INNO CORR MANAGEMENT SYSTEM

KONG SUET HUA

UNIVERSITI TUNKU ABDUL RAHMAN
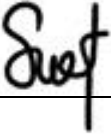
INNOCORR MANAGEMENT SYSTEM

KONG SUET HUA

A project report submitted in partial fulfilment of the requirements for the award of Bachelor of Science (Honours) Software Engineering

Lee Kong Chian Faculty of Engineering and Science
Universiti Tunku Abdul Rahman

September 2023

DECLARATION

I hereby declare that this project report is based on my original work except for citations and quotations which have been duly acknowledged. I also declare that it has not been previously and concurrently submitted for any other degree or award at UTAR or other institutions.

Signature   :

Name   :   Kong Suet Hua

ID No.   :   2005756

Date   :   05 October 2023

APPROVAL FOR SUBMISSION

I certify that this project report entitled **"TITLE TO BE THE SAME AS FRONT COVER, CAPITAL LETTER, BOLD"** was prepared by **STUDENT'S NAME** has met the required standard for submission in partial fulfilment of the requirements for the award of Bachelor of Science Software Engineering with Honours at Universiti Tunku Abdul Rahman.

Approved by,

Signature :

Supervisor : Beh Hooi Ching

Date : 06th October 2023

Signature :

Co-Supervisor :

Date :

ACKNOWLEDGEMENTS

I would like to thank everyone who contributed to the successful completion of this project. I would like to thank my research supervisor, Ms.Beh Hooi Ching, for her invaluable advice, guidance, and enormous patience throughout the research development.

In addition, I would like to express my gratitude to the external company for allowing me to explore and experience the real-time project. This opportunity has enhanced my skills for handling peak workloads or tackling projects with varying resource needs. Meanwhile, I improved my communication skills to ensure a successful partnership in software development projects.

Lastly, I also sincerely appreciate my loving parents and friends, who helped and encouraged me to complete this complex project. They have provided full support and encouraged me whenever I faced any difficulty during the project's development. Not only that, I would also like to thank my seniors for giving me some advice to improve the project.

ABSTRACT

The ability to seamlessly handle quotations, manage tasks, and ensure strict compliance with ISO documentation standards is paramount in efficient project management. Recognizing the significance of these interconnected elements, the "Inno Corr Management System" is a comprehensive solution designed to streamline and optimize these essential functions. The primary objective of the Inno Corr Management System is to provide a unified platform for tracking quotations, managing task distribution, and ensuring compliance with ISO documentation. Besides, the Inno Corr Management System is built on a robust methodology that integrates different components, which includes quotation tracking, task distribution, ISO Documentation, and more. Additionally, these features have been created using various packages such as Laravel Mix, Laravel Eloquent, and more. Lastly, several tests were conducted to ensure every requirement was met according to the user's needs. The overall results of the user acceptance tests were positive. Hence, the Inno Corr management system has been accepted by the target users. Developed in collaboration with Inno Corr Sdn. Bhd represents a pivotal step toward achieving a comprehensive management system that enhances quotation, ISO Documentation, and task accountability, which results in a more efficient Inno Corr Management System.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOLS / ABBREVIATIONS

API	Application Programming Interface
CTE	Common Table Expressions
DBMS	Database Management System
DOM	Document Object Model
DSDM	Dynamic Software Development Method
EA	Enterprise Architeture
FAST	Facilitated Application Specification Technique
FDD	Features Driven Development
GM	General Manager
GRN	Good Receive Note
GUI	Graphical User Interface
HDD	Horizontal Directional Drilling
ISO	International Organization for Standardization
JS	Java Script
MRF	Material Request Form
MVC	Model View Controller
MVT	Model View Template
PHP	Hypertext Preprocessor
PO	Purchase Order
PWA	Progressive Web App
QFD	Quality Function Deployment
RFQ	Request for Quotation
SDLC	Software Development Lifecycle
SKU	Stock Keeping Unit
SMS	Short Message Service
SPA	Single Page Application
UAT	User Acceptance Testing
UI	User Interface
UX	User Experience
VAT	Value-Added Tax
VS	Visual Code

XP eXtreme Programming

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

1.1 General Introduction

InnoCorr Offshore Sdn. Bhd is an Innovative Corrosion Control company that provides Corrosion protection systems and engineering services for East and West Malaysia, Thailand, Indonesia, Myanmar, and Brunei. InnoCorr focus on delivering innovative offshore platforms corrosion protection technology, especially for aging process piping and pipeline in need of life extension. For instance, engineering services provided by InnoCorr are Oil and Gas, Water and Waste Water, Electric Power Generation, Petrochemical Plants, Refineries, Offshore, and Marine Jetties. From these examples, we understood that this company could provide engineering solutions. Besides, the primary products and services provided by InnoCorr are Viscotaq, ClockSpring, Heat Shrink Sleeve, and Deepwater (InnoCorr Offshore, 2023).

1.1.1 Overview of Project

Based on this product and service provided by InnoCorr Offshore Sdn. Bhd, we understood that the company was required to deal with many documents and forms for a different project, especially Purchasing Orders (PO), Request Quotation Forms (RFQ), etc. Hence, the company faced difficulties keeping track of the latest version when other staff edited the outdated quotation. Another issue faced by the company is the weakness of authorization that allows all the users to access all the documents without permission. From these issues, the ultimate goal that InnoCorr Sdn. Bhd would like to develop a web-based application that can enhance the performance of the quotation process with excellent security and user-friendly features for the key stakeholders.

Therefore, this project's scope is to track the quotation records using quotation running numbers with strong user authorization. Meanwhile, the proposed system can distribute the task when any critical stakeholders receive a request quotation from the clients via email. Also, this proposed system can improve the efficiency of controlling the inventory records by viewing and

tracking the document's status, especially the Good Receive Note (GRF) and Material Request Form (MRF). Last but not least, this proposed system can perform CRUD functions for different formats of documents and pictures such as PDF, PNG, and JPG. The project solution is a web-based application that uses the Bootstrap Studio framework for front-end development. Laravel will be used as the back-end development tool to guarantee the website performs correctly. Lastly, PostgreSQL is the database that will store all the data required for this project. This project was expected to be completed by August 2023, with InnoCorr Management System as the functional deliverable.

1.2   Background of Problem

In these few years, InnoCorr Offshore Sdn. Bhd has faced several challenges in tracking the latest quotation records due to the limitation of the internet at the site area, especially the project related to offshore and marine jetties. Without internet access, this problem may decrease staff productivity in uploading and tracking the latest quotation records after several changes are made to the document. Another challenge faced by the company in this quotation process is human error. As you know, human error is a human behavior that causes the intended result not to be achieved. Due to this minor error, some staff may forget to upload the quotation document when their workload increases.

Meanwhile, a high level of turnover among the employees has also become one of the most significant impacts on the company. Two reasons cause high employee turnover: some employees may voluntarily resign from their job due to higher profit offered by other companies, or involuntary employees may be fired due to dereliction of duty. According to the 2021 Bureau of Labor Statistics report, the overall turnover rate is 57.3 %, however that number decrease to 25% when only voluntary turnover, while 29% when only considering involuntary turnover (ian, 2022). Based on this statistical report, we understood that most of the employees involuntarily resigned due to the lack of productivity or changes in fundamental terms of their employment. If these resigned employees were involuntary, they might leave the company without helping the company to upload and save the latest quotation record for specific

customers. Meanwhile, this problem has increased the customer complaint about the inefficiency of the quotation process after some time.

In these cases, InnoCorr Offshore Sdn. Bhd has expressed their interest in creating a web application to solve the problem of tracking the records of quotation process and ISO documents and task distribution among the employee. Using this proposed system, the company can improve its accuracy and level of competence when handling a large number of records for each project. Also, this system helps the company to enhance its quality of work and job knowledge and reduce errors when dealing with a different project simultaneously. From these advantages, the company can increase customer satisfaction with the assistance of technology to improve work efficiency.

1.3 Importance of the Study

In this 4th revolution of industry, the online platform has become one of the crucial platforms for us to improve our knowledge and interact with each other by using the latest technology. In other words, an online platform can be defined as any website that facilitates a service or interaction between itself and the visitor. This platform allows users to access all sorts of information and things daily. For instance, services provided by the online platform are a marketplace, search engine, social media, online website builder, and payment system. In the same way, the online platform can also help the company track the good and latest record by providing different intelligent features for the company to manage and improve their business. With an online platform, the company may be able to collect and analyze a large data in a minimum time. Therefore, a company should always keep good and latest records so that these records can keep for a more extended period while assisting the company in analyzing the information.

There are a few advantages to keeping the latest records through an online platform: to help improve and grow the company's business. The reason is that these latest quotation records may help the company to achieve customer satisfaction and SMART goal. Without the newest record, the company will lose some of the critical information required by the clients, which may cause

customer dissatisfaction with the services. Hence, the company should always keep the latest and good record to ensure the objectives are attainable within a certain period while improving customer services using the SMART goal.

Besides, the online platform helps the company store financial information in the accounting system. So that the financial staff was able to use the data anywhere and at any time without being required to carry the hard copy of the financial documents such as purchase order (PO), profit margin and general ledger, etc., from this example, we understood that the online platform had provided many benefits to reduce the workload of the financial department. Not only that, the online platform can track all the work progress of the user and the person that did the work with the usage of the job management system. Therefore, the manager can delegate and acknowledge the work efficiently without blaming the wrong person if any issues happen.

Moreover, the significant contribution of a project is considered essential to study in this project because it helps me understand the ultimate goal so that it can help the developers make better individual choices while reduce confusion. Also, it can identify a more precise role in the project so that the developers can contribute the best solution for a specific part. Another vital contribution to the project is collaboration. With collaboration, developers can improve communication skills, problem-solving, and adaptability when handling external companies. Through this collaboration, developers can also help the company improve the efficiency of the processes, increase the percentages of success in a business, and provide suitable consultants for the innovation of a particular product or service.

Last but not least, contribution assists the developers in recognizing interdependencies between the external company. Each work product and decision might have a massive impact on others if developers have delayed any task without any discussion with the supervisor and exterior company. Hence, developers should always acknowledge and work with the developers so that developers can achieve the final goal and solve the major problem faced by the company.

1.4   Problem Statements

1.4.1   Difficulties In Keeping Track Latest Quotation Records

Good and latest records are essential to every successful business. The reason is that these records enable the company to plan and execute the project efficiently. With good records, the company may notice or make minor mistakes during the project process. Recently, InnoCorr Offshore acknowledged that manually keeping track of the quotation records was not effective and efficient, which caused them to mix up and duplicate the original quotation records with the latest ones. Thus, the company could not trace the responsible person to verify the project's scope. Besides, the company is also aware of the internet coverage problems faced by the staff to update the latest quotation records at the site area. Based on these issues, this impact has lowered a company's productivity to accomplish a project on time. Therefore, automating the manual process was required to ensure better performance and productivity when handling many tasks.

1.4.2   Weak Authorization among the key stakeholders

Authentication is a term that refers to the process on providing a correct document or fact (Balaban, 2021). This process requires the users to provide their credentials before accessing sensitive information. Usually, password authentification will be used as username and password are the most well-known authentication mechanism. Despite this fact, InnoCorr Offshore Sdn. Bhd has faced challenges in handling weak authorization between different key stakeholders. One of the challenges is the collection of data without any permission from the general managers. Hence, a management system with more robust authorization was required to ensure each critical stakeholder was privileged with limited access to a particular folder.

1.4.3   Limitation on distributing the task

Task distribution is the theory and practice on dividing a large number of tasks with other team to improve their skills and experience. Every organization used this theory to create a subtask that allows the company to assign the task to each person within certain time frame that required them to complete the task. This theory is crucial within a company as it can divide the work equally and

complete tasks faster. There are several benefits provided by task distribution to the company, which are minimizing project risks, increasing productivity, reducing an employee's stress level, etc. However, InnoCorr Offshore Sdn. Bhd faced difficulties distributing the task with limited features provided by the third-party software. These limited features have restricted the company from tracking the time within a project, and only one user can be assigned to a task. Although the third-party software provides plenty of features, it is not user-friendly as it requires some experience in the project management technique. Thus, a task management module was needed that enabled the critical stakeholder to track the task's status with user-friendly features so that the vital stakeholder could distribute the task to multiple key stakeholders efficiently with a better user experience.

1.4.4 Inaccuracy of inventory record

Inventory records are vault of data for every item in a brand's product line. The details in the inventory records include the stock at the SKU level, product value, etc. These records help to improve the visibility and control of the inventory process. Despite these facts, InnoCorr Offshore Sdn. Bhd still faced some issues in controlling the inventory accurately as the project amount increased occasionally. Without an accurate inventory, it can cause significant discrepancies that can throw off profit margins and other financials when the stock's level is lower than the recorded balance in the accounting record. Thus, the ISO Documentation management module and Production management module have played an essential character in enabling the critical stakeholder to create an online record for each product instead of physical records. Using these features, the key stakeholder can keep the latest inventory records up-to-date while preventing inventory stockout.

1.5 Aim and Objectives

1.5.1 Project Goal

To develop a web application that helps the company track quotation records and manage task distribution.

1.5.2 Project Objective

1. To investigate the current problems that the company is facing and determine the requirements.
2. To develop a Web application for managing quotations and projects, task distribution, and ISO documentation.
3. To evaluate the web application by performing a user acceptance test.

1.6 Scope and Limitation of the Study

1.6.1 Target Users

The targeted users for this project will mainly focus on the five people on the management team, which include the general manager, financial staff, and technicians. These users were targeted because each person has a tremendous workload that may cause them to commit a human error. Hence, this project will assist the users in reducing human error and project risk from time to time. This web application will only enable the five key stakeholders to access the web application with limited authorization.

1.6.1.1 General Manager

General Manager (GM) is the person that control all or part of a department's or company's operations. General Manager will be the administrator user of this web application that contains the highest privilege to access all the documents and task distribution to different users. He can access all the modules involved in this project, such as the web file management module, quotation management module, product and service module, task management module, production management module, mail management module, and user authorization module. Last but not least, the general manager will have the authority to delete any record for certain modules based on their needs.

1.6.1.2 Financial Staff

Financial staff is a group of people responsible for accounting and various revenue and expenses for a company. Without financial Staff, the company might face plenty of challenges in planning and controlling its financial resources while ensuring the growth and development of the company within the concern. Therefore, financial Staff has played an essential role in ensuring

proper usage of the money and providing proficient finance strategies so that the company can achieve its objective in the future. In this project, financial Staff will only be involved in the web file management module, quotation management module, task management module, mail management module, and user authorization module.

1.6.1.3 Technicians

Project Technicians is a specialized engineer who works on projects requiring technical expertise. They will oversee equipment, software, or other systems installation or repair. Specifically, they were required to monitor the progress of projects so that they were completed on schedule. Also, they should coordinate with other team members to ensure that projects are completed on time. Thus, the module that requires the involvement of technicians is the web file management module, quotation management module, product and service module, task management module, production management module, mail management module, and user authorization module.

1.6.2 Modules

A module extends a main program dedicated to a specific function. These modules will help the developers to define the boundaries and specific use cases in a system. In this case, the modules involved in this project are the web file management module, quotation management module, task management module, production management module, mail management module, and user authorization module.

1.6.2.1 Web File Managemenet Module

In this module, all the key stakeholders can view the general documents for ISO documentation sections. Only authorized vital stakeholders can edit and update actions toward the control documents. These modules allow the key stakeholders to upload PDF froamt and image. Last but not least, only technicians will have limited access to upload the photo in their file.

1.6.2.2   Quotation Management Module

This module allows the authorized key stakeholders to register a quotation running number based on the due date and Request for Quotation (RFQ) email requested by the clients. Besides, this module contains filter features that enable the critical stakeholder to filter the results based on the quotation running number, company name, date, and quotation status. Lastly, this module allows the critical stakeholder to save a copy of the quotation after several changes were made in the quotation so that the company can track the latest quotation easily.

1.6.2.3   Task Management Module

This module allows all the key stakeholders to distribute the task whenever critical stakeholders receive a Request for Quotation (RFQ) from the client's email. Also, this module permits the critical stakeholder to assign the task based on the task description, date assigned, targeted deadline to complete, and task status. At the same time, the key stakeholder can also perform filter functions to check the task status so that they may acknowledge the pending task before the deadline. Lastly, this module allows the key stakeholder to edit and update the awaiting task once the projects are completed.

1.6.2.4   Production Managemenet Module

In this module, all the key stakeholders can view the general documents for production sections. Only authorized vital stakeholders can perform delete actions toward the control documents. These modules allow the key stakeholders to upload, PDF format and image. Last but not least, only technicians will have limited access to upload the photo in their file.

1.6.2.5   Mail Management Module

This module will allow all the key stakeholders to save a copy of the Request for Quotation (RFQ) via the client's email. Also, this module will auto-generate an email as a reminder for the responsible key stakeholder to update the file weekly until the projects are considered completed. Similarly, this auto-generated email will prompt the critical stakeholder to complete the pending

task assigned by the general manager to finalize the project before the targeted deadline.

1.6.2.6 User Authorization Module

In this module, each key stakeholder will contain their authorization with a different User ID and password. In the same way, the critical stakeholder can register a new account for the new employee whenever the company confirms the new employee. If the essential stakeholders have forgotten their passwords, this module allows the critical stakeholder to forget and create a new password via the auto-generated email for verification purposes.

1.6.3 Scope Exception

This project might not cover the scope of the hosting environment by using a VPN connection to the server. The reason is that this scope may require technical support, the cost of the product, and time constraints to set up the environment. Similarly, the primary goal of this project is to create a web application with intelligent features to solve the company's central problem.

1.7 Proposed Solution

In every successful project, the proposed solution has played an essential role so that each critical stakeholder acknowledges the desired solution. In this case, the proposed result of this project is a web-based application penetrated over a network connection using HTTP that runs within the web browser. The web-based application can be categorized into two sides, which include the client side and the server side. Typically, client side can be accessed through the user's desktop, while the developer will use the server side to process the data over the internet throughout the external server.

Based on Figure 1.1, this proposed solution will use the Bootstrap Studio framework as the front-end development. This framework consists of many built-in components that allow the user to drag and drop to easily assemble responsive web pages with just a few steps (Bootstrap Studio, 2023). Then, the front-end development can send HTTP requests or receive HTTP responses from the Restful API to communicate with each other and exchange information between the front-end and back-end to perform various tasks. Following up,

Laravel will be used as the back-end server to process the incoming request and return the response to the client. Lastly, PostgreSQL will be used as the database to store and sort out the data required in this project.
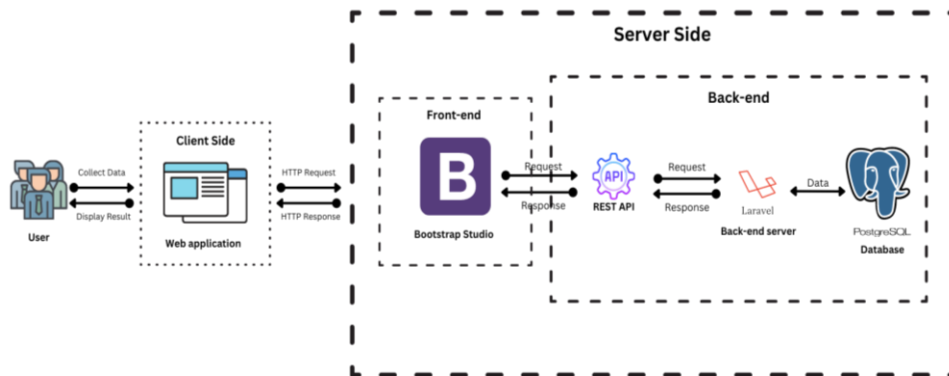
Figure 1.1: Overview of the Web Architecture Design.

1.8   Project Approach

1.8.1   Development Approach

The development approach was used to generates and evolves the outcome throughout the project life cycle. In this project, the Agile Methodology approach is chosen for the development approach because Agile software development anticipates the requirements for flexibility and incorporates a certain amount of pragmatism into the delivery of the end product. Similarly, Agile development, also known as iterative development, divides the entire project into smaller iterations so that the scope of the iterations is clearly defined in advance. Also, a full software development life cycle is used in agile software development, which helps to lower project risk and shorten project delivery timelines.. Based on Figure 1.2, six phases are involved in the Agile model: requirement gathering, designation of requirements, construction, testing, deployment, and feedback.
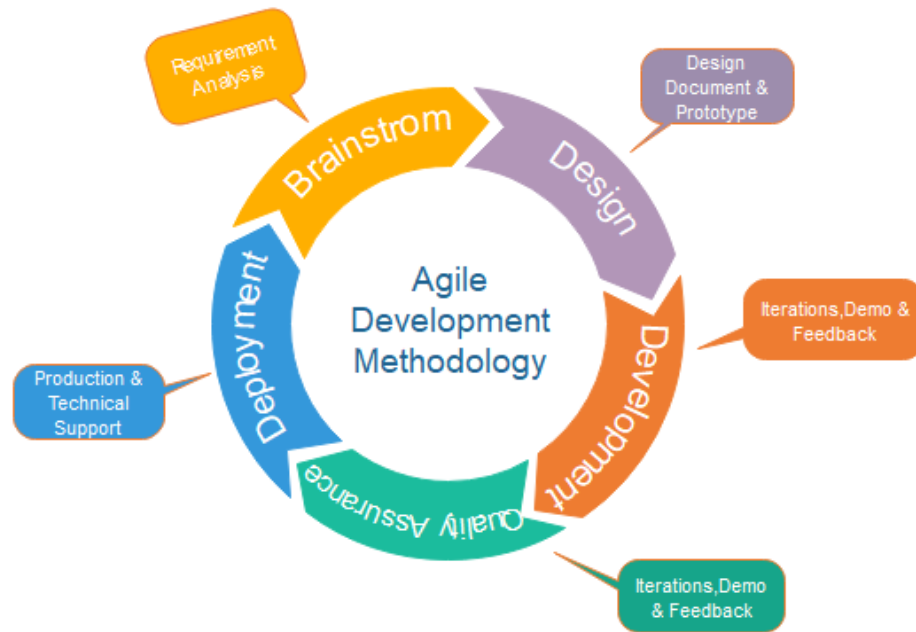
Figure 1.2: Agile Model (Javatpoint, 2023a).

In the requirement-gathering phase, several discussions have been created with the external company while preparing plenty of documents to outline the requirement, such as the system's features, proposed results, etc. Next, a different diagram will be created based on the criteria stated by the critical stakeholder while determining the required features during the design phase. This phase will use various tools and resources to mock up the user interface and the formation of the project architecture. Following up, the construction process will bring together all product needs and consumer feedback to convert the design into code. This phase is the most prolonged phase that requires the developer to carry out the hard work primarily on the product's functionality by the end of the first iteration or sprint.

In addition, a testing process will be required to ensure the software is fully functional. Without the testing process, the system might contain bugs or defects that will cause the system to go down. Last but not least, the deployment process will be taking part to ensure the system runs smoothly while providing training to the key stakeholder on the usage of the system. In the end, the product will go through feedback stages, which will process the input. In this case, this project will employ features driven development (FDD) since it enables

frequent project updates and speedy error detection. Also, this testing method can ensure that the software meets the customer's needs. From these examples, the agile approach has provided several advantages for the project, such as increased software quality, early delivery through sprints, engagement with stakeholders, and the opportunity to make changes whenever required.

1.8.2   Research Approach

The Requirement Elicitation Technique will be used for this project's research strategy since it may guarantee that the software development process is founded on a clear and thorough grasp of the needs and requirements of the customer. Each process enables the developers to understand the external requirement with the interaction of the system while detailed investigation of user needs. Additionally, the Facilitated Application Specification Technique (FAST), Interviews, Brainstorming Sessions, and other techniques are all part of the Requirements Elicitation Technique, which comprises many methods to assist developers in the requirement collection stages.

In order to understand the client's expectations for the software, this project used interviews to gather information from the consent form, meeting minutes, and information sheets. Two types of questionnaires have been used, which are open-ended questions and structured questions. The open-ended question helps the developers understand the customer's perspective as the customer gave feedback by elaborating on their answer instead of a close-end question. Similarly, structured questions provide a predetermined set of responses that helps the developers to compare and track the changes in responses over time. The use case technique will also be employed in this project to better grasp the needs concurrently. Hence, a stick figure and oval shape will be representing the use case while the line will indicate the connection between an actor and a use case, and text were all included in the use case diagram. The reason use case diagram was used is to gives the developers the ability to identify every potential system use while still creating a functioning representation of the system.

Based on these proper methods, requirement elicitation has provided plenty of advantages for the software developers, which helps the developers clarify and refine the customer requirements to avoid any misunderstandings. At the same time, ensure the project meets the expectations. In the meantime, requirements elicitation enhanced stakeholder cooperation and communication, boosting user and stakeholder trust in the software development process. Last but not least, requirement elicitation supports the early identification of potential risks and issues, increasing the likelihood of creating a software system that satisfies customer expectations.

CHAPTER 2

LITERATURE REVIEW

2.1   Introduction

Technology has become increasingly crucial to daily life in this era of globalisation, impacting a wide range of industries, including business, communication, manufacturing, healthcare, and transportation. Without technology, individuals could find it difficult to communicate with one another. Technology has done more than anything else to enable people to live comfortable lives. Therefore, technology is crucial and enormously valuable to everyone, especially for ongoing research and development in the field. There are few advantages that offered by the technology to human's live which are the improvement of efficiency, faster decision making, time and cost saving as well as increase innovation towards industry.

Firstly, technology helps to automate the manual process by reducing repetitive and redundant operations in an organizations. Therefore, the organization able to maximize their output while reducing the inputs in a minimal time or labor while achieving their goal. With the development of technology, artificial intelligence and machine learning has helped the humans to make faster decisions in an easier ways while handling a large volume of data. Therefore, humans are able to minimise the potential for errors in manual processes and go forward with their work effectively.

Other than that, technology assists the humans to accomplish a task in a short time while save significant costs. The reason is because, technology can perform multiple task in the same time while ensure accuracy towards the details of the project. Hence, humans may able save their money when there are no any error happen in a project. In the same way, technology has transformed paper-based communication to digital communication so that humans can communicate with other without using manual ways. Last but not least, technology has demonstrated itself to be the most helpful resource for every business because it aids organisations in making operations easier for employees.

To sum it up, the continued efforts to advance technical advances were justified by the inherent benefits that technology brings to our lives in both minor and large ways.

In this chapter, various of research will be done on the importance of quotation towards a business and current trends of development for front-end, back-end as well as database system. So that, each people able to gain deeper insight on the quotation process while acknowledged the current-trends of the development tools. Also, this section will focus on the identification of the best technique and tools to build a runnable web application. Similarly, software development methodology and usability testing will be scrutinized so that the web application able to solve the issues that faced by the company while improve efficiency and accuracy towards the current progress. Lastly, several existing applications will be analyzed in order to discover the best and common features that suitable for this project.

2.2   Importance of Quotation towards a Business

A quote is a written offer from a seller to a buyer of products or services at a given cost and under particular terms. This document, which includes the suggested rates for the supplier's goods or services, will be provided to a prospective client. Typically, this quotation will be developed based on the specifications that the consumer provides when they want to inquire about or learn more about the product. Then, the supplier will pledge the proposed price when sending back the quotation to the customer. Based on the quotation, the customer will compare the price with several business in order to get an effective product with lowest price.

Typically, this quotation will be calculated with markup price based on all the cost that associated with the job in order to gain more profit for certain product. The quotation will similarly include a breakdown of the costs that went into determining the final price, such as taxes and VAT, material costs, labour costs, and delivery or completion dates for services and commodities. Last but not least, this document will also include the period for quotation verification and clarification of price changes resulting from amendments or adjustments to

the initial invoice. Therefore, the customer able to acknowledged the difference between the new quotation and old quotation easily.

Additionally, there are other ways to write a quotation, including by hand, utilising an online quotation generator, or an Excel or Word quotation template. However, the majority of businesses will go for online quotation generation software because it has the ability to make quotes rapidly and distribute them straight via email, SMS, or even Facebook or WhatsApp. Similar to this, online software enables users to quickly alter the format of the quotation depending on the provided template. As a result, the suppliers won't be able to send inaccurate or disrespectful emails that could harm your company's reputation and the calibre of your job.

In addition, quotation is considered an important tools towards a organizations because this document able to let the customer understand the price that the organizations charged for the product as wells as the terms and conditions. At the same time, the quotation able to ensure the company and clients are in the same outline so that each of them understand the requirement and price of the product easily. Also, the quotation assists the organizations on breaking down the customer requirement so that the itemised quotation can be a great starting point for planning out the project. Other than that, quotation helps to build a new line of communication with potential customers so that the company can show their honesty and upfront towards their customers.

Meanwhile, quotation helps to provides valuable feedback about the company's pricing. The reason is because, it permit the company to gain the right price by offering customer quote that help the organizations get a reasonable price point. Therefore, the company can produce a new pricing strategy or maintain the proposed costs. Lastly, quotation protect the company if a customer fail to complete the payment. The reason is that, many of the industries may delay the payment in reality. Hence, the quotation may act as the evidence that they've accepted a written quote for the work so it can be helpful in resolving the dispute.

Based on these justifications, quotations have provided a significant benefit to both the business and the client by enabling prospective customers to learn the price of goods or services before committing to a purchase. As a result, the business should schedule a time to develop the best prices for a certain product, avoiding issuing sales quotations that are inaccurate or proposing a price that the business is unable to honour.

2.3   Importance of ISO Documentation towards a Business

ISO (International Organization for Standardization) documentation plays a crucial role in businesses across various industries. ISO standards provide a framework for organizations to establish and maintain quality management, environmental management, information security, and other systems. Not only that, ISO Documentation helps businesses ensure the consistent quality of their products or services. It establishes processes for quality control, monitoring, and improvement, which can lead to higher customer satisfaction and reduced defects. In summary, it's a valuable tool for improving business processes, ensuring quality, managing risk, and building trust with stakeholders. It can also lead to tangible benefits, such as increased efficiency, competitiveness, and customer satisfaction, while helping the organizations stay in line with industry best practices and regulatory demands.

2.4   Current Trend Of Development For Front-End

Recently, the trends of front-end technology are always changing in the front-end development world. The reason is because, prioritizing up-to-date front-end design will be essential for businesses that want to stay ahead of the game. Hence, most of the front-end developers are expect the front-end technologies to be more established and intensively used compared to traditional front-end technologies. Meanwhile, the front-end technologies should offer memorable and enjoyable experience for the users in order to produce a trendy and intuitive designs. As you know that, front-end is what people actually see and interact with when they use an app, so it's important to make the user's experience as smooth and enjoyable as possible. Based on these explanations, there are top three most popular frontend framework that used for the front-end development process in 2023 which are React, Angular, Vue.js.

The first thing to know about React is that it is a front-end JavaScript toolkit that enables the developers to create user interfaces using reusable UI components (nihar-raval, 2022). Using server-side rendering, this JavaScript framework offers a scalable and performance-based solution. Therefore, most of the developers likes to use this JavaScript library is because React provide preferred choice for developers to build fast and scalable applications. For instance, this framework offer simple syntax and reusable components that allow the developers to construct dynamic and interactive applications with incredible efficiency. At the same time, React provide server-side rendering and code splitting that enhance the website's loading time. Based on these reasons, the experts has recommend the new developers to use React for projects that involve building SPAs and PWAs. Generally, React has become the most popular and perfect choice of frontend framework for faster development of dynamic and feature-rich applications.

Furthermore, Angular is also one of the most popular and widely-used front-end frameworks for building web apps and creating mobile applications in 2023. This framework was launched by Google Angular team since 2016 to bridge the divide between up-to-date technologies and outdated yet effective techniques (Joshi, 2022). The reason to link the newest technologies with technique is to let the developers around the world to see tangible outcomes without compromising cutting-edge ideas. Hence, the most popular benefits that provided by Angular is Model View Controller (MVC) method as it divides the work into logical pieces and speeds up the initial webpage loading time. At the same time, Angular provide plenty of libraries that helps the developers to create robust template solutions. Angular is regarded as the most well-liked client-side framework for creating scalable and effective mobile and web apps utilizing HTML, CSS, and TypeScript as a result of these advantages.

Moreover, Vue.js is another one of the popular front-end frameworks nowadays. The reason is because, this framework reduce the burden of Angular developers by providing two primary advantages which are virtual DOM and component-based. As you are aware, declarative web frameworks like React,

Vue. js, and Elm employ the Document Object Model (DOM), which is represented by a lightweight JavaScript version known as virtual DOM. Likewise, component-based allow the developers to split the UI into independent and reusable pieces. Using these features, developers can easily manage the web and mobile development from straightforward to complicated processes. Therefore, most of the programmer with javascript background will recommend Vue.js as it provide viable option for many big corporations as well as offers amazing results.

In general, React still takes a strong lead compared to Angular and Vue.js as shown in the Figure 2.1. According to a 2022 Statista poll, React, Angular, and Vue are the top three most popular web frameworks among developers worldwide, with 42.62%, 20.39%, and 18.82% of developers, respectively (Stack Overflow, 2022). React was the most popular front-end framework since it provides both users and developers with a wealth of fantastic front-end advantages. Angular.js is used to create complicated enterprise apps like progressive web apps and single-page apps, whereas React.js is mostly used to create interactive UI components with often variable data. Angular JS is used to create single-page applications utilising HTML and TypeScript when comparing Angular JS vs React JS. User interfaces for single-page applications are frequently built with React JS from separate components. Also user-friendly for beginners is Vue.
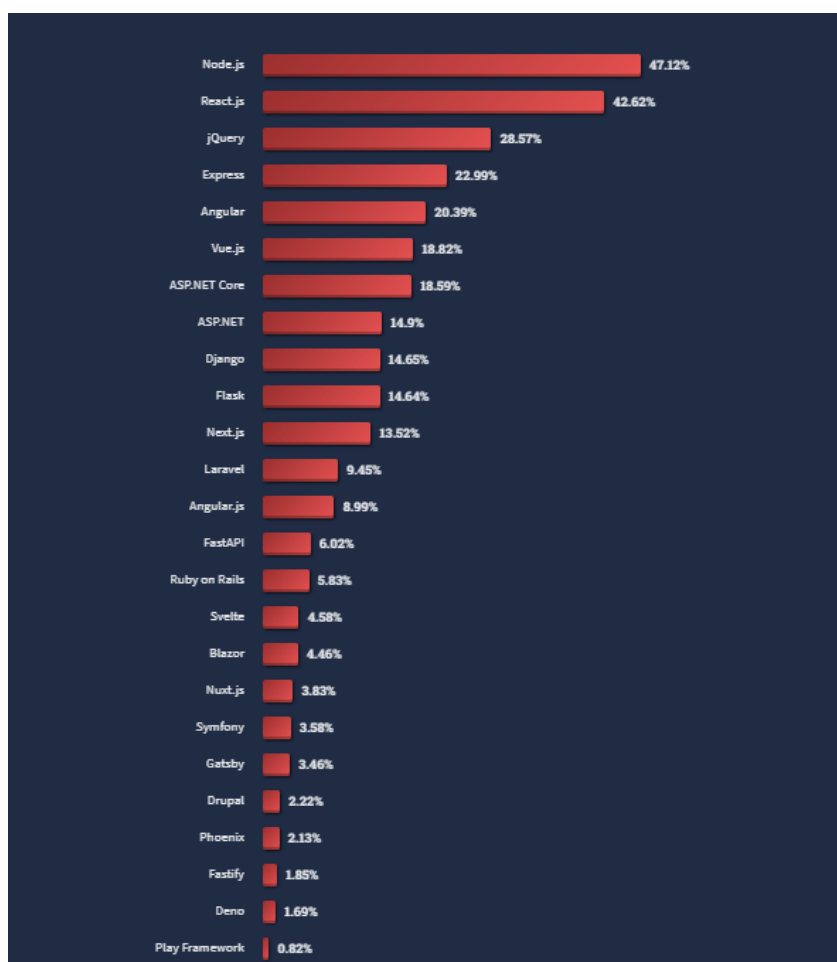
Figure 2.1: Most popular web frameworks among developers worldwide 2022
(Stack Overflow, 2022).

2.5   Current Trend Of Development For Back-End Programming Language

In the same way, the trends of back-end programming language are always changing in the back-end development world. The reason back-end technology has provided huge impact towards the front-end development is because, back-end technology ensures the development of web or mobile applications works smoothly and seamlessly for the users. As you are aware, back-end development entails creating and maintaining the systems that carry out operations on websites and applications, process data, and carry out other server-side tasks. Therefore, there are top three backend programming languages that are popular in 2023 which are JavaScript, PHP and Python (Horiachko, 2023).

First of all, JavaScript (JS) is the web language that will continue to gain popularity in the field of back-end web development. The reason is because JS is a multi-paradigm language that supports imperative, functional, and object-oriented programming approaches and offers lots of coding flexibility. Apart from that, JS is a well-liked option for web developers creating full-stack web apps because to its support for server-side development and selection of libraries and frameworks. Businesses won't have any trouble locating skilled JS developers to aid in the success of the software development process thanks to its rising popularity.

Besides, PHP was also included in this record of the top backend technologies for 2023. As you are aware, PHP stands for Hypertext Preprocessor and is a popular general-purpose open-source programming language that is particularly well suited for server-side web development. PHP is the greatest backend technology because it has a large library of frameworks and packages that enable developers to create dynamic websites quickly. PHP also contains an immensely versatile language. Additionally, PHP has a straightforward syntax that is simple to grasp for both experienced developers and beginners. These factors make PHP the best option for the web development business in 2023 (Hari, 2023).

On the other hand, Python can also be regarded as one of the leading backend technologies in 2023. Python is a general-purpose programming language, which means it can support a range of programming paradigms. Additionally, Python may be the preferred language for addressing significant software development difficulties because of its abundance of libraries and support for GUI programming (Simplilearn, 2022). Additionally, Python is powerful enough for seasoned programmers to create large programmes while remaining simple enough for beginners to pick up fast. Python is a wise choice for the web development business in 2023.

According to Figure 2.2, JavaScript is the top coding language according to the survey conducted by Statista in 2022 with 65.36%. JavaScript allows the developers to write easy-to-read and streamlined code while reduce

the numbers of bugs and handle complex functions with less code compared to Python and PHP. Similarly, 48.07% of developers chosen Python while PHP consists of 20.87% of developers chosen as the most widely used software programming languages worldwide. Finally, there isn't really a big difference between PHP, Python, and JavaScript. JavaScript, Python, and PHP are excellent backend web development technologies. Both languages feature a vast number of frameworks and supplementary tools, are mature, and don't lack for top-notch engineers. The availability of human resources and the goal of the future website are therefore the most important elements.
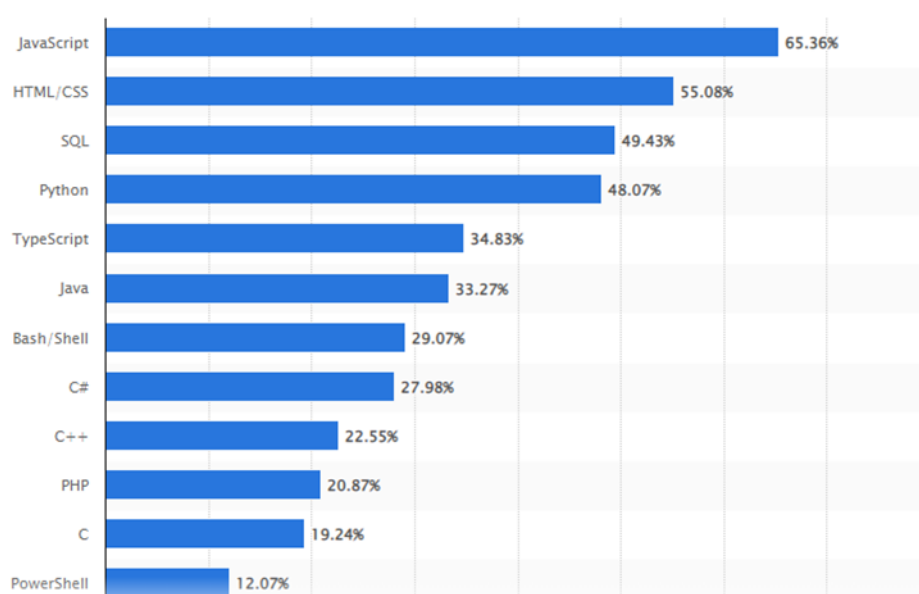
Figure 2.2: Most used programming languages among developers worldwide as of 2022 (Statista, 2023).

