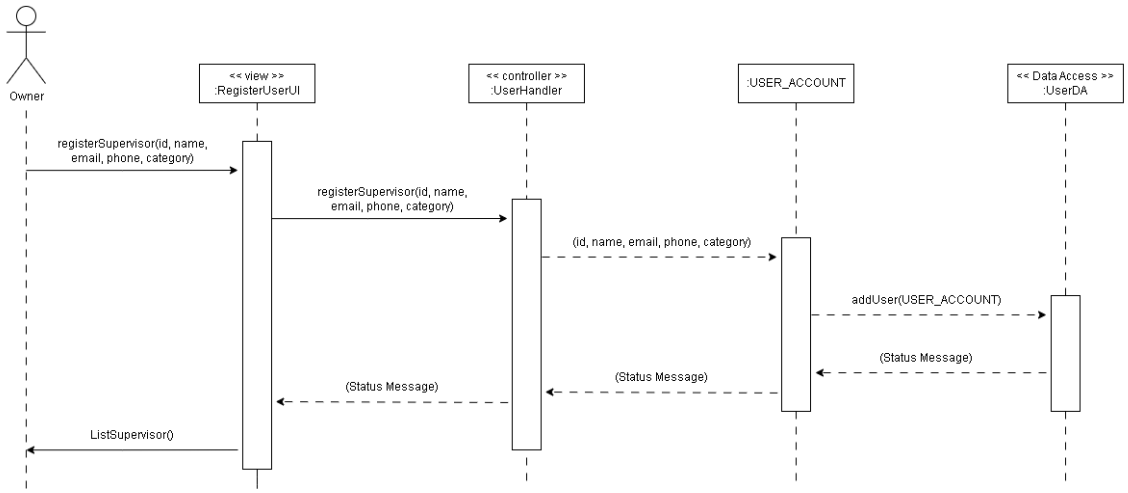
7.1 FIRST CUT DIAGRAM

7.1.1 MANAGE USER (CREATE)

DCD

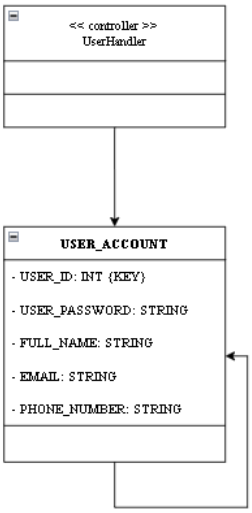


SSD

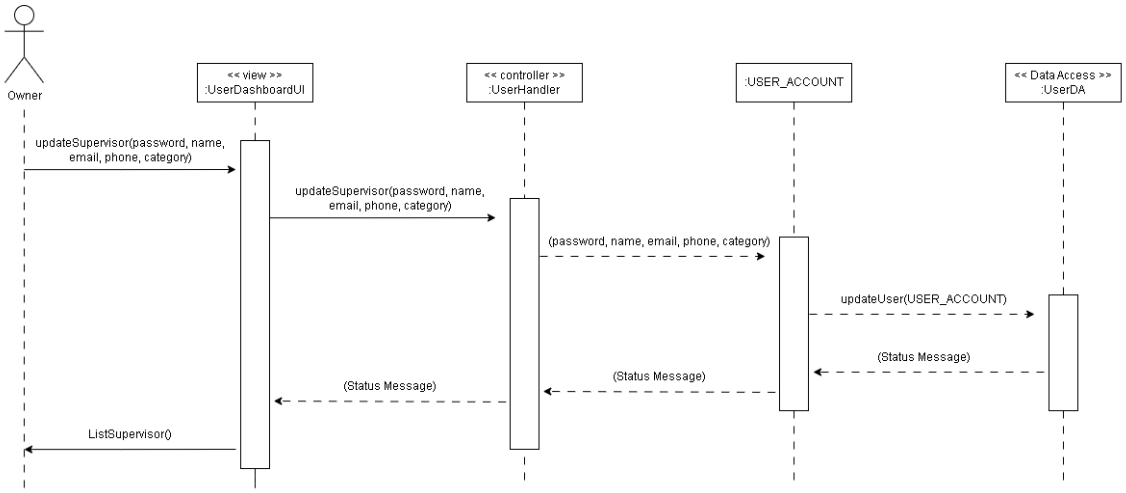

Owner
<< view >>
:RegisterUserUI
<< controller >>
:UserHandler
:USER_ACCOUNT
<< Data Access >>
:UserDA
registerSupervisor(id, name,
email, phone, category)
registerSupervisor(id, name,
email, phone, category)
(id, name, email, phone, category)
addUser(USER_ACCOUNT)
(Status Message)
(Status Message)
(Status Message)
ListSupervisor()

