FYP4202 Assessment Form

NAME OF STUDENT:	PROJECT ID:
ER YAN YAO	FIT-INTI-IU-BITI-JANUARY-2021-0002

PROJECT TITLE: Sales and Inventory Management Web Application to Enhance Retail in Mobile Phone Store	
PROJECT SUPERVISOR:	Ms. Mohana Muniandy
INDEPENDENT EXAMINER:	Ms. Sarasvathi Nagalingham

1. Project Report (30%)

Criteria & Points Assigned	Missing	Unacceptable	Below Expectations	Meets Expectations	Exceeds Expectations	Points Earned
	0	1	2	3	4	
Content						
Summarize, compare and evaluate, at an advanced level, features and functionality in core content areas of study.	There is no explanation on features and functionality of the system.	Explanation on features and functionality is in the report but omits important features of the system.	Explanation on the features is brief, with insufficient detail.	Explanation on features and functionality is brief but complete.	Explanation on features and functionality is with a lot of details and includes supporting material.	
Identify principles in the areas of study that are relevant to thesis or project topic and apply them within specific problem domain.	Unable to identify relevant theories or algorithms.	Basic understanding of computing principles. Fails to apply them within specific problem domain.	Basic principles and techniques relevant to project or thesis are included, but some are missing. Fails to develop complete theoretical or design framework for thesis or project.	Provides good computing framework for thesis or project; applies principles and algorithms correctly to problem domain.	Project or thesis is completely grounded in computing theories and techniques. Applies them to problem correctly and clearly establishes their relevance.	

Criteria & Points Assigned	Missing	Unacceptable	Below Expectations	Meets Expectations	Exceeds Expectations	Points Earned
	0	1	2	3	4	
Appropriate methodology for the project. Critical and in depth considerations for design of study.	There was no logical sequence in the presentation of ideas. The student gave little or no description of the project design The program design was totally without organization.	The lack of sequential flow seriously interfered with the objective of the presentation. The student gave an inadequate description of the project design. The program design was logically weak for this level.	There was a generally logical sequence to the presentation. The student adequately explained the project design using a high level diagram (flow-chart, pseudo-code, etc).	There was a logical and appropriate sequence to the presentation. The student effectively explained the project design using a high level diagram (flow-chart, pseudo-code, etc). The logical design was appropriate for this level.	There was unity, coherence and inherent logic in the sequence of the presentation. The student effectively explained the project design using a high level diagram (flow-chart, pseudo-code, etc). There is explanation given on the programming design methods (i.e. structured or object-oriented were used in the project.) The explanation was beyond what one would expect at this level.	
Explanation of implementation	The student did not explain any parts of the implementation in the report.	Basic programming was shown with brief explanation.	The student included a partial explanation of difficult, unique and/or significant section(s) of the program.	The student included a general explanation of difficult, unique and/or significant sections (s) of the program.	The student included a complete explanation of difficult, unique and/or significant section(s) of the program.	
Appropriate implementation for the project.	Student failed to discuss the justification for the approach chosen for the project.	Student considered one approach of solving the problem and did not justify the chosen approach.	Student included a partial discussion of approaches available and briefly discusses the reason for choosing the approach.	Student included a general discussion of approaches available and discusses the reason for choosing the approach.	Student included a full, critical discussion of approaches available and discusses the reason for choosing the approach.	
Testing	No test plan/evaluation was conducted.	Lack of test plan was conducted for evaluating the program/product.	Brief test plan was conducted and discussed.	General test plan for evaluating each iteration of the program/product was conducted and discussed.	Full test plan for evaluating each iteration of the program/product was conducted and discussed. Student followed this plan when testing the initial program/product design and subsequent designs.	

Criteria & Points Assigned	Missing	Unacceptable	Below Expectations	Meets Expectations	Exceeds Expectations	Points Earned
	0	1	2	3	4	
Critical Thinking						
Evaluate and integrate business information technology literature to address specific theory or practical problem. Describe and select appropriate scientific methods to answer question.	No clear research question or project posed. Relevance to existing literature and theory not established. Major errors in choice of research methods or analysis. Conclusions inconsistent with evidence presented.	Project/Question posed is of questionable relevance or has clearly been answered. Question unrelated to existing literature. Errors in choice, execution or interpretation of methods and/or data. Conclusions weakly justified by evidence.	Project is not very innovative. Question has been adequately answered in prior research; no clear rationale for reexamination of question given. Research and methods selected are flawed or inadequately carried out. Conclusions overreach evidence presented.	Meaningful question/project is posed, but may not be fully explicated. Research and methods selected appropriate for project. Conclusions follow logically from evidence presented.	Project addresses question or problem that is meaningfully connected to existing literature and theory. Student provides clear explanation of relationship. Research methods selected are appropriate for project. Conclusions follow logically from evidence presented.	
Written						
Organization and logic	No logical order to information provided.	Weak organization; sentences rambling; ideas repeated.	Minor problems of organization or logic; Needs work on creating transitions between ideas.	Presentation is organized, but does not present clear argument for research position/project rationale.	Clear and logical presentation; good development of argument/projec t rationale; transitions made clearly and smoothly.	
Mechanics of writing (spelling, punctuation, grammar, clarity of writing)	Problems with mechanics of language serious enough to interfere with effective communication. Frequent errors in punctuation, spelling, sentence structure, etc.	Major problems with mechanics of language; Awkward sentence construction; poor or absent transitions; frequently difficult to understand.	Frequent problems with mechanics of language; Occasional awkward sentences and poor transitions reduce readability.	Infrequent and minor mechanical problems; Errors do not impair readability.	Clear, readable writing. Good use of transitions; no problems with spelling, punctuation, or grammar.	
Use of relevant HARVARD Style (Title page, citations & references, use of language, etc.)	No evidence HARVARD style used.	Minimal use of HARVARD style; frequent errors in all aspects of HARVARD style.	Adequate use of HARVARD style, but frequent errors in citations & references.	Infrequent errors in HARVARD style; errors involve minor aspects of HARVARD style – no errors in style for citations & references.	All relevant aspects of HARVARD style used effectively and correctly.	
					SUB-TOTAL (30 points)	

Comments (Project Report)

2. Product (40 marks)

Criteria & Points Assigned	Missing	Unacceptable	Below Expectations	Meets Expectations	Exceeds Expectations	Points Earned
	0	1	2	3	4	
Content						
Applications of concepts into product	There is no linkage between the research conducted and the product developed.	Student failed to understand the concept studied and has applied the wrong concepts in the development of the product.	Student attempt to link the concept studied into product developed but the concept applied is incomplete/ partial.	A brief application of concepts into the product was conducted by the student. Student is able to demonstrate in general how concepts are applied to the product developed.	Product developed is completely grounded in the relevant major theories and techniques. Student applied to concept correctly in the development of the product and clearly establishes their relevance.	
Extent of improvement over existing projects/products based on supervisors' experience	No improvement over existing projects. The project is worse than past year projects conducted.	Student has completed a similar project with past students with no improvement.	Only very brief improvement over existing projects/products.	A general improvement over past projects/products.	Student has built on the foundation from past projects/product s and has made considerable improvements over the projects.	
Usefulness to target users	Not useful to target useful as the product was not working.	Although system is working but it will not be useful to target users.	Some features/functio ns are useful to target users.	Generally acceptable and useful to target users.	Product is very useful to target users. The project has potential commercial value if given more resources.	

Criteria & Points Assigned	Missing	Unacceptable	Below Expectations	Meets Expectations	Exceeds Expectations	Points Earned
	0	1	2	3	4	
Is the program code / design clear enough that others would be able to replicate the student's work?	Bad programming practice. Student has no understanding of how the product was designed and developed.	Although some functions are working, the student in general presented a very messy design and shows a lack of understanding of programming practice required for a final year student.	Some features are presented in a way that clear but still contains major programming weaknesses and bad practices.	Generally the code and design is clear and understandable. Only minor bad practices are found.	Excellent design of program code and design. Future students will be able to replicate the work done.	
Originality of the product	All the product's coding/output were mainly taken from past projects. Although credits were given to past projects, student did not input any new idea.	Majority of the product are similar with existing/past projects. Only minor and insignificant parts of the products was contributed by the student.	Some minor functions / features were created by the student. However, these features and functions are not significant to the overall product functions/features.	Most of the functions and features are developed by the student with good justifications.	The product is entirely original. Student has given a fresh input to the product.	
					SUB-TOTAL (5 criteria*2=40 points)	

Comments (Product)

4. Project Management (10%)

Criteria & Points Assigned	Missing	Unacceptable	Below Expectations	Meets Expectations	Exceeds Expectations	Points Earned
	0	1	2	3	4	
Content						
Appropriate level of overall planning and time management						
Evidence of weekly progress presentation to supervisor						
Student's responsiveness towards the supervisor's feedback						
Student's initiative in handling project challenges						
Ability to identify, manage, and control the project risks						
SUB-TOTAL (5 criteria/2=10 points)						

Comments (Project Management)

VIVA Presentation (10%)

Criteria & Points Assigned	Missing	Unacceptable	Below Expectations	Meets Expectations	Exceeds Expectations	Points Earned
	0	1	2	3	4	
Content						
To what extent does the student communicate the merits of the final product?						
To what extent does the student communicate the process the student went through to reach the final product?						
To what extent does the student communicate effectively about the project?						
Can the student provide cogent responses to the questions?						
Can the student defend the design choices that she/he made?						

SUB-TOTAL (5 criteria/2=10 points)

Comments

3. Pre-VIVA Presentation (10%)
(Refer to Appendix A)

Grading:

Category 1	Category 2	Category 3	Category 4	Category 5	TOTAL MARKS
/ 30%	/ 40%	/ 10%	/ 10%	/ 10%	/ 100%

To be filled by Lead Supervisor:

Project Supervisor's total mark (60%)	Independent Examiner's total mark (40%)	FINAL MARK (100%)
/ 100%	/ 100%	/ 100%

Anything that may need to be brought to the attention of the examiners:

(continue on separate sheet if necessary)

Supervisor/Examiner Name	Signature	Dated

INTI International University

INTI International University & Colleges™

FINAL YEAR PROJECT REPORT

PROJECT TITLE:
Sales and Inventory Management Web Application to Enhance Retail in Mobile Phone Store

"A dissertation submitted in partial fulfillment of the requirement of an Honours Degree in Information Technology at INTI International University under the management and supervision of Faculty of Information Technology"

I declare that this project is my own work, it has not been copied in part or in whole from any source except where duly acknowledge. As such, all uses of previously published works (from books, journals, internet, etc.) have been properly acknowledged within the report to an item in the references or bibliographies. I hereby submit my dissertation, dated 22/04/21 for review and assessment.

by

Student Name	:	ER YAN YAO
Student ID	:	i18016358
IC No/ Passport No	:	
Project ID	:	FIT-INTI-IU-BITI-JANUARY-2021-0002

ACKNOWLEDGEMENTS

I am very grateful to Ms. Mohana Muniandy as my project supervisor and Ms. Sarasvathi Nagalingham for her guidance throughout the whole project process. First of all, I would like to thank my project supervisor, Ms. Mohana Muniandy, who is willing to take the time to guide me to ensure that I will be on the right track in the last year of the project journey. I would like to express my gratitude to Ms. Mohana Muniandy for her suggestions and suggestions during her trip. I would also like to thank Ms. Sarasvathi Nagalingham, the class lecturer, for her hard work and guidance during the project. I would like to thank all my friends and colleagues for their help and support, especially my family for their support and love. I am very grateful to learn a lot from this project. Finally, I want to thank INTI and FIT (Faculty of Information Technology) for providing such exciting courses to improve our skills and expand our knowledge in the project.

ABOUT THE AUTHOR

Er Yan Yao is the name of the author in this project. At present, he is studying for a bachelor's degree in information technology at the International University of India. He put forward this project in his last year's project, titled Sales and Inventory Management Web Application to Enhance Retail in Mobile Phone Store.

PROJECT PROPOSAL

Research Proposal

Title: Sales and Inventory Management Web Application to Enhance Retail in Mobile Phone Store

Abstract:

Sales and Inventory Management Web Application is an application that will help the retail store to increase their business performance. In this report, the author will designate a mobile store as our client and conduct its business operations through our system. This system can well assist the operation of the store and help manage inventory.

Based on the article and the real situation, there are still many traditional retail stores that do not have systems that can support their business operations. They use traditional methods to manage their inventory and keep paper inventory. Moreover, some of the stores do not even record their inventory. If these traditional methods are compared with the inventory system, the traditional methods cannot analyze their business. The inventory system will perform better analysis.

The directive of the system enables users to manage the items in their inventory. It allows users to track their inventory levels and alert the user when the inventory level is low. Users can analyze their inventory. It can increase the business sales and service levels of the store. User data is stored in the cloud database to avoid data loss and can be accessed by users anytime and anywhere.

Research Description:

Literature Review

Small and medium-sized enterprises (SMEs) are tools to promote economic growth and job creation. Due to such challenges as the challenges and the like, they cannot provide direct services to their customers at the micro-level. It is because due to lack of enough funds to conduct business, it sparked an intense debate about whether they promote economic development at the macro level. SMEs are facing considerable challenges in the development of communications, information and computing, which has led them to face increased competition and threats. (Muchaendepi, Mbohwa, Hamandishe & Kanyepe, 2019). Most traditional stores have lost innovation, and they are using traditional methods to conduct business. Therefore, for example, the mobile phone store used books to record their sales and purchases. The retail store needs to count its goods frequently to ensure the quantity of the goods. Every time SMEs are counting goods, they need to spend a lot of time to do so. They cannot keep up with the changes of the times and do not use the current technology. These will become a crisis for these stores. These traditional stores have lost innovation and lack the threshold of information integration and information transmission (Vugec, Pupek & Vuksic, 2018).

After understanding, the author knows that inventory control is the most important thing in business management. Usually, there is no right solution that can help them solve the problems faced by the company. Every company faces different problems because of its business. Inventory management is the best solution that can help them change the situation facing their business. And they need to develop a suitable inventory management system based on their business model.

Due to current business viability, the need to maintain service levels, business performance, and minimize costs. As far as retail stores are concerned, the most important cost comes from inventory. To maintain service levels, we must be ready to provide merchandise. To minimize inventory costs, the number of goods ordered must be equal to the customer's needs. Ensure that all goods are purchased by customers. If the order is less than customer demand, it will reduce the level of service. If orders exceed customer demand, there will be sinking costs of inventory, merchandise obsolete and excess storage costs. Therefore, inventory management is an important factor in the retail store business success (Leepaitoon & Bunterngchit, 2019).

On the other hand, the process of monitoring and controlling inventory levels is inventory management. It was the process to ensure that the company has enough replenishment to meet customer needs. It is essential to determine a healthy inventory level because too much inventory will lead to insufficient funds and affect the company's liquidity. However, too little inventory will lead to missed sales and out of stock, which leads to reduced profits and company revenues. These factors will affect performance. Managers must focus on keeping inventory levels balanced and strive to improve customer satisfaction to reduce out-of-stocks while keeping inventory costs as low as possible (Priniotakis & Argyropoulos, 2018).

To reduce unnecessary orders, inventory analysis is required. A good inventory management system will provide monitoring of inventory. It will list the best-selling products. Showing the best-selling products allows users to know which product sells the most, and then they can order more products on the following products. Data analysis of these stocks can make retail stores have better performance. When the product is out of stock, the system will remind the retail store. When users need to buy products from suppliers, this feature will make users more efficient. Retail stores can immediately check the product status through the system.

Problem Statement

The first problem facing mobile phone retail stores in this project is that they still use traditional business processes. They use paper to record their inventory status, not even inventory. These methods often occur in traditional stores. The store faces a huge risk of data loss. This problem occurred because they did not try to use new information technology to conduct business. The author will try to help the store to implement a new system to manage its inventory.

The second problem that retail stores need to face is human resources. They need human resources to record the inventory status and calculate the inventory quantity. If they want to manage their inventory better, daily inventory is necessary. It will increase the cost of human resources and waste much time.

The third problem is that it takes a lot of time and effort to merge data and operate in the table. These forms are drawn on paper to record the status of the inventory. Recording on paper also causes analysis difficulties. It takes a long time to generate meaningful information about costs, profits, and profit margins.

Project Objectives

This section will describe the objective of this project:

1. Implement a web-based system to help the client to manage their inventory.
2. Record inventory online and back up to reduce the chance of data loss.
3. Conduct analysis on inventory.
4. Testing the efficiency of the process of recording inventory status.

Project Scope

In this section, the author will describe the project scope. In order to realistically simulate this project, the application is only released in Malaysia. Therefore, retail stores in Malaysia can only use them. The application implements by using ASP.NET. Small retail stores can only use web applications because our database cannot handle too much data. Moreover, the inventory management system will provide analysis functions. It allows users to analyse their inventory.

Project Limitation

In this section, the author will describe the project limitation. The inventory management system does not provide automatic data entry. Therefore, the user cannot automatically enter data. The system requires manual data entry. Besides, web application only provides a desktop version. It only can be used by the desktop user. Users cannot get all the functions when accessing the system through mobile phones.

Research Methodology:

Service Level

The author will use the service level to determine the inventory status and try to achieve a higher service level. Therefore, the system will support retail stores to monitor inventory levels. Retail stores can obtain more detailed information about the inventory management system. This inventory status ensures that the inventory is enough, and customers can get their products more easily.

ABC Inventory Classification

In this project, the author will develop a system that allows users to automatically generate ABC inventory classifications. Classification can help users determine which products have higher sales and which products have lower sales. Users can get complete detailed information about the products they sell. Users can control their inventory requirements according to classification.

Forecast Error and Safety Stock

Forecast error and safety stock is that the methodology can reduce the chance of inventory shortage and help users better manage inventory. This methodology will be applying to the system. The author will implement an inventory management system that provides announcements. When the inventory is low, the system will remind the user.

Interview

The author will use qualitative methods to gather information for this project—the tool used by the author interviews. The author will go to the mobile retail store to conduct interviews. People who work in mobile retail stores will be interviewers. The reason we conducted the interview is that they can get actual data from the mobile store. The data obtained by them will be realistic.

Observation

Observations will be used in our project. The author will go to a retail store to observe how the store deals with its customers. The customer's purchase of mobile phones will be recorded in the observation. The author will document the entire process. This information of observation will help him to obtain the information that can support the project.

Target Audience:

In this project, the author designated traditional retail stores as mobile stores. Therefore, the data the author use in the system will be related to mobile devices. The employee on the traditional mobile phone retail store is the target audience on this project. They will use the system and key in the data to the web application manually to manage and analyze their inventory. The analysis will be conducted by him to ensure the quantity level of the inventory.

Besides, customers are also the target audience of the inventory management system. The author will establish a public website that allows customers to access to view inventory status and information. For example, the website will display the product's price and whether the product is in stock.

References:

Leepaitoon, S. and Bunterngchit, C., 2019. The Application of Monte Carlo Simulation for Inventory Management: A Case Study of a Retail Store. *International Journal of the Computer, the Internet and Management, 27*, pp.67-83.

Muchaendepi, W., Mbohwa, C., Hamandishe, T. and Kanyepe, J., 2019. Inventory 、Management and Performance of SMEs in the Manufacturing Sector of Harare. *Procedia Manufacturing*, 33, pp.454-461.

Priniotakis, G. and Argyropoulos, P., 2018, December. Inventory management concepts and techniques. In *IOP Conference Series: Materials Science and Engineering* (Vol. 459, No. 1).

Ziukov, S., 2016. A literature review on models of inventory management under uncertainty.

ER YAN YAO

_____ _____

Student's Name: ER YAN YAO **Date**

Project Supervisor:

_____ _____

Name and Signature **Date**

Class Lecturer:

_____ _____

Name and Signature **Date**

Table of Contents

LIST OF TABLES

LIST OF FIGURES

Chapter 1: Introduction

1.0 Overview

Inventory management is becoming more and more common in every enterprise. The report's title is "Sales and Inventory Management Web Application to Enhance Retail in Mobile Phone Stores." In the first chapter, the author will explain the project's purpose and goals based on the title. Therefore, more details about the project will be introduced. Prompt that the plan can continue.

Besides, the problem statement will be listed and described. Through this question, you can better understand the current situation that customers are experiencing. After that, the goals will be listed, and the goals must be met and reached. The scope and limitations can tell what the plan can and cannot achieve. These will be explained in this chapter. The target audience will also find a process. Then, it can also help us more easily understand the conclusions people draw from our projects. Store employees and customers will become users in our system. This chapter allows people to develop a blueprint for the project. All the information makes the entire project easier to manage.

1.1 Description of Project

Nowadays, information technology support already becomes an essential part of the business process. Most of the large-scale industry already use information support to operate the business. It helps the industry achieve tremendous success in business operations. IT support helps corporate maximize profitability and minimize operation cost. On the contrary, the Small and Medium enterprise no capital investment in information technology. This reason makes them unable to run their business better with the help of IT.

The main objective and target of this project are to implement and study a sale and inventory management web application to enhance retail in the mobile store. Therefore, the integration of inventory management system will be the final product in this project. The system will contain all the functions and can help customers meet their requirements and develop solutions to problems.

Inventory can be any variety of things, it may not have cooked food raw materials, hand-painted items or finished items. They are regarded as part of the company's property that is ready or not ready but can be sold on the market (Ziukov, S., 2016.). Inventory management system is a system that can improve the efficiency of each company by shortening time and helping them organize business lists. It can help companies reduce prices, reduce unnecessary costs, and improve product quality and responsiveness to cope with the pressure of world competition. And lead the company and work hard to reduce inefficiencies, such as slowly removing inventory from the supply chain. Therefore, there is an encouragement to execute plans and measures to reduce inventory costs (Malhotra, M.K., Mackelprang, A.W. & Jayaram, J., 2017.). Forced by the development of information technology (IT), some supplier has adopted the application of inventory management systems to improve operational potential (Ru, J., Shi, R. & Zhang, J., 2018.).

1.2 Problem Statement

Many traditional retail stores face the same problem in their business. The problem occurs because they still use the conventional method to conduct their business. This activity will give rise to various situations. Below the author will list the issues that will occur in this project.

Using traditional business processes to conduct business is a problem worth facing by mobile phone retail stores in this project. They use paper to record their inventory status, not even inventory. These methods often occur in traditional stores. The store faces a huge risk of data loss. This problem occurred because they did not try to use new information technology to conduct business. The store will not be able to update the inventory status properly. The traditional method used will cause them were not able to check and monitor the inventory. The author will try to help the store to implement a new system to manage its inventory.

Retail stores need to face is human resources. Usually, there are only a few employees in a small store. Therefore, human resources are very insufficient. If they want to manage their inventory better, daily inventory calculation is necessary. It will increase the cost of human resources and waste much time. They need human resources to record the inventory status and calculate the inventory quantity. And it takes a lot of time and effort to merge data and operate in the table. These forms are drawn on paper to record the status of the inventory. Recording on paper also causes analysis difficulties. It takes a long time to generate meaningful information about costs, profits, and profit margins.

Lack of the system causes the inventory cannot monitor properly. Inventory records are complex and confusing, and employees cannot find the stock immediately. Spend too much time looking for goods. Customers cannot get the products they need in time. This situation will lead to reduced customer satisfaction and reduce the reputation of the store.

1.3 Project Objective

This section will describe the objective of this project:

1. **Implement a web-based system to help the client to manage their inventory.**

   The author will develop an application that allows the user to access through HTTP. Web-based is the method used to describe applications that run in a web browser. In summary, this is an inventory management system that can use on the web. Users can access the webpage anywhere and anytime within their network.

2. **Record inventory online and back up to reduce the chance of data loss.**

   In this project, the author will use a cloud-based database to record data. It allows the user to keep the data online and back it up. It can reduce the percentage of data loss.

3. **Conduct analysis on inventory.**

   The web application will provide an analysis function to help the user analyze the business operation. The analysis will specifically focus on the quantity of inventory. Due to sluggish product sales or poor inventory management skills, inventory turnover rates may fluctuate. The inventory turnover rate is also different due to the nature of the industry.

4. **Testing the efficiency of the process of recording inventory status.**

   The system will provide a more convenient method for the process of record inventory data. Better performance on record data compares with before. Not only that, but the system also provides better displays with the status of the inventory.

1.4 Project Scope

In this section, the author will describe the project scope. In order to realistically in simulating this project, the application is only can be released in Malaysia. Therefore, retail stores in Malaysia can only use them, and we only specify that it is used by a mobile phone store in this project. Small retail stores can only use web applications because our database cannot handle too much data. The application, the same as the title, is only limited to a web-based application.

Moreover, the inventory management system will provide analysis functions. It allows users to analyse their inventory. The inventory data will store in the cloud, and it can be managed by the owner based on the stock level.

1.5 Project Limitation

In this section, the author will describe the project limitation. The inventory management system does not provide automatic data entry. Therefore, the user cannot automatically enter data, and it will require manual data entry. Besides, web application only provides a desktop version. It only can be used by the desktop user. Users cannot get all the functions when accessing the system through mobile phones.

On the other hand, the system's security also a limitation that the author needs to consider. The author needs to pay attention to the function and performance of the inventory system as well. The security features may be improved in the future of implementation.

1.6 Target Audience

In this project, the author designated traditional retail stores as mobile stores. Therefore, the data the author use in the system will be related to mobile devices. The employee on the traditional mobile phone retail store is the target audience on this project. They will manually use the system and key in the data to the web application to manage and analyze their inventory. The analysis will be conducted by him to ensure the quantity level of the inventory.

Besides, customers are also the target audience of the inventory management system. The author will establish a public website that allows customers to access to view inventory status and information. For example, the website will display the product's price and whether the product is in stock. Customer can check the inventory status through the website before they want to self-pick on the store.

1.7 Summary

In this chapter, the author will have the briefly introduction of the project. People who view the project can know that what is the main objective of the project. The problem that the client – mobile phone stores also mention on this chapter. The IT support is very necessary to the business operation. The problem can be solved if the retail stores using the inventory management system. Overall, the final product is an inventory management system and it will be procedure when the project is completed.

Chapter 2: Literature Review

2.0 Overview

In this chapter, the author will conduct the background study in several aspects of the tools and technology that will be used in the project. It mainly describes and explains the things that related with the sales and inventory system. And will have a more in-depth outlook and inspection on the implementation and development of the system. So, the author needs to conduct more searching to have the better understanding of the system. It can help the author can fulfil user and system requirements more appropriate. In additional, this chapter will focus on the existing software used in real life. After the study, the author can have the better knowledge to make a good choice for application in the project.

2.1 Sales and Inventory Management

Since human beings were born hundreds of years ago, they have been buying and selling things, called commerce. Therefore, inventory management has always existed and has had a profound impact on business. In the past industrial revolution, product cost and market share are reflected and displayed in the "supply" is of strategic significance (Houlihan, 1988). Usually, company will define its operating costs to keep their costs underachieving this objective, specifically for manufacturers and different cost centers (Kerkhove & Vanhoucke, 2017). Sales and Inventory management is the business solution that can help a company weakens the company's financial processes and may pose a threat to its cash liquidity position. The optimization of inventory is very important to ensure the availability and reliability of inventory. It can reduce the risk of business operations. Complete inventory management system can help control the company's inventory management process. It allows the company to focus on other businesses.

Material or resource inventory can be defined as inventory. The literature identifies four types of inventory management processes: manufacturing, distribution and retail inventory, and service inventory (Jacobs et al., 2014). Organizations of all sizes include their raw materials, supplies, work-in-process, transition of item, and all finished products. The stock size can be as small as the needle, or it can be some complex components. Either way, improper inventory handling or ignorance of effectively assessing Inventory can lead to significant financial problems and may lead to overstock or shortage of Inventory. For companies, this means lost productivity and lost sales.

Automating the entire inventory management process can reduce the possibility of dead Inventory, overflow, and unnecessary storage costs. Every business owner can try to find a suitable inventory management method to support their business's operation. Inventory management is an important part to every type of business. If an enterprise wants to develop continuously, inventory management is imperative. Without effective inventory management, the enterprise will face various bankruptcy crises (Jayden, 2020).

2.1.1 Retail Inventory

In today's increasingly competitive retail world, retailers try to draw and maintain consumers by delivering a rich shopping experience. For numerous of them, giving omnichannel services is a stage in this demand (Cai & Lo, 2020). Retail inventory has its terms and procedures. An essential retail inventory feature is that it can be integrated with the cash register's POS system. The POS system provides checkout equipment, which includes cash registers and bars code readers, and the like. The device can also view the inventory database, identify specific items to be sold, and deduct inventory. Depending on the product to be sold, users can use barcodes or radio frequency identification (RFID) tags to identify them. This feature allows users to add items to inventory before distributing them and then reduce them from inventory. Some advanced POS systems also have the function of identifying the product's location, showing that the product is in a specific warehouse or on the floor of a store. It is widespread in various retail stores, such as consumer goods, clothing, and electronic goods businesses. Item location, barcode, and bin location identification are also functioning in many inventory systems.

Besides, one thing that needs to know is that inventory software will never be used alone. Instead, it is part of a modular accounting system. It requires dialogue or integration with other back-end business systems, especially with content for accounting. Some stores will want to obtain all accounting module information from a single supplier, usually including inventory management. Unfortunately, implementing some integration will result in bundled applications from different vendors. It saves the licensing cost and can also accurately utilize the various functions required, even if they are from different software vendors. All inventory systems reviewed can export data to at least a spreadsheet to be imported into a third-party accounting system (Needleman, 2020).

2.2 Introduction to Web Development

2.2.1 Inventory in website

Creating a product list on the Internet provides an opportunity to expand the customer base or increase the company's accessibility to existing business partners. Place your inventory online and connect with payment processing platforms to establish other sales channels or provide an online catalogue for customer review. Customers will find your products online through search engine queries or directly visit your website. Promote new product review options through emails, in-store banners and offline advertising venues to enhance the success of Internet-based inventory projects.

The inventory will be converted into a format that can be stored directly on the website. Putting inventory online may increase business demands for customer service and technical support. For example, when a customer uses the phone to call and ask about inventory, the staff of the retail store can immediately check the inventory through its inventory website. In addition, retail stores can store product images online and allow consumers to browse it. It can increase the purchase rate of its customers.

Typically, Inventory management systems are often included as part of the online store software suite. It can be integrated online and offline as the inventory management needs as an independent system. Companies can contact website developers or hosting companies to inquire about supported inventory solutions, options, and suggestions. Recent choose to meet the online needs and can expect growth to solve the program type (Acevedo, 2020).

2.2.2 Inventory and Sales Report in web server

In retail, inventory and sales reports contain much information. The inventory report is a summary of the retailer's current inventory status. It will extract detailed information, such as how much the store surplus inventory, which products sell fastest, performance and other information related to inventory category status and performance. Various types of inventory report are permitted, each type of report has its own use value.

Nevertheless, nearly half of small businesses either do not track their inventory or use manual methods for tracking. Sales and Inventory report makes retailers vulnerable to inaccurate reports. Although this may seem trivial, when you use data to make business decisions, it can be the difference between the backlog and the period of successful sales. The sales report allows companies to query their past sales performance, so that they also have records and can better understand the current company's situation. The online inventory management system allows users to check inventory anytime and anywhere. Even an effective online system supports timely calculations, so that users can know the inventory status in real time, and then replenish or clear goods.

Besides, the company need to consider their technology stack performance. In other words, it means the technology tools that the company use to operate their business. It would bring help to them if they had a reliable inventory management system. The system will speed up the business process and increase the performance, and it can be perfect for synchronizing data across tools and avoiding a human mistake. 15% of advertising resource distortion problems are caused by a system that cannot be integrated (Nicasio, 2020).

When data or information is stored online on a web server, this encourages users to access inventory records through the website. The data on the website allows users to access the data anytime, anywhere. It brings more convenient methods to all companies that create websites or uses third-party website services. Those give them the ability and easier management of their inventory.

2.3 Inventory and Sales Report on Database

The author decides to implement a database on the webserver. The database is essential due to the business will conclude a massive amount of inventory data. Inventory record can be a database file that you can store all the information about the part name, quantity, supplier, location, etc. therein. It should be accessible, accurate, current, and can be customized. The database can be on paper, in a spreadsheet or software solutions. A database can help the user store necessary data efficiently. In this section, the author will compare cloud-based databases and localhost databases. And determine which is better to store the data on the cloud or to store the data locally? The author will read for more information. Which database is better will be considered in this chapter?

2.3.1 Cloud-Based Database

Cloud based database will be used in this project. The reason that the author chose cloud-based database is to avoid the loss of data. With the popularity of the Internet and the enhancement of broadband, cloud-based applications have more and more advantages over the past.

Although the commercial application of cluster-based compression function system is still limited and there are various problems, the researchers currently engaged in inventory management have realized that the use of cluster-based compression methods to transmit and store critical information and data in the cloud databases is critical (Livi, L., Bianchi, F.M., Rizzi, A. & Sadeghian, A., 2013).

Cloud database connection is based on collection compression is a novel and avant-garde technology and idea, which compresses data through the cluster and then compresses the data before transmission, and quickly transmits essential information from one place to another. Besides, the highly flexible use of cluster-based compression with cloud-based databases can assist inventory management operations well.

2.3.1.1 Cloud inventory management system

The system on the cloud allows users to track inventory in real-time. All inventory records are stored in the cloud, and users can access data through its Internet anytime and anywhere. The only things users need are computer equipment and networks. Without these two things, they will not be able to access the system. Nevertheless, networks and computers are viral today, and users can quickly get these two things. Therefore, these issues will not hinder them. There are many advantages of a cloud inventory management system. It helps the business can be operating properly. The advantages of a cloud-based inventory management including:

I. Tracking inventory real-time

Business owners can not only use the system to track and collect data. The system also provides the function of automatically generating reports. Not only that, but businesses can also use various Internet-enabled devices to access cloud-based inventory data. These devices include traditional desktop PCs, smartphones, laptops, or tablets. Besides, users can also use the Web-based inventory program to access the inventory software anytime and anywhere outside the business premises. Those functions extensively provide system flexibility.

II. Easy to integrate the system

The cloud-based inventory management system makes it easier for business owners to integrate existing systems smoothly. For example, they can use e-commerce stores and integrated cloud-based inventory software simultaneously. It makes the enterprise's system more flexible and efficient and will not repeat the same work, resulting in low efficiency.

III. Improved coordination

Cloud-based inventory system allows various departments to work more efficiently within the company. Department can directly extract information about other department's inventory data from the system without contacting their employees to obtain this information. This inter-departmental communication is more comfortable knowing when need to restock, shipment of the customer orders, and other actions can be smoother and efficient, enhance customer confidence to the company. Correct and trustworthy inventory information will lead to and affect the company's profits. It provides a picture of where workflow issues and bottlenecks occur, and with this data, the company's breakeven point and profitability can be estimated.

IV. Enhanced efficiency

Cloud inventory system can improve the efficiency of several ways. It authorizes inventory monitoring in real time. If the data is changed or updated, it will be replicated and updated throughout the company immediately, and the data of all company owners is the same. Therefore, the company can maintain confidence in the accuracy of the information in the system, and the management can safely and smoothly track the flow of supplies and products and generate reports one by one. This software also provides a function that helps user automatic report generation services, which will greatly increase the company's business capabilities. In addition, cloud-based solutions provide greater convenience, and company employees can access company data anywhere.

V. Reduce hardware cost

Since the system is cloud-based, there is no need for companies to buy expensive hardware and maintain it. On the contrary, SMEs and start-ups can directly use capital and profits to expand them to let more people know the company's business. For cloud-based solutions, hiring IT staff is no longer necessary. The problem of keeping inventory software is left to the service provider and will be handled properly.

Overall, the security and privacy of cloud databases must be considered. Data on the cloud has risks such as unauthorized user access. Therefore, data owners must ensure that third-party cloud providers are trusted. And you must also consider the provider's services, such as the location of the server, because a location that is too far away will affect the loading time and affect flexibility. In short, the database owner must find a trusted provider and use it when the service is needed.

2.3.2 Localhost Database

The local host is a host name that references the current computer is used to access it. It is used by network services running on the loopback network interface to access the host. Use loopback interface to bypass any local network interface hardware. Localhost Database is the database that store using user computer and the data only available on local. If the computer storage broken, the data on localhost database will be lost.

In computer networks, “localhost” directs to a computer running a specific program. For example, if a computer program is running, such as using a web browser or a local network development environment, the computer is the “local host.” On the other hand, if the database is located on a host web server, then the host web server is the “localhost” in that scenario. In the most straightforward terms, the localhost can be understood as “this computer.” It applies to the program and does not necessarily apply to computer users.

Localhost database having more security, it is because the accessibility of the file can directly control by own IT staff. Local storage is usually the fastest way to store and access your data files. No network connection is necessary, and there will be no data charges for any mobile devices. The business owner actually own their data and files.

In the inventory management system, the local host database is only used to keep inventory records on single computer storage. Then mean only a single computer has inventory records. If the computer is damaged, all data will be lost. Although users can back up inventory data, then data loss can be prevented. In contrast, compared with local databases, cloud-based databases are more flexible and efficient. Because cloud-based databases usually have automatic backups, users can use other computers to access the database.

2.4 Existing System Comparison

The inventory management system has become a very famous system in the real world. Many companies use this system to monitor and manage their extensive inventory. Those are an essential part of every business in the world. Without inventory management, companies will face these costs and other risks of inefficiency. In this section, the author will compare the existing inventory management systems. Furthermore, he needs to consider the features that our system requires. Those considerations can help to improve the efficiency of the system.

2.4.1 Inventory Transaction Journal Entries

If the industry is selling products, it is needed to keep accounting records of inventory transactions. Some firms buy the finished product at wholesale and resell to the retail price with other manufactured products. In a company, an accounting journal is a record of financial transactions. The transaction will list the affected accounts and the flow of money in order of time and amount (Carlson, 2019). Inventory journal entries is a method that can used to record the transactions of the inventory in every business (Bragg, 2020).

In an era when computers are not widespread, all industries use inventory diaries to record their inventory. All purchases and sales will be recorded in the book. Every period, maybe a week or every day, the company will count the inventory shipments and sales. The company also counts the goods based on the inventory records to ensure that the goods' quantity is consistent with the inventory records. However, all walks of life have begun to use computers to run their businesses with the advancement of technology and computers' popularization. Computers make inventory management more comfortable, and people can store all records on the computer.

2.4.2 Features of the Inventory Management System

In this section, the author will define the inventory management system's functional elements by comparing the previously existing systems. These functions can help businesses use the system when due to inventory, improving its inventory management efficiency and ability.

The system consists of many components, which can handle inventory quickly and conveniently. Through inventory management services, the overall efficiency and productivity of the enterprise can be improved. It is necessary because they use this type of inventory software to handle daily tasks and time-consuming housework in the enterprise effectively so that they can concentrate on the production part. The main features of inventory management should include:

I. Order Point

If the inventory reaches a certain threshold, the inventory system will be reminded to notify the store that it is time to reorder the product. This product can help businesses avoid excess inventory or out of stock.

II. Service Management

For any service management mainly related to the company, this management system can help track materials, the cost of the company using the service, and the cost of cleaning supplies. It increases the overall service cost and some installation costs.

III. Inventory Optimization

The inventory management method helps to optimize inventory. It identifies the reorder point of the manufacturing process, that is when orders should be issued new stock and an appropriate amount of inventory. It also helps manage inventory on hand and, in some emergency situations, cannot provide a new date an emergency stock of available stock. All these features inventory management systems, making it one of the most important systems. It should be integrated into any business to improve productivity and efficiency.

IV. Assets Tracking

When the stock is in a store or storage, it allows the company to track it through its barcode or other tracking standards. These tracking standards include serial numbers, batch numbers, or revision numbers. Nowadays, the most frequently used inventory management software methods are barcodes, wireless tracking technologies or radio frequency identification (RFID). This product is easy to track significant savings in staff's time and effort and is responsible for finding the work. The product can be invested elsewhere and can improve productivity (Reddy, 2020).

2.4.3 Inventory Transaction Journal Entries vs Inventory Management System

In this section, the author compares inventory transaction journal entries and the inventory management. Table below shows the different of these two methodologies.

Table 2.1 Inventory Transaction Journal Entries vs Inventory Management System

	Inventory Transaction Journal Entries	**Inventory Management System**
User friendly	Yes	Yes
Output display	Yes	Yes
Database record	No	Yes
Control functionality	No	Yes
Security	No	Yes
Detection Object	Inventory Record	Inventory Record
Premise access	Everybody	Authorized people only

Based on this data, the result shows that the inventory management system's overall performance is better than inventory transaction journal entries. An inventory system can help the business perform more efficiently and flexibly. Journal entries are not enough to fulfill the company's requirement and need to spend more time compare with the system.

