



Faculty of Computer Science and Information Technology

A Web-Based Invoice System

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Bachelor of Computer Science with Honours (Information System)

2025

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Abstract

This project provides the development of a web-based invoice management system designed to facilitate the management of invoices for businesses. The objective of the system is to improve process times, reduce errors and increase productivity. Utilizing modern web technology, the platform provides an intuitive interface for employees to create, view and manage invoices in real time. Key features include customizable invoice templates, tax and easy to use interface.. Ultimately, these web-based solutions reduce operational costs, increase financial transparency, and streamline operations.

Abstrak

Projek ini menyediakan pembangunan sistem pengurusan invois berasaskan web yang direka untuk memudahkan pengurusan invois untuk perniagaan. Objektif sistem adalah untuk menambah baik masa proses, mengurangkan ralat dan meningkatkan produktiviti. Menggunakan teknologi web moden, platform ini menyediakan antara muka intuitif untuk pekerja membuat, melihat dan mengurus invois dalam masa nyata. Ciri utama termasuk templat invois yang boleh disesuaikan, cukai dan antara muka yang mudah digunakan. Akhirnya, penyelesaian berasaskan web ini mengurangkan kos operasi, meningkatkan ketelusan kewangan dan menyelaraskan operasi.

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Chapter 1: Introduction

1.1 Project Background

In today's fast-paced business environment, proper financial management is essential for businesses of all sizes. One of the most important elements of this is invoicing—the essential process by which companies receive money for their products or services. But for many small businesses, freelancers and startups, invoicing can be time-consuming and error-prone, often lacking the necessary tools to handle it outstanding amounts have been properly tracked and dealt with.

Traditional methods of creating invoices, such as using a spreadsheet or word processor, can lead to inconsistencies and manual errors, while complex accounting software often provides complex learning and possibly unnecessary features for small operations.

The proposed service addresses this need by providing a straightforward, web-based invoice management system that enables businesses to quickly create invoice, track, and store business payments so for future reference The system is designed with small businesses, freelancers, and entrepreneurs in mind, the one that provides flexible interfaces that reduce administrative burdens, ensures accuracy, also improves productivity all are effective in payment and payment management.

By creating a tool that automates key elements of the invoicing process, businesses can save time, reduce errors and improve their cash flow This system is designed to help companies have increased focus on development and customer relations and given the financial tools to improve payment management.

1.2 Problem Statement

- Manual Invoice management

Invoicing is an important part of business, especially for freelancers, small businesses and organizers. However, many small businesses and individuals still rely on manual processes or specialized tools like spreadsheet or manually written to create and track invoices. These processes are often time-consuming, hard to manage especially the manual invoices, mistakes are easy to make and lack important features such as payment tracking and business invoice generation capabilities.

- High cost and complex structure of enterprise system

While some businesses may find another alternative to more expensive enterprise solutions, these systems are often comes with unnecessary features such as integration of HR systems, advanced and complex reporting systems and integrations with CRM,ERP or any other enterprise system. For small businesses or freelancers, they need a simple, user-friendly solution to help in a more efficient way create, track and manage invoices.

- Hard to keep tracking of invoices

The manual invoicing system lacks centralized records, making it difficult to track invoice status, track payments, or generate balance reports. This can lead to missed payments and ineffective business transactions. This usually happen to manually written invoicing system.

- Lacks of customizations

As there are many invoice system out there, they often lack the customization tools and options such as adding business logos to show the branding of the business or lacks of different invoice layout that did not suit on different type of business model or client requirements. Freelancers might no need a company logo or discount details of an item as they only need a simple invoice report.

- **Lacks of support on multiple devices**

There are many invoicing system that are only design for only desktop-based software, mobile only software and may not offer cross-platform support. This lacks of device accessibility can be a problem to freelancers or small businesses who need to make an invoice when travelling or working from a different locations. This can leads to inefficiency and delays as they did not have the ability to access and update on their invoice across multiple devices. Beside that, many software or web-based invoice system does not have optimized for mobile devices such as tablet or smartphones.

1.3 Objectives

- To analyse the common feature of an invoice system
- To design a web-based invoice system
- To evaluate the functionality of the web-based invoice system.

Overall, the main objective of the project aims to develop a web-based invoice generation system that allows small businesses, freelancers, and individuals to create and manage invoices efficiently. This project will focus on user-friendly design and simplicity, making it suitable for businesses with basic invoicing needs.

1.4 Scope

This web-based system can be used by the user to manage their invoice. This system is designed for freelancers, small companies and organizations to manage their invoice via we-based. The person who organizes the system is the administrator of the system.

