



Faculty of Computer Science and Information Technology

Inventory Management System for Pheck Nam Aluminium Works

Spencer Chee Te-Inng

Bachelor of Computer Science with Honours (Software Engineering)

2023

INVENTORY MANAGEMENT SYSTEM FOR PHECK NAM ALUMNIUM WORKS

SPENCER CHEE TE-INNG

This project is submitted in partial fulfilment of the
requirements for the degree of
Bachelor of Computer Science with Honours (Software Engineering)

Faculty of Computer Science and Information Technology

UNIVERSITI MALAYSIA SARAWAK

2023

**SISTEM PENGURUSAN INVENTORI UNTUK PHECK NAM ALUMINIUM
WORKS**

SPENCER CHEE TE-INNG

Projek ini merupakan salah satu keperluan untuk Ijazah
Sarjana Muda Sains Komputer dan Teknologi Maklumat
(Jurutera Perisian)

Fakulti Sains Komputer dan Teknologi Maklumat

UNIVERSITI MALAYSIA SARAWAK

2023

UNIVERSITI MALAYSIA SARAWAK

THESIS STATUS ENDORSEMENT FORM

TITLE INVENTORY MANAGEMENT SYSTEM FOR PHECK NAM
ALUMINIUM WORKS

ACADEMIC SESSION: 2022/2023

SPENCER CHEE TE-INNG
(CAPITAL LETTERS)

hereby agree that this Thesis* shall be kept at the Centre for Academic Information Services, Universiti Malaysia Sarawak, subject to the following terms and conditions:

1. The Thesis is solely owned by Universiti Malaysia Sarawak
2. The Centre for Academic Information Services is given full rights to produce copies for educational purposes only
3. The Centre for Academic Information Services is given full rights to do digitization in order to develop local content database
4. The Centre for Academic Information Services is given full rights to produce copies of this Thesis as part of its exchange item program between Higher Learning Institutions [or for the purpose of interlibrary loan between HLI]
5. ** Please tick (✓)

CONFIDENTIAL (Contains classified information bounded by the OFFICIAL SECRETS ACT 1972)

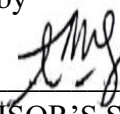
RESTRICTED (Contains restricted information as dictated by the body or organization where the research was conducted)

UNRESTRICTED



(AUTHOR'S SIGNATURE)

Validated by



(SUPERVISOR'S SIGNATURE)

Dr. Norfadzlan bin Yusup
Lecturer

Faculty of Computer Science and Information Technology
Universiti Malaysia Sarawak

Permanent Address

92, LRG 2A1D, JLN SETIA RAJA

MUARA TABUAN, 93350

KUCHING, SARAWAK

Date: 21/07/2023

Date: 24/07/2023

Note * Thesis refers to PhD, Master, and Bachelor Degree

** For Confidential or Restricted materials, please attach relevant documents from relevant organizations / authorities

DECLARATION

I hereby declare that this research together with all of its content is none other than that of my own work, with consideration of the exception of research based information and relative materials that were adapted and extracted from other resources, which have evidently been quoted or stated respective.



SPENCER CHEE TE-INNG

72698

24/07/2023

DATE

ACKNOWLEDGEMENT

I would like to express my deepest gratitude and appreciation to all those who have contributed to the successful completion of this report. First and foremost, I extend my heartfelt thanks to my supervisor, Dr Norfadzlan bin Yusup, for his valuable guidance, encouragement, and unwavering support throughout this project. His expertise and insightful feedback played a crucial role in shaping the direction of this report. I am also indebted to the company who generously shared their knowledge and insights during interviews and discussions. Their inputs have enriched the content of this report and broadened my understanding of the subject matter. Lastly, I would like to express my heartfelt appreciation to my family for their unwavering support, understanding, and encouragement throughout this endeavour. Without the collective efforts and support of all these individuals, this report would not have been possible.

ABSTRACT

The inventory management system is created to ease the user while doing inventory management, as the company has a wide variety of aluminium materials to cater to. The user is currently using the physical stock card to do inventory management, which might make searching for the previous records they intended more difficult. On the other hand, the software that the company has purchased that comes with the inventory management function is not that user-friendly. So, creating an inventory management system that is custom-made specifically for the company can be more efficient and flexible for the company's needs. Furthermore, a custom-made inventory management system will also cater to the company's specific needs.