Overall, inventory transaction journal entries are an old methodology that used before. All the features of the journal entries are less than the inventory management system. Therefore, an inventory management system is the best solution that can use for inventory management.

2.5 Summary

Through the background research of sales and inventory management, the author understands that the system's development needs to consider many factors. Much knowledge related to inventory management is already found and list systematically. These materials have perfected the basis of inventory management and established the prototype of the inventory management system for the author. For example, the type of integrated development environment used to implement the system, the type of database used with the system, and many. All the information is essential to avoid compatibility issues and meet user requirements.

Chapter 3: Requirement Specification and Design

3.0 Overview

In this chapter, the author will explain the fact-finding techniques and the results of discovering facts through analysis. The author will explain in detail the fact-finding techniques used by the author to collect data and information and conduct interviews and questionnaires. The purpose of this investigation is to obtain evidence to prove the fact that users accept the standards and improved functions of the proposed system. A questionnaire will be sent to social networking platforms to answer questions using Google Forms. Interviews will be conducted with the business owner to hear his expectations and views on the system. The purpose of data collection is to have a general understanding of system development. After this, the requirements of the project will be sorted and generated. Based on these requirements, the author can master the blueprint of the entire system. The system design will generate the diagram based on these requirements. The interface system will also appear in the system design. Based on these designs, you will know the shape of the system. In the end, the author compilation of all content and design of the proposed system sketch imagination.

3.1 Fact Finding Techniques

The author will develop a plan to predict where the selected fact-finding techniques will be used to arrive at the requirements of the system. The fact-finding techniques chosen by the author are questionnaire surveys and interviews, such as information feedback from various interviewees. Therefore, the author will conduct more and more research to understand how to create and operate fact-finding methods through online knowledge. After that, you will learn about the author and determine how to use fact-finding techniques. In addition, he will make predictions for these two methods.

3.1.1 Questionnaire

The questionnaire survey will help the author to collect useful information about system functions and delivery. These questionnaires will enable more people to have opinions on the perception and demand of retail stores, including traditional retail and modern retail. For the inventory management system, the provision of this information can further enhance the function of the system and have a deeper understanding of the requirements of the system.

3.1.1.1 Design for Questionnaire

The questionnaire is designed to understand the problems the store is facing and determine the system requirements. The survey targets will be all kinds of people because everyone will have been to a retail store. The primary purpose of the questionnaire is to get people's views on retail stores. To know whether people should use inventory systems and modern technology for retail stores. Whether to know modern technology can help retail stores to conduct business operations better. Below the author will show the design problem and the purpose of designing this problem.

Table 3.1 Questionnaire question and purpose

Question	**Purpose**
1. Do you often go to retail stores? Options: Yes, No	To know people often go to retail store or not.
2. How often you go Options: Daily, Weekly, Monthly	To know if people often go to retail stores.
3. What type of retail store do you often encounter? Options: Modern retail (Store using modern technology) or Traditional retail.	In case to know which type of retail store people often go.
4. Have you tried to purchase a product in a store but was unable to? Options: Yes, No	To know that people have experience buying things in stores.
5. Should the store display the information of out of stock products to let customers know? Options: Yes, No	In order to know if people want to see the product out of stock information.

Question	**Purpose**
6. Do you think that the retail store should display the product details (E.g. product quantity, restock date) on a website? Options: Yes, No	If you want to see product information, do you want to see it on the web?
7. In your opinion, should traditional store owners let customers know when stock is available? Options: Yes, No	Should it show the date when the out-of-stock product was restocked.
8. If the website of a retail store shows the status of a product, would you visit the website and check the product details? Options: Yes, No	Know if people visit the store's website for the product information.
9. If a store has a website that displays product information, how often will you visit? Options: Daily, Weekly, Monthly, before going to the store	To know if people often visit to the website.
10. According to your opinion, do you think there is anything traditional stores can strengthen?	Know what people want the store to strengthen.

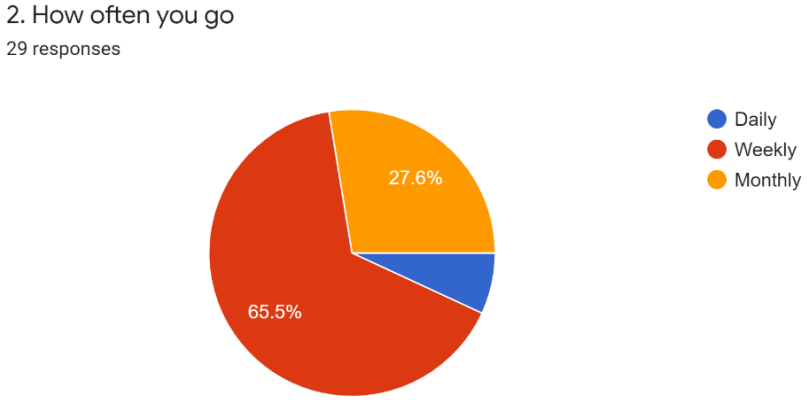
3.1.1.2 Analysis on Questionnaire Results

Finally, a total of 36 people participated in this questionnaire. The questionnaire is published online and shared by the author to all social media platforms, including Facebook, WhatsApp, etc. Therefore, anyone can participate in filling out this questionnaire. Based on this questionnaire, how people feel about retail stores can be understand.

Figure 3.1 Questionnaire Result: Question 1

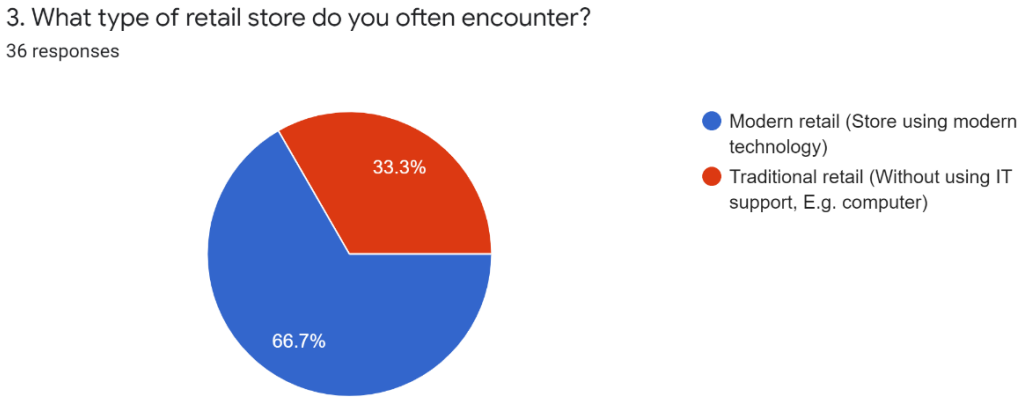
Based on this result, more than 80% of people will often go to retail stores.

Figure 3.2 Questionnaire Result: Question 2



The results show that 19 people go to the retail store once a week, 8 people go to the retail store once a month, and 2 people go to the retail store once a day.

Figure 3. 3 Questionnaire Result: Question 3

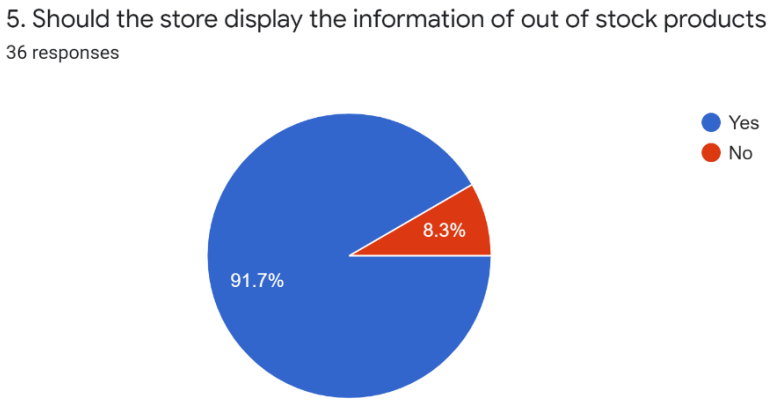


Most retail stores already use modern technology to handle their business. The figure shows that 68.6% of retail stores use modern technology.

Figure 3.4 Questionnaire Result: Question 4

The figure above shows that the products of the retail store still cannot meet user requirements. 66.7% of people cannot buy what they want in the store. But 33.3% of people can buy what they want.

Figure 3.5 Questionnaire Result: Question 5

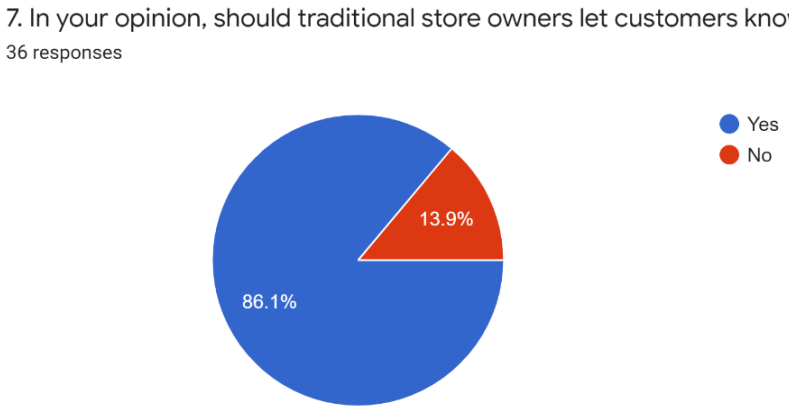


The figure above shows that 33 people want retail inventory to let them know about out-of-stock products.

Figure 3.6 Questionnaire Result: Question 6

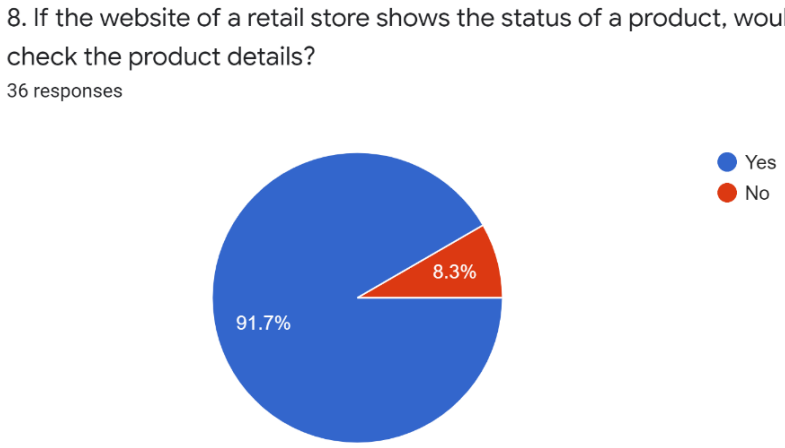
The figure above shows that 33 people want retail stores to display product details.

Figure 3.7 Questionnaire Result: Question 7



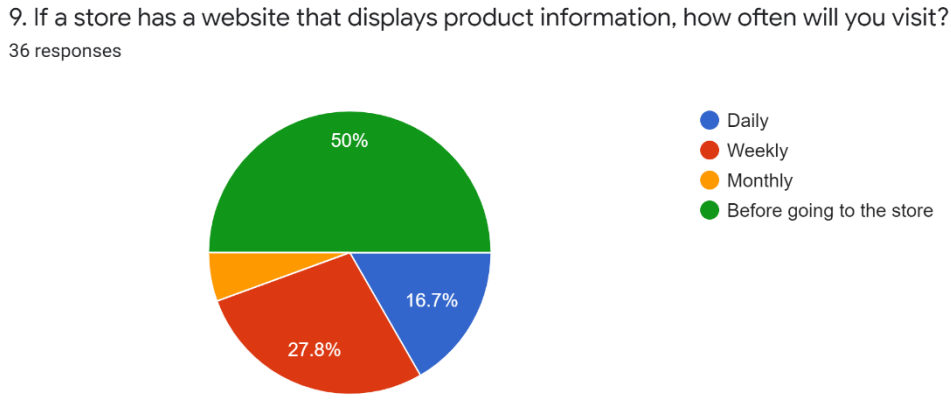
The figure above shows that 31 people want store owners to let them know if the inventory is enough.

Figure 3.8 Questionnaire Result: Question 8



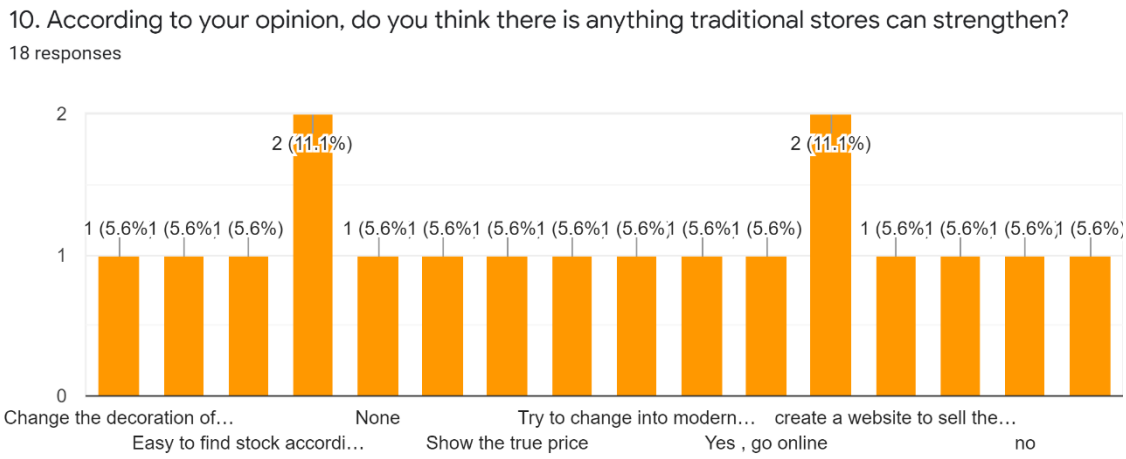
The figure above shows that 33 people will visit the website and view product details.

Figure 3.9 Questionnaire Result: Question 9



The figure above shows that if the store has a website, 50% of people will visit the website before visiting the retail store. 16.7% of people visit the site every day. 27.8% of people visit the site every month.

Figure 3.10 Questionnaire Result: Question 10



According to the feedback from the questionnaire, most people want retail stores to post their product status online. Then they can easily explore when needed. And the website must show them complete details to solve their problems.

3.1.2 Interview

3.1.2.1 Design for Interview

The person interviewed will be a retailer. And the author designed the interview questions to ensure that he can have an in-depth understanding of mobile retail stores. All questions aimed at obtaining detailed information about retail stores, including challenges, difficulties, and needs faced by the store.

Table 3.2 Interview Question and Purpose

Question	**Purpose**
1. When did you start your business?	To know the duration of business work.
2. What are the working hours of your store?	To know the working hours of the business.
3. How many employees of work in your store?	To know the business size.
4. How many employees work in the store?	To know the quantity of the customer.
5. Do you use the computer to support your business operation?	To know do the business use the modern technology to run their business.
6. Does a retail store need inventory management?	To know retail store, need the inventory management or not。
7. How often do you count the product quantity?	Is there calculate inventory.
8. For traditional retail, do it need to calculate the quantity of goods from time to time?	To know that the store will calculate the quantity of stock. How important the quantity of the stock to the traditional store.

Question	**Purpose**
9. Have you ever thought of expanding your customer base online?	Learn how they feel about e-commerce.
10. Do you have experience in using sales and inventory management systems?	In order to understand whether people often touch the inventory management system.
11. Can the Web-based inventory management system fully meet user requirements?	To understand people's views on web-based systems. And it should carry out the needs.
12. Which functions of the inventory management system do you expect?	To understand what functions people, want the system to have.
13. Does the inventory management system help business processes become efficient?	To know whether the inventory management system can support business operations.

3.2.3 Analysis on Questionnaire and Interview

Through the results of the questionnaire survey, readers can know that most people will go to retail stores to buy the products they need. All retail stores can be divided into modern retail and traditional retail. In addition, many shops face the situation of insufficient inventory of required products and too late to replenish. These circumstances make many customers cannot obtain the desired product. When a product displayed in a retail store is out of stock, most people want to ask the store and request the store to display the replenishment date. Using website display is a solution that can display product information, including the date of purchase and detailed product information.

The results of the interview conducted by the author show the specific situation and difficulties faced by mobile phone retail stores. It enables the author to know the needs of retail stores and have a better understanding. Inventory management system is essential for retail stores. It can help retail stores manage their inventory efficiently and flexibly. These displayed system requirements and conditions can facilitate developers to provide better solutions.

3.2 Requirements

In this section, we will describe the scope related to the inventory management system. It will include functional requirements, non-functional requirements, and user requirements. These requirements will help us better understand the needs of users. Here, we are responsible for the implementation and system design functions. Collecting feedback based on questionnaire surveys and interviews, we can help customers perform tasks efficiently, reliably, and consistently, and most importantly, they can meet customer needs.

3.2.1 Functional Requirements

Table 3.3 Functional Requirements

ID	Title	Description	Priority
F1	User Authentication	The system provides user authentication to verify user's identity to ensure all information store in the system is safe.	High
F2	Store product information through system	Allow user to store the product detail into the system.	High
F3	Manage inventory details	Allow user conduct CRUD operation on the inventory.	High
F4	Remind users when processing requests	When requesting processing, the system should remind the user. E.g., After the user updates the product information, an alert dialog will be displayed to let the user know that the process is complete.	Medium
F5	Product summary is available	The system must show the product detail, description, category, supplier detail, etc. All information must store in the database.	Medium

3.2.2 Non-Functional Requirements

Table 3.4 Non-Functional Requirement

ID	Title	Description	Priority
NF1	Only administrator can modify inventory details.	Ensures that only the administrator can have access to change/reject a request or update status	High
NF2	User password cannot be displayed on login page and admin page.	Ensures that the confidentiality of the user's password is safe.	High
NF3	Stay within the time period given.	The system is required to be on time when delivering but unexpected changes might occur that would affect the delivery.	Medium
NF4	Stay within budget.	Ensures that system does not go over budget and work with the funds we have been given.	Medium
NF5	A closed website which is only for the mobile phone retail stores.	Ensures the staffs and students can only access the system and public access is not permitted.	High
NF6	System availability must be ensured	Must ensure the availability of the system and allow users to log in when they need to use the system.	High

3.2.3 User Requirements

When discussing project use cases, user requirements are usually written. The requirement definition is completed by the customer or product manager who understands that the user will use the embedded system.

User requirements relate to how users interact with the system and their expectations. If the system has a screen, the user request may be based on what happens when the user selects an action on the screen. Maybe pressing a button will not only start a process but will also switch to another screen and make a sound notification. When writing down such user requirements, they will usually be divided into multiple system requirements in the future due to switching screens, the maximum delay in the startup process, and the appearance of the last next screen. One trap is to start trying to write system requirements during the user requirements meeting. It is usually not conducive to in-depth understanding of user needs and may miss key functional components (Kraeling and Tania, 2019).

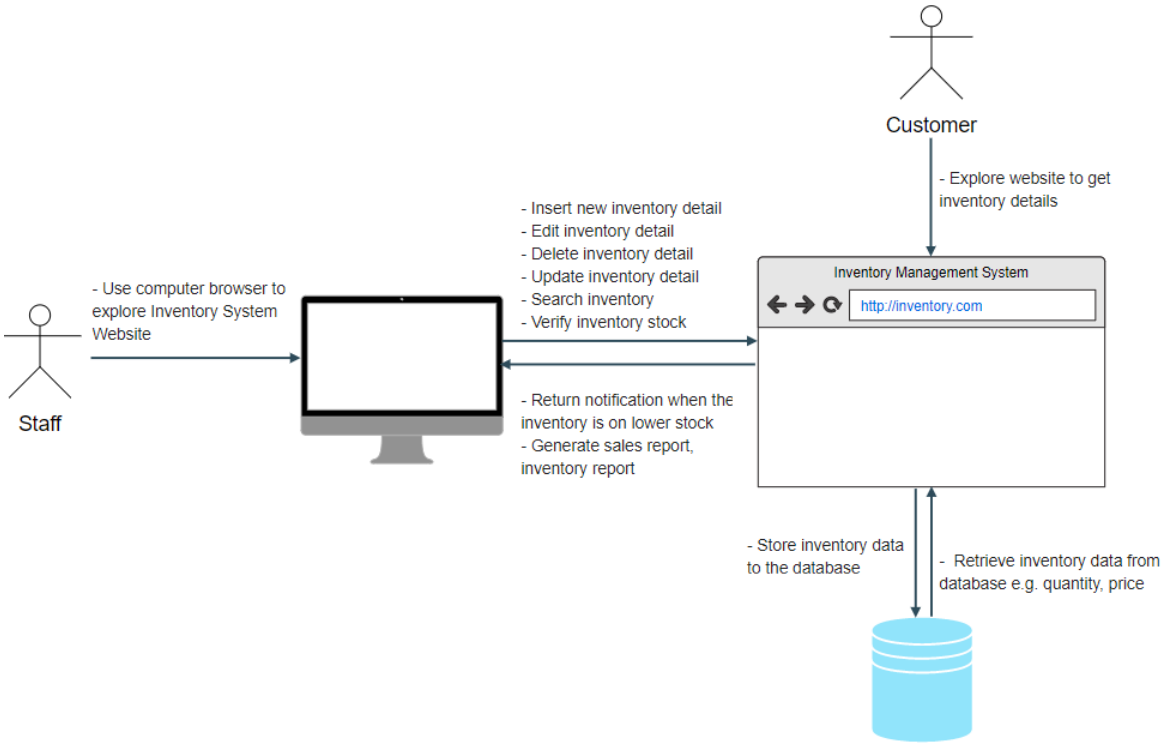
Table 3.5 User Requirement

ID	Title	Description	Priority
U1	Store inventory status to the database	The system must allow user to store the inventory detail to the database.	High
U2	CRUD operation to the inventory record	Allow user to create, read, update and delete the inventory record. User can modify on the detail of the inventory.	High
U3	View database record through administrator page	Allow the user to view on the database record. Check the change of the database.	High
U4	Search function through all inventory record	Allow user search through the inventory record.	High

3.3 System Design

3.3.1 Rich Picture Diagram

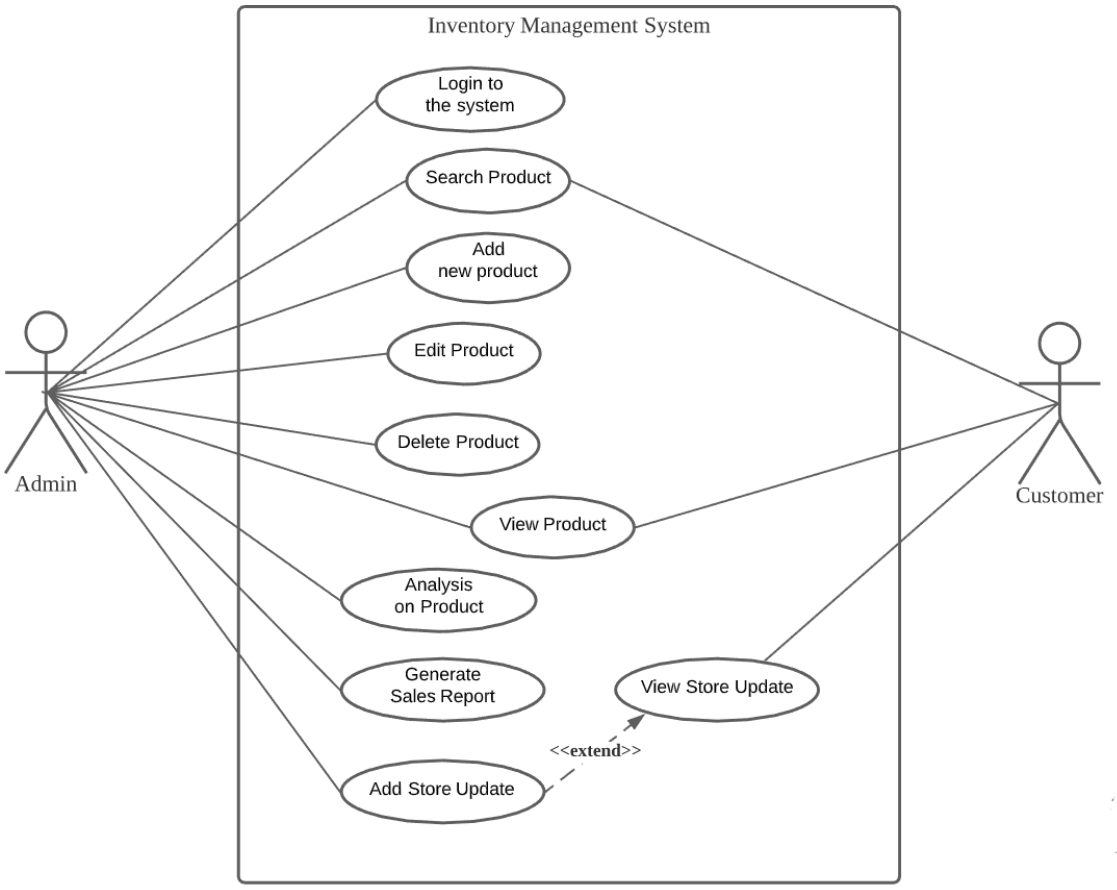
Figure 3.11 Rich Picture Diagram



Rich picture diagram shows the blueprint of the entire system and shows the basic functions of the system. Store staff can use the computer to browse the inventory management system website. After logging in, they can perform CRUD operations on their inventory. Including insert, edit, delete, and update. A search function is also provided so that they can search in the inventory. You can also verify the inventory level after calculating the inventory level. All inventory records will be stored in the database. When the customer browses the website, the inventory record will be returned to the client browser. Therefore, the inventory records are up to date and connected to the database. When the inventory is low, the system will notify the employee. Then, the staff will be able to replenish the stock. The system can also generate sales reports to allow employees to analyze their products. Customers are also allowed to browse the website to get inventory details, such as product quantity, product price, etc.

3.3.2 Use Case Diagram

Figure 3.12 Use Case Diagram: Administrator and Customer



The diagram shows the use cases for administrators and customers. The administrator needs to log in to the system, but the user does not. Both administrators and users can search for products. The administrator can CRUD the product, including adding, editing, deleting, and viewing. And they also can modify inventory, sell products, perform user management, analyze products, generate reports, and manage database. Customers are also allowed to view products. In addition, the administrator can analyze the product and generate reports. Finally, the administrator can add store information updates, and then customers will see the store's updated information.

3.3.2.1 Use Case Table

Table 3.6 Use Case Table: Add new product

Use Case	Add new product
Description	This use case consists of one actor (admin), it related with 1 activity (add product)
Primary actor	Admin
Precondition	New product needs to add
Events	Add product
Basic flows	1) Add product 2) Enter product details
Includes	-
Extend	-

Table 3.7 Use Case Table: Modify Inventory

Use Case	Modify inventory
Description	This use case consists of one actor (admin), it related with 4 activities (add product, edit product, delete product, view product)
Primary actor	Admin
Precondition	Admin modify product
Events	When the product needs to modify
Basic flows	1) View product 2) Select product 3) Edit product or delete product
Includes	-
Extend	-

Table 3.8 Use Case Table: Inventory Analysis

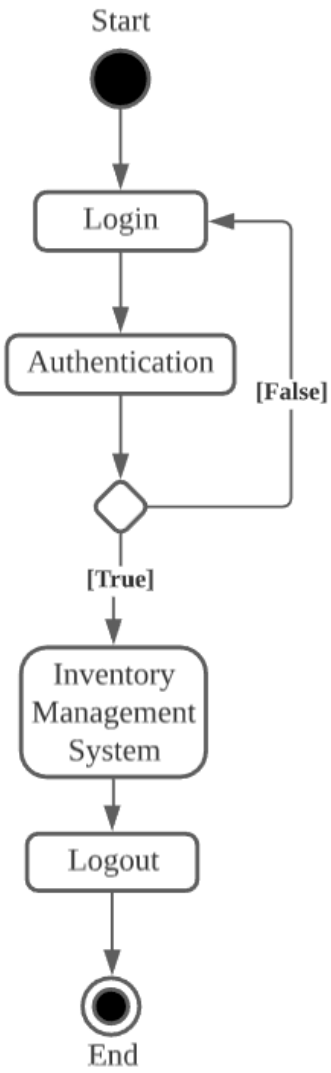
Use Case	Inventory analysis
Description	This use case consists of one actor (admin), it related with 3 activities (sell product, analysis on product, generate sales report)
Primary actor	Admin
Precondition	The product is sold
Events	Conduct analysis on sold product
Basic flows	1) Select specified date 2) Generate sales report 3) Analysis on product
Includes	**-**

Table 3.9 Use Case Table: Add store information update

Use Case	Add store information update
Description	This use case consists of two actors (admin, customer), it related with 3 activities (add store update, view store update)
Primary actor	Admin
Precondition	The store update is added
Events	Store update information is adding
Basic flows	1) Admin add store information update 2) Customer view store update
Includes	-
Extend	View store update

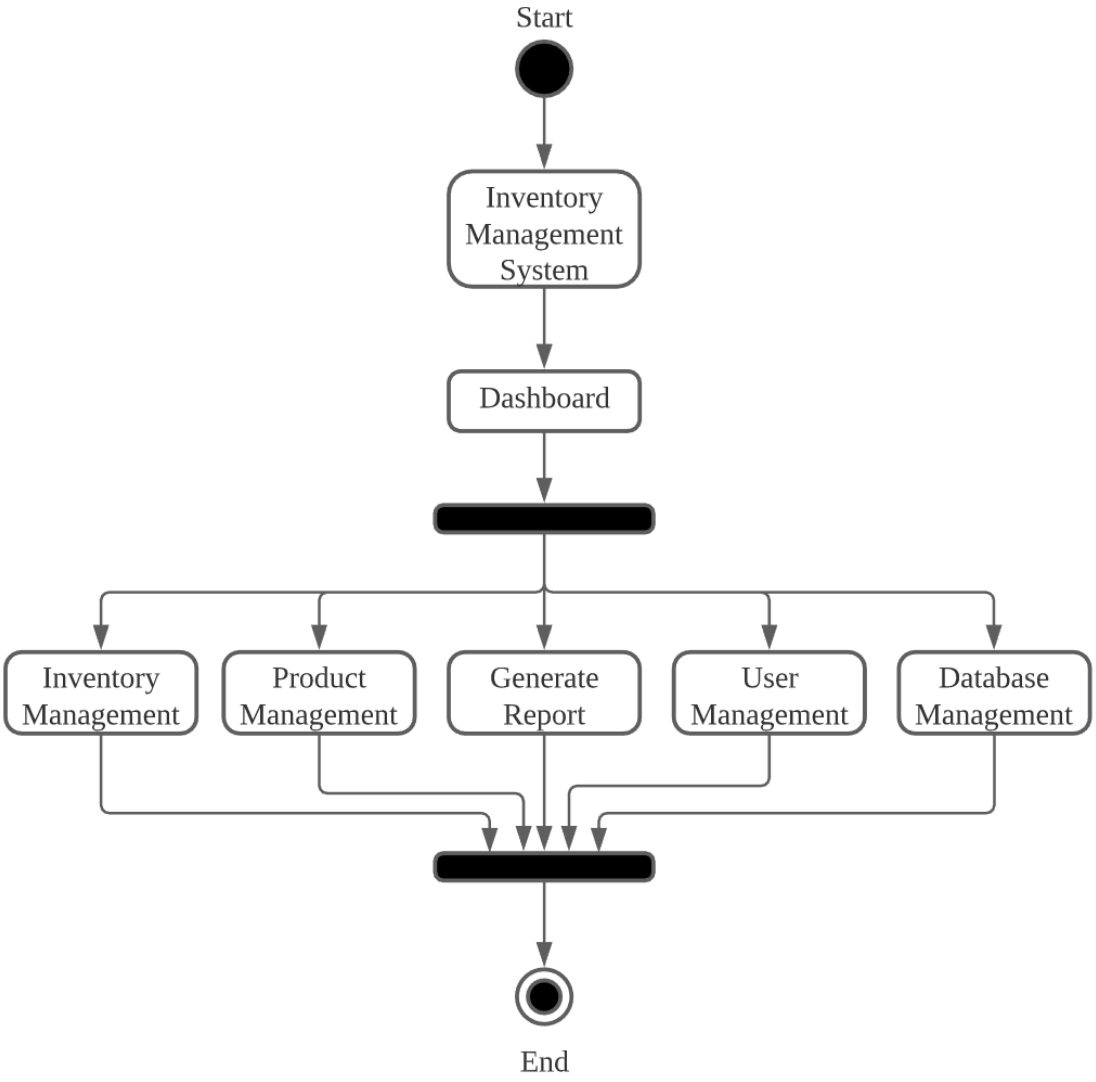
3.3.3 Activity Diagram

Figure 3.13 Activity Diagram: Admin login to System



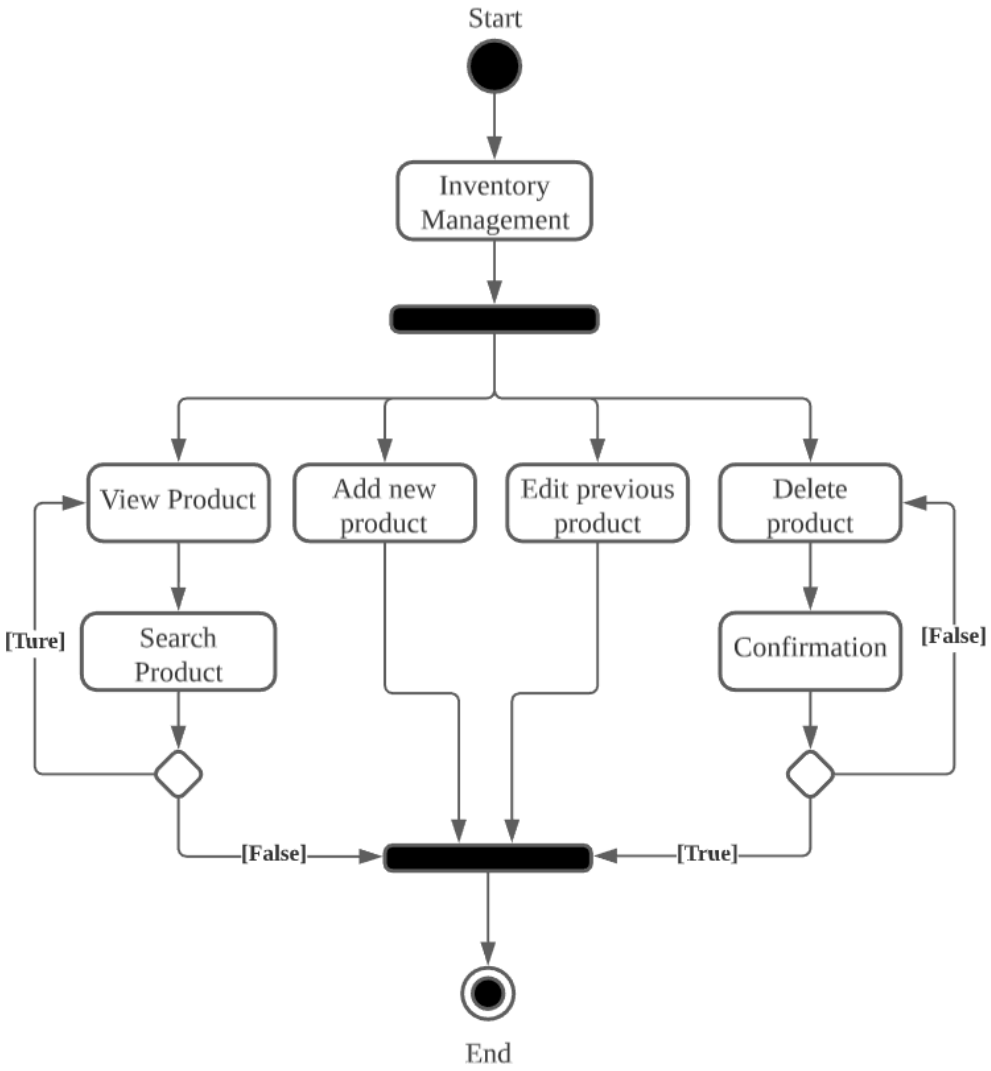
This activity diagram shows how admin log into the system. If the authentication is false, the user will receive an error message and return to the login page. Otherwise, the authentication is true, and the user will log in to the system. After finishing all the work, the user can log out of the system.

Figure 3.14 Activity Diagram: Admin's activity



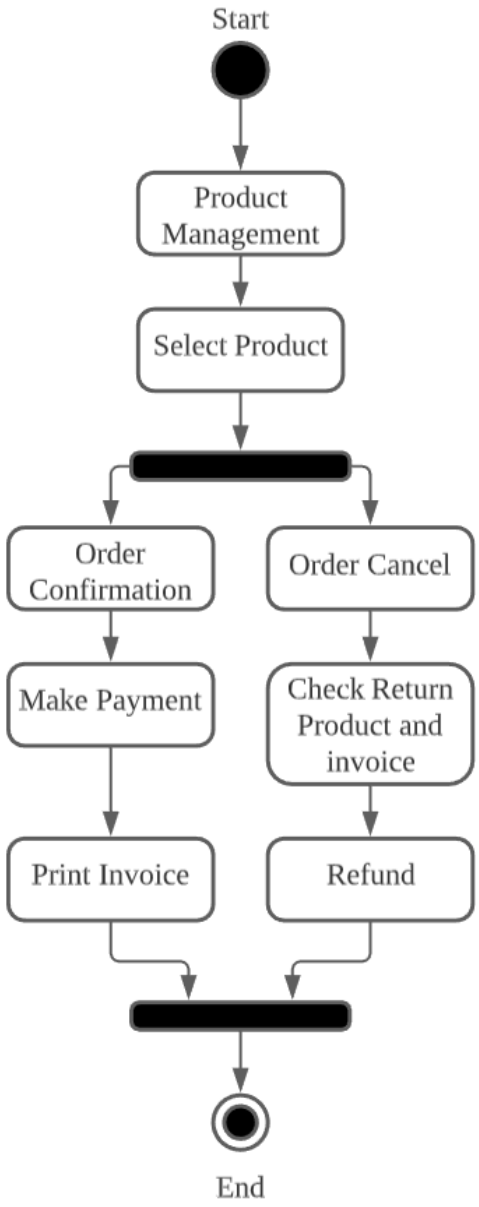
The diagram shows the activities that the administrator can perform in the inventory management system. In the beginning, the user will be redirected to the dashboard. The dashboard will display some detailed information about the inventory, including analysis, inventory reduction, etc. Thereafter, the user can perform inventory management, product management, generate reports, user management and database management.

Figure 3.15 Activity Diagram: Inventory Management



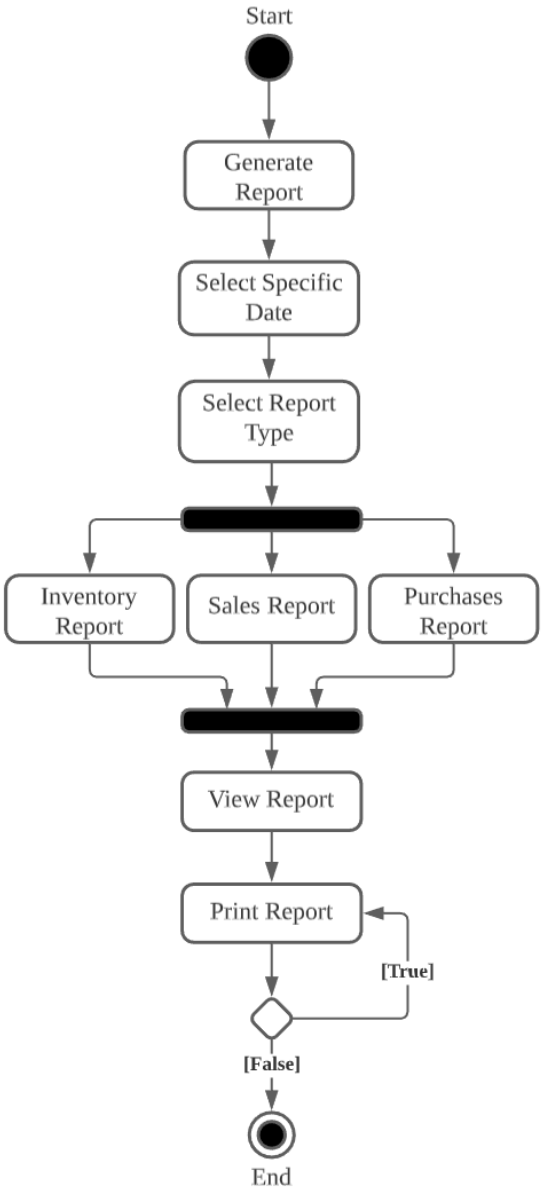
The figure shows the inventory management functions in the system. Only the administrator has the authority to perform this operation. In this section, CRUD operations are allowed. Users can view products, add new products, edit previous products and delete products. And in the "View Products" section, allow users to search for products. If they search for a product, the product they searched for will be displayed. If not, the viewing product operation will end. In the “Delete Product” section, it has a confirmation to avoid accidental deletion by the user. If the confirmation is false, the user will be returned to the interface to delete the product.