1.5 Significance of Project

The significant of the project is to provide a platform where all freelances and small business it hold a significant value who often face challenges in managing their invoicing manually. By providing a user friendly solution for their problem. This can save time because the invoicing system can provide an automation for the repetitive task in creating an invoice and can reducing error and mistakes. This system also provide a payment tracking, data centralization for easy access as it stored in in a central database and cost-effective.

1.6 Expected Outcome

- 1 A fully functional invoice generation system.
- 2 Users can easily create invoices, track payments, and download invoices in PDF format.
- 3 Basic reporting to monitor invoice status and payment history.
- 4 Simple, easy-to-use interface for small business owners and freelancers.

1.7 Project Schedule

This project consists of two parts throughout the first and second semester of the academic year of 2024/2025 which are Final Year Project 1 and Final Year Project 2. Final Year Project 1 must be completed throughout the period from 7 October 2024 (Week 1) until 23 February 2025 (Week 14), while FYP 2 is completed throughout semester 2. Refer to Figure 1 and Figure 2:

ID	Task Name	Start	End	Duration
1	Brief Proposal	2024-10-07	2024-10-20	14 days
2	Full Proposal	2024-10-21	2024-11-14	25 days
3	Chapter 1	2024-11-15	2024-11-21	7 days
4	Chapter 2	2024-11-22	2024-12-13	22 days
5	Chapter 3	2024-12-14	2025-01-05	23 days

Figure 1.1



Figure 1.2

1.8 Thesis Outline

1.8.1 Title

Web-Based Invoice Management System

1.8.2 Introduction

- Overview of the project
- Problem Statement(challenges and limitations of manual invoicing)
- Objectives of the project
- Scope of the project
- Significant of the project
- Expected outcomes
- Project schedule

1.8.3 Literature Review

- Overview of existing system
- List of advantages of web based invoicing over traditional method of invoicing
- Technologies used in invoice management system
- Comparisons between existing system and proposed system

1.8.4 Methodology

- Describe in detail on the methodology used (Web Development Life Cycle)
- Web Development Life Cycle(Consists of 5 main phases- Planning, Analysis, Design, Development and Maintenance and Testing)
- Describe the planning phase (Describe the main goal of the system and how will it be implemented)

- Describe the analysis phase (Analysis on the current system and proposed system and includes the user requirements, functional requirements and non-functional requirements)
- Describe the design stage (Include the context diagram of the proposed system, the data flow diagram, entity relationship diagram and data dictionary)

1.8.5 References

1.9 Summary

This project aims to create a simple, web-based invoice management system designed to help small businesses, freelancers and organizations streamline the invoicing process. The system will allow users to create invoices, track and processed quickly with minimal effort requiring manual calculations, paperwork, and the possibility of human error. The system also provide features such as automatic invoice generation, simple reporting feature of paid and unpaid invoices and payments.

Users can create invoices, view them before they are sent, and download as PDFs. The system will allow for easy organization and storage of advances, with an easy-to-use dashboard to view billing history, search and filter by date or status, and generate key reports if about unpaid bills.

The solution is built to be intuitive, scalable and cost-effective, meeting the needs of businesses that require straightforward billing tools without the complexity of large accounting software. Saving system businesses time by automating repetitive tasks and providing an organized, easy way to manage invoices will , reduce errors, and improve the quality of invoicing process. Ultimately, the project will help businesses present and deliver a professional image to their customers the focus is more on growth and revenue generations.

Chapter 2: Literature Review

2.1 Introduction

This chapter will give an overview of the features and approaches used by existing system and the system as proposed. Over the past few years, as internet evolved where anybody could access, businesses have turned to web-based solutions for a range of business services, including invoicing. The shift from traditional paper invoicing to automated web-based systems is inspired by the need for efficiency, accuracy and improving productivity by integrating with other business processes. Web-Based Invoicing System allows business to generate and manages invoices through online system, which provides real-time access anywhere as long there are internet available. These reviews will give a deeper insight on how web based invoice system features, benefits and challenges on each different system available with the proposed system.

The evolution of the internet where anyone could access give more business opportunities to thrive and this also lead to the evolution of invoicing systems. Generally, many freelancers and small companies use manual invoicing systems that are paper-based, requiring manually enter data and hand in physical invoices. While these systems work, they are time consuming and error prone to loss of data or hard to track the current status of invoice payment. As businesses grew, desktop-based invoice system software emerged, providing more automation and reducing the chances of error. However, these systems had limitations in terms of accessibility such as they were restricted to specific computers or networks, flexibility to access the software anywhere, and lack of customizations tools for companies to add their own logo or create a different invoice layout.