ABSTRAK

Sistem pengurusan inventori dicipta untuk memudahkan pengguna semasa melakukan pengurusan inventori, kerana syarikat mempunyai pelbagai jenis bahan aluminium untuk dipenuhi. Pengguna sedang menggunakan kad stok fizikal untuk melakukan pengurusan inventori, yang mungkin membawa kepada carian untuk rekod sebelumnya yang mereka maksudkan lebih sukar. Sebaliknya, perisian yang dibeli oleh syarikat yang disertakan dengan fungsi pengurusan inventori tidak begitu mesra pengguna. Jadi, mewujudkan sistem pengurusan inventori yang dibuat khas khusus untuk syarikat boleh menjadi lebih cekap dan fleksibel untuk keperluan syarikat. Tambahan pula, sistem pengurusan inventori yang dibuat khas juga akan memenuhi keperluan khusus syarikat.

Table of Contents

ABSTRACT.....	iv
ABSTRAK.....	v
Table of Contents	vi
LIST OF TABLES	vii
LIST OF FIGURES	ix
ABSTRACT.....	4
ABSTRAK.....	8
List of Tables	12
List of Figure.....	13
CHAPTER 1: INTRODUCTION	1
1.1 Introduction	1
1.2 Problem Statement.....	1
1.3 Project Scope	2
1.4 Objective	2
1.5 Methodology.....	2
1.6 Significance of Project.....	3
1.7 Project Schedule	4
1.8 Expected Outcome.....	4
1.9 Report Outline.....	5
1.9.1 Chapter 1: Introduction	5
1.9.2 Chapter 2: Literature Review	5
1.9.3 Chapter 3: Requirement Analysis and Design.....	5
CHAPTER 2: LITERATURE REVIEW	6
2.1 Introduction	6
2.2 Company Background	6
2.3 Reviews on Existing Systems.....	6
2.3.1 Quickbooks Inventory Management Software	7
2.3.2 Inventory Software for Small Business from Enterpryze	8
2.3.3 Zoho Inventory from Zoho	10
2.4 Comparison Between Systems.....	13
2.5 Conclusion.....	14
CHAPTER 3: REQUIREMENT ANALYSIS AND DESIGN	15
3.1 Introduction	15
3.2 Rapid Application Development	15

3.3 Requirements Specification	16
3.3.1 User Requirement	16
3.3.2 Functional Requirements	17
3.3.3 Non-Functional Requirements	18
3.4 Unified Modeling Language	18
3.4.1 Use Case Diagram	18
3.4.2 Activity Diagram	21
3.4.2 Sequence Diagram	22
3.4.3 Class Diagram	27
3.5 Interface Design	28
3.6 Summary	32
CHAPTER 4: IMPLEMENTATIONS AND TESTING	33
4.1 Introduction	33
4.2 Installation and Configuration of System Component.....	33
4.2.1 ReactJS	33
4.2.2 Firebase	34
4.2.3 Visual Studio Code	35
4.3 Inventory Management System for Pheck Nam Aluminium Works Interface	36
4.3.1 Login Page	36
4.3.2 Main Page	37
4.3.3 Inventory Page	38
4.3.4 History Page	39
4.3.5 Report Page.....	42
4.4 Testing.....	44
4.4.1 Functionality	45
4.4.2 Usability.....	52
4.5 Summary	59
CHAPTER 5: CONCLUSION & FUTHER WORK	60
5.1 Introduction	60
5.2 Achievements of Objectives	60
5.3 Project Limitation.....	61
5.4 Future Works	62
5.5 Contribution	64
5.6 Conclusion.....	64
REFERENCES	66
APPENDIX A: STOCK CARD	67

List of Tables

Table 2.1 Comparison between selected existing systems and proposed system	13
Table 3.1 Use Case for Login	20
Table 3.2 Use Case for Manage Inventory	20
Table 3.3 Use Case for View Stock	21
Table 3.4 Use Case for Generate Reports	21
Table 4 Test Case of Login	45
Table 5 Test Case of Generate Report	47
Table 6 Test Case of Manage Inventory History	50
Table 7 Test Case of Usability Test	56
Table 8 Achievement of Project Objective of the Inventory Management System	60