Figure 3.16 Activity Diagram: Sell Product



The figure shows how to perform product management. Customers and employees in retail stores will participate in this event. After selecting the product, the user can perform order confirmation and order cancellation in this section. When the customer confirms the order, they will pay, after which the invoice will be printed and provided to the customer. For cancelled orders, the staff will check the product and invoice and refund the customer.

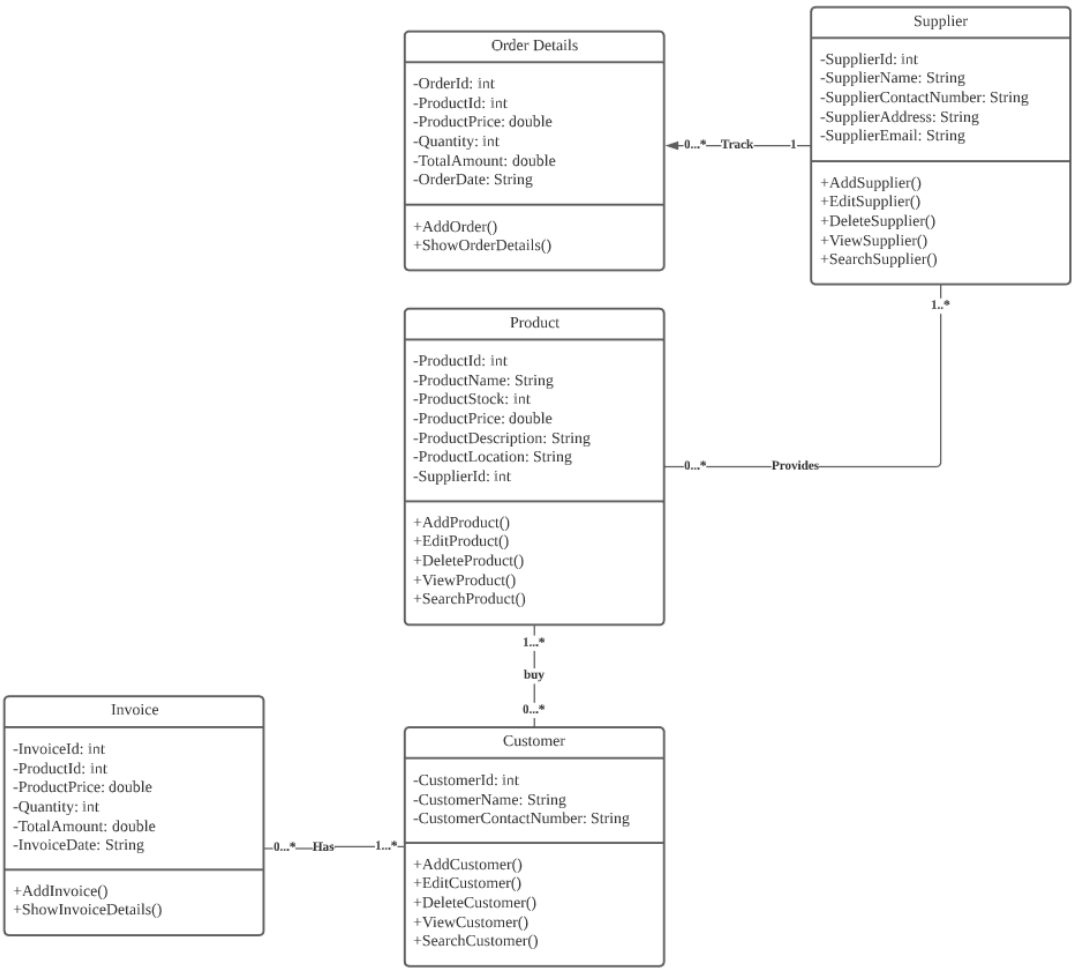
Figure 3.17 Activity Diagram: Generate Report



This figure shows the report generation activity in the inventory system. The system allows administrators to generate reports based on inventory records. First, the user needs to select a specific date, and then select the report type. The report types can be inventory report, sales report and purchase report. After that, the report is generated, and then the user can view the report. Users can then choose whether they want to print the report or know.

3.3.4 Class Diagram

Figure 3.18 Class Diagram

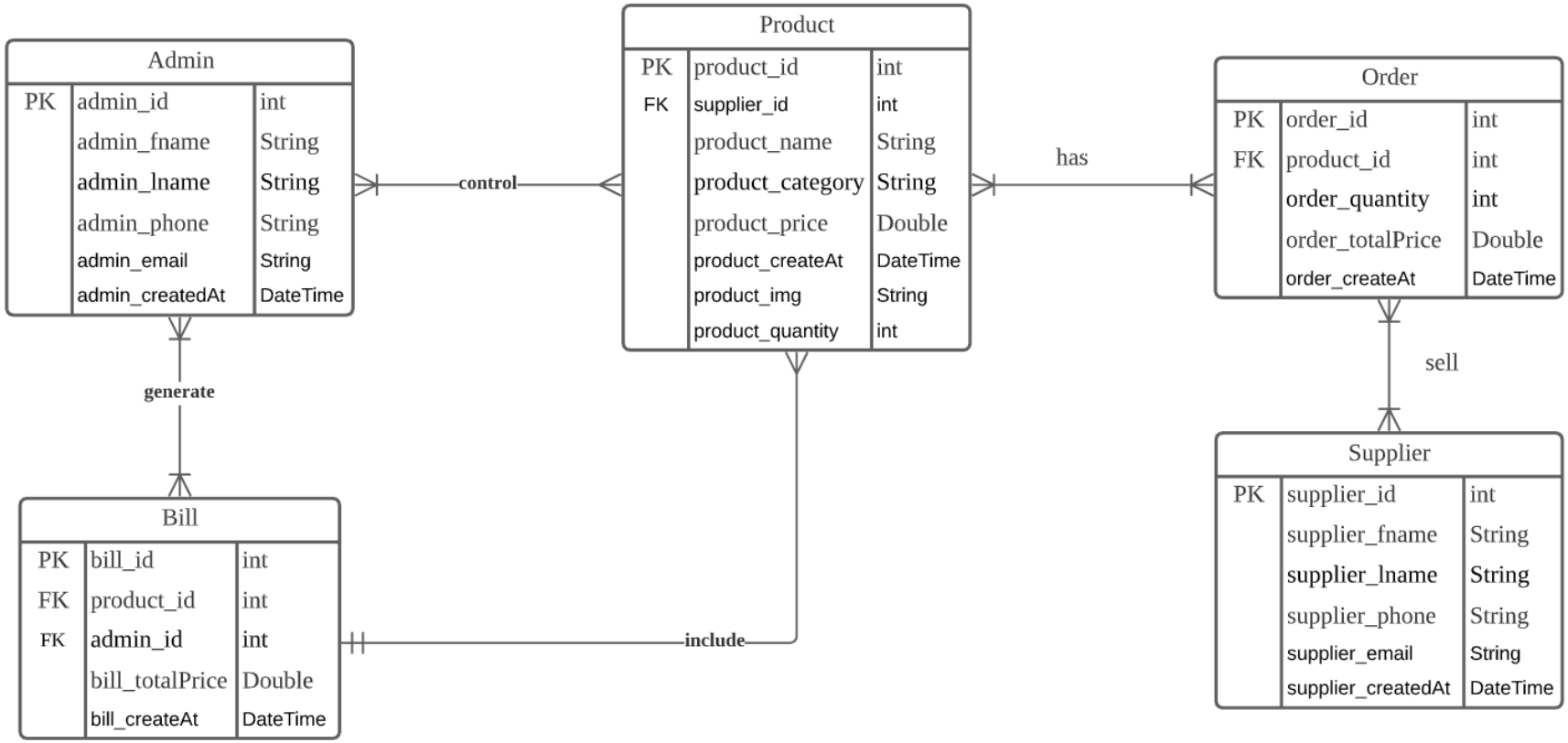


Class diagram is an object-oriented modeling. It can be used to conceptually model the application structure. Audience can understand the structure or concept of our system based on this diagram. It describes the structure of the system by showing it as a class. And will show the attributes, operations and relationships between objects.

According to this diagram, readers can know the classes included in the inventory management system. It includes admin, order details, invoices, products, customers and suppliers. And in each class, their operations are also defined.

3.3.5 Entity Relationship Diagram

Figure 3.19 Entity Relationship Diagram



The ER diagram shows the structure of the inventory management system database (Singh, 2020). It shows the blueprint of the database. The figure shows the relationship of each entity set. The author also specifies the primary key and foreign key of each entity. And the data type has also been specified, the developer will have ideas in the database because of the ER diagram.

In the database, it will have all the information of administrators, products, orders, bills, suppliers, etc. All tables will contain data, and the table and the table themselves will have a relationship. The storage of these data is necessary because it can help us better develop the system.

3.4 System Interface

In this section, the author will show the interface of the system, including the prototype. The design of the system will be provided to users. For the prototype, Moqups is used to develop. After reading this section, the audience can have a blueprint of the overall system interface.

3.4.2 Prototype

Figure 3.20 Prototype: Inventory

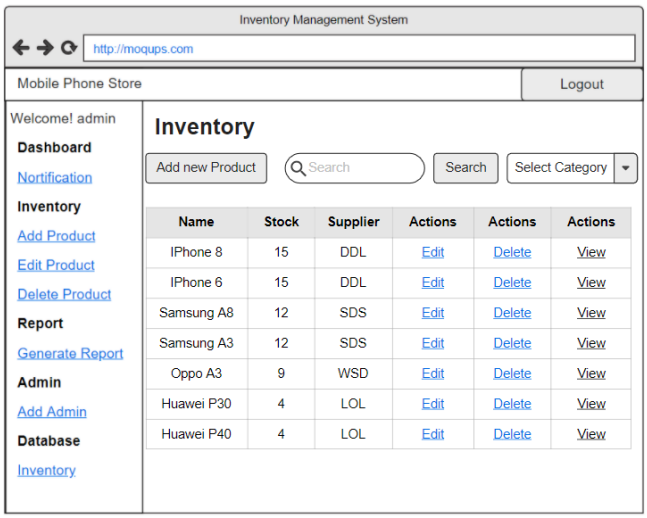


Figure shows the navigation bar of the system. When the user logs in to the system, it will always be displayed. It will display the user's session record, including the username. And there is a logout button in the upper right corner. If the user clicks the logout button, the user session will be destroyed.

In additional, this figure also shows the inventory records in the system. All records are returned from the database. Allow users to add new products, search for them and select categories. When the user searches, the record will be returned. Allow users to edit, delete and view.

Figure 3.21 Prototype: Add Product

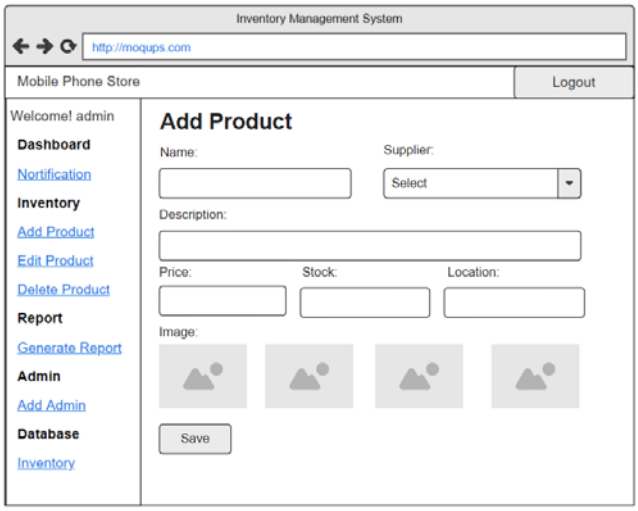


Figure shows the add product page. The user is required to enter the product name. Select supplier, product description, price, available inventory and warehouse location. Pictures can also be uploaded to distinguish products. After saving, the data will be stored in the database.

Figure 3.22 Prototype: Edit Product

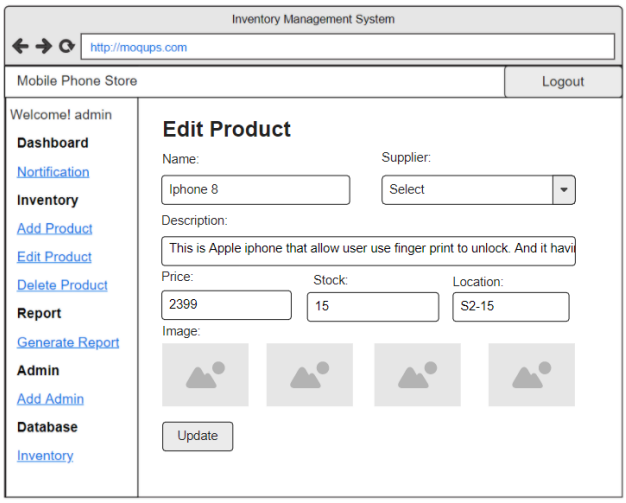


Figure shows the edit product page. Allow users to edit product details, including name, supplier, description, price, inventory, location, image, etc. After clicking the update button, the product record will be updated.

Figure 3.23 Prototype: Sell Product

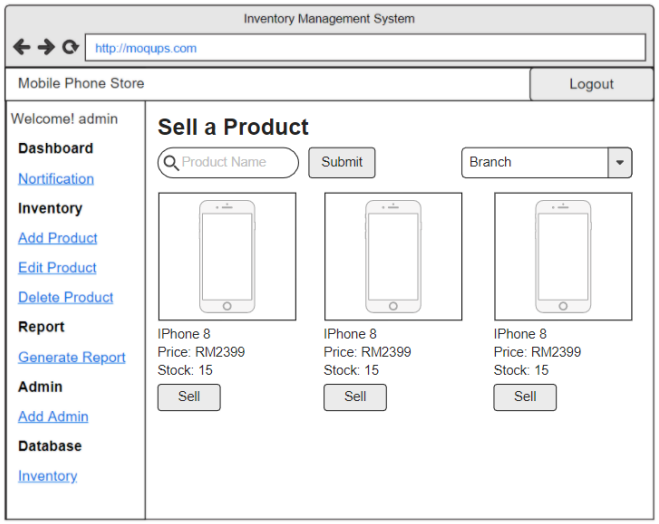


Figure shows the sold product page. The user can search or select the product category to be sold to the customer. The name, image, price and quantity will be displayed.

Figure 3.24 Prototype: Payment Page

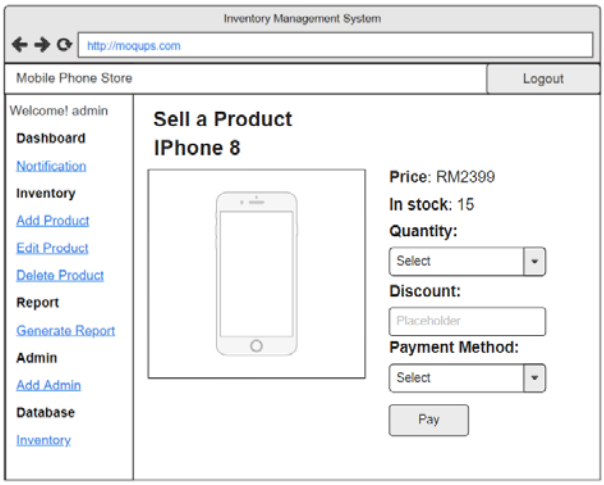


Figure shows the payment confirmation page. In this page, users can select the number of products to be sold, the discount percentage and the payment method. After clicking the "Pay" button, the inventory of the following products will be updated.

Figure 3.25 Prototype: Generate Report

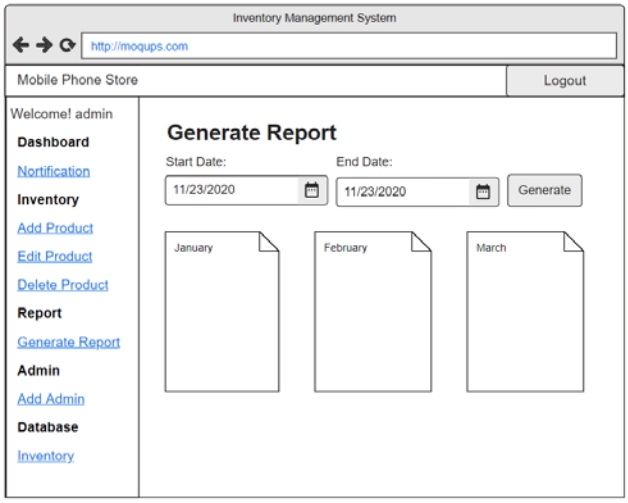


Figure shows the Generate report page. It allows the user to select the start date and end date for the user to generate the report. They can choose a report based on the month. After clicking, the report will be displayed.

Figure 3.26 Prototype: Report Review

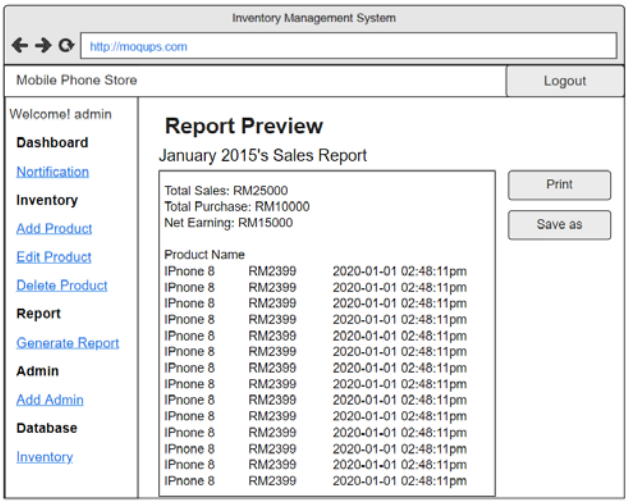


Figure shows the details of the report. It allows users to print the report or save the report to their computer.

3.5 Summary

Chapter 3 describes all the relevant facts of survey techniques being used and analyzes how to use them to become useful data. Throughout the questionnaires and interviews, the authors collected valuable raw data, such as opinion and the proposed system and market products related advice and examples. After data collection and analysis, the author lists functional requirements, non-functional requirements, user requirements, and information about all related components and standards. Based on these requirements, the author draws system design drawings and interface design drawings. These drawings can help users explain the proposed system and have a better understanding of the working principle of the system.

Chapter 4: Implementation

4.0 Overview

In this chapter, the included documents will explain the system prototype involved in the development and implementation. The author will use the result of fact finding, data analysis, functional and non-functional requirement, and then compile them into a document covering the development process and technology used in the proposed system. According to the system specifications listed from the previous chapter, the author will meet the requirements of users during the system construction. All the processes are carried out and discussed in a detailed way, which will involve software, hardware, programming, and coding. Sales and Inventory Management Web Application using ASP.NET, C#, CSS, HTML, SQL, and JavaScript. Application is published in HTML format, which will contain database for storing inventory data. This application can be used by any computer device.

4.1 Tools and Technologies

4.1.1 ASP.NET

In the implementation stage, the author developed an inventory web application using Visual Studio 2015 IDE. Asp: GridView and Asp: Repeater have been used to display database tables. Asp: Repeater allows authors to display repeated tabular data. It can efficiently process forms. Asp: SqlDataSource is also used to allow users to connect to the database immediately. Asp: Buttons can be run on the server. After clicking the button, the server can control these functions by using c # at the back end. ASP.NET is used to generate interactive and data-driven network applications on the Internet. It is composed of many controls, such as text boxes, buttons, and labels, which are used to combine, configure, and operate code to create HTML pages.

4.1.2 C#

C # is the back-end programming language of this system. It is included in the ASP. NET framework is used to control the back-end architecture, includes the interaction between the database and the Web application. In the implementation, c # is used together with SQL commands to perform CRUD operations on inventory data stored in the database. Control the connection behaviour between the database and the application. The author also uses c # to control the container of the application, including buttons, hyperlinks, labels, text boxes, drop-down lists and so on.

4.1.3 HTML

HTML has been used to represent the structure of the web application. It is the standard mark-up language used to display the document in the web browser. The author used the html to display the document of the inventory management system. It can be said that all web pages need to be displayed in html format. It is a standardized system, which is used to mark text files to achieve fonts, colours, graphics, and hyperlink effects on world wide web pages.

4.1.4 CSS

In the implementation of the system design, the author used Bootstrap and W3.CSS Framework for Web Design Bootstrap and W3.CSS is an open source CSS framework. It contains a large library, which can help authors to simplify the development of front-end web pages. The interface of the website is developed by using these two CSS frameworks. So, the interface design looks neat and tidy. The author downloads the CSS file from w 3. CSS and Bootstrap official website and puts it in the folder, then the html can be used directly with the CSS file. CSS makes Web pages more suitable for human-computer interaction. Make the webpage closer to the design of user interface and user experience. To make it easier for human beings to understand.

4.1.5 SQL

SQL is a domain-specific language, which is used to design, and program data stored in relational database management systems. In the implementation of the system, SQL is a programming language that can interact with the database from the system. C # keeps the connection active and passes the query to the database. The database then returns the result to the system. The author use SQL queries to perform CRUD operations on SQL databases. All inventory details are stored in the database.

4.1.6 Datatables.net

The author uses datatables.net to implement tables with additional functions. It has enhanced plug-in to query the JavaScript library. It adds sorting, paging, and filtering functions to pure HTML tables with minimal workload. It allows us to put database records into tables, and provides user search functions, sorting functions and so on, which makes the table functions reliable and abundant. The following figure shows the brand data placed on the datasheet.

4.1.7 JavaScript

JavaScript is very important in the front-end development of the system, especially in websites. The main function of JavaScript is to control the front end of the webpage. It allows users to interact with web pages, which is an important part of web applications. Users can perform client-side page behaviours through JavaScript. All browsers have their own JavaScript engine to run it. Using JavaScript, certain user actions do not need to be sent to the server and can be done on the client. Moreover, JavaScript can also help authors make virtualized data and converts the data into a chart when using some library. Many JavaScript libraries will be used to make the system more reliable.

In the implementation of the system, the jQuery library is used, which makes the front end more efficient. For example, the author uses jQuery printing to print bills and invoices. Users can directly print invoices based on this JavaScript library.

4.1.8 Google Chart

Google Charts is an interactive network service, which allows authors to create graphic charts according to information and data provided by users. The user provides data and format descriptions of JavaScript representation embedded in web pages. In response to the user's response, the Google Chart Service sends the chart image back to the webpage. In the implementation of the system, the author visualizes the inventory status by using Google Chart. All the data used in the analysis comes from the database. According to the return of the chart, users can more conveniently check the performance of inventory sales. In this system, the monthly sales volume is also visualized by Google Chart.

4.2 Pseudocode

4.2.1 Home Screen (Dashboard)

The following pseudo code will be executed after the main screen is loaded. It inserts label ID and SQL query, and call the program. The program returns data from the database.

Figure 4.1 Pseudocode 1 – When home screen is load

```
If this page is not post back
        Insert product label id and query "SELECT COUNT(*) as count FROM
        product" to get the result
        Insert bill label id and query "SELECT COUNT(*) as count FROM bill"
        to get the result
        Insert category label id and query "SELECT COUNT(*) as count
        FROM category" to get the result
        Insert brand label id and query "SELECT COUNT(*) as count FROM
        brand" to get the result
```

The following program will allow users to place labels and SQL commands in it, to obtain data from the database for analysis and visualization.

Figure 4.2 Pseudocode 2 – Retrieve SQL result

```
Select label and input SQL command.
If connection state is close.
        Database connection open.
        Get sql command.
        Put the sql command.
        Read sql command.

        If SqlDataReader have record
                Update specific label.

        Database connection close.
```

4.2.2 Category Control Panel

When the user clicks the "Save" button on the "Edit Category" page or "Add Category" page, the program will retrieve the operation identification from the cookie. If the cookie value is 0, a new category will be added. Otherwise, the following data records will be updated if the value is "1".

Figure 4.3 Pseudocode 3: Category save button is click

```
If cookies value is “0” (“0” represent user add new category)
        Database connection open
        Set the select SQL query ("SELECT * FROM category WHERE
        category_name=@name";)
        Put query to the SQL command
        Put the category name inside the command
        Use data reader to get result
        If has result
                Announce user that the category name already exists
        Else
                If connection state is closed
                        Database connection open
                        Set the select SQL query "INSERT INTO category
                        (category_name,
                        category_status)values(@name,@status)")
                        Put the category name inside the command
                        Put the category status inside the command
                        Execute query
                        Database connection close
                        Alert user the category added successfully and redirect
                        to brand control page.
Else if cookies value is “1” (“1” represent user edit brand)
        If connection state is closed
                Database connection open
                Set the update SQL query "UPDATE [category] SET
                category_name=@name, category_status=@status WHERE
                Id=@Id"
                Put the category id from cookies to the command
                Put the category name inside the command
                Put the category status inside the command
                Execute query
                Database connection close
                Alert user the category update successfully and redirect to
                category control page.
```

When the user clicks the delete button on the category table, the program will delete the category row according to its given category ID. This category id is stored on the delete command. Therefore, when the user clicks the button, the category ID will be transmitted to the server.

Figure 4.4 Pseudocode 4: Category delete button is click

```
This program will display when user pass the delete command when click the
delete button from the table.

Delete confirmation window is display.
Database connection open.

Use SQL query to select the category from table based on the id.
Store category id to the cookies.
Put the category id to the SQL command.

Use SqlDataReader to execute the SQL command.

If the SqlDataReader have record
        Change the label id based on the SQL result.
        Change the label name based on the SQL result.
Else
        Refresh this page to avoid error.

Database connection close.
```

4.2.3 Brand Control Panel

When the user clicks the "Save" button on the "Edit Brand" page or "Add Brand " page, the program will retrieve the operation identification from the cookie. If the cookie value is 0, a new brand will be added. Otherwise, the following data records will be updated if the value is "1".

Figure 4.5 Pseudocode 5 – Brand save button is click

```
If cookies value is “0” (“0” represent user add new brand)
        Database connection open
        Set the select SQL query ("SELECT * FROM brand WHERE
        brand_name=@name";)
        Put query to the SQL command
        Put the brand name inside the command
        Execute query
        Use data reader to get result

        If has result
                Announce user that the brand name already exists
        Else
                If connection state is closed
                        Database connection open
                        Set the select SQL query "INSERT INTO brand
                        (brand_name,brand_status)values(@name,@status)")
                        Put the brand name inside the command
                        Put the brand status inside the command
                        Execute query
                        Database connection close
                        Alert user the brand added successfully and redirect to
                        brand page.
Else if cookies value is “1” (“1” represent user edit brand)
        If connection state is closed
                Database connection open
                Set the update SQL query "UPDATE [brand] SET
                brand_name=@name, brand_status=@status WHERE Id=@Id"
                Put the brand id from cookies to the command
                Put the brand name inside the command
                Put the brand status inside the command
                Execute query
                Database connection close
                Alert user the brand update successfully and redirect to brand
                page.
```

4.2.4 Product Control Panel

This process will be executed after the add product page is loaded. The function of this program is to obtain the latest product ID.

Figure 4.6 Pseudocode 6– Add product page is load

```
If page is not post back
        Database connection open
        Set the SQL select query "SELECT TOP 1 Id FROM [product] ORDER
        BY Id DESC"
        Execute SQL command

        If data reader is read
                Store the product Id and add 1
        Else
                Alert user that is error and redirect to product control page.
        Database connection close
```

When you click the "Save" button on the "Add Product" page. It stores the image of the product in the server folder and stores the product data in the SQL database. The user is then reminded that the process is complete.

Figure 4.7 Pseudocode 7 – Add product save button is click

```
If connection state is closed
        Database connection open
        Set the directory information.
        If directory information is existing
                Create subdirectory based on product id
        Save the product image to the directory

        Set the SQL insert query ("INSERT INTO product
        (product_name,product_sku,product_price,product_quantity,product_d
        esc,product_brand,product_category,product_img,product_status)valu
        es(@name,@sku,@price,@quantity,@desc,@brand,@category,@img
        ,@status)")
        Inset query into SqlCommand.
        Add item values to the query (Textbox, image, drop down list)
        Execute SQL command
        Database connection close

        Alert user that the product is added and redirect to product control
page.
```

After clicking the edit button on the product list, the program will get the product ID from the next line, store it in a cookie, and then redirect it to the edit product page.

Figure 4.8 Pseudocode 8 – Product edit page is click

```
If command name is “ProductId”
        Store the product id to the cookies
        Redirect to the edit product page.
```

The following pseudocode will be executed when the user is redirected to the edited product page. It will return product data from the database according to the product id on the cookie.

Figure 4.9 Pseudocode 9 – Product edit page is load

```
If page is not post back
        Database connection open

        Set the SQL select query "SELECT * FROM [Product] WHERE
        Id=@Id"
        Add the product id from cookies to the SQL command
        Execute SQL command

        If data reader is read
                Retrieve the record to the textbox, drop down list, image url
        Else
                Alert user that is error and redirect to product control page.

        Database connection close
```

When the user clicks the Save button on the Edit Product page, the product table data will be updated according to the product id. When it is finished, it notifies the user that the product has been updated.

Figure 4.10 Pseudocode 10 – Edit product page save button is click

```
If connection state is closed
        Database connection open

        Set the directory information.
        If directory information is existing
                Create subdirectory based on product id
        Save the product image to the directory

        Set the SQL update query "UPDATE [product] SET
        product_name=@name, product_sku=@sku, product_price=@price,
        product_quantity=@quantity, product_desc=@desc,
        product_brand=@brand, product_category=@category,
        product_img=@img, product_status=@status WHERE Id=@Id"
        Inset query into SqlCommand.
        Add item values to the query (Textbox, image, drop down list)
        Execute SQL command
        Database connection close

        Alert user that the product is update and redirect to product control
page.
```

The pseudocode will be executed when the delete button is clicked. It will delete table rows based on the product ID.

Figure 4.11 Pseudocode 11 – Product delete button is click

```
Database connection open

Store sql query into variable
Set the sql query "DELETE FROM [product] WHERE Id=@id;" and
connection
Add delete product id to the command.
Execute sql command to get the result

Database connection close

Alert user that the following product is delete.
```

4.2.5 Order Control Panel

The program will be executed when the add order page is loaded. It deletes table data from the shopping cart table to avoid errors and ensure that the shopping cart table is in the default state.

Figure 4.12 Pseudocode 12 – Add order page is load

```
If webpage is not post back
        If connection state is closed
                Database connection open
                Set the SQL query string “DELETE FROM cart" and connection
                Execute sql command to get the result
                Database connection close
        Get the data time now and store into variable
        Set the data label
        Set the time label
```

The following pseudocode will be performed after the cart table is updated. This program runs whenever the user makes any changes to the cart table.

Figure 4.13 Pseudocode 13 – Update and bind the cart table

```
This program will bind the cart table.

Set up the data table

If connection state is closed
        Database connection open
        Set the SQL query string "SELECT * FROM cart" and connection
        Execute sql command to get the result
        Store result to the data table
        Database connection close

If data table rows > 0
        Grid view product data source equal data table
        Bind grid view

Calculate sum
```

When the discount text box is changed, the program will be executed. The total amount will be updated according to the calculation result.

Figure 4.14 Pseudocode 14 – Discount textbox is changed

```
Get value on the discount textbox
Get value on the gross amount textbox
Get value on the services tax textbox

Update net amount textbox. (Gross amount + services tax – discount)
```

When there is any change in the shopping cart table, this program will run. It calculates the total amount, service tax and order total amount.

Figure 4.15 Pseudocode 15 – Calculate the sum of the order

```
This program is used to calculate sum.

Set variable for gross amount
Set variable for services tax
Set variable for net amount

If connection state is closed
        Database connection open
        Set the SQL query string "SELECT COUNT(*) FROM cart" and
connection
        Execute sql command to get the result
        If result is “0”
                Set gross amount = 0
                Set services tax = 0
                Set net amount = 0
        Else
                Set the SQL query string "SELECT SUM(product_total_price)
                as Total FROM [cart]"and connection
                Execute sql command to get the result
                If result is return
                        Set up gross amount to be calculated based on the result
                                Set up service tax to be calculated based on the
                result
                        Set up net amount to be calculated based on the result
        Database connection close
```

This program is executed when the product in the pop-up window is selected. After that, it will update the shopping cart table based on the product selected by the user and the quantity entered.

Figure 4.16 Pseudocode 16 – Pop-up product is select

```
Get the repeater item values
Get the quantity textbox value from the selected repeater item.
Get the product id from the repeater item.
Get the product name from the repeater item.
Get the product quantity in stock from the repeater item.
Get the product quantity need from the repeater item.
Calculate total and store to a variable.
Get the product price from the repeater item.
        If connection state is closed
                Database connection open
                Set the SQL query string "SELECT * FROM cart WHERE
                product_id=@id"and connection
                Add the product id to the command
                Execute sql command to get the result
                If result is read (the product already on cart table)
                        Set the SQL update query string "UPDATE cart SET
                        product_name = @name, product_qty_instock =
                        @qty_instock, product_qty_need =
                        @qty_need,product_price = @price,
                        product_total_price=@total WHERE product_id = @id"
                        Add the item value to the command
                        Execute sql command
                        Alert user the cart item is exists and update the product
                        quantity.
                        Bind the cart table
                Else
                        Set the SQL insert query string "INSERT INTO cart
                        (product_id,product_name,product_qty_instock,product_
                        qty_need,product_price,product_total_price)values(@id,
                        @name,@qty_instock,@qty_need,@price,@total)"
                        Add the item value to the command
                        Execute sql command
                        Alert user the product is add to the cart table

                        Bind the cart table

Close the product popup window
```

4.2.6 Company Profile Settings

After the company profile settings page is loaded, the following program will run. After that, the previous records of the company file will be loaded from the database and displayed on the webpage. According to these results, users can change company settings.

Figure 4.17 Pseudocode 17: Company profile settings page is load

```
If webpage is not post back
        Database connection open

        Store sql query into variable
        Set the sql query and connection
        Execute sql command to get the result

        If result is read
                Retrieve the company profile data to the textbox

        Database connection close
```

The program will be executed when users click the Save Confirm button. It will update the company table data in the database and remind users that the data has been updated.

Figure 4.18 Pseudocode 18: Company settings profile confirm button is click

```
When confirm button is click
        If connection state is closed
                Database connection open
                Set sql query string with variable.
                Use SqlCommand to set the query and connection
                Add the updating value to the SqlCommand
                Execute the Sql Command.
                Database connection close

                Popup alert window to announce user the company profile
                setting is update.
```

4.2.7 Report

After loading the report page, the program below will run. It will get the query string from the URL to display the following report, and check to make sure that the report is in the default state.

Figure 4.19 Pseudocode 19: Report page is load

```
If webpage is not post back
        Request query string from URL
        If query string is not empty
                Set report table to default.
                Set report table data based on specific year.
                Set drop down list to specific year
        Else
                Redirect to this page based on this year.
```

The following program updates the content of the report page according to the year selected by the user.

Figure 4.20 Pseudocode 20: Report page retrieve data based on year selected

```
Database connection open.
Set query string "SELECT SUM(net_amount) AS total,MONTH(date_time) as
mon,YEAR(date_time) as year FROM bill WHERE YEAR(date_time)=@year
GROUP BY MONTH(date_time), YEAR(date_time) ;" into variable.

Put query into sql command.
Add year inside command.
Set year label.
Use SqlDataReader to execute the command.

While the data is read
        Store month to list.
        Store sum of the net amount to list.

Database connection close.
```

4.3 Web Application Screenshot

4.3.1 Home Screen (Dashboard)

After logging in to the system, the home screen will be displayed as the home page. It displays the analysis results of the system, including sales achievement, product quantity, total orders, total categories, total brands, etc. All details are related to inventory. Based on this result, the user can know the inventory status, sales performance and so on of the store. In addition, the dashboard also displays out-of-stock and low-stock products to announce product replenishment by the management department.