The development of a web-based invoicing system addresses these shortcomings, by providing a flexible, simple and intuitive solution. Web-based systems allow businesses to generate invoices from any location with Internet access, connect to various business tools and access their data in real time.

2.2 Review on existing systems

There are four (4) existing systems similar to the project that are proposed which is: Excel Invoice, Manually written invoice, FreshBooks and Bukku. These existing systems has its own features, strengths and weakness.

2.2.1 Excel Invoice

The spreadsheet, especially Microsoft Excel, is integrated into many business operations, especially in accounting and finance. One of the most common use of Excel in the business is to create and manage invoice. Despite the availability of special invoice software, many small medium -sized companies are still dependent on Excel due to its cost -effectiveness, flexibility and the learning curve is quite easy for new person to use and learn.

One of the biggest benefits of Excel as an invoice tool is the flexibility. Excel allows users to design invoices with customized layouts, formats and features, such as adjusting the logo or the appearance of tables and text. This adaptation ensures that businesses can maintain a professional and consistent brand approach. In addition, Excel's powerful formula functions allow companies to automate the necessary calculations. For example, taxes can be used automatically depending on specific prices, while the total can be generated without manual input. This feature significantly reduces the risk of mistakes and provides high levels of accuracy and stability.

Another important advantage of Excel has the ability to track payments and generate financial reports. Excel equipment for data analysis, such as pivot tables, charts and conditional formatting, allows unpaid invoices to companies, outstanding balance and customer payment history. This functionality can save time and improve cash flow management, as users can quickly generate reports to assess their financial conditions.

In addition, Excel provides the benefit of being a widely available equipment. Companies can easily store and share invoice via email, and cloud-based services that are one provides the opportunity for real-time collaboration. This access ensures that companies can manage invoices with an internet connection from all devices, making it an attractive alternative for external teams or companies with many places.