7.1.2 MANAGE USER (UPDATE)

DCD

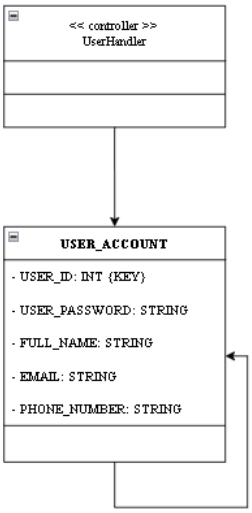


SSD

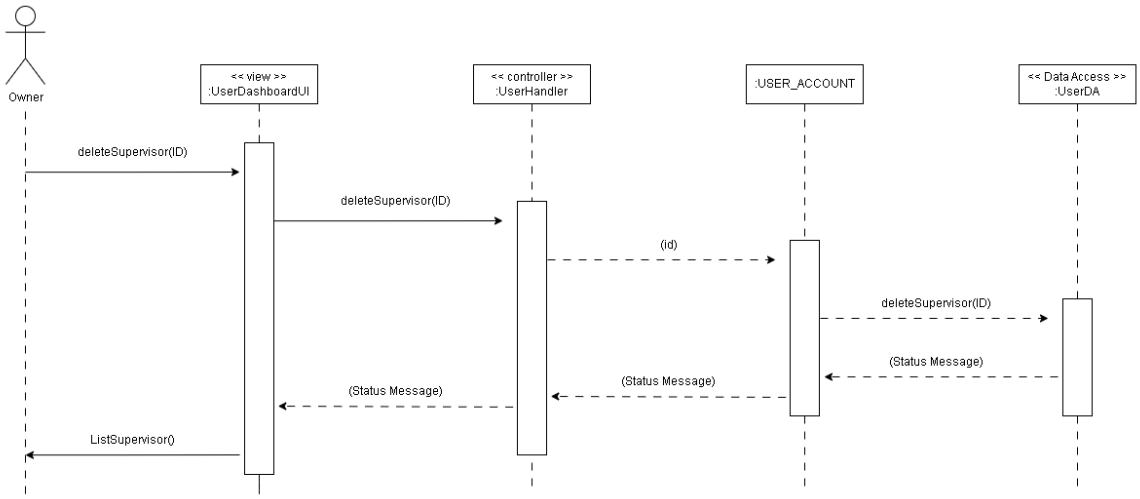


7.1.3 MANAGE USER (DELETE)

DCD

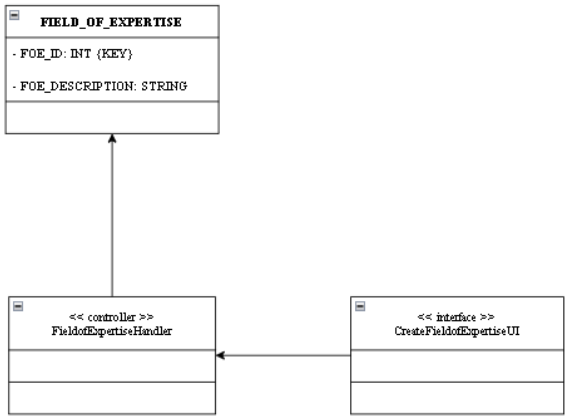


SSD