Figure 4.21 Home Screen (Dashboard)

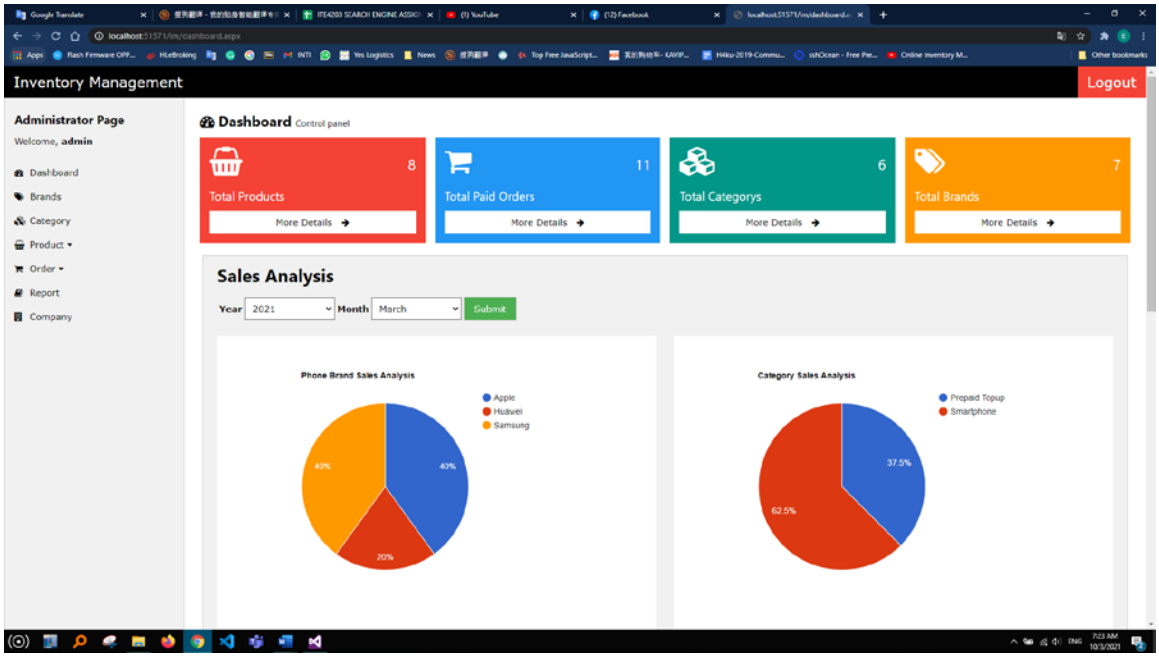


Figure 4.22 Home Screen – Sales Analysis

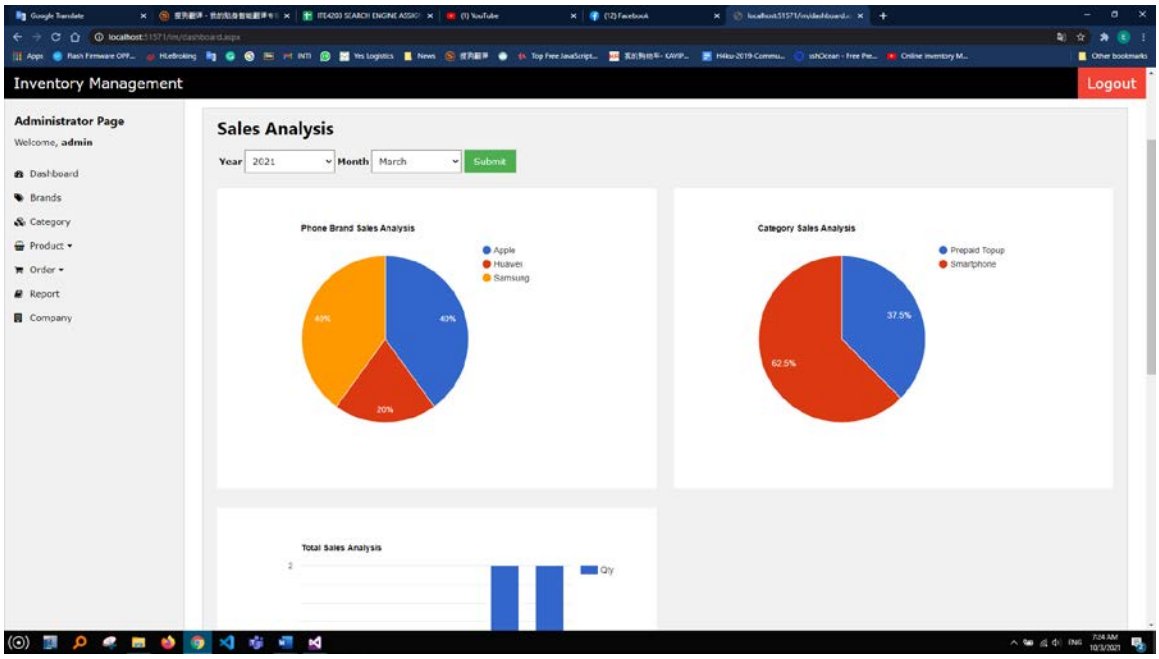
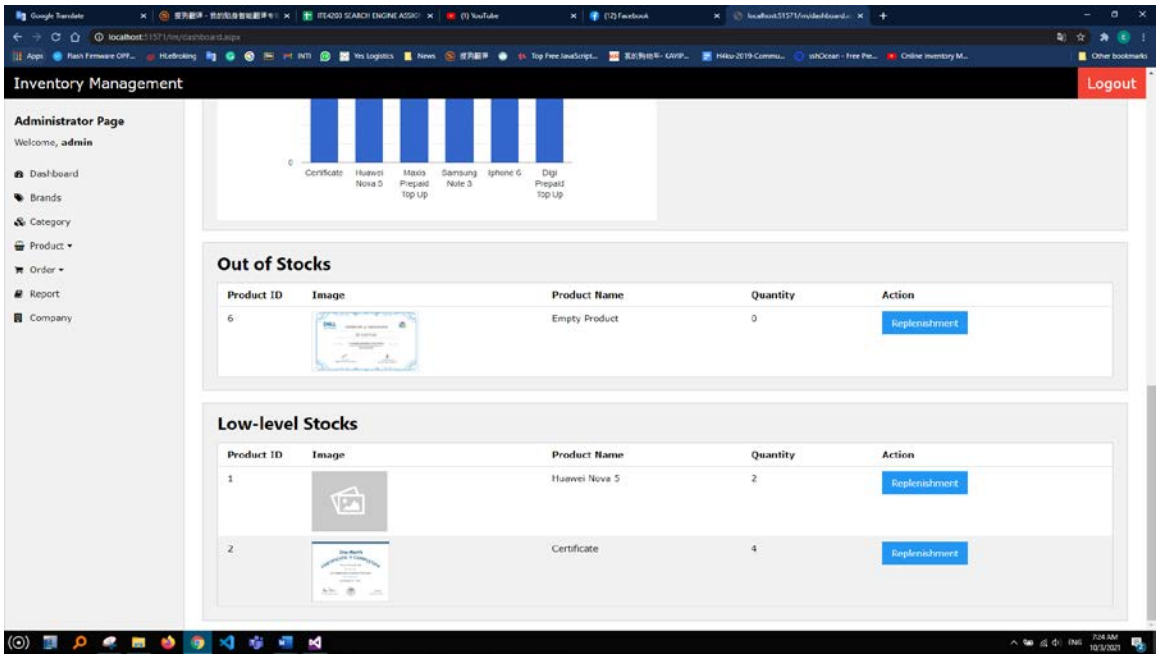


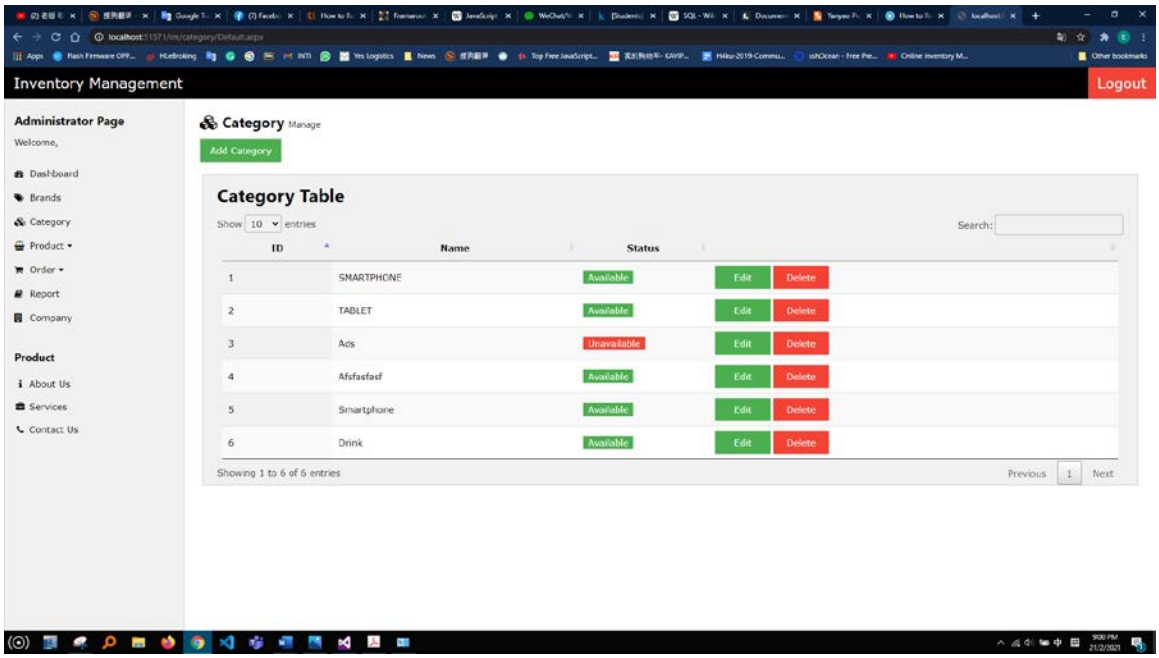
Figure 4.23 Home Screen - Out of Stocks and Low-level Stocks



4.3.2 Category Control Panel

This page is used to manage the details of categories. It allows users to perform CRUD operations on category details. Users can add new categories, edit categories, and delete categories. This status indicates whether this category is available. If the category is unavailable, it will not be displayed on the product form. It will be displayed on the category table and displayed in different colors. The user can change the status of this category. It makes it easy for users to manage categories.

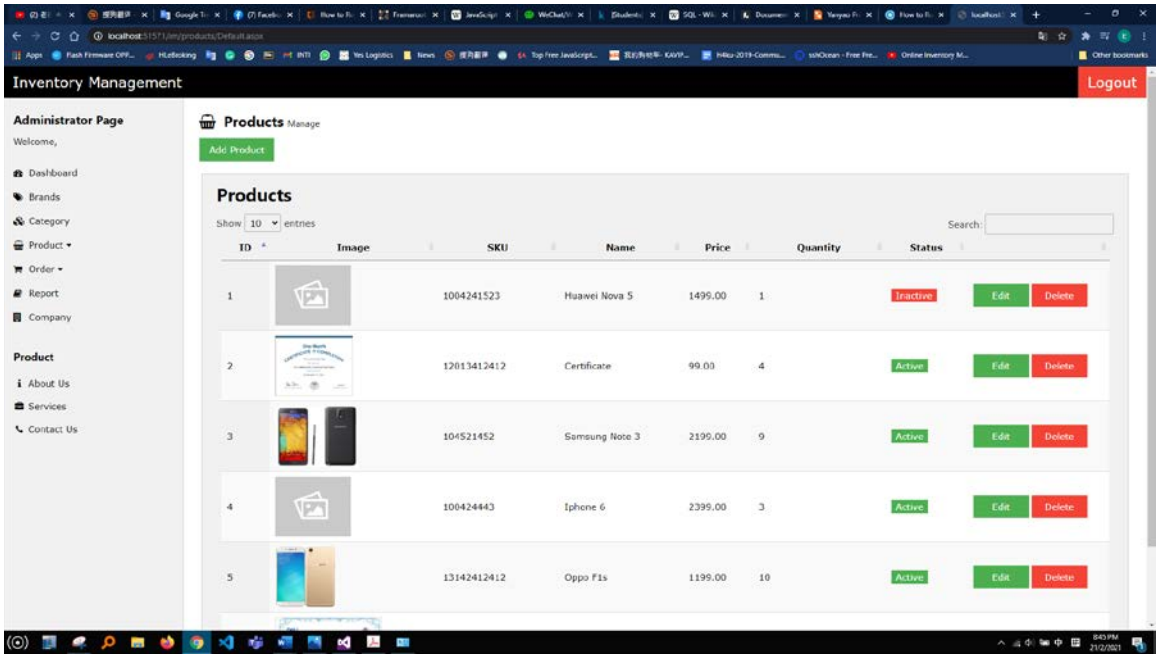
Figure 4.24 Category Control Panel



4.3.3 Brand Control Panel

This page is used for managing brand details. Like the category control panel, it allows users to CRUD the brand details. The user can change the status of the brand. Edit the brand name or delete the brand. After clicking the "Add" button, the "Add Item" page will be displayed, and the user needs to input the brand name. After clicking the edit button, the edit page will be displayed and the brand data to be edited by the user will be displayed. After clicking the Delete button, the system will pop up a deletion confirmation message, confirming whether the user wants to delete the following items. The status of the brand can be changed to “Available” or “Unavailable”.

Figure 4.25 Brand Control Panel



4.3.4 Product Control Panel

The product control panel allows users to perform CRUD operations on the product. They can add new products, edit products, or delete products. And the table is developed using the datatables.net library, which allows users to search and sort the following data. This status shows whether the product is active or not. The user can change the shape according to the color. Green indicates activity, and red indicates invalidity. Moreover, this page allow user to upload the product image. Add product page and edit product page have validation to avoid user input wrong details or leave blank. After clicking the Delete button, the deletion confirmation message will be displayed to prevent users from clicking by mistake.

In addition, the product control panel also allows users to replenish products. They can increase the quantity of specific products here, and all replenishment records will be saved in the database. And can be viewed in the replenishment page.

Figure 4.26 Product Control Panel

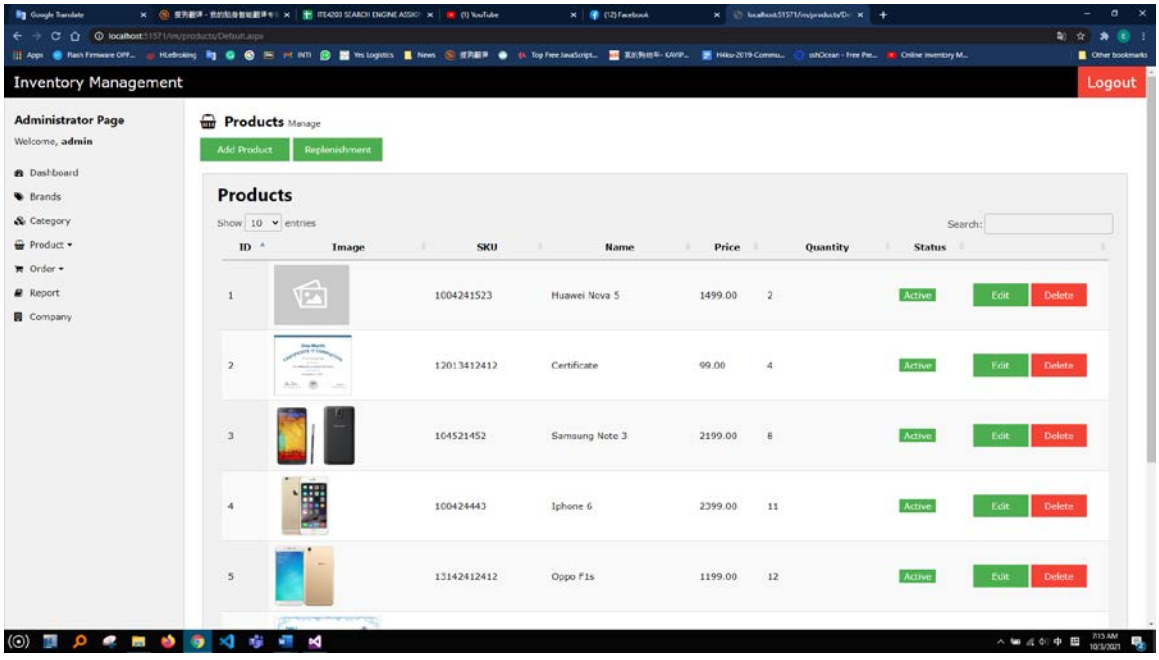


Figure 4.27 Product Control Panel - Add new product

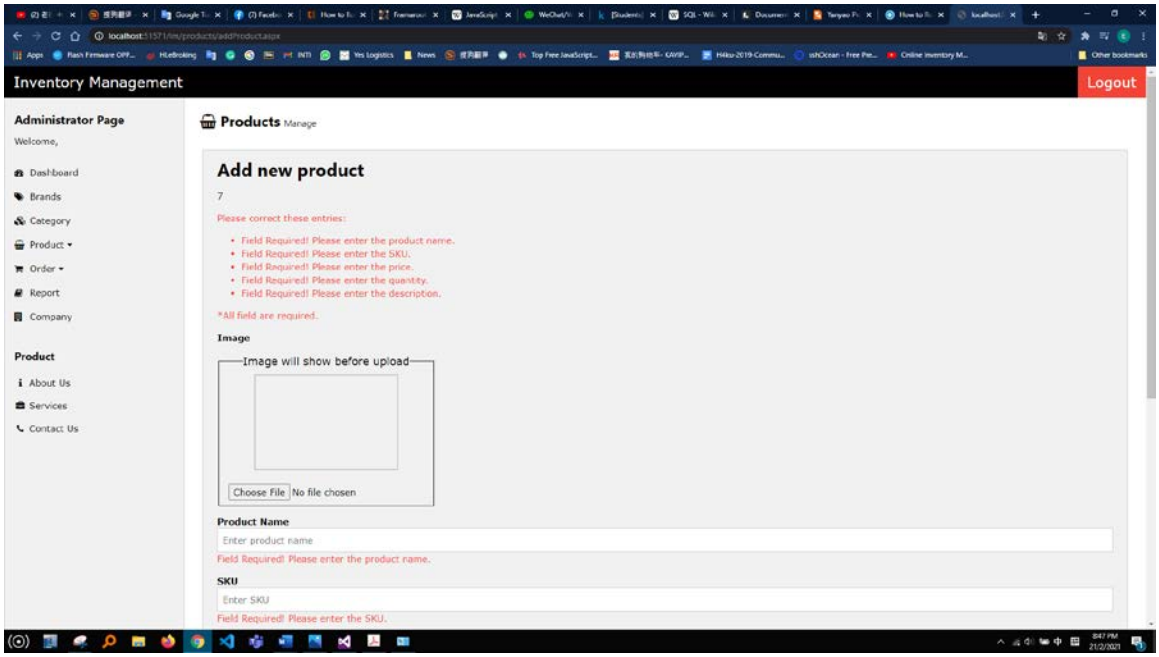


Figure 4.28 Product Control Panel - Delete confirmation

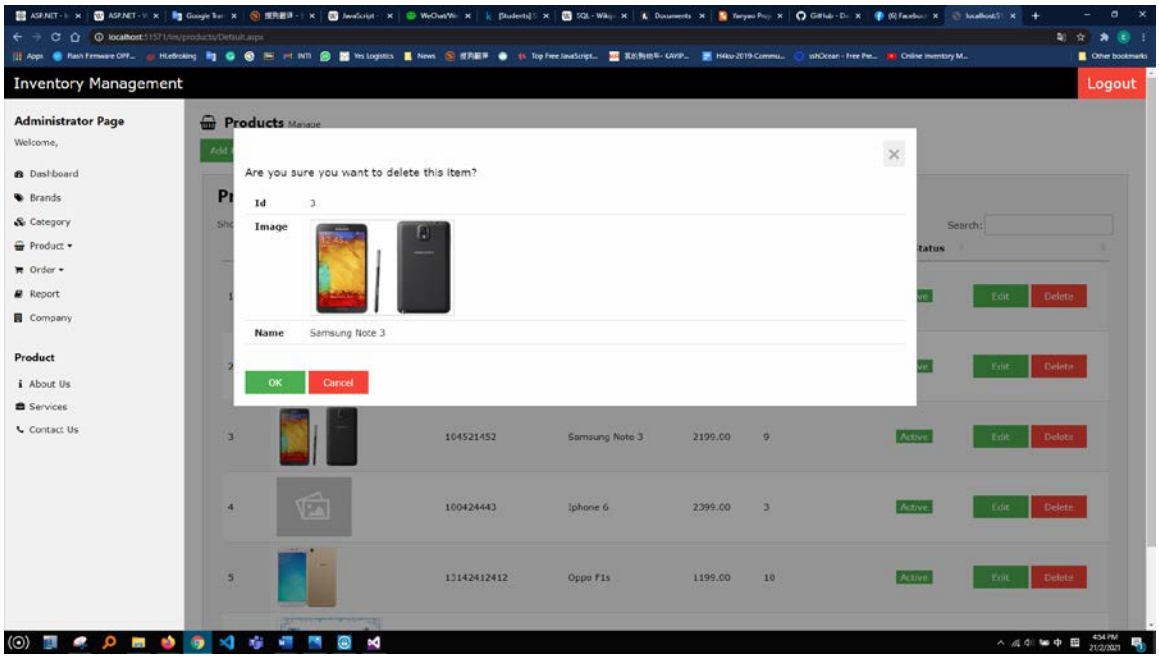


Figure 4.29 Product Control Panel – Replenishment

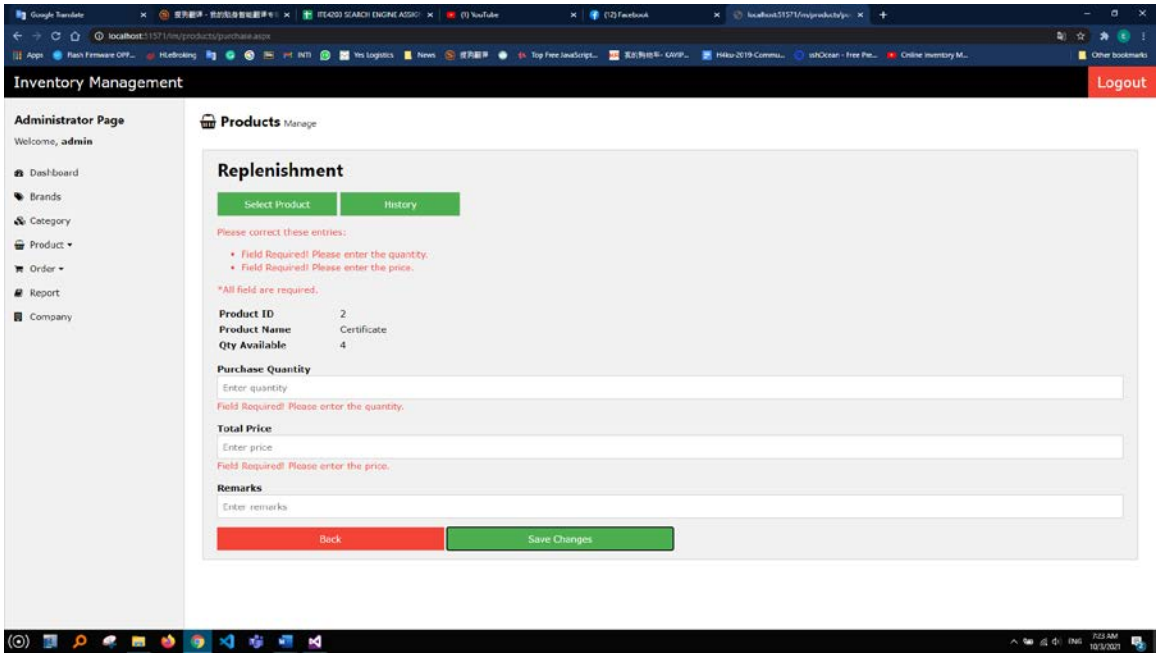
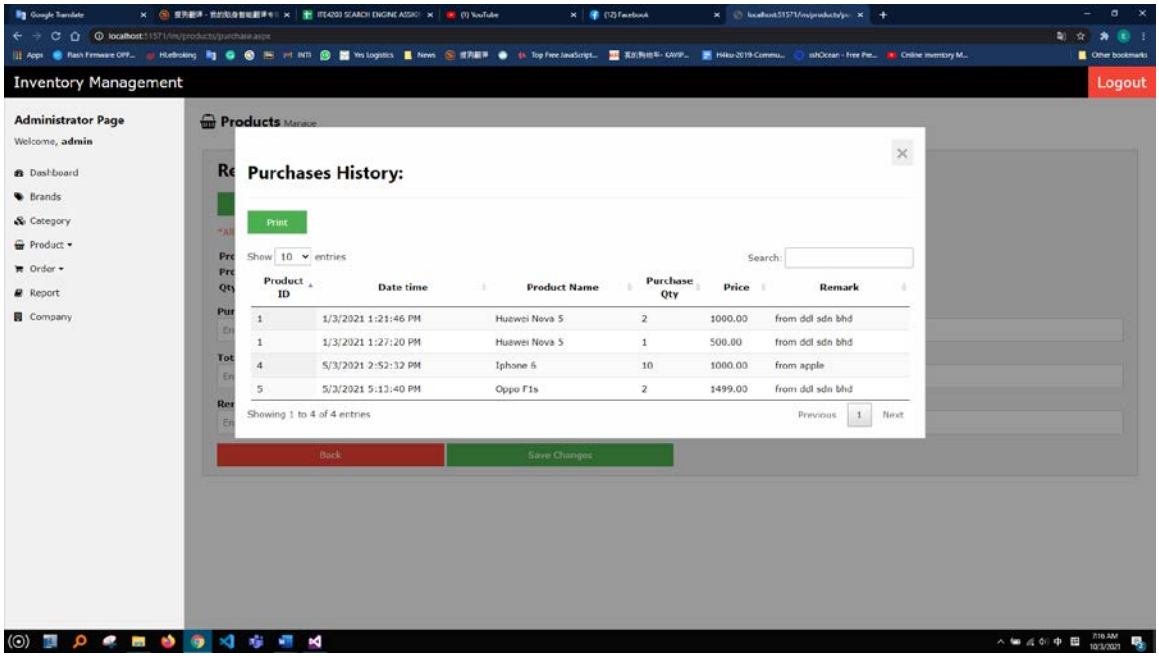


Figure 4.30 Product Control Panel – Purchases history on Replenishment page



4.3.5 Order Control Panel

The order control panel allows users to perform CRUD operations. The user can add a new order after clicking the "Add Order" button. On the Add New Order page, users can select New Customer or Existing Customer. If the user clicks Existing Customer, the Select Customer table will be displayed, from which the user can select customers. After the user's selection, the customer information will be displayed in the text box. After clicking the "Add Product" button, the product table will be displayed, and the user needs to input the required quantity and then press the "Add Product" button. Users can only add products available in the inventory, and the added quantity cannot exceed the inventory. After that, the product will be displayed on the table of the shopping cart. They can also edit items in the shopping cart list. After selecting the product, the price of the amount will be calculated according to the service fee, the number of product and discount. After the order is created, an invoice is generated, and the user can print it.

Figure 4.31 Order Control Panel

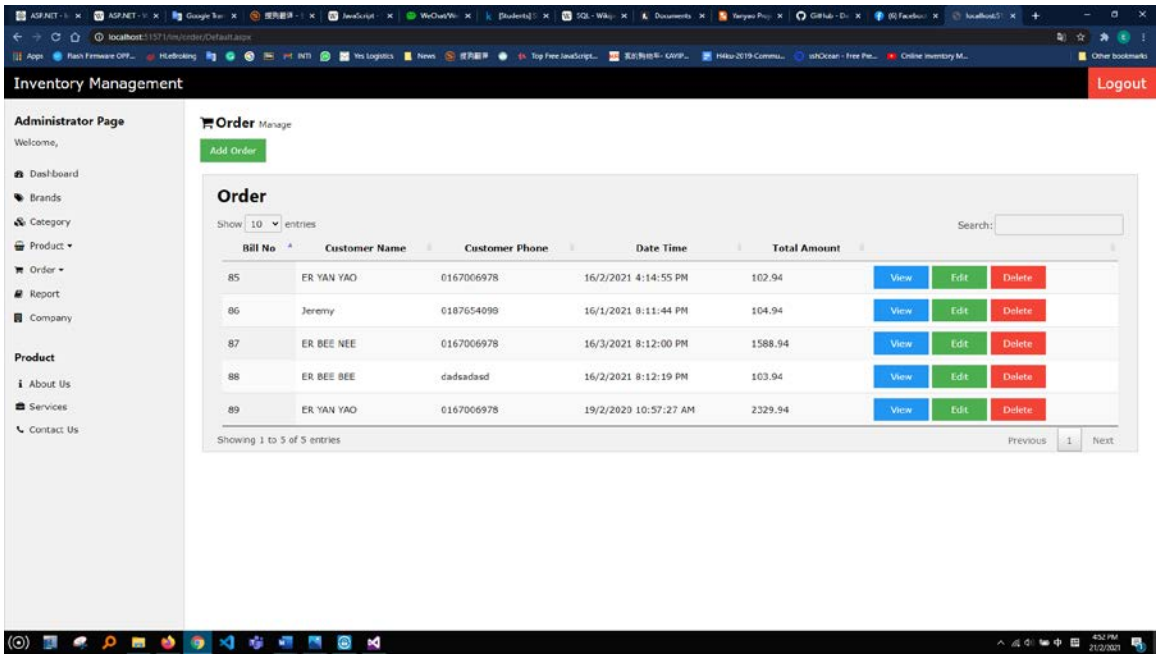


Figure 4.32 Order Control Panel - Select existing customer

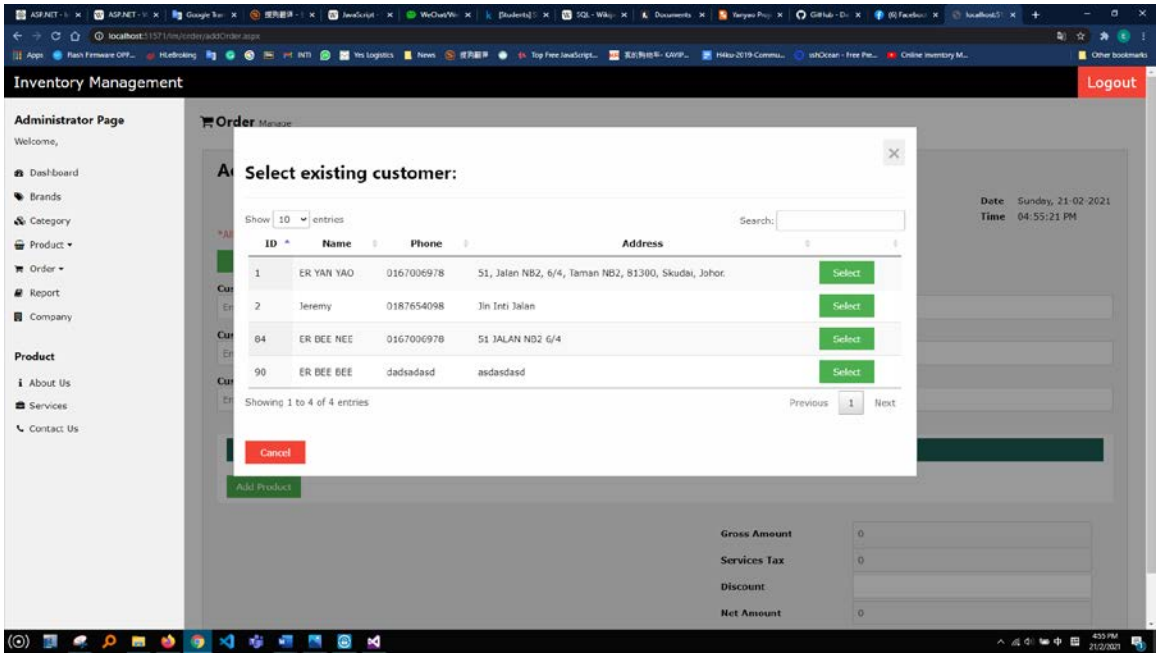


Figure 4.33 Order Control Panel - Select product

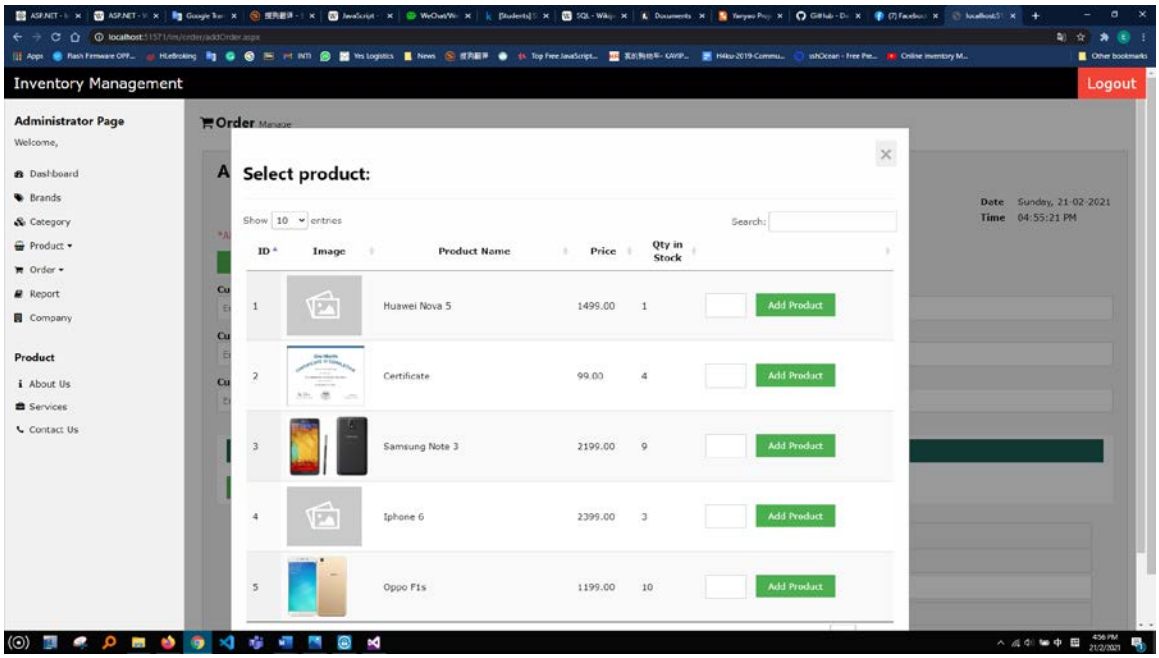


Figure 4.34 Order Control Panel – Edit product quantity and Calculation

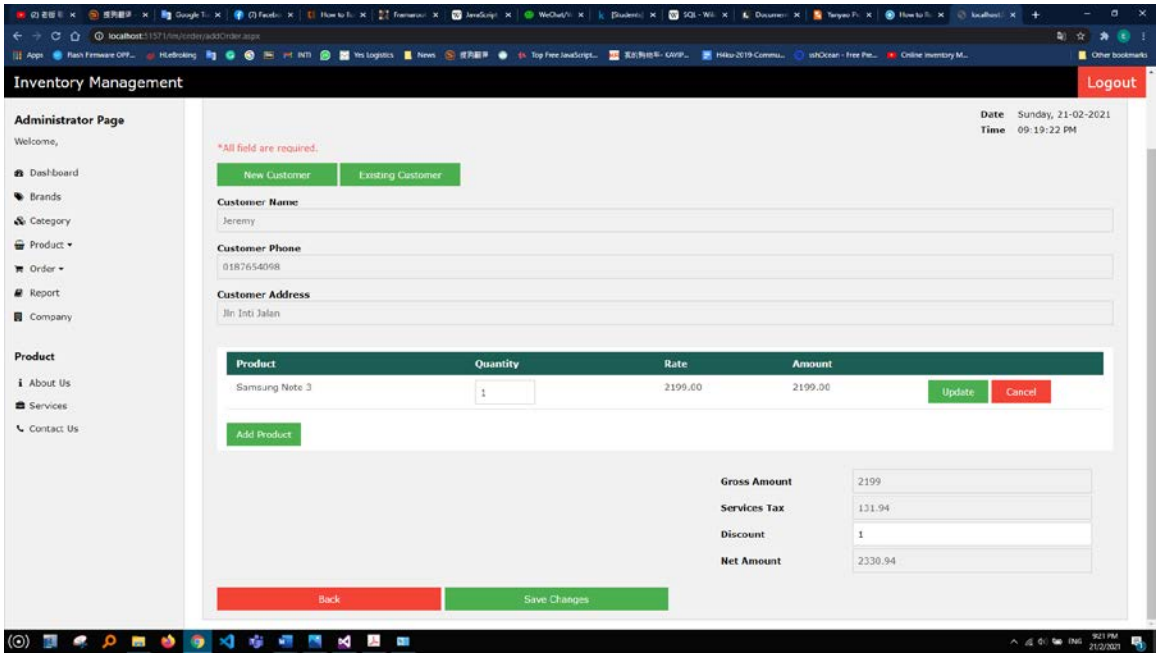
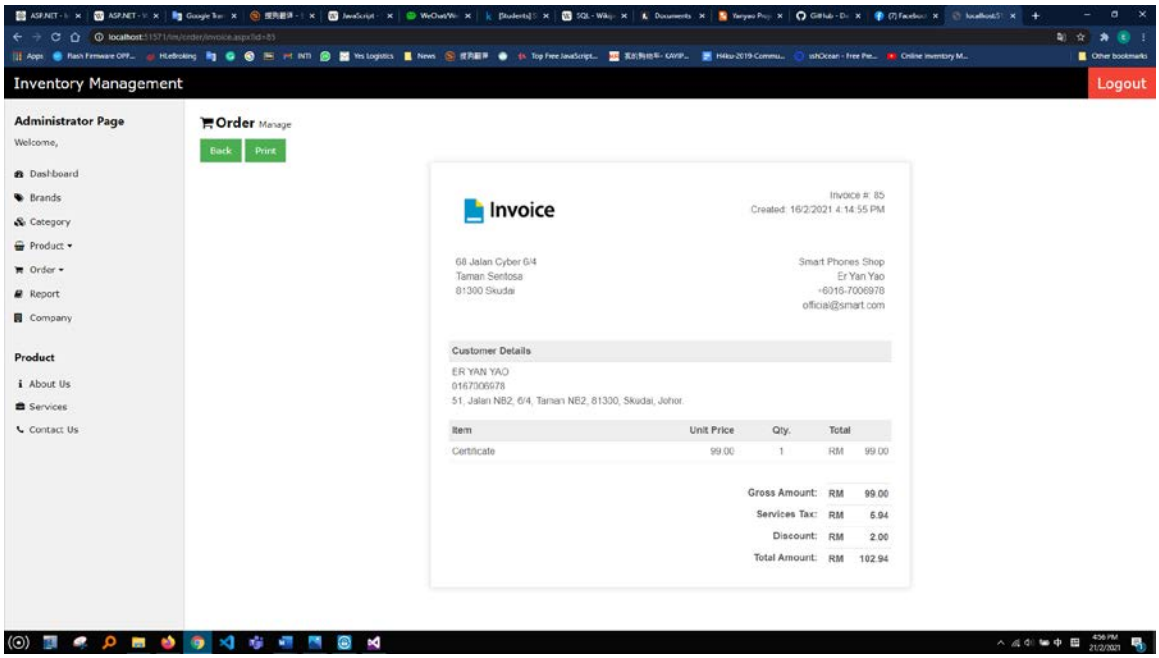


Figure 4.35 Order Control Panel - Invoice



4.3.6 Company Profile Settings

Company profile settings allow users to change company details, including name, e-mail, phone number, address, etc. After clicking Save Changes, a confirmation message will pop up to confirm whether the information is correct. After saving the changes, the invoice company information will be changed.

Figure 4.36 Company Profile Settings - Manage

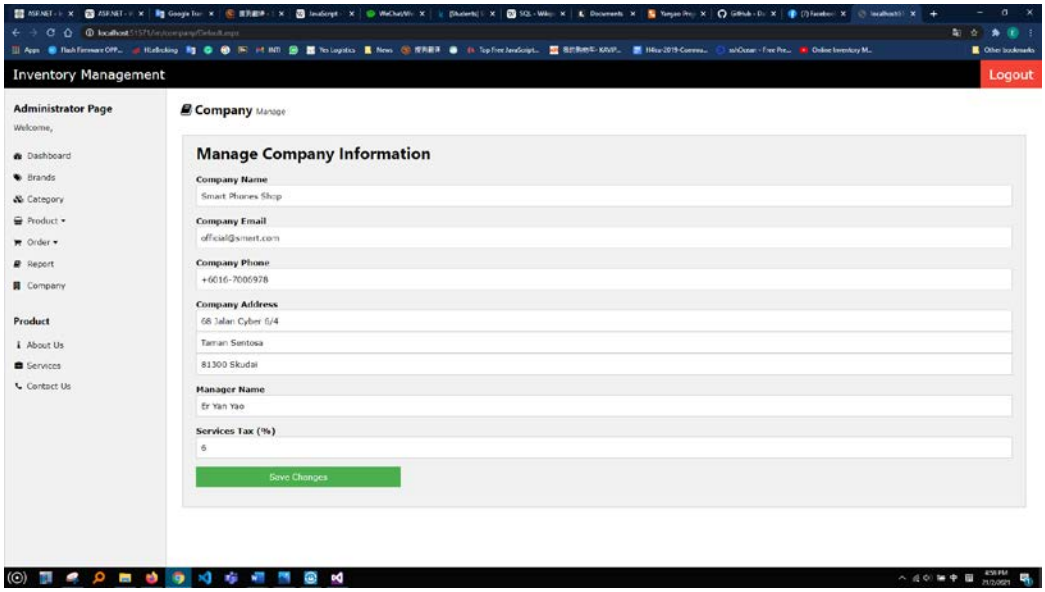
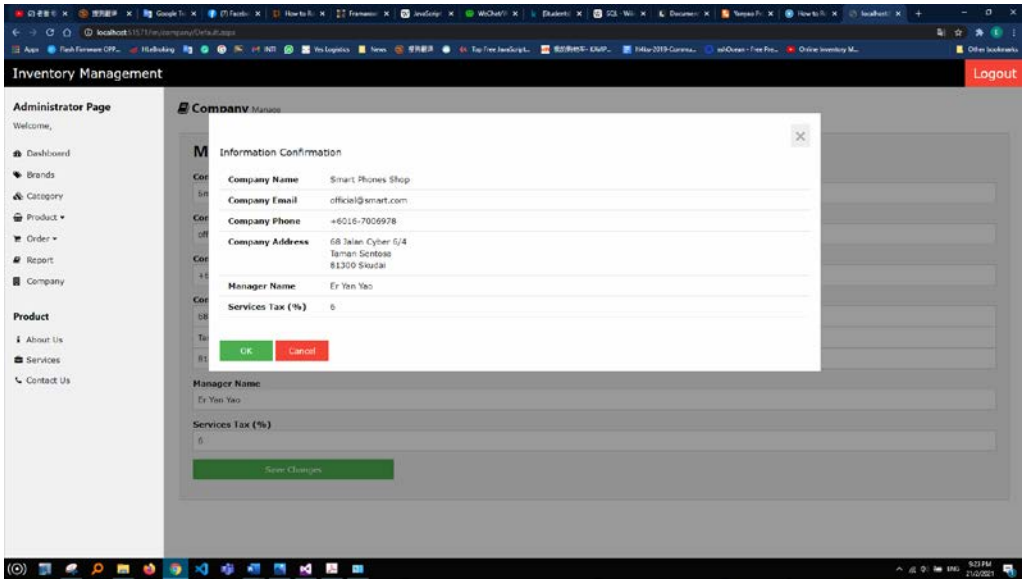


Figure 4.37 Company Profile Settings - Information Confirmation



4.3.7 Report

The report page shows the company's sales performance. The Google chart is used to show the 12-month sales, and the table below shows the sales. When the user clicks on the view, the following orders created in that month will be displayed. The document for the specified month will be generated.