2.6 Current Trend Of Development For Back-End Development Framework

In addition, the world of back-end development is always changing with regard to framework trends. As you may already be aware, backend frameworks—also known as "server-side framework"—are used in conjunction with backend programming languages to develop the logic and functionality of software applications. Backend frameworks provide the magic that happens in the background to make an application function as intended. The developers may simply manage and control the apps or websites thanks to backend frameworks.

Therefore, it's critical to pick the appropriate framework while building a successful online project. The management of user authentication and authorization, data organization, and interaction with a wide range of different 3rd party apps and REST APIs are just a few advantages that backend frameworks offer for quick application development. Consequently, Django, Laravel, and Flask are the top three backend frameworks to take into account in 2023 (admin, 2021).

First of all, Django is a high-level web framework that makes it simple to create Python online applications that are quick and safe. Model-view-template (MVT), a variant of the model-view-controller (MVC) pattern, is the paradigm that Django employs. Additionally, the Django framework handles many of the model's controller-related features, leaving developers to specify data view and presentation templates. The majority of the libraries and tools required to create a basic web application are also included with Django. In the meantime, Django encourages the use of best practices in programming while allowing developers to operate entirely within the framework, which can be advantageous for newer developers. Django was therefore validated as a trustworthy and superior set of programming tools in 2023.

Other than that, Laravel is a well-liked option for backend frameworks. As you are aware, the model-view-controller (MVC) architectural pattern is used to create online applications utilizing the cross-platform PHP framework Laravel. User authentication, API routing, HTML templating, database access, and security are just a few of the features offered by Laravel. Laravel is a progressive framework that enables developers to start with straightforward routes to specific RESTful URLs and proceed using the same tools to a fully scaled data-driven application. Additionally, because PHP has been around for almost as long as the internet, Laravel enables the developers to take advantage of that expertise and community assistance. In comparison to Django and Flask, Laravel is thought to be the most frequently used by an expanding community.

Flask is a fantastic option for developers in 2023 as well because it provided a highly-flexible tool for web developers by enabling the developers

to customize their services and apps in accordance with the project requirements (Desmond, 2023). A straightforward, compact, and flexible Python web framework called Flask enables programmers to use third-party tools and modules. Similar to this, Flask is better suited for smaller projects because it keeps a web application's core simple and extendable. When the developers chose a non-relational database, such as mongoDB, or a third-party ORM, the backend framework was simpler to configure. Last but not least, Flask enables developers to create projects using both standard tools and unique capabilities. Flask was therefore demonstrated to be one of the best and appropriate back-end frameworks for the organization to construct small-scale projects.

According to Figure 2.3, Laravel has 67902 user-rated repository stars, giving it the strongest lead among Backend Frameworks (Statista, 2022). The difference between Django and Flask is that Django has 61614 response stars whereas Flask has 57681. Laravel offers a modular package management system with a dedicated dependency manager, numerous ways to access relational databases, tools to aid in application deployment, and other features that make it the best backend framework. However, Django was ranked second in the statistic because it promotes quick development and logical, clean design. Finally, Flask was placed in third place since it is a microframework that doesn't require any special libraries or tools. Despite this, Flask continues to offer extensions that can add application functionalities just like they were built into the core framework. In summary, there are a lot of strong backend web development frameworks out there that have essential characteristics and functionalities. Therefore, before choosing any web framework, it depends on the project requirements and the experience of a web developer.
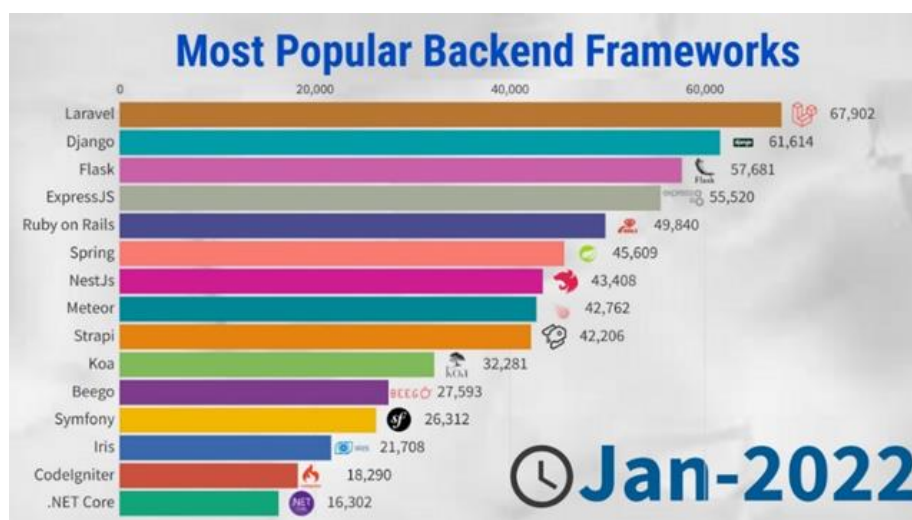
Figure 2.3: Most Popular Backend Frameworks (Statista, 2022).

2.7   Current Trends Of Development For Database System

The system software used to create and administer databases is called a database management system (DBMS) (Data Management, 2023). A database management system (DBMS) was used to generate, protect, read, update, and remove data. Additionally, DBMS offers a centralized view of the data that may be accessed in a regulated manner by numerous people from various locations (Peterson, 2020a). DBMS, on the other hand, covers a wide range of common database administration functions, such as change management, performance monitoring and tuning, security, backup and recovery, and security. Based on these qualities, DBMS enables users to build their own databases in accordance with their requirements, storing and retrieving data for both users and other third-party software. However, the market's adoption of new technologies has caused constant changes in the present development trends for database management systems. Hence, there are top four database that will be focused based on the statistic report which are Oracle, MySQL, PostgreSQL and SQL server.

First of all, Oracle database which also known as Oracle DB is one of the most popular and stable relational databases for enterprise and web (Ostrowska, 2022). The reason is because, Oracle Database allows the developers to store and retrieve data quickly and safely. In the same way, Oracle database can be considered as a relational database management system because

it shares the largest part of a market among other relational databases. Also, Oracle database provide several advantages for the users to manage information and applications which include performance, portability, backup and recovery, PL/SQL extension for procedural programming, Multiple Database and Flashback Technology. Based on these advantages, user able to product high levels of database performance that can be ported to different platform compared to other database system. At the same time, user can backup and recovery their data easily by using oracle online backup and recovery features to avoid downtime or outages. Lastly, Oracle database allows several database instances management on a single server while recover those data that are incorrectly deleted or lost by human errors using flashback technology. Eventhough oracle database provided plenty of advantages toward the user, but oracle database is not an open source database system with low costs. Thus, oracle database is less suitable for the beginner and small business.

Furthermore, MySQL has dominated various ranks for many years. The explanation for this is because MySQL enables users to learn about and alter the source code to better suit their needs (Derek, 2022). Also, MySQL provide optimum speed that assists the user to store massive amounts of big data and manage heavy business intelligence activities smoothly. Besides, MySQL has achieved industry standard as this database system has been used for years and proven by the skilled developers. Hence, most of the MySQL users can use the database system to perform rapid development of the software. Lastly, MySQL offered high security of Access Privilege System and User Account Management. Thus, MySQL users can store their data securely as the database system provide host-based verification and password. Based on these reasons, MySQL are considered the good choice for the beginner to start their first steps with SQL.

A free, open-source object-relational DBMS that has grown in popularity over the past several years is PostgreSQL as well. The explanation is that PostgreSQL is a highly stable database and has been developed by the open-source community for more than 20 years. In addition, because PostgreSQL serves as a general-purpose transaction database, it has been selected as the

primary database for many web applications, as well as mobile and analytics applications. Apart from that, there are many essential features provided by PostgreSQL to enhance user experience such as free to download and compatible with various programming language, data integrity and several operating system as well as support multiple features of SQL. Lastly, PostgreSQL can be considered as a robust back-end database as this database system support many dynamic websites and web applications by using LAPP stack. Based on these features, PostgreSQL users able to use the database system easily without require much training. Hence, PostgreSQL is the most widely used open-source database tools across the globe.

The relational database management system (RDMS) known as SQL server was created by Microsoft as a software product and is mostly used to store and retrieve data for the same or different applications (Peterson, 2020b). The users of SQL Server can occasionally run numerous services, each of which has its own logins, ports, and databases. Hence, SQL server can be divided into two instances which are primary instances and named instances (Javatpoint, 2023b). Primary instances is the instances that can be accessed by using server name while named instances can be accessed using a backslash and instance name. However, SQL server only permits the user choose one of the instances as the default instances as one instances can rull all the instances concurrently. The user can also lower the price of running SQL Server, particularly the cost of the SQL Server license, based on the usage of SQL server instances. The consumers don't need to buy a single license for all services because they can use multiple instances to obtain different services. Similar to this, SQL Server enables users to install various versions of SQL Server on a single machine because each installation is independent of the others. Based on these advantages, MS SQL Server has grown in popularity over time and offers a price advantage over Oracle database.

Based on the Stack Overflow report as shown in the Figure 2.4, MySQL has taken the first-place spot on the rankings with 46.85% while PostgreSQL has achieved the second place of the rankings with 43.59% (Stack Overflow, 2022). Likewise, MS SQL has taken the fifth place of the rankings

with 26.87% and Oracle database contain only 11.49% of votes from the developers (Stack Overflow, 2022). According to this report, MySQL are the most likely solution for the developers as this database can efficiently manage your data with this application. In conclusion, all the top four database systems are among the most popular database on the market that contain their advantages and disadvantages. Hence, the developers should choose the database system that serve the particular project and requirement as all of the database system can be installed in any major operating system.
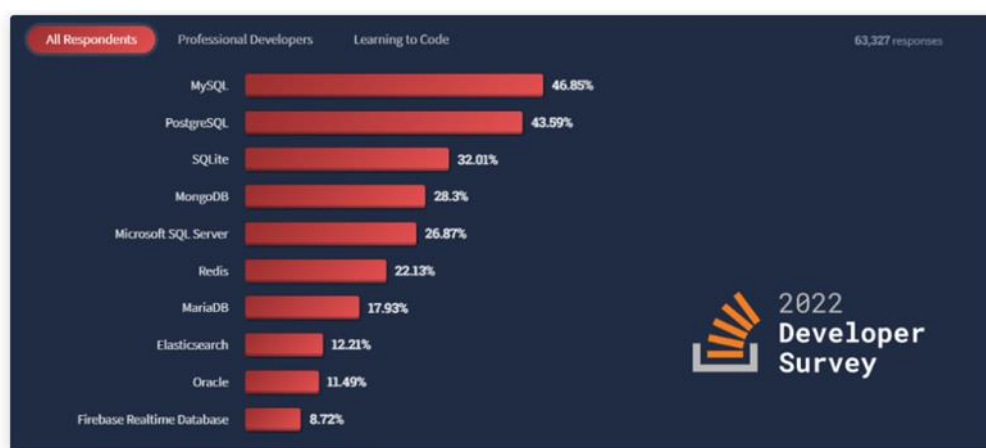
Figure 2.4: Stack Overflow DBMS Survey 2022 (Stack Overflow, 2022).

2.8   Software Development Methodologies

Software development approaches have become increasingly important in recent years for designing software systems. The reason is that by facilitating streamlined software development in accordance with project requirements, these techniques aid. As a result, the majority of the organization has begun to adopt various software development approaches on a daily basis. Software development methodology, as you may know, is a framework used to organize, schedule, and manage the process development of an information system. Because of this, the company has access to a wide range of software development methodologies, including Agile Software Development Methodology, Scrum Development Methodology, and others. Despite this fact, each software development technique has pros and cons that vary depending on the project's requirements. The top three software development technologies

will be discussed in this section in order to help you choose the development methodologies that will help this project succeed more often.

2.8.1   Agile Software Development Methodology

Firstly, the Agile Software Development methodology is one of the greatest methods for creating a structured software management process that also permits periodic changes to the development project. Alternatively put, Agile development approaches are a collection of frameworks and procedures that emphasize adaptability, teamwork, and client delight when developing software. Iterations or sprints, which are typically one to four weeks long, are used to divide the development of the software into smaller, more manageable parts. Iterative development, continuous improvement, and customer collaboration were typically components of Agile development approaches.

Therefore, there are a number of benefits that the Agile Development Methodology has demonstrated, including continuous delivery of valuable software that increases customer satisfaction while being able to adapt to the changing needs of the client (The Strategic Project Manager | Just another WordPress site, 2022). At the same time, Agile Development Methodology increase enhanced collaboration between customer, developers and testers in order to get better communication and faster decision-making. Hence, Agile Development Methodology is suitable to be used in this project as this project required to collaborate with the external company in order to understand and solve the issues that faced by the company. Another reason is that agile development methodologies provide flexibility for the developers to respond to changing requirements and customer needs more effectively.

2.8.2   Scrum Development Methodology

Scrum Development Methodologies will also be emphasized when discussing software development methodologies. Scrum is an Agile development process that is frequently applied in the management and completion of challenging projects. Brief planning sessions, meetings, and a final review mark the beginning and end of the Scrum software development paradigm. Consequently, Scrum uses small, self-organizing teams to complete tasks in brief intervals

known as sprints, which are usually between one and four weeks long. Delivering a functional product increment that can be inspected and assessed by the customer or stakeholders is the main goal of each sprint.

Additionally, the benefits that the Scrum Development Methodologies offer to a project include the ability for the business to control the project development processes that are evident in this method, with an emphasis on regular updates of the progress. Despite this, Agile Scrum is not a good fit for this project since it may cause scope creep if the project management stakeholder keeps insisting that new functionality be supplied. Similar to this, Agile Scrum is only appropriate for small, quick projects rather than elaborate ones. These factors demonstrate that Agile Scrum is not appropriate for this project since it may not be a quick-moving or small project.

2.8.3   Feature Driven Development

Feature Driven Development (FDD), an agile software development methodology, focuses on producing functional software features on schedule and within budget (Jeff De Luca, 2023). FDD is a highly structured method of software development with a focus on continuous integration, planning, and design. Similar to this, FDD is made to be extremely scalable and can be utilized for applications of any size, from little startups to huge business ones. FDD is a highly structured method to software development, which can help to handle the complexity of larger projects, and as a result has a lot of benefits for a project (Kanjilal, 2023).

Also, FDD places a strong emphasis on design that help to create a more robust and scalable software architecture while encourages developers to integrate their code frequently that can help to identify and resolve issues more quickly. Even though FDD contain several benefits, but FDD still contain some disadvantages which are time-consuming due to the emphasis on design and planning (Lucid Content Team, 2023a). Despite this fact, FDD was chosen for this external project as it can be an effective approach for managing complex software development projects. Therefore, FDD can be considered the best

choices to ensure that everyone is working towards a common goal. Based on the Figure 2.5 shows the diagram of the FDD model.
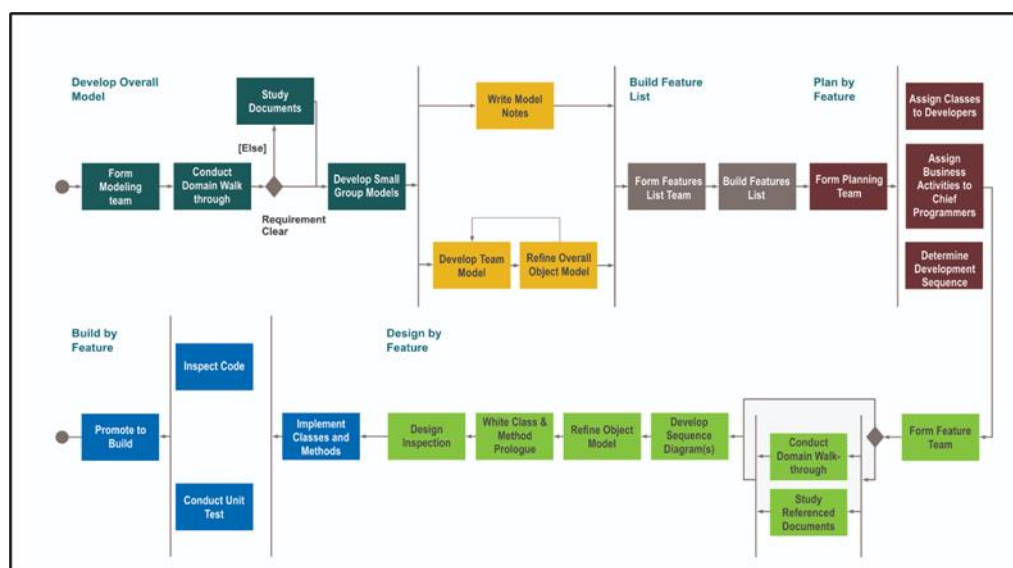
Figure 2.5: Feature Driven Development (FDD) (Dynamic Domain, 2023).

2.8.4 Conclusion

In summary, the best software development methodology for this project will be feature driven development after a study of the top 3. The foundation of this type of architecture is established industry standards for software development, making it easier to build and adhere to accepted best practices. Additionally, FDD only requires five basic procedures, but Agile Scrum requires five complex processes to create a quality product on schedule. This helps to complete work quickly and easily. Develop an overall model, design by feature, generate a feature list, plan by feature, and build by feature are the five straightforward steps that make up FDD (Laura Fitzgibbons, 2023). Based on these procedures, the developers can produce modest feature sets in one- to two-week cycles while adhering to a set of engineering best practices. Similarly, by following these five processes, development is kept consistent, allowing the project to expand and new team members to quickly catch up. As the developers and clients do not have much time for daily meetings like Agile Scrum, another reason to choose Feature Driven Development in this project is that FDD just requires fewer meetings. Not to mention, FDD contain the ability to break feature sets down into smaller pieces and regularly schedule iterative releases makes it simpler to

identify and repair code problems, lowers risk, and enables you to respond quickly to your client's requests.

2.9   Usability Testing Method

Usability testing is an effective method for assessing a website's operation and ensuring that users can move around it easily (hotjar, 2022). It usually entails testing a product with people who represent the target market in order to find usability problems, then implementing modifications in response to their comments. Three categories of usability testing methods exist: moderated vs. unmoderated, remote vs. in-person, and exploratory vs. comparative. An unmoderated testing session is used to test a very specific hypothesis or to observe and measure behavior patterns. In contrast, a moderated testing session is used to study the motivations behind user behavior. On the other hand, a remote usability test is conducted online or over the phone, but an in-person test involves seeing and analyzing body language and facial expressions. Exploratory tests are open-ended, but comparative research methods ask users to select between two options, and they are used to compare a website with its main rivals. This is the final distinction between explorative and comparative testing.

Besides, there are several general steps that involved in conducting a usability testing which are determine the objectives, identify the participants, develop a test plan, conduct the test, analyze the results and lastly generate report and implement findings. In the beginning, the developers should identify the goals and objectives of the usability testing and the questions you want to answer. Meanwhile, the developers should identify the target audience and recruit participants who represent the users of the product. The next step is for the developers to create a test plan outlining the tasks that participants will be required to complete and the performance measures that will be applied to them. After that, the developers will conduct the usability test by observing participants as they interact with the product or system and complete the tasks outlined in the test plan while analyze the data collected during the test to identify usability issues and prioritize them based on severity. In the end, the developers will need to create a report outlining the findings and

recommendations, and share them with the development team to make improvements. Not only that, unit testing, integration testing, and acceptance testing are the three primary phases of testing that must be finished before a programme is approved for usage.

2.9.1   Unit Testing

First of all, unit testing is a kind of software testing where just certain software units or components are examined (Hamilton, 2020a). This project's primary goal is to confirm that every piece of software code functions as planned. Additionally, as unit tests isolate a specific portion of code and validate its correctness, they can be seen as the first level of testing performed prior to integration testing in the SDLC. Additionally, unit testing is a type of White Box testing that is typically carried out by the developer. Apart from that, unit testing is crucial because, contrary to popular belief, software developers frequently try to save time by performing minimal unit testing, which results in expensive bug fixes during system testing, integration testing, and even beta testing after an application has been built. According to these justifications, unit testing is always required to some extent in order for the programmer to refactor code in the future and ensure that the module continues to function as intended.

2.9.2   Integration Testing

Second, integration testing will be used in a software project since it offers the chance to combine and test all of the program's individual elements at once (Hamilton, 2020b). This testing level may also comprise several software modules that were created by several programmers. This level of testing mostly serves to highlight flaws in how these software modules interact when they are combined. Therefore, integration testing is crucial when dealing with the high likelihood of client requirements changing during module development. Besides, every software developer has a unique understanding and method of programming that may differ from that of other programmers. These justifications suggest that integration testing is essential to confirming the interoperability of the software parts.

2.9.3   User Acceptance Testing

In the last stage, end-to-end business flow is validated through user acceptance testing (UAT). User Acceptance Testing (UAT), as you are aware, is a type of testing carried out by the client or end user to confirm or accept the software system prior to deploying the software programme to the production environment. UAT is typically conducted in the testing process' final stage, following functional, integration, and system testing. As a result, user acceptability testing is performed using production-like data configuration in a separate testing environment. As a result, UAT might not pay attention to minor typos, misspellings, or system testing. Unit Acceptance Testing is also necessary to prevent customer misunderstandings because some developers may have constructed software based on requirements documents according to their own interpretation. UAT is therefore required to confirm that the client or end user has accepted the final product.

2.10   Summary

In conclusion, this chapter has discussed the value of quotations to a firm because they inform the client of the price and terms of the transaction. Quotations are considered important in business transactions as they provide a detailed overview of the products or services being offered and their corresponding costs. Besides, quotation clearly outlines what the customer can expect from the product or service being offered, including its specifications, features, and pricing. Therefore, quotation helps to prevent any misunderstandings or confusion that may arise later on. Meanwhile, quotation provides a detailed and accurate quotation shows that the business values transparency and honesty in its dealings with customers, which can help to establish trust and build a positive reputation. Based on these explanations, quotation has played a vital role to improve and maintain a business's reputation, increase customer satisfaction, and ultimately drive sales.

In addition, several current trends of development for front-end, back-end and database have been studied in order to understand and select the best framework and programming language that suits for this project. Moreover, there are top three software development methodologies that has been

discovered based on the list of software development methodologies. Each of the software development methodologies has showed their advantages, disadvantages and the choices either the development methodology suitable for this project so that, the software development methodologies able to adapted in this project based on different factors easily. Lastly, the usability testing method has been explored based on the types and few stages of testing so that the company able to improve their products or services, enhance the user experience, reduce development costs, increase adoption and retention rates, and enhance brand reputation.

CHAPTER 3

METHODOLOGY AND WORK PLAN

3.1   Introduction

For the InnoCorr Management System, every aspect of the chosen software development technique will be fully documented in this chapter. Additionally, an illustration and analysis of each software development tool utilised in this project will be provided. In order to complete the project on time and satisfy all stakeholders, this chapter will prescribe the work break down structure and Gantt chart to show the project scope and schedule planning.

3.2   Feature Driven Development Methodology

Short iterations and frequent releases are hallmarks of the customer-focused software development technique known as feature-driven development (FDD) (Lucid Content Team, 2023b). To put it another way, FDD arranges workflow according to which features should be created next. As a result, FDD in Agile promotes reporting progress and results at all levels to make it easier for developers to monitor progress. Additionally, FDD was created to adhere to a five-step development approach that was primarily based on discrete "feature" projects. The development of an overall model, creation of a features list, planning by feature, creation by feature, and design by feature comprise the FDD project lifecycle. When used effectively, FDD can shorten the development process and free up time for regular updates to software releases.

3.2.1   Develop An Overall Model

Project objectives and scope will be the main focus of the first phase because they contain the essential content structure and the early ideas for UX and UI (Pr, 2022). In order to capture the idea behind the product, an overall model— the draught proposal—will be made at the same time. To comprehend the target audience and their wants, requirement collecting and elicitation will be necessary within the same stages. Once the developers have identified their objectives, they will begin to create a comprehensive domain model using the combined overall model, which serves as a general framework for the system.

3.2.2   Build A Feature List

The information obtained in the earlier phases will all be combined in this phase in order to develop the functional and non-functional requirements of the necessary features based on output that is valued by the client. Then, while the project is being worked on and a release date is determined, the developers will come up with a list of prospective needs that would be helpful to the clients. Each feature will be manageable in a matter of two weeks or less. These characteristics should generally be ranked according to how important they are to the company's goals and how dependent they are on other features.

3.2.3   Plan By Features

After the building features list's phase was done, the developers will break down the feature list into smaller and more manageable units. This feature list is also known as feature sets. These feature set will be planned as a mini project with its own timeline and budgets. Meanwhile, the developers will identify and estimate the time that the tasks required to implement each feature. Next, the developers will create a schedule by using Work Breakdown Structure (WBS) to set a deadline for the project so that the project completed on time. In the end, several discussions will be conducted to discuss the potential risks and constraints so that the developers able to make faster decision-making while increase the accuracy of the estimation.

3.2.4   Design By Features

The feature will be carefully designed in the fourth stage by the developer utilising a variety of software development tools to demonstrate each feature's true details. Using the UML modelling technique, a use case diagram will be used to demonstrate how the feature will be built and how it will interact with other features. As you work on these particular designs, your understanding of the product grows, which informs any modifications that should be made to the initial domain object model. The developer will conduct a design review session with the supervisor as the last step in the design process to make sure the design is capable of resolving the issues facing the outside company.

3.2.5   Build By Features

The features will be implemented by the developers using the design that was generated in the previous stage during the fifth and final stage. Database will be set up to ensures the server and database connection were completed. Then, a feature prototype is created, the user interface is constructed, each modules have been generated and it goes through various testing phases. The finished version of the feature can be included in the main build and made accessible to customers if it passes the test and is approved. Finally, the developers will solicit input from subject-matter specialists to confirm that the functionality performs as anticipated. Future versions will then be informed in order to guarantee that the product meets customer needs.

3.3   Development Tools Used In This Project

3.3.1   Figma

The collaborative cloud-based interface design tool Figma is sweeping the design industry. Unlike Sketch, this software may be used with any operating system, including Linux, MacOS, Windows PCs, and Chromebooks. In addition, Figma supports real-time collaboration on the same project, in contrast to Photoshop, which only allowed users to send emails after exporting their work as image files. Figma enables clients and co-workers to connect more deeply with the work and review the most recent version of the file, to put it briefly. Additionally, Figma has a sizable library of plugins that may be used to increase the tool's capability. Using these features, the designer able to create interactive prototypes and manage design systems, which can be used to maintain consistency across all design work. Overall, Figma is a popular and powerful design that provide plenty of collaborative features and flexibility towards the designers.

3.3.2   Bootstrap Studio

Bootstrap Studio is a powerful desktop application that is used to create responsive websites using Bootstrap. This application is considered a popular front-end framework because it provides a visual interface that allows users to drag and drop components to create web pages while automatically generates clean HTML, CSS, and JavaScript code. At the same time, Bootstrap Studio has

an effective grid system that enables designers to make adaptable layouts that change according to the size of the screen. Additionally, a variety of pre-built elements, such buttons, forms, and navigation menus, are included with Bootstrap Studio and may be quickly customised and integrated to a design. In conclusion, Bootstrap Studio is a strong tool that makes it easier to build responsive websites with Bootstrap.

3.3.3 Enterprise Architect

Enterprise Architect (EA) is a modelling and design tool used by software architects, business analysts, and developers to create and manage complex software systems. EA was designed to assists the developers on managing the complexity of large-scale software development projects by providing a single, integrated environment for modelling, design, analysis, and implementation. Therefore, EA provides a wide range of modelling and design tools that allow users to create and visualize complex systems and processes. In order to make sure that the finished product satisfies the expectations of stakeholders, EA also contains tools for managing requirements and tracking them throughout the development process. In conclusion, Enterprise Architect is a thorough product that supports every stage of the software development lifecycle, from gathering requirements to implementation and testing.

3.3.4 Visual Studio Code

Visual Studio Code (VS Code) is a free code editor created by Microsoft. Innovative online and cloud apps can be created and debugged with the aid of this platform. Besides, VS code offered IntelliSence Code that provides intelligent code completion, code highlighting, and code formatting to help developers write code more efficiently. Also, VS code includes a built-in debugger that supports debugging for various programming languages, including JavaScript, Python, and C++. Based on these features, VS code provide delightfully frictionless edit-build-debug cycle that allow the developers to fiddling with the environment in a short time while more time to execute the ideas. In general, VS code is a strong and flexible code editor that offers a wealth of features and extensions to enable contemporary web and cloud development.

3.3.5 PostgreSQL

PostgreSQL is used to maintain the database file and records while handling data storage, multi-access control and security purpose. Hence, this platform is the best choices as PostgreSQL provides advanced features and reliability for data storage, retrieval, and management. Apart from that, PostgreSQL support different advanced SQL support such as nested queries, window functions, and Common Table Expressions (CTEs) and etc. At the same time, PostgreSQL can handle large amounts of data and support concurrent transactions especially for high-traffic applications. In general, PostgreSQL is a powerful and versatile database management system that provides advanced features and reliability for data storage and management.

3.3.6 Notepad++

Notepad++ is a free code editor that made for Microsoft Windows. This tool can be considered the most popular text editor among the developers because it provides many advanced features and tools that make it a powerful alternative to the standard Windows Notepad application. For instance, Notepad++ makes it simpler for developers to view and write code by providing syntax highlighting for various programming languages. Meanwhile, Notepad++ includes an auto-completion feature that suggests keywords and functions as you type, making coding faster and more efficient. Lastly, Notepad++ contain a large library of plug-ins that extend its functionality which include the tools for code formatting, debugging, and version control. On the whole, the developers can access to many cutting-edge features and tools using Notepad++'s robust and adaptable code editor.

3.3.7 Canva

Canva has become the most popular graphic design tools on the web because it offered a wide range of professionally designed templates that users can customize to create their own designs quickly and easily. Besides, user interface of Canva is considered easy to use because it provides a drag-and-drop editor that allows users to add and arrange elements on the canvas. Lastly, Canva permit more than one user to work on the same design project simultaneously

so that these users able to collaborate on a visual content. In general, Canva is a powerful and versatile graphic design platform that provides a wide range of tools and features for creating stunning visual content.

3.4   Project Plan

3.4.1   Work Breakdown Structure (WBS)

1.0 Develop Overall Model

       1.1 Analyze The Project Title

       1.2 Study Background Of The Problem

       1.3 Identify Problem Statement

       1.4 Define Project Objectives

       1.5 Illustrate Project's Solution

              1.5.1 Discover System Architecture

              1.5.2 Determine System Architecture

       1.6 Propose Project Approach

               1.6.1 Determine Development Approach

              1.6.2 Determine Research Approach

       1.7 Define Project Scope

               1.7.1 Identify Target Users

              1.7.2 Identify Modules

              1.7.3 Identify Scope Exception

       1.8 Requirement Gathering

               1.8.1 Conduct Interview

                     1.8.1.1 Generate Interview Questions

                     1.8.1.2 Distribute the questionnaire

                     1.8.1.3 Analyze the feedbacks

       1.9 Literature Review

               1.9.1 Investigate the importance of quotation towards a

                   business

               1.9.2 Investigate the software development methodologies

               1.9.3 Investigate the usability testing methods

2.0 Build a Feature List

       2.1 Requirement Elicitation

2.1.1 Define the functional and non-functional requirements

2.1.2 Clarify the functional and non-functional requirements

2.1.3 Finalize the functional and non-functional requirements

3.0 Plan By Feature

    3.1 Project Scheduling

        3.1.1 Generate Work Breakdown Structure (WBS)

            3.1.1.1 Define the major deliverables

            3.1.1.2 Classify the deliverable into smaller tasks

            3.1.1.3 Create a hierarchical structure

            3.1.1.4 Review and refine the deliverable

        3.1.2 Create Gantt Chart

            3.1.2.1 Define the project tasks

            3.1.2.2 Determine task duration

            3.1.2.3 Determine task dependency

            3.1.2.4 Draft a Gantt Chart

            3.1.2.5 Clarify the Gantt Chart

            3.1.2.6 Finalize the Gantt Chart

4.0 Design By Feature

    4.1 Design Use Case Diagram

    4.2 Create Use Case Description

    4.3 Design Interface Flow Diagram

    4.4 Design Initial Prototype

    4.5 Review Feedback from Project I submission

    4.6 Clarify Project I documentation

    4.7 Explore the implementation framework and tools

5.0 Build By Feature

    5.1 Development Phase One

        5.1.1 Set Up Connection

            5.1.1.1 Set Up bootstrap connection with VS code

            5.1.1.2 Set Up database connection

                5.1.1.1.1 Create a databse

5.1.1.1.2 Generate REST API

5.1.1.3 Connect the application with REST API

5.1.2 Test Connection

5.2 Development Phase Two

5.2.1 Develop User Authorization Module

5.2.1.1 Implementation

5.2.1.1.1 Create User Dashboard

5.2.1.1.2 Create Login Feature

5.2.1.1.3 Create Users

Registration Features

5.2.1.1.4 Create Track Users

Activity Log Feature

5.2.1.2 Test User Authorization Module

5.2.1.2.1 Test Sign Up Feature

5.2.1.2.2 Test Login Feature

5.2.1.2.3 Test Create Account Feature

5.2.1.2.4 Test Track Record Feature

5.2.1.2.5 Tests User's

Registration Feature

5.2.1.2.6 Test Track User's

Activity Log Feature

5.2.2 Develop Web File Management Module

5.2.2.1 Implementation

5.2.2.1.1 Create "ISO Documentation"

Dashboard

5.2.2.1.2 Create CRUD features for file

management

5.2.2.1.3 Create search file feature

5.2.2.2 Test Web File Management Module

5.2.2.2.1 Test CRUD Feature

5.2.2.2.2 Test Search Feature

5.2.3 Develop Quotation Management Module

    5.2.3.1 Implementation

        5.2.3.1.1 Create "Quotation"

        Dashboard

        5.2.3.1.2 Create CRUD features for

        quotation document

        5.2.3.1.3 Create search quotation

        document feature

    5.2.3.2 Test Quotation Management Module

        5.2.3.2.1 Test CRUD Feature

        5.2.3.2.2 Test Search Feature

5.2.4 Develop Production Management Module

    5.2.4.1 Implementation

        5.2.4.1.1 Create "Production"

        Dashboard

        5.2.4.1.2 Create generate production

        5.2.4.1.3 Create search production feature

    5.2.4.2 Test Production Management

    Module

        5.2.4.2.1 Test generate production

        feature

        5.2.4.2.2 Test Search Feature

5.2.5 Develop Task Management Module

    5.2.5.1 Implementation

        5.2.5.1.1 Create "Tasks"

        Dashboard

        5.2.5.1.2 Create CRUD task feature

        5.2.5.1.3 Create search tasks feature

    5.2.5.2 Test Task Management Module

        5.2.5.2.1 Test generate task feature

        5.2.5.2.2 Test Search Feature

5.3 Development Phase Three

5.3.1 Develop Mail Management Module

5.3.1.1 Implementation

5.3.1.1.1 Create generate auto-email

feature

5.2.5.2 Test Mail Management Module

5.2.5.2.1 Test generate auto-email

Feature

5.3.3 Conduct Unit Testing

5.3.4 Conduct System Integration Testing

5.3.5 Conduct User Acceptance Testing

5.3.6 Finalize Project Documentation

3.4.2   Gantt Chart
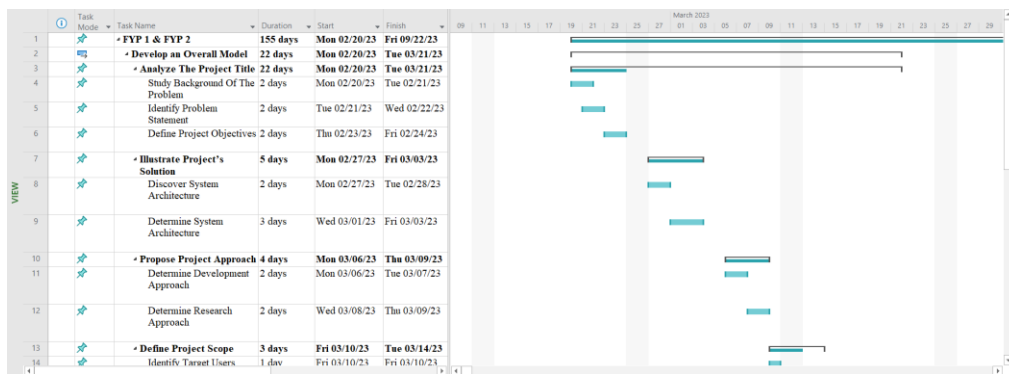
Figure 3.1: Develop an Overall Model Phase.
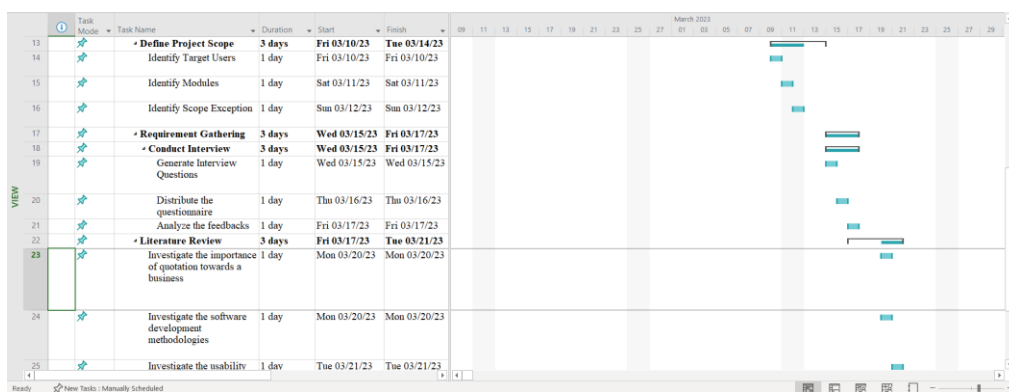
Figure 3.2: Continuation of Develop an Overall Model Phase.
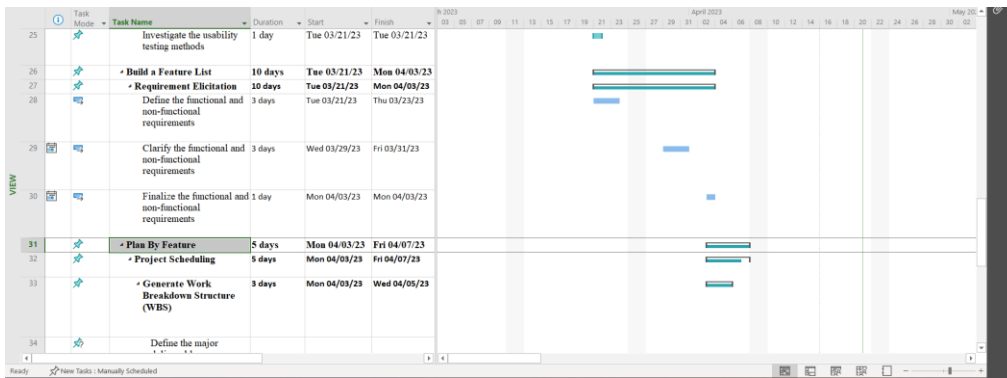
Figure 3.3: Build a Feature List Phase.
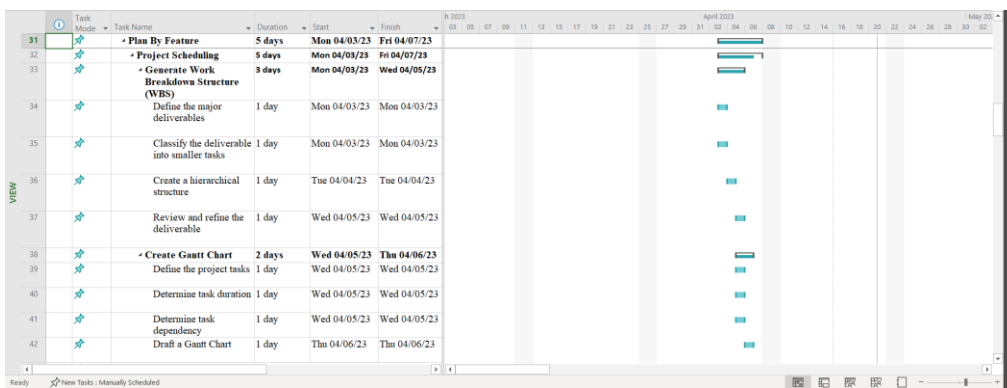
Figure 3.4: Plan By Feature Phase.
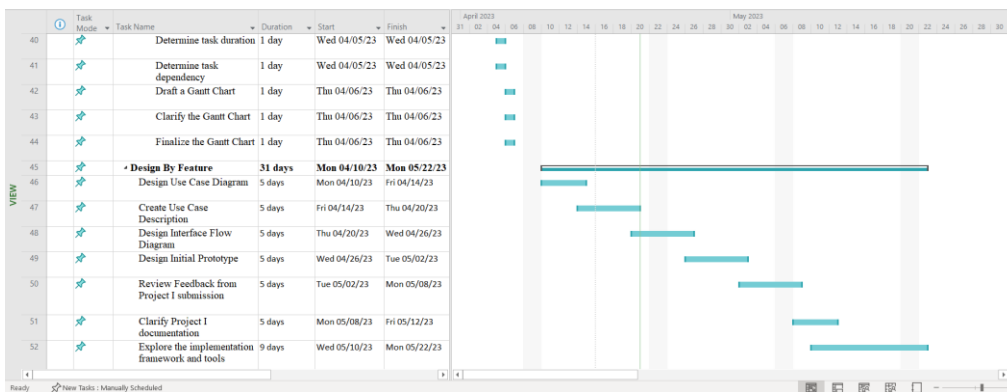
Figure 3.5: Continuation of Plan By Feature Phase.
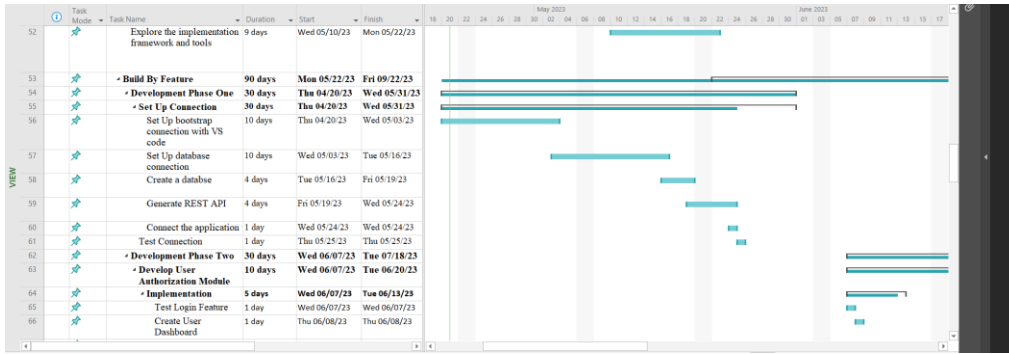
Figure 3.6: Build By Feature for First Development Phase.
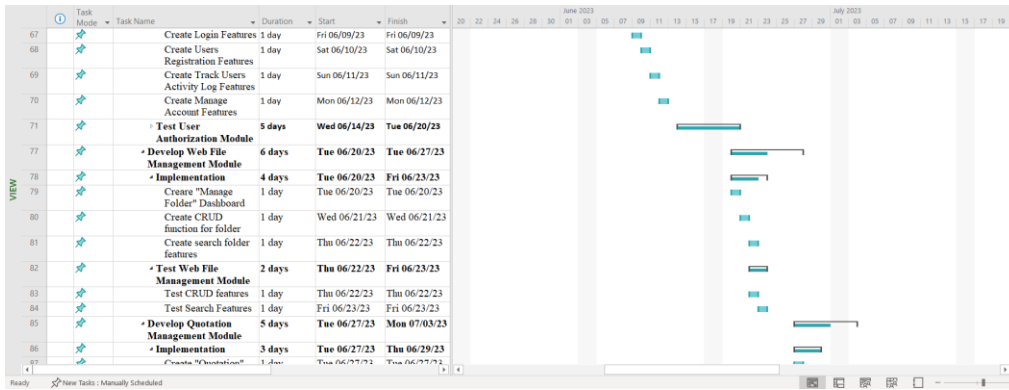
Figure 3.7: Build By Feature for Second Development Phase.