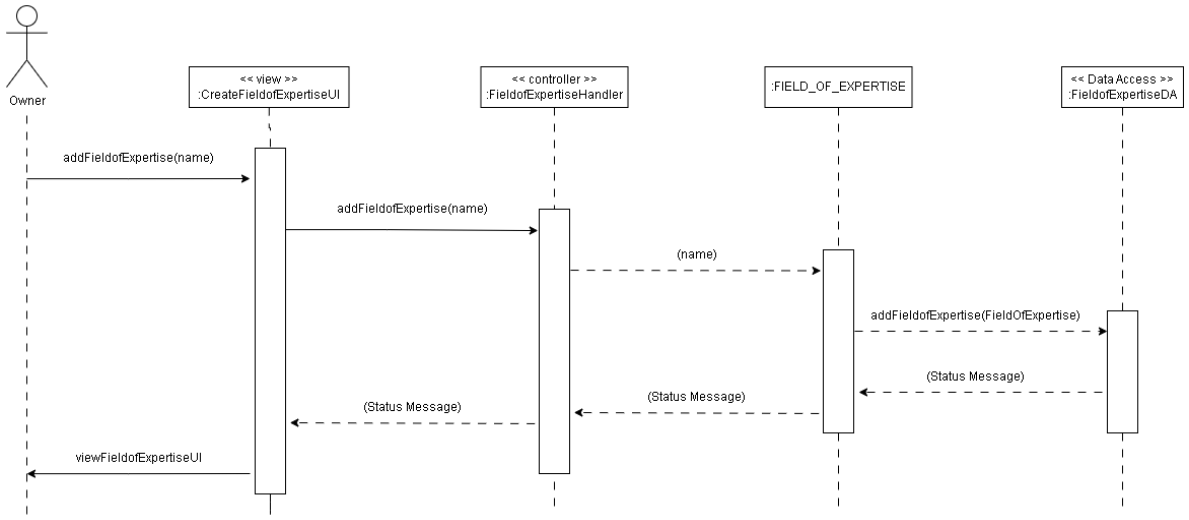


7.1.4 MANAGE FIELD OF EXPERTISE (CREATE)

DCD

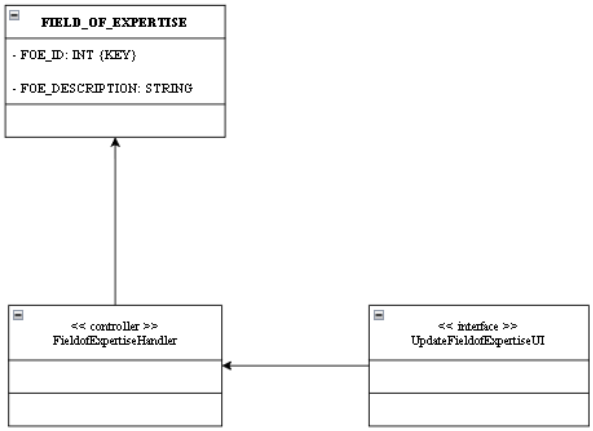


SSD

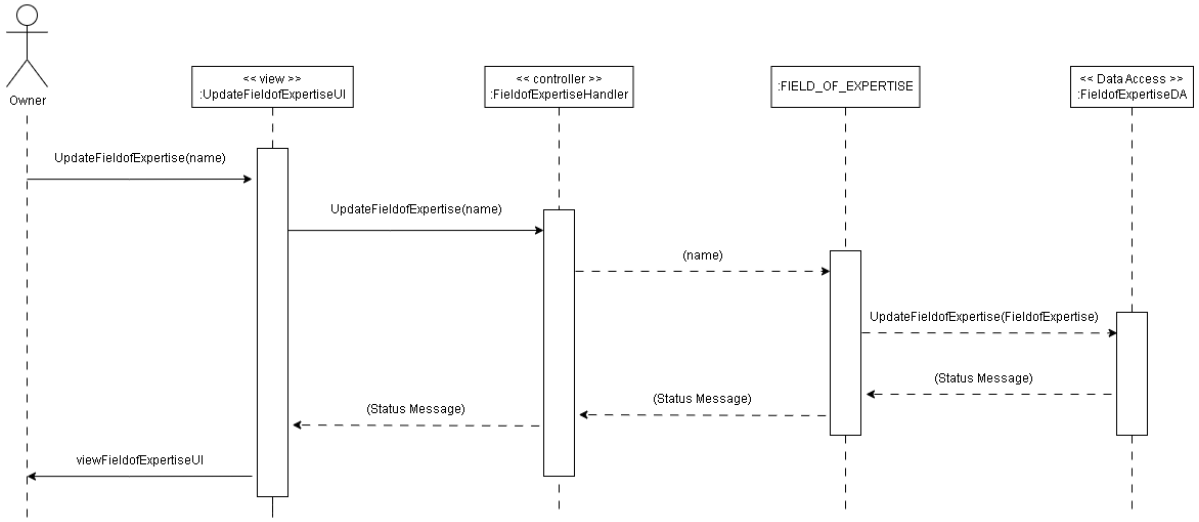


7.1.5 MANAGE FIELD OF EXPERTISE (UPDATE)

DCD