List of Figure

Figure 1.1. Rapid Application Development (RAD)	3
Figure 1.2. Gantt Chart	6
Figure 2.1. Quickbooks Interface	8
Figure 1.2. Item Reordering Interface	9
Figure 2.2. Mobile Interface	10
Figure 2.3. Mobile Interface	12
Figure 3.1. Rapid Application Development (RAD)	15
Figure 3.2. Use Case Diagram of the Inventory Management System	19
Figure 3.3. Activity Diagram for User	22
Figure 3.4. Sequence Diagram for Login	23
Figure 3.5. Sequence Diagram for Reset Password	23
Figure 3.6. Sequence Diagram for Add Inventory	24
Figure 3.7. Sequence Diagram for Edit Inventory	25
Figure 3.8. Sequence Diagram for View Inventory	26
Figure 3.9. Sequence Diagram for Delete Inventory	27
Figure 3.10. Class Diagram for Proposed System	27
Figure 3.15. Login Interface of the Inventory Management System	28
Figure 3.16. Dashboard Interface of the Inventory Management System	29
Figure 3.17. Order Interface of the Inventory Management System	30
Figure 3.18. Product Interface of the Inventory Management System	31
Figure 3.19. Report Interface of the Inventory Management System	32
Figure 4.1. Firebase User Interface	35
Figure 4.2. Visual Studio Code User Interface	36

Figure 4.3. Login Page of the Inventory Management System	37
Figure 4.3.1. Forgot Password Page of the Inventory Management System	37
Figure 4.4. Dashboard Page of the Inventory Management System	38
Figure 4.5. Inventory Page of the Inventory Management System	38
Figure 4.6. History Page of the Inventory Management System	39
Figure 4.6.1. Add Product User Interface of the Inventory Management System	40
Figure 4.6.2. Edit Product User Interface of the Inventory Management System	40
Figure 4.6.3. Delete Product User Interface of the Inventory Management System	41
Figure 4.7. Report Page User Interface of the Inventory Management System	42
Figure 4.7.1. Annual Report of the Inventory Management System	43
Figure 4.7.2. Monthly Report of the Inventory Management System	43
Figure 4.8. Usability Form Filled by the Respondent	54

CHAPTER 1: INTRODUCTION

1.1 Introduction

Inventory management aids businesses in determining which merchandise to order when and in what quantities. Inventory is tracked from product acquisition to sale. To guarantee there is always adequate inventory to fulfil client orders and proper warning of a shortfall, the technique recognises trends and reacts to them.

Regardless size of the organisation, having an effective inventory management system is crucial. It can assist you in keeping track of all your goods and figuring out the precise costs. Additionally, it can assist you in managing rapid variations in demand without compromising customer satisfaction or product quality. This is especially crucial for businesses that want to focus more on their customers.

The key benefit of applying inventory management system for industrial use are reduce human error. According to Atieh (2016), the needs to improve the performance of an inventory management system process by using an automated warehouse management system is due to the manual handling may cause human error (Atieh et al., 2016, p. 568). Furthermore, Zhao and Tu (2021) stated that establishing an optimal resource management system, improving the allocation of enterprise resources, and enhancing core management capabilities are the goals of developing an information management platform for businesses (Zhao and Tu, 2021, p.11).

1.2 Problem Statement

The use of a physical stock card that has limited columns for record the stocks, will lead to cause using too many stock cards and the risk of losing the records, thus lead to inaccurate records. The user do have a system that comes with an inventory management function, but the user interface is complicated and not user-friendly, causing the user having a hard time to understand how to use the function that is being provide. The stock card is attached in Appendix A.

In addition, it is important that the system is able to help the company to do work not only on management the inventory status, it should also able to generate reports with useful information for the company. Thus, the inventory management system should be able to let the

company to do the year-end inventory closing report, and able to update prices of stock according to the market as prices do fluctuate.

1.3 Project Scope

As this project is built specific for this company, there might have certain features that other companies find useful that are not included in this project. This inventory management system does not allow the user to track the shipping status, as there is no partnership between the company and the shipping carrier. Furthermore, this system is built only for inventory management in mind, so there is no other functionality such as financial, human resources, or marketing included with this system.

1.4 Objective

- To develop a web-based inventory management system that enable user to keep track and record inventory details.
- To design a user-friendly inventory management system for the user by create a learnable system.
- To generate reports that show inventory status monthly and annually.