Figure 4. 38 Report

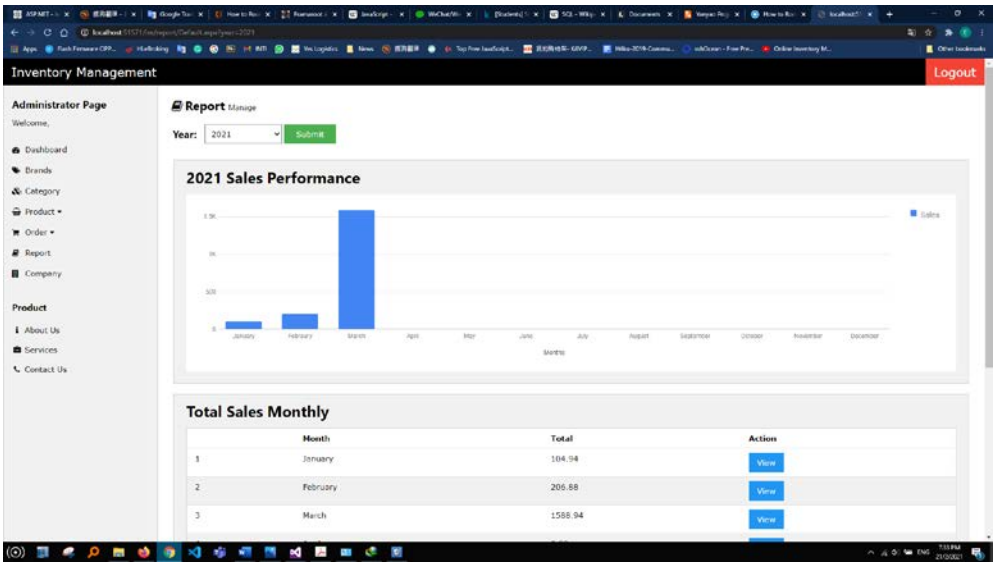
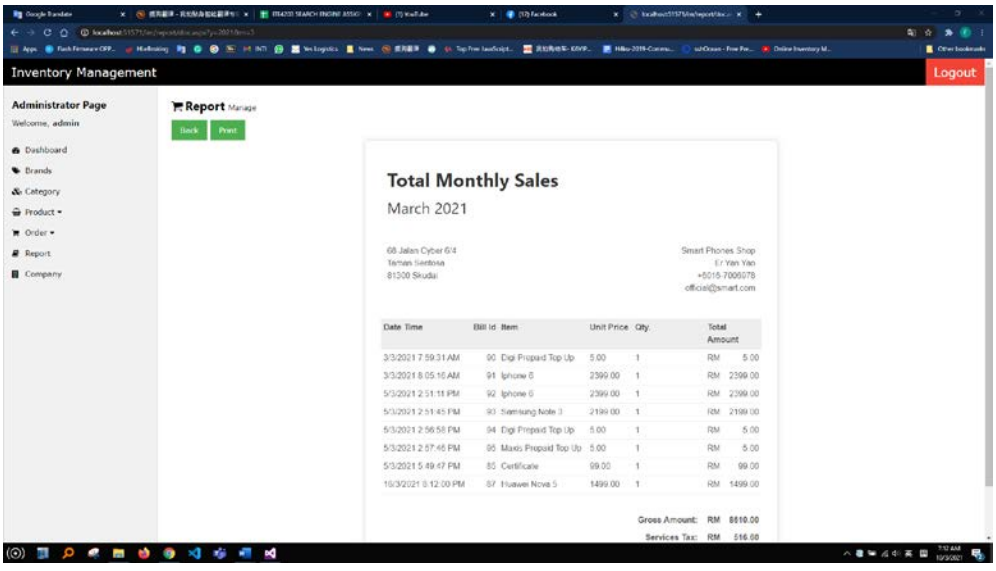


Figure 4. 39 Report – Total Monthly Sales Document



4.4 Problems Encountered and Solution

At the end of the implementation process, the author will list and discuss the problems they face and solutions. This information will enable you to better understand the operation of this system.

4.4.1 Problems

The first problem faced by the author in the implementation process was the connection between the database and the website. The author uses C# as backend to connect to the SQL database. However, there is too much connection activity handled by the backend. Backend needs to retrieve a large amount of data from the database. In the implementation stage, the author cannot retrieve all data from the database normally. He is faced with many errors when getting data records. The second problem is the visualization of analysis. The author uses Google Chart to display the graphics for analysis. Google Chart is a JavaScript library, which is used to process at the front end and operate with JavaScript. However, the analysis data needs to come from the database, and all data must be obtained from the background c # Therefore, it requires the author to transfer data from the back end to the front end.

4.4.2 Solutions

The solution to the first problem has been solved by the author. C# is a kind of language. Therefore, the author divides SQL connection activities into different categories. If the system needs this class, the author can call this class directly. A separate class can help the author avoid errors and make the code simple and clear. For the second problem that the system needs used for data transfer from the back end to the front end. The author uses the JavaScriptSerializer class, which is a class on C# that allows users to pass data from C# to JavaScript. It is a bridge between C# and JavaScript. This solution can effectively solve the data transfer problem.

4.5 Strengths and Weakness of the System

4.5.1 Strengths

All users are required to log in to the system with their username and password. This can prevent unauthorized access to the system. In addition, it can protect inventory data well and avoid authorized personnel using the service of the system.

The system has a clear direction navigation bar. All functions are divided into several parts, including brand, category, product, order, etc., which makes all functions clear and clear. Users of the system will not be confused about where this function is enabled. The navigation bar can guide users to the places they need.

Data records on this inventory system have CRUD operations. It enables users to flexibly manage data. Users can create, read, update, and delete data records.

All data records on the table have the function of searching and sorting. The search function can help users find the required data efficiently. Sorting can help users sort the data into ascending or descending order according to the data type. This can reduce the time spent by the users looking for specific data.

There is a sales analysis section on the dashboard, which can help users understand more excellent products. These records help them to improve their sales performance. They can supplement especially the highest-selling products. According to the sales analysis records, control the replenishment.

4.5.2 Weaknesses

The connection between the database and the system is inflexible. All connections are connected directly between the front end and the back end. It has some limitations in terms of database connectivity. If one day the author wants to implement the backend of the system on another machine, he needs to modify the code or re-create the backend.

A network connection needs to be established with the system. Without a network, the analysis cannot be performed. Therefore, it will not display visualizations of sales records, such as sales charts. However, other functions of the system can still be used if the system is installed locally.

4.6 Summary

After completing the implementation section, the author introduces the development process of the system in detail. From self-research to testing and development are all done by the author himself. Although there are challenges in the whole system, the author has successfully overcome every challenge and successfully developed a functional system that served the target from the beginning. Web application screenshot and pseudocode explain everything about the system well. Through these information materials, readers can understand the overall structure and complexity of the system. The functions of this inventory management system can solve and satisfy the needs of users.

Chapter 5: Testing

5.0 Overview

In Chapter 5, the author will test and evaluate each component involved in the suggestion system. This testing phase will be carried out after the previous chapter is completed, because the previous chapter is all about system implementation. Throughout the whole test plan, the author will study these characteristics carefully and provide expectations for the proposed system. This chapter will discuss acceptance tests, some of which come from user feedback collected by the author. Each feedback will be analyzed, and the results recorded. In addition, the author requires that the system be placed in the testing phase to test the proposed system to find any errors or errors in the execution of the system, and to repair them if there are any errors or errors. In fact, the author tested all the functions of the system, but due to the limitation of the number of pages, he only placed the test cases required by the system, and other test cases will be attached in Appendix F.

5.1 Unit Testing

Unit testing is a method of testing a single unit of a software process. The main purpose of software testing is to verify whether the performance of the software is running as expected. The following sections are the details of each test case in each unit test plans mentioned above.

Test Case 1: Unit testing with functional testing for dashboard.aspx

Test Case ID	UT03	**Objective**	Test logout button
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	dashboard.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	1/3/2021
Executed By	ER YAN YAO	**Execution Date**	1/3/2021
Short Description	After clicking the logout button, test what the page redirect.		
Pre-conditions	Must be redirected to the login page. And the session is clear,		

Step	**Action**	**Expected System Response**	**Pass/Fail**	**Comment**
1	Click the logout button.	Redirect to login page.	Past	
2	The user session is clear		Past	
3	Check Post-conditions			

Post-conditions	The user logout from the system. And user session is clear.
Summary	Passed the test. The user logout from the system.
Output Interface	1. Page redirect to the login page.
Result	The test passed.

Test Case 2: Unit testing with functional testing for dashboard.aspx

Test Case ID	UT04	**Objective**	Test navigation bar
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	dashboard.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	1/3/2021
Executed By	ER YAN YAO	**Execution Date**	1/3/2021
Short Description	After clicking the navigation bar item, test what the page will redirect.		
Pre-conditions	Must be redirected to the following page.		

Step	**Action**	**Expected System Response**	**Pass/Fail**	**Comment**
1	Click the brands button	Redirect to brand control page.	Past	
2	Click the category button	Redirect to category control page.	Past	
3	Click the product button	Redirect to product control page.	Past	
4	Click the order button	Redirect to order control page.	Past	
5	Click the report button	Redirect to report control page.	Past	
6	Check Post-condition.			

Post-conditions	The navigation bar is work and redirect to correct page.
Summary	Passed the test. The navigation bar work efficiently.
Output Interface	1. Page redirect to the following page after clicked.
Result	The test passed.

Test Case 3: Unit testing with functional testing for dashboard.aspx

Test Case ID	UT05	**Objective**	Test sales analysis drop down list and button
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	dashboard.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	1/3/2021
Executed By	ER YAN YAO	**Execution Date**	1/3/2021
Short Description	After clicking the drop-down list, test what the drop-down list can be work or not.		
Pre-conditions	Drop down list and button must be workable.		

Step	**Action**	**Expected System Response**	**Pass/Fail**	**Comment**
1	Change the year drop down list	The year drop down list will be changed	Past	
2	Change the month drop down list	The month drop down list data will be changed	Past	
3	Click the submit button	Sales analysis data will be changed based on the drop-down list user selected.	Past	
4	Check Post-condition.			

Post-conditions	The drop-down list and button must be workable, and the data will be updated after button click
Summary	Passed the test. The sales data is updated after click.
Output Interface	1. Page refreshed and sales data is updated.
Result	The test passed.

Test Case 4: Unit testing with functional testing for products/Default.aspx

Test Case ID	UT12	**Objective**	Test Button on Product Control Page
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	products/Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	1/3/2021
Executed By	ER YAN YAO	**Execution Date**	1/3/2021
Short Description	After clicking this button, test the content or action of redirection.		
Pre-conditions	Must be redirect to the product control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to product control page.	Redirect and display product control page.	Past	
2	Click the “Add Product” button	Redirect to following content page	Past	Redirect to addProduct.aspx
3	Click the “Replenishment” button	Redirect to following content page	Past	Redirect to purchase.aspx
4	Click the “Edit” button on table	Redirect to following content page	Past	Redirect to editProduct.aspx
5	Click the “Delete” button on table	Delete confirmation window popup.	Past	
6	Check Post-condition.			

Post-conditions	If all the tested buttons are work, the test is successful.
Summary	Passed the test. The page is redirected to the correct content and action.
Output Interface	1. Redirect to correct content page or action.
Result	The test passed.

Test Case 5: Unit testing with functional testing for order/Default.aspx

Test Case ID	UT13	**Objective**	Test Button on Order Control Page
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	order/Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	3/3/2021
Executed By	ER YAN YAO	**Execution Date**	3/3/2021
Short Description	After clicking this button, test the content or action of redirection.		
Pre-conditions	Must be redirect to the order control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to order control page.	Redirect and display order control page.	Past	
2	Click the “Add Order” button	Redirect to following content page	Past	Redirect to addOrder.aspx
3	Click the “View” button on table	Redirect to following content page	Past	Redirect to invoice.aspx
4	Click the “Edit” button on table	Redirect to following content page	Past	Redirect to editOrder.aspx
5	Click the “Delete” button on table	Delete confirmation window popup.	Past	
6	Check Post-condition.			

Post-conditions	If all the tested buttons are work, the test is successful.
Summary	Passed the test. The page is redirected to the correct content and action.
Output Interface	1. Redirect to correct content page or action.
Result	The test passed.

Test Case 6 Unit testing with functional testing for report/Default.aspx

Test Case ID	UT14	**Objective**	Test items on Report Control Page
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	report/Default.aspx	**Subsystem**	report/doc.aspx
Design By	ER YAN YAO	**Design Date**	3/3/2021
Executed By	ER YAN YAO	**Execution Date**	3/3/2021
Short Description	After clicking this item, test the content or action of redirection.		
Pre-conditions	Must be redirect to the report control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to order control page.	Redirect and display order control page.	Past	
2	Click the “year” dropdown list	Select the following year	Past	
3	Click the “Submit” button on table	Refresh the page and display the following year content	Past	
4	Click the “View” button	Redirect to following content page	Past	Redirect to doc.aspx
5	Check Post-condition.			

Post-conditions	If all the tested buttons are work, the test is successful.
Summary	Passed the test. The page is redirected to the correct content and action.
Output Interface	1. Redirect to correct content page or action.
Result	The test passed.

Test Case 7: Unit testing with functional testing for company/Default.aspx

Test Case ID	UT15	**Objective**	Test items on Company Control Page
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	company/Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	3/3/2021
Executed By	ER YAN YAO	**Execution Date**	3/3/2021
Short Description	Test the content or action of redirection.		
Pre-conditions	Must be redirect to the company control page.		

Step	**Action**	**Expected System Response**	**Pass /Fail**	**Comment**
1	Go to company control page.	Redirect and display company control page.	Past	
2	Change the text of the “Company Name” textbox	The text of the text box has changed.	Past	
3	Change the text of the “Company Email” textbox	The text of the text box has changed.	Past	
4	Change the text of the “Company Phone” textbox	The text of the text box has changed.	Past	
5	Change the text of the “Company Address” textbox	The text of the text box has changed.	Past	
6	Change the text of the “Manager Name” textbox	The text of the text box has changed.	Past	
7	Change the text of the “Services Tax” textbox	The text of the text box has changed.	Past	
8	Click the “Save Changes” button	Take action.	Past	Confirmation window popup
9	Check Post-condition.			

Post-conditions	If all the tested items are work, the test is successful.
Summary	Passed the test. The page is redirected to the correct content and action.
Output Interface	1. Redirect to correct content page or action.
Result	The test passed.

5.2 Integration Testing

Integrated testing is a testing method which combines individual units. The main purpose of this testing method is to expose errors and errors during the interaction process between combination units.

Test Case 8: Integration testing with functional testing for product/Default.aspx

Test Case ID	IT14	**Objective**	Edit product data
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	products/Default.aspx	**Subsystem**	products/editProduct.aspx
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Edit product data on the database.		
Pre-conditions	Must be redirected to the product control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to product control page.	Redirect and display the product control page.	Past	
2	Click edit button on product table	Redirect to the edit product page and display the specified product data	Pass	Redirect to editProduct.aspx
3	Change the product data	Product data on textbox or dropdown list is shown	Past	
4	Click the save button	Redirect to the product control page and the product data have been updated	Past	Redirect to Default.aspx
5	Check Post-condition.			

Post-conditions	If the product data is display on the product control page and data has been updated, the test is successful.
Summary	Product data is display on the product table and it already updated.
Result	The test passed.

Test Case 9: Integration testing with functional testing for product/Default.aspx

Test Case ID	IT13	**Objective**	Add new product
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	products/Default.aspx	**Subsystem**	products/addProduct.aspx
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Add new product data to the database.		
Pre-conditions	Must be redirected to the product control page.		

Step	**Action**	**Expected System Response**	**Pass /Fail**	**Comment**
1	Go to product control page.	Redirect and display product control page.	Past	
2	Click add product button	Add product page is display.	Pass	Redirect to addProduct.aspx
3	Choose product image	After the user selects the picture, the preview box is displayed	Pass	
4	Enter product name	Product name is display on textbox	Pass	
5	Enter SKU	SKU is display on textbox	Past	
6	Enter price	price is display on textbox	Past	
7	Enter quantity	quantity is display on textbox	Past	
8	Enter description	description is display on textbox	Past	
9	Select brands, category, status	Brand, category, status change according to user selection	Past	
10	Click save button	Product data save to database	Past	
7	Check Post-condition.			

Post-conditions	The product data is display on the product control page.
Summary	New product data is display on the product table and with correct details.
Result	The test passed.

Test Case 1: Integration testing with functional testing for product/Default.aspx

Test Case ID	IT10	**Objective**	Delete product data
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	products/Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Delete the product data on the database.		
Pre-conditions	Must be redirected to the product control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to product control page.	Redirect and display the product control page.	Past	
2	Click delete button on product table	The delete confirmation pop-up window is displayed.	Pass	product data is displayed in a pop-up window
3	Click “OK” button	The following data has been deleted and redirected to the product control page	Past	Show notifications about deleted data
4	Check the product control page.	Product data has been deleted and cannot be found in the product table	Past	
5	Check Post-condition.			

Post-conditions	If the product data is deleted, the test is successful.
Summary	The product data is deleted on the product table and cannot be found.
Result	The test passed.

Test Case 2: Integration testing with functional testing for product/Default.aspx

Test Case ID	IT16	**Objective**	Replenishment on product control page
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	products/Default.aspx	**Subsystem**	products/purchase.aspx
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Replenishment and increase the number of products		
Pre-conditions	Must be redirected to the product control page.		

Step	**Action**	**Expected System Response**	**Pass /Fail**	**Comment**
1	Go to product control page.	Redirect and display the product control page.	Past	
2	Click "replenishment"	Go to replenishment page.	Pass	Redirect to purchase.aspx
3	Click "Select Product" button	Allow user to select the specific product	Past	Select product pop-up window is displayed
4	Select product	Product data is displayed on the form	Past	
5	Enter quantity	quantity is display on textbox	Past	
6	Enter price	price is display on textbox	Past	
7	Enter remarks	remark is display on textbox	Past	
8	Click save button	Quantity add to the database based on the specific product	Past	Confirmation pop-up window is displayed
9	Check the product control page	Product quantity has been updated.	Past	Redirect to Default.aspx
10	Check Post-condition.			

Post-conditions	If the product quantity is updated, test is passed.
Summary	The product quantity is updated based on the replenishment.
Result	The test passed.

Test Case 3: Integration testing with functional testing for order/Default.aspx

Test Case ID	IT17	**Objective**	Add new order
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	order/Default.aspx	**Subsystem**	order/addOrder.aspx
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Add new order data to the database.		
Pre-conditions	Must be redirected to the order control page.		

Step	**Action**	**Expected System Response**	**Pass /Fail**	**Comment**
1	Go to order control page.	Redirect and display order control page.	Past	
2	Click add order button	Add order page is display.	Pass	Redirect to addOrder.aspx
3	Select customer	Customer data is displayed on the textbox.	Pass	Enter customer data or select existing customer
4	Click the add product button	Allow user to select product	Pass	Select product pop-up windows is displayed.
5	Enter quantity	quantity is display on textbox	Past	
6	Click add product on pop-up windows	Product details is displayed on the cart	Past	The pop-up window closes.
7	Enter discount price to the textbox	Discount price is display on textbox	Past	
8	Click save button	Check order details	Past	Invoice displayed after saving
9	Check the order control page	Order data save to database	Past	Redirect to Default.aspx
10	Check Post-condition.			

Post-conditions	The order data is display on the order control page.
Summary	New order data is display on the order table and with correct details.
Result	The test passed.

Test Case 4: Integration testing with functional testing for order/Default.aspx

Test Case ID	IT18	**Objective**	View order data
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	order/Default.aspx	**Subsystem**	order/invoice.aspx
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	View order data to the database.		
Pre-conditions	Must be redirected to the order control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to order control page.	Redirect and display order control page.	Past	
2	Click view button on order table	Redirect to the view order page and display order data according to the selected order.	Pass	Redirect to invoice.aspx
3	Click “Print” button	Allow user to print the order.	Past	The print function allow user to print the order
4	Click “Back” button	Redirect to the previous page.	Past	Redirect to Default.aspx
5	Check Post-condition.			

Post-conditions	If the order data is displayed correctly, the test is successful.
Summary	Display order data and allow users to print orders.
Result	The test passed.

Test Case 5: Integration testing with functional testing for order/Default.aspx

Test Case ID	IT19	**Objective**	Edit order data
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	order /Default.aspx	**Subsystem**	order/editOrder.aspx
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Edit product data on the database.		
Pre-conditions	Must be redirected to the product control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to order control page.	Redirect and display the order control page.	Past	
2	Click edit button on order table	Redirect to the order product page and display the specified order data	Pass	Redirect to editOrder.aspx
3	Change the order data (customer, product, discount)	Order data on textbox or dropdown list is shown	Past	Users can add new products, update product quantities or delete products in the shopping cart
4	Click the save button	Check order details. Invoice displayed after saving	Past	Redirect to invoice.aspx
	Check the order control page	The order data has been saved to the database and has been updated	Past	Redirect to Default.aspx
5	Check Post-condition.			

Post-conditions	If the order data is display on the order control page and data has been updated, the test is successful.
Summary	Order data is display on the order table and it already updated.
Result	The test passed.

Test Case 6: Integration testing with functional testing for order/Default.aspx

Test Case ID	IT20	**Objective**	Delete order data
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	order/Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Delete the product data on the database.		
Pre-conditions	Must be redirected to the product control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to order control page.	Redirect and display the order control page.	Past	
2	Click delete button on order table	The delete confirmation pop-up window is displayed.	Pass	order data is displayed in a pop-up window
3	Click “OK” button	The following data has been deleted and redirected to the order control page	Past	Show notifications about deleted data
4	Check the order control page.	Order data has been deleted and cannot be found in the order table	Past	
5	Check Post-condition.			

Post-conditions	If the order data is deleted, the test is successful.
Summary	The order data is deleted on the order table and cannot be found.
Result	The test passed.

Test Case 7: Integration testing with functional testing for report/Default.aspx

Test Case ID	IT21	**Objective**	View the report analysis
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	report/Default.aspx	**Subsystem**	report/doc.aspx
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Check the analysis result on the report page.		
Pre-conditions	Must be redirected to the report control page.		

Step	**Action**	**Expected System Response**	**Pass /Fail**	**Comment**
1	Go to report control page.	Redirect and display the report control page.	Past	
2	Select the year on the dropdown list	When the user changes the year, the year is updated。	Pass	
3	Click “Submit” button	The data has been changed according to the selected year.	Past	Redirect to Default.aspx
4	Check the report control page.	The following data has been updated and redirected to the report control page	Past	
5	Click “View” button on the total monthly sales	Page display monthly sales according to the selected month		Redirect to doc.aspx
6	Click “Print” button	Allow user to print the order.	Past	The print function allow user to print the sales
7	Click “Back” button	Redirect to the previous page.	Past	Redirect to Default.aspx
8	Check Post-condition.			

Post-conditions	If the report data is displayed correctly, the test is successful.
Summary	The report data is displayed based on the year and month.
Result	The test passed.

Test Case 8: Integration testing with functional testing for company/Default.aspx

Test Case ID	IT22	**Objective**	Change company information
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	company/Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Update company data.		
Pre-conditions	Must be redirected to the company control page.		

Step	**Action**	**Expected System Response**	**Pass /Fail**	**Comment**
1	Go to company control page.	Redirect and display company control page.	Past	
2	Change company name	Company name is display on textbox.	Pass	
3	Change email	Email is display on textbox	Pass	
4	Change phone	Phone is display on textbox	Pass	
5	Change address	Address is display on textbox	Past	
6	Change manager name	Manager name is display on textbox	Past	
7	Change services tax	Services tax is display on textbox	Past	
8	Click save button	Check company information	Past	Information confirmation windows is pop-up
9	Check the company control page	Company data save to database and it has been updated	Past	Redirect to Default.aspx
10	Check Post-condition.			

Post-conditions	If the company data is display on the company control page and data has been updated, the test is successful.
Summary	Company data is display and it already updated.
Result	The test passed.

5.3 System Testing

System testing, testing the whole system. The main purpose of this test method is to evaluate whether the system meets the expected requirements.

Test Case 9: System testing with functional testing for login.aspx

Test Case ID	ST01	**Objective**	Test access to the dashboard.aspx page
Test Type Parameter	Functional Testing	**Test Type**	System Testing
System	login.aspx	**Subsystem**	dashboard.aspx
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Check whether the system displays the home page.		
Pre-conditions	Log in to the system using a valid username and password. Test which page the login page redirects to.		

Step	**Action**	**Expected System Response**	**Pass /Fail**	**Comment**
1	Go to login page.	The login portal is displayed.	Pass	
2	Type in valid username	The system display username on the textbox.	Pass	
3	Type in valid password	The system display password on the textbox.	Pass	
4	Click “login” button	Redirect to the home page.	Pass	It redirects to the dashboard.aspx page
5	View the page displayed	Redirect and stay on the homepage.	Pass	It stays at dashboard.aspx page

Post-conditions	The system displays the final interface to determine the test.
Summary	Test passed. Because the home page is displayed. The dashboard.aspx page is displayed after login.
Output Interface	1. Login to the system with valid account. 2. The dashboard.aspx page is displayed after login successful.
Result	The test passed.

5.4 Usability Tests

The usability test phase is performed by volunteers who become the end users of the suggestion system. The main purpose of the test is to obtain feedback on the real situation to collect feedback and suggestions from volunteers. The test will be conducted in a non-face-to-face informal meeting with 2 volunteers to test the proposed system. The author uses the Team Viewer remote control software to gather user data, allowing volunteer to manipulate the software made by the author on the computer. Both volunteers have extensive sales and marketing experience and have a certain IT background.

5.4.1 Test Plan

The following table shows the test plan for usability test. Through the test plan, the author can have a better understanding of the user experience. And all feedback can be used to update the system later.

Table 5.1 Usability Testing Test Plan

	Subject	**Pass Criteria**
1	Login to the system.	The user can access to the system.
2	Conduct sales analysis on dashboard.	The user can change the year and month dropdown list to update the analysis chart.
3	CRUD operations on brands control page.	The user can conduct create, read, update, and delete operations on brands data.
4	CRUD operations on product control page.	The user can conduct create, read, update, and delete operations on products data.
5	Replenishment.	The user can restock specific product.
6	CRUD operations on order control page.	The user can conduct create, read, update, and delete operations on orders data.
7	Add new order and change the total amount (e.g. Discount)	The user can add new order.
8	Check invoice and print invoice.	The user can check the invoice and print out the invoices.
9	Check monthly sales report.	The user can check the monthly sales report.
10	Edit company information.	The user can update the company information.
11	Logout system.	The user can logout the system.

The following table lists the usability tests of two volunteers by the author.

Interviewee	Danny Yee
Age	22
Occupation status	IT Student

No.	Subject	Pass/Fail	Duration (Second)	Remarks
1	Login to the system.	Pass	9	
2	Conduct sales analysis on dashboard.	Pass	18	
3	CRUD operations on brands control page.	Pass	25	
4	CRUD operations on product control page.	Pass	26	
5	Replenishment.	Pass	14	
6	CRUD operations on order control page.	Pass	28	
7	Add new order and change the total amount (e.g. Discount)	Pass	14	
8	Check invoice and print invoice.	Pass	12	
9	Check monthly sales report.	Pass	13	
10	Edit company information.	Pass	11	
11	Logout system.	Pass	2	

Interviewee	Lee Zhi Zheng
Age	23
Occupation status	Mobile Phone Shop Employee

No.	**Subject**	**Pass/Fail**	**Duration (Second)**	**Remarks**
1	Login to the system.	Pass	6	
2	Conduct sales analysis on dashboard.	Pass	12	
3	CRUD operations on brands control page.	Pass	19	
4	CRUD operations on product control page.	Pass	20	
5	Replenishment.	Pass	12	
6	CRUD operations on order control page.	Pass	21	
7	Add new order and change the total amount (e.g. Discount)	Pass	11	
8	Check invoice and print invoice.	Pass	12	
9	Check monthly sales report.	Pass	11	
10	Edit company information.	Pass	12	
11	Logout system.	Pass	3	

5.3.2 Result

According to the usability test, our volunteers can complete all the tasks given in the test plan. According to records, in all the tasks, the time for the participants to perform the task did not exceed 30 seconds. They completed all the tasks in a short time. Based on these results, it shows that the system provides users with powerful functions and simple control. The functions required by the user have been sorted into the navigation bar. They can easily find it in the navigation bar. In addition, the user interface of the system is very simple and clear. The interface will not be confusing, nor will it contain too many things, and each page contains only a few functions, which are classified according to each function.

5.5 Acceptance Tests

5.5.1 Interview

After volunteers conduct the usability, the author will ask the following questions to get their experience data.

Table 5.2 Interview Question and Purpose

	Question	**Purpose**
1	Tell me about your first impression of this system?	Understand the user's first impression of the system user interface.
2	What do you think of the complexity of this system?	Understand whether the user experience is complicated for the system user experience.
3	Do you think the time spent using the system, such as adding an order, is acceptable?	Understand whether the user experience is too long for the system to use.
4	Is the replenishment method practical?	Understand what users think about the replenishment function.
5	Do you think the system can help merchants in managing inventory?	Understand what users think about the system's functions, and whether that idea can help enhance the business.
6	What do you think is the whole function of the system?	Know the overall functionality of the system that users feel.
7	Do you have any suggestions for future improvement?	Understand what users think about the future of the system

Interview 1:

Interviewee	Danny Yee
Age	22
Occupation status	IT Student

	Question	**Answer**
1	Tell me about your first impression of this system?	The whole interface looks clear and tidy. Its appearance is beautiful and simple, without any complicated design in general.
2	What do you think of the complexity of this system?	The system is very easy to use.
3	Do you think the time spent using the system, such as adding an order, is acceptable?	Acceptable, it takes very little time to complete the task of adding orders.
4	Is the replenishment method practical?	Yes, very useful.
5	Do you think the system can help merchants in managing inventory?	Yes, it must be, especially in face-to-face business with customers. The inventory management system can improve efficiency when dealing with customers and help companies organize inventory.
6	What do you think is the whole function of the system?	For example, I mentioned the function in the previous question. The system may include a system capable of conducting business transactions completely online, such as an e-commerce website.
7	Do you have any suggestions for future improvement?	Try to deploy the system on other platforms (such as Android).

Interview 2:

Interviewee	Lee Zhi Zheng
Age	23
Occupation status	Mobile Phone Shop Employee

	Question	**Answer**
1	Tell me about your first impression of this system?	It seems that all functions are clearly explained.
2	What do you think of the complexity of this system?	very easy to use.
3	Do you think the time spent using the system, such as adding an order, is acceptable?	Time won't be too long.
4	Is the replenishment method practical?	Useful.
5	Do you think the system can help merchants in managing inventory?	Yes, it will help business owners, such as my business. We really need an inventory management system to check our products and manage the company's inventory, so that the owner can clearly monitor sales report and inventory.
6	What do you think is the whole function of the system?	It is very good and easy to use. As I said, all the buttons are written clearly, so the system is easy to learn and use.
7	Do you have any suggestions for future improvement?	The current system is only suitable for a single user, and the author can try to deploy user roles later. For example, add user authority control, so that the clerk can only add orders, but cannot modify product information.

5.5.2 Result

Based on the results of the tests and interviews, the two volunteers were satisfied with the system. They think that the system is easy to use, easy to control, comprehensive in function, and can well meet business needs. Through feedback from volunteers, they mentioned that the system may be able to develop other platform versions, such as Android. In addition, perhaps the author can also develop a function, which can increase the user authority control on the system, so that the sales staff can only add orders, but cannot modify product information. This feedback can be considered by the author and incorporated into future improvements of the system.

5.6 Summary

In this chapter, the author uses several system testing methods to retrieve and analyze the results of the proposed system, so that they can become useful data for the author's reference and improvement in the future. These test plans enable the author to identify the advantages and disadvantages of the system. It explains all types of tests and test techniques used by the systems proposed in this chapter. This chapter also mentions the content of the interview to test the suggestion system used by the end user. By analyzing these feedbacks in detail, the author can transform simple feedbacks into powerful and useful data.

Chapter 6: Future Works

6.0 Overview

The author will discuss the limitations that appear in the system at the current stage and list any future enhancements that the proposed system might make. The author determined the limitations of the system and how to improve it through the various test plans mentioned earlier. This inventory management system having many usable functions. Those function can support business operation and fulfil the requirement of the business need.

6.1 Connect Physical Devices

Connect the physical devices can make the business process more efficient. Barcode Scanner is a physical device that can help the business process become faster. The cashier just needs to use the scanner to scan the barcode of the product, then they can get the specific product information. If the barcode scanner is used, the cashier no need uses the mouse to choose the product. It can avoid error for user mistake. Author can try to add scanner feature to improve the use of the system.

Figure 6.1 Barcode Scanner

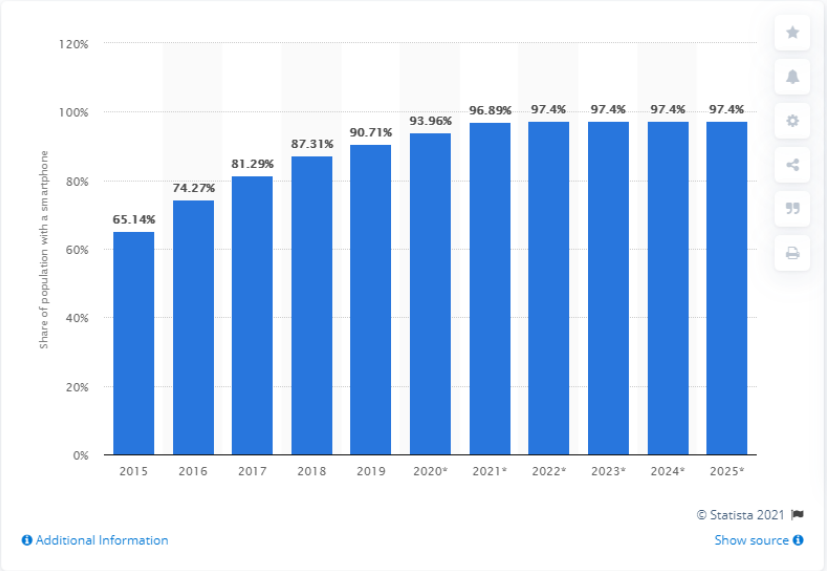
6.2 Develop System on other Platforms

Currently, the system that the author develop is web application, it was a website and it can be redirect using web browser. According to the feedback from users, they think that developing the system on other platforms is a way to improve the system efficiency. It can improve the popularity of the system on other platforms. Nowadays, the mobile platform has become a platform with many users, and gradually become a popular platform. The development of a mobile version can make the system portable and enable users to manage inventory at any time and place. It allows users to use mobile phones and carry out inventory management.

6.2.1 Android Platform

Android is a mobile operating system. It allows user to run the application on the touchscreen mobile device. Nowadays, the smartphone already having high popularity. In Malaysia, 93.96% of people having their own smartphone shown by figure below. Mobile version application can be use anytime, anywhere. The business owner can monitor and view their business sales outside the store.

Figure 6.2 Percentage of smartphone penetration rate in Malaysian population



(Malaysia smartphone penetration 2019-2023 | Statista, 2021)

6.3 Connect Database and System through API

At present, the SQL database is connected directly to the system. Connecting them in the API can make the connection more flexible. In computing, an application programming interface (API) is an interface that defines the interaction between multiple software applications or software and hardware mixed intermediaries. The development API allows any platform to use the database without modifying the code. The API allows different platforms to use the database through the same API. For instance, the Android platform can use the same API as the website platform. Within the API, if developers want to change CRUD operations directly through the API, they do not need to change the codes of the two platforms, they only need to change the API.

6.4 Roles-Based Access Control

Using RBAC to control employee 'access to the system. This can help the company manage the system and protect the sensitive information of the company. For example, if an employee's user role is to only use the function of adding orders, they will not be able to add products. Furthermore, access to system resources can be limited to specific tasks, such as the ability to view, create, or modify files. Therefore, low-level employees usually do not need access to sensitive data to perform their duties. This is especially useful if the company has many employees, and it is difficult to closely monitor network access by using third parties and contractors. Using RBAC is helpful to protect sensitive data and important applications of the company (Zhang, 2021).

6.5 Summary

This chapter describes the future improvements of the system. When the system is updated, all the improvements made in this chapter can help business owners get a more efficient system. All improvements must be considered to improve the system.

Chapter 7: Conclusion

7.0 Overview

In this chapter, the author will make a comprehensive summary of this system. He will share all the knowledge learned from the project. The conclusion of this chapter will be the result of this process and the project, the project will enable users to process and understand the authors' knowledge learned.

7.1 Results

The system has been developed and fully functional. Functions can meet the commercial needs of mobile phone stores. Inventory management system can help mobile stores finish inventory tasks. From "add products", "add orders" until printing invoices and analyze sales records, all functions can help companies.

The system allows users to add product categories and brands names. When adding products, these data will be displayed in the drop-down lists of product category and product brand. Users can choose directly without re-entering. Users can add products, allowing users to input product information, including name, price, sku, inventory quantity, brand, type, etc. Not only that, users can also add pictures of products.

In the part of adding an order, the user can input customer information, which will be stored in the database of the system. If the customer purchases for the second time, the user can select the customer information directly from the database. When adding a product when adding an order, the product information is already stored in the database, and the user only needs to directly select it. The price of the order will change automatically with the different product. After adding an order, the announcement will be automatically generated, which can be printed directly by users.

In addition, all data in the database allows users to perform CRUD operations. User can change data directly in the following section. For example, the user can change the product information in the product section or order information in the order section. Users can create, read, update, and delete data. It makes inventory management flexible and efficient.

In the analysis section, users can select a specified date to view the analysis results. The analysis will be visualized and displayed graphically. According to the chart, it is easier for users to know the inventory status. When the user selects a specific month, a monthly sales report will be generated or printed out.

Furthermore, the system also allows users to change company information. Company information is stored in the database, which can be modified directly by users. Moreover, it will update all the information, such as the company information on the invoice. This system meets all the basic requirements of the enterprise.

7.3 Self-Reflection

For this project, through search and analysis, the author understands the overall development of the project. All projects have a life cycle, and the author formulates the development of the project through SDLC. This project took a long time from the beginning to the end. Gantt chart has been created, so that the author can work out the project development schedule. It's a good way to help authors organize his time.

For the development process, the author learned a lot of new things from this project, such as web development, using third-party JavaScript libraries, including Google Chart and Database.net, etc., these tools make the development system smoother. Not only that, but the design of the web page is also challenging. The CSS of this web page uses Bootstrap and W3.CSS. This makes the design of the webpage very neat and clean.

Although this project is difficult to plan and tedious, the author did it anyway. He thinks the plan is the most difficult part of the project. Because we need to understand the problems encountered by enterprises. Then solve the problem. In the planning stage, the author needs to consider the function of the system. These functions need to meet business requirements. A good system needs good functions, and the functions must meet the user's needs.

7.4 Summary

This chapter shows the conclusions of the project. Display system results, and let users know the running state of the system. Self-reflection can help users understand what authors have learned in the process of project development. From planning to development to system production, all processes are recorded in this chapter, which can help readers understand the development process of the system and the author's experience.

REFERENCES

Acevedo, L., (2020) *How to Create an Online Inventory*. [online] Small Business - Chron.com. Available at: <https://smallbusiness.chron.com/create-online-inventory-13526.html> [19 October 2020].

Bragg, S., (2020). Journal Entries for Inventory Transactions — Accounting tools. [online] Accounting Tools. Available at: <https://www.accountingtools.com/articles/2017/5/13/journal-entries-for-inventory-transactions> [20 October 2020].

Cai, Y. J., & Lo, C. K. Y. (2020). 'Omni-Channel Management in the New Retailing Era: A Systematic Review and Future Research Agenda. International Journal of Production Economics'. [online] 229. Available at: <https://doi.org/10.1016/j.ijpe.2020.107729> [16 October 2020]

Carlson, R. (2019). Bookkeeping Entries for Inventory Transactions. [online] The Balance Small Business. Available at: <https://www.thebalancesmb.com/example-of-a-bookkeeping-entry-for-inventory-transactions-392923> [24 October 2020].

Houlihan, J.B. (1985), 'International Supply Chain Management', International Journal of Physical Distribution & Materials Management [online] Vol. 15 No. 1, pp. 22-38. Available at: < https://doi.org/10.1108/eb014601 > [17 October 2020].

Jacobs, F.R., Chase, R.B. and Lummus, R.R., (2011). Operations and supply chain management (Vol. 567). New York: McGraw-Hill Irwin. [online] Available at: <http://dl.booktolearn.com/ebooks2/management/9781259666100_Operations_and_Supply_Chain_Management_15th_Edition_5a13.pdf> [18 October 2020]

Jayden, S. (2020) '*8 Best Free & Open Source Inventory Management Software Systems'*. [online] Goodfirms.co. Available at: <https://www.goodfirms.co/blog/best-free-open-source-inventory-management-software-systems> [20 October 2020].