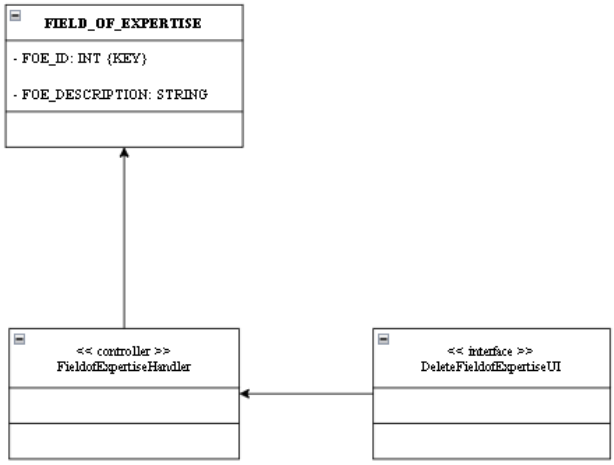


SSD

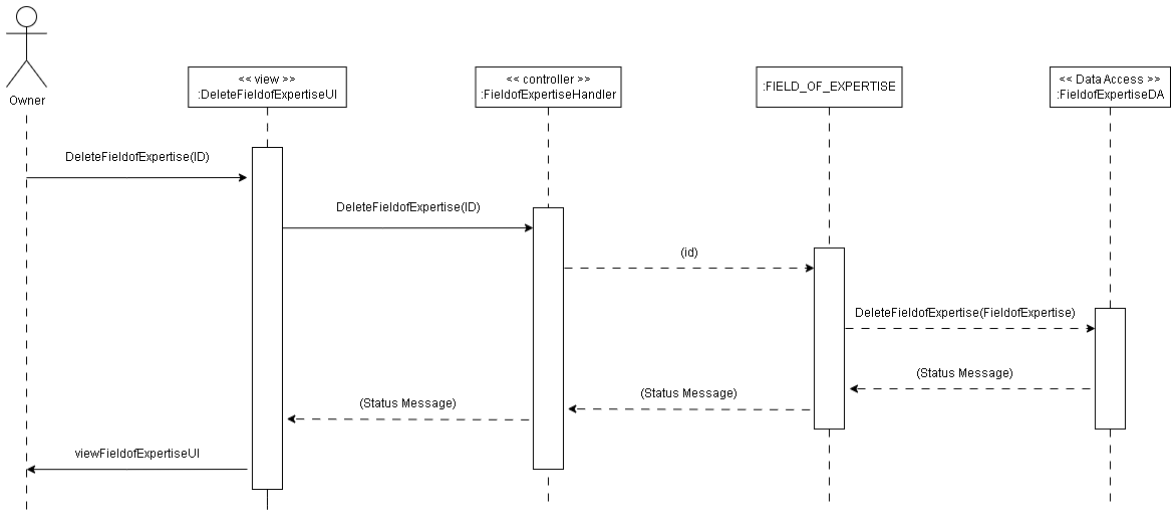


7.1.6 MANAGE FIELD OF EXPERTISE (DELETE)

DCD

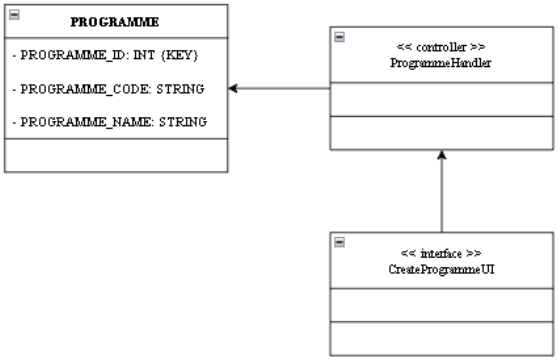


SSD

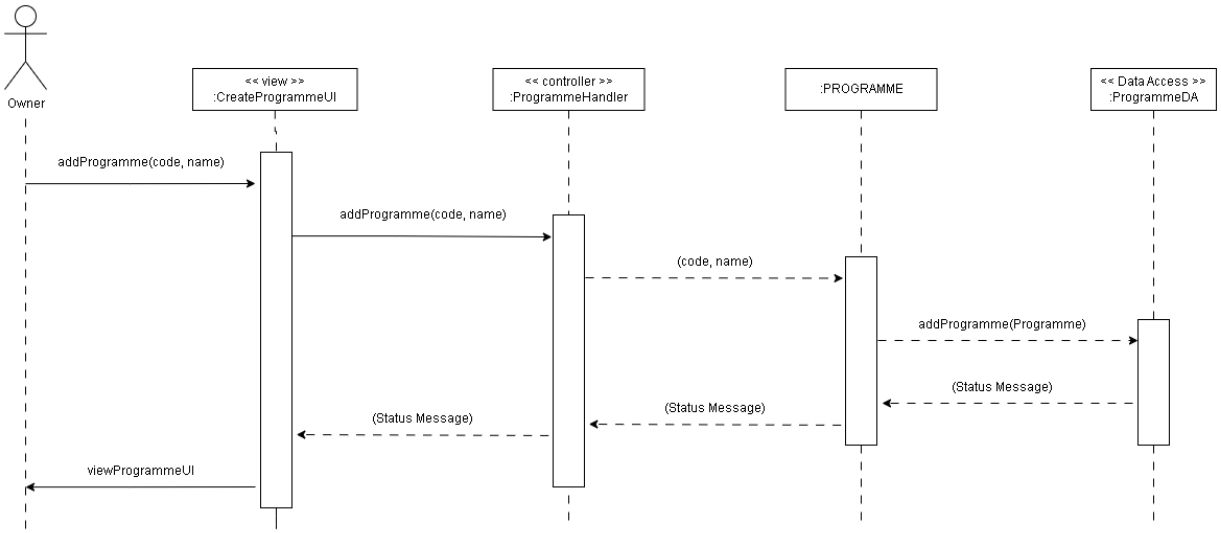