1.5 Methodology

The methodology that will be used is rapid application development (RAD), there are four phases in this methodology, the four phases are requirements planning, user design, rapid construction, and cutover as shown in *Figure 1.1*. The benefit of this methodology is that the user involve from the beginning of system development until the end to assure that the system meet their requirement.

Rapid Application Development (RAD)

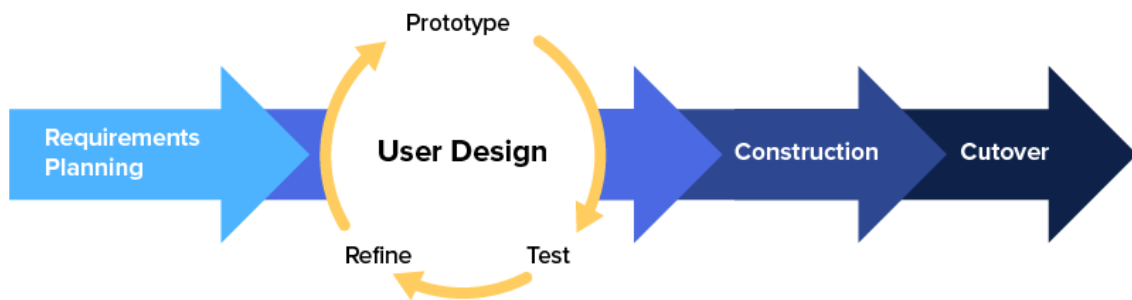


Figure 1.1. Rapid Application Development (RAD)

Figure 1.1. Rapid Application Development (RAD)

In phase one, the requirements will be gathered by holding a face-to-face interview session with Madam Han, the administrator of the company, she also in charge of the inventory management. The requirement may have changed or been added along the way.

In the next phase, the user interface will then be designed using Figma for prototyping and let the person in charge see how the system will work and understand the workflow of the application. The prototype with the functionalities and features must be agreed upon by both sides. C# and visual studio are used to develop the system into a desktop application. The user will have a look over the prototypes and decide what user like and what can be scrapped. The system is not the final product at this point.

In phase three, the system will then be presented to the end user to gather feedback. Then will proceed back to phase two to work on the design, functionality, and missing features based on the feedback until the feedback is entirely positive.

In the last phase, the system will undergo additional testing, write documentation, or undertake any maintenance-related tasks before the system launches.

1.6 Significance of Project

This project is created with intention of helping the company to have a user-friendly yet efficient inventory management system. There are many inventory management systems on the market, however, some of the functionality and features are not useful for the company's needs and a custom-made inventory management system is required to cater for the specific needs of this company.

1.7 Project Schedule

The project schedule for the Final Year Project 1 and 2 are plotted with the Gantt Chart that are shown in the *Figure 1.2*.