Kerkhove, L.P. and Vanhoucke, M., (2017). "A parallel multi-objective scatter search for optimising incentive contract design in projects". European Journal of Operational Research, [online] 261(3), pp.1066-1084. Available at: < https://doi.org/10.1016/j.ejor.2017.02.043> [21 October 2020]

Kinsta, M. (2020) '*What Is Localhost? And How Does It Apply To Wordpress?'*. [online] Available at: <https://kinsta.com/knowledgebase/what-is-localhost/> [20 October 2020].

Kraeling, M. and Tania, L., (2019). Software Development Process. *Software Engineering for Embedded Systems*, [online] pp.33-87. Available at: < https://doi.org/10.1016/B978-0-12-809448-8.00002-3> [19 November 2020]

Livi, L., Bianchi, F.M., Rizzi, A. and Sadeghian, A. (2013) 'August. Dissimilarity space embedding of labeled graphs by a clustering-based compression procedure'. In *The 2013 International Joint Conference on Neural Networks (IJCNN)* [online] (pp. 1-8). IEEE. Available at: <https://doi.org/10.1109/IJCNN.2013.6706937> [15 October 2020].

Needleman, T., (2020) *The Best Inventory Management Software For 2020*. [online] PC Mag Asia. Available at: <https://sea.pcmag.com/cloud-services/16513/the-best-inventory-management-software-for-2020> [26 October 2020].

Nicasio, F. (2020). *Inventory Reporting: What It Is and How To Use It For Your Retail Business - Vend Retail Blog*. [online] Vend Retail Blog. Available at: <https://www.vendhq.com/blog/inventory-reporting/> [22 October 2020].

Reddy, C. (2020). '*Inventory Management: Features, Objectives, Pros and Cons – Wisestep'*. [online] WiseStep. Available at: <https://content.wisestep.com/inventory-management-features-objectives-pros-cons/> 12 October 2020].

Statista. 2021. Malaysia smartphone penetration 2019-2023 | Statista. [online] Available at: <https://www.statista.com/statistics/625418/smartphone-user-penetration-in-malaysia/> [Accessed 6 April 2021].

SINGH, C., (2020). *Entity Relationship Diagram - ER Diagram In DBMS*. [online] beginnersbook.com. Available at: <https://beginnersbook.com/2015/04/e-r-model-in-dbms/> [20 November 2020].

Symmetry.com. (2020). *Understanding Cloud-Based Vs. Local/Network Data Storage*. [online] Available at: <https://www.symmetry.com/payroll-tax-insights/understanding-cloud-based-vs.-local-network-data-storage> [13 October 2020].

UKEssays. (2018). Definition of Fact-Finding Techniques Information Technology Essay. [online]. Available at: <https://www.ukessays.com/essays/information-technology/definition-of-fact-finding-techniques-information-technology-essay.php?vref=1> [20 November 2020].

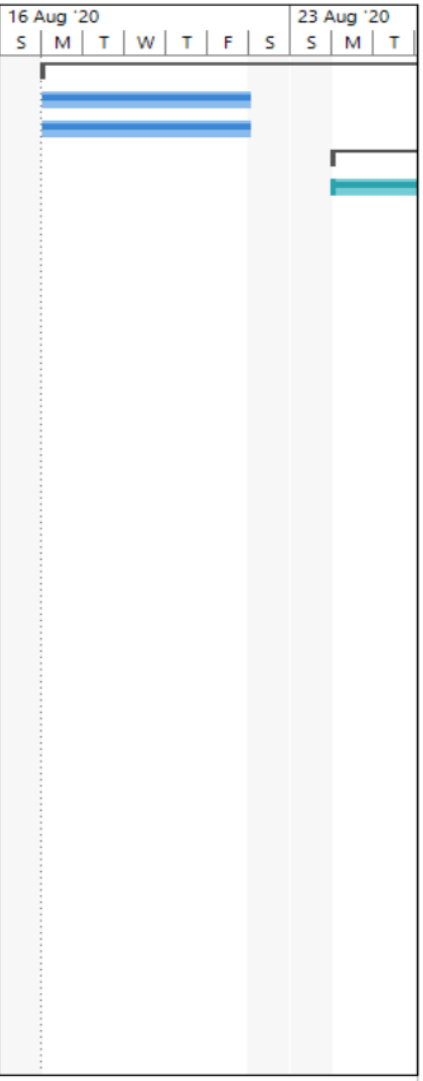
van de Rakt, M. (2020). *What Is Site Structure and Why Is It Important? • SEO For Beginners • Yoast*. [online] Yoast. Available at: <https://yoast.com/site-structure/#:~:text=Site%20structure%20refers%20to%20how,and%20presented%20to%20the%20visitor.> [16 November 2020].

APPENDIX A: Project Gantt Chart

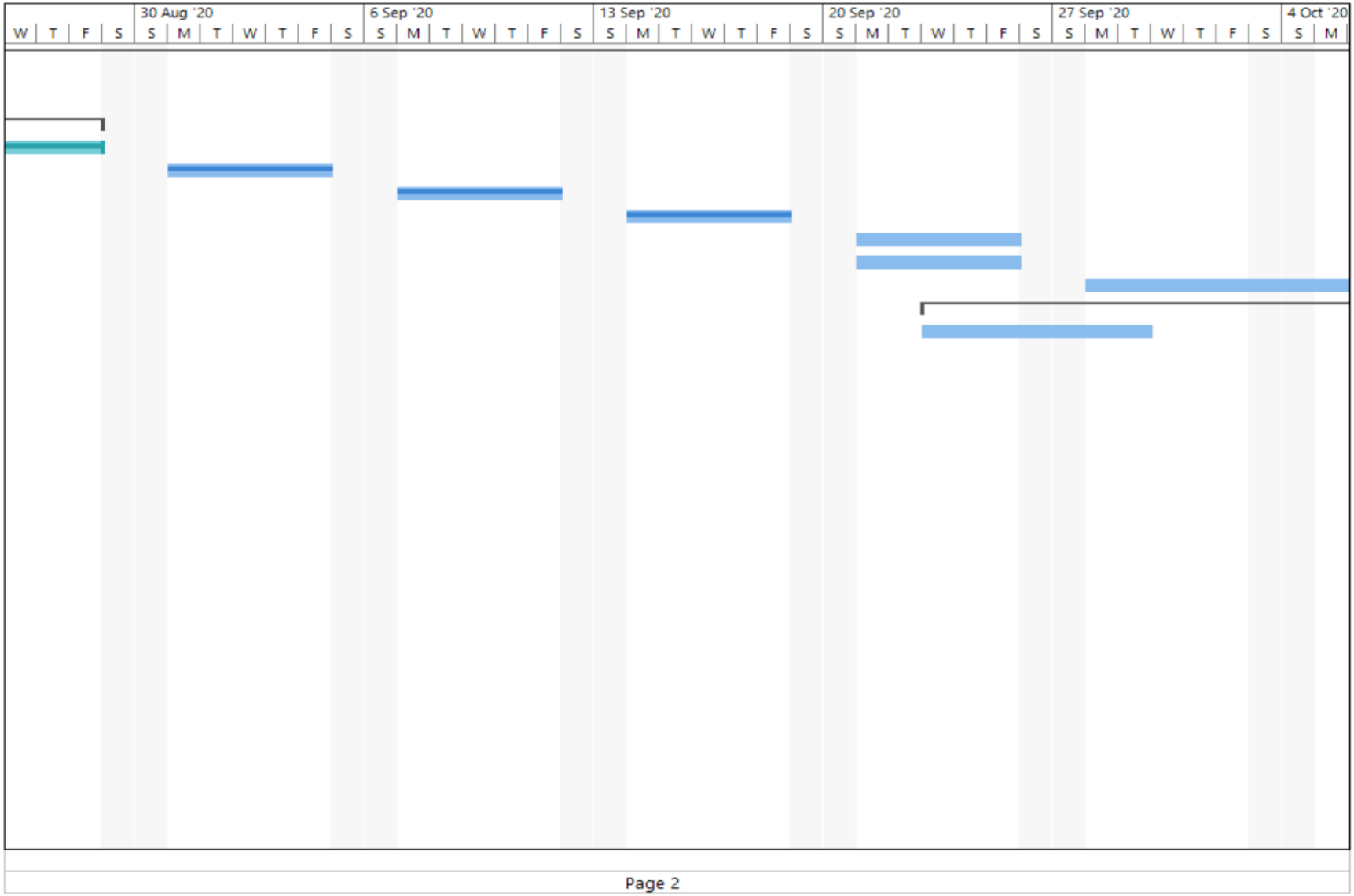
	Task Name	Re	Duration	Start	Finish	Work	Pred	% Compl
1	**FYP Proposal**		**40 days?**	**8/17/2020 8:00 AM**	**10/9/2020 5:00 PM**	**0 hrs**		**60%**
2	Introduction to FYP		5 days?	8/17/2020 8:00 AM	8/21/2020 5:00 PM	0 hrs		100%
3	Finding Topic		5 days?	8/17/2020 8:00 AM	8/21/2020 5:00 PM	0 hrs		100%
4	**Proposal Writing**		**5 days**	**8/24/2020 8:00 AM**	**8/28/2020 5:00 PM**	**0 hrs**		**100%**
5	Conduct Research		5 days?	8/24/2020 8:00 AM	8/28/2020 5:00 PM	0 hrs		100%
6	Problem Statement and		5 days?	8/31/2020 8:00 AM	9/4/2020 5:00 PM	0 hrs		100%
7	Project Scope and Limitations		5 days	9/7/2020 8:00 AM	9/11/2020 5:00 PM	0 hrs		100%
8	Completion of Proposal		5 days	9/14/2020 8:00 AM	9/18/2020 5:00 PM	0 hrs		100%
9	Submission of Project		5 days	9/21/2020 8:00 AM	9/25/2020 5:00 PM	0 hrs		0%
10	Submission of Gantt Chart		5 days	9/21/2020 8:00 AM	9/25/2020 5:00 PM	0 hrs		0%
11	Proposal Presentation		10 days?	9/28/2020 8:00 AM	10/9/2020 5:00 PM	0 hrs		0%
12	**Project Documentation I**		**28 days**	**9/23/2020 8:00 AM**	**10/30/2020 5:00 PM**	**0 hrs**		**0%**
13	Introduction of Project Documentation I		5 days	9/23/2020 8:00 AM	9/29/2020 5:00 PM	0 hrs		0%
14	Chapter 1		5 days	10/19/2020 8:00 AM	10/23/2020 5:00 PM	0 hrs		0%
15	Chapter 2		5 days	10/19/2020 8:00 AM	10/23/2020 5:00 PM	0 hrs		0%
16	Submission of Project Documentation I		5 days	10/26/2020 8:00 AM	10/30/2020 5:00 PM	0 hrs		0%
17	**Project Documentation II**		**17 days**	**11/2/2020 8:00 AM**	**11/24/2020 5:00 PM**	**0 hrs**		**0%**
18	Introduction of Project Documentation II		5 days	11/2/2020 8:00 AM	11/6/2020 5:00 PM	0 hrs		0%
19	Writing Chapter 3		5 days	11/9/2020 8:00 AM	11/13/2020 5:00 PM	0 hrs		0%
20	Mid Semester Break		5 days	11/16/2020 8:00 AM	11/20/2020 5:00 PM	0 hrs		0%
21	Submission of Project Documentation II		3 days	11/20/2020 8:00 AM	11/24/2020 5:00 PM	0 hrs		0%
22	**Updated Project Proposal and Complete Gantt Chart**		13 days?	1/11/2021 8:00 AM	1/27/2021 5:00 PM	0 hrs		0%
23	Arrange Proposal		11 days?	1/11/2021 8:00 AM	1/25/2021 5:00 PM	0 hrs		0%
24	Conduct Gantt Chart		10 days?	1/12/2021 8:00 AM	1/25/2021 5:00 PM	0 hrs		0%
25	Submission of updated Project Proposal, Complete		1 day?	1/27/2021 8:00 AM	1/27/2021 5:00 PM	0 hrs		0%
26	**Chapter 4**		21 days?	2/1/2021 8:00 AM	2/24/2021 5:00 PM	0 hrs		0%
27	Interface Design		5 days	2/1/2021 8:00 AM	2/5/2021 5:00 PM	0 hrs		0%
28	Database Design		5 days	2/8/2021 8:00 AM	2/12/2021 5:00 PM	0 hrs		0%
29	System Design		5 days	2/15/2021 8:00 AM	2/19/2021 5:00 PM	0 hrs		0%
30	Conduct Documentation		2 days	2/22/2021 8:00 AM	2/23/2021 5:00 PM	0 hrs		0%
31	Submission of Chapter 4 - Implementation		1 day	2/24/2021 8:00 AM	2/24/2021 5:00 PM	0 hrs		0%

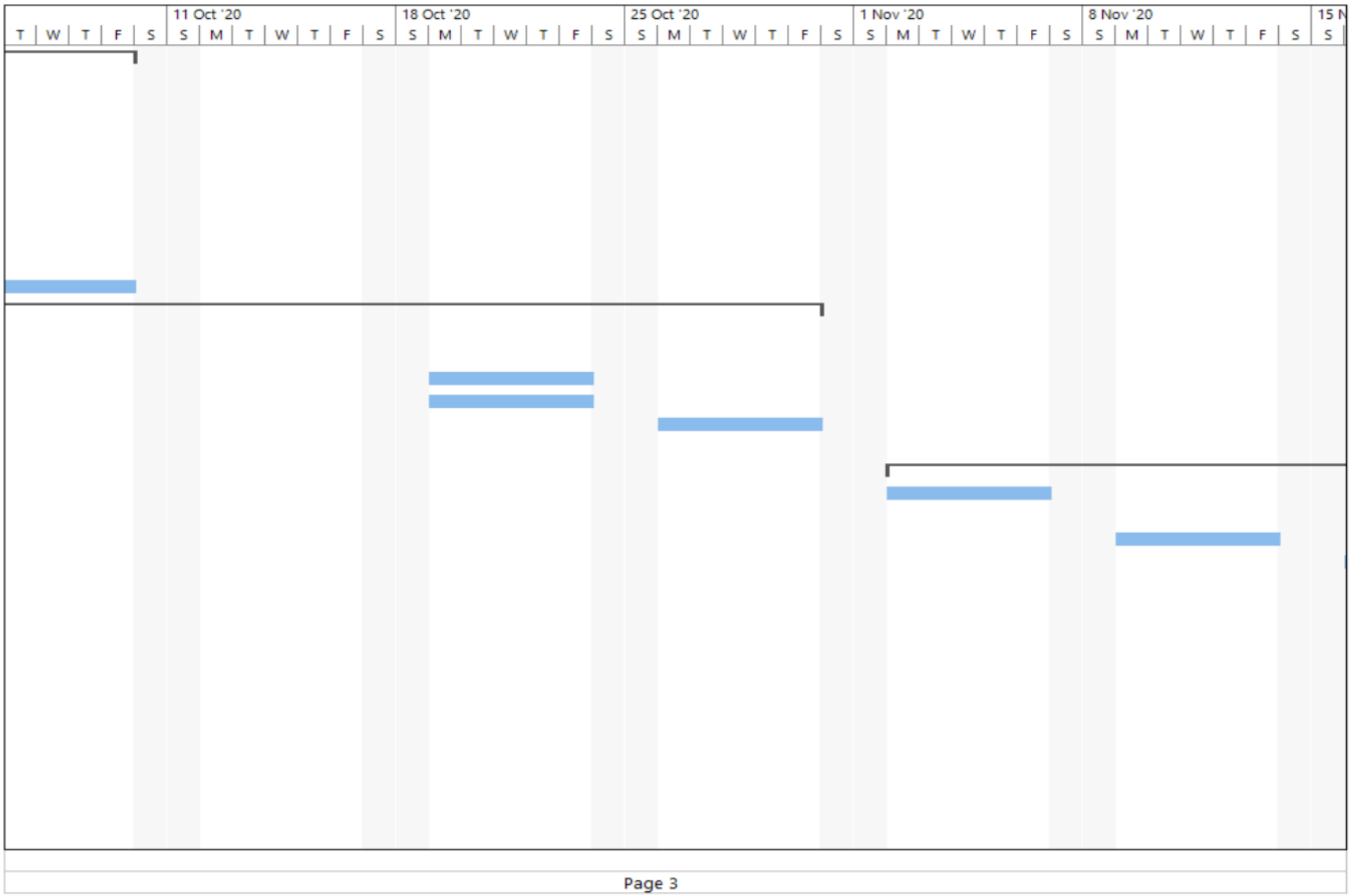
32		**Chapter 5**	13 days	3/1/2021 8:00 AM	3/17/2021 5:00 PM	0 hrs		0%
33		System Testing	10 days	3/1/2021 8:00 AM	3/12/2021 5:00 PM	0 hrs		0%
34		Conduct Documentation	5 days	3/8/2021 8:00 AM	3/12/2021 5:00 PM	0 hrs		0%
35		Submission of Chapter 5 - Testing and User Evaluation	1 day	3/17/2021 8:00 AM	3/17/2021 5:00 PM	0 hrs		0%
36		**Continue chapter 6 and 7**	**10 days**	**3/15/2021 8:00 AM**	**3/26/2021 5:00 PM**	**0 hrs**		**0%**
37		Chapter 6	5 days	3/15/2021 8:00 AM	3/19/2021 5:00 PM	0 hrs		0%
38		Chapter 7	5 days	3/22/2021 8:00 AM	3/26/2021 5:00 PM	0 hrs		0%
39		**Pre-Viva Presentation**	15 days	3/15/2021 8:00 AM	4/2/2021 5:00 PM	0 hrs		0%
40		Prepare poster and slide	5 days	3/15/2021 8:00 AM	3/19/2021 5:00 PM	0 hrs		0%
41		Preparation for Pre-Viva	5 days	3/22/2021 8:00 AM	3/26/2021 5:00 PM	0 hrs		0%
42		Presentation	5 days	3/29/2021 8:00 AM	4/2/2021 5:00 PM	0 hrs		0%
43		**Completion of Project Documentation**	15 days	4/5/2021 8:00 AM	4/23/2021 5:00 PM	0 hrs		0%
44		Finalized System	5 days	4/5/2021 8:00 AM	4/9/2021 5:00 PM	0 hrs		0%
45		Finalized Documentation	5 days	4/12/2021 8:00 AM	4/16/2021 5:00 PM	0 hrs		0%
46		Submission of Compiled Final Year Project Report – Chapter 1 – 7 softcopy & Project VIVA	5 days	4/19/2021 8:00 AM	4/23/2021 5:00 PM	0 hrs		0%

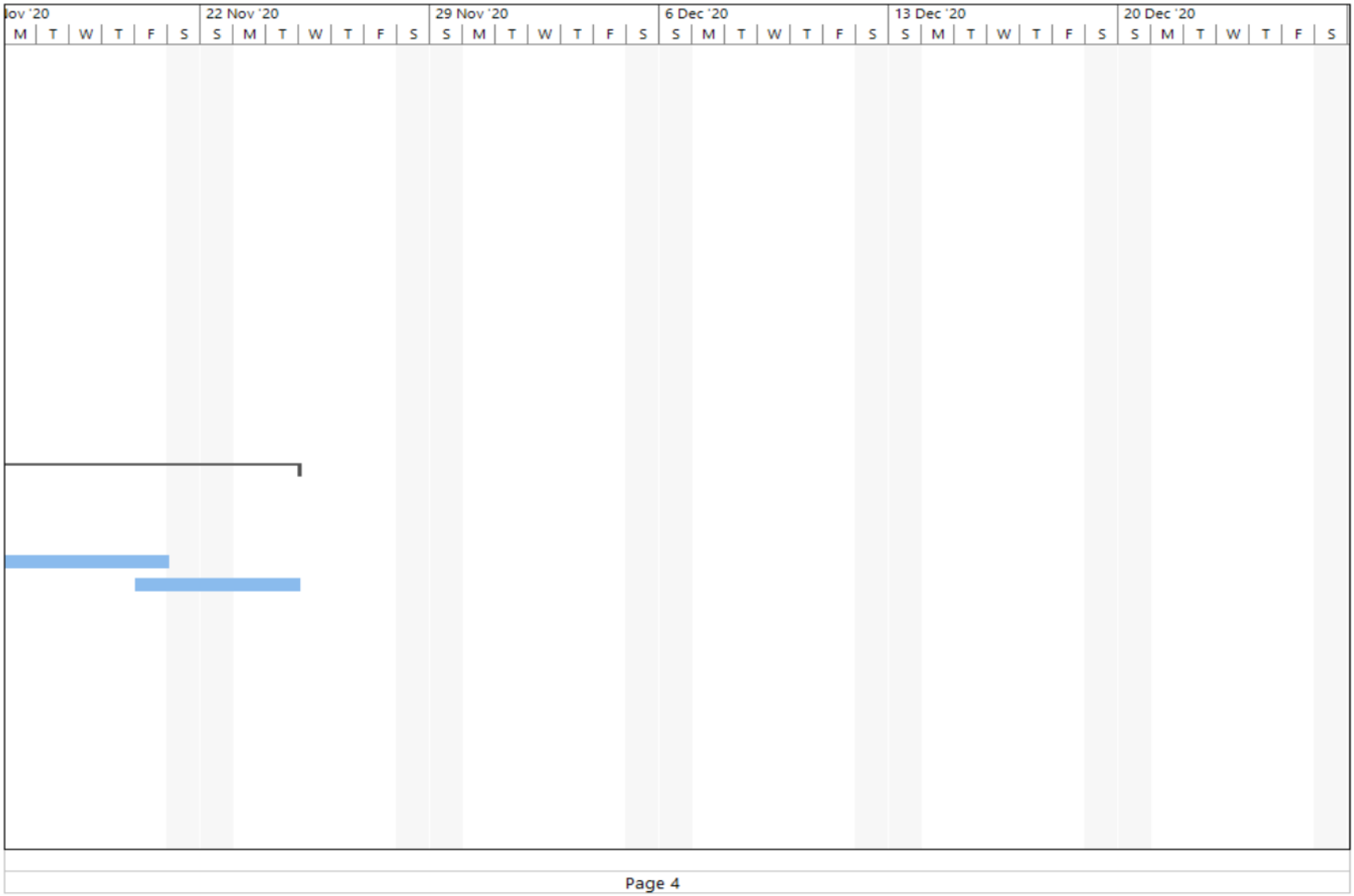
	Task Name	R	Duration	Start	Finish	Work	P	% Com
1	**FYP Proposal**		**40 days?**	**8/17/2020 8:00 AM**	**10/9/2020 5:00 PM**	**0 hrs**		**60%**
2	Introduction to FYP		5 days?	8/17/2020 8:00 AM	8/21/2020 5:00 PM	0 hrs		100%
3	Finding Topic		5 days?	8/17/2020 8:00 AM	8/21/2020 5:00 PM	0 hrs		100%
4	**Proposal Writing**		**5 days**	**8/24/2020 8:00 AM**	**8/28/2020 5:00 PM**	**0 hrs**		**100%**
5	Conduct Research		5 days?	8/24/2020 8:00 AM	8/28/2020 5:00 PM	0 hrs		100%
6	Problem Statement and Object		5 days?	8/31/2020 8:00 AM	9/4/2020 5:00 PM	0 hrs		100%
7	Project Scope and Limitations		5 days	9/7/2020 8:00 AM	9/11/2020 5:00 PM	0 hrs		100%
8	Completion of Proposal		5 days	9/14/2020 8:00 AM	9/18/2020 5:00 PM	0 hrs		100%
9	Submission of Project Proposal		5 days	9/21/2020 8:00 AM	9/25/2020 5:00 PM	0 hrs		0%
10	Submission of Gantt Chart		5 days	9/21/2020 8:00 AM	9/25/2020 5:00 PM	0 hrs		0%
11	Proposal Presentation		10 days?	9/28/2020 8:00 AM	10/9/2020 5:00 PM	0 hrs		0%
12	**Project Documentation I**		**28 days**	**9/23/2020 8:00 AM**	**10/30/2020 5:00 PM**	**0 hrs**		**0%**
13	Introduction of Project Documentation I		5 days	9/23/2020 8:00 AM	9/29/2020 5:00 PM	0 hrs		0%
14	Chapter 1		5 days	10/19/2020 8:00 AM	10/23/2020 5:00 PM	0 hrs		0%
15	Chapter 2		5 days	10/19/2020 8:00 AM	10/23/2020 5:00 PM	0 hrs		0%
16	Submission of Project Documentation I		5 days	10/26/2020 8:00 AM	10/30/2020 5:00 PM	0 hrs		0%
17	**Project Documentation II**		**17 days**	**11/2/2020 8:00 AM**	**11/24/2020 5:00 PM**	**0 hrs**		**0%**
18	Introduction of Project Documentation II		5 days	11/2/2020 8:00 AM	11/6/2020 5:00 PM	0 hrs		0%
19	Writing Chapter 3		5 days	11/9/2020 8:00 AM	11/13/2020 5:00 PM	0 hrs		0%
20	Mid Semester Break		5 days	11/16/2020 8:00 AM	11/20/2020 5:00 PM	0 hrs		0%
21	Submission of Project Documentation II		3 days	11/20/2020 8:00 AM	11/24/2020 5:00 PM	0 hrs		0%
22	**Updated Project Proposal and Complete Gantt Chart**		13 days?	1/11/2021 8:00 AM	1/27/2021 5:00 PM	0 hrs		0%
23	Arrange Proposal		11 days?	1/11/2021 8:00 AM	1/25/2021 5:00 PM	0 hrs		0%
24	Conduct Gantt Chart		10 days?	1/12/2021 8:00 AM	1/25/2021 5:00 PM	0 hrs		0%
25	Submission of updated Project Proposal, Complete Gantt Chart		1 day?	1/27/2021 8:00 AM	1/27/2021 5:00 PM	0 hrs		0%
26	**Chapter 4**		21 days?	2/1/2021 8:00 AM	2/24/2021 5:00 PM	0 hrs		0%
27	Interface Design		5 days	2/1/2021 8:00 AM	2/5/2021 5:00 PM	0 hrs		0%
28	Database Design		5 days	2/8/2021 8:00 AM	2/12/2021 5:00 PM	0 hrs		0%

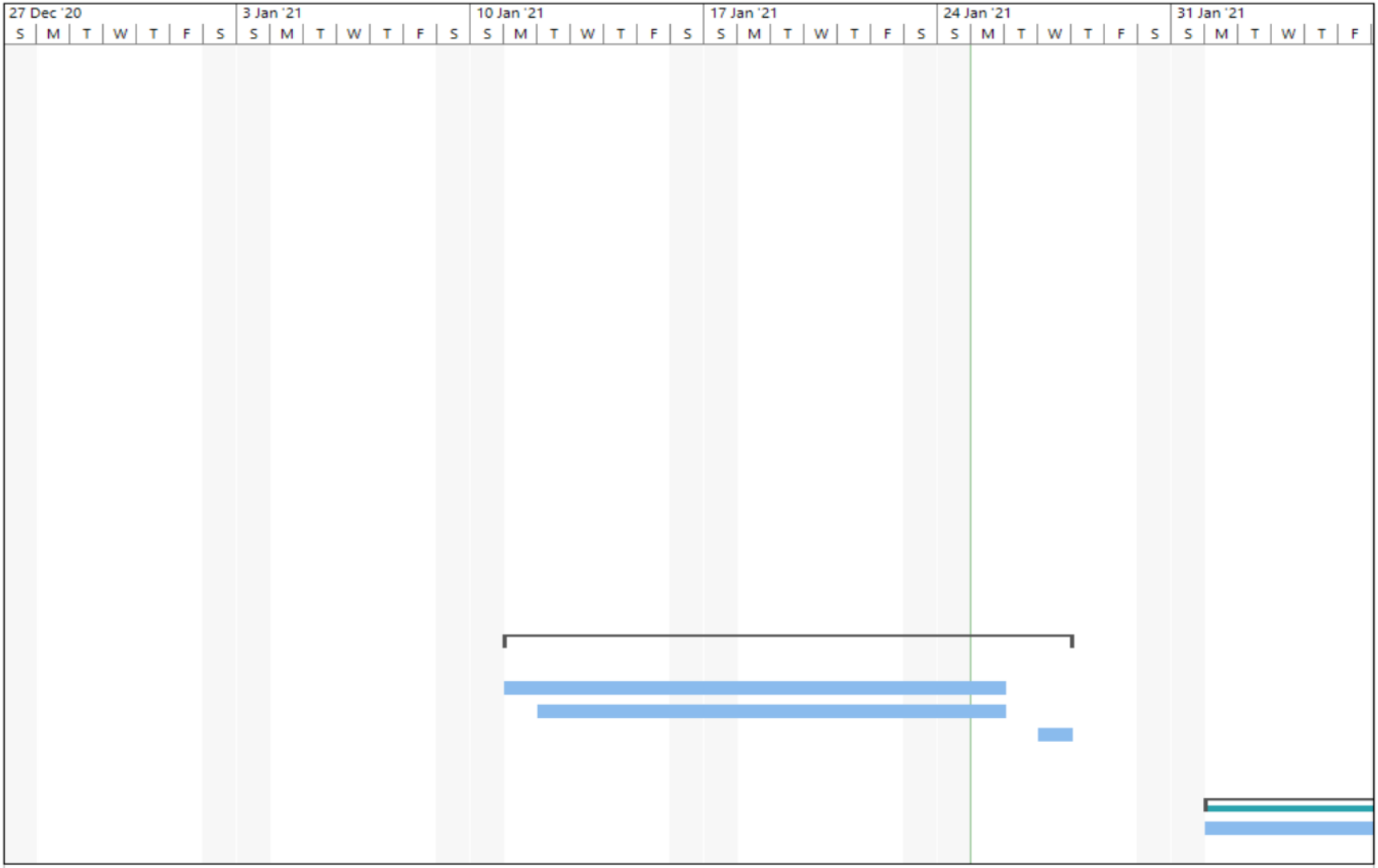


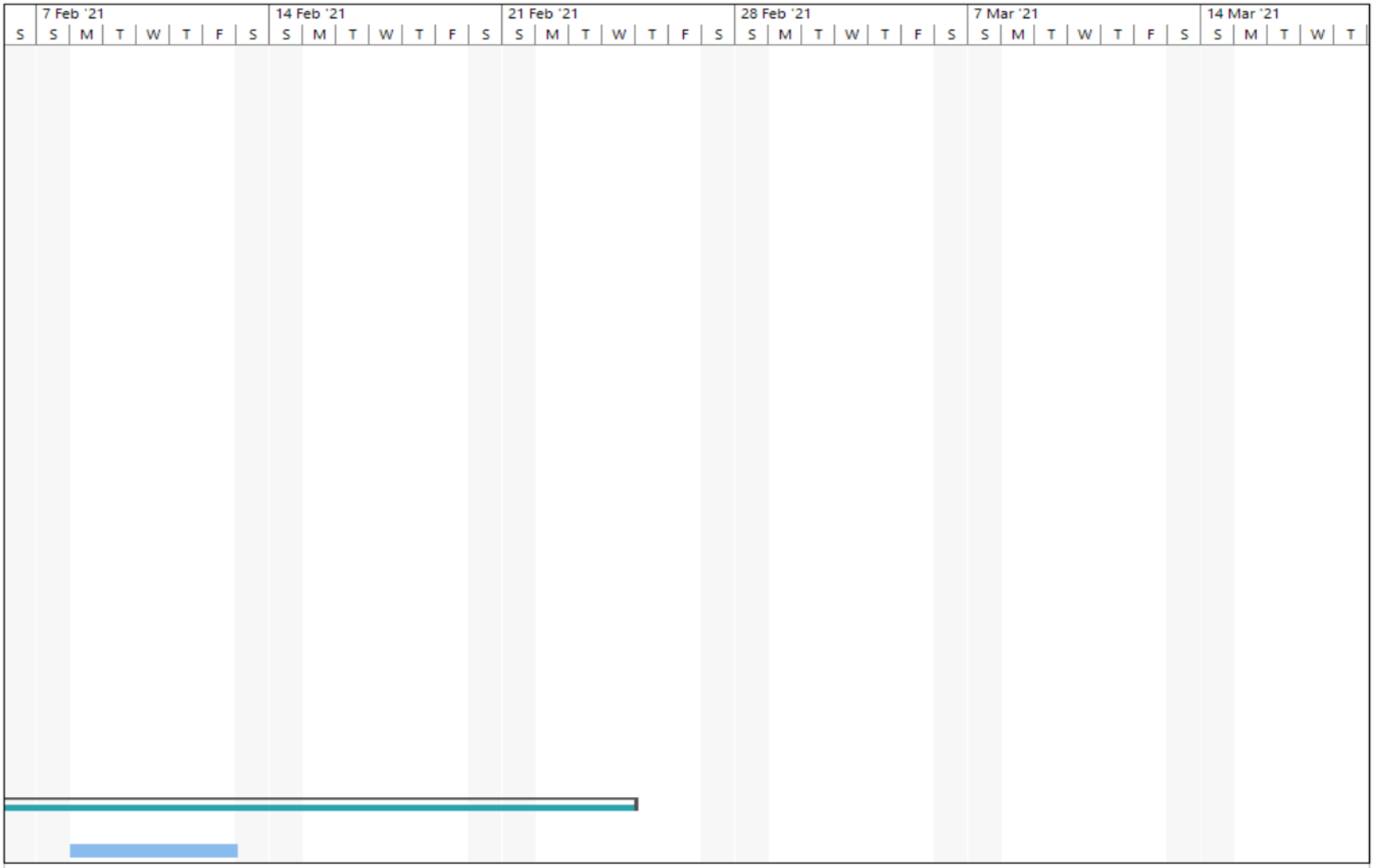
Page 1


30 Aug '20
6 Sep '20
13 Sep '20
20 Sep '20
27 Sep '20
4 Oct '20
W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M
Page 2

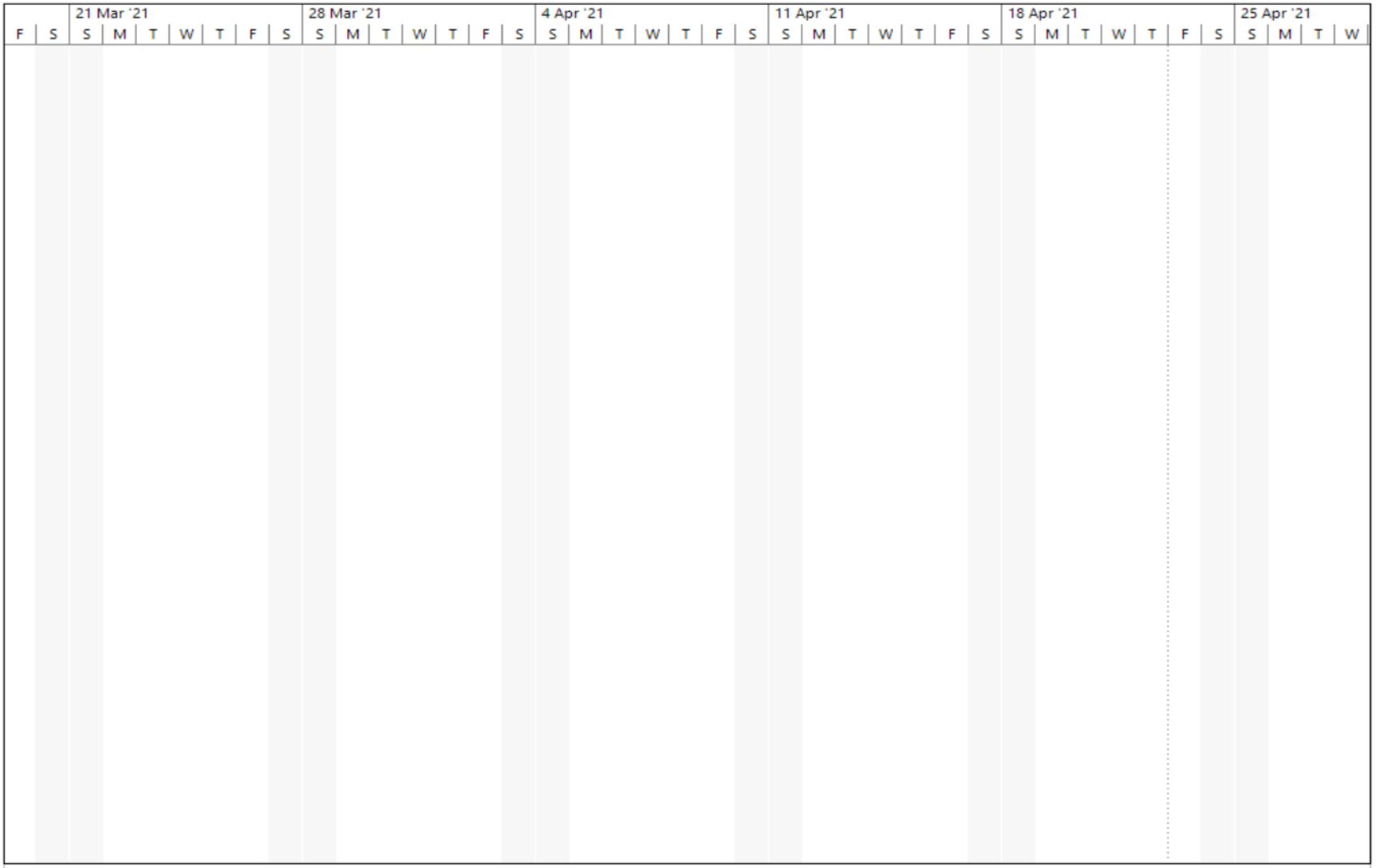

11 Oct '20
18 Oct '20
25 Oct '20
1 Nov '20
8 Nov '20
T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S
Page 3


ov '20
22 Nov '20
29 Nov '20
6 Dec '20
13 Dec '20
20 Dec '20
M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S
Page 4