7.1.7 MANAGE PROGRAMME (CREATE)

DCD

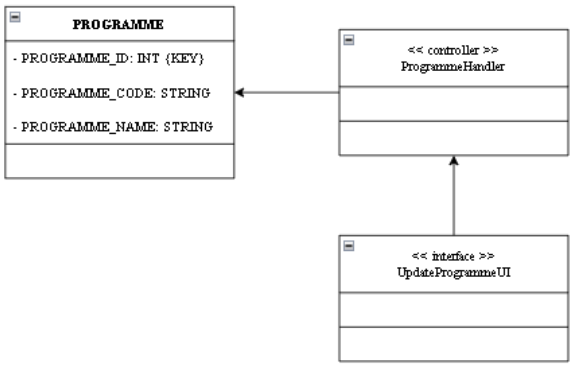


SSD

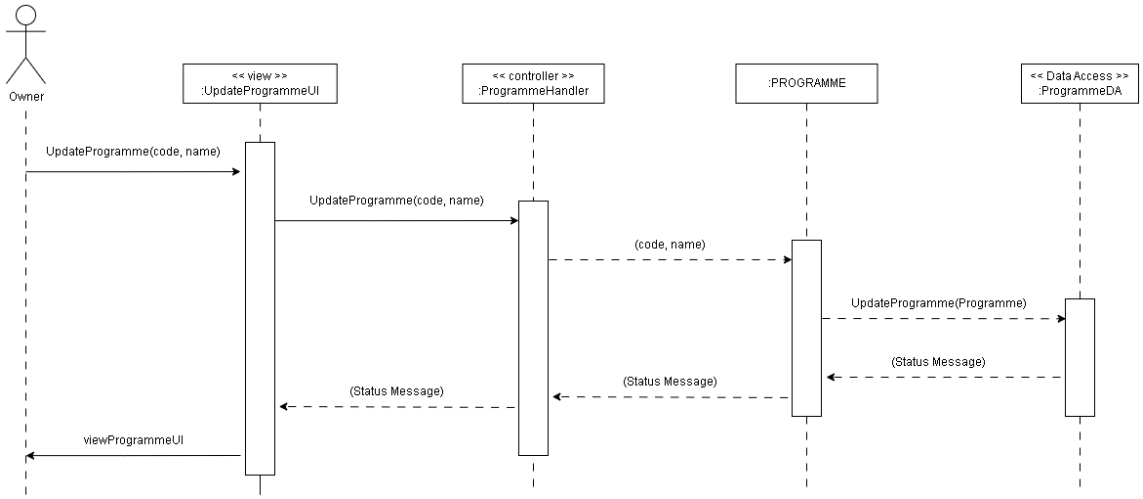


7.1.8 MANAGE PROGRAMME (UPDATE)

DCD

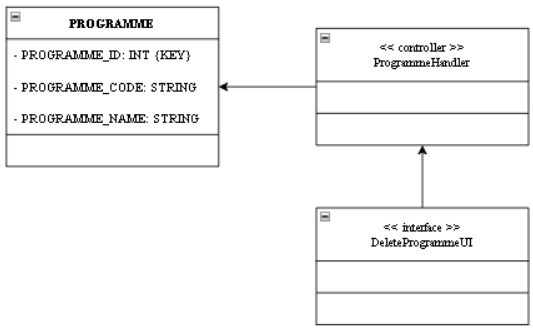


SSD