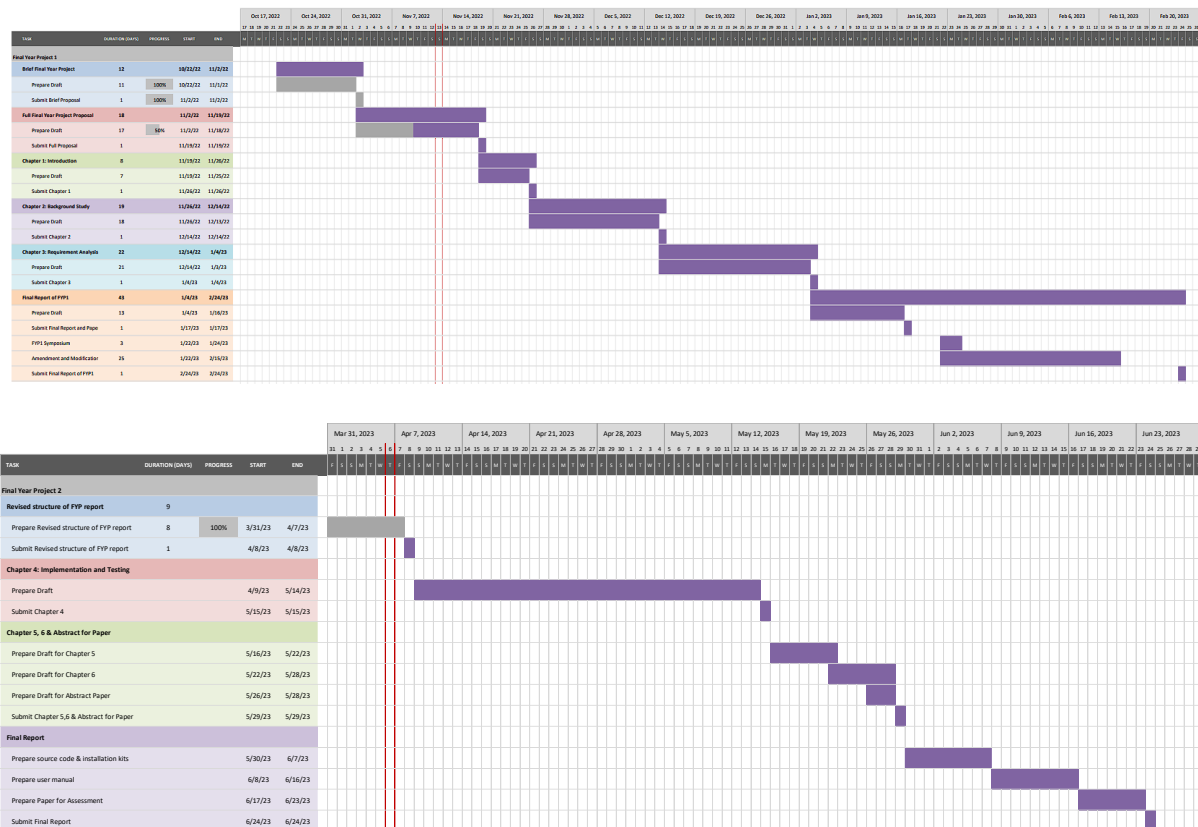


Figure 1.2. Gantt Chart

1.8 Expected Outcome

As the system is software-based, the user does not have to worry about losing track of the status of the stock, the records that the user intended to look for are much easier to find as this system has a search function compared to search through the physical stock cards one by one. The system will also allow much more efficient uses as it is easy to navigate and understand,

saving time. Furthermore, the system will allow the user to track every stock movement accordingly. The system will record every record that the user keyed in and show reports that are clear and complete. Last but not least, the system will alert the user when the stock level is low, ensuring that the appropriate quantity of goods is offered for purchase. In order to fulfil client requests without overstocking or stockouts.

1.9 Report Outline

1.9.1 Chapter 1: Introduction

The project's background, which outlines its overarching goal, is described in Chapter 1. The project title, problem statement, objectives, methodology, scope, significance of project, project schedule and expected outcome are all identified and briefly explained in this chapter. The problem statement describes the issues that are currently being experienced. The project's primary goals will be made clear by the objectives. The project scope demonstrates the project's limitations. The rapid application development (RAD) was the methodology employed in this project. To show the project development step according to milestones and scheduled dates, a Gantt Chart of the project schedule was made. The proposed project's outcome is described by the projected outcome.

1.9.2 Chapter 2: Literature Review

In this chapter, the review based on current methods or analogous systems is explained. These methods can be found in any relevant articles and journals. Similar system will also be involved in the review. This chapter's significance lies in giving a preliminary expectation of the suggested system. Also covered in this chapter are the advantages and disadvantages of the current system.

1.9.3 Chapter 3: Requirement Analysis and Design

Rapid Application Development, a methodology, will be covered and further elaborate on in this chapter. Along with analysing the user requirements to make sure the information is beneficial to the project's goals, the method for obtaining user requirements is discussed in this project. The design phase for the proposed system is also explained, with an emphasis on user interface design.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The same existing systems, whether the system be mobile applications or web-based applications, will be discussed and reviewed in this chapter. This chapter will also cover the appropriate tools and technology that were used to construct the proposed system. The desktop application for the Inventory Management System enables users to manage their material much easier and efficient.