Figure 3.8: Continuation of Build By Feature for Second Development Phase.
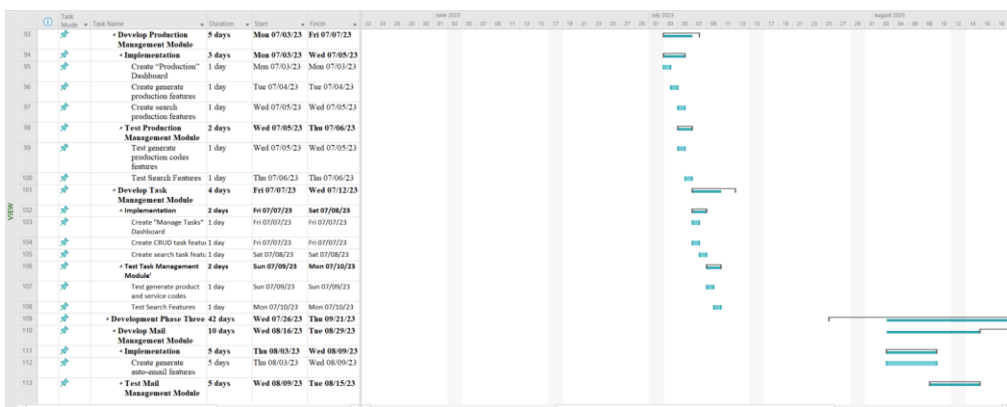
Figure 3.9: Continuation of Build By Feature for Second Development Phase.
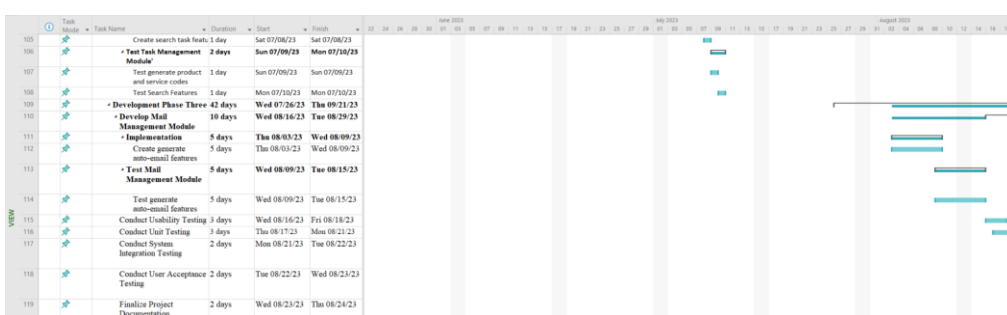
Figure 3.10：Build By Feature for Third Development Phase.

3.5   Summary

In conclusion, Feature Driven Development (FDD) has been chosen in this project as this methodology allow the developers to work in parallel and focus on delivering small, targeted features, which can result in a more efficient use of resources and faster development times. At the same time, each phase of FDD has been described detailly in order to clear and well-defined set of processes for developing software features, which can help teams to stay organized and focused on the task at hand. Besides, FDD helps the developers on delivering features that provide value to the business or end-users that can lead to higher customer satisfaction and increased revenue. Moreover, several software developments tools have been described in this chapter so that it can reduce the time and effort required to develop and test software. Finally, the developers can identify the resources needed for each project component while ensuring that the project is on schedule and under budget by using WBS and Gantt charts to represent the project schedule of the entire project.

CHAPTER 4

PROJECT SPECIFICATION

4.1   Introduction

The project's outcome will be established in this chapter. First, the fact-finding approach will be presented in light of the various interviews with the external firm that were held to compile user needs and comprehend the present problems that the external company is facing. According to the needs of the project, both functional and non-functional requirements will be presented in the same area in order to visualise the high-level view of the functional needs of a system, such as the behaviour and interactions of the system from the perspective of its users, several software diagrams and use case descriptions will also be displayed. Last but not least, before going on to more advanced stages of development, a complete prototype of this project will be made to polish the concept.

4.2   Fact Findings

An interview has been chosen as one of the fact findings methods in this project compared to other method such as survey or observations. The reason is because, interview enable the developers to gather factual information from participants, such as their experiences, opinions, and perspectives on a particular topic. Meanwhile, the developer can use the information to support their ideas while validate the assumption that made in the project. Besides, several questionnaires have been created before organizing any interviews. These interviews will be conducted and recorded with the general manager of the external company. After the interviews, transcripts will be generated and analysed according to the insight of the interviewee before coding the data and categorizing it into different themes or topics. Therefore, 30 questionnaires have been created and categorized into two sections which are general question and questions based on modules. This categorization is required to gather the user needs and preferences easily. Lastly, please refer to Appendix E for a detail of interview's transcript.

4.2.1   General Question

The first general question in the interview was to understand the goal associated with the development project. As you know, the purpose of a project helps to provide a clear definition of what the project is meant to achieve, which in turn helps define the project's scope. Thus, this project aims to keep all the records with the server's connections. Server connections are required in this project because the external company faced severe issues of human errors. Human error can be the mistakes or incorrect actions individuals make while performing tasks or activities. For instance, some staff may forget to update the record in the system or access the server without user authorization, so it isn't easy to keep track of all the logs from head to tail. Therefore, it is critical to pinpoint the underlying reasons of human mistake and take action to reduce its frequency. Using server connections, the primary problem faced by the external company can be solved by allowing applications to store and process data on remote servers rather than on local devices.

Besides, another problem the external company faces is the Staff is unable to perform the CRUD function on the server at the site area. Thus, server connections can solve this problem by enabling the users to access the application from remote locations so that the users can work remotely or across different areas. Lastly, the external company has also faced a difficulty that some of the Staff may resign without saving a soft copy on the pc, so the required document could not be found after an extended period. Consequently, server connection applications access the database so users can store the soft copy efficiently whenever they work from home or while traveling.

As for the next question, the key stakeholders of this project are General Manager, Financial Staff, and technicians. Hence, the total number of vital stakeholders involved in this project is five. At the same time, the significant feature that the general managers hope for each stakeholder is that the technicians can create the folder and upload the required photo in the formatted document within a particular folder. Meanwhile, the general manager can perform all the tasks with the CRUD function and distribute the task to the required Staff, while the financial Staff can access the server with the VPN

connection to perform SQL Accounting Software with access to perform CRUD function for all the documents.

Furthermore, the access privilege that the general manager wished to have for each of the key stakeholders is the technicians only have the privilege to create the folder and upload a photo into the formatted form, while the general manager will have the privilege to control the whole system. Meanwhile, only financial Staff are privileged to perform SQL Accounting Software based on the VPN connection while creating different documents required in the project. Apart from that, the project's scope and timeline must be carefully considered during development to ensure that the project satisfies stakeholder expectations and gets the job done on schedule. Other than that, there is no restriction on designing the user interfaces of the project so that the developers can increase their creativity while providing flexibility to explore a wide range of options and possibilities for how the interface will look and function.

In addition, the general manager hopes the proposed web application system will manage the technicians' job assignment so that the Staff may not forget to do the task without a deadline or causes any customer complaint. Therefore, the general manager expects the system to be able to create an assignment with a title, set a deadline, and assign tasks to specific Staff for a particular project with ID while notifying the user if the deadline for a specific project has been reached. At the same time, the system can also record the task's status, either pending or complete. On the other hand, the developer can always contact and interact with the general manager and technical lead whenever the developer encounters any problem in the project based on the WhatsApp platform. Additionally, the current technology used by the external company is Asana and digital cloud storage such as One drive, google drive, and iCloud. While digital cloud storage enables people and organisations to store and access their data, files, and programmes on remote servers, Asana is used to assist teams track and organise their work.

Moreover, general manager permits the developer to use their company logo as the system logo so that the Staff can easily recognize and identify the

company. Similarly, the logo also shows the professionalism of the company so that the company appears more credible and trustworthy to customers, investors, and partners. Meanwhile, the critical information that must be included on the web page is the description related to the user manual or simple guide so that new users can acknowledge the company's process flow. Last but not least, the data allowed to store in the data include the quotation documents and inquiries as well as the drawings of the product. Finally, the system does not require generating reports or charts as this feature is not a mandatory scope of this project.

4.2.2   Questionnaire Based on Modules

Other than the general question, several questionnaires have been produced based on the eight modules, which include the web file management module, quotation management module, product or service management module, task management module, inventory module, mail management module, user authorization module, and hosting environment module. For web file management modules, the general manager emphasizes using Excel, Word, and PDF formats for the file used in this project. At the same time, only two technicians will be involved in this module since most of the tasks will entail documentation. Lastly, the workflow for the ISO Documentation section has been explained in detail by the general manager, as this section is used to create one general document and one control document that can perform editing functions with special authorization.

As for the quotation management modules, the workflow of the quotation process of the company has also been described as the client will send an RFQ based on the email, and the key stakeholder will create a quotation based on the request. Then, the critical stakeholder will send back the RFQs to the client so that the client can understand the quantity and price of the required product. Furthermore, the next module will be discussed, which is the product or service management module. In this module, the general manager has defined four to five company will be involved in the quotation running number. These companies are considered private limited companies owned by the general manager and related to the offshore.

In addition, the general manager has clarified the dissimilar task in the task management module as the technician person in the coating project section is different from the technician job distribution. Similarly, the handler of the quotation management module is not the same as the task management module because the quotation management may be assigned to any of the five key stakeholders, while the coating project will be assigned to PIC or Engineer. Usually, PIC will distribute the task to any of the five key stakeholders who received the job and can spread the task.

Besides this interview, has also discussed the inventory management module to understand the definition of MRF and GRN status. Based on the explanation of the general manager, MRF status is referred to as Material Request Form, while GRN status will be defined as Goods Receive Note. Both statuses are required to generate records by using the running number features. In the same way, the work of the MRF status is the order will be processed based on the stock list in the warehouse. Meanwhile, the Workflow of GRN status will act as a checklist that helps the worker to acknowledge the product and calculate the quantity of the product. As for the production processes, the staff must create a form for purchase requests so that the PIC and three other key stakeholders can control this process. Lastly, the key stakeholders should be able to track the coating and poly-shrink process's status, date, and time with the provided form.

Additionally, the general manager has also discussed the type of emails that the general manager wishes to update the user on updating the latest quotation every month, which is Gmail. The reason Gmail has been chosen as the powerful mail platform for the mail management module is that Gmail is a free email service provided by Google, and it is very user-friendly that allows the user to create an account easily. In the same way, Gmail offers a large storage capacity that will enable users to store many emails without worrying about running out of space. Moreover, this email should not send to the client as a reminder before the certification expires. Instead, these features will alert the critical stakeholder to do the task on time.

As for the user authentication module, the general manager hopes that the authentication method can include the standard password login that can verify a user's or system's identity while ensuring that only authorized individuals or systems can access protected resources or information. Last, the general managers wish the system contains a standard password login function when hosting the VPN to the server to track usage or investigate security incidents for the hosting environment module. Finally, the general manager also explained why the company does not subscribe to any cloud service because the company thinks the service provided by the cloud service provider is not secure when encountering any issues.

4.2.3   Summary

In conclusion, several points have been learned: insights into the interviewee's perspective and identification of knowledge gaps while generating new ideas. Based on the insight into the interviewee's perspective, the developer can broaden their understanding of the project and uncover new ideas or perspectives. At the same time, the developers can reveal areas where they may have gaps in their knowledge or understanding. Using this knowledge gap assists the developer in identifying areas where they need further research or learning. In short, the developer can also provide new ideas or insights they may not have previously considered. These ideas can be valuable for informing your work or decision-making.

4.3   Requirement Specification

Based on the data acquired after the various of stages, the functional and non-functional requirements for this project will be determined in this section. As you know, applicable requirements stipulate what a system or product is supposed to do to meet the needs of its users or stakeholders. Usually, these functional requirements include detailed specifications for system behavior, inputs, processing, and outputs. Meanwhile, the functional requirement should describe the specific functions, features, and capabilities the system must possess to perform its intended tasks and meet its objectives. Other than that, non-functional requirements describe the characteristics, constraints, and qualities that a system or product must possess to be effective, efficient, and

usable. Hence, the non-functional requirement described in this project includes system attributes such as performance, reliability, security, usability, and maintainability. In this section, various functional requirement and non-functional requirement will be illustrated to achieve the needs of for different target users such as general manager, financial staffs and technicians.

4.3.1 Functional Requirements

The following is a list of the functional requirements based on InnoCorr management system modules:

Table 4.1:   Functional Requirements for Web File Management Module.

ID	Use Case ID	Functional Requirement
WR-001	UC-2	The system should allow the user to manage ISO document file with different format and image.
WR-002	UC-2	The system should allow the users to manage the file whenever they have received any project.
WR-003	UC-7	The system should allow only the admin to delete specific ISO document files based on their needs.

Table 4.2:   Functional Requirements for Quotation Management Module.

ID	Use Case ID	Functional Requirement
QR-001	UC-3	The system should allow the users to manage the quotation based on the auto-generated quotation running number.
QR-002	UC-3	The system should allow the users to manage quotation whenever they have received any quotation from clients.
QR-003	UC-8	The system should allow only the admin to delete specific quotation based on their needs.

Table 4.3:   Functional Requirements for Production Management Module.

ID	Use Case ID	Functional Requirement

PR-001	UC-4	The system should allow the user to manage production's document file with different format.
PR-002	UC-4	The system should allow the users to manage the file whenever they have received any project.
PR-003	UC-10	The system should allow only the admin to delete specific Production document files based on their needs.

Table 4.4:   Functional Requirements for Task Management Module.

ID	Use Case ID	Functional Requirement
TR-001	UC-6	The system should allow the users to manage the task based on the project's date assigned, targeted deadline to complete and status of the task.
TR-002	UC-9	The system should allow only the admin to delete specific task based on their needs.

Table 4.5:   Functional Requirements for Mail Management Module.

ID	Use Case ID	Functional Requirement
MR-001	UC-6	The system should able to generate auto-email to the users when task assigned.

Table 4.6:   Functional Requirements for User Authorization Module.

ID	Use Case ID	Functional Requirement
UR-001	UC-1	The system should permit the users to log into their account by entering their username and password.
UR-002	UC-1	The system should allow users to reset their password by clicking on "Forgot my password" and receiving a link to their verified email address.

UR-003	UC-1	The system should allow the users to register a new account by clicking on "Create an account" whenever a new employee joined the company.
UR-004	UC-5	The system should show the date accessed by the user when they used the server to perform any changes.

4.3.2   Non-Functional Requirement

The following is a list of the InnoCorr management system's non-functional requirements:

Table 4.7: Non-Functional Requirements for InnoCorr Management System.

Quality Attribute	ID	Description
Usability	NFR-001	The system shall able to complete a common tasks performed by a user without require to any documentation.
	NFR-002	The system shall be intuitive and easy to navigate, with clear and consistent menus and controls.
	NFR-003	The system shall prompt the users with error messages that guide users through the workflow.
Availability	NFR-004	The system shall be available for use at least 99.99% of the time.
	NFR-005	The system shall be able to recover from failures quickly within a few minutes or less.
	NFR-006	The system shall be designed to minimize planned downtime.
Performance	NFR-007	The system shall able to handle multiple user request without significant performance degration.

	NFR-008	The system shall response the user request within 5 seconds.
	NFR-009	The system shall able to utilize the resource under varying level of workloads.
Security	NFR-010	The system shall provide role-based access controls to guarantee the users only have authority to access the data and functionality.
	NFR-011	The system shall store passwords and other sensitive data using secure hashing algorithms to prevent unauthorized access.
	NFR-012	The system shall require strong and secure passwords as well as complexity policies.
Interoperability	NFR-013	The system shall support industry-standard communication protocols, such as HTTP, SMTP, or FTP, to facilitate interoperability with other systems.
	NFR-014	The system shall provide APIs or web services to allow other systems to access its functionality or data.
	NFR-015	The system shall be developed to work with different operating systems, including Windows, MacOS, and Linux.

4.4   Use Case Modelling

To document the functional requirements of a system or software application, use case modelling is a technique used in software engineering. This method was typically applied early in the software development process to help verify that the system being created will satisfy the requirements of its users. Consequently, a use case diagram will be utilised to record, model, and visualise the needs of an actor-based system. As you are aware, a use case diagram is a particular kind of behavioural diagram in the Unified Modelling Language (UML) that explains a system's functioning from the viewpoint of the user. Actor, Use Case, and Association are thus the key elements used in this diagram.

These components were chosen because it makes it easier to visualise the use cases and the connections between them in each user-system interaction. As a result, a use case diagram has been created to show how the InnoCorr Management System interacts with the system and performs its tasks.

4.4.1 Use Case Diagram
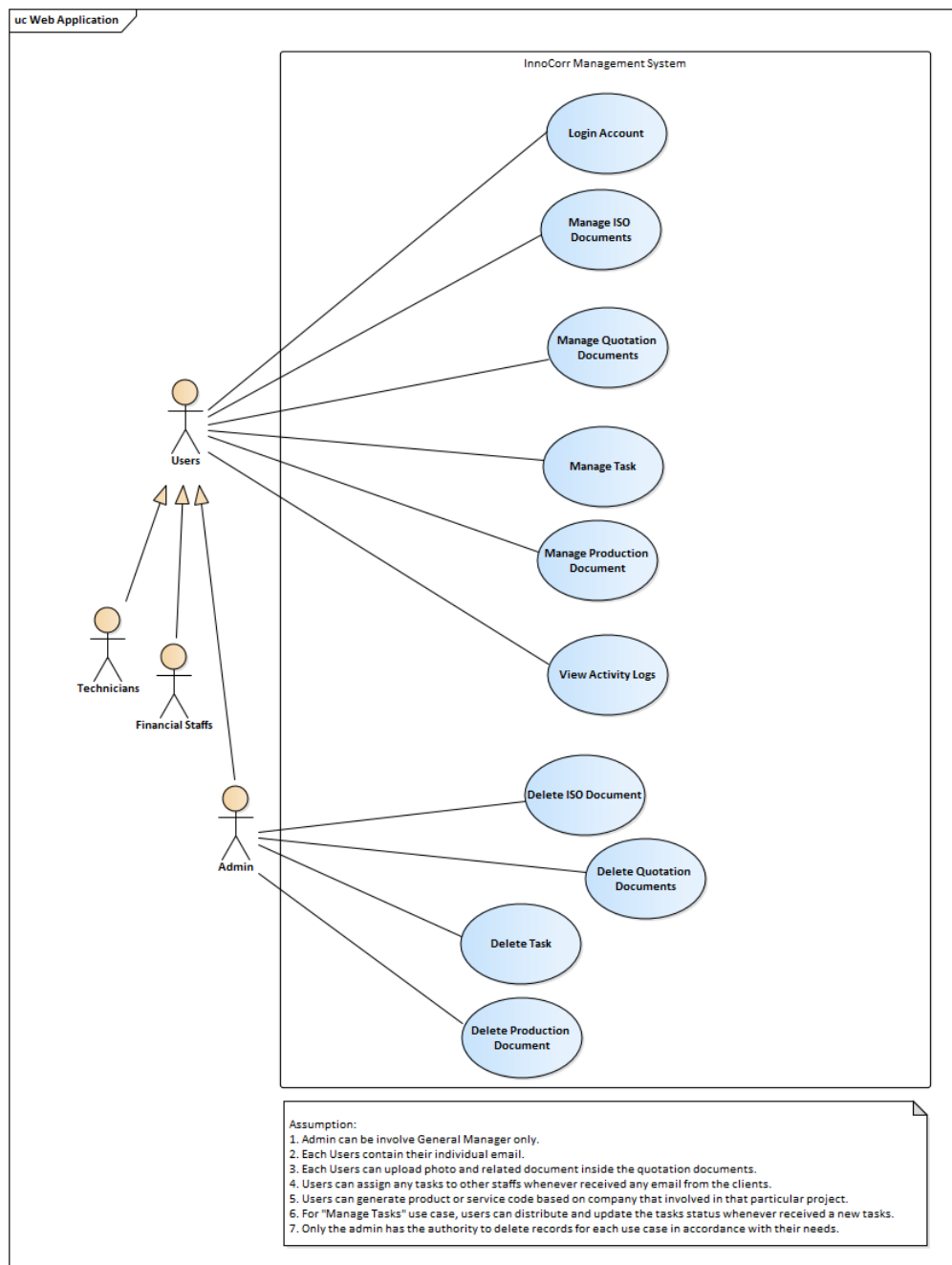
Figure 4.1：Use Case Diagram For Inno Corr Management System.

4.4.2 Use Case Description

Table 4.8: Use Case Description of Login Account.

Use Case Name: Login Account	ID: 1	Importance Level: **High**
Primary Actor: Users	Use Case Type: Detail, Real	
Stakeholders and Interests: Users – Users can login to their account with their individual login ID and password.		
Brief Description: This use case describes the methods used by the users to login into their account.		
Trigger: Users attempt to access their account of the web application.		
Relationships: Association : **Users** Include : **-** Extend : **-** Generalization: **-**		
Normal Flow of Events: 1. The users navigate to the web application and clicks the "login" button on the top right of the web application. 2. System prompts the users to enter their email and password. 3. The users enter their email and password and clicks the "login" button. 4. System will verify the credentials and grants access to their account. 5. The users will be directed to their account dashboard.		
Sub-flows: -		
Alternate/Exceptional Flows: 1.1 The system displays an error message and asks the user to try again if they input an erroneous username or password. 1.2 If the users forget their password, the system will provide a password reset option where the user can reset their password by receiving a password reset link via email.		

Table 4.9:   Use Case Description of Manage ISO Documents.

Use Case Name: Manage ISO Documents	ID: 2	Importance Level: **High**
Primary Actor: Users	Use Case Type: Detail, Real	

Stakeholders and Interests:
Users – Users can manage the ISO Documents in the web application.

Brief Description: This use case describes how the users view, create, update and delete the ISO documents in the web application.

Trigger: Users want to perform CRUD function towards the ISO documents whenever required by the clients.

Relationships:
Association   : **Users**   Include   : -   Extend   : -   Generalization: -

Normal Flow of Events:
1. Users navigates to the "ISO Documentation" page on the dashboard.   2. System display a list of ISO documents that has been generated lately.   3. User can search the project file based on the project running number, file name, person in-charged and date at the search bar.   4. Users can create a new ISO documents by clicking "New Document" button.   5. Users can update the required ISO documents by clicking the edit icon.   6. Users can delete the required ISO documents by clicking the delete icon.   7. Users can view the ISO documents by clicking on the ISO document's ID in the list.

Sub-flows: -

Alternate/Exceptional Flows:
2.1The system will provide an error notice and the action will be unable to be performed if the user does not have the required permission to carry out the action.   2.2 If the user cancels a edit action, the document will remain unchanged.

2.3 The system will display an error notice and the document might not be viewable if the user tries to open a file that is corrupted or not in a compatible format.

Table 4.10: Use Case Description of Manage Quotation Documents.

Use Case Name: Manage Quotation Documents	ID: 3	Importance Level: **High**
Primary Actor: Users	Use Case Type: Detail, Real	
Stakeholders and Interests: Users – Users can manage the quotation documents in the web application.		
Brief Description: This use case describes the various actions performed by users to manage the quotation in the web application.		
Trigger: Users want to perform CRUD function towards the quotation whenever received a Request for Quotation (RFQ) email from the clients.		
Relationships: Association **: Users** Include **: -** Extend **: -** Generalization**: -**		
Normal Flow of Events: 1. Users navigates to the "Quotation" page on the dashboard. 2. User can search the quotation based on the quotation running number, person in-charged and date at the search bar. 3. User can create a new quotation by clicking "New Quotation Document" button. 4. User can update the required quotation by clicking the edit icon. 5. User can delete the required quotation by clicking the delete icon. 6. User can view for the certain quotation by clicking on the quotation document's ID in the list. 7. User can save the quotation by clicking on the "Save" button.		
Sub-flows: -		
Alternate/Exceptional Flows:		

3.1 If the user does not have the necessary permissions to perform an action, the system displays an error message and the action cannot be completed.

3.2 If the user cancels a edit action, the quotation remains unchanged.

Table 4.11: Use Case Description of Manage Production.

Use Case Name: Manage Production	ID: 4	Importance Level: **High**
Primary Actor: Users	Use Case Type: Detail, Real	
Stakeholders and Interests: Users – Users can manage the production in the web application.		
Brief Description: This use case describes how the users view, create, update and delete the production in the web application.		
Trigger: Users want to perform CRUD function towards the production whenever required by the clients.		

Relationships: Association   **: Users**
     Include   **: -**
     Extend   **: -**
     Generalization**: -**		

Normal Flow of Events:

1. Users navigates to the "Production" page on the dashboard.
2. System display a list of production that has been generated lately.
3. User can search the project file based on the project running number, file name, person in-charged and date at the search bar.
4. Users can create a new production by clicking "Create" button.
5. Users can update the required production by clicking the edit icon.
6. Users can delete the required production by clicking the delete icon.
7. Users can view the production by clicking on the production's ID in the list.

Sub-flows: -

Alternate/Exceptional Flows:

4.1 The system will provide an error notice and the action will be unable to be performed if the user does not have the required permission to carry out the action.

4.2 If the user cancels a edit action, the document will remain unchanged.

4.3 The system will display an error notice and the document might not be viewable if the user tries to open a file that is corrupted or not in a compatible format.

Table 4.12: Use Case Description of View Activity Logs.

Use Case Name: View Activity Logs	ID: 5	Importance Level: **High**
Primary Actor: Users	Use Case Type: Detail, Real	
Stakeholders and Interests: Users – Users can view the activity logs whenever logged in the web application.		
Brief Description: This use case describes the user on accessing a log of system activities and events in order to track changes or diagnose problems in the system.		
Trigger: Users wish to view the activity log to acknowledge the person that performed the activity and the time as well as the date of the activity.		

Relationships:
 	
    Association   **: Users**
    Include   **: -**
    Extend   **: -**
    Generalization: **-**		

Normal Flow of Events: 1. Users navigates to the "Action Trail" page on the dashboard. 2. System display a list of activity logs that has been performed by different users recently. 3. User can view the details of each activity logs by clicking on the "Details" button.		
Sub-flows: -		
Alternate/Exceptional Flows: 5.1 The system shows an error notice and the operation cannot be completed if the user does not have the required rights to access the activity log.		

5.2 The action cannot be completed if the system encounters a problem when presenting the activity log and displays an error message.

Table 4.13: Use Case Description of Manage Tasks.

Use Case Name: Manage Tasks		ID**: 6**	Importance Level**: High**
Primary Actor: Users		Use Case Type**:** Detail, Real	
Stakeholders and Interests**:** Users – Users can manage the tasks whenever received any request from the clients.			
Brief Description**:** This use case describes various actions performed by users to manage the tasks within the task management system.			
Trigger**:** Users wish to create, edit, and complete the tasks based on their permission level.			
Relationships: Association **: Users** Include **: -** Extend **: -** Generalization**: -**			
Normal Flow of Events**:** 1. Users navigates to the "Task" page on the dashboard. 2. System displays a list of tasks with different status and date recently. 3. User can search the tasks on the search bar based on the task's ID, name, person in-charged, status and targeted deadline. 4. User can create a new task by clicking on the "Create New Tasks" button. 5. User can edit the tasks by clicking on the edit icon. 6. User assign the tasks to another user by selecting the dropdown features. 7. User can save the changes of the task by clicking "Save" after performed any action. 8. System will generate an auto-email to the user as a reminder to complete the pending tasks before the deadline.			
Sub-flows**: -**			
Alternate/Exceptional Flows:			

6.1 The system displays an error notice and the activity cannot be completed if the user does not have the required rights.

6.2 The system will display an error notice and prevent the operation from being performed if there is a problem saving the modifications to a task.

6.3 The system may display an error notice and ask the user to submit complete or valid information if the user enters inaccurate or partial information while creating or changing a task.

6.4 The system may show an error message or an empty search result if the user searches for a task that doesn't exist.

Table 4.14: Use Case Description of Delete ISO Document.

Use Case Name: Delete ISO Document	ID: 7	Importance Level: **High**
Primary Actor: Admin	Use Case Type: Detail, Real	
Stakeholders and Interests: Users – Admin can delete ISO Document based on their needs.		
Brief Description: This use case describes delete actions towards ISO Document performed by admin within the ISO Documentation management system.		
Trigger: Admin wish to delete the ISO Document based on their requirement.		

Relationships:
    Association : **Admin**
    Include   : -
    Extend   : -
    Generalization: -		

Normal Flow of Events: 1. Admin navigates to the "ISO Documentation" page on the dashboard. 2. System displays a list of ISO Document with different status, date and file recently. 3. Admin can search the ISO Document on the search bar based on the ISO's ID, name, person in-charged, status, modified date and file type. 4. Admin can delete certain ISO Document by clicking on the "Delete" button.		

Sub-flows**: -**
Alternate/Exceptional Flows:
7.1 The system may display an error notice and ask the admin to confirm the deletion of specific ISO Documents.

Table 4.15: Use Case Description of Delete Quotation Document.

Use Case Name: Delete Quotation Document	ID**: 8**	Importance Level**: High**
Primary Actor: Admin	Use Case Type**:** Detail, Real	
Stakeholders and Interests**:** Users – Admin can delete Quotation Document based on their needs.		
Brief Description**:** This use case describes delete actions towards Quotation Document performed by admin within the Quotation management system.		
Trigger**:** Admin wish to delete the Quotation Document based on their requirement.		
Relationships: Association **: Admin** Include **: -** Extend **: -** Generalization**: -**		
Normal Flow of Events**:** 1. Admin navigates to the "Quotation" page on the dashboard. 2. System displays a list of quotation with different status, date and approved status recently. 3. Admin can search the quotation on the search bar based on the quotation's ID, name, person in-charged, status, modified date, received date and closing date. 4. Admin can delete certain quotation by clicking on the "Delete" button.		
Sub-flows**: -**		
Alternate/Exceptional Flows: 7.1 The system may display an error notice and ask the admin to confirm the deletion of specific quotation.		

Table 4.16: Use Case Description of Delete Task.

Use Case Name: Delete Task	ID: **9**	Importance Level: **High**
Primary Actor: Admin	Use Case Type: Detail, Real	
Stakeholders and Interests**:** Users – Admin can delete task based on their needs.		
Brief Description**:** This use case describes delete actions towards task performed by admin within the task management system.		
Trigger**:** Admin wish to delete the task based on their requirement.		
Relationships: Association : **Admin** Include : **-** Extend : **-** Generalization**: -**		
Normal Flow of Events**:** 1. Admin navigates to the "Task" page on the dashboard. 2. System displays a list of task with different status, date and target deadline recently. 3. Admin can search the task on the search bar based on the task's ID, name, person in-charged, status, modified date and target deadline. 4. Admin can delete certain task by clicking on the "Delete" button.		
Sub-flows**:** -		
Alternate/Exceptional Flows: 7.1 The system may display an error notice and ask the admin to confirm the deletion of specific task.		

Table 4.17: Use Case Description of Delete Production Document.

Use Case Name: Delete Production Document	ID: **10**	Importance Level: **High**
Primary Actor: Admin	Use Case Type: Detail, Real	
Stakeholders and Interests**:** Users – Admin can delete Production Document based on their needs.		

Brief Description**:** This use case describes delete actions towards Production Document performed by admin within the Production management system.
Trigger**:** Admin wish to delete the Production Document based on their requirement.

Relationships:
 	
      Association   **: Admin**
      Include   **: -**
      Extend   **: -**
      Generalization**: -**

Normal Flow of Events**:** 1. Admin navigates to the "Production" page on the dashboard. 2. System displays a list of Production Document with different status, date and file recently. 3. Admin can search the Production Document on the search bar based on the production's ID, name, person in-charged, status, modified date and file type. 4. Admin can delete certain Production Document by clicking on the "Delete" button.
Sub-flows**:** -
Alternate/Exceptional Flows: 7.1 The system may display an error notice and ask the admin to confirm the deletion of specific Production Documents.

4.5 Interface Flow Diagram

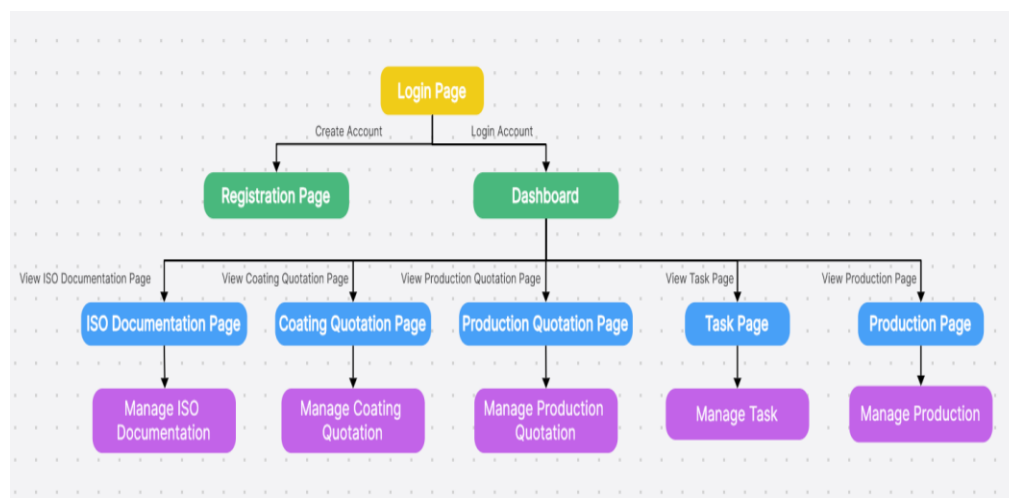The flow of web application are shown in the interface flow diagrams.

Figure 4.2：Interface Flow Diagram.

4.6 Summary

In summary, this chapter has analysed and determined the result of the requirement specification based on the interview conducted with the external company. According to the interview, valuable insights and information have been recorded to ensure the project's success. Meanwhile, the developers can develop contingency plans and mitigate potential issues before they occur. Thus, the developer can monitor project progress while identifying the areas that require adjustments.

Apart from that, functional and non-functional requirements have been developed to clarify what must be provided and how it must function. A use case diagram has also been created in order to give a clear and simple overview of the capabilities of the system and the interactions between users and the system. To comprehend the precise behaviour and interactions between a system and its actors in given use cases, many use case descriptions have been developed based on the use case diagram. Finally, a user interface prototype will be created to demonstrate an early version of the suggested system. The project will continue with the design, development, and testing phase once the early phases are finished in order to achieve the deliverables on time and guarantee that the system remains stable and dependable.

CHAPTER 5

SYSTEM DESIGN

5.1   Introduction

In this chapter, a system architecture design, database architecture, modelling diagram, and user interface design will be illustrated to communicate the overall structure and functionality of the system to various stakeholders, including clients, developers, testers, and project managers. It also ensure that that the design aligns with the initial requirements and expectations of the project. Meanwhile, these design able to identify the potential risks and challenges before become major problems. Therefore, it can reduce the likelihood of cost and time to redesigns later in the development process.

5.2   System Architecture Design

System architecture can be defined as the conceptual design or organization of a complex system. It provides a high-level view of how various system components interact with each other and how they are structured to achieve specific functionalities. As a result, system architecture diagrams are a powerful tool for improving communication, reducing risks, supporting decision-making, and ensuring the successful development, maintenance, and scalability of complex systems. Figure 5.1 shows the overall system architecture design.
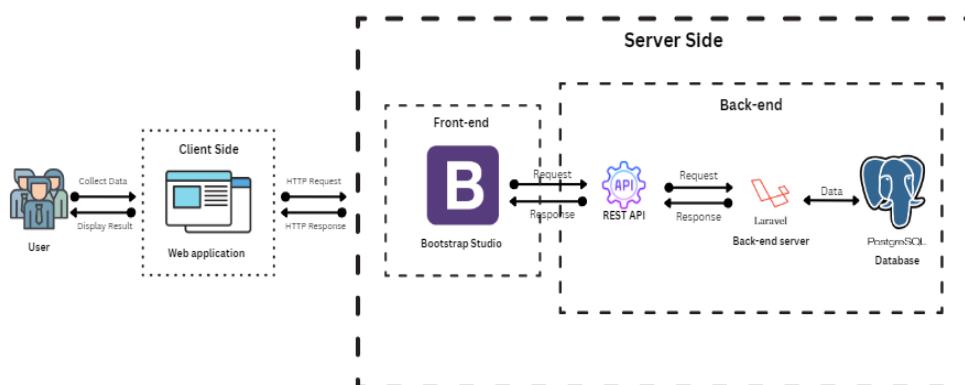

Figure 5.1：Overall System Architecture Design.