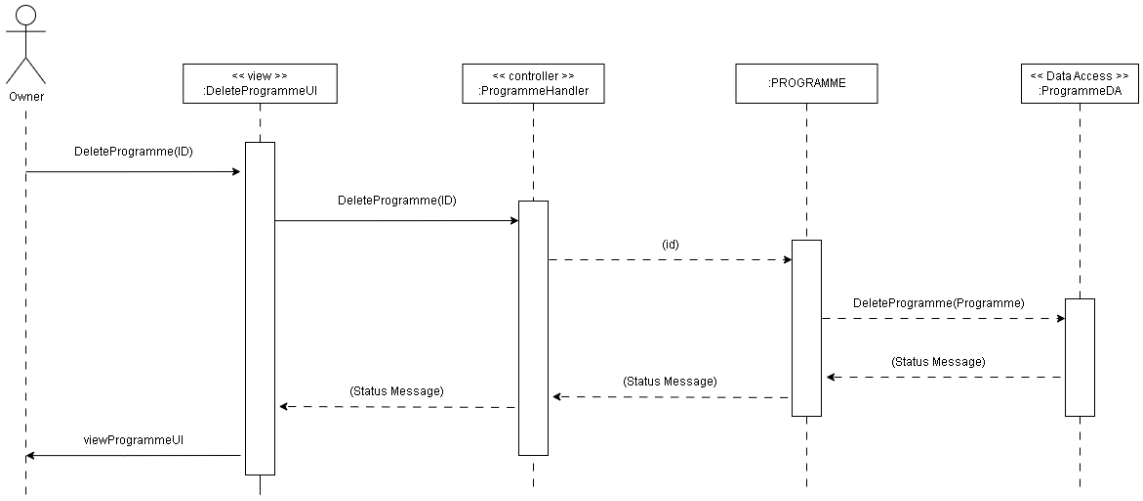


7.1.9 MANAGE PROGRAMME (DELETE)

DCD

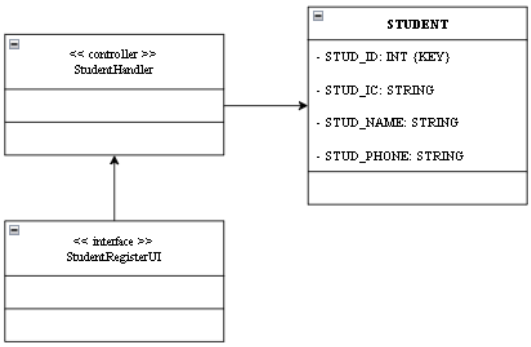


SSD

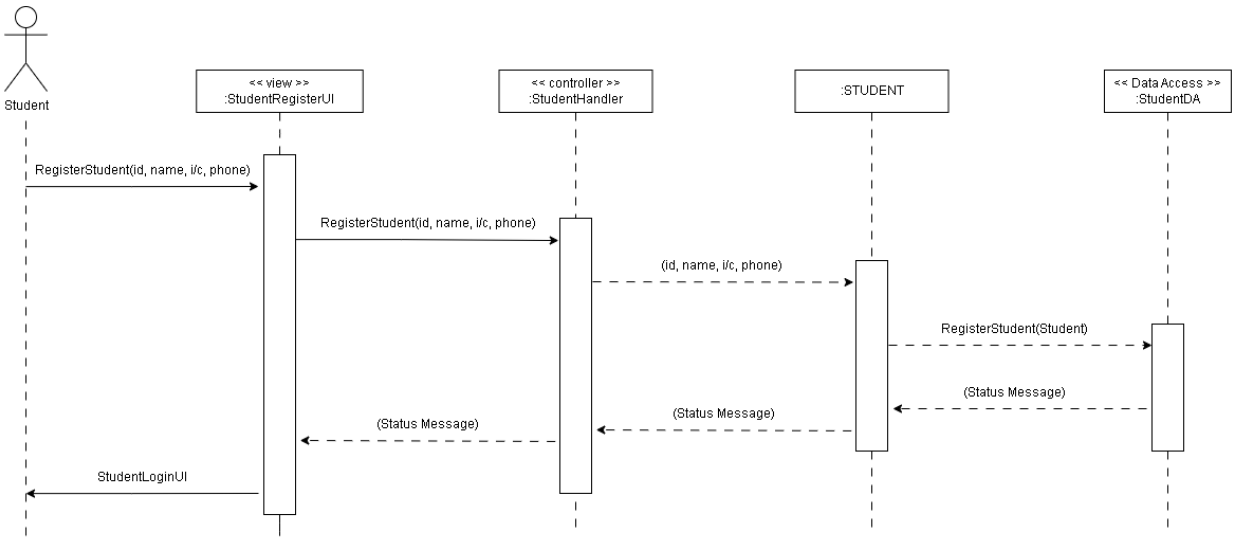


7.1.10 REGISTER (STUDENT)

DCD

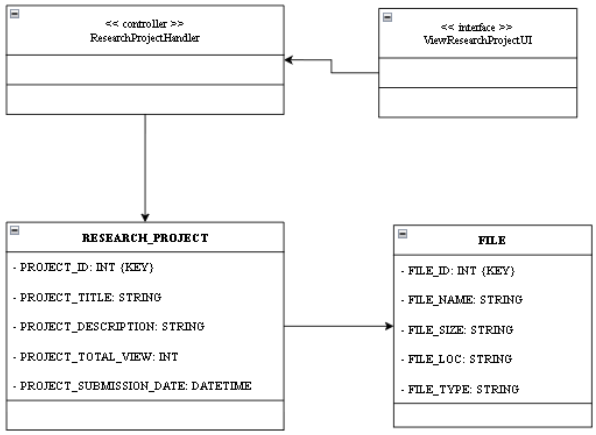