2.2 Company Background

Pheck Nam Aluminium Works is founded in 1990. The company is located at Lot 1112, Jalan Kwong Lee Bank, Pending Heights I, 93450 Kuching, Sarawak. It starts out with two founders, Mister Chee Kui Kim and Madam Han Chong Eng founded and run the business till today. The company falls under the categories of small and medium-sized enterprises (SMEs), as it currently has five employees. The company specialize in manufacturing show case, ceiling, partition, curtain rail, mosquito netting, casement window, swing door, sliding window, roller shutter, aluminium door grill and window grill. Since the company has a total of 33 years in the industry, it is well known by the locals and has a good reputation for quality. Furthermore, the company provides transportation and installation services for the customer's needs, hence it has loyal customers until today. Finally, is that it provides after-sales services for people having issues with their products.

2.3 Reviews on Existing Systems

Three systems with similar functions are reviewed in this chapter. The strengths and weaknesses of each system will be further discussed in this chapter and a comparison will be done at the end of this chapter. The system will be the web applications that can be found on the internet, the web application is Quickbooks Inventory Management Software from Intuit, Inventory Software For Small Business from Enterpryze, and Zoho Inventory from Zoho.

2.3.1 Quickbooks Inventory Management Software

Intuit developed and marketed the accounting software suite known as QuickBooks. QuickBooks is primarily targeted at small and medium-sized enterprises. QuickBooks provide cloud-based accounting programmes that take payments from companies, manage and pay invoices, and handle payroll in addition to on-premises accounting tools.

Inventory management is a feature that comes with the accounting software that can purchase in a package. QuickBooks allows user to monitor their stock levels with real-time information and low stock alerts. Inventory level and stock value are being tracked in real-time. If the user creates a bill that the vendor sends new stock, the system will update the inventory level accordingly. The same goes for the stock value, as the value of the stock changes, the balance sheet changes accordingly. Prices will adjust automatically as you go about your day. There is a term in QuickBooks called “reorder point” and it means the lowest inventory level before the user needs to restock. This is a great feature as it works like a low stock alert and avoids being behind on orders. With low stock alerts, the software will let the user know when it's time to place a new order for inventory. To ensure that the user pays their supplier on time, QuickBooks turns the purchase order (PO) into a bill after the inventory has arrived. Lastly, the system allows the user to get an insight into the inventory. Run reports to quickly examine the top-selling products, total sales, and taxes so user can assess their position and decide what to market more of.

On the other hand, the inventory management function is not limited to a specific type of items, instead, there is a total of four types of items that can be tracked. First is the most common type of items, inventory items. Inventory item is the items that a company buy or sell that has a quantity. Non-inventory items are those that the user doesn't need to track quantities of. Services also can be tracked using the system.