5.3 Database Architecture

Database architecture refers to the design and association of a database system. It encompasses the structure, factors, and principles that govern how data is stored, accessed, and managed within a database operating system (DBMS). Database architecture aims to optimize data storage, retrieval, and management while ensuring data integrity, security, and performance. Therefore, database architecture is a critical element of software systems, and the choices made during its design profoundly impact the performance, reliability, and scalability of the applications that rely on the database.

5.3.1 Database Schema

Database schema illustrate the structure of the database, including tables, columns, relationships, constraints, and data types. It serves as a blueprint for data storage and retrieval. Hence, based on figure 5.2 shows the database schema for Inno Corr Management System.
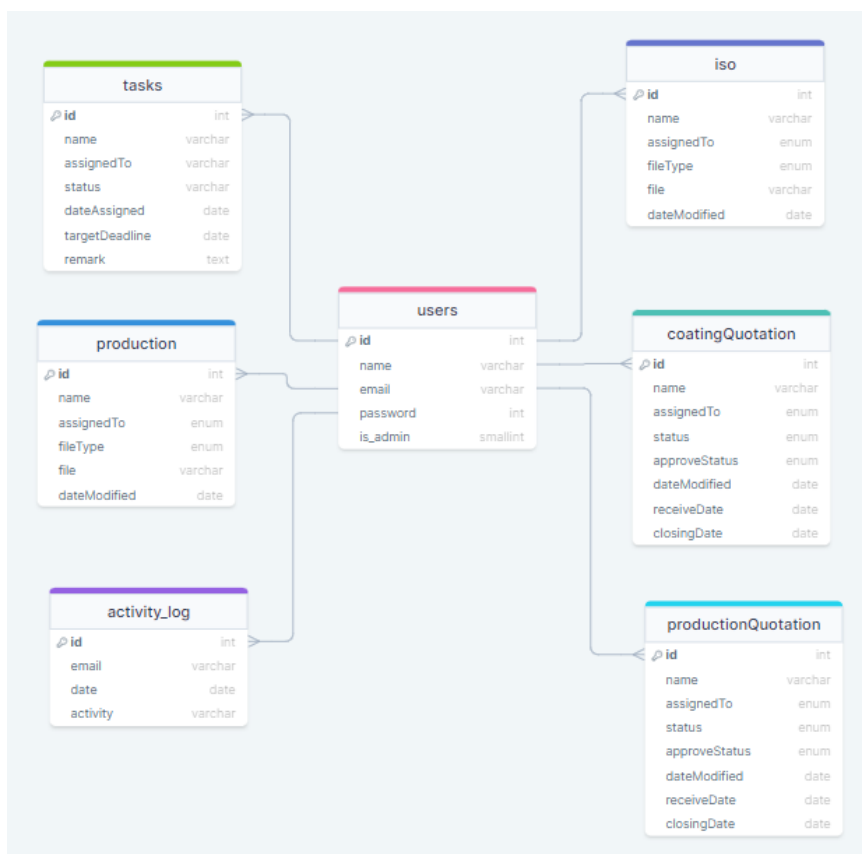

Figure 5.2：Database Schema.

5.3.2   Table Description

In the context of the relational database, a table description is crucial documentation to show the document's detail or metadata that provides information about a database table's structure, attributes, and characteristics. Hence, table descriptions are valuable resources for database administrators and developers who interact with the database. So, the in-charged persons were able to understand its structure effectively. Figure 5.1 shows a table description of the database schema.

Table 5.1:   Table Description for Database Schema.

Table Name	Table Desceiption
users	Includes all the users account for the web application.
iso	Includes all the files that uploaded by the users.
coatingQuotation	Includes all the details of coating quotation.
productionQuotation	Includes all the details of production quotation.
tasks	Includes all the details of task.
production	Includes all the details of production.
activity_log	Includes all the details of user activity.

5.3.3   Data Dictionary

The data dictionary is a centralized repository or document that stores metadata and information about data elements, structures, definitions, and relationships within a database or information system. It serves as a valuable reference for database administrators, developers, and other stakeholders, providing a comprehensive and organized view of the data used in an organization.

Table 5.2:   User Table.

Column Name	Description	Data Type	Primary Key	NULL
id	User Unique Identifier	int	PK	No
name	User's username	Varchar(255)	-	No

email	User's email address	Varchar(255)	-	No
password	User's password	int	-	No
Is_admin	Role Assign	Varchar(255)	-	No

Table 5.3: ISO Table.

Column Name	Description	Data Type	Primary Key	NULL
id	ISO Unique Identifier	int	PK	No
name	ISO username	Varchar(255)	-	No
assignedTo	Role Assign	enum	-	No
fileType	Type of file that uploaded in the system	enum	-	No
file	User's File	Varchar(255)	-	No
dateModified	Date modified by the users	date	-	No

Table 5.4: Coating Quotation Table.

Column Name	Description	Data Type	Primary Key	NULL
id	Coating Quotation Unique Identifier	int	PK	No
name	Coating Quotation name	Varchar(255)	-	No
assignedTo	Role Assign	enum	-	No

status	Coating Quotation status	enum	-	No
approveStatus	Coating Quotation status	enum	-	No
dateModified	Date modified	date	-	No
receiveDate	Received Date of coating quotation	date	-	No
closingDate	Closing Date of coating quotation	date	-	No

Table 5.5: Production Quotation Table.

Column Name	Description	Data Type	Primary Key	NULL
id	Production Quotation Unique Identifier	int	PK	No
name	Production Quotation name	Varchar(255)	-	No
assignedTo	Role Assign	enum	-	No
status	Production Quotation status	enum	-	No
approveStatus	Production Quotation status	enum	-	No
dateModified	Date modified	date	-	No

receiveDate	Received Date of production quotation	date	-	No
closingDate	Closing Date of production quotation	date	-	No

Table 5.6: Task Table.

Column Name	Description	Data Type	Primary Key	NULL
id	Task Unique Identifier	int	PK	No
name	Task name	Varchar(255)	-	No
assignedTo	Role Assign	enum	-	No
status	Task status	enum	-	No
dateAssigned	Task assigned date	date	-	No
targetDeadline	Targeted Deadline of the task	date	-	No
remark	Remark of the task	text	-	No

Table 5.7: Production Table.

Column Name	Description	Data Type	Primary Key	NULL
id	User Unique Identifier	int	PK	No
name	Production name	Varchar(255)	-	No
assignedTo	Role Assign	enum	-	No
fileType	Type of file for production	enum	-	No

file	Production's File	Varchar(255)	-	No
dateModified	Date Modified of production	date	-	No

Table 5.8:   Activity Log Table.

Column Name	Description	Data Type	Primary Key	NULL
id	User Unique Identifier	int	PK	No
email	User's Email	Varchar(255)	-	No
date	Acitivity Date	date	-	No
activity	Acitivity Description	Varchar(255)	-	No

5.3.4   Activity Diagram

An activity diagram is a type of UML (Unified Modeling Language) diagram used in software engineering and business process modeling to visually represent the workflow or activities within a system, process, or use case. It provides a high-level view of the steps, actions, and transitions involved in accomplishing a specific task or achieving a particular goal. Activity diagrams are commonly used to model the behavior of software systems, business processes, and workflows. Hence, activity diagrams are valuable tools for visualizing complex processes and workflows, making them easier to understand, analyze, and communicate to stakeholders. In this section, the activity diagram for Inno Corr Management System will be displayed to specific action performed in the process.
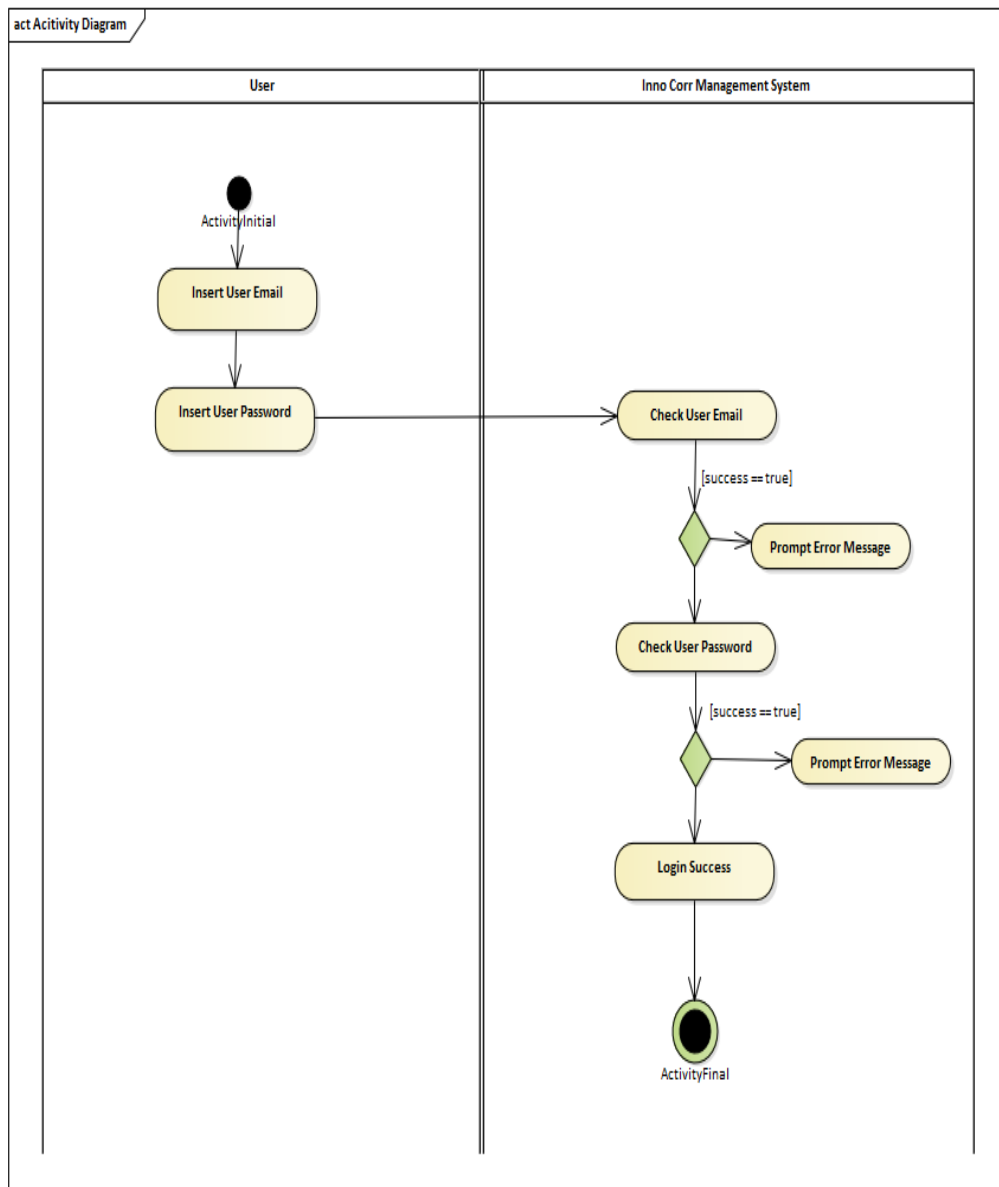
5.3.4.1 Login

Figure 5.3：Login Activity Diagram.
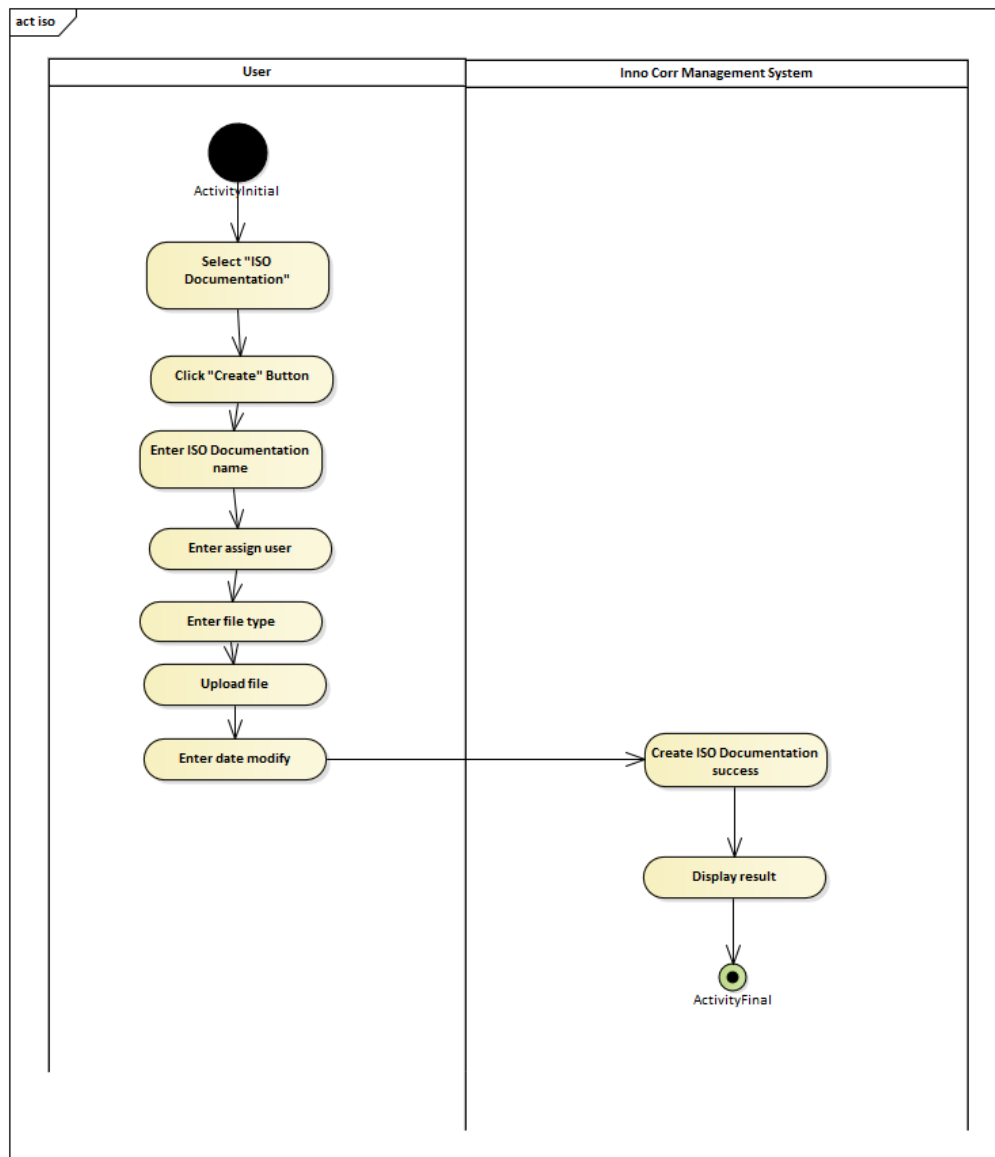
5.3.4.2 Create ISO Documentation

Figure 5.4：Create ISO Documentation.

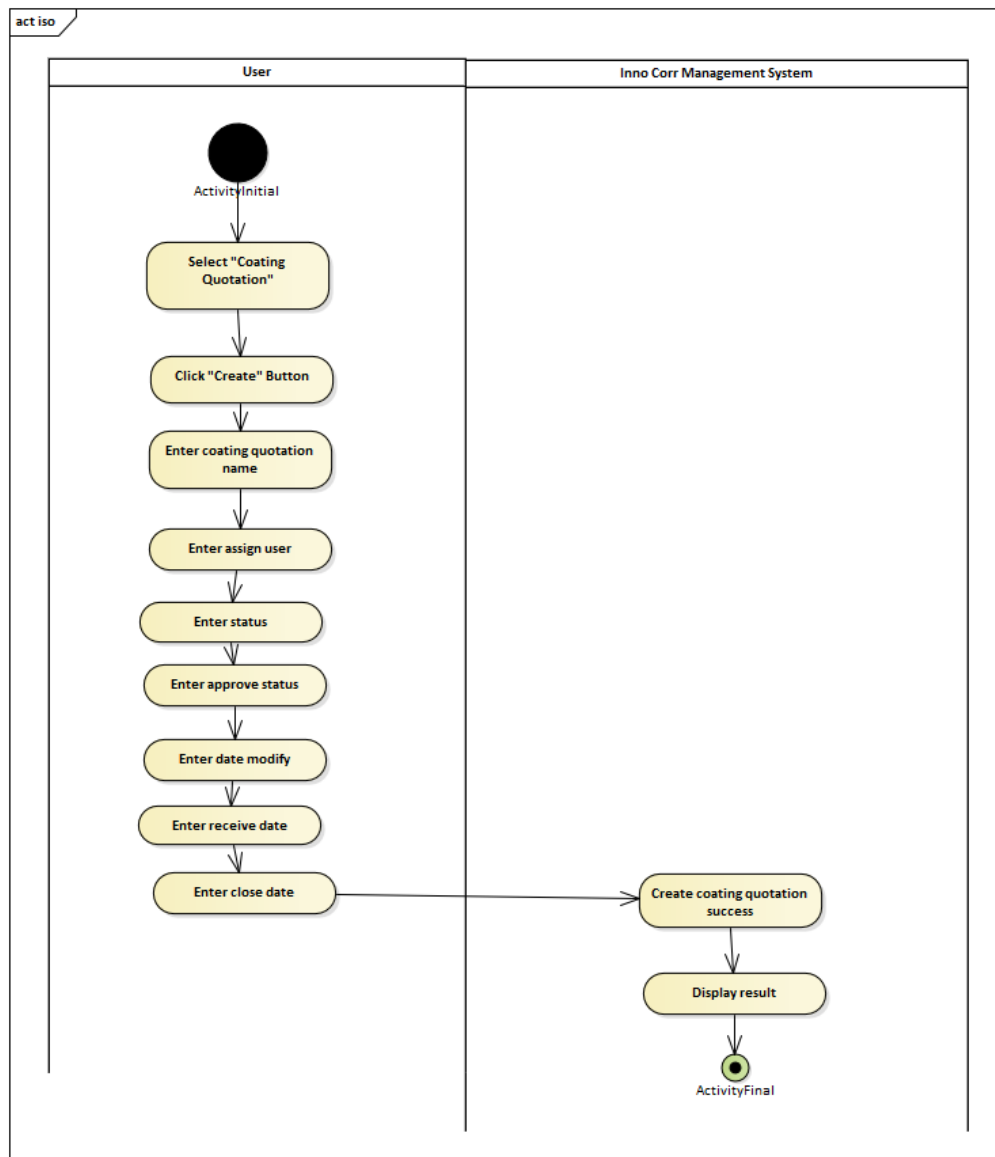### 5.3.4.3 Create Coating Quotation

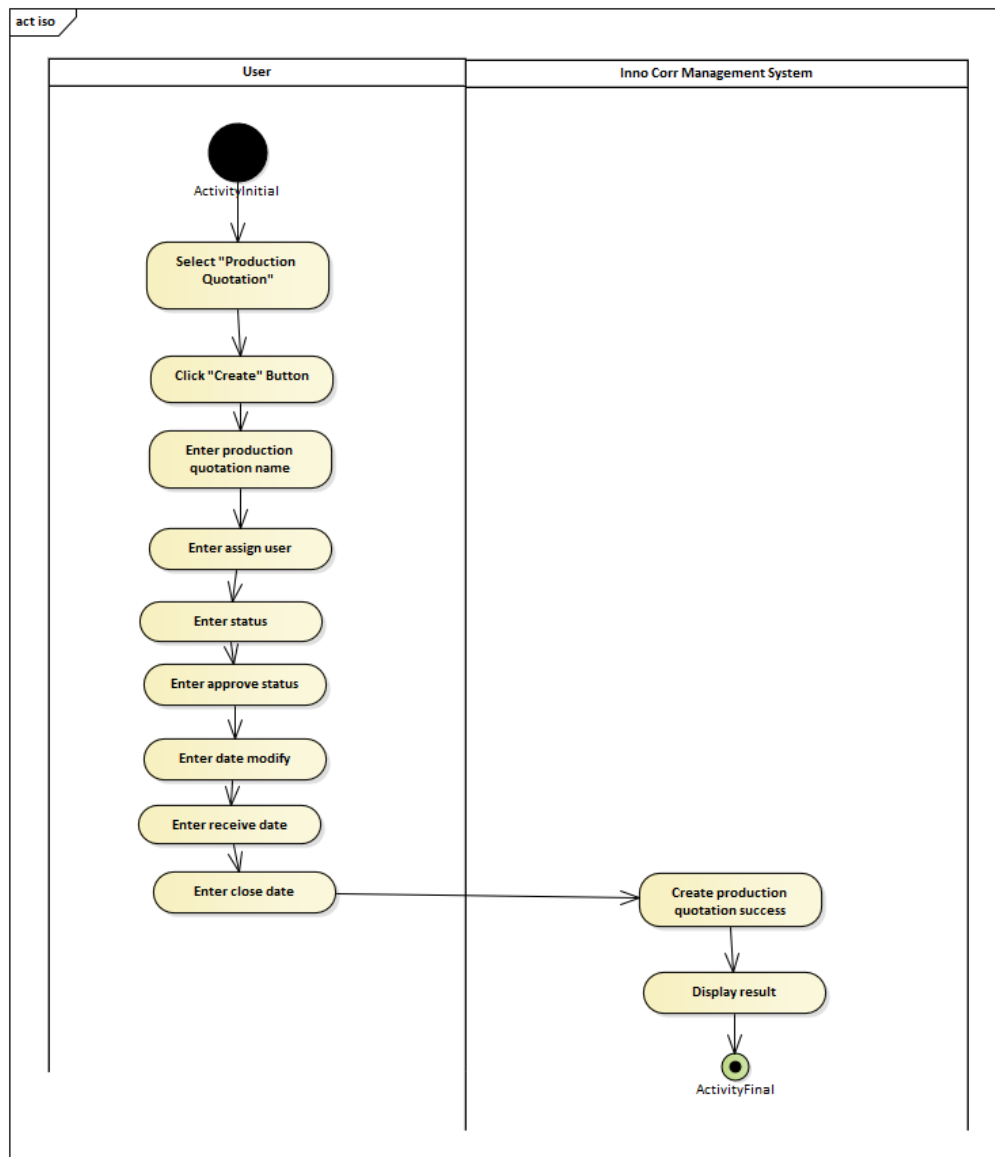Figure 5.5：Create Coating Quotation.

5.3.4.4 Create Production Quotation

Figure 5.6：Create Production Quotation.
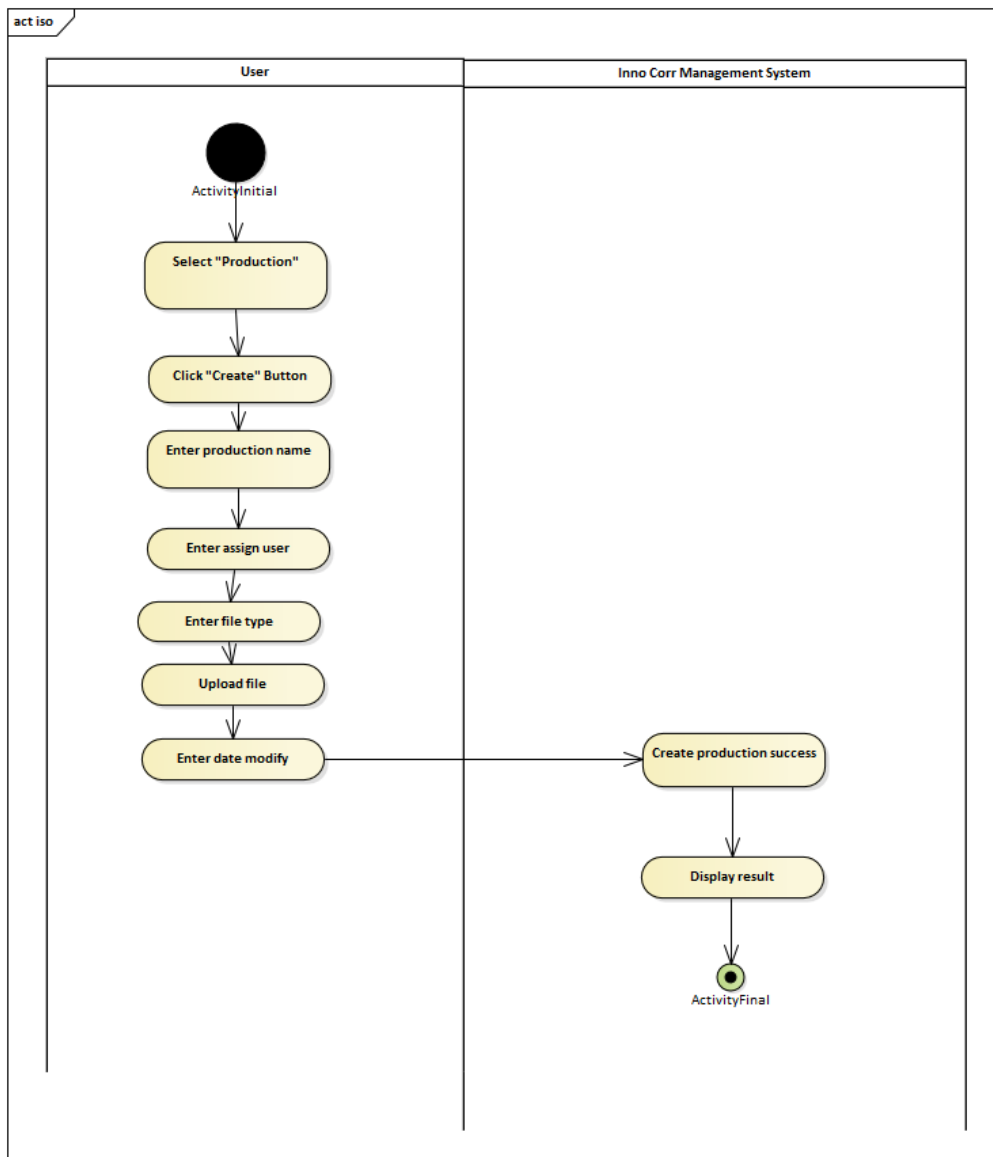
5.3.4.5 Create Production

Figure 5.7：Create Production.
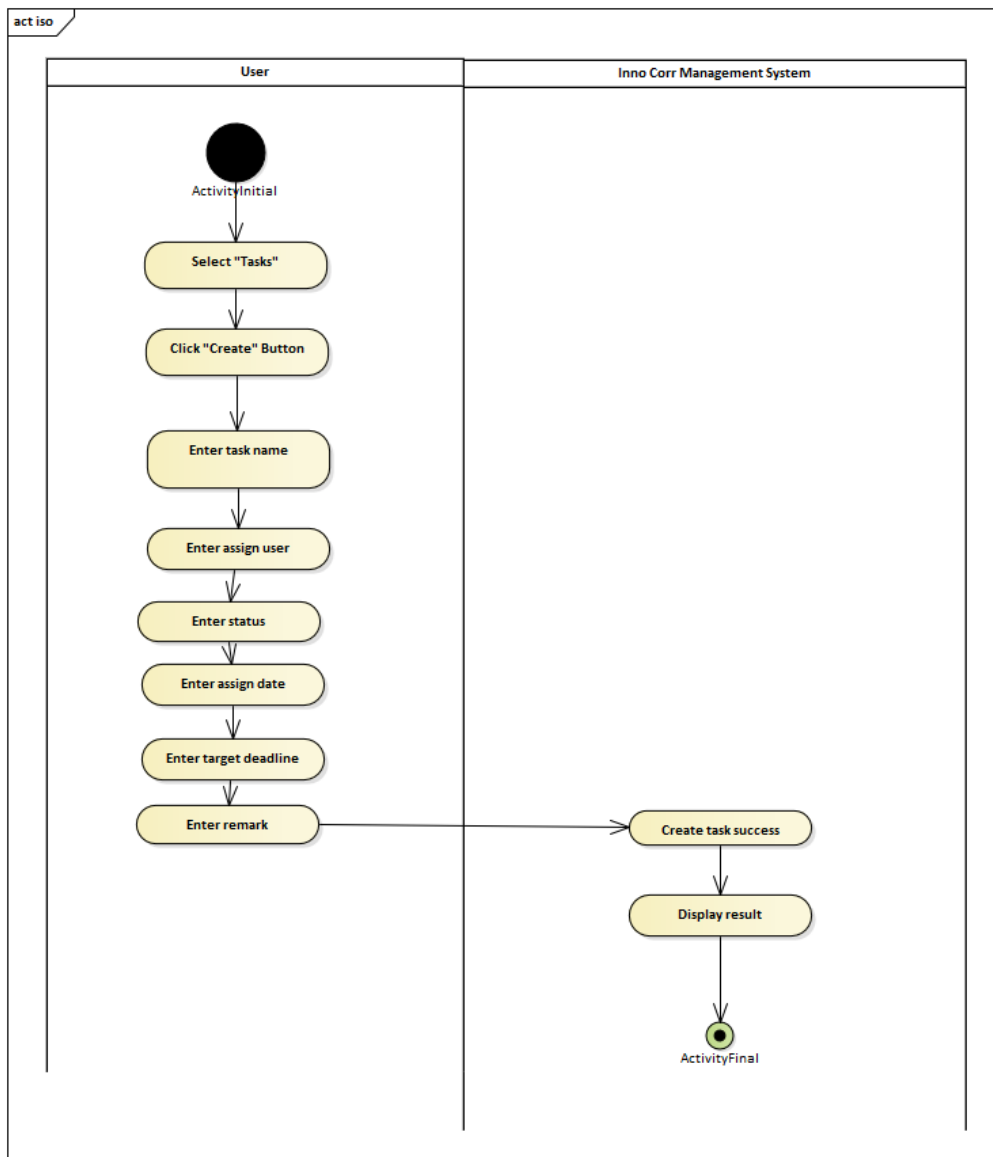
5.3.4.6 Create Task

Figure 5.8：Create Task.
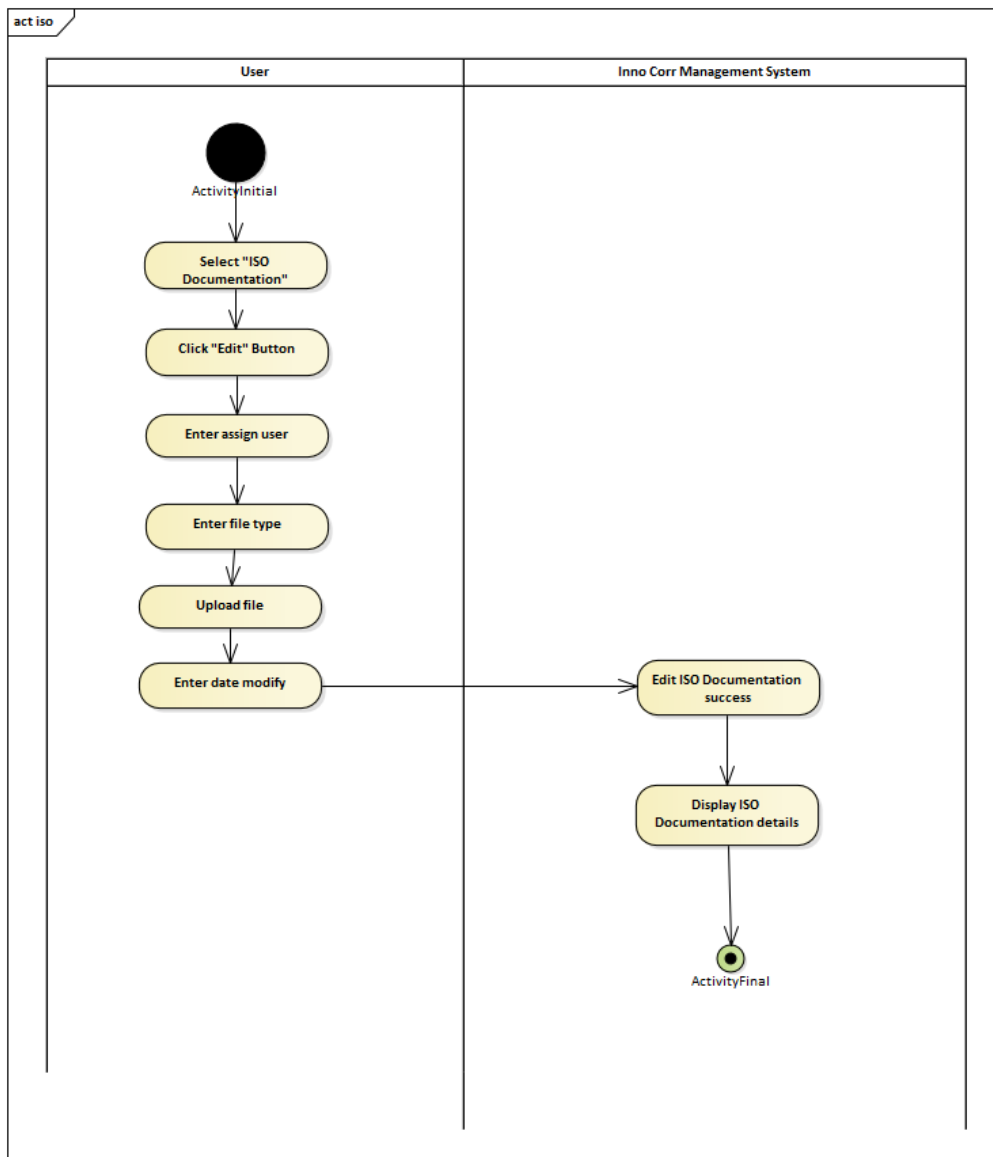
5.3.4.7 Edit ISO Documentation

Figure 5.9：Edit ISO Documentation.
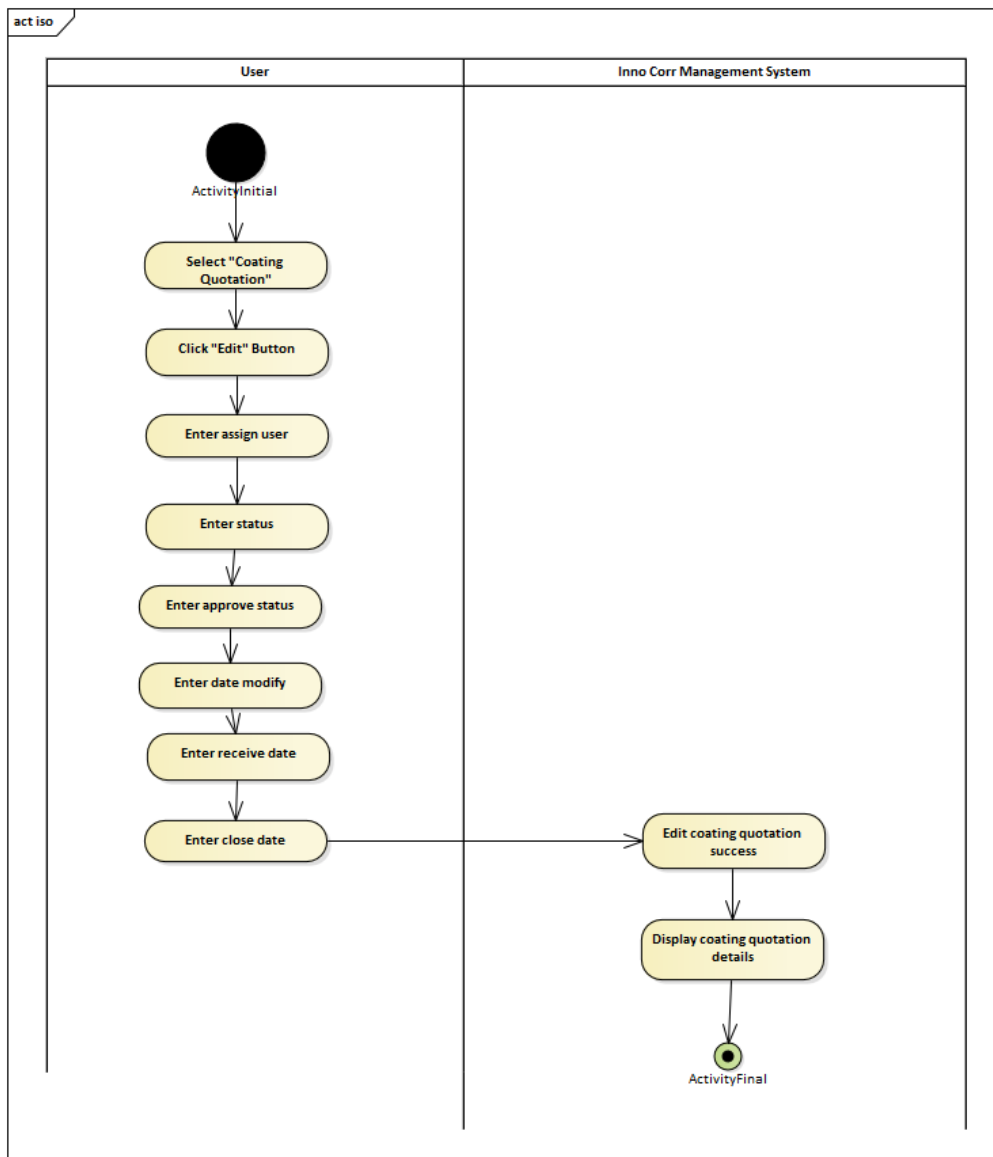
5.3.4.8 Edit Coating Quotation

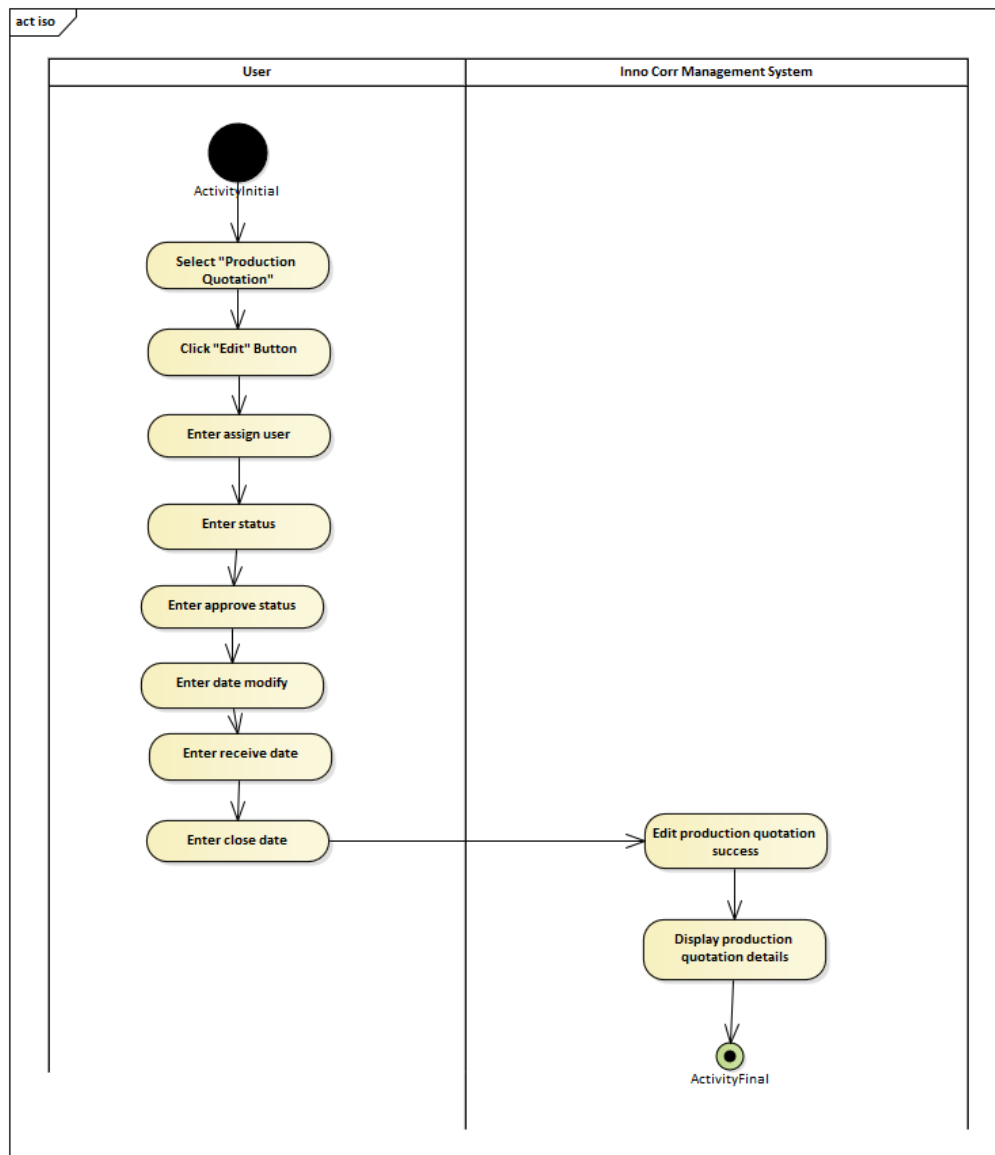Figure 5.10：Edit Coating Quotation.