SSD

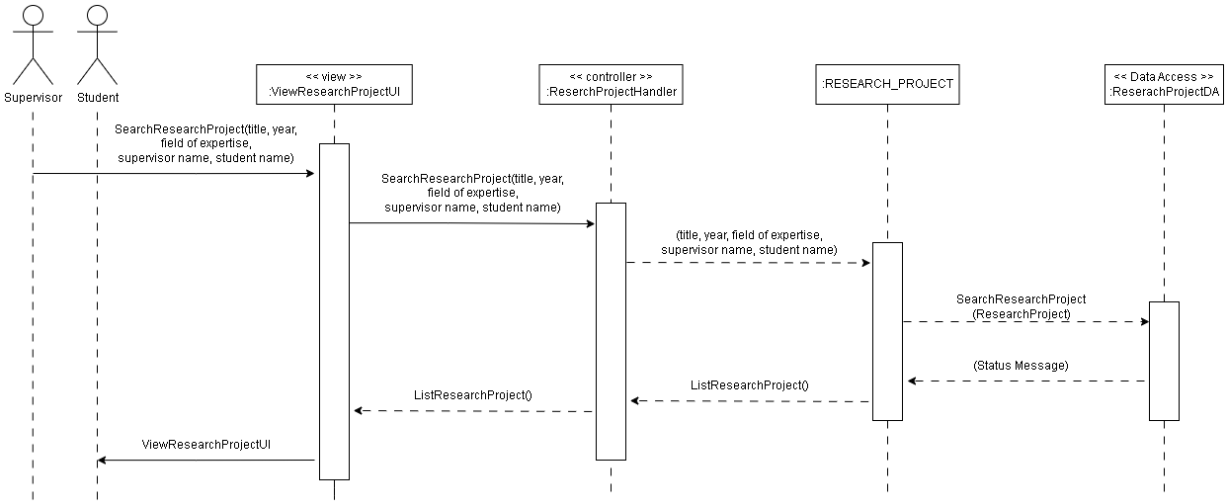


7.1.11 VIEW RESEARCH PROJECT

DCD

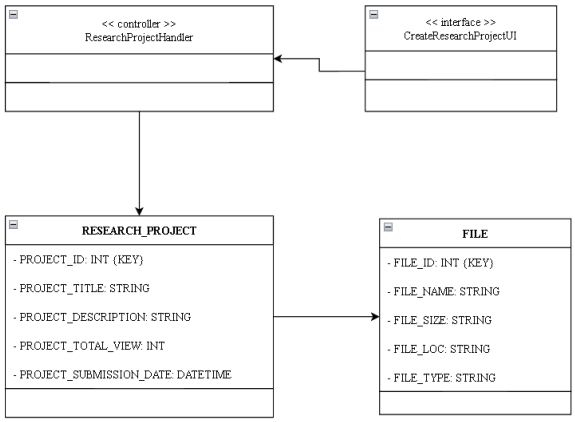


SSD

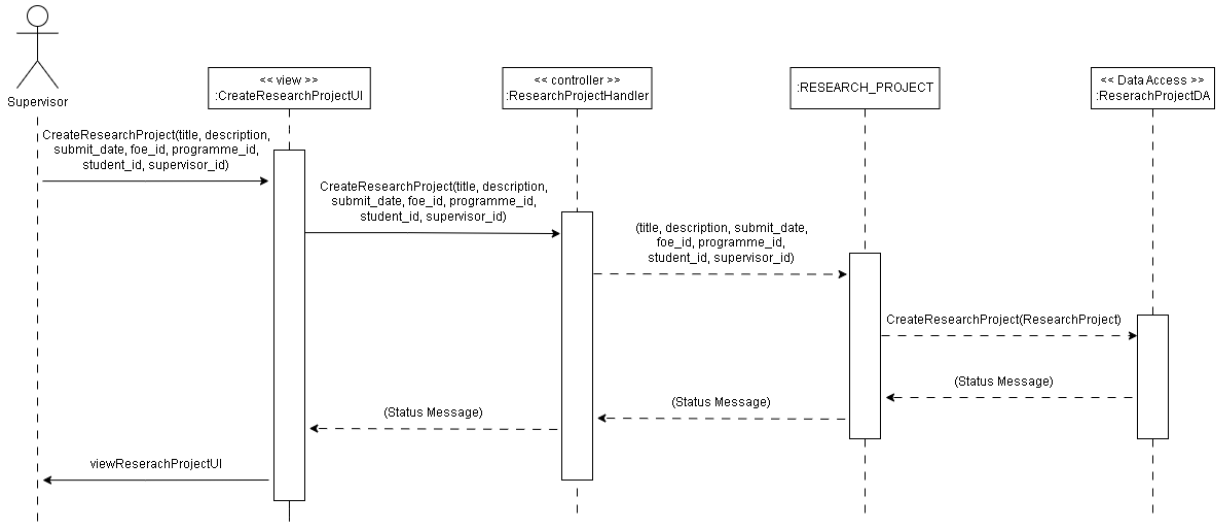


7.1.12 MANAGE RESEARCH PROJECT (CREATE)

DCD