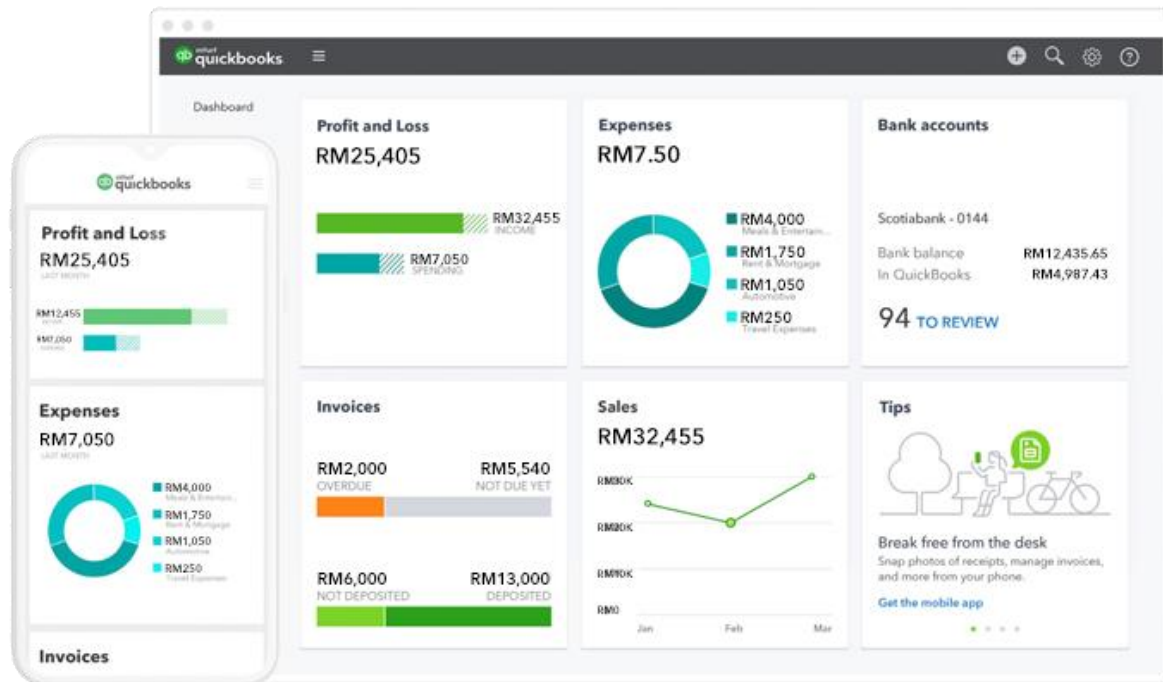


Figure 2.1. Quickbooks Interface. Adapted from “INVENTORY MANAGEMENT SOFTWARE IN MALAYSIA” by Intuit. n.d.

2.3.2 Inventory Software for Small Business from Enterpryze

As the first SAP Business One Partner in the UK and Ireland, Enterpryze began in 2003 by installing and supporting this solution for SMEs and the software have helped their customer from their offices in Malaysia, Ireland, The UK and Colombia.

Automation is one of the highlights of their system. Enterpryze implement the automation function into their system as Enterpryze find out that most of the manual processes that the company perform are reoccurring tasks in their recent webinar sharing. Automation is possible with the help of machine learning being implemented into the system. Inventory management is also considered one of the features that Enterpryze offers. The automated stock re-ordering works with just one click, and after determining the order quantity, suppliers will receive a purchase order, making it work similarly to the system that being mentions in 2.2.1. In addition, the system will automatically combine the order that is under the same supplier to minimize the number of orders being made, making it suppliers much easier as Enterpryze only need to see only one order instead of more than one order.

Furthermore, the system introduced a function called invoice automation. Invoice automation allows the user to upload a pdf format invoice into the system, and the system will automatically extract the data that is useful such as the item description, tax code, and quantity. As it is scanned automatically by the system, the user will only need to do is check the status of the automation and made decisions or changes according to the automation status. There is also a feature that allows the user to switch currency of the price list if the user are intended to sell their product internationally.

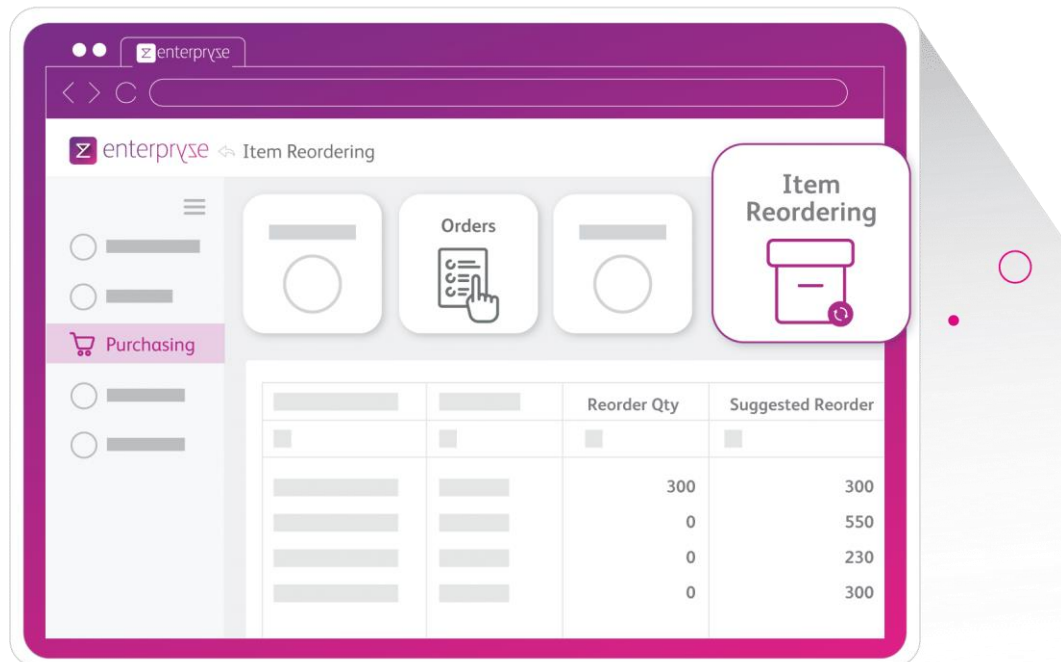


Figure 2.2. Item Reordering Interface. Adapted from “All-in-one Inventory Management for Better Control” by enterpryze. n.d.