5.3.4.9 Edit Production Quotation

Figure 5.11：Edit Production Quotation.

5.3.4.10 Edit Production
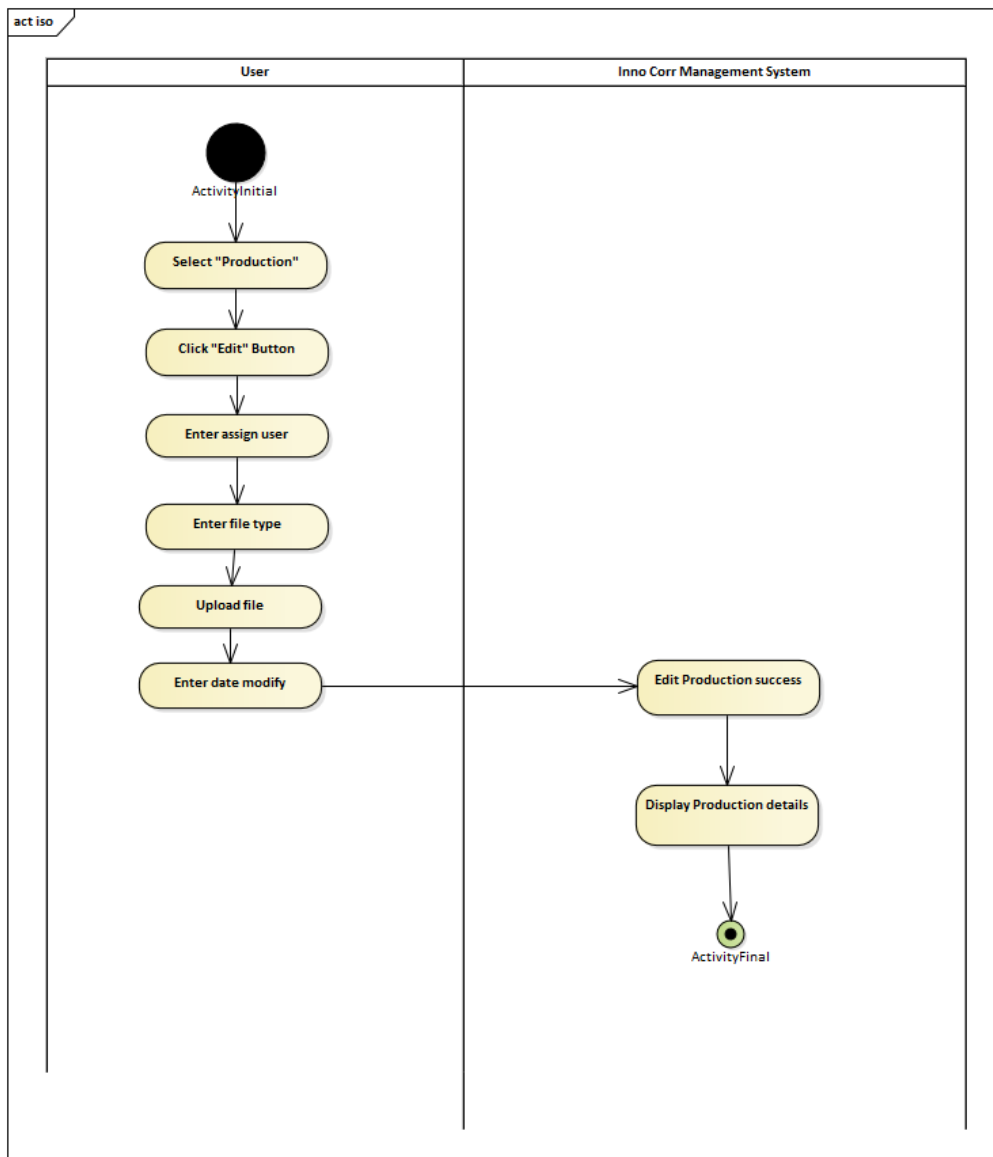

Figure 5.12：Edit Production.

5.3.4.11 Edit Task
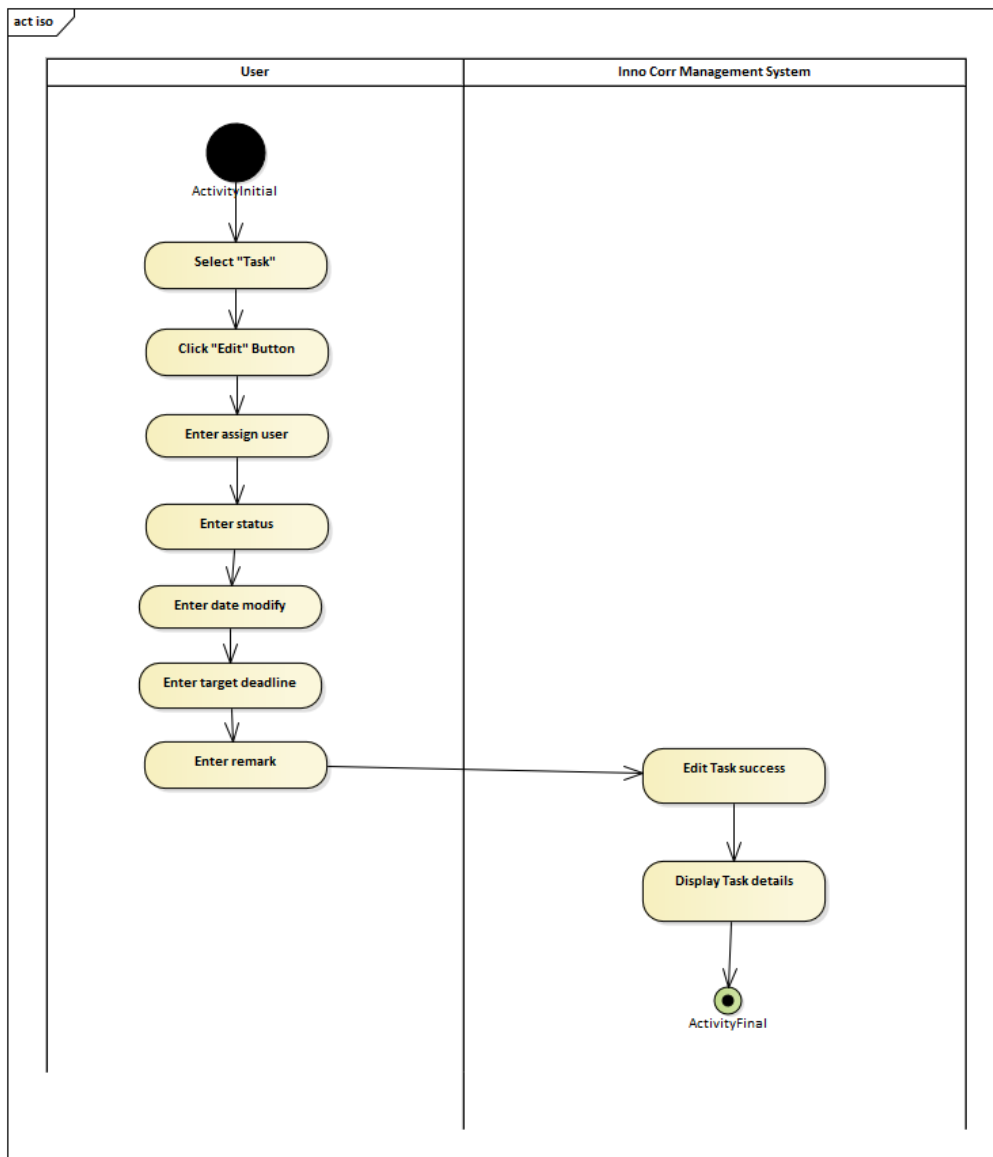
Figure 5.13：Edit Task.

5.3.4.12 View ISO Documentation
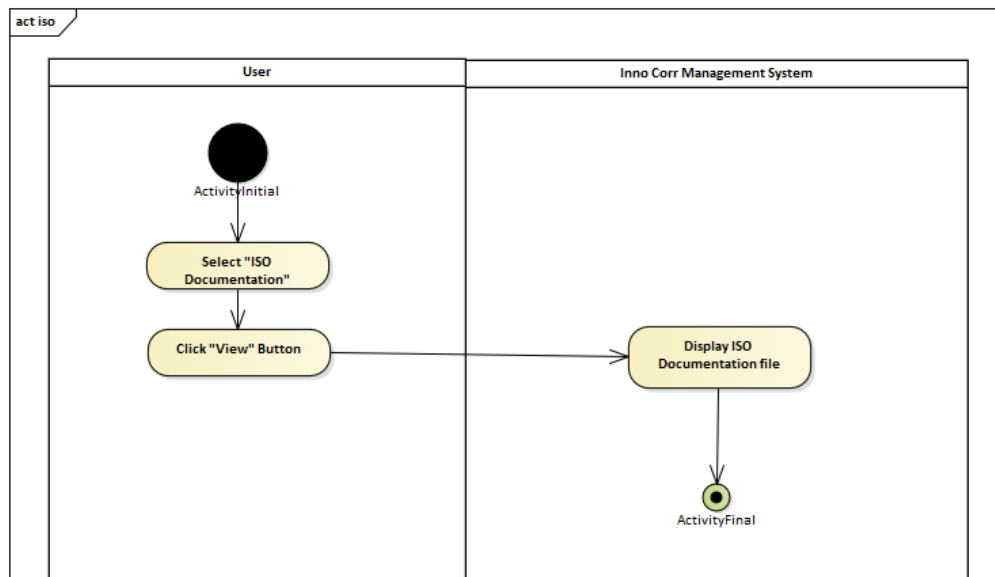
Figure 5.14：View ISO Documentation.

5.3.4.13 View Coating Quotation
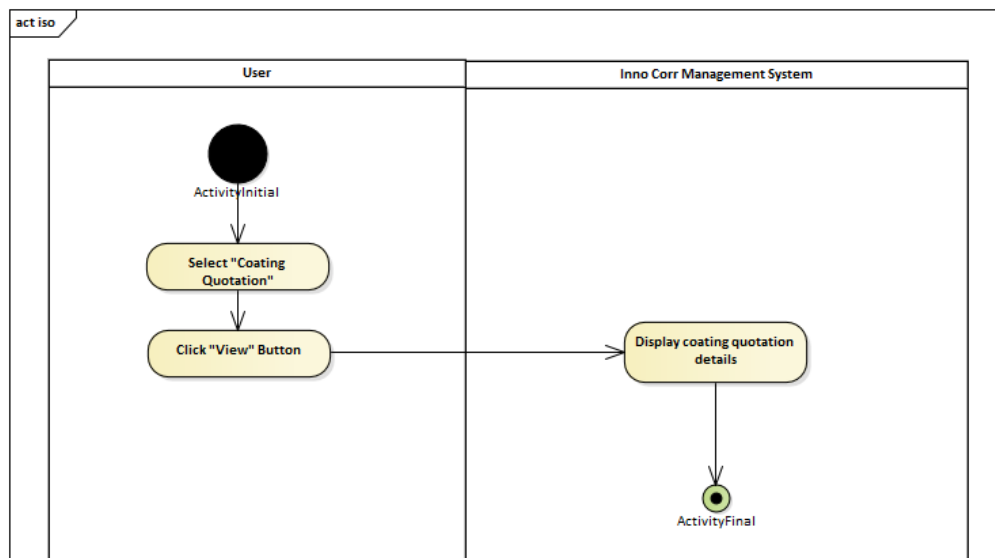
Figure 5.15：View Coating Quotation.

5.3.4.14 View Production Quotation
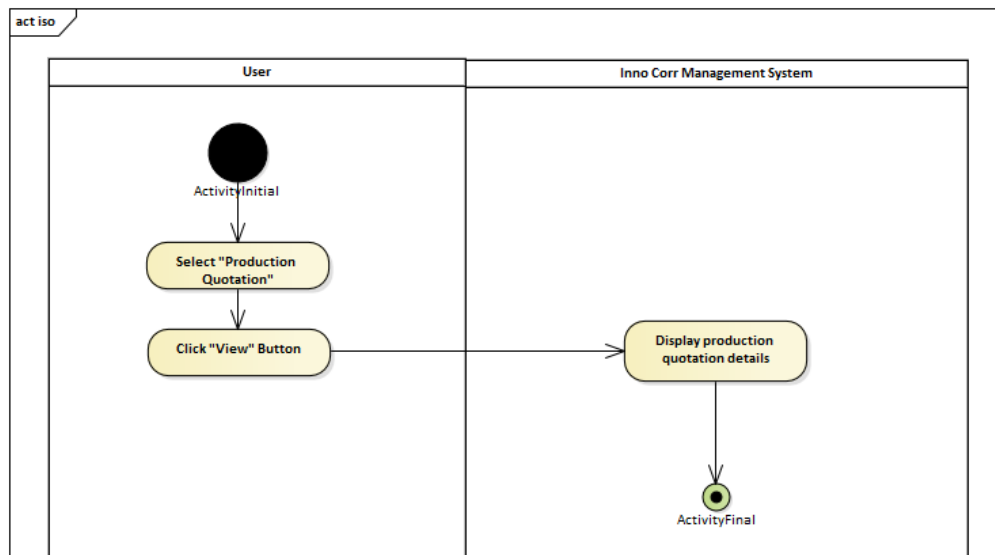
Figure 5.16：View Production Quotation.

5.3.4.15 View Production
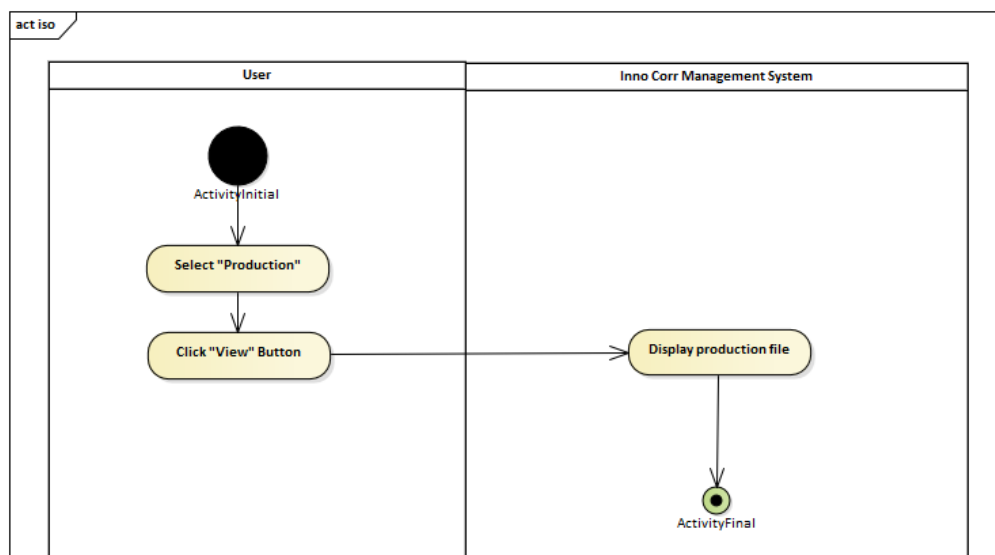
Figure 5.17：View Production.

5.3.4.16 View Task
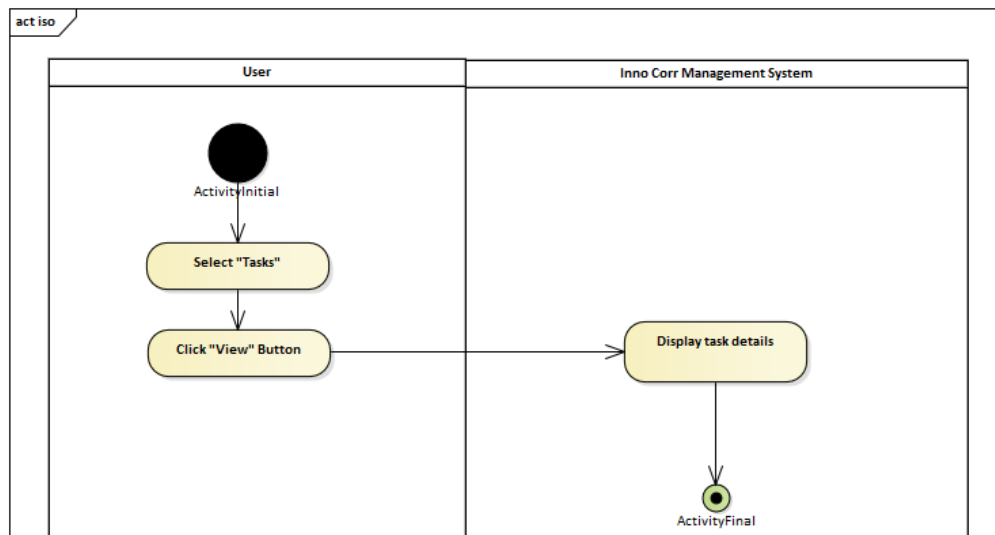
Figure 5.18：View Task.

5.3.4.17 Delete ISO Documentation
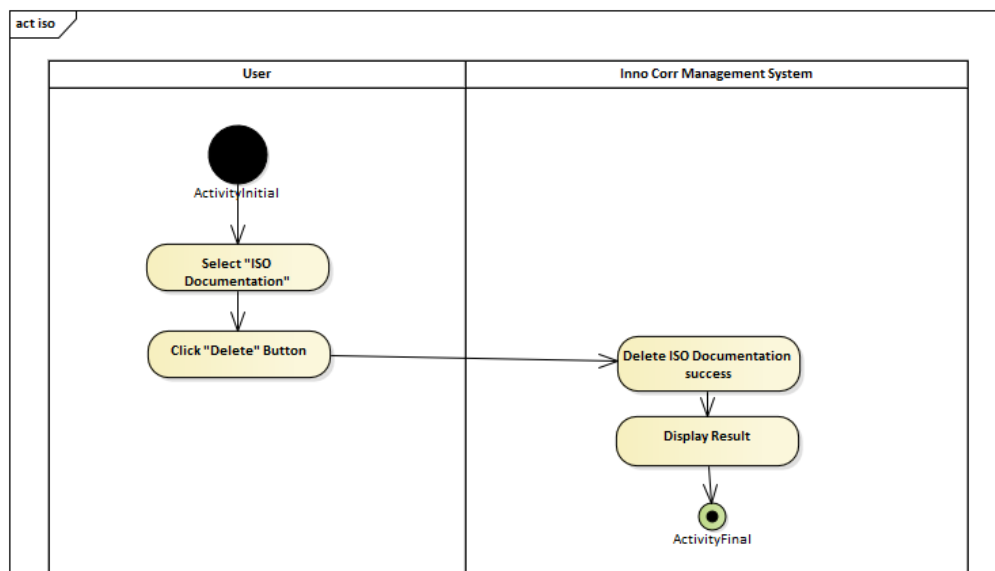
Figure 5.19：Delete ISO Documentation.

5.3.4.18 Delete Coating Quotation
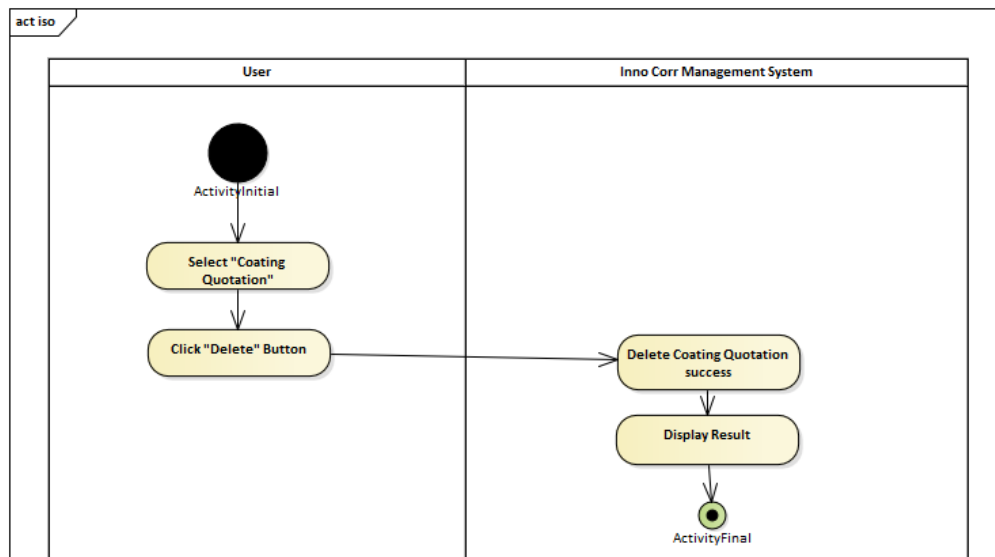
Figure 5.20：Delete Coating Quotation.

5.3.4.19 Delete Production Quotation
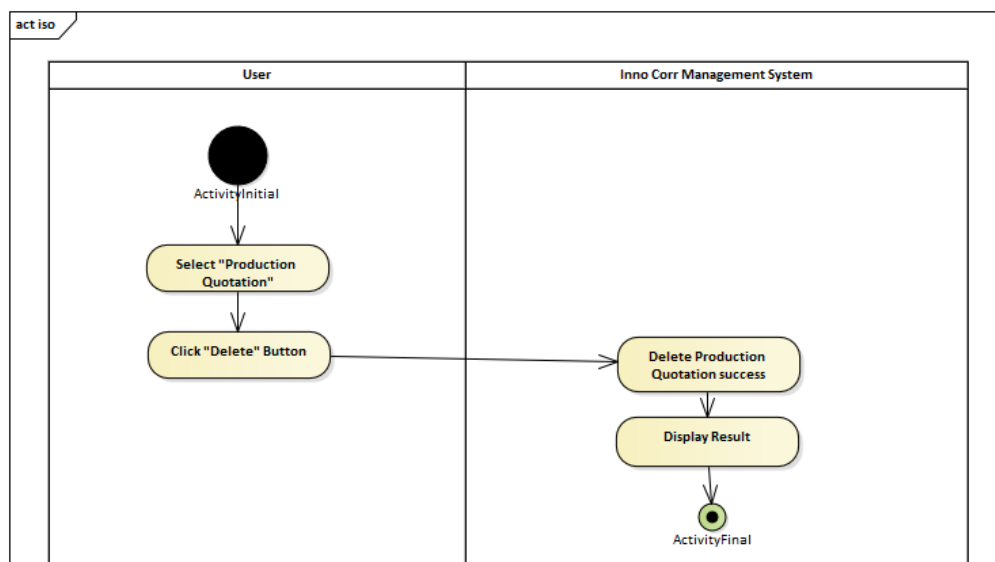
Figure 5.21：Delete Production Quotation.

5.3.4.20 Delete Production
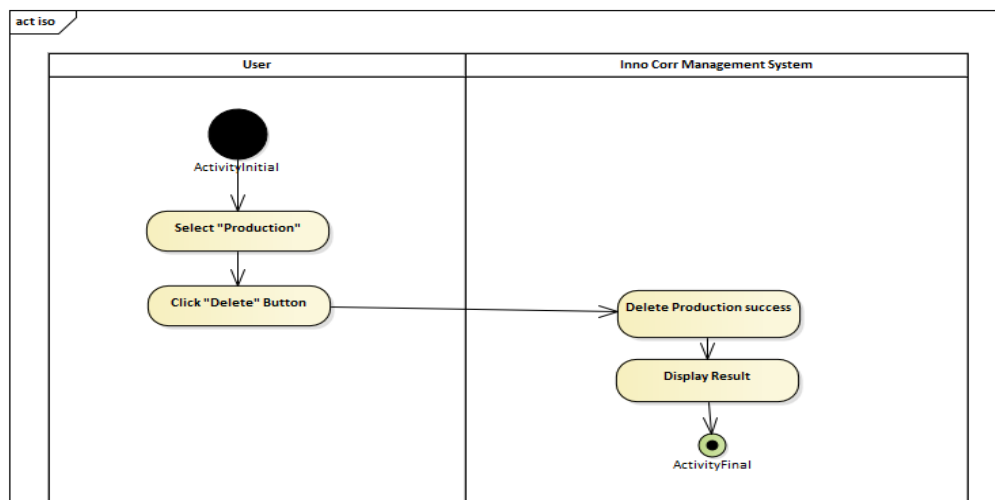
Figure 5.22：Delete Production.

5.3.4.21 Delete Task
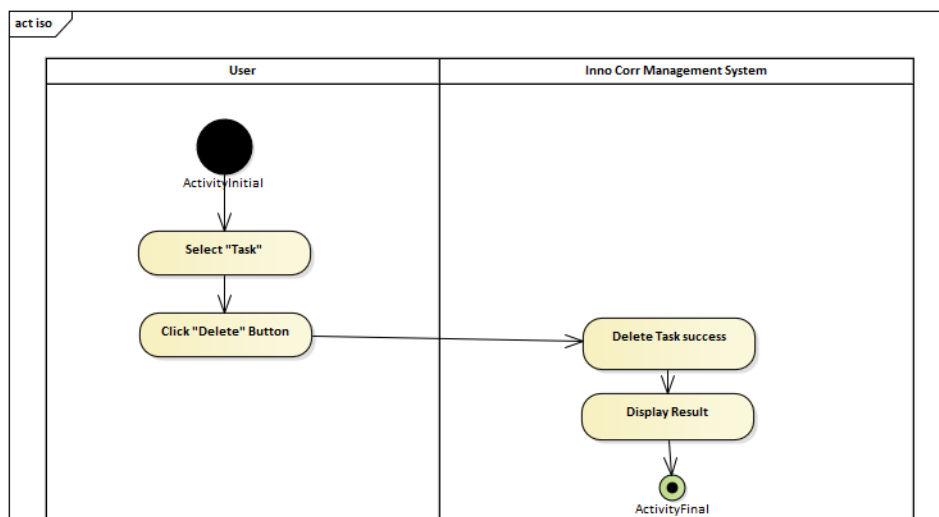
Figure 5.23：Delete Task.

5.3.4.22 View Audit Trail
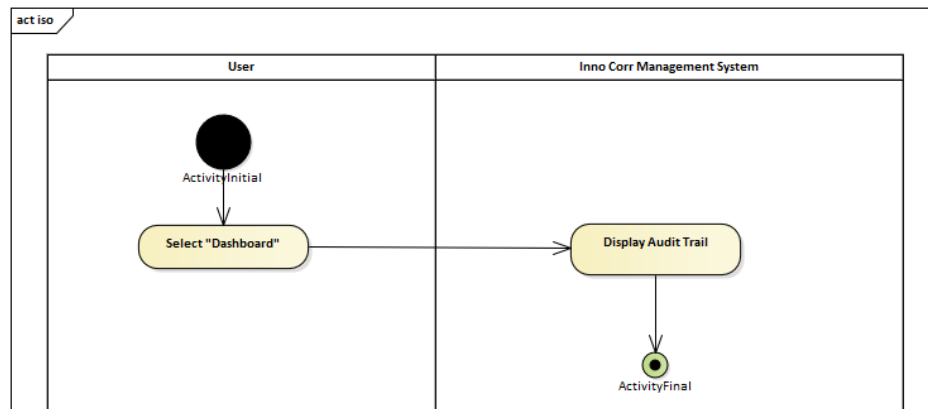
Figure 5.24：View Audit Trail.

5.3.4.23 Change Password
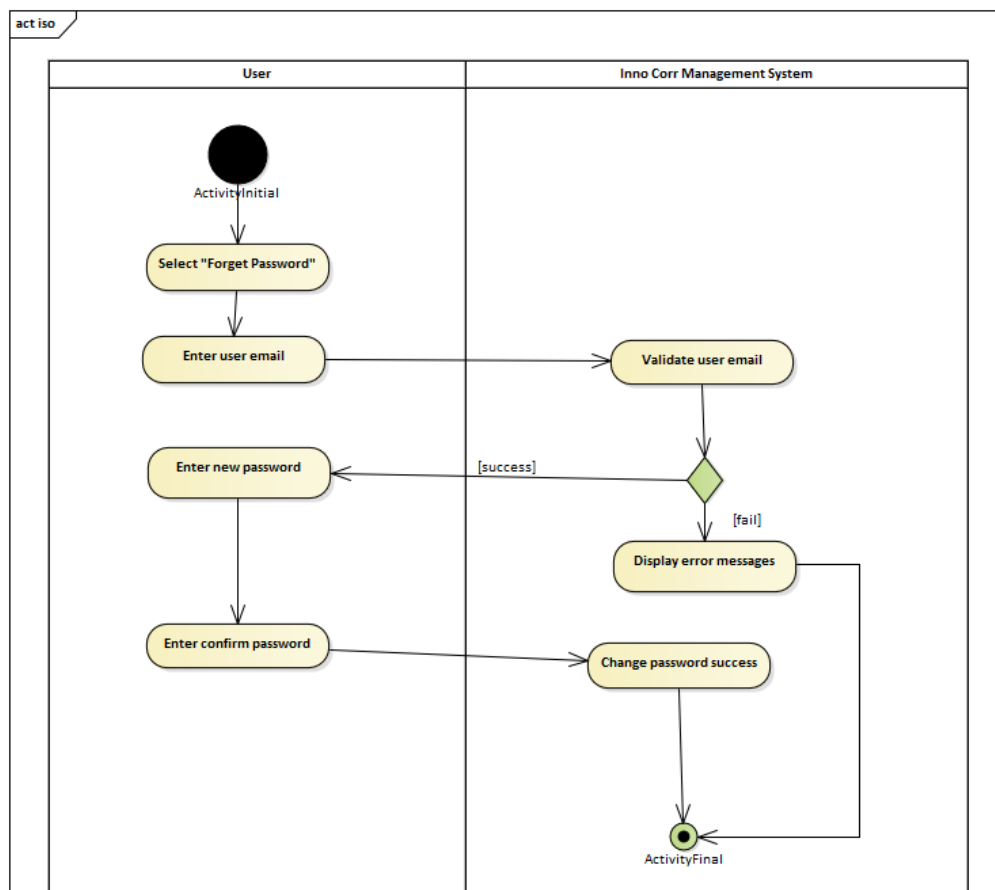
Figure 5.25：Change Password.

5.4   User Interface Design

User interface (UI) design refers to the process of designing the visual and interactive elements of a software application or system that users interact. Main

goal of UI design is to create a user-friendly, intuitive, and aesthetically pleasing interface that enables users to effectively and efficiently interact with the software, accomplish their tasks, and have a positive overall user experience. Therefore, user interface design is a critical aspect of software development because the quality of the UI directly impacts user satisfaction and the usability of the application.