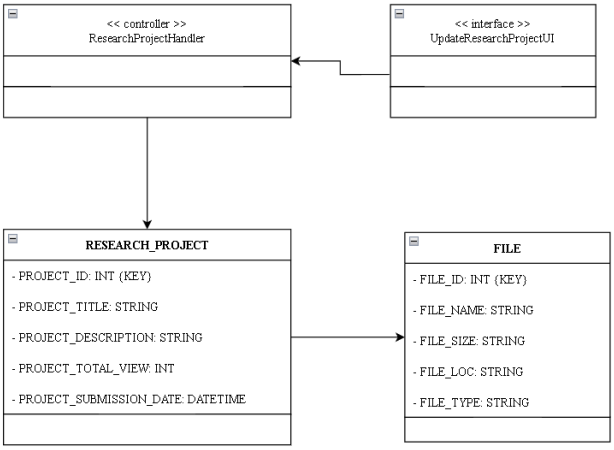


SSD

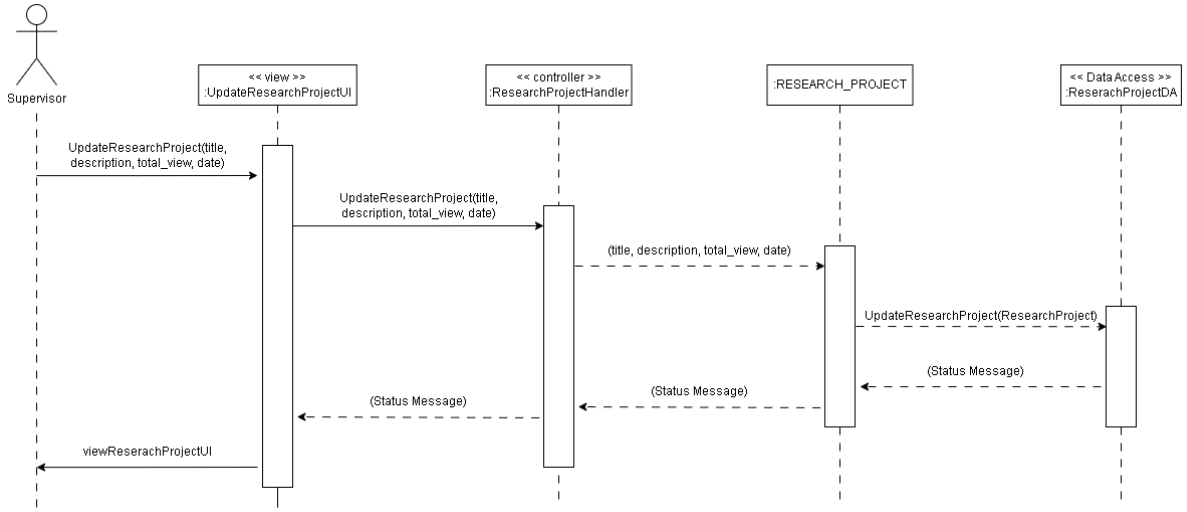


7.1.13 MANAGE RESEARCH PROJECT (UPDATE)

DCD

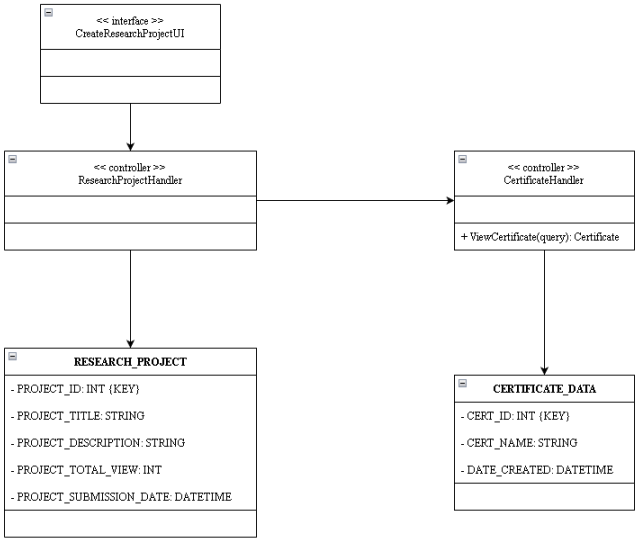


SSD



7.1.14 GENERATE CERTIFICATE

DCD



SSD