Enterpryze makes cross-platform possible as there is an application that can be downloaded to both Android and IOS users. Through the use of mobile apps, employees who are on the go may confirm delivery and stay updated on company events. The Enterpryze app syncs mobile transactions in real time, enabling quicker decision-making. This ensures that the user maximises efficiency by not being limited to using only one system.

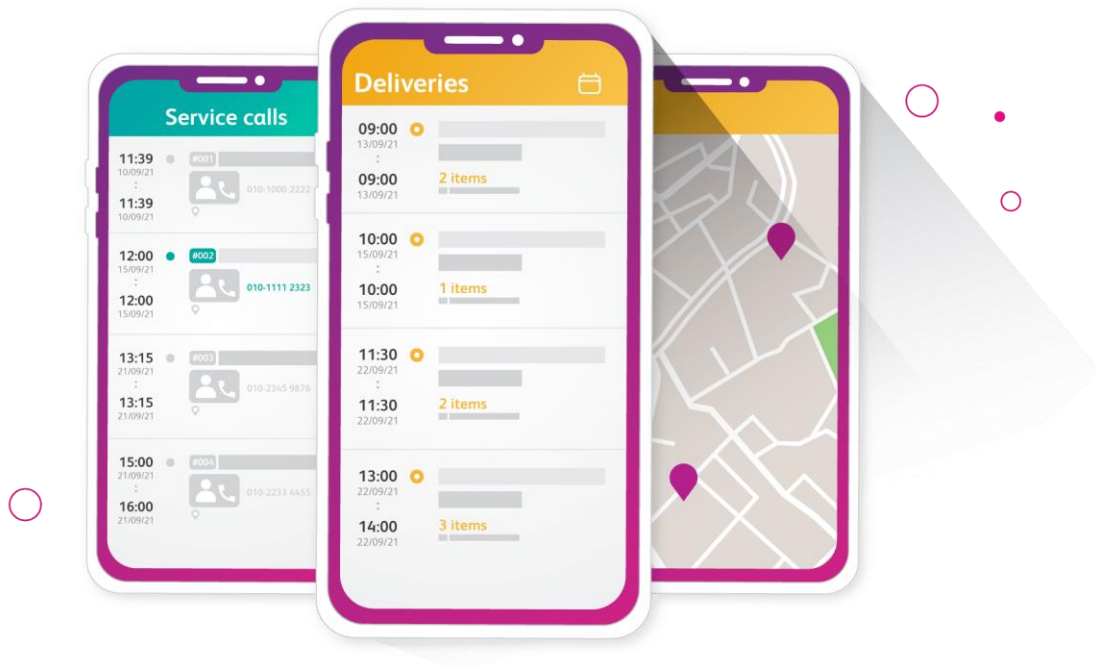


Figure 2.3. Mobile Interface. Adapted from “All-in-one Inventory Management for Better Control” by enterpryse. n.d.

2.3.3 Zoho Inventory from Zoho

Zoho was originally known as AdventNet Inc. and founded in 1996. Zoho has wide range of software to tackle the user requirement and Zoho have more than 75 million users today. In addition, Zoho have meticulously created dozens of items over the years. Now that Zoho are all bundled together into one suite called Zoho One, a business may run entirely on the cloud, they are even accessible. Zoho expanded the Finance package to include Zoho Inventory in response to the rise of online retailers, making multichannel selling, inventory management, and order fulfilment simple for expanding companies.

One of the highlights of their system is that their product work well with one and another. This is an important feature as this mean that user does not have to do extra work to learn a new skill on using other system to get their jobs done. In addition, the system allow the user to do tasks not limited to on using desktop pc, but also include mobile application. Their application works well on both android and IOS, which are the two most common mobile platform that most people use nowadays.

Zoho system made manage online and offline orders and keep track of stock levels across multiple channels much easier for the business owner, business owner will find it challenging to keep track of the products that Zoho sell and the ones Zoho have on hand.