27 Dec '20
3 Jan '21
10 Jan '21
17 Jan '21
24 Jan '21
31 Jan '21
S M T W T F S
Page 5

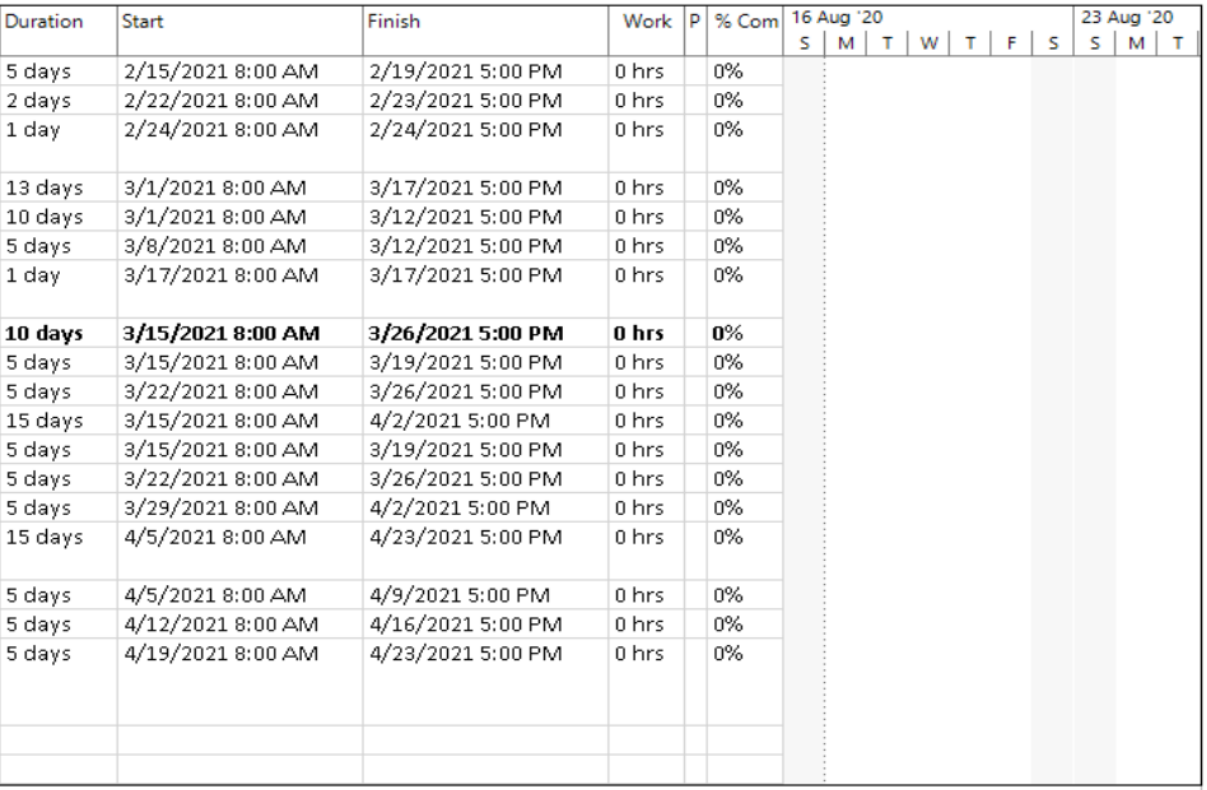


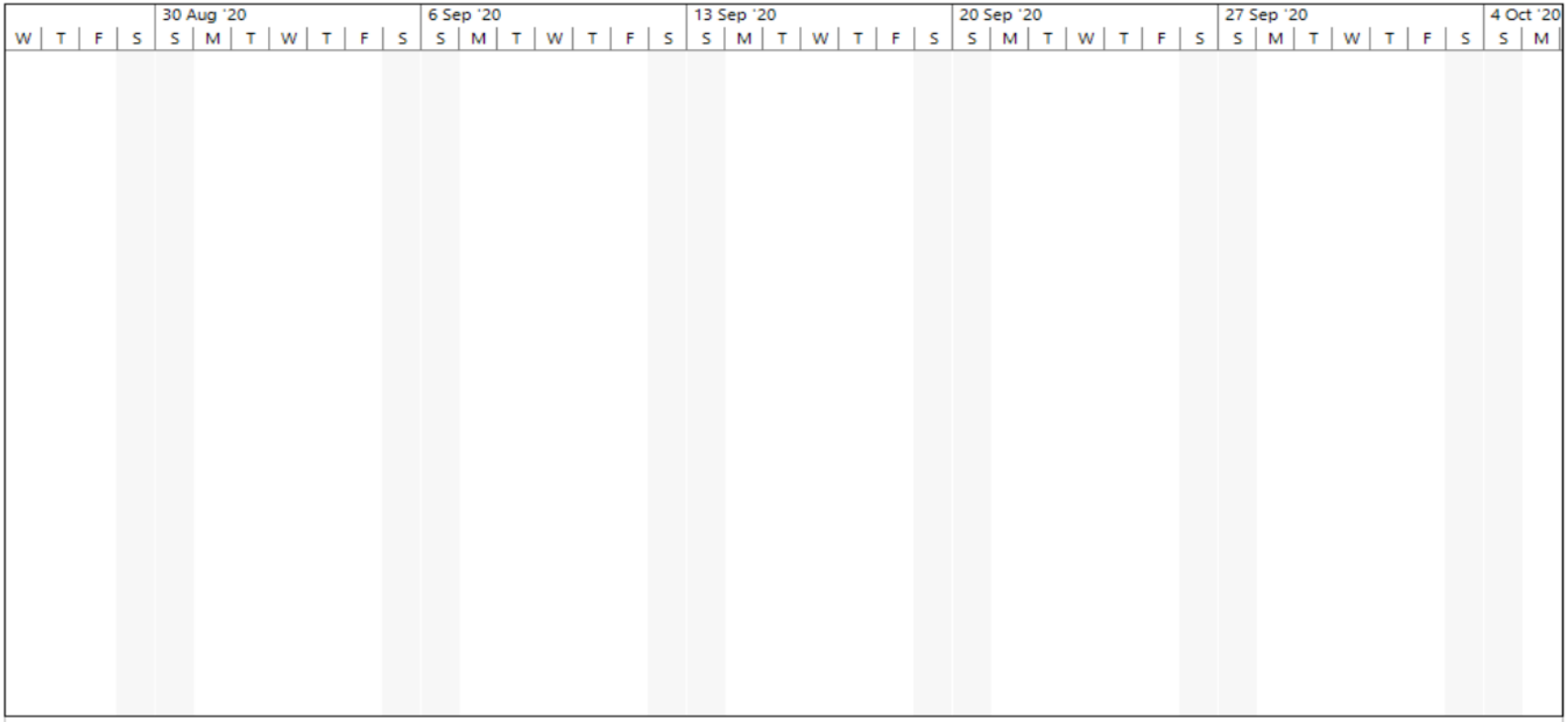
Page 6


21 Mar '21
28 Mar '21
4 Apr '21
11 Apr '21
18 Apr '21
25 Apr '21
F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W

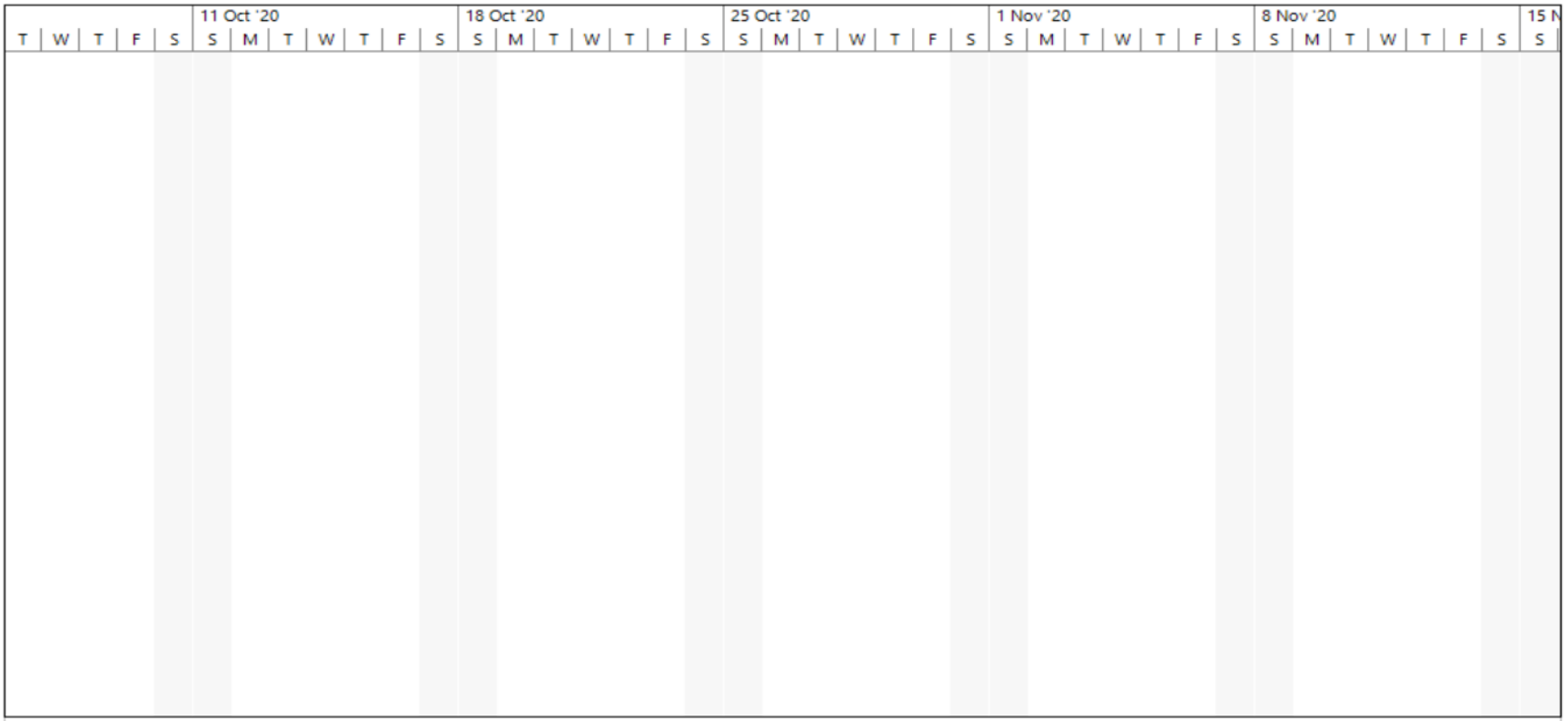
Page 7

	Task Name	R	Duration	Start	Finish	Work	P	% Com
29	System Design		5 days	2/15/2021 8:00 AM	2/19/2021 5:00 PM	0 hrs		0%
30	Conduct Documentation		2 days	2/22/2021 8:00 AM	2/23/2021 5:00 PM	0 hrs		0%
31	Submission of Chapter 4 - Implementation		1 day	2/24/2021 8:00 AM	2/24/2021 5:00 PM	0 hrs		0%
32	**Chapter 5**		13 days	3/1/2021 8:00 AM	3/17/2021 5:00 PM	0 hrs		0%
33	System Testing		10 days	3/1/2021 8:00 AM	3/12/2021 5:00 PM	0 hrs		0%
34	Conduct Documentation		5 days	3/8/2021 8:00 AM	3/12/2021 5:00 PM	0 hrs		0%
35	Submission of Chapter 5 - Testing and User Evaluation		1 day	3/17/2021 8:00 AM	3/17/2021 5:00 PM	0 hrs		0%
36	**Continue chapter 6 and 7**		**10 days**	**3/15/2021 8:00 AM**	**3/26/2021 5:00 PM**	**0 hrs**		**0%**
37	Chapter 6		5 days	3/15/2021 8:00 AM	3/19/2021 5:00 PM	0 hrs		0%
38	Chapter 7		5 days	3/22/2021 8:00 AM	3/26/2021 5:00 PM	0 hrs		0%
39	**Pre-Viva Presentation**		15 days	3/15/2021 8:00 AM	4/2/2021 5:00 PM	0 hrs		0%
40	Prepare poster and slide		5 days	3/15/2021 8:00 AM	3/19/2021 5:00 PM	0 hrs		0%
41	Preparation for Pre-Viva		5 days	3/22/2021 8:00 AM	3/26/2021 5:00 PM	0 hrs		0%
42	Presentation		5 days	3/29/2021 8:00 AM	4/2/2021 5:00 PM	0 hrs		0%
43	**Completion of Project Documentation**		15 days	4/5/2021 8:00 AM	4/23/2021 5:00 PM	0 hrs		0%
44	Finalized System		5 days	4/5/2021 8:00 AM	4/9/2021 5:00 PM	0 hrs		0%
45	Finalized Documentation		5 days	4/12/2021 8:00 AM	4/16/2021 5:00 PM	0 hrs		0%
46	Submission of Compiled Final Year Project Report – Chapter 1 – 7 softcopy & Project VIVA		5 days	4/19/2021 8:00 AM	4/23/2021 5:00 PM	0 hrs		0%
47								
48								

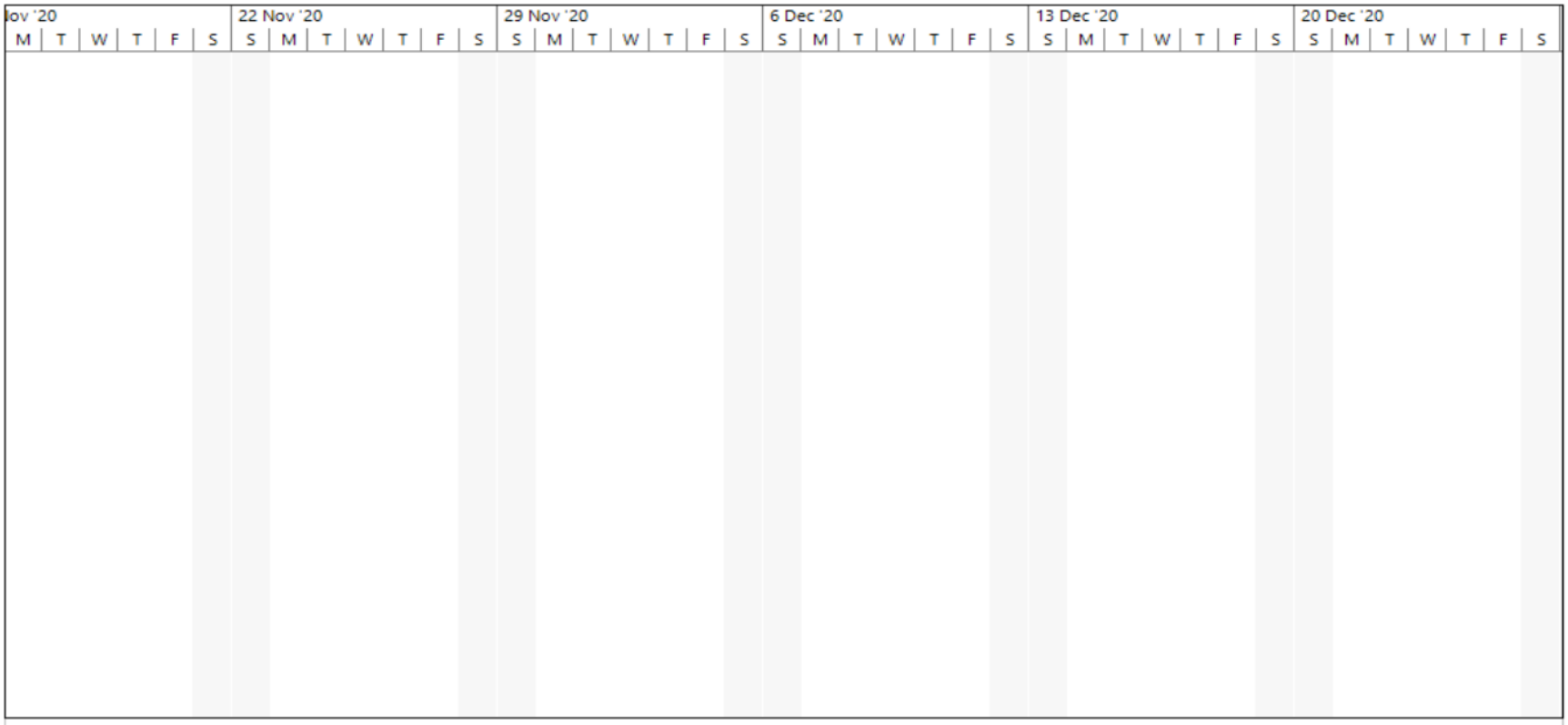


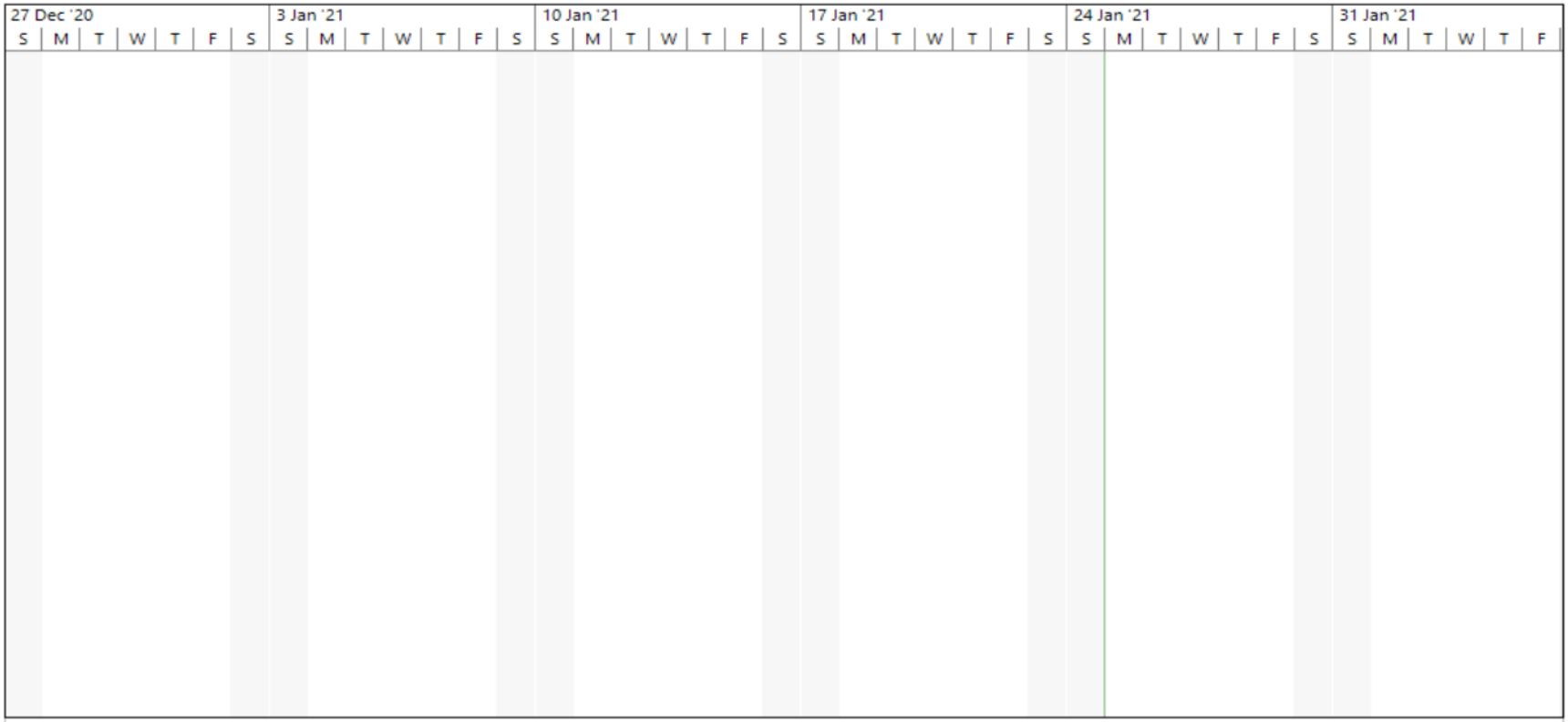

30 Aug '20
6 Sep '20
13 Sep '20
20 Sep '20
27 Sep '20
4 Oct '20
W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M

Page 9

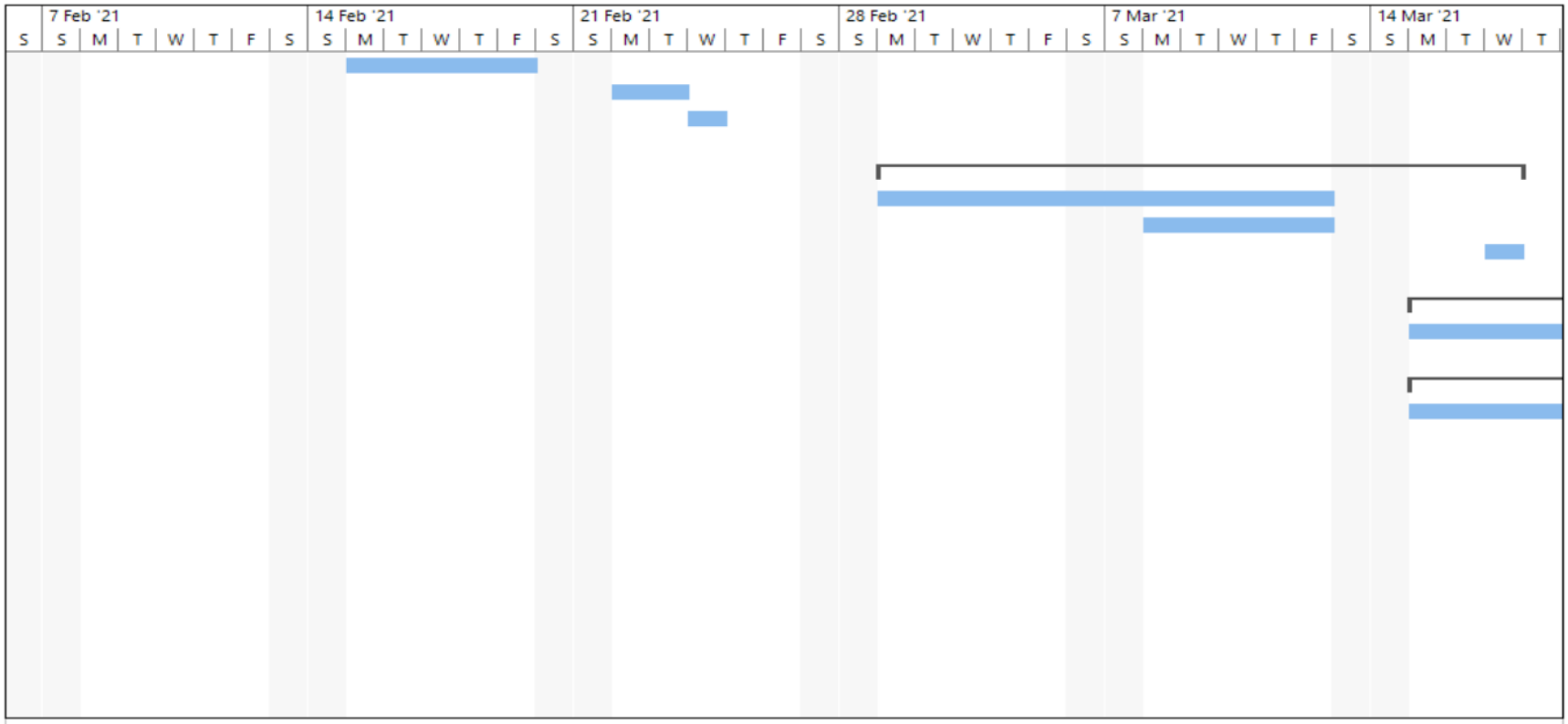

11 Oct '20
18 Oct '20
25 Oct '20
1 Nov '20
8 Nov '20
15 N
T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S

Page 10

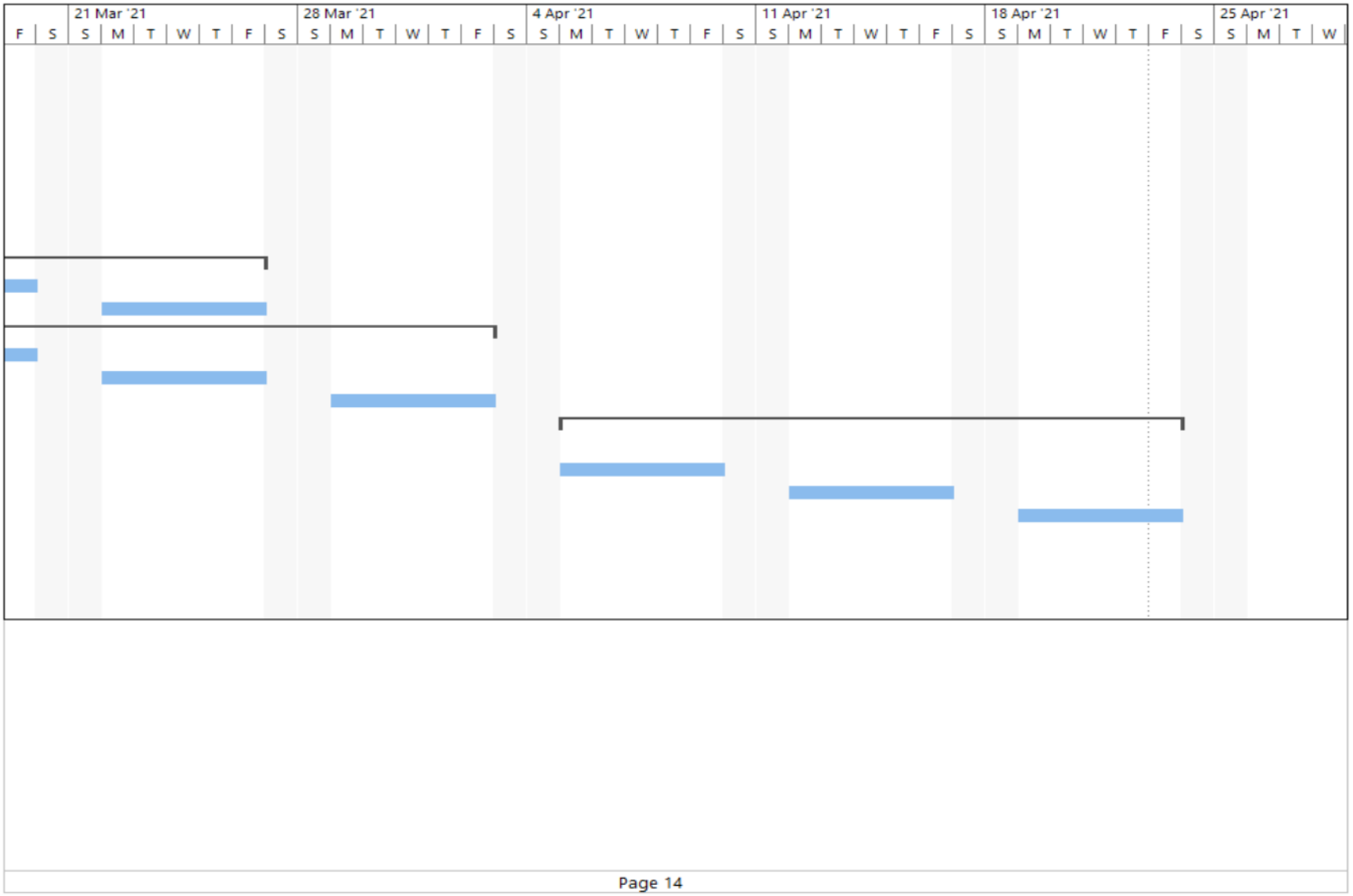

ov '20
22 Nov '20
29 Nov '20
6 Dec '20
13 Dec '20
20 Dec '20
M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S

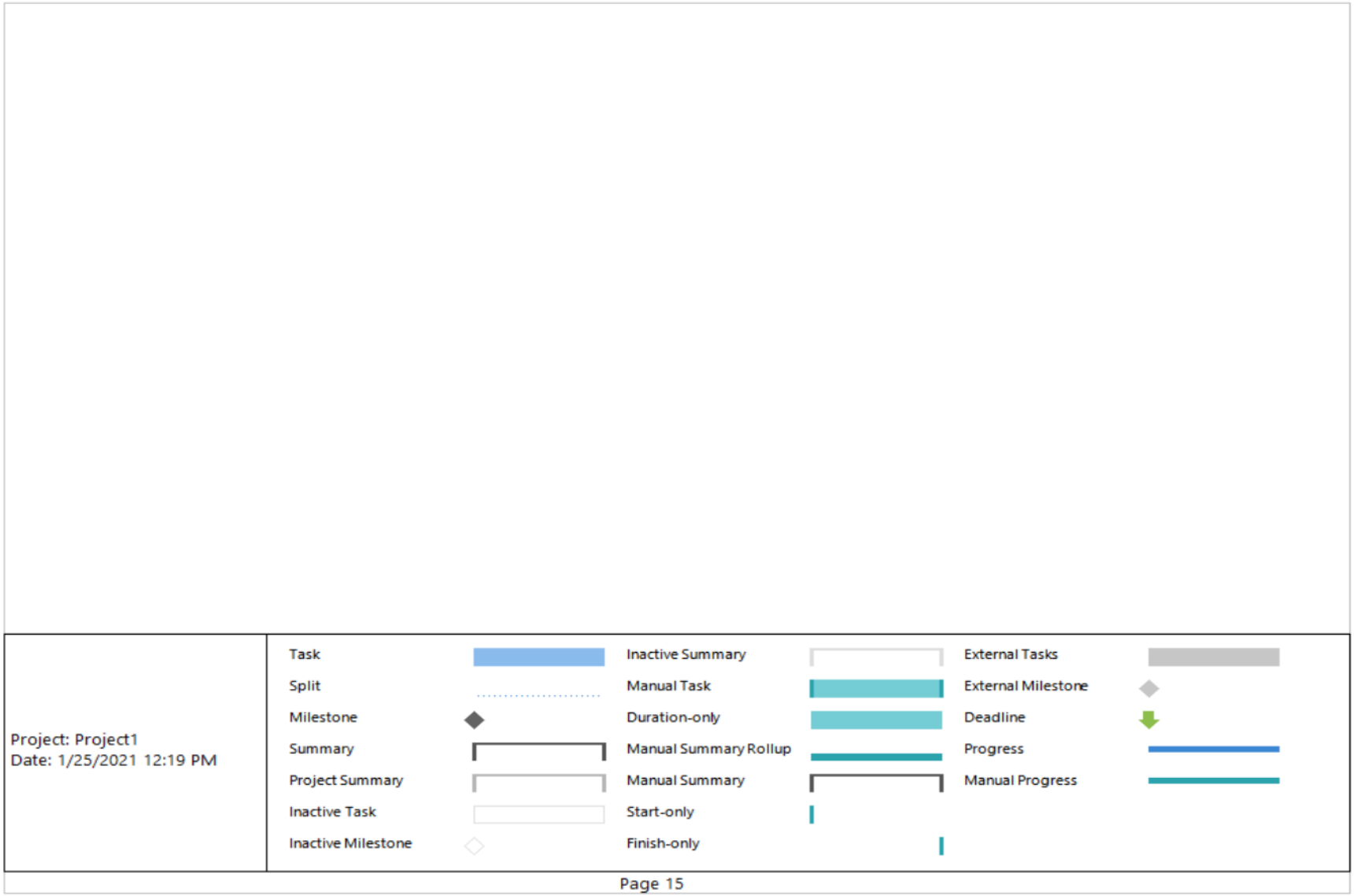


Page 12



Page 13


21 Mar '21
28 Mar '21
4 Apr '21
11 Apr '21
18 Apr '21
25 Apr '21
F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W
Page 14


Project: Project1
Date: 1/25/2021 12:19 PM
Task
Split
Milestone
Summary
Project Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Deadline
Progress
Manual Progress
Page 15

APPENDIX B: Supervisory Meeting Report

SUPERVISORY MEETING REPORT

Meeting No. :	1	**Date:**	19 August 2020
Start Time:	10:40:00 am	**End Time:**	11:00:00 am

Review of actions from the last supervisor meeting:-
-
Identification of any issues:-
Possible topic inventory management system using Web App and analysing the inventory.
Actions set for the next meeting:-
Improve on topic: How inventory management system can be improved in business.

Student's Name:	Er Yan Yao
Signature:	
Date:	19 August 2020
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	19 August 2020

SUPERVISORY MEETING REPORT

Meeting No. :	2	**Date:**	26 August 2020
Start Time:	6:00:00 pm	**End Time:**	6:20:00 pm

Review of actions from the last supervisor meeting:-
-Title, problem statement, objectives, target audience - Scope and limitations
Identification of any issues:-
- Need to rephrase the objectives - Problem statement should be in a paragraph - Scope and limitations should be in full sentences - leave the abstract, for now
Actions set for the next meeting:-
- Read up on the inventory, business models and add content to the research background

Student's Name:	Er Yan Yao
Signature:	
Date:	26 August 2020
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	26 August 2020

SUPERVISORY MEETING REPORT

Meeting No. :	3	**Date:**	2 September 2020
Start Time:	5:00:00 pm	**End Time:**	5:20:00 pm

Review of actions from the last supervisor meeting:-
-Literature Review, problem statement, project objective, project scope, project limitation, target audience
Identification of any issues:-
-In text citation, doing more research
Actions set for the next meeting:-

Student's Name:	Er Yan Yao
Signature:	
Date:	2 September 2020
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	2 September 2020

SUPERVISORY MEETING REPORT

Meeting No. :	4	**Date:**	2 September 2020
Start Time:	5:00:00 pm	**End Time:**	5:20:00 pm

Review of actions from the last supervisor meeting:-
-Draft of proposal
Identification of any issues:-
-
Actions set for the next meeting:-
Continue finalizing proposal

Student's Name:	Er Yan Yao
Signature:	
Date:	2 September 2020
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	2 September 2020

SUPERVISORY MEETING REPORT

Meeting No. :	5	**Date:**	17 September 2020
Start Time:	5:00:00 pm	**End Time:**	5:20:00 pm

Review of actions from the last supervisor meeting:-
-Draft of proposal
Identification of any issues:-
- Check on reference list
Actions set for the next meeting:-
Submission of proposal & Gantt Chart Prepare draft of Chapter 1 & 2

Student's Name:	Er Yan Yao
Signature:	
Date:	17 September 2020
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	17 September 2020

SUPERVISORY MEETING REPORT

Meeting No. :	6	**Date:**	23 September 2020
Start Time:	5:00:00 pm	**End Time:**	5:20:00 pm

Review of actions from the last supervisor meeting:-
- show the draft of project documentation 1
Identification of any issues:-
- the sequence of the chapter 1
Actions set for the next meeting:-
- conduct research for chapter 2

Student's Name:	Er Yan Yao
Signature:	
Date:	23 September 2020
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	23 September 2020

SUPERVISORY MEETING REPORT

Meeting No. :	7	**Date:**	8 October 2020
Start Time:	4:00:00 pm	**End Time:**	4:20:00 pm

Review of actions from the last supervisor meeting:-
- show the background study of inventory management
Identification of any issues:-
- the content not enough
Actions set for the next meeting:-
- conduct research for chapter 2

Student's Name:	Er Yan Yao
Signature:	
Date:	8 October 2020
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	8 October 2020

SUPERVISORY MEETING REPORT

Meeting No. :	8	**Date:**	22 October 2020
Start Time:	4:00:00 pm	**End Time:**	4:20:00 pm

Review of actions from the last supervisor meeting:-
Show questionnaire and interview
Identification of any issues:-
The questionnaire does not meet the requirements. Needs further improvement.
Actions set for the next meeting:-
Continues doing chapter 3.

Student's Name:	Er Yan Yao
Signature:	
Date:	22 October 2020
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	22 October 2020

SUPERVISORY MEETING REPORT

Meeting No. :	9	**Date:**	5 November 2020
Start Time:	4:00:00 pm	**End Time:**	4:20:00 pm

Review of actions from the last supervisor meeting:-
show questionnaire, requirement, site map
Identification of any issues:-
the sequence of the all document
Actions set for the next meeting:-
gather data through questionnaire, requirement and system design

Student's Name:	Er Yan Yao
Signature:	
Date:	5 November 2020
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	5 November 2020

SUPERVISORY MEETING REPORT

Meeting No. :	10	**Date:**	13 January 2021
Start Time:	10:05:00 am	**End Time:**	10:15:00 am

Review of actions from the last supervisor meeting:-
-
Identification of any issues:-
- Start working on the implementation of the system before writing chapter 4 - Submission of chapter 4's draft will be in week 7 or 8 - Refer to existing systems to identify whether php or asp.net was used
Actions set for the next meeting:-
- Show system

Student's Name:	Er Yan Yao
Signature:	
Date:	13 January 2021
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	13 January 2021

SUPERVISORY MEETING REPORT

Meeting No. :	11	**Date:**	20 January 2021
Start Time:	10:05:00 am	**End Time:**	10:15:00 am

Review of actions from the last supervisor meeting:-
Identification of any issues:-
Change the status of the brand, category. Become more actual. Button show existing customer when they order.
Actions set for the next meeting:-
Conduct the rest function.

Student's Name:	Er Yan Yao
Signature:	
Date:	20 January 2021
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	20 January 2021

SUPERVISORY MEETING REPORT

Meeting No. :	12	**Date:**	27 January 2021
Start Time:	10:05:00 am	**End Time:**	10:15:00 am

Review of actions from the last supervisor meeting:-
Identification of any issues:-
Continue implement system.
Actions set for the next meeting:-
Conduct the rest function.

Student's Name:	Er Yan Yao
Signature:	
Date:	27 January 2021
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	27 January 2021

SUPERVISORY MEETING REPORT

Meeting No. :	13	**Date:**	5 February 2021
Start Time:	10:05:00 am	**End Time:**	10:15:00 am

Review of actions from the last supervisor meeting:-
Identification of any issues:-
Continue implement system.
Actions set for the next meeting:-
Conduct the rest function. Visualization of the data.

Student's Name:	Er Yan Yao
Signature:	
Date:	5 February 2021
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	5 February 2021

SUPERVISORY MEETING REPORT

Meeting No. :	14	**Date:**	10 February 2021
Start Time:	10:05:00 am	**End Time:**	10:15:00 am

Review of actions from the last supervisor meeting:-
Identification of any issues:-
Continue implement system.
Actions set for the next meeting:-
Conduct the rest function. Visualization of the data. Using class to develop system function.

Student's Name:	Er Yan Yao
Signature:	
Date:	10 February 2021
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	10 February 2021

SUPERVISORY MEETING REPORT

Meeting No. :	15	**Date:**	24 February 2021
Start Time:	10:05:00 am	**End Time:**	10:15:00 am

Review of actions from the last supervisor meeting:-
Continues doing chapter 4 implementation and pass up by friday
Identification of any issues:-
Continue implement system.
Actions set for the next meeting:-
Conduct the rest function. Visualization of the data. Using class to develop system function.

Student's Name:	Er Yan Yao
Signature:	
Date:	24 February 2021
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	24 February 2021

SUPERVISORY MEETING REPORT

Meeting No. :	16	**Date:**	3 March 2021
Start Time:	10:05:00 am	**End Time:**	10:15:00 am

Review of actions from the last supervisor meeting:-
Continues doing chapter 5 testing
Identification of any issues:-
Continue implement system and conduct testing
Actions set for the next meeting:-
Show testing part including usability, acceptance, unit, intregation

Student's Name:	Er Yan Yao
Signature:	
Date:	3 March 2021
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	3 March 2021

SUPERVISORY MEETING REPORT

Meeting No. :	17	**Date:**	10 March 2021
Start Time:	10:05:00 am	**End Time:**	10:15:00 am

Review of actions from the last supervisor meeting:-
Continues doing chapter 5 testing
Identification of any issues:-
Continue implement system and conduct testing
Actions set for the next meeting:-
Show testing part including usability, acceptance, unit, intregation

Student's Name:	Er Yan Yao
Signature:	
Date:	10 March 2021
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	10 March 2021

SUPERVISORY MEETING REPORT

Meeting No. :	18	**Date:**	17 March 2021
Start Time:	10:05:00 am	**End Time:**	10:15:00 am

Review of actions from the last supervisor meeting:-
Continues doing chapter 6 future enchancement
Identification of any issues:-
Continue doing documentation.
Actions set for the next meeting:-

Student's Name:	Er Yan Yao
Signature:	
Date:	17 March 2021
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	17 March 2021

SUPERVISORY MEETING REPORT

Meeting No. :	19	**Date:**	24 March 2021
Start Time:	10:05:00 am	**End Time:**	10:15:00 am

Review of actions from the last supervisor meeting:-
Show poster
Identification of any issues:-
need to rearrange the template of the poster
Actions set for the next meeting:-
prepare poster for pre-viva

Student's Name:	Er Yan Yao
Signature:	
Date:	24 March 2021
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	24 March 2021

SUPERVISORY MEETING REPORT

Meeting No. :	20	**Date:**	7 April 2021
Start Time:	10:05:00 am	**End Time:**	10:15:00 am

Review of actions from the last supervisor meeting:-
Identification of any issues:-
Actions set for the next meeting:-
Show the full document

Student's Name:	Er Yan Yao
Signature:	
Date:	7 April 2021
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	7 April 2021

SUPERVISORY MEETING REPORT

Meeting No. :	21	**Date:**	16 April 2021
Start Time:	10:05:00 am	**End Time:**	10:15:00 am

Review of actions from the last supervisor meeting:- Show full report
Identification of any issues:-
Actions set for the next meeting:-

Student's Name:	Er Yan Yao
Signature:	
Date:	16 April 2021
Supervisor's Name	Ms. Mohana Muniandy
Signature:	
Date:	16 April 2021

APPENDIX C: Questionnaire Preview

Survey: User Experience in retail stores

The survey will raise issues related to inventory management in retail stores. The following questions can make it easier for the author to implement the project. The author uses fact-finding techniques -questionnaire to ask about your experience in retail stores. Thank you so much.

* Required

1. Do you often go to retail stores? *

- ◯ Yes
- ◯ No

2. How often you go

- ◯ Daily
- ◯ Weekly
- ◯ Monthly

3. What type of retail store do you often encounter? *

- ◯ Modern retail (Store using modern technology)
- ◯ Traditional retail (Without using IT support, E.g. computer)

4. Have you tried to purchase a product in a store but was unable to? *

- ◯ Yes
- ◯ No

5. Should the store display the information of out of stock products to let customers know? *

- ◯ Yes
- ◯ No

6. Do you think that the retail store should display the product details (E.g. product quantity, restock date) on a website? *

- ◯ Yes
- ◯ No

8. If the website of a retail store shows the status of a product, would you visit the website and check the product details? *

- ◯ Yes
- ◯ No

9. If a store has a website that displays product information, how often will you visit? *

- ◯ Daily
- ◯ Weekly
- ◯ Monthly
- ◯ Before going to the store

10. According to your opinion, do you think there is anything traditional stores can strengthen?

Your answer

APPENDIX D: Interview Transcript Preview

Interview Results

Interviewer	Er Yan Yao
Interviewee	Danny Yee

Yan Yao: Good afternoon sir, I am doing my FYP project. My project is conducting an Inventory Management System. May I get some suggestions from you to improve my system?