5.4.1 Login Page
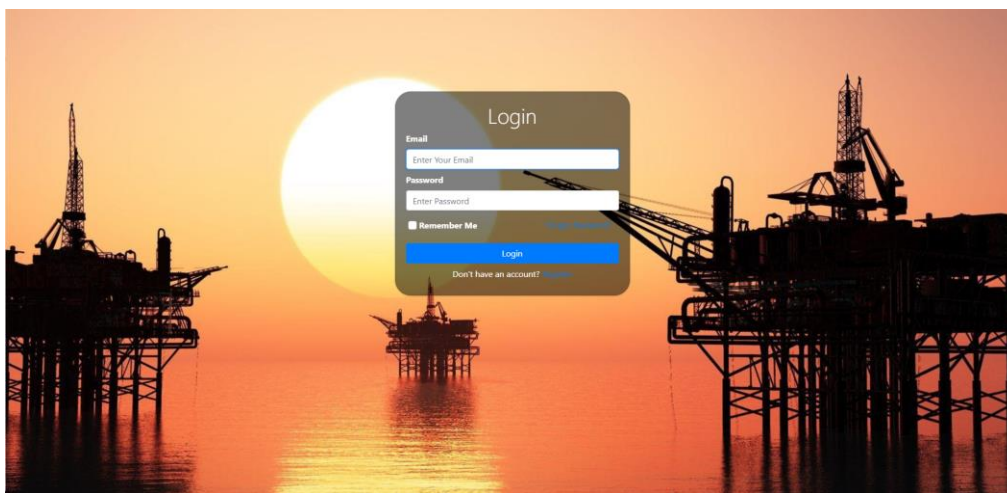
Figure 5.26：Login Page.

5.4.2 Registration Page
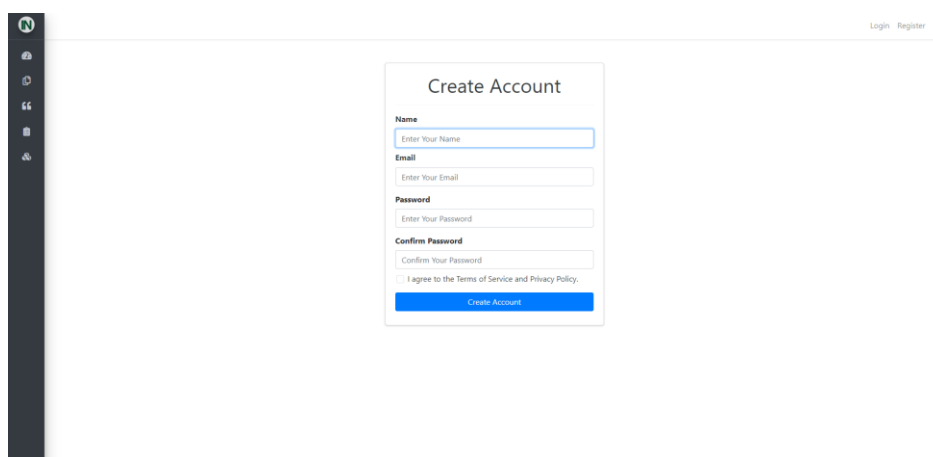
Figure 5.27：Registration Page.

5.4.3　Forget Password Page
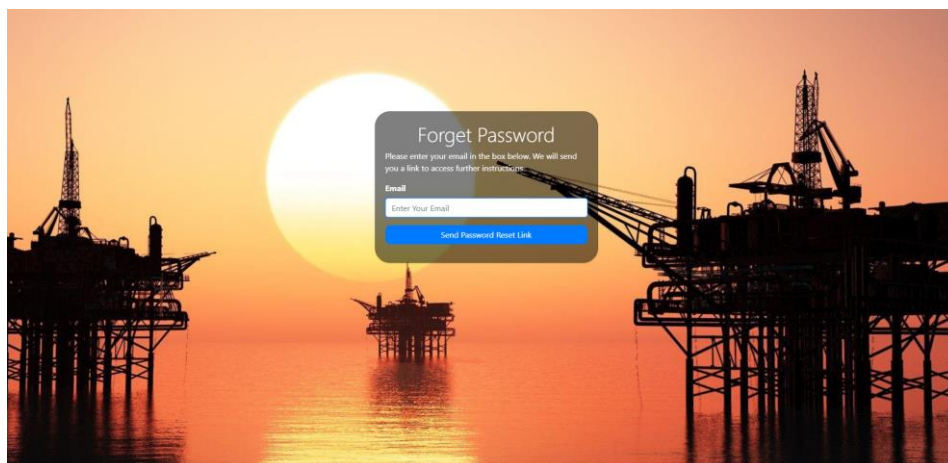
Figure 5.28：Forget Password Page.

5.4.4　Change Password Page
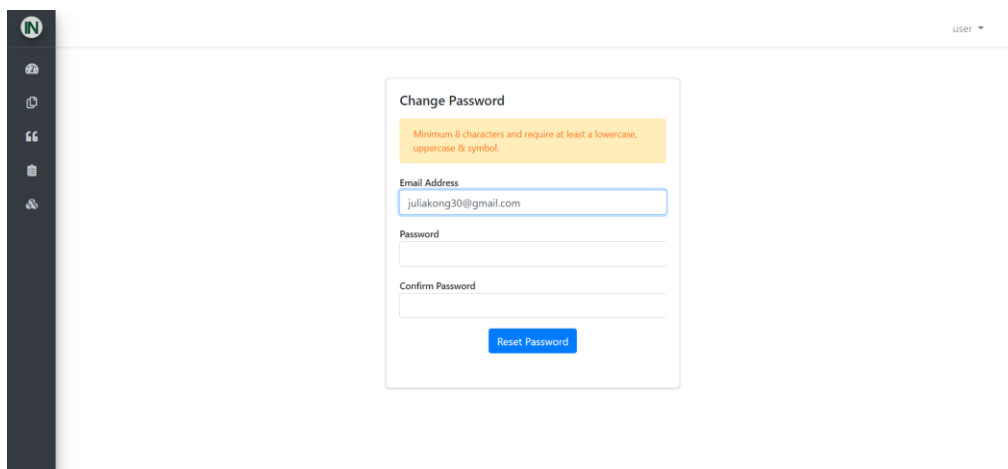
Figure 5.29：Change Password Page.

5.4.5 Dashboard Page
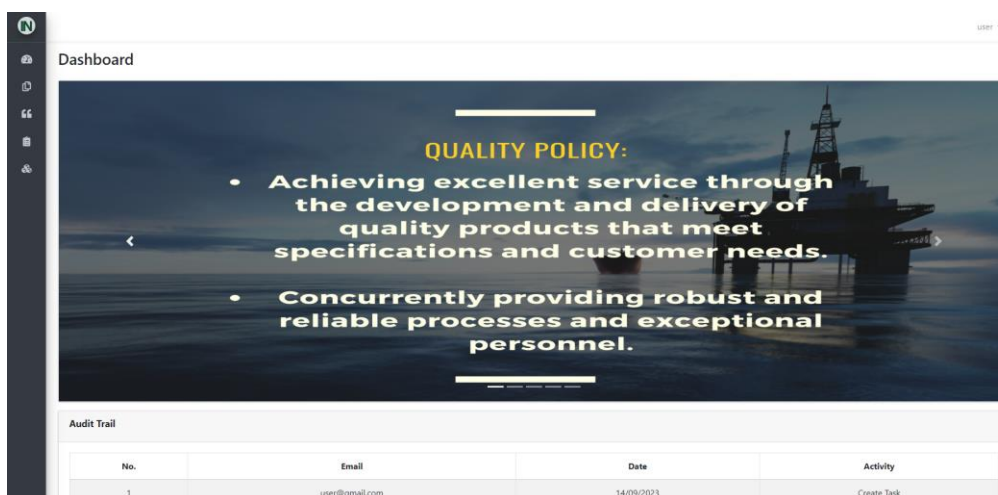
Figure 5.30：Dashboard Page.

5.4.6 Create ISO Documentation Page
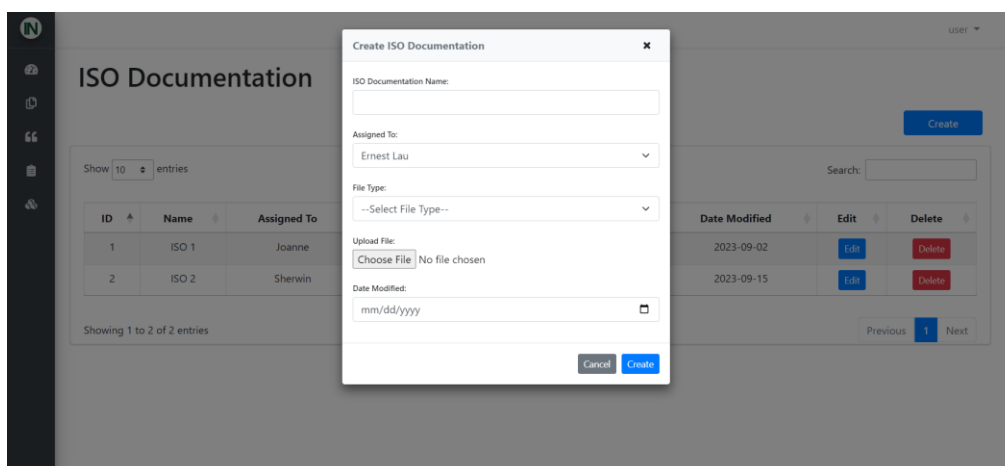
Figure 5.31：Create ISO Documentation Page.

5.4.7 Edit ISO Documentation Page
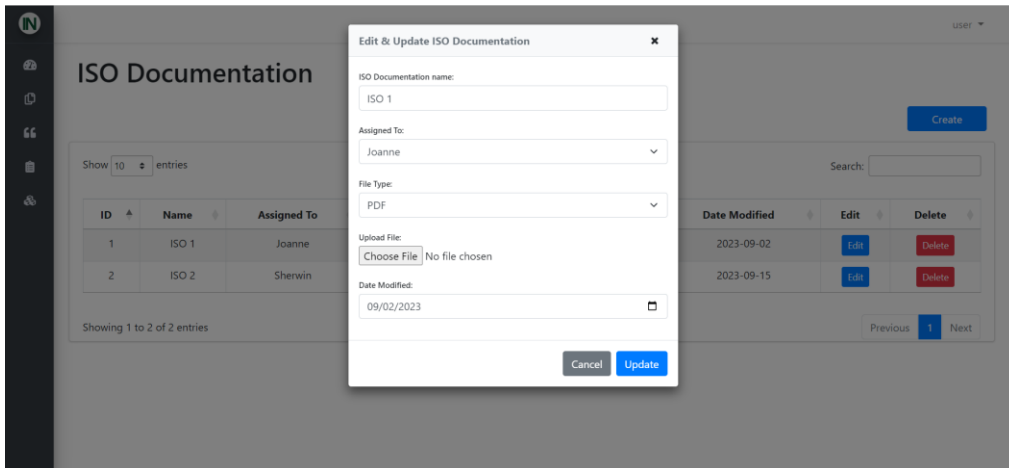
Figure 5.32：Edit ISO Documentation.

5.4.8 Delete ISO Documentation Page
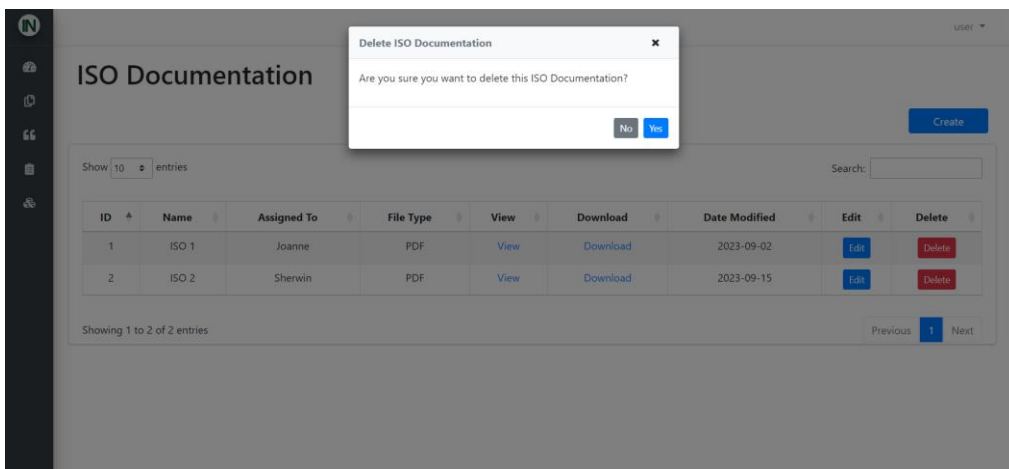
Figure 5.33：Delete ISO Documentation Page.

5.4.9 View ISO Documentation Page
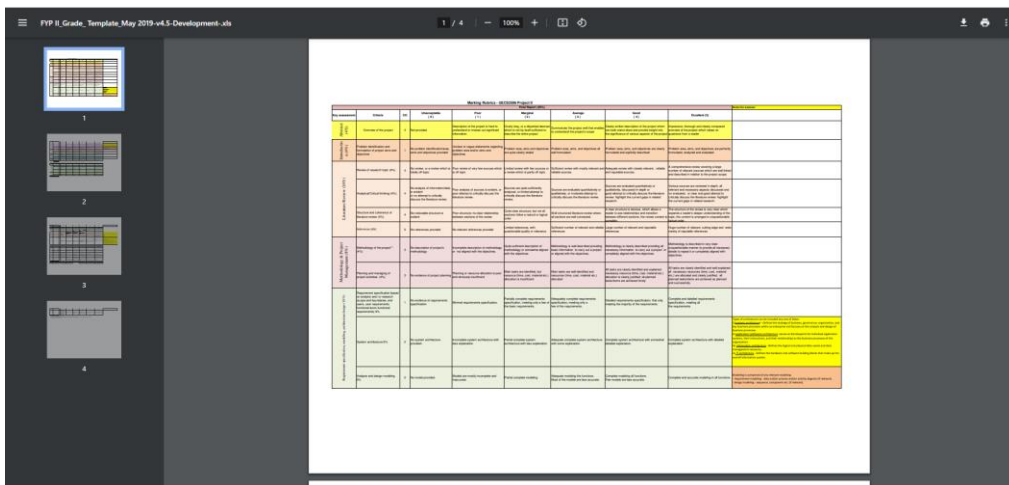
Figure 5.34：View ISO Documentation Page.

5.4.10   Download ISO Documentation Page
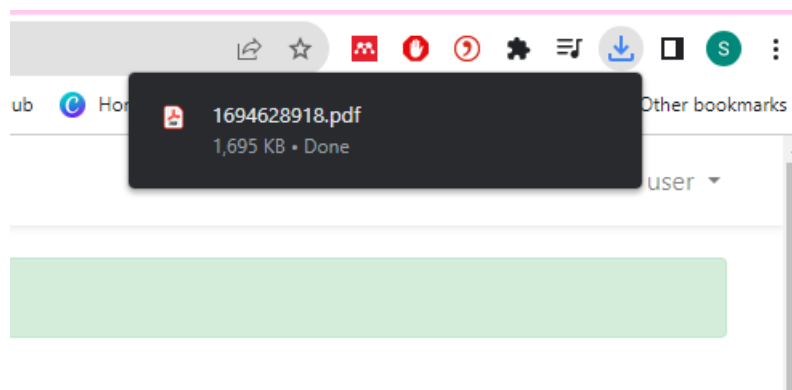
Figure 5.35：Download ISO Documentation Page.

5.4.11   Create Coating Quotation Page
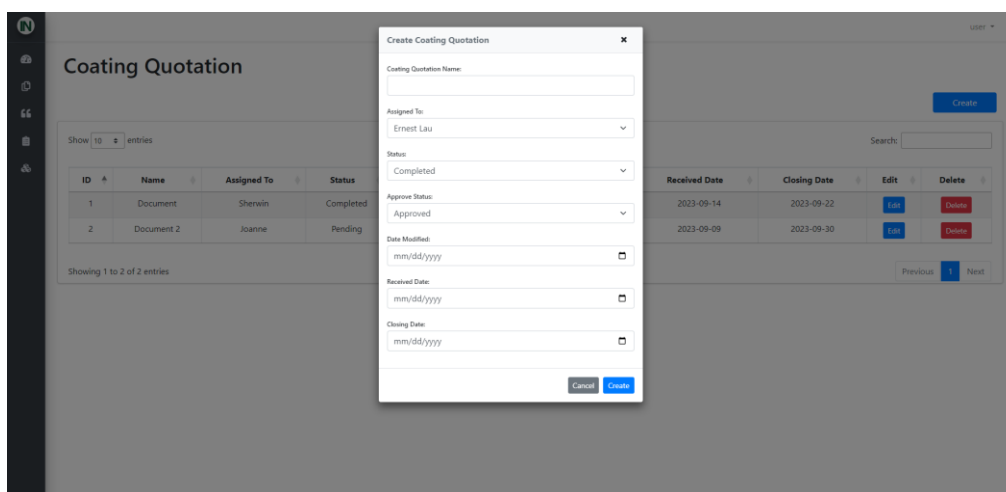
Figure 5.36：Create Coating Quotation Page.

5.4.12   Edit Coating Quotation Page
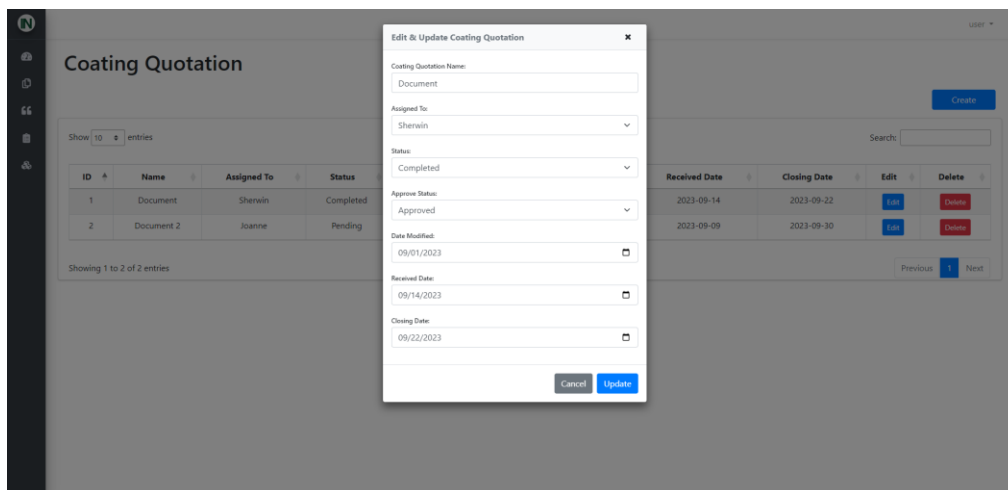
Figure 5.37：Edit Coating Quotation Page.

5.4.13   Delete Coating Quotation Page
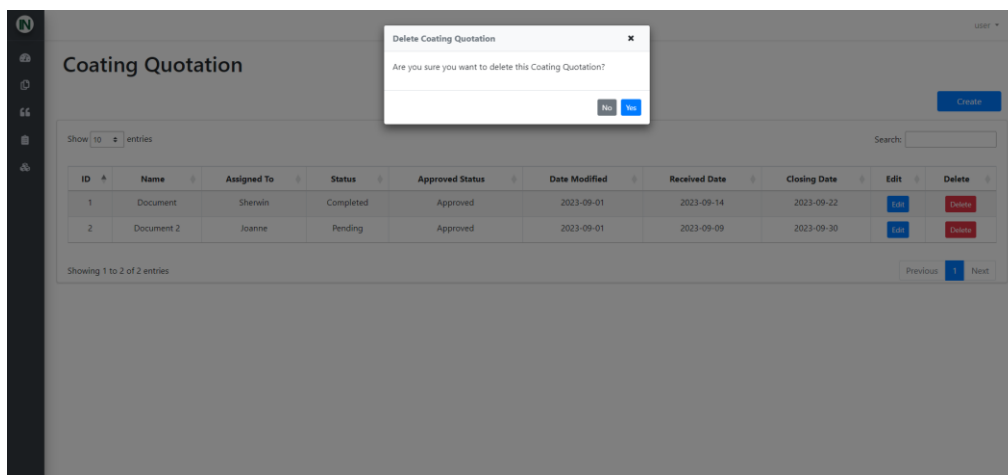
Figure 5.38：Delete Coating Quotation Page.

.

5.4.14   Create Production Quotation Page

Figure 5.39：Create Production Quotation Page.

5.4.15   Edit Production Quotation Page

Figure 5.40：Edit Production Quotation Page.

.

5.4.16 Delete Production Quotation Page
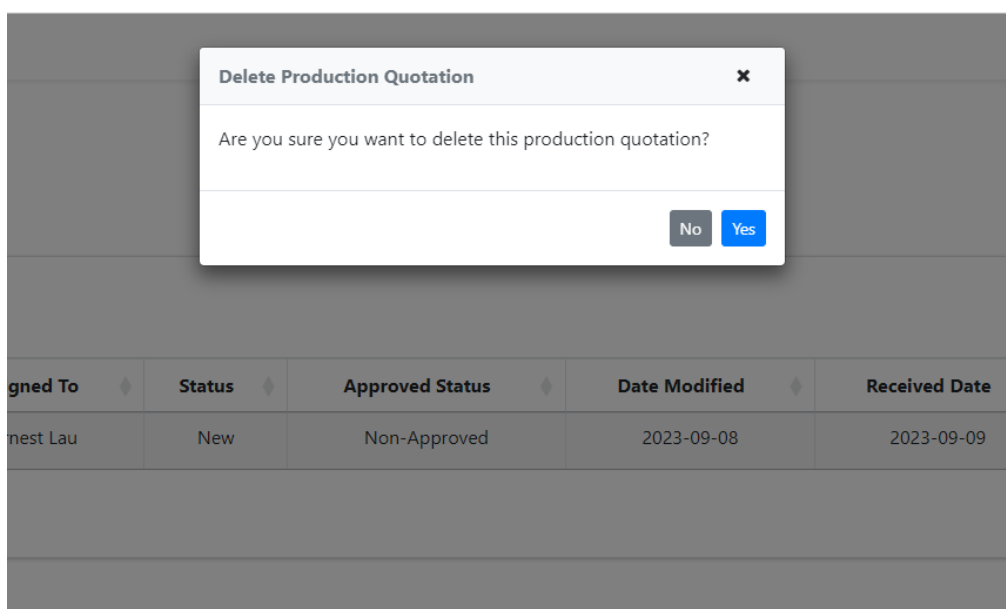
Figure 5.41：Delete Production Quotation Page.

5.4.17 Create Task Page
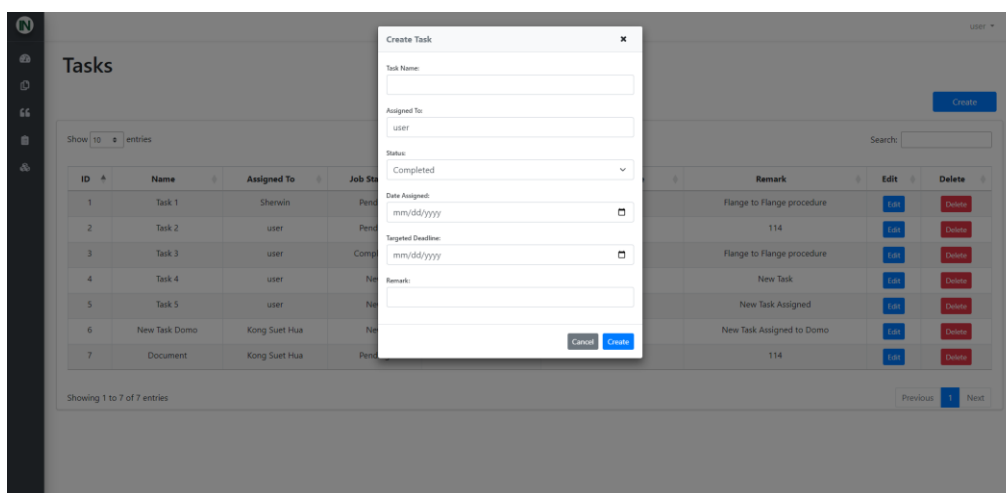
Figure 5.42：Create Task Page.

5.4.18 Edit Task Page
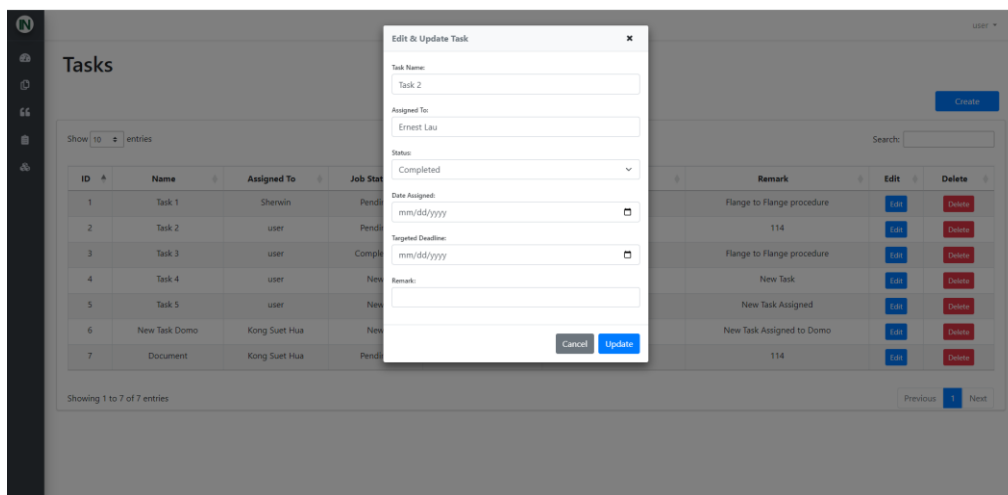
Figure 5.43：Edit Task Page.

5.4.19 Delete Task Page
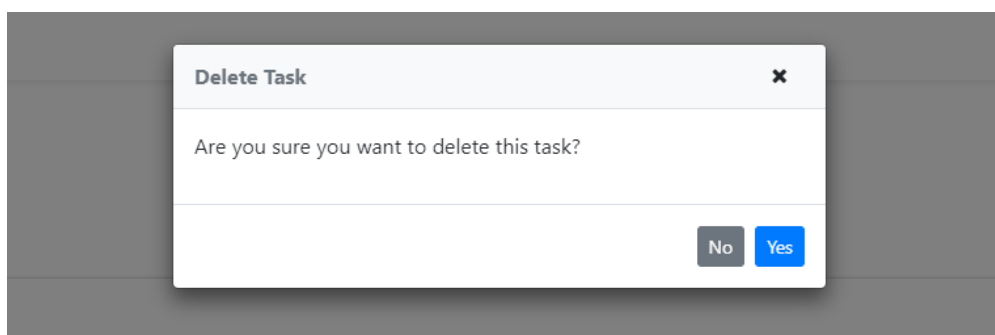
Figure 5.44：Delete Task Page.

5.4.20 Reset Password Email Notification
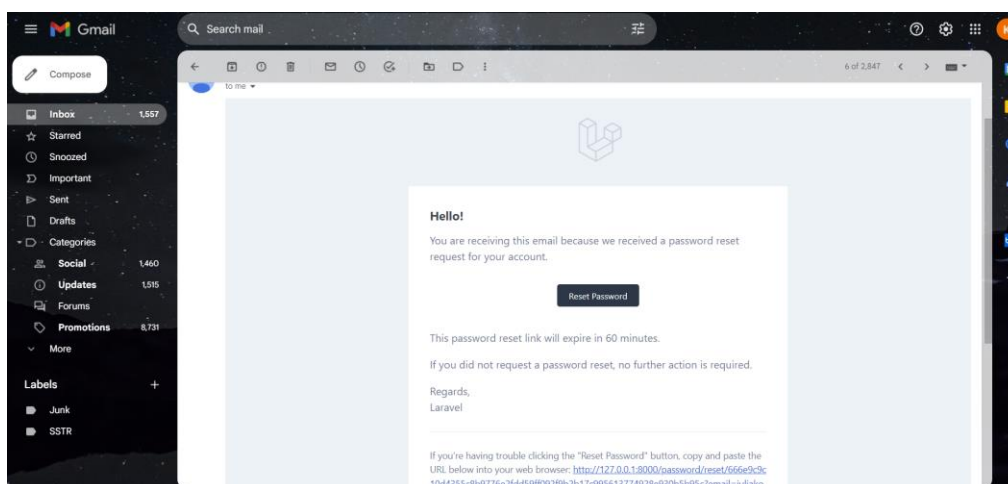
Figure 5.45：Reset Password Email Notification.

5.4.21   Task Assign Email Notifcation
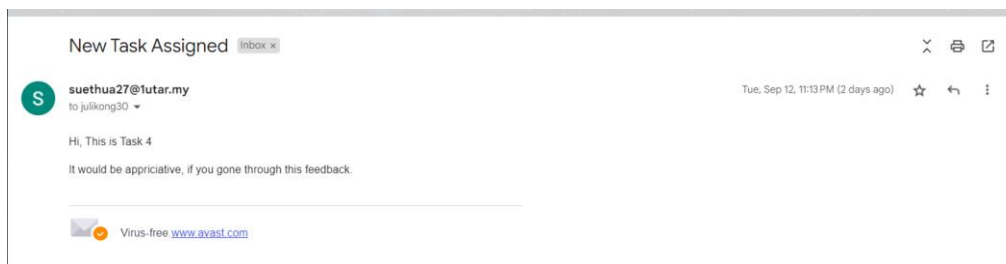
Figure 5.46：Task Assign Email Notification.

5.4.22   Activitiy Log

Figure 5.47：Activity Log.

5.5   Summary

In summary, this chapter has illustrasted various type of diagram in order the intended objectives and requirements. In the beginning, a system architecture design has been generated to understand the high-level components, modules, and interactions of a complex system to meet specific functional and non-functional requirements. Meanwhile, differen type of data architecture have also created to show how data is structured and organized within the database. In the end, a high high-fidelity prototype has been demonstrated to to test and validate design concepts, gather user feedback, and ensure that the final product meets user expectations.

CHAPTER 6

SYSTEM IMPLEMENTATION

6.1 Introduction

In this chapter, system implementation will be focused as the project solution. Meanwhile, various of the framework and package will also be integrated into the implemented system to enhance the current features and capabilities of existing software such as Laravel Mix, Laravel Breeze, Laravel Eloquent, Laravel Queueable and more. Lastly, wamp server will be used as the local development and testing activity.

6.2 Laravel Mix

Laravel Mix is a popular asset compilation and build tool that simplifies managing and building assets in Laravel applications. It provides a fluent API for defining webpack build steps for the Laravel application using several standard CSS and JavaScript pre-processors. For example, Laravel Mix simplifies the compilation of various front-end assets such as CSS, JavaScript, images, and more. Hence, the developers can define asset sources and destinations simply and intuitively.

Besides, Laravel Mix allows the definition of the asset compilation tasks using a JavaScript configuration file. It contains a file named webpack.mix.js that permits the developers to specify source files, output paths, and compilation rules. At the same time, Laravel Mix can minify and optimize the JavaScript and CSS files for production to reduce file sizes while improving page load times. Laravel Mix also provides a straightforward and user-friendly API for defining asset compilation tasks. It abstracts away the complexity of setting up build processes with Webpack to make it accessible to developers with different levels of front-end expertise.

```
webpack.mix.js > ...
1   const mix = require('laravel-mix');  Calculating...
2
3   /*
4    |--------------------------------------------------------------------------
5    | Mix Asset Management
6    |--------------------------------------------------------------------------
7    |
8    | Mix provides a clean, fluent API for defining some Webpack build steps
9    | for your Laravel application. By default, we are compiling the Sass
10   | file for the application as well as bundling up all the JS files.
11   |
12   */
13
14  mix.js('resources/js/app.js', 'public/js')
15      .sass('resources/sass/app.scss', 'public/css')
16      .sourceMaps();
17
```

Figure 6.1：Webpack.mix.js.

6.3   Laravel Breeze

Laravel Breeze is a starter kit for building web applications with the Laravel PHP framework. It's designed to help developers quickly set up the authentication and scaffolding for their Laravel projects, making it easier to start building web applications that require user registration, login, and other standard features. For instance, Laravel Breeze provides pre-built authentication controllers, views, and routes for user registration, login, password reset, and email verification.

Furthermore, Laravel Breeze provides blade views for authentication-related pages, allowing developers to customize the look and feel of these pages to match their application's design. In addition, Laravel Breeze can be considered a part of the Laravel ecosystem as it integrates seamlessly with other Laravel packages, tools, and features. This ensures a consistent and familiar development experience for Laravel developers. For example, Laravel provides a package manager called Composer, which easily integrates third-party packages and extensions into Laravel applications. As a result, these packages cover many functionalities, including authentication, authorization, caching, database management, API integrations, and more. Laravel Breeze ensures that these packages are designed to work seamlessly with the Laravel framework, making adding new features to web applications simple.

6.4   Laravel Eloquent

Eloquent is the built-in Object-Relational Mapping (ORM) system that provides an elegant and expressive way to interact with the database. Eloquent is Laravel's implementation of the ActiveRecord pattern, which allows the developers to interact with database tables in PHP objects. For instance, Eloquent supports various relationships between models, such as one-to-one, one-to-many, many-to-one, and many-to-many relationships. In the same way, Eloquent provides methods for performing CRUD records in the database. For example, the create function allows the users to insert a new record while it retrieves a record by using the primary key and updating the records.

Additionally, Eloquent supports attribute casting, allowing developers to specify whether the model attributes should be serialized and deserialized when interacting with JSON or arrays. Lastly, Eloquent provides a mechanism for protecting against mass assignment vulnerabilities. Therefore, the attributes used in this project were fillable to control, which can be mass-assigned.

```php
 9    use Illuminate\Database\Eloquent\Model;
10    use Illuminate\Database\Eloquent\Casts\Attribute;
11

      36 references | 0 implementations
12    class User extends Authenticatable
13    {
14        use Notifiable, HasFactory;
          0 references
15        protected $table = 'users';
16

          0 references
17        protected $fillable = [
18            'name',
19            'userID',
20            'email',
21            'password'
22        ];
23

          0 references
24        protected $hidden = [
25            'password',
26            'remember_token',
27        ];
28

          0 references
29        protected $casts = [
30            'email_verified_at' => 'datetime',
31        ];
32

          0 references | 0 overrides
33        public function tasks()
34        {
35            return $this->hasMany(Task::class);
36        }
```

Figure 6.2：Eloquent Model.

6.5   Laravel Queueable

Laravel Queueable is a Laravel feature that facilitates the asynchronous sending of email notifications using Laravel's built-in email system and queue system. Queueable reduces time-consuming and resource-intensive tasks to a queue so

that it can respond quickly to user requests without waiting to complete them. Meanwhile, Queueable dispatches a job by creating an instance of the job class and then sending it to the queue.

Besides, Queueable can be used to monitor the queued jobs and logging, allowing developers to track the progress and status of background tasks. Queueable jobs can also execute asynchronously by worker processes or queue listeners. This means the application doesn't have to wait for the job to complete, leading to improved performance and responsiveness. In summary, Laravel Queueable is a feature that enables to handle background tasks asynchronously, improving the performance and responsiveness of Laravel applications. It is a valuable tool for managing tasks that might otherwise slow down the application's user interface or executing functions at specific times or on particular conditions.

```php
5   use Illuminate\Bus\Queueable;
6   use Illuminate\Mail\Mailable;
7   use Illuminate\Queue\SerializesModels;
8   use Illuminate\Contracts\Queue\ShouldQueue;
9
    2 references | 0 implementations
10  class SendMail extends Mailable
11  {
12      use Queueable, SerializesModels;
        2 references
13      public $data;
14      /**
15       * Create a new message instance.
16       *
17       * @return void
18       */
        1 reference | 0 overrides
19      public function __construct($data)
20      {
21          $this->data = $data;
22      }
```

Figure 6.3：Laravel Queueable.

6.6　　WAMP Server

WAMP Server is a popular open-source web development environment for Windows operating systems. It provides a complete stack of web development tools and services bundled into a single package, making it easy for developers

to set up and manage a local web server environment for PHP, MySQL, and Apache (or Nginx). For example, the WAMP Server supports the configuration of virtual hosts, allowing developers to set up multiple websites or web applications on their local server with their domain name.

In addition, WAMP Server provides a straightforward and user-friendly installation process. It bundles all the necessary components into a single installer while eliminating the need to configure and install them individually. At the same time, WAMP Server allows developers to work on web projects without needing a live web server or internet connection. WAMP Server also provides a database server component that enables developers to store and manage data for web applications. Last, WampServer includes the Apache HTTP Server as the web server component, which handles HTTP requests from clients and delivers web pages, scripts, and other resources.

As a result, the WAMP Server is a valuable tool for web developers working on Windows systems who need a local web server environment to develop and test web applications and websites. It simplifies setting up a complete web development stack on a Windows PC, providing the essential components required for web development in a user-friendly and integrated package.

Figure 6.4：WAMP Server.

6.7   Summary

This chapter has displayed plenty of implementation phases for this project. The implemented system has utilized Laravel Breeze, Laravel Eloquent, and Laravel Queueable to use the authentification functionalities and the UI elements. In the

end, the implemented system has also used the WAMP Server for local development and testing purposes.

CHAPTER 7

TESTING AND EVALUATION

7.1   Introduction

Software testing is a software development process that evaluates a software application and corrects defects, errors, and issues. This chapter will illustrate various testing activities by assessing the testing results. The testing activities that have been conducted in this project are user acceptance testing, unit testing, and integration testing. Meanwhile, a traceability matrix between use cases, functional requirements, and test cases has been generated to observe the compliance of the test cases with the use case and functional requirements written in Chapter 4.

7.2   Traceability between Use Cases, Functional Requirements and Test Cases

A traceability matrix is a structured document that helps maintain and track the relationships between different artifacts or elements in a project. The objective of the traceability matrix is to establish traceability between various project elements and the requirements, which include mapping requirements to design components, test cases, and other project artifacts. Therefore, the traceability matrix in software development is valuable for maintaining transparency, quality, and alignment with requirements throughout the software development lifecycle.

7.2.1   Use Case Table

A use case table is essential for software development and requirements analysis. The primary goal of this table is to provide a structured format for defining and detailing use cases while breaking down complex systems into manageable parts. Hence, it serves as a central documentation tool that helps clarify requirements, guide development, and ensure that the software system aligns with its users' and stakeholders' needs and expectations. Table 7.1 shows all the web application use cases to describe how users interact with a software system to achieve specific goals.

Table 7.1:   Use Case Table.

Use Case ID	Use Case Name	System
UC001	Login Account	Web Application
UC002	Manage ISO Documents	Web Application
UC003	Manage Quotation	Web Application
UC004	Manage Production	Web Application
UC005	View Activity Log	Web Application
UC006	Manage Tasks	Web Application

7.2.2   Functional Requirement

Functional Requirement that reflect the corresponding modules:

Table 7.2:   Functional Requirement for Web File Management Module.

ID	Functional Requirement Statement	Related Use Case ID
WR-001	The system should allow the user to manage ISO document file with PDF format and image.	UC002
WR-002	The system should allow the users to manage the file whenever they have received any project.	UC002
WR-003	The system should allow only the admin to delete specific ISO document files based on their needs.	UC007

Table 7.3:   Functional Requirement for Quotation Management Module.

ID	Functional Requirement Statement	Related Use Case ID
QR-001	The system should allow the users to manage the quotation based on the auto-generated quotation running number.	UC003
QR-002	The system should allow the users to manage quotation whenever they have received any quotation from the clients.	UC003

QR-003	The system should allow only the admin to delete specific quotation based on their needs.	UC008

Table 7.4: Functional Requirement for Production Management Module.

ID	Functional Requirement Statement	Related Use Case ID
PR-001	The system should allow the user to manage production's document file with PDF format.	UC004
PR-002	The system should allow the users to manage the file whenever they have received any project.	UC004
PR-003	The system should allow only the admin to delete specific Production document files based on their needs.	UC010

Table 7.5: Functional Requirement for Task Management Module.

ID	Functional Requirement Statement	Related Use Case ID
TR-001	The system should allow the users to manage the task based on the project's date assigned, targeted deadline to complete and status of the task.	UC006
TR-002	The system should allow only the admin to delete specific task based on their needs.	UC009

Table 7.6: Functional Requirement for Mail Management Module.

ID	Functional Requirement Statement	Related Use Case ID
MR-001	The system should able to generate auto-email to the users when task assigned.	UC006

Table 7.7: Functional Requirement for User Authorization Management Module.

ID	Functional Requirement Statement	Related Use Case ID

UR-001	The system should permit the users to log into their account by entering their username and password.	UC001
UR-002	The system should allow users to reset their password by clicking on "Forgot my password" and receiving a link to their verified email address.	UC001
UR-003	The system should allow the users to register a new account by clicking on "Create an account" whenever a new employee joined the company.	UC001
UR-004	The system should show the date and time accessed by the user when they used the server to perform any changes.	UC005

7.2.3   Traceability Matrix

A Traceability Matrix is a structured document used in project management and quality assurance to ensure that project requirements remain aligned with the project's scope and objectives throughout its lifecycle. It helps track and manage project requirements, ensuring they are appropriately documented. Hence, traceability matrices for all the tests performed by the functional requirements and use case described in the chapter are shown in Table 7.8.

Table 7.8:   Tracibility Matrix.

Use Case ID	Functional Requirement ID	UAT Test Case ID	Integration Test Case ID
UC001	UR-001, UR-002, UR-003	UAT001, UAT002, UAT003	ITC001,ITC002, IT003
UC002	WR-001, WR-002	UAT004, UAT009, UAT014, UAT016, UAT018, UAT028	ITC004, ITC010, ITC020, ITC025, ITC030, ITC032

UC003	QR-001, QR-002	UAT005, UAT006, UAT010, UAT011, UAT019, UAT020, UAT024, UAT025, UAT029, UAT030	ITC005, ITC006, ITC011, ITC012, ITC021, ITC022, ITC026, ITC027
UC004	PR-001, PR-002	UAT008, UAT013, UAT015, UAT017, UAT022, UAT032	ITC008,ITC014, ITC024, ITC029, ITC031, ITC033
UC005	UR-004	UAT033	ITC009
UC006	TR-001	UAT007, UAT012, UAT021, UAT 031	ITC007, ITC013, ITC023, ITC028
UC007	WR-003	UAT023	ITC015
UC008	QR-003	UAT024, UAT025	ITC016, ITC017
UC009	PR-003	UAT027	ITC019
UC010	TR-002	UAT026	ITC018

7.3   Unit Test

Unit testing is a fundamental and critical software testing phase that evaluates individual components or units of a software application in isolation. This test aims to verify the correctness of individual code units and to catch defects early in the development process. Therefore, unit testing will be used in this web application to guarentee that each of the modules run correctly and smoothly. Table 7.9 shows a unit test case table for the web application.

Table 7.9:   Unit Test Case for Web Application.

Test Case ID	Test Case Name	Test Case Description	Module	Status
UTC001	Test login with correct credential	Examine whether the system able to login success.	User Authorization Module	Pass

UTC002	Test login with incorrect credential	Examine whether the system able to show error if login unsuccess.	User Authorization Module	Pass
UTC003	Test create user account with valid input	Examine whether the system able to create account successfully.	User Authorization Module	Pass
UTC004	Test create user account with invalid input	Examine whether the system able to show error if unable to create an account.	User Authorization Module	Pass
UTC005	Test modify user password with valid input	Examine whether the successful update user password when change password email sended.	User Authorization Module	Pass
UTC006	Test modify user password with invalid input	Examine whether the unsuccessful update user password will show error messages.	User Authorization Module	Pass

UTC007	Test retrieve activity log	Examine wheter the system show all the activity log when user login and logout.	User Authorization Module	Pass
UTC008	Test create new ISO Documentation	Examine whether successful create ISO Documentation after add button is pressed.	Web File Management Module	Pass
UTC009	Test create new Coating Quotation	Examine whether successful create Coating Quotation will show after create button is pressed.	Quotation Module	Pass
UTC010	Test create new Production Quotation	Examine whether successful create Production Quotation will show after create button is pressed.	Quotation Module	Pass

UTC011	Test create new task	Examine whether successful create task after create button is pressed.	Task Module	Pass
UTC012	Test create new production	Examine whether successful create Production after create button is pressed.	Production Module	Pass
UTC013	Test edit ISO Documentation	Examine whether successful edit ISO Documentation after edit button is pressed.	Web File Management Module	Pass
UTC014	Test edit Coating Quotation	Examine whether successful edit Coating Quotation after edit button is pressed.	Quotation Module	Pass
UTC015	Test edit Production Quotation	Examine whether successful edit	Quotation Module	Pass

		Production Quotation after edit button is pressed.		
UTC016	Test edit task	Examine whether successful edit task after edit button is pressed.	Task Module	Pass
UTC017	Test edit production	Examine whether successful edit production after edit button is pressed.	Production Module	Pass
UTC018	Test delete ISO Production	Examine whether successful delete ISO Documentation after delete button is pressed.	ISO Documentation Module	Pass
UTC019	Test delete Coating Quotation	Examine whether successful delete Coating Quotation after delete button is pressed.	Quotation Module	Pass

UTC020	Test delete Production Quotation	Examine whether successful delete Coating Quotation after delete button is pressed.	Quotation Module	Pass
UTC021	Test delete task	Examine whether successful delete production after delete button is pressed.	Task Module	Pass
UTC022	Test delete production	Examine whether successful delete production after delete button is pressed.	Production Module	Pass

Table 7.10: Unit Test Case Result for Login with Valid Input.

Test Case ID	UTC001	Test Name	Test login with correct credential	Pass/Fail	Pass
Test Case Description		Examine whether the system will show login success.			
Test Case Scenario				**Test Data**	

1. User enters the valid and correct email and password to. 2. User presses the login button.	Email: user@gmail.com Password: 12345678
Expected Result	**Actual Result**
The system redirects to dashboard.	The system redirects to The dashboard.

Table 7.11: Unit Test Case Result for Login with Invalid Input.

Test Case ID	UTC002	**Test Name**	Test login with incorrect credential	**Pass/Fail**	Pass
Test Case Description		Examine whether the system able to show error if login unsuccess.			
Test Case Scenario			**Test Data**		
1. User enters the invalid and incorrect email and password. 2. User presses the login button.			Email: user@gmail.com Password: 12345678		
Expected Result			**Actual Result**		
The error message prompts the user entered the invalid input.			The error message prompts the user entered the invalid input.		

Table 7.12: Unit Test Case Result for Create Acocunt with Valid Input.

Test Case ID	UTC003	**Test Name**	Test add user account with valid input	**Pass/Fail**	Pass
Test Case Description		Examine whether the system able to create account successfully.			
Test Case Scenario			**Test Data**		
1. User enters the valid name, email, password and confirm password. 2. User clicks on the "Create Account" button			Name: user Email: admin@gmail.com Password: 12345678		

				Confirm Password: 12345678	
Expected Result				**Actual Result**	
The system redirects to dashboard.				The system redirects to The dashboard.	

Table 7.13: Unit Test Case Result for Create Acocunt with Invalid Input.

Test Case ID	UTC004	**Test Name**	Test create user account with invalid input	**Pass/Fail**	Pass
Test Case Description		Examine whether the system able to show error if unable to create an account.			
Test Case Scenario				**Test Data**	
1. User enters the invalid name, email, password and confirm password. 2. User presses the login button.				Name: user Email: admin@gmail.com Password: 12345 Confirm Password: 12345	
Expected Result				**Actual Result**	
The error message is prompted.				The error message is prompted.	

Table 7.14: Unit Test Case Result for Modify Password with Valid Input.

Test Case ID	UTC005	**Test Name**	Test modify user password with valid input	**Pass/Fail**	Pass
Test Case Description		Examine whether the successful update user password when change password email send.			
Test Case Scenario				**Test Data**	

1. User enters the valid email and password. 2. User click "Send Password Reset Link" button. 3. User enter new and confirm password. 4. User presses the "Reset Password" button.	Email: user@gmail.com Password: 123456789 Confirm Password: 123456789
Expected Result	**Actual Result**
The system redirects to login page.	The system redirects to the login page.

Table 7.15: Unit Test Case Result for Modify Password with Invalid Input.

Test Case ID	UTC006	**Test Name**	Test modify user password with invalid input	**Pass/Fail**	Pass
Test Case Description		Examine whether the successful update user password when change password email send.			
Test Case Scenario				**Test Data**	
1. User enters the invalid email and password. 2. User click "Send Password Reset Link "button.				Email: user@gmail.com Password: 123456789 Confirm Password: 123456789	
Expected Result				**Actual Result**	
The error message will be prompt.				The error message will be prompt.	

Table 7.16: Unit Test Case Result for Retreive Activity Log.

Test Case ID	UTC007	**Test Name**	Test retrieve activity log	**Pass/Fail**	Pass
Test Case Description		Examine whether the system show all the activity log when user login and logout.			
Test Case Scenario				**Test Data**	

1. User enters the dashboard page.	-
Expected Result	**Actual Result**
All the user's activity log is displayed.	All the user's activity log is displayed.

Table 7.17: Unit Test Case Result for Create New ISO Documentation.

Test Case ID	UTC008	**Test Name**	Test create new ISO Documentation	**Pass/Fail**	Pass
Test Case Description		Examine whether successful create ISO Documentation after create button is pressed.			
Test Case Scenario				**Test Data**	
1. User enters correct ISO File Name, Assigned To, File Type and Date Modified. 2. User Upload a PDF File or Image. 3. User presses the create button.				ISO File Name: ISO1 Assigned To: Joanne File Type: PDF Date Modified: 09/09/2023	
Expected Result				**Actual Result**	
The successful create message will be prompt to tell the user that the ISO Document has been created. At the same time, an email will be sent to the assigned user to perform the task.				The successful create message will be prompt to tell the user that the ISO Document has been created. At the same time, an email will be sent to the assigned user to perform the task.	

Table 7.18: Unit Test Case Result for Create New Coating Quotation.

Test Case ID	UTC009	**Test Name**	Test create new Coating Quotation.	**Pass/Fail**	Pass
Test Case Description		Examine whether the successful create Coating Quotation will show after create button is pressed.			
Test Case Scenario				**Test Data**	

1. User enters correct Coating Quotation Name, Assigned To, Status, Approve Status, Date Modified, Received Date and Closing. 2. User presses the create button.	Coating Quotation Name: Coating 1 Assigned To: Sherwin Status: New Approve Status: Non-Approved Date Modified: 20/09/2023 Received Date: 01/09/2023 Closing Date: 30/09/2023
Expected Result	**Actual Result**
The successful create message will be prompt to tell the user that the coating quotation has been created. At the same time, an email will be sent to the assigned user to perform the task.	The successful create message will be prompt to tell the user that the coating quotation has been created. At the same time, an email will be sent to the assigned user to perform the task.

Table 7.19: Unit Test Case Result for Create New Production Quotation.

Test Case ID	UTC010	Test Name	Test create new Production Quotation.	Pass/Fail	Pass
Test Case Description		Examine whether the successful create Production Quotation will show after create button is pressed.			
Test Case Scenario				**Test Data**	
1. User enters correct Production Quotation Name, Assigned To, Status, Approve Status, Date Modified, Received Date and Closing. 2. User presses the create button.				Production Quotation Name: Production Quote 1 Assigned To: Sherwin Status: New Approve Status: Non-Approved Date Modified: 20/09/2023 Received Date: 01/09/2023 Closing Date: 30/09/2023	
Expected Result				**Actual Result**	
The successful create message will be prompt to tell the user that the production quotation has been created. At the same time, an email will be sent to				The successful create message will be prompt to	

the assigned user to perform the task.	tell the user that the production quotation has been created. At the same time, an email will be sent to the assigned user to perform the task.

Table 7.20: Unit Test Case Result for Create New Task.

Test Case ID	UTC011	Test Name	Test create new task	Pass/Fail	Pass
Test Case Description		Examine whether successful create task after create button is pressed.			
Test Case Scenario				**Test Data**	
1. User enters correct Task Name, Assigned To, Status, Date Assigned, Targeted Deadline and Remark. 2. User presses the create button.				Task Name: Task 1 Assigned To: Joanne Status: PDF Date Assigned: 09/09/2023 Targeted Deadline: 30/09/2023	
Expected Result				**Actual Result**	
The successful create message will be prompt to tell the user that the task has been created. At the same time, an email will be sent to the assigned user to perform the task.				The successful create message will be prompt to tell the user that the task has been created. At the same time, an email will be sent to the assigned user to perform the task.	

Table 7.21: Unit Test Case Result for Create New Production.

Test Case ID	UTC012	Test Name	Test create new production	Pass/Fail	Pass
Test Case Description		Examine whether successful create Production after create button is pressed.			
Test Case Scenario				**Test Data**	

3. User enters correct Production Name, Assigned To, File Type and Date Modified. 4. User Upload a PDF File. 5. User presses the create button.	Production Name: Production 1 Assigned To: Joanne File Type: PDF Date Modified: 09/09/2023
Expected Result	**Actual Result**
The successful create message will be prompt to tell the user that the production has been created. At the same time, an email will be sent to the assigned user to perform the task.	The successful create message will be prompt to tell the user that the production has been created. At the same time, an email will be sent to the assigned user to perform the task.

Table 7.22: Unit Test Case Result for Edit ISO Documentation.

Test Case ID	UTC013	**Test Name**	Test edit ISO Documentation	**Pass/Fail**	Pass
Test Case Description		Examine whether successful edit ISO Documentation after edit button is pressed.			
Test Case Scenario			**Test Data**		
4. User enters correct ISO File Name, Assigned To, File Type and Date Modified. 5. User Upload a PDF File or Image. 6. User presses the edit button.			ISO File Name: ISO2 Assigned To: Sherwin File Type: PDF Date Modified: 10/09/2023		
Expected Result			**Actual Result**		
The successful edit message will be prompt to tell the user that the ISO Document has been edited.			The successful edit message will be prompt to tell the user that the ISO Document has been edited.		

Table 7.23: Unit Test Case Result for Edit Coating Quotation.

Test Case ID	UTC014	**Test Name**	Test edit Coating Quotation.	**Pass/Fail**	Pass

Test Case Description	Examine whether the successful edit Coating Quotation will show after edit button is pressed.
Test Case Scenario	**Test Data**
3. User enters correct Coating Quotation Name, Assigned To, Status, Approve Status, Date Modified, Received Date and Closing. 4. User presses the edit button.	Coating Quotation Name: Coating 2 Assigned To: Ernest Lau Status: Pending Approve Status: Approved Date Modified: 22/09/2023 Received Date: 03/09/2023 Closing Date: 28/09/2023
Expected Result	**Actual Result**
The successful edit message will be prompt to tell the user that the coating quotation has been edited.	The successful edited message will be prompt to tell the user that the coating quotation has been edited.

Table 7.24: Unit Test Case Result for Edit Production Documentation.

Test Case ID	UTC015	Test Name	Test edit Production Quotation.	Pass/Fail	Pass
Test Case Description		Examine whether the successful edit Production Quotation will show after edit button is pressed.			
Test Case Scenario				**Test Data**	
3. User enters correct Production Quotation Name, Assigned To, Status, Approve Status, Date Modified, Received Date and Closing. 4. User presses the edit button.				Production Quotation Name: Production Quote 2 Assigned To: Joanne Status: Pending Approve Status: Approved Date Modified: 23/09/2023 Received Date: 03/09/2023 Closing Date: 28/09/2023	
Expected Result				**Actual Result**	

The successful edit message will be prompt to tell the user that the production quotation has been edited.	The successful edit message will be prompt to tell the user that the production quotation has been edited.

Table 7.25: Unit Test Case Result for Edit Task.

Test Case ID	UTC016	**Test Name**	Test edit task	**Pass/Fail**	Pass
Test Case Description		Examine whether successful edit task after edit button is pressed.			
Test Case Scenario				**Test Data**	
6. User enters correct Task Name, Assigned To, Status, Date Assigned, Targeted Deadline and Remark. 7. User presses the edit button.				Task Name: Task 2 Assigned To: Sherwin Status: PDF Date Assigned: 03/09/2023 Targeted Deadline: 20/09/2023	
Expected Result				**Actual Result**	
The successful edit message will be prompt to tell the user that the task has been edited.				The successful edit message will be prompt to tell the user that the task has been edited.	

Table 7.26: Unit Test Case Result for Edit Production.

Test Case ID	UTC017	**Test Name**	Test edit production	**Pass/Fail**	Pass
Test Case Description		Examine whether successful edit Production after edit button is pressed.			
Test Case Scenario				**Test Data**	
8. User enters correct Production Name, Assigned To, File Type and Date Modified. 9. User Upload a PDF File. 10. User presses the create button.				Production Name: Production 2 Assigned To: Sherwin File Type: PDF Date Modified: 19/09/2023	

Expected Result	Actual Result
The successful edit message will be prompt to tell the user that the production has been edited.	The successful edit message will be prompt to tell the user that the production has been edited.

Table 7.27: Unit Test Case Result for Delete ISO Documentation.

Test Case ID	UTC018	Test Name	Test delete ISO Documentation	Pass/Fail	Pass
Test Case Description		Examine whether successful delete ISO Documentation after delete button is pressed.			
Test Case Scenario			Test Data		
1. Admin presses the delete button.			-		
Expected Result			Actual Result		
The successful delete message will be prompt to tell the user that the ISO Documentation has been deleted.			The successful delete message will be prompt to tell the user that the ISO Documentation has been deleted.		

Table 7.28: Unit Test Case Result for Delete Coating Quotation.

Test Case ID	UTC019	Test Name	Test delete Coating Quotation	Pass/Fail	Pass
Test Case Description		Examine whether successful delete Coating Quotation after delete button is pressed.			
Test Case Scenario			Test Data		
1. Admin presses the delete button.			-		
Expected Result			Actual Result		

The successful delete message will be prompt to tell the user that the Coating Quotation has been deleted.	The successful delete message will be prompt to tell the user that the Coating Quotation has been deleted.

Table 7.29: Unit Test Case Result for Delete Production Quotation.

Test Case ID	UTC020	Test Name	Test delete Production Quotation	Pass/Fail	Pass
Test Case Description		Examine whether successful delete Production Quotation after delete button is pressed.			
Test Case Scenario			Test Data		
1. Admin presses the delete button.			-		
Expected Result			Actual Result		
The successful delete message will be prompt to tell the user that the Production Quotation has been deleted.			The successful delete message will be prompt to tell the user that the Production Quotation has been deleted.		

Table 7.30: Unit Test Case Result for Delete Task.

Test Case ID	UTC021	Test Name	Test delete task	Pass/Fail	Pass
Test Case Description		Examine whether successful delete task after delete button is pressed.			
Test Case Scenario			Test Data		
1. Admin presses the delete button.			-		
Expected Result			Actual Result		

The successful delete message will be prompt to tell the user that the task has been deleted.	The successful delete message will be prompt to tell the user that the task has been deleted.

Table 7.31: Unit Test Case Result for Delete Production.

Test Case ID	UTC022	Test Name	Test delete production	Pass/Fail	Pass
Test Case Description		Examine whether successful delete production after delete button is pressed.			
Test Case Scenario			Test Data		
1. Admin presses the delete button.			-		
Expected Result			Actual Result		
The successful delete message will be prompt to tell the user that the production has been deleted.			The successful delete message will be prompt to tell the user that the production has been deleted.		

7.4   Integration Test

Integration testing is a software testing phase that focuses on verifying the interactions and data exchange between different software application modules. The primary goal of the integration testing is to make sure that the integrated components work together as intended and that they can pass data back and forth without errors or unexpected behavior. Using integration tests can detect integration-related issues early in the development process while reducing the risk of discovering critical problems during system testing or production. Table 7.33 shows the integration test case for the web application.

Table 7.32: Integration Test Case for Web Application.

Test Case ID	Test Case Name	Test Case Deacription	Status
ITC001	Test login page	Examine whether the user can navigate to login page.	Pass
ITC002	Test forget and change password	Examine whether the user can forget and change password.	Pass
ITC003	Test dashboard with correct credential	Examine whether the user can go to dashboard if user is authenticated.	Pass
ITC004	Test create ISO Documentation	Examine whether the user can create ISO Documentation.	Pass
ITC005	Test create Coating Quotation	Examine whether the user can create Coating Quotation.	Pass
ITC006	Test create Production Quotation	Examine whether the user can create Production Quotation.	Pass
ITC007	Test create task	Examine whether the user can create task.	Pass

ITC008	Test create production	Examine whether the user can create production.	Pass
ITC009	Test activity log	Examine whether the system can track user login and logout activity.	Pass
ITC010	Test edit ISO Documentation	Examine whether the user can edit ISO Documentation.	Pass
ITC011	Test edit Coating Quotation	Examine whether the user can edit Coating Quotation.	Pass
ITC012	Test edit Production Quotation	Examine whether the user can edit Production Quotation.	Pass
ITC013	Test edit task	Examine whether the user can edit task.	Pass
ITC014	Test edit production	Examine whether the user can edit production.	Pass
ITC015	Test delete ISO Documentation	Examine whether the admin can delete	Pass

		ISO Documentation.	
ITC016	Test delete Coating Quotation	Examine whether the admin can delete Coating Quotation.	Pass
ITC017	Test delete Production Quotation	Examine whether the admin can delete Production Quotation.	Pass
ITC018	Test delete task	Examine whether the admin can delete task.	Pass
ITC019	Test delete production	Examine whether the admin can delete production.	Pass
ITC020	Test view ISO Documentation	Examine whether the user can view ISO Documentation.	Pass
ITC021	Test view Coating Quotation	Examine whether the user can view Coating Quotation.	Pass
ITC022	Test view Production Quotation	Examine whether the user can view Production Quotation.	Pass

ITC023	Test view task	Examine whether the user can view task.	Pass
ITC024	Test view production	Examine whether the user can view production.	Pass
ITC025	Test email notification when ISO Documentation aasigned	Examine whether the system will send email notification when ISO Documentation assigned.	Pass
ITC026	Test email notification when Coating Quotation aasigned	Examine whether the system will send email notification when Coating Quotation assigned.	Pass
ITC027	Test email notification when Production Quotation aasigned	Examine whether the system will send email notification when Production Quotation assigned.	Pass
ITC028	Test email notification	Examine whether the	Pass

	when task aasigned	system will send email notification when task assigned.	
ITC029	Test email notification when production aasigned	Examine whether the system will send email notification when production assigned.	Pass
ITC030	Test upload file for ISO Documentation	Examine whether the system able to upload file for ISO Documentation.	Pass
ITC031	Test upload file for production	Examine whether the system able to upload file for production.	Pass
ITC032	Test download file for ISO Documentation	Examine whether the system able to download file for ISO Documentation.	Pass
ITC033	Test download file for production	Examine whether the system able to	Pass

		download file for production.	

7.5   User Acceptance Test

User Acceptance Test (UAT) is the testing process of a software application or system to determine whether it meets the specified requirements and is acceptable for release to end-users or customers. Therefore, this test has been conducted to validate that the software fulfills the needs and objectives it was designed to address. So, the main aim of developing this system is to solve and assist the management team in monitoring the documentation and tasks remotely. Besides, this test only involves one individual management team member to test the acceptance level of the web application. Hence, a UAT test case has been displayed in Table 7.33.

Table 7.33: UAT Test Case.

Test Case ID	Test Case Name	Test Description	Pass /Fail	Tested by user group
UAT001	Login Account	Able to login with the correct credentials.	Pass	Management Team
UAT002	User Registration	Able to register an user account.	Pass	Management Team
UAT003	Forget and Change Password	Able to forget and change password.	Pass	Management Team
UAT004	View all ISO Documentation	Able to view ISO Documentation	Pass	Management Team
UAT005	View all Coating Quotation	Able to view Coating Quotation	Pass	Management Team

UAT006	View all Production Quotation	Able to view Production Quotation	Pass	Management Team
UAT007	View all task	Able to view task	Pass	Management Team
UAT008	View all production	Able to view production	Pass	Management Team
UAT009	Create new ISO Documentation	Able to create new ISO Documentation	Pass	Management Team
UAT010	Create new Coating Quotation	Able to create new Coating Quotation	Pass	Management Team
UAT011	Create new Production Quotation	Able to create new Production Quotation	Pass	Management Team
UAT012	Create new task	Able to create new task	Pass	Management Team
UAT013	Create new Production	Able to create new production	Pass	Management Team
UAT014	Upload file for ISO Documentation	Able to upload file for ISO Documentation.	Pass	Management Team
UAT015	Upload new file for production	Able to upload file for production.	Pass	Management Team
UAT016	Download file for ISO Documentation	Able to download file for ISO Documentation.	Pass	Management Team
UAT017	Download file for production	Able to download file for production.	Pass	Management Team

UAT018	Edit ISO Documentation	Able to edit ISO Documentation.	Pass	Management Team
UAT019	Edit Coating Quotation	Able to edit Coating Quotation.	Pass	Management Team
UAT020	Edit Production Quotation	Able to edit Production Quotation.	Pass	Management Team
UAT021	Edit task	Able to edit task.	Pass	Management Team
UAT022	Edit production	Able to edit production.	Pass	Management Team
UAT023	Delete ISO Documentation	Able to delete ISO Documentation.	Pass	Management Team
UAT024	Delete Coating Quotation	Able to delete Coating Quotation.	Pass	Management Team
UAT025	Delete Production Quotation	Able to delete Production Quotation.	Pass	Management Team
UAT026	Delete task	Able to delete task.	Pass	Management Team
UAT027	Delete production	Able to delete production.	Pass	Management Team
UAT028	Receive Email Notification When ISO Documentation Assigned	Able to receive email notification when ISO Documentation assigned.	Pass	Management Team

UAT029	Receive Email Notification When Coating Quotation Assigned	Able to receive email notification when Coating Quotation assigned.	Pass	Management Team
UAT030	Receive Email Notification When Production Quotation Assigned	Able to receive email notification when Production Quotation assigned.	Pass	Management Team
UAT031	Receive Email Notification When Task Assigned	Able to receive email notification when task assigned.	Pass	Management Team
UAT032	Receive Email Notification When Production Assigned	Able to receive email notification when Production assigned.	Pass	Management Team
UAT033	Review Activity Log	Able to review activity log	Pass	Management Team

7.6   Summary

In summary, this chapter has shown various types of testing activity to identify and detect defects, errors, and issues while ensuring that the software meets the specified requirements. After conducting all the tests, the results of all testing activities were positive, indicating that all the test cases produced the expected or desired outcome. As a result, software testing is essential because it plays a pivotal role in delivering high-quality, reliable, and secure software products.

CHAPTER 8

CONCLUSION AND RECOMMENDATION

8.1 Introduction

This project was started in January 2023 and used approximately eight months of development project based on the Feature Driven Development phases. As you know, Feature Driven Development (FDD) is a robust and systematic software development methodology that places a strong emphasis on creating software features or functionalities. It ensures that the final system meets the specific requirements while reducing the critical defect. Hence, FDD has played a vital role in delivering high-quality software on time and within budget while mitigating risks and ensuring customer satisfaction.

At the beginning of the project, a planning phase has been conducted to plan the schedule and resources of the project while identifying the project goals and requirements with the collaborated company. Next, all the requirements gathered with the cooperated company will be analyzed and documented to understand and create a detailed specification of the software based on the company's needs. Afterward, a blueprint for the software based on the requirements gathered in the analysis phase. In this design phase, the software's architecture, data structures, and user interface have been designed to visualize the user interface while organizing and accessing the data efficiently and effectively. As for the design, development, and testing iterations, the project solutions will be generated based on modules.

After the design and development process iteration, the testing phase has been conducted to ensure each module meets the system's requirements without any errors or bugs. Not only that, various testing processes have been carried out to evaluate the usability of the implemented system and the acceptance rate of the implemented system. Lastly, the project was closed in September 2023, and future system improvement will be handled to improve the quality and performance of the system.

8.2   Objective Examination

Each of the objectives defined in the early stages has been achieved, as shown in the list below:

1. To investigate the current problems that the company is facing and determine the requirements.
2. To develop a Web application for managing quotations and projects, task distribution, and ISO documentation.
3. To evaluate the web application by performing a user acceptance test.

Firstly, the project's first objective was to investigate the current and significant problems faced by the company while analyzing the project requirements. This objective was completed during the planning phase in February 2023. Meanwhile, the functional and non-functional requirements have been produced and finalized after a physical meeting with the company. This meeting is essential to understand and experience the issues that affect the company. Lastly, the project scope and solution have been identified before moving to the next phase.

The second objective is to build a web application for managing the four main modules: ISO documentation, quotation, project, and task distribution. These modules have been produced to automate manual tasks so that the management team can save time and reduce the risk of errors when managing documents and tasks. In the same way, it supports collaboration among team members, allowing multiple stakeholders to work on a quotation simultaneously and share feedback. Therefore, these modules were essential to improve your sales operations' efficiency, accuracy, and professionalism, leading to increased customer satisfaction.

Lastly, the third objective is to evaluate the web application by performing a user acceptance test (UAT). This test was used to ensure the software system meets the company's expectations before it was deployed into production. Based on the test performed, the user acceptance rate is 5 out of 5, indicating that the company has accepted the web application.

8.3   Limitation

Despite the project's three objectives being achieved, there are still plenty of limitations during the project's development. The first limitation was the authentification and authorization level of the system. The reason is that the current authentification and authorization of the system only contain two levels of roles and permissions. Hence, it has limited granularity in assigning permissions and controlling access. Due to this reason, there may be situations where users have more access than they need or unintended access to sensitive data.

Moreover, the second limitation of the system was the delayed sending process of email notification. This is because the email server used in this system is experiencing high traffic or congestion, so that it may slow down the delivery of emails. Similarly, the recipient's email server could be experiencing problems or delays, which may affect the delivery of email notifications to the server. At the same time, the email servers may often process many emails in a queue. Hence, this has caused the system to take some time to send email notifications to the targeted roles.

In addition, the third limitation of the system is the size of the attachment for specific modules. This is because large files can consume significant server resources, including memory and processing power. Additionally, large file uploads can create security risks as malicious users could attempt to upload huge files as a denial-of-service attack, consuming server resources and potentially causing the server to become unresponsive. For these reasons, this system only allows uploading a file with a 2048KB limit to prevent excessive resource consumption, especially in shared hosting environments where resource allocation may be limited.

In the end, the fourth limitation of the system was the limited performance of audit trail features. The current system only tracks the activity log for login and logout. Therefore, the system does not provide a complete picture of user activity or the actions taken within a system. This lack of context may hinder

the company's ability to investigate security incidents, troubleshoot issues, or analyze user behavior.

8.4   Recommendation for Future Work

According to the system's limitations, this system was required to perform continuous improvement to increase the quality and performance of the system while providing a better user experience. Hence, this section proposes a list of recommendations for future work for future developers, as shown in Table 8.1. Meanwhile, this recommendation is not an exhaustive list and is not limited to this list. Many other strategies and measures can be considered to address the system's limitations to improve the system's security, monitoring, and user accountability.

Table 8.1: Recommendation of Future Work.

No.	Recommendation	Description
1	Instantaneous Updates	The current system can be implemented with real-time notifications to send instant messages within 5 seconds. At the same time, the current system may support different email servers such as Outlook, Yahoo Mail, iCloud Mail, and more.
2	Integrate User Authentication	The current system can be implemented with role-based access control (RBAC). Both implementations can restrict access to computer systems and data based on the roles and responsibilities of individual users
3	Database Enhancement	The current system can be enhanced using Database as a Service (DBaaS) to provision and management of database systems in the cloud using the cloud service providers. Using these providers

		offers scalable resources, allowing businesses to easily adjust their computing capacity, storage, and other resources up or down as needed.
4	Audit Trail Advancement	The current system for audit trail features can be improved by tracking user actions and interactions, including access to specific resources or files, changes to user profiles or permissions, and records of data modifications, additions, or deletions. Or else, the audit trail features can be implemented with user session activity by monitoring the user session lifecycle, which includes the session start and end times, session duration, and action performed during a session.
5	File Size and Format Attachment Improvement	The current system can be integrated with a larger file size limit and supports many standard formats. This is because the current system only supports PDFs with limited size. By improving these features, users can upload, view, and download any file without constraint.

REFERENCES

admin, 2021. 8 Best Backend Frameworks For Web App Development in 2023. *admin*. [online] 8 Nov. Available at: <https://www.monocubed.com/blog/best-backend-frameworks/> [Accessed 14 April 2023].

Balaban, D., 2021. What Is Authentication And How Does It Work? *Forbes*. [online] 27 Jul. Available at: <https://www.forbes.com/sites/davidbalaban/2021/07/27/what-is-authentication-and-how-does-it-work/?sh=19b7c781e2bc> [Accessed 18 March 2023].

Bootstrap Studio, 2023. *Bootstrap Studio - The Revolutionary Web Design Tool*. [online] Available at: <https://bootstrapstudio.io/> [Accessed 18 March 2023].

Data Management, 2023. *Database Management System (DBMS)*. [online] Available at: <https://www.techtarget.com/searchdatamanagement/definition/database-management-system> [Accessed 15 April 2023].

Derek, 2022. 7 Benefits of Using MySQL in Your Business - Bootcamp. *Bootcamp*. [online] 9 Jun. Available at: <https://bootcamp.uxdesign.cc/7-benefits-of-using-mysql-in-your-business-e587e326144f> [Accessed 15 April 2023].

Desmond, K., 2023. The 11 Best Backend Frameworks – 2023. *CodingNomads*. [online] 14 Jan. Available at: <https://codingnomads.co/blog/best-backend-frameworks/> [Accessed 14 April 2023].

Dynamic Domain, 2023. *Welcome to Dynamic Domain*. [online] Available at: <http://thedynamicdomain.com/feature-driven-development.aspx> [Accessed 20 April 2023].

Hamilton, T., 2020a. Unit Testing Tutorial – What is, Types & Test Example. *Guru99*. [online] 10 Jan. Available at: <https://www.guru99.com/unit-testing-guide.html> [Accessed 15 April 2023].

Hamilton, T., 2020b. Integration Testing: What is, Types with Example. *Guru99*. [online] 11 Jan. Available at: <https://www.guru99.com/integration-testing.html> [Accessed 15 April 2023].

Hamilton, T., 2020c. What is System Testing? Types with Example. *Guru99*. [online] 12 Jan. Available at: <https://www.guru99.com/system-testing.html> [Accessed 15 April 2023].

Hari, S., 2023. PHP vs Javascript in 2023: Comparison, Features & Applications. [online] 2023. Available at: <https://hackr.io/blog/php-vs-javascript> [Accessed 14 April 2023].

Horiachko, A., 2023. Most Popular Programming Languages & Frameworks List for 2023. *Softermii*. [online] 6 Jan. Available at: <https://www.softermii.com/blog/top-programming-languages-and-frameworks-for-software-development> [Accessed 14 April 2023].

hotjar, 2022. *8 Usability Testing Methods That Work (Types + Examples)*. [online] Available at: <https://www.hotjar.com/usability-testing/methods/> [Accessed 15 April 2023].

ian, 2022. A Solution for Employee Retention: Trial Hiring. *Employnet Workforce Solutions*. [online] 5 Feb. Available at: <https://employnet.com/a-solution-for-employee-retention-trial-hiring/> [Accessed 18 March 2023].

InnoCorr Offshore, 2023. *VISCOTAQ® – InnoCorr Offshore*. [online] Available at: <http://innocorroffshore.com/home/services/viscotaq/> [Accessed 18 March 2023].

Javatpoint, 2023a. *Agile Model (Software Engineering) - javatpoint*. [online] Available at: <https://www.javatpoint.com/software-engineering-agile-model> [Accessed 18 March 2023].

Javatpoint, 2023b. *Learn Sql Server Tutorial - javatpoint*. [online] Available at: <https://www.javatpoint.com/sql-server-tutorial> [Accessed 15 April 2023].

Jeff De Luca, 2023. *FEATURE DRIVEN DEVELOPMENT METHODOLOGY*. [online] Available at: <http://thedynamicdomain.com/feature-driven-development.aspx> [Accessed 15 April 2023].

Joshi, M., 2022. Angular vs React vs Vue: Core Differences | BrowserStack. *BrowserStack*. [online] 23 Dec. Available at: <https://www.browserstack.com/guide/angular-vs-react-vs-vue> [Accessed 14 April 2023].

Kanjilal, J., 2023. Introduction to Feature Driven Development. *Developer.com*. [online] 10 Jan. Available at: <https://www.developer.com/project-management/feature-driven-development/> [Accessed 16 April 2023].

Laura Fitzgibbons, 2023. *What is feature-driven development (FDD)? | Definition from TechTarget*. [online] Available at: <https://www.techtarget.com/searchsoftwarequality/definition/feature-driven-development> [Accessed 16 April 2023].

Lucid Content Team, 2023a. *Why (and How) You Should Use Feature-Driven Development*. [online] Available at: <https://www.lucidchart.com/blog/why-use-feature-driven-development> [Accessed 15 April 2023].

Lucid Content Team, 2023b. *Why (and How) You Should Use Feature-Driven Development | Lucidchart Blog*. [online] Available at: <https://www.lucidchart.com/blog/why-use-feature-driven-development> [Accessed 16 April 2023].

nihar-raval, 2022. React vs Angular: Which One is Best for Your Next Front-end Project? *Radixweb*. [online] 7 Jun. Available at: <https://radixweb.com/blog/react-vs-angular> [Accessed 14 April 2023].

Ostrowska, K., 2022. The Most Popular Databases in 2023. *LearnSQL.com*. [online] 25 Nov. Available at: <https://learnsql.com/blog/most-popular-databases-2023/> [Accessed 15 April 2023].

Peterson, R., 2020a. What is DBMS (Database Management System)? Application, Types & Example. *Guru99*. [online] 6 Jan. Available at: <https://www.guru99.com/what-is-dbms.html> [Accessed 15 April 2023].

Peterson, R., 2020b. What is SQL Server? Introduction, History, Types, Versions. *Guru99*. [online] 6 Jan. Available at: <https://www.guru99.com/sql-server-introduction.html> [Accessed 15 April 2023].

Pr, N., 2022. What Is Feature Driven Development (FDD)? & How It Works? *NimbleWork, Inc*. [online] 23 Dec. Available at: <https://www.nimblework.com/agile/feature-driven-development-fdd/> [Accessed 16 April 2023].

Simplilearn, 2022. JavaScript vs Python: Understand the Key Differences. *Simplilearn*. [online] 25 Mar. Available at: <https://www.simplilearn.com/tutorials/programming-tutorial/javascript-vs-python> [Accessed 14 April 2023].

Stack Overflow, 2022. *Stack Overflow Developer Survey 2022*. [online] Available at: <https://survey.stackoverflow.co/2022/#most-popular-technologies-language-prof> [Accessed 14 April 2023].

Statista, 2022. *Most Popular Backend Frameworks – 2012/2022* -. [online] Available at: <https://statisticsanddata.org/data/most-popular-backend-frameworks-2012-2022/> [Accessed 14 April 2023].

Statista, 2023. *Most used languages among software developers globally 2022 / Statista*. [online] Available at: <https://www.statista.com/statistics/793628/worldwide-developer-survey-most-used-languages/> [Accessed 14 April 2023].

The Strategic Project Manager | Just another WordPress site, 2022. *The Agile Feature-driven Development Methodology*. [online] Available at: <https://bethestrategicpm.com/agile-feature-driven-development-methodology-for-strategic-pms/> [Accessed 16 April 2023].

APPENDICES

Appendix A: Meeting Logs.

Final Year Project

MEETING MINUTES 1

Student Name & ID	: Kong Suet Hua (2005756)
Project Title	: InnoCorr Management System
Date	: 03/03/2023
Time	: 2pm-4pm
Attendees	: Ernest Lau, Michelle Beh Hooi Ching, Kong Suet Hua

Pending Items from Last Meeting with Supervisor
1. Project Objectives and Scopes.
2. Issues faced by the company.
3. Work Flow of Quotation Process/Operation.

Discussion Items
1. Clarification of User requirement.
2. Explore the meaning of MRF Status and GRN Status.
3. Number of technicians involve in this project.
4. Flow Chart of the quotation process.
5. Current work flow of the server in retrieving documents.

Next Action Plan
1. Proposal for Cloud Service Provider.
2. Enhancement of User Requirement to Functional Requirement.
3. Initial design of the ideas.

Prepared by: Endorsed by Supervisor:

Name: Kong Suet Hua   Name:Beh Hooi Ching
Date:01/03/2023   Date Received: 08/03/2023

Appendix B: Interview Consent Form.

Interview Consent Form

UTAR
UNIVERSITI TUNKU ABDUL RAHMAN
Wholly owned by UTAR Education Foundation

Title of Project : InnoCorr Management System

Name of Interviewer(s) : Kong Suet Hua

Name of interviewee : Ernest Lau

Brief Introduction of the Responsibilities of the Interviewee:

I assumed that you have fully understood the details of our project after reading the provided information sheet. Thus, this consent form is necessary for us to ensure that you know the purpose of your involvement and agree to your participation conditions. Please consider this information carefully before deciding whether to participate in this interview.

Purpose of the Interview:

I am conducting this interview as part of my FYP project to gather the user requirement. In this interview, you will be asked several questions about the project's goal, scope and objective as well as the major problem faced by the company.

Time Required:

The interview will take approximately 2 hours.

Confidentiality:

- The interview will be filmed/audio-recorded.
- Access to the interview recording will be limited to me and my supervisor at our university.
- Any summary interview content, or direct quotations from the interview, that are made available through academic publication or other academic outlets will be anonymized so that you cannot be identified. In addition, care will be taken to ensure that additional information in the interview that could identify you is unknown.
- The actual recording will be kept within the period of our project and destroyed when we finalize our project.
- Any variation of the conditions above will only occur with your further explicit approval.

This project has been reviewed and approved by (Supervisor or faculty leader and University name). If you have any further questions or concerns about this study, please contact:

Person in charge	: Kong Suet Hua	Supervisor	: Ms Beh Hooi Ching	1
Phone	: 017-6177208	Phone	: 012-5257672	
Email	: suethua27@1utar.my	Email	: behhc@utar.edu.my	

UTAR
UNIVERSITI TUNKU ABDUL RAHMAN
Wholly owned by UTAR Education Foundation

Quotation Agreement

I also understand that my words may be quoted directly. With regards to being quoted, please write your initials next to any of the statements that you agree with:

✓	I agree to be quoted directly.
	I agree that the team may publish documents that contain quotations by me.
✓	I understand that my responses will be kept strictly confidential.
✓	I understand that my participation is voluntary and that I am free to withdraw without giving any reason and without any negative consequences. In addition, should I not wish to answer any question or questions, I am free to decline.
✓	I agree for this interview to be recorded. I understand that the audio recording made of this interview will be used only for analysis. I understand that no other use will be made of the recording and that no one outside the team will be allowed access to the recording.

By signing this form, I agree that;

1. I am voluntarily taking part in this project. I understand that I don't have to take part, and I can stop the interview at any time;
2. I have read the information stated above;
3. I don't expect to receive any benefit or payment for my participation;
4. I have been able to ask any questions I might have, and I understand that I am free to contact the project team with any questions I may have in the future.

Printed name: Ernest Lau

_____
Participant's Signature
Date:

_____
Interviewers' Signatures
Date: 01/03/2023

This project has been reviewed and approved by (Supervisor or faculty leader and University name). If you have any further questions or concerns about this study, please contact:

Person in charge	: Kong Suet Hua	Supervisor	: Ms Beh Hooi Ching
Phone	: 017-6177208	Phone	: 012-5257672
Email	: suethua27@1utar.my	Email	: benhc@utar.edu.my

2

Appendix C: Interview Information Sheet with English Version.

UTAR
UNIVERSITI TUNKU ABDUL RAHMAN
Wholly owned by UTAR Education Foundation
(Co. No. 578227-M)
DU012(A)

INFORMATION SHEET OF FYP PROJECT

Project Title   : InnoCorr Management System
Date of Interview   : 03/03/2023
Time   : 2pm-4pm
Platform   : Site Meeting

A.   What you should know about this study:
- This FYP project is part of a project for my subject of UECS3599 Project I in fulfillment of the Software Engineering programme from Universiti Tunku Abdul Rahman.
- The primary purpose of this project is to gather user requirement. Thus, questions asked in the interview are to understand the goals, fears, and challenges faced by the company.
- Please ask questions at any time about anything you do not understand.
- You are a volunteer. If you join the interview, you can change your mind later.
- During the interview, only relevant questions will be asked. If you find any of the questions asked inconvenient to answer, you may choose not to.
- An interview consent form will be provided prior to the actual interview.

B.   What happens to the information collected in the study?
Information provided will be used only in the context of this project. Data will not be shared and will be disposed of once the study has been finalized. None of the information is intended for other uses as this is merely a university project.

C.   Interview questions that will be asked

General Question
1. What is the goal associated with the end product?
2. What problem will be solved by the software?
3. What is the scope of this project?
4. What features are most important to the target audience?
6. Who are the key stakeholders?
7. What kind of access will we have to them?
8. What are the main constraints or limitations that must be taken into account during development?
9. How will the user interfaces for this product need to be designed?
10. What sort of performance requirements does your system have in terms of speed, security, scalability, etc.?
11. Will we use specific project management and collaboration tools to ensure the process runs smoothly?
12. Do you have a technical consultant or advisor to call on if needed?
13. How much do software developers interact with other departments?
14. What technology are you currently using?

15. What is the newest technology/tool/framework that your team has implemented?
16. How do you estimate project timelines?
17. Do you have a logo you plan to use or will one need to be created?
18. What key information should be available on the web pages?
19. What data do I need to store?
20. Does the system required to generate any report or charts?

Questionnaire Based on Modules

Module 1: Web File Management
1. What type of files and formats do you need? (PDF, Word)
2. How many technicians involve in this project?
3. What is the work flow for ISO Documentation section?

Module 2: Quotation Management
1. What is the work flow of quotation process in a company?

Module 3: Product/Service Management
1. How many companies involve for quotation running number?
2. What is the companies involved in this quotation running number sections?

Module 4: Task Management
1. Is the technician's person in coating project section is the same as the technician job distribution?
2. Is the handler for quotation management is the same person as PIC?
3. Who will distribute the task? (Office-To-Do-List section)

Module 5: Inventory Management
1. What is MRF and GRN status?
2. What is the process to send out for Coating and Polyshrink?
3. Do you require the system to create records for MRF and GRN status?
4. What is the work flow of MRF and GRN status?
5. Client-side request quotation or Mr. Lau request quotation to buy other product from other company? (Requisition of purchase from Hardware/Raw Material Section)

Module 6: Mail Management
1. What types of emails do you wish to update the user on updating latest quotation every month?
2. This email is sent to the client as a reminder before the certification expire?

Module 7: User Authorization
1. What are the authentication methods apart from the standard password login? (Additional confirmation password features, reCAPTCHA)

Additional Features: Hosting Environment
1. What are the specifications and requirements when hosting the VPN to the server?
2. What is your budget when subscribe any cloud service?
3. What are the major features that you hope to include in the cloud service? (Security, performance, speed)

Appendix D: Interview Information Sheet with Chinese Version.

马来西亚拉曼大学（优大）
软件工程系 项目科目
采访资料

主题 ：了解公司目前的工作流程以及确定用户需求。

采访人 ：江雪华

采访时间：下午两点到四点

采访地点：实体会议

参加面试者须知：

- 本学习研究报告是我们 "UECS3599 第一项目" 主题项目的一部分，旨在完成东姑阿都拉曼大学的软件工程项目。
- 本研究的主要目的是了解公司目前的工作流程以及确定用户需求。 因此，面试中提出的问题主要涵盖企业的决策过程、公司结构、管理风格、技能短缺、以了解贵公司的挑战。
- 请随时提出任何您不明白的问题。
- 你是志愿参与面谈。你可以随时改变主意。
- 在面谈中只会被采访相关的问题。如果您发现我们提出任何不相关问题，您可以选择不回答。
- 我们会在实际面谈之前提供面谈同意书。

关于收集到的研究数据：

所提供的数据和统计数据仅用于本项目的研究报告中。研究完成后，您所提供的资料将不会被共享，并将被立即处理。本项目所有的信息均不被用于其他用途，这只是一个学术研究项目。

将被提及的问题：

1. 贵公司与开发项目相关的目标是什么？
2. 您希望该应用程序可以解决什么问题？
3. 您能描述谁是主要利益相关者？
4. 您认为哪些功能对主要利益相关者最重要？
5. 您能描述有什么样的访问权限与每一位相关者？ （基于系统级别）
6. 您认为在开发过程中必须考虑的主要约束或限制是什么？
7. 您对该产品的用户界面需要如何设计？

1

8. 您是否建议提出的应用程序系统来管理技术人员的工作分配?