Danny: Yes, sure.

Yan Yao: OK, let us start. When did you start your business?

Danny: I started my business in 2010.

Yan Yao: Can I know your business working hours?

Danny: Our store is from 10 am until 9 pm.

Yan Yao: How many employees work in your store?

Danny: Currently we are having two people in our store.

Yan Yao: Do you use the computer to support your business operation?

Danny: Yes, we are using it to record our sales.

Yan Yao: How were the features of the system?

Danny: we were only using excel to record the data. It still cants fully support our business.

Yan Yao: Do you think inventory management is critical?

Danny: Sure, it very important to every business.

Yan Yao: How often do you count the product quantity?

Danny: every day.

Yan Yao: Why you need to calculate the stock every day?

Danny: It is because we must ensure that all the inventory is still in our warehouse. It will avoid missing goods.

Yan Yao: Have you ever thought of expanding your customer base online?

Danny: Yes, but I think I need much time. So, we still in consideration.

Yan Yao: Do you have experience in using sales and inventory management systems?

Danny: Yes.

Yan Yao: If we develop a web-based inventory management system. Can the Web-based inventory management system fully meet user requirements? Furthermore, which functions do you think is necessary.

Danny: It should meet user requirements. Record the inventory and maybe analyze it.

Yan Yao: In your opinion, if having an inventory system. Do you use it in your business?

Danny: Sure, we will use it in our business.

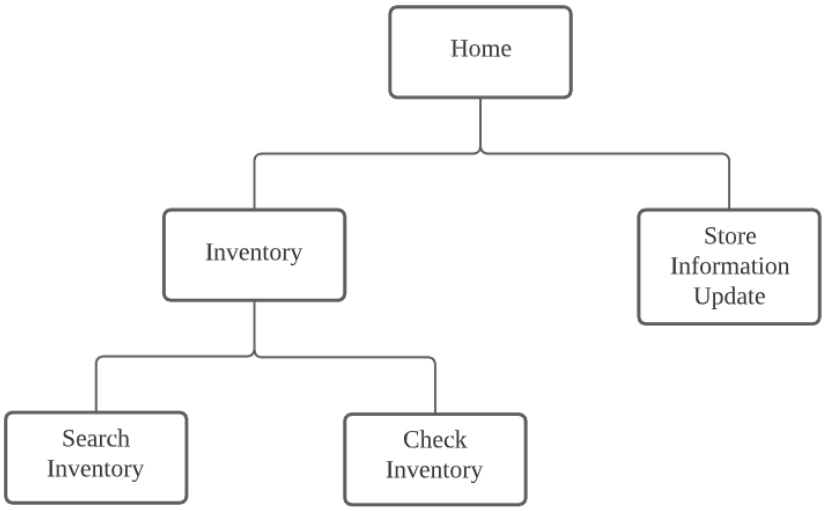
Yan Yao: There are all my questions. Thank you very much.

Danny: Sure, welcome.

APPENDIX E: Site Structure

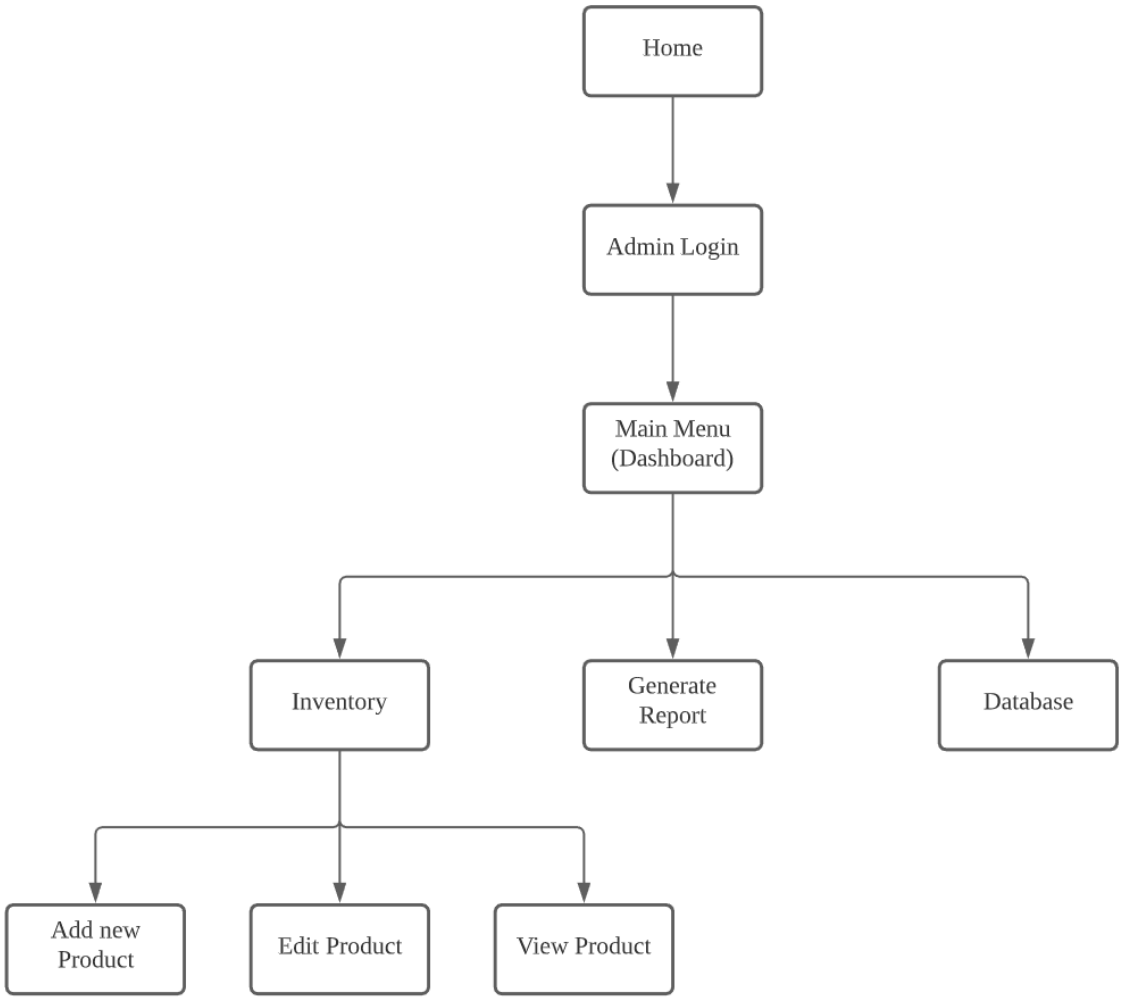
Site structure make the user have the structure of the overall system. In this graph, it is having admin view and customer view. Website structure refers to the way you organize the content of your website. Websites usually contain content on various related topics presented on posts and pages. The website structure deals with how to group these contents, link and present them to visitors (van de Rakt, 2020).

Customer's View



The figure shows the structure of the system. First, the user will enter the home page. And the home page will display inventory details. Users can search for inventory and check the inventory status, including the inventory, price and detailed description of a specific product.

Admin's View



For the admin part, system require administrator to login. After login, it will take the administrator to the main menu. The administrator page contains three important parts, namely inventory, reports and database. For the inventory part, it allows admin to perform CRUD operations. For the report part, the system provides a report generation function, which can generate reports based on transaction records. The last part is the database, which allows the administrator to monitor and modify the database.

APPENDIX F: Test Case

Test Case 10: Unit testing with functional testing for login.aspx

Test Case ID	UT01	**Objective**	Test Username Textbox
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	Login.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	1/3/2021
Executed By	ER YAN YAO	**Execution Date**	1/3/2021
Short Description	After entering the username in the textbox, test what the textbox will display.		
Pre-conditions	Must be redirected to the login page. The username must be entered in the text box.		

Step	Action	Expected System Response	Pass/Fail	Comment
1	Go to login page.	Redirect to login page.	Past	
2	Click on first textbox.	The textbox is selected.	Past	
3	Type in the username “helloworld” to textbox.	The username showed on textbox.	Past	
4	View the text written in the textbox.	“helloworld” is display on textbox.	Past	
5	Check Post-conditions			

Post-conditions	The text that the user types must be displayed in the text box.
Summary	Passed the test. The text box displays user input.
Output Interface	1. The written text displayed in the textbox.
Result	The test is passed.

Test Case 11: Unit testing with functional testing for login.aspx

Test Case ID	UT02	**Objective**	Test Password Textbox
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	login.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	1/3/2021
Executed By	ER YAN YAO	**Execution Date**	1/3/2021
Short Description	After entering the password in the textbox, test what the textbox will display.		
Pre-conditions	Must be redirected to the login page. The password must be entered in the text box.		

Step	**Action**	**Expected System Response**	**Pass/Fail**	**Comment**
1	Go to login page.	Redirect to login page.	Past	
2	Click on second textbox.	The textbox is selected.	Past	
3	Type “helloworld” in the username textbox.	The password showed on textbox.	Past	
4	View the text written in the textbox.	Written text is display on textbox.	Past	
5	Check Post-conditions			

Post-conditions	The text that the user types must be displayed in the text box.
Summary	Passed the test. The text box displays user input.
Output Interface	1. The written text displayed in the textbox.
Result	The test passed.

Test Case 12: Unit testing with functional testing for dashboard.aspx

Test Case ID	UT03	**Objective**	Test logout button
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	dashboard.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	1/3/2021
Executed By	ER YAN YAO	**Execution Date**	1/3/2021
Short Description	After clicking the logout button, test what the page redirect.		
Pre-conditions	Must be redirected to the login page. And the session is clear,		

Step	**Action**	**Expected System Response**	**Pass/Fail**	**Comment**
1	Click the logout button.	Redirect to login page.	Past	
2	The user session is clear		Past	
3	Check Post-conditions			

Post-conditions	The user logout from the system. And user session is clear.
Summary	Passed the test. The user logout from the system.
Output Interface	2. Page redirect to the login page.
Result	The test passed.

Test Case 13: Unit testing with functional testing for dashboard.aspx

Test Case ID	UT04	**Objective**	Test navigation bar
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	dashboard.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	1/3/2021
Executed By	ER YAN YAO	**Execution Date**	1/3/2021
Short Description	After clicking the navigation bar item, test what the page will redirect.		
Pre-conditions	Must be redirected to the following page.		

Step	**Action**	**Expected System Response**	**Pass/Fail**	**Comment**
1	Click the brands button	Redirect to brand control page.	Past	
2	Click the category button	Redirect to category control page.	Past	
3	Click the product button	Redirect to product control page.	Past	
4	Click the order button	Redirect to order control page.	Past	
5	Click the report button	Redirect to report control page.	Past	
6	Check Post-condition.			

Post-conditions	The navigation bar is work and redirect to correct page.
Summary	Passed the test. The navigation bar work efficiently.
Output Interface	2. Page redirect to the following page after clicked.
Result	The test passed.

Test Case 14: Unit testing with functional testing for dashboard.aspx

Test Case ID	UT05	**Objective**	Test sales analysis drop down list and button
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	dashboard.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	1/3/2021
Executed By	ER YAN YAO	**Execution Date**	1/3/2021
Short Description	After clicking the drop-down list, test what the drop-down list can be work or not.		
Pre-conditions	Drop down list and button must be workable.		

Step	**Action**	**Expected System Response**	**Pass/Fail**	**Comment**
1	Change the year drop down list	The year drop down list will be changed	Past	
2	Change the month drop down list	The month drop down list data will be changed	Past	
3	Click the submit button	Sales analysis data will be changed based on the drop-down list user selected.	Past	
4	Check Post-condition.			

Post-conditions	The drop-down list and button must be workable, and the data will be updated after button click
Summary	Passed the test. The sales data is updated after click.
Output Interface	2. Page refreshed and sales data is updated.
Result	The test passed.

Test Case 15: Unit testing with functional testing for brands/Default.aspx

Test Case ID	UT06	**Objective**	Test Add Button on Brand Control Page
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	brands/Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	1/3/2021
Executed By	ER YAN YAO	**Execution Date**	1/3/2021
Short Description	After clicking the Add button, test the redirected content of the page.		
Pre-conditions	Must be redirect to the brands control page.		

Step	**Action**	**Expected System Response**	**Pass/Fail**	**Comment**
1	Click the add button	Redirect to add brand page	Past	
2	Check Post-condition.			

Post-conditions	The page redirect to the add brand page.
Summary	Passed the test. The page redirect to correct content.
Output Interface	1. Page redirect to add brand page.
Result	The test passed.

Test Case 16: Unit testing with functional testing for brands/Default.aspx

Test Case ID	UT07	**Objective**	Test Edit Button on Brand Control Page
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	brands/Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	1/3/2021
Executed By	ER YAN YAO	**Execution Date**	1/3/2021
Short Description	After clicking the edit button, test the redirected content of the page.		
Pre-conditions	Must be redirect to the brands control page.		

Step	**Action**	**Expected System Response**	**Pass/Fail**	**Comment**
1	Click the edit button	Redirect to edit brand page	Past	
2	Check Post-condition.			

Post-conditions	The page redirect to the edit brand page.
Summary	Passed the test. The page redirect to correct content.
Output Interface	1. Page redirect to edit brand page.
Result	The test passed.

Test Case 17: Unit testing with functional testing for brands/Default.aspx

Test Case ID	UT08	**Objective**	Test Delete Button on Brand Control Page
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	brands/Default.aspx	**Subsystem**	
Design By	ER YAN YAO	**Design Date**	1/3/2021
Executed By	ER YAN YAO	**Execution Date**	1/3/2021
Short Description	After clicking the delete button, test the redirected content of the page.		
Pre-conditions	Must be redirect to the brands control page.		

Step	Action	Expected System Response	Pass/Fail	Comment
1	Click the delete button	Delete confirmation window popup.	Past	
2	Check Post-condition.			

Post-conditions	Delete confirmation window is popup and display brand details.
Summary	Passed the test. The page redirect to correct content.
Output Interface	1. Delete confirmation window popup.
Result	The test passed.

Test Case 18: Unit testing with functional testing for category/Default.aspx

Test Case ID	UT09	**Objective**	Test Add Button on Category Control Page
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	category/Default.aspx	**Subsystem**	
Design By	ER YAN YAO	**Design Date**	1/3/2021
Executed By	ER YAN YAO	**Execution Date**	1/3/2021
Short Description	After clicking the Add button, test the redirected content of the page.		
Pre-conditions	Must be redirect to the category control page.		

Step	**Action**	**Expected System Response**	**Pass/Fail**	**Comment**
1	Click the add button	Redirect to add category page	Past	
2	Check Post-condition.			

Post-conditions	The page redirect to the add category page.
Summary	Passed the test. The page redirect to correct content.
Output Interface	1. Page redirect to add category page.
Result	The test passed.

Test Case 19: Unit testing with functional testing for category/Default.aspx

Test Case ID	UT10	**Objective**	Test Edit Button on Category Control Page
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	category/Default.aspx	**Subsystem**	
Design By	ER YAN YAO	**Design Date**	1/3/2021
Executed By	ER YAN YAO	**Execution Date**	1/3/2021
Short Description	After clicking the edit button, test the redirected content of the page.		
Pre-conditions	Must be redirect to the category control page.		

Step	**Action**	**Expected System Response**	**Pass/Fail**	**Comment**
1	Click the edit button	Redirect to edit category page	Past	
2	Check Post-condition.			

Post-conditions	The page redirect to the edit category page.
Summary	Passed the test. The page redirect to correct content.
Output Interface	1. Page redirect to edit category page.
Result	The test passed.

Test Case 20: Unit testing with functional testing for category/Default.aspx

Test Case ID	UT11	**Objective**	Test Delete Button on Category Control Page
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	category /Default.aspx	**Subsystem**	
Design By	ER YAN YAO	**Design Date**	1/3/2021
Executed By	ER YAN YAO	**Execution Date**	1/3/2021
Short Description	After clicking the delete button, test the redirected content of the page.		
Pre-conditions	Must be redirect to the category control page.		

Step	**Action**	**Expected System Response**	**Pass/Fail**	**Comment**
1	Click the delete button	Delete confirmation window popup.	Past	
2	Check Post-condition.			

Post-conditions	Delete confirmation window is popup and display category details.
Summary	Passed the test. The page redirect to correct content.
Output Interface	1. Delete confirmation window popup.
Result	The test passed.

Test Case 21: Unit testing with functional testing for products/Default.aspx

Test Case ID	UT12	**Objective**	Test Button on Product Control Page
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	products/Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	1/3/2021
Executed By	ER YAN YAO	**Execution Date**	1/3/2021
Short Description	After clicking this button, test the content or action of redirection.		
Pre-conditions	Must be redirect to the product control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to product control page.	Redirect and display product control page.	Past	
2	Click the “Add Product” button	Redirect to following content page	Past	Redirect to addProduct.aspx
3	Click the “Replenishment” button	Redirect to following content page	Past	Redirect to purchase.aspx
4	Click the “Edit” button on table	Redirect to following content page	Past	Redirect to editProduct.aspx
5	Click the “Delete” button on table	Delete confirmation window popup.	Past	
6	Check Post-condition.			

Post-conditions	If all the tested buttons are work, the test is successful.
Summary	Passed the test. The page is redirected to the correct content and action.
Output Interface	2. Redirect to correct content page or action.
Result	The test passed.

Test Case 22: Unit testing with functional testing for order/Default.aspx

Test Case ID	UT13	**Objective**	Test Button on Order Control Page
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	order/Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	3/3/2021
Executed By	ER YAN YAO	**Execution Date**	3/3/2021
Short Description	After clicking this button, test the content or action of redirection.		
Pre-conditions	Must be redirect to the order control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to order control page.	Redirect and display order control page.	Past	
2	Click the “Add Order” button	Redirect to following content page	Past	Redirect to addOrder.aspx
3	Click the “View” button on table	Redirect to following content page	Past	Redirect to invoice.aspx
4	Click the “Edit” button on table	Redirect to following content page	Past	Redirect to editOrder.aspx
5	Click the “Delete” button on table	Delete confirmation window popup.	Past	
6	Check Post-condition.			

Post-conditions	If all the tested buttons are work, the test is successful.
Summary	Passed the test. The page is redirected to the correct content and action.
Output Interface	2. Redirect to correct content page or action.
Result	The test passed.

Test Case 23: Unit testing with functional testing for report/Default.aspx

Test Case ID	UT14	**Objective**	Test items on Report Control Page
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	report/Default.aspx	**Subsystem**	report/doc.aspx
Design By	ER YAN YAO	**Design Date**	3/3/2021
Executed By	ER YAN YAO	**Execution Date**	3/3/2021
Short Description	After clicking this item, test the content or action of redirection.		
Pre-conditions	Must be redirect to the report control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to order control page.	Redirect and display order control page.	Past	
2	Click the “year” dropdown list	Select the following year	Past	
3	Click the “Submit” button on table	Refresh the page and display the following year content	Past	
4	Click the “View” button	Redirect to following content page	Past	Redirect to doc.aspx
5	Check Post-condition.			

Post-conditions	If all the tested buttons are work, the test is successful.
Summary	Passed the test. The page is redirected to the correct content and action.
Output Interface	2. Redirect to correct content page or action.
Result	The test passed.

Test Case 24: Unit testing with functional testing for company/Default.aspx

Test Case ID	UT15	**Objective**	Test items on Company Control Page
Test Type Parameter	Functional Testing	**Test Type**	Unit Testing
System	company/Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	3/3/2021
Executed By	ER YAN YAO	**Execution Date**	3/3/2021
Short Description	Test the content or action of redirection.		
Pre-conditions	Must be redirect to the company control page.		

Step	**Action**	**Expected System Response**	**Pass /Fail**	**Comment**
1	Go to company control page.	Redirect and display company control page.	Past	
2	Change the text of the “Company Name” textbox	The text of the text box has changed.	Past	
3	Change the text of the “Company Email” textbox	The text of the text box has changed.	Past	
4	Change the text of the “Company Phone” textbox	The text of the text box has changed.	Past	
5	Change the text of the “Company Address” textbox	The text of the text box has changed.	Past	
6	Change the text of the “Manager Name” textbox	The text of the text box has changed.	Past	
7	Change the text of the “Services Tax” textbox	The text of the text box has changed.	Past	
8	Click the “Save Changes” button	Take action.	Past	Confirmation window popup
9	Check Post-condition.			

Post-conditions	If all the tested items are work, the test is successful.
Summary	Passed the test. The page is redirected to the correct content and action.
Output Interface	2. Redirect to correct content page or action.
Result	The test passed.

Test Case 25: Integration testing with functional testing for login.aspx

Test Case ID	IT01	**Objective**	Login with invalid username and password
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	login.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Login to the system using invalid username and password.		
Pre-conditions	Must be redirected to the login page. Login with invalid username and password.		

Step	**Action**	**Expected System Response**	**Pass /Fail**	**Comment**
1	Go to login page.	Redirect and display login page.	Past	
2	Enter “username” at first column	Username display at textbox	Pass	
3	Enter “password” at second column	Password display at text	Pass	
4	Click “Login” button	Display username and password is incorrect.	Pass	Redirect to login page.
5	View the page displayed.	Show information that the login operation is incorrect.	Past	The login page show error message
6	Check Post-condition.			

Post-conditions	If the system cannot be accessed with incorrect username and password, the test is successful.
Summary	The error message is displayed after user click the “login” button. The user cannot access the system with incorrect username and password.
Result	The test passed.

Test Case 26: Integration testing with functional testing for login.aspx

Test Case ID	IT02	**Objective**	Login with valid username and password
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	login.aspx	**Subsystem**	dashboard.aspx
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Login to the system using valid username and valid password.		
Pre-conditions	Must be redirected to the login page. Login with valid username and password.		

Step	Action	Expected System Response	Pass/ Fail	Comment
1	Go to login page.	Redirect and display the login page.	Past	
2	Enter “admin” at username column	Username display at textbox	Pass	
3	Enter “admin” at password column	Password display at text	Pass	
4	Click “Login” button	Redirect and successfully access the system.	Pass	Redirect to dashboard.aspx
5	View the page displayed.	System has been successfully accessed.	Past	Username is displayed on the navigation bar
6	Check Post-condition.			

Post-conditions	If the system can be accessed with the correct username and password, the test is successful.
Summary	The user successfully accessed the system.
Result	The test passed.

Test Case 27: Integration testing with functional testing for brand/Default.aspx

Test Case ID	IT03	**Objective**	Add new brand data
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	brand/Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Add new brand data to the database.		
Pre-conditions	Must be redirected to the brand control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to brand control page.	Redirect and display brand control page.	Past	
2	Click add brand button	Add brand page is display.	Pass	
3	Enter brand name “Huawei”	“Huawei” display at the textbox	Pass	
4	Chose status of the brand	Drop down list display the status of the brand	Pass	
5	Click save button	The brand data have been saved	Past	Display a notification that the data has been stored and redirect to the control page
6	Check the brand control page.	The brand data display on the brand table	Past	
7	Check Post-condition.			

Post-conditions	If the brand data is display on the brand control page, the test is successful.
Summary	New brand data is display on the brand table and with correct status.
Result	The test passed.

Test Case 28: Integration testing with functional testing for brand/Default.aspx

Test Case ID	IT04	**Objective**	Edit brand data
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	brand/Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Edit brand data on the database.		
Pre-conditions	Must be redirected to the brand control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to brand control page.	Redirect and display brand control page.	Past	
2	Click edit button on brand table	Edit brand page is display.	Pass	Brand data is displayed on edit page
3	Change brand name	Brand name display at the textbox	Pass	
4	Chose status of the brand	Drop down list display the status of the brand	Pass	
5	Click save button	Redirect to the brand control page and the brand data have been updated	Past	Display a notification that the data has been changed
6	Check the brand control page.	The brand data is changed and display on the brand table	Past	
7	Check Post-condition.			

Post-conditions	If the brand data is display on the brand control page and data has been updated, the test is successful.
Summary	brand data is display on the brand table and it already updated.
Result	The test passed.

Test Case 29: Integration testing with functional testing for brand/Default.aspx

Test Case ID	IT05	**Objective**	Delete brand data
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	brand/Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Delete the brand data on the database.		
Pre-conditions	Must be redirected to the brand control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to brand control page.	Redirect and display the brand control page.	Past	
2	Click delete button on brand table	The delete confirmation pop-up window is displayed.	Pass	Brand data is displayed in a pop-up window
3	Click “OK” button	The following data has been deleted and redirected to the brand control page	Past	Show notifications about deleted data
4	Check the brand control page.	Brand data has been deleted and cannot be found in the brand table	Past	
5	Check Post-condition.			

Post-conditions	If the brand data is deleted, the test is successful.
Summary	The brand data is deleted on the brand table and cannot be found.
Result	The test passed.

Test Case 30: Integration testing with functional testing for brand/Default.aspx

Test Case ID	IT06	**Objective**	Search through brand data
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	brand/Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Search through brand data on the brand table		
Pre-conditions	Must be redirected to the brand control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to brand control page.	Redirect and display the brand control page.	Past	
2	Enter search text “Huawei” in the search text box	The table changes according to the search text	Pass	
3	Check the table	The “Huawei” data has been displayed on the brand table.	Past	
4	Check Post-condition.			

Post-conditions	If the brand data on table is displayed based on search text, the test is successful.
Summary	Brand data is displayed
Result	The test passed.

Test Case 31: Integration testing with functional testing for brand/Default.aspx

Test Case ID	IT07	**Objective**	Add brand data that already exists
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	brand/Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Add brand data that already exists on database.		
Pre-conditions	Must be redirected to the brand control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to brand control page.	Redirect and display brand control page.	Past	
2	Click add brand button	Add brand page is display.	Pass	
3	Enter brand name that already exists”	Brand name display at the textbox	Pass	
4	Chose status of the brand	Drop down list display the status of the brand	Pass	
5	Click save button	Display error that the brand name already exists	Past	The brand name text box shows that the brand name already exists.
6	Check Post-condition.			

Post-conditions	If the brand data cannot be saved, the test is successful.
Summary	Existing brand data cannot be saved.
Result	The test passed.

Test Case 32: Integration testing with functional testing for category/Default.aspx

Test Case ID	IT08	**Objective**	Add new category data
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	category/Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Add new category data to the database.		
Pre-conditions	Must be redirected to the category control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to category control page.	Redirect and display category control page.	Past	
2	Click add category button	Add category page is display.	Pass	
3	Enter category name “Tablet”	“Tablet” display at the textbox	Pass	
4	Chose status of the category	Drop down list display the status of the brand	Pass	
5	Click save button	The category data have been saved	Past	Display a notification that the data has been stored and redirect to the control page
6	Check the category control page.	The category data display on the category table	Past	
7	Check Post-condition.			

Post-conditions	If the category data is display on the category control page, the test is successful.
Summary	New category data is display on the category table and with correct details.
Result	The test passed.

Test Case 33: Integration testing with functional testing for category/Default.aspx

Test Case ID	IT09	**Objective**	Edit category data
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	category /Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Edit category data on the database.		
Pre-conditions	Must be redirected to the category control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to category control page.	Redirect and display category control page.	Past	
2	Click edit button on category table	Edit category page is display.	Pass	category data is displayed on edit page
3	Change category name	Category name display at the textbox	Pass	
4	Chose status of the brand	Drop down list display the status of the category	Pass	
5	Click save button	Redirect to the category control page and the category data have been updated	Past	Display a notification that the data has been changed
6	Check the category control page.	The category data is changed and display on the category table	Past	
7	Check Post-condition.			

Post-conditions	If the category data is display on the category control page and data has been updated, the test is successful.
Summary	Category data is display on the category table and it already updated.
Result	The test passed.

Test Case 34: Integration testing with functional testing for category/Default.aspx

Test Case ID	IT10	**Objective**	Delete category data
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	category /Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Delete the category data on the database.		
Pre-conditions	Must be redirected to the category control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to category control page.	Redirect and display the category control page.	Past	
2	Click delete button on category table	The delete confirmation pop-up window is displayed.	Pass	category data is displayed in a pop-up window
3	Click “OK” button	The following data has been deleted and redirected to the category control page	Past	Show notifications about deleted data
4	Check the category control page.	Category data has been deleted and cannot be found in the category table	Past	
5	Check Post-condition.			

Post-conditions	If the category data is deleted, the test is successful.
Summary	The category data is deleted on the category table and cannot be found.
Result	The test passed.

Test Case 35: Integration testing with functional testing for category/Default.aspx

Test Case ID	IT11	**Objective**	Search through category data
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	category /Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Search through category data on the category table		
Pre-conditions	Must be redirected to the category control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to category control page.	Redirect and display the category control page.	Past	
2	Enter search text “Tablet” in the search text box	The table changes according to the search text	Pass	
3	Check the table	The “Tablet” data has been displayed on the category table.	Past	
4	Check Post-condition.			

Post-conditions	If the category data on table is displayed based on search text, the test is successful.
Summary	Brand data is displayed
Result	The test passed.

Test Case 36: Integration testing with functional testing for category/Default.aspx

Test Case ID	IT12	**Objective**	Add category data that already exists
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	category /Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Add category data that already exists on database.		
Pre-conditions	Must be redirected to the category control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to category control page.	Redirect and display category control page.	Past	
2	Click add category button	Add category page is display.	Pass	
3	Enter category name that already exists”	category name display at the textbox	Pass	
4	Chose status of the category	Drop down list display the status of the category	Pass	
5	Click save button	Display error that the category name already exists	Past	The category name text box shows that the category name already exists.
6	Check Post-condition.			

Post-conditions	If the category data cannot be saved, the test is successful.
Summary	Existing category data cannot be saved.
Result	The test passed.

Test Case 37: Integration testing with functional testing for product/Default.aspx

Test Case ID	IT13	**Objective**	Add new product
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	products/Default.aspx	**Subsystem**	products/addProduct.aspx
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Add new product data to the database.		
Pre-conditions	Must be redirected to the product control page.		

Step	**Action**	**Expected System Response**	**Pass /Fail**	**Comment**
1	Go to product control page.	Redirect and display product control page.	Past	
2	Click add product button	Add product page is display.	Pass	Redirect to addProduct.aspx
3	Choose product image	After the user selects the picture, the preview box is displayed	Pass	
4	Enter product name	Product name is display on textbox	Pass	
5	Enter SKU	SKU is display on textbox	Past	
6	Enter price	price is display on textbox	Past	
7	Enter quantity	quantity is display on textbox	Past	
8	Enter description	description is display on textbox	Past	
9	Select brands, category, status	Brand, category, status change according to user selection	Past	
10	Click save button	Product data save to database	Past	
7	Check Post-condition.			

Post-conditions	The product data is display on the product control page.
Summary	New product data is display on the product table and with correct details.
Result	The test passed.

Test Case 38: Integration testing with functional testing for product/Default.aspx

Test Case ID	IT14	**Objective**	Edit product data
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	products/Default.aspx	**Subsystem**	products/editProduct.aspx
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Edit product data on the database.		
Pre-conditions	Must be redirected to the product control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to product control page.	Redirect and display the product control page.	Past	
2	Click edit button on product table	Redirect to the edit product page and display the specified product data	Pass	Redirect to editProduct.aspx
3	Change the product data	Product data on textbox or dropdown list is shown	Past	
4	Click the save button	Redirect to the product control page and the product data have been updated	Past	Redirect to Default.aspx
5	Check Post-condition.			

Post-conditions	If the product data is display on the product control page and data has been updated, the test is successful.
Summary	Product data is display on the product table and it already updated.
Result	The test passed.

Test Case 39: Integration testing with functional testing for product/Default.aspx

Test Case ID	IT10	**Objective**	Delete product data
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	products/Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Delete the product data on the database.		
Pre-conditions	Must be redirected to the product control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to product control page.	Redirect and display the product control page.	Past	
2	Click delete button on product table	The delete confirmation pop-up window is displayed.	Pass	product data is displayed in a pop-up window
3	Click “OK” button	The following data has been deleted and redirected to the product control page	Past	Show notifications about deleted data
4	Check the product control page.	Product data has been deleted and cannot be found in the product table	Past	
5	Check Post-condition.			

Post-conditions	If the product data is deleted, the test is successful.
Summary	The product data is deleted on the product table and cannot be found.
Result	The test passed.

Test Case 40: Integration testing with functional testing for product/Default.aspx

Test Case ID	IT16	**Objective**	Replenishment on product control page
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	products/Default.aspx	**Subsystem**	products/purchase.aspx
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Replenishment and increase the number of products		
Pre-conditions	Must be redirected to the product control page.		

Step	**Action**	**Expected System Response**	**Pass /Fail**	**Comment**
1	Go to product control page.	Redirect and display the product control page.	Past	
2	Click "replenishment"	Go to replenishment page.	Pass	Redirect to purchase.aspx
3	Click "Select Product" button	Allow user to select the specific product	Past	Select product pop-up window is displayed
4	Select product	Product data is displayed on the form	Past	
5	Enter quantity	quantity is display on textbox	Past	
6	Enter price	price is display on textbox	Past	
7	Enter remarks	remark is display on textbox	Past	
8	Click save button	Quantity add to the database based on the specific product	Past	Confirmation pop-up window is displayed
9	Check the product control page	Product quantity has been updated.	Past	Redirect to Default.aspx
10	Check Post-condition.			

Post-conditions	If the product quantity is updated, test is passed.
Summary	The product quantity is updated based on the replenishment.
Result	The test passed.

Test Case 41: Integration testing with functional testing for order/Default.aspx

Test Case ID	IT17	**Objective**	Add new order
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	order/Default.aspx	**Subsystem**	order/addOrder.aspx
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Add new order data to the database.		
Pre-conditions	Must be redirected to the order control page.		

Step	**Action**	**Expected System Response**	**Pass /Fail**	**Comment**
1	Go to order control page.	Redirect and display order control page.	Past	
2	Click add order button	Add order page is display.	Pass	Redirect to addOrder.aspx
3	Select customer	Customer data is displayed on the textbox.	Pass	Enter customer data or select existing customer
4	Click the add product button	Allow user to select product	Pass	Select product pop-up windows is displayed.
5	Enter quantity	quantity is display on textbox	Past	
6	Click add product on pop-up windows	Product details is displayed on the cart	Past	The pop-up window closes.
7	Enter discount price to the textbox	Discount price is display on textbox	Past	
8	Click save button	Check order details	Past	Invoice displayed after saving
9	Check the order control page	Order data save to database	Past	Redirect to Default.aspx
10	Check Post-condition.			

Post-conditions	The order data is display on the order control page.
Summary	New order data is display on the order table and with correct details.
Result	The test passed.

Test Case 42: Integration testing with functional testing for order/Default.aspx

Test Case ID	IT18	**Objective**	View order data
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	order/Default.aspx	**Subsystem**	order/invoice.aspx
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	View order data to the database.		
Pre-conditions	Must be redirected to the order control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to order control page.	Redirect and display order control page.	Past	
2	Click view button on order table	Redirect to the view order page and display order data according to the selected order.	Pass	Redirect to invoice.aspx
3	Click “Print” button	Allow user to print the order.	Past	The print function allow user to print the order
4	Click “Back” button	Redirect to the previous page.	Past	Redirect to Default.aspx
5	Check Post-condition.			

Post-conditions	If the order data is displayed correctly, the test is successful.
Summary	Display order data and allow users to print orders.
Result	The test passed.

Test Case 43: Integration testing with functional testing for order/Default.aspx

Test Case ID	IT19	**Objective**	Edit order data
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	order /Default.aspx	**Subsystem**	order/editOrder.aspx
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Edit product data on the database.		
Pre-conditions	Must be redirected to the product control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to order control page.	Redirect and display the order control page.	Past	
2	Click edit button on order table	Redirect to the order product page and display the specified order data	Pass	Redirect to editOrder.aspx
3	Change the order data (customer, product, discount)	Order data on textbox or dropdown list is shown	Past	Users can add new products, update product quantities or delete products in the shopping cart
4	Click the save button	Check order details. Invoice displayed after saving	Past	Redirect to invoice.aspx
	Check the order control page	The order data has been saved to the database and has been updated	Past	Redirect to Default.aspx
5	Check Post-condition.			

Post-conditions	If the order data is display on the order control page and data has been updated, the test is successful.
Summary	Order data is display on the order table and it already updated.
Result	The test passed.

Test Case 44: Integration testing with functional testing for order/Default.aspx

Test Case ID	IT20	**Objective**	Delete order data
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	order/Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Delete the product data on the database.		
Pre-conditions	Must be redirected to the product control page.		

Step	**Action**	**Expected System Response**	**Pass/ Fail**	**Comment**
1	Go to order control page.	Redirect and display the order control page.	Past	
2	Click delete button on order table	The delete confirmation pop-up window is displayed.	Pass	order data is displayed in a pop-up window
3	Click “OK” button	The following data has been deleted and redirected to the order control page	Past	Show notifications about deleted data
4	Check the order control page.	Order data has been deleted and cannot be found in the order table	Past	
5	Check Post-condition.			

Post-conditions	If the order data is deleted, the test is successful.
Summary	The order data is deleted on the order table and cannot be found.
Result	The test passed.

Test Case 45: Integration testing with functional testing for report/Default.aspx

Test Case ID	IT21	**Objective**	View the report analysis
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	report/Default.aspx	**Subsystem**	report/doc.aspx
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Check the analysis result on the report page.		
Pre-conditions	Must be redirected to the report control page.		

Step	**Action**	**Expected System Response**	**Pass /Fail**	**Comment**
1	Go to report control page.	Redirect and display the report control page.	Past	
2	Select the year on the dropdown list	When the user changes the year, the year is updated。	Pass	
3	Click “Submit” button	The data has been changed according to the selected year.	Past	Redirect to Default.aspx
4	Check the report control page.	The following data has been updated and redirected to the report control page	Past	
5	Click “View” button on the total monthly sales	Page display monthly sales according to the selected month		Redirect to doc.aspx
6	Click “Print” button	Allow user to print the order.	Past	The print function allow user to print the sales
7	Click “Back” button	Redirect to the previous page.	Past	Redirect to Default.aspx
8	Check Post-condition.			

Post-conditions	If the report data is displayed correctly, the test is successful.
Summary	The report data is displayed based on the year and month.
Result	The test passed.

Test Case 46: Integration testing with functional testing for company/Default.aspx

Test Case ID	IT22	**Objective**	Change company information
Test Type Parameter	Functional Testing	**Test Type**	Integration Testing
System	company/Default.aspx	**Subsystem**	-
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Update company data.		
Pre-conditions	Must be redirected to the company control page.		

Step	**Action**	**Expected System Response**	**Pass /Fail**	**Comment**
1	Go to company control page.	Redirect and display company control page.	Past	
2	Change company name	Company name is display on textbox.	Pass	
3	Change email	Email is display on textbox	Pass	
4	Change phone	Phone is display on textbox	Pass	
5	Change address	Address is display on textbox	Past	
6	Change manager name	Manager name is display on textbox	Past	
7	Change services tax	Services tax is display on textbox	Past	
8	Click save button	Check company information	Past	Information confirmation windows is pop-up
9	Check the company control page	Company data save to database and it has been updated	Past	Redirect to Default.aspx
10	Check Post-condition.			

Post-conditions	If the company data is display on the company control page and data has been updated, the test is successful.
Summary	Company data is display and it already updated.
Result	The test passed.

Test Case 47: System testing with functional testing for login.aspx

Test Case ID	ST01	**Objective**	Test access to the dashboard.aspx page
Test Type Parameter	Functional Testing	**Test Type**	System Testing
System	login.aspx	**Subsystem**	dashboard.aspx
Design By	ER YAN YAO	**Design Date**	5/3/2021
Executed By	ER YAN YAO	**Execution Date**	5/3/2021
Short Description	Check whether the system displays the home page.		
Pre-conditions	Log in to the system using a valid username and password. Test which page the login page redirects to.		

Step	**Action**	**Expected System Response**	**Pass /Fail**	**Comment**
1	Go to login page.	The login portal is displayed.	Pass	
2	Type in valid username	The system display username on the textbox.	Pass	
3	Type in valid password	The system display password on the textbox.	Pass	
4	Click “login” button	Redirect to the home page.	Pass	It redirects to the dashboard.aspx page
5	View the page displayed	Redirect and stay on the homepage.	Pass	It stays at dashboard.aspx page

Post-conditions	The system displays the final interface to determine the test.
Summary	Test passed. Because the home page is displayed. The dashboard.aspx page is displayed after login.
Output Interface	3. Login to the system with valid account. 4. The dashboard.aspx page is displayed after login successful.
Result	The test passed.

APPENDIX G: SafeAssign Report