9. 如果需要，我们可以联络哪一位技术顾问或顾问?

10. 软件开发人员与主要利益相关者的互动需要多少?

11. 您目前有使用什么技术? （硬件、软件、服务器）

12. 您的团队实施的最新技术/工具是什么?

13. 您是否有计划使用的徽标或是否需要创建徽标?

14. 您希望该网页上应该提供哪些关键信息?

15. 我需要存储什么数据?

16. 系统是否需要展现任何报告或图表?

17. 公司是否包含单独的文件服务器? （示例：邮件服务器）

18. 您能否详细说明该项目的范围?

Appendix E: Interview Transcript.

UTAR
UNIVERSITI TUNKU ABDUL RAHMAN
Wholly owned by UTAR Education Foundation
(Co. No. 578227-M)
DU012(A)

INFORMATION SHEET OF FYP PROJECT

Project Title   : InnoCorr Management System
Date of Interview : 03/03/2023
Time   : 2pm-4pm
Platform   : Site Meeting

_____

A.   What you should know about this study:
- This FYP project is part of a project for my subject of UECS3599 Project I in fulfillment of the Software Engineering programme from Universiti Tunku Abdul Rahman.
- The primary purpose of this project is to gather user requirement. Thus, questions asked in the interview are to understand the goals, fears, and challenges faced by the company.
- Please ask questions at any time about anything you do not understand.
- You are a volunteer. If you join the interview, you can change your mind later.
- During the interview, only relevant questions will be asked. If you find any of the questions asked inconvenient to answer, you may choose not to.
- An interview consent form will be provided prior to the actual interview.

B.   What happens to the information collected in the study?
Information provided will be used only in the context of this project. Data will not be shared and will be disposed of once the study has been finalized. None of the information is intended for other uses as this is merely a university project.

C.   Interview questions that will be asked

General Question

1. What is the goal associated with the development project?

-Ultimate goal of this project is to keep all the records with the server's connection.

2. What problem will be solved by the proposed web application?

-Due to human error, some staff may forget to update the record in the system or access the server without user authorization, so it is difficult to keep track of all the logs from head to tail. Another problem the company faces is the staff unable to perform the CRUD function on the server at the site area. Meanwhile, some staff may also resign without saving a soft copy on the pc, so the required document could not be found after an extended period.

3. Who are the key stakeholders?

-Key stakeholders of this project are General Manager, Financial Staff, and technicians. The total number of vital

stakeholders involved in this project is five people.

4. What features are most important to the key stakeholders?

-Technicians contain the features to create the folder and upload the required photo in the formatted document within a particular folder. With the template and do report. If going offshore, the engineer may be unable to access the folder since the area was offline. Contain a fixed folder. Besides, General Manager can perform all the tasks with the CRUD function and distribute the task to the required staff. Lastly, Financial Staff can access the server with the VPN connection to perform SQL Accounting Software while containing access to perform CRUD function for all the quotation, PO, and T&C documents as well as open the subfolder.

5. What kind of access privilege will we have to them? (Based on system's level)

-Technicians only have the privilege to create the folder and upload a photo into the formatted form, while General Manager will act as the superuser with the privilege to control the whole system. However, only Financial Staff are privileged to perform SQL Accounting Software based on the VPN connection while creating different documents that are required in the project.

6. What are the main constraints or restriction that must be taken into account during development?

-The main constraint that must be taken into account during the development is the scope and time of the project so that the project meets the deliverables while ensuring the project's quality is achieved.

7. How will the user interfaces for this product need to be designed?

-All the design of the user interfaces will be given the option to the developer.

8. Would you prefer the proposed web application system to manage the job assignment for the technicians? (Example: Asana)

-Yes. The system can create a task with a title, set a deadline, and assign tasks to specific staff for a particular project with ID. At the same time, the system can also notify the user if the deadline for a particular project has been reached. The reason is that some staff may forget to do the task without a deadline and causes customer complaint. With this system, staff can reply to the customer whenever the customer requires clarification. Lastly, the system can also record the task's status, either pending or complete.

9. Do you have a technical consultant or advisor to call on if needed?

-Mr. Lau and Mr. Sherwin will be the technical consultant whenever you encounter any problem.

10. How much do software developers interact with key stakeholders?

-Yes. You may interact with the vital stakeholder anytime via the WhatsApp platform.

11. What technology are you currently using? (Hardware, Software, Server)

-Current technology used are Assana and digital cloud storage. Assana was used to distribute tasks, while digital cloud storage was used as a shared folder. One drive, google drive, and ICloud with the subscription.

12. What is the newest technology/tool that your team has implemented?

-The newest tool that my team has implemented is Assana.

13. Do you have a logo you plan to use or will one need to be created?

-Can use the company logo for the system logo.

14. What key information should be available on the web pages?

-Can put a description that relates to the user manual or simple guide so that new users can acknowledge the company's process flow.

15. What data do I need to store?

-Quotation documents, inquiries, or drawings must be stored in the system.

16. Does the system required to generate any report or charts?

-No need to generate any reports or charts in the system.

17. Does the company contain separate file server? (Example: Mail Server)

-No other server was used. Only one local server was used for documentation purposes.

18. Can you elaborate in details about the project's scope? (Warehouse, Coating Project)

-I may elaborate on the detail based on the server plan.

Questionnaire Based on Modules
Module 1: Web File Management

1. What type of files and formats do you need? (PDF, Word)

    -Excel, Word, and PDF files will be used in this project, and both can be either Word or PDF files. Meanwhile, I also hope that the task can also be created.

2. How many technicians involve in this project?

    -Only 2 technicians will be involve in this project.

3. What is the work flow for ISO Documentation section?

    -Workflow for ISO Documentation is to create one general document and one control document that can perform editing functions with special authorization.

Module 2: Quotation Management

1. What is the work flow of quotation process in a company?

    -Work Flow of the quotation process in a company is the client will send an RFQ based on the email, and the key stakeholder will create a quotation based on the request. Then, the critical stakeholder will send back the RFQs to the client so that the client can understand the quantity and price of the required product.

Module 3: Product/Service Management

1. How many companies involve for quotation running number?

   - 4 to 5 companies will be involved in this project. All these companies are under Mr.Lau.

2. What is the companies involved in this quotation running number sections?

   - As mentioned, these companies related to the offshore project are involved in this quotation running number sections.

Module 4: Task Management

1. Is the technician's person in coating project section is the same as the technician job distribution?

   -The technician person in the coating project section is different from the technician job distribution.

2. Is the handler for quotation management is the same person as PIC?

   -Not the same person as PIC. This quotation management may be assigned to any of the five key stakeholders. For example, a coating project will be assigned to PIC or Engineer.

3. Who will distribute the task? (Office-To-Do-List section)

   -Normally, PIC will distribute the task. However, I hope any of the five key stakeholders who received the job can spread the task.

Module 5: Inventory Management

1. What is MRF and GRN status?

   -MRF status means Material Request Form while GRN status means Goods Receive Note.

2. What is the process to send out for Coating and Polyshrink?

   -These parts can be considered a complicated process and hard to describe. However, I hope the system can track these processes' status, date, and time with the provided form.

3. Do you require the system to create records for MRF and GRN status?

   -Need to create records for MRF and GRN status using running numbers.

4. What is the work flow of MRF and GRN status?

   -Workflow of MRF status is the order will be processed based on the stock list in the warehouse. Meanwhile, the Workflow of GRN status will act as a checklist that helps the worker to acknowledge the product and calculate the quantity of the product.

5. Client-side request quotation or Mr. Lau request quotation to buy other product from other company? (Requisition of purchase from Hardware/Raw Material Section)

-Production need to create a form for purchase request. PIC and three other key stakeholders will control this part of the process. For instance, after the production makes the form, this form will be sent to the finance to issue PO.

Module 6: Mail Management

1. What types of emails do you wish to update the user on updating latest quotation every month?

   -We will use our company domain, such as innocorr offshore.com. However, Gmail will be used to update the user on updating the latest quotation every month.

2. This email is sent to the client as a reminder before the certification expire?

   -No, these features will alert the critical stakeholder to do the task on time.

Module 7: User Authorization

1. What are the authentication methods apart from the standard password login? (Additional confirmation password features, reCAPTCHA)

   -I would recommend using standard password login, but if the system contains an OTP function will be better.

Additional Features: Hosting Environment

1. What are the specifications and requirements when hosting the VPN to the server?

   -I recommend using standard password login, but it will be better if the system contains an OTP function.

2. What is your budget when subscribe any cloud service?

   -I have no interest in any cloud service since I thnk this service is not secure when my department or I face any data problem.

3. What are the major features that you hope to include in the cloud service? (Security, performance, speed)

   -So far, I have no idea about any features to include in the cloud service since I'm going to use the local server.

Appendix F: User Acceptance Testing for Inno Corr Management System.

Are users able to change password if they forget their password?
1 response

- Yes
- No

100%

Are user able to logout the account?
1 response

- Yes
- No

100%

ISO Documentation Module

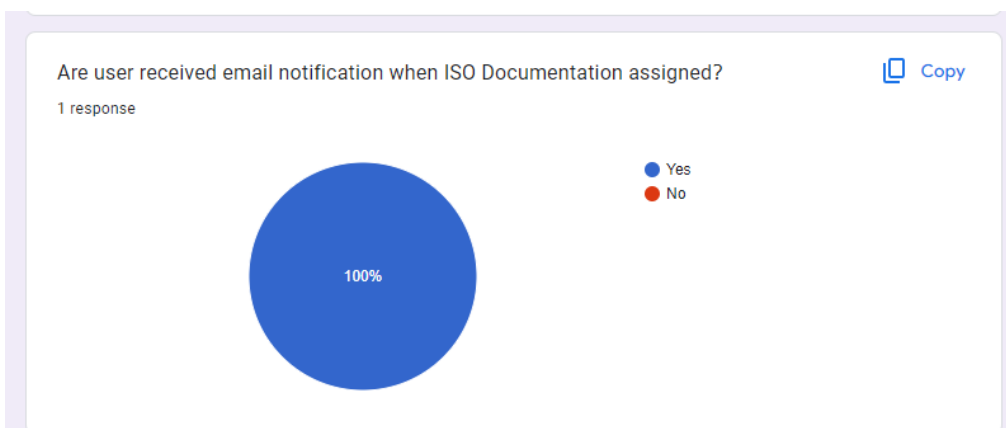## Are user able to create an ISO Documentation?
1 response

- Yes
- No

100%

Are user able to edit and update an ISO Documentation?
1 response

- Yes
- No

100%

Are user able to view an ISO Documentation?

1 response

- Yes
- No

100%

Are user able to download an ISO Documentation?

1 response

- Yes
- No

100%

Are user able to delete an ISO Documentation?

1 response
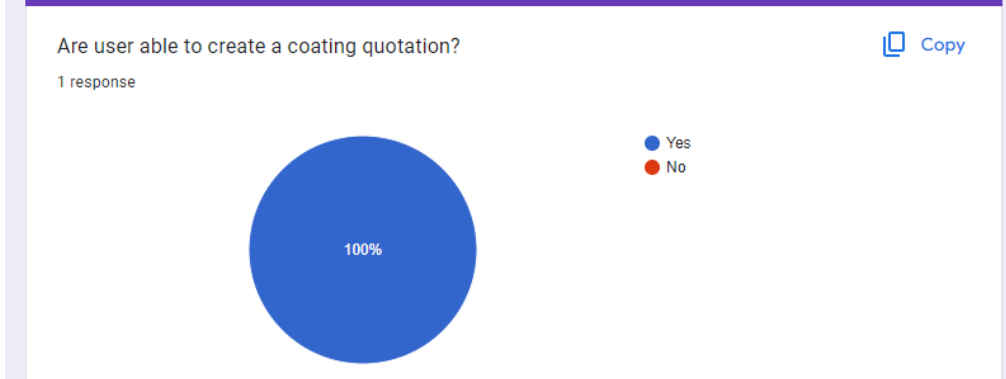

- Yes
- No

100%

Are user able to search an ISO Documentation?

1 response

- Yes
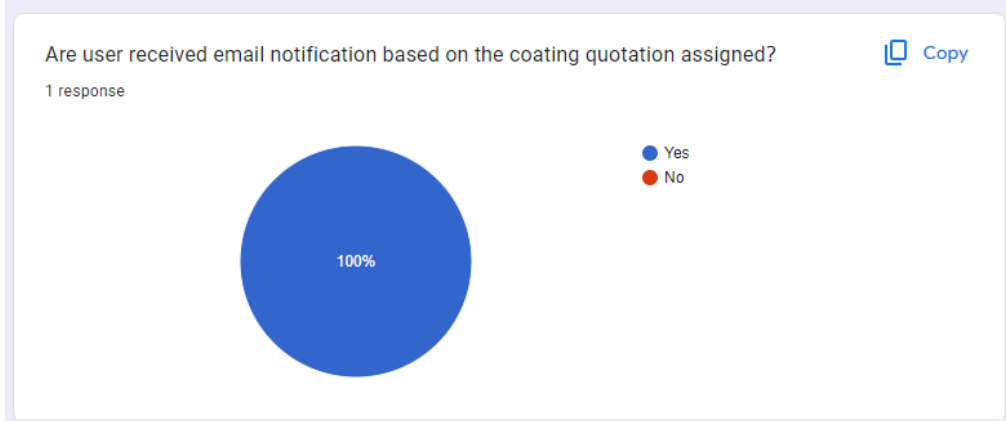- No

100%

Are user received email notification when ISO Documentation assigned?

1 response

Copy

- Yes
- No

100%

Coating Quotation Module

Are user able to create a coating quotation?

1 response

Copy

- Yes
- No

100%

Are user able to edit and update an coating quotation?

1 response

Copy

- Yes
- No

100%

Are user able to view a coating quotation?

1 response

Copy

- Yes
- No

100%

Are user able to download a coating quotation?

1 response

Copy

100%

- Yes
- No

Are user unable to delete a coating quotation?

1 response

Copy

100%

- Yes
- No

Are user able to search a coating quotation?

1 response

Copy

100%

- Yes
- No

Are user received email notification based on the coating quotation assigned?

1 response

Copy

100%

- Yes
- No

Production Quotation Module

Are user able to create a production quotation?
1 response

Copy

100%

● Yes
● No

Are user able to edit and update a production quotation?
1 response

Copy

100%

● Yes
● No

Are user able to view a production quotation?
1 response

Copy

100%

● Yes
● No

Are user able to download a production quotation?
1 response

Copy

100%

● Yes
● No

Are user unable to delete a production quotation?
1 response

- Yes
- No

100%

Are user able to search a production quotation?
1 response

- Yes
- No

100%

Are user received email notification based on the production quotation assigned?
1 response

- Yes
- No

100%

Production Module

Are user able to create a production?
1 response

- Yes
- No

100%

Are user able to edit and update a production?

1 response

100%

- Yes
- No

Are user able to view a production?

1 response

100%

- Yes
- No

Are user able to download a production?

1 response

100%

- Yes
- No

Are user unable to delete a production?

1 response

100%

- Yes
- No

Are user able to search a production?

1 response

Yes ●
No ●

100%

Copy

Are user received email notification based on the production assigned?

1 response

Yes ●
No ●

100%

Copy

Task Module

Are user able to create a new task?

1 response

Yes ●
No ●

100%

Copy

Are user able to edit and update a task?

1 response

Yes ●
No ●

100%

Copy

Are user able to view a task?

1 response

- ● Yes
- ● No

100%

Are user enable to delete a task?

1 response

- ● Yes
- ● No

100%

Are user able to search a task?

1 response

- ● Yes
- ● No

100%

Are user received email notification based on the task assigned?

1 response

- ● Yes
- ● No

100%

Copy

User Experience

This application will help you easier to manage user information.

Copy

1 response

This application will help you easier to manage admin information.

Copy
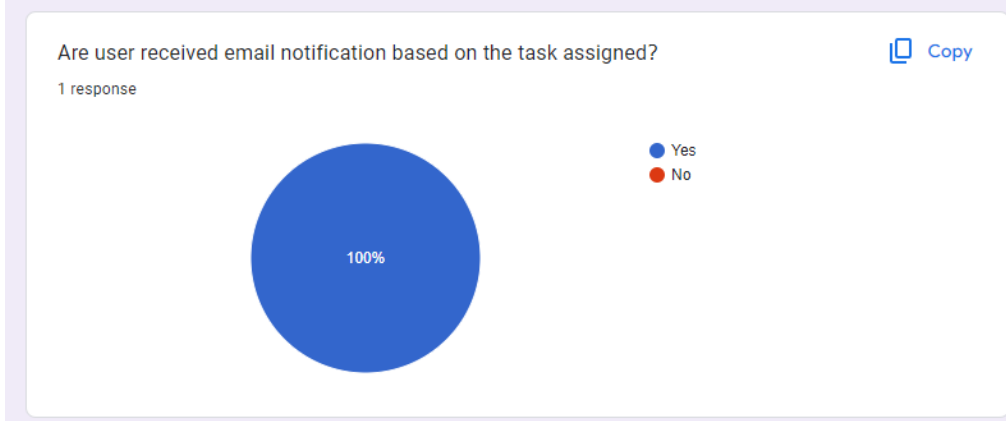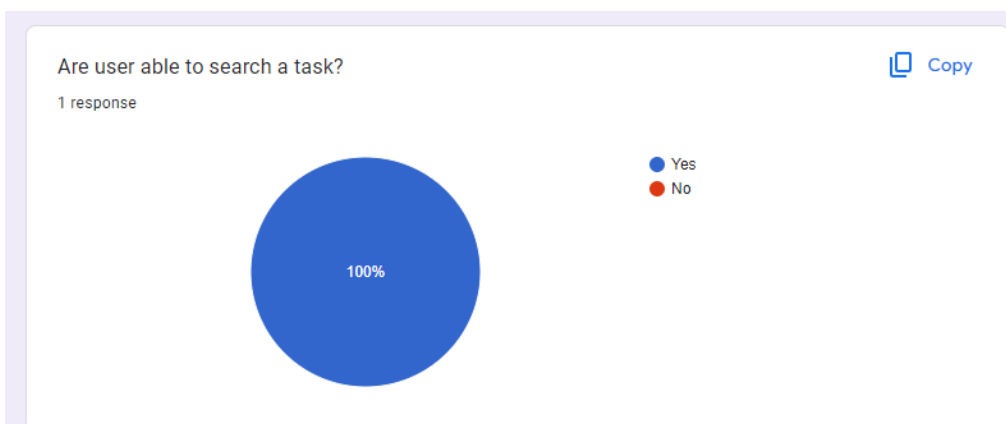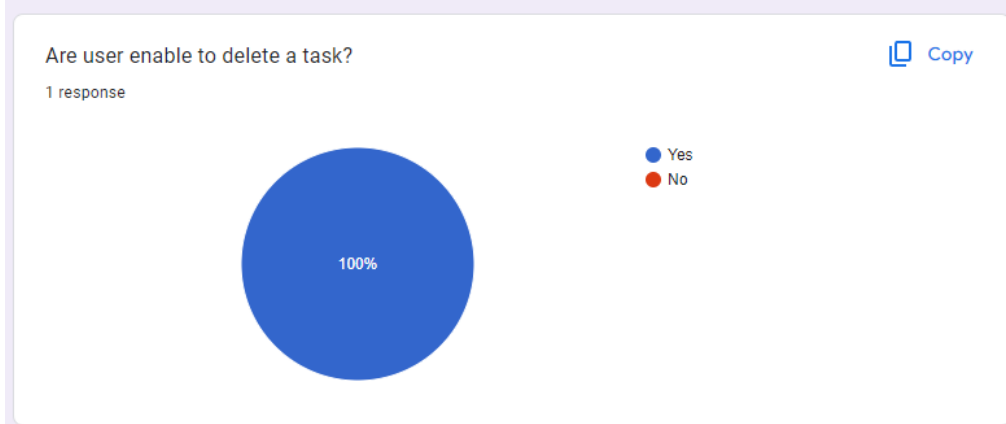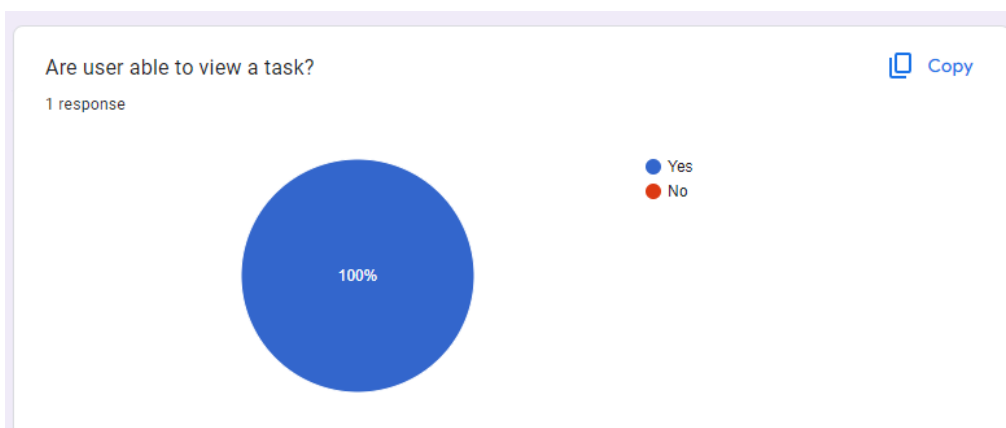
1 response

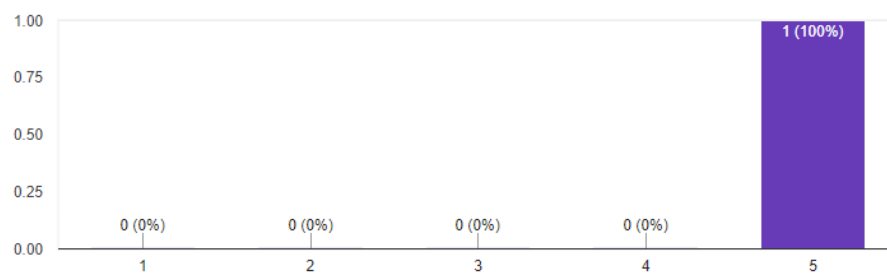This application will help you to simplify administrative work.

Copy
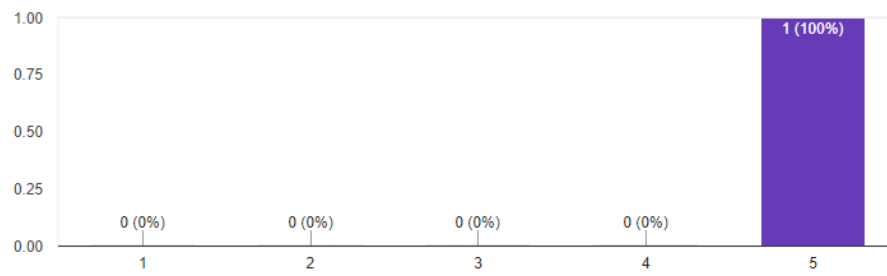
1 response

Rate the overal web application design.

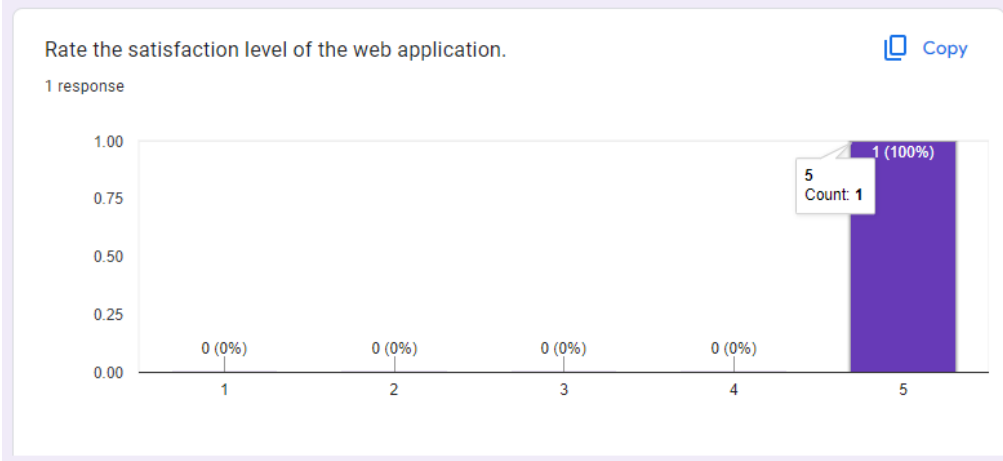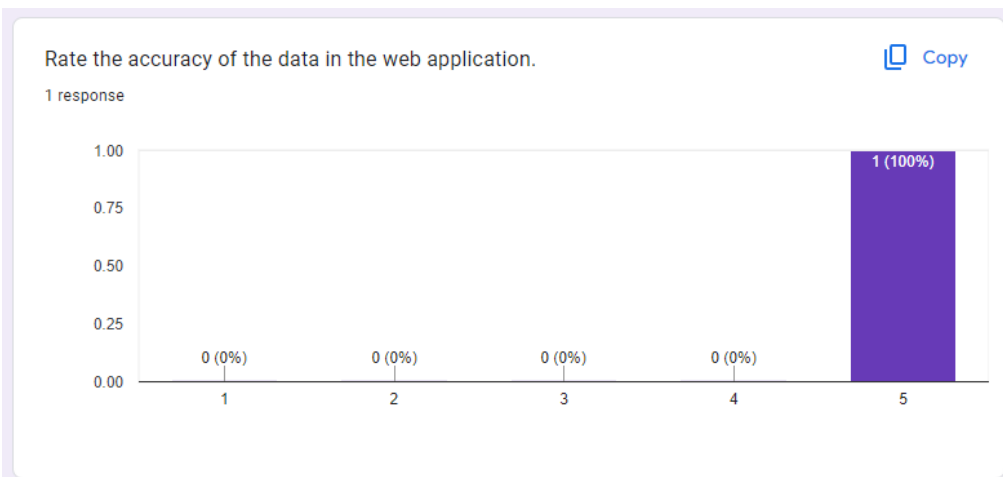Copy

1 response

Rate the accuracy of the data in the web application.

1 response

Copy

Rate the satisfaction level of the web application.

1 response

Copy

As a user or admin of the web application, would you sign off the user acceptance test? **(Sign Off - you agree that this system has been tested the solution and accept that it is bug-free and ready for deployment.)**

1 response

Copy

- Yes
- No

100%
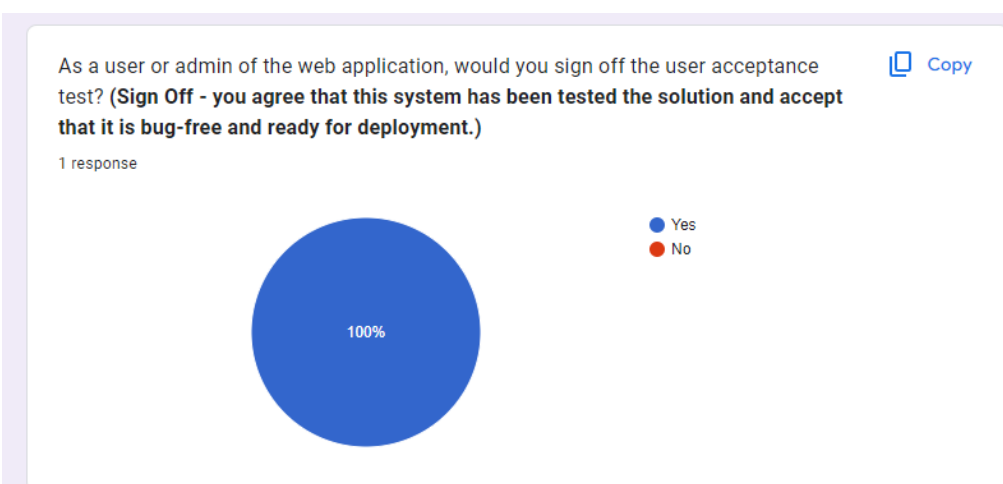
Overall feedback/suggestion about Inno Corr Management System/

1 response

Good effort, keep it up

Appendix G: Log Book for FYP2.

Home / Log Book

Final Year Project Log Book 2

Category	Project 2 Students
Course	Bachelor of Science (Honours) Software Engineering
Name	KONG SUET HUA
Student ID	2005756
FYP Title	InnoCorr Management System
Supervisor	Beh Hooi Ching

Gantt Chart

No.	Project Activities	Planned Completion Date	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17
1.	Project Planning and Organizing	2023-07-02	■	■															
2.	Develop Overall Model	2023-07-09		■	■														
3.	Construct Features List	2023-07-16			■	■													
4.	Plan By Features	2023-07-23				■	■												
5.	Design By Features	2023-07-30				■	■	■											
6.	Build By Features	2023-09-03						■	■	■	■								
7.	Revise Final Project Report	2023-09-15									■	■	■	■	■				

Log Book

Week	Activities to achieve milestones	Submission Date/Status	Ackowledge By	Comments
Week 2	Task Assignment: - Conducted an online meeting with the supervisor to understand the feedback provided by the moderator while improving the content of the FYP report via Microsoft Teams. - Joined an online meeting with the external company and supervisor to refine the project scope and UI design before proceeding to the project's next step. - Created an advanced Gantt Chart and Log Book to plan and show the activities that will perform during the semester. - Produced a demonstration video according to the initial prototype. - Generated a draft poster before the FYP poster submission. Discovered Outcome: - Acknowledged and created a mind map to show the overall scopes based on the latest requirements provided by the external company. - Explored and improved the initial prototype based on the requirements. - Discovered and refined the functional requirements code to make the project requirement more precise and orderly.	2023-06-19 10:32:52	Reviewed by supervisor	The project scope has been reviewed after meeting the external company reps.
Week 2	Task Assignment: - Conducted an online meeting with the supervisor to understand the feedback provided by the moderator while improving the content of the FYP report via Microsoft Teams. - Joined an online meeting with the external company and supervisor to refine the project scope and UI design before proceeding to the project's next step. - Created an advanced Gantt Chart and Log Book to plan and show the activities that will perform during the semester. - Produced a demonstration video according to the initial prototype. - Generated a draft poster before the FYP poster submission. Discovered Outcome: - Acknowledged and created a mind map to show the overall scopes based on the latest requirements provided by the external company. - Explored and improved the initial prototype based on the requirements. - Discovered and refined the functional requirements code to make the project requirement more precise and orderly.	2023-06-19 10:32:59	Reviewed by supervisor	The project scope has been reviewed after meeting the external company reps. Great to have a mind map showing a glance at the refined project scope based on the feedback. Thanks.
Week 4	Task Assignment: - Conducted a second physical meeting with a supervisor to understand the current project's progress. - Completed front-end code for login, sign up and forget password pages. - Researched the SQL command to create a simple table that will be used in PostgreSQL. - Created a complete Gantt chart based on the project plan. Discovered Outcome: - Discovered some methods to create an attractive user interface design using Bootstrap. - Learned to create a table with dumpy data using PostgreSQL. - Acknowledged the authentication and authorization for different users based on the latest requirement of the external company.	2023-07-10 17:33:57	Reviewed by supervisor	Noted. Expected to see the initial prototype (front-end) in W6.

Week	Activities to achieve milestones	Submission Date/Status	Ackowledge By	Comments
Week 6	**Task Assignment:** - Improved and completed the whole UI design by using Bootstrap, - Contacted external companies to clarify all the ideas and information related to the project. - Researched the search and filter function of the data table. - Created several slides to show the mission, vision, and safety as well as rules and regulations of the company based on the requirement given by the external company. **Discovered Outcome:** - Discovered various methods to import the bootstrap design in the Visual Code Studio. - Acknowledged some ways to show the task status for each user. - Explored different quotation software to enhance current project functions.	2023-07-28 22:35:23	Satisfactory from Supervisor	Progressing well. Clarified unclear requirements/specifications with the company PIC and able to move on.
Week 8	**Task Assignment:** - Conducted a third physical meeting with a supervisor to check and enhance the current design of the INNOCORR management system. - Researched the CRUD function for several management systems. - Continuous improvement of UI Design based on the suggestion given by the supervisor. - Connected PostgreSQL with Laravel according to the method learned from the Advanced Web Application course. - Created CRUD function for INNOCORR management system. **Discovered Outcome:** - Discovered several methods for creating a model, controller, and view of the system. - Learned to create filter functions based on internet resources. - Explored various task management systems to understand the necessary function. - Acknowledged some methods to upgrade the authentication and authorization of the system.	2023-08-11 20:05:15	Reviewed by supervisor	Progressing. Need to manage time for the completion of the working application and report.
Week 10	**Task Assignment:** - Continuous Improvement for the CRUD function based on the requirement. - Created and tested several dummy data using the CRUD function on the web application. - Browsed numerous websites to view the document using different formats. - Researched the email notification function and status function. - Improved the arrangement of the table's title according to the suggestion given by the supervisor. **Discovered Outcome:** - Discovered various methods to send email notifications using an SMTP server. - Learned to view the document using PDF format. - Acknowledged plenty of methods to show the task status quickly and easily. - Explored some approaches to show the data for ISO, Quotation, and Tasks in a table format. - Gained an understanding of how to improve the essential function of quotation software according to the latest trends.	2023-08-26 21:56:20	Satisfactory from Supervisor	Progressing well.

Week	Activities to achieve milestones	Submission Date/Status	Ackowledge By	Comments
Week 12	Task Assignment: - Completed CRUD function for the required modules. - Completed activity log function according to each module. - Completed task schedule function according to different levels of roles. - Created test cases to perform unit acceptance testing. - Submitted poster based on the deadline given by the university. - Completed FYP Final Report draft to review by the supervisor. Discovered Outcome: - Discovered several ways to display activity logs for different modules. - Acknowledged the difference between audit log and audit trail. - Learned various methods to upload and download PDF files using Laravel. - Explored some approaches to sending email reminders by using Gmail. - Gained some understanding of the privilege level for different levels of users. - Browsed different management systems to implement current project functions.	2023-09-08 23:30:04	Satisfactory from Supervisor	Built the web application and conducted UAT with one of the company staff. Working on the final report.

Appendix H: FYP1 Feedback.

1	**Project title:**	InnoCorr Management System	
2	**Student Name**	KONG SUET HUA	
3	**Supervisor**	Beh Hooi Ching	
4	**Moderator**	Norazah binti Yusof	
5			
6	**Key Assessment for Project Proposal**	**Supervisor Comments/Remarks**	**Moderator Comments/Remarks**
7	**Project Description** - Is the problem or need to be addressed clearly presented? - Is the proposed approach or solution clearly presented and justified?	Proper description with the right proposed solution.	Yes. But no need to solve all problems requested by the company.
8	**Project Scope and Objectives** - Is the scope of the project clearly defined? - Are the objectives of the project clearly specified? - Are the project scope and objectives appropriate for a final year project?	Yes, may need to reconsider the entire project scope with the company.	The objectives to develop a web application that helps the company managing quotations and projects, task distribution, and ISO documentation seem to be too big. This project needs to select the most important application and make sure it is able to complete within the specified timeframe.
9	**Literature Review / Fact Finding for Benchmarking / Verification of Project** - Are sources for literature review / fact finding appropriate? - Is information from literature review / fact finding relevant and adequate? - Is information from literature review / fact finding clearly presented and discussed?	NIL	Lack of literature review on task distribution and ISO documentation
10	**Research/Development Methodology and Development Tools** - Is the methodology for the project clearly described and discussed? - Are the required development tools clearly described and discussed? - Are the stated methodology and development tools appropriate?	Review if FDD is the most appropriate methodology and how would it be applied in the project.	Using feature driven development methodology
11	**Project Plan** - Are the phases and tasks of the project properly defined and planned? - Are the phases and tasks consistent with the methodology of the project?	Good	Yes
12	**Initial Deliverables** - Are deliverables (e.g. use case diagrams and descriptions) of initial phases of the project plan included in the report?	Good	Yes.
13	**Report Structure and References** - Is the report organised in a logical structure? - Are references listed in accordance to Harvard format?	A well-structured report with a smooth flow.	
14	**Language and Clarity of Writing** - Are the sentences concise and understandable? - Are there spelling and grammar issues?	Excellent.	

Appendix I: Turnitin Report.

Updated_FYP2_Corrected Report_Kong Suet Hua_2005756

8%	4%	1%	7%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Laureate Education Inc. Student Paper	1%
2	Submitted to Asia Pacific University College of Technology and Innovation (UCTI) Student Paper	1%
3	Submitted to Universiti Teknologi Malaysia Student Paper	1%
4	Submitted to The University of Texas at Arlington Student Paper	<1%
5	eprints.utm.my Internet Source	<1%
6	www.coursehero.com Internet Source	<1%
7	Submitted to University of Wollongong Student Paper	<1%
8	www.slideshare.net Internet Source	<1%

18 Submitted to Technological Institute of the Philippines
Student Paper
<1%

19 Submitted to East Texas Baptist University
Student Paper
<1%

20 Submitted to University of Greenwich
Student Paper
<1%

21 de.slideshare.net
Internet Source
<1%

22 Submitted to The Robert Gordon University
Student Paper
<1%

23 Submitted to University of Bolton
Student Paper
<1%

24 docs.intersystems.com
Internet Source
<1%

25 issokidsjeans.com
Internet Source
<1%

26 Ton Duc Thang University
Publication
<1%

27 digest.myhq.in
Internet Source
<1%

28 Submitted to University of Westminster
Student Paper
<1%

29 whatis.techtarget.com

51 Aamir Mehmood Mirza, Muhammad Naeem Ahmed Khan, Raja Asif Wagan, Muhammad Bux Laghari et al. "ContextDrive: Towards a Functional Scenario-Based Testing Framework for Context-Aware Applications", IEEE Access, 2021
Publication
<1%

52 Submitted to Liverpool John Moores University
Student Paper
<1%

53 Submitted to City University
Student Paper
<1%

54 Submitted to Kennesaw State University
Student Paper
<1%

55 Submitted to Multimedia University
Student Paper
<1%

56 Submitted to Wawasan Open University
Student Paper
<1%

57 www.pcfileinfo.com
Internet Source
<1%

58 Submitted to American InterContinental University
Student Paper
<1%

59 Submitted to Higher Education Commission Pakistan
Student Paper
<1%

60 Submitted to University of Bahrain
Student Paper
<1%

61 Submitted to University of Sunderland
Student Paper
<1%

62 mediacurrent.gitbook.io
Internet Source
<1%

63 iq.opengenus.org
Internet Source
<1%

64 Submitted to De Montfort University
Student Paper
<1%

65 Submitted to National College of Ireland
Student Paper
<1%

66 edoc.pub
Internet Source
<1%

67 elib.dlr.de
Internet Source
<1%

68 scholar.ufs.ac.za
Internet Source
<1%

69 www.northropgrumman.com
Internet Source
<1%

70 Communications in Computer and
Information Science, 2012.
Publication
<1%

71 Submitted to Intercollege

72 Kaushalya Thopate, Tilak Bang, Yashodhan
    Bankar, Mohanjeetsingh Bansal, Awanti
    Bagade. "Efficient Transport Optimization",
    2023 International Conference on Advances in
    Electronics, Communication, Computing and
    Intelligent Information Systems (ICAECIS),
    2023
    Publication

<1%

73 Paolo Giorgini, Fabio Massacci, Nicola
    Zannone. "Chapter 8 Security and Trust
    Requirements Engineering", Springer Science
    and Business Media LLC, 2005
    Publication

<1%

74 adoc.pub
    Internet Source

<1%

75 etd.aau.edu.et
    Internet Source

<1%

76 oparu.uni-ulm.de
    Internet Source

<1%

77 www.ros-test.hw.ac.uk
    Internet Source

<1%