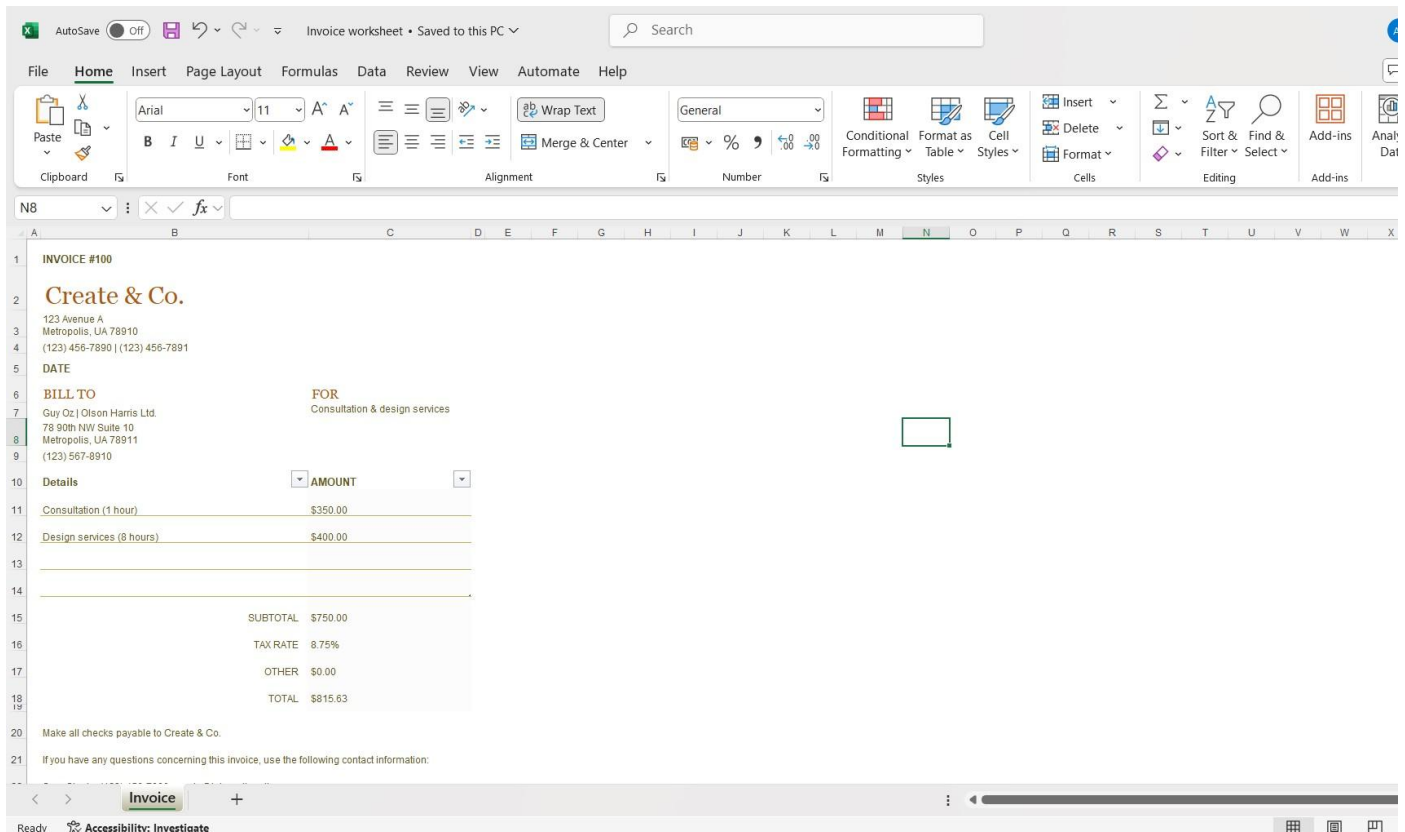


Figure 2.1: Excel invoice template

Figure 2.1 shows the premade template of excel invoice that can be found in the internet. It shows that excel invoice is able to be customized with different template. Although it has many benefits, there are limitations of what it can do. For example, one of the most important challenges is the potential for manual data entry errors. While Excel's formulas reduce the possibility of calculation errors, it is very dependent on the user input. Error in data registration - for example, incorrect prices, date or customer details - can lead to the alteration in the invoice, that can potentially cause financial or legal problems for companies.

Safety is also a concern when using Excel for invoice. Invoice often contains sensitive financial information, and store the data just in one place could lead to loss of data information or breach of security as the desktop can be access by anyone in the company to be borrowed. This lead many companies move towards cloud-based invoicing.

2.2.2 Manually written invoice

Manually written invoices have long been an important part of business practices. Before the arrival of computer and digital technologies, all invoices were handed in by hand. Historically, the invoice was handwritten on paper forms, often a businessman or master of business needs manually calculating totals, using taxes and entering client details. This process was labor intensive, but also necessary to keep accurate financial records.

Manual invoices were done as one of the primary pieces of equipment for companies to ensure that payment and transactions were documented properly. As the business operation expanded, it was also required to have standardized invoice formats, which led to the development of the template that could be filled in manually. The early forms of these invoices often contained simple documents that had basic details such as business names, customer information, goods or services offered, prices and terms of payment.

While the use of manually written challenges in favor of digital alternatives is reduced, some businesses continue to use this traditional method. A significant advantage of manual written invoices involves low costs. For small businesses or individuals, manually write invoices may seem more budget friendly than investing in software or system, especially when they only have few customers or infrequent transactions. In such cases, a handwritten invoice offers a quick and direct solution to register sales and request payment without increasing extra costs.

Another advantage is individual touch that can create a sense of relationship between business and customer. Some customers may appreciate the traditional nature of a handwritten document, which can strengthen the feeling of trust and reliability. For some small scales or for craftsmen, handwritten invoice can also better match their brand image, emphasizing crafts and personal involvement with customers.

In addition, manual invoice may be preferred in certain areas or markets where technology is slow, or where businesses do not have access to digital infrastructure. In rural or undeveloped areas, businesses can still work mainly on paper -based systems due to internet access or lack of financial resources to implement modern accounting systems.

NEW LITE LUMBER and CONSTRUCTION SUPPLY, INC.

No. 11473

SALES INVOICE

Sold to M. Jth. C. Date Mar. 14/2018

Business Style TIN Checked by _____

Address Malanday Marikina P.O.No. _____

OSCA/PWD ID No. _____ SC/PWD Sig. _____ Terms _____

Qty	Unit	ARTICLES	Unit Price	Amount
5	gals.	Regia elast. Paint (white)	600-	3,000.00
1	"	BSI Sanding Sealer	600-	600.00
1	"	" Clear gloss lacq.	630-	630.00
1	"	" lacq. thinner	485-	485.00
1	liter	" dead flat lacq.	200-	200.00
1	"	" auto lacq. white	250-	250.00
2	PCS.	Paint brush. 2"	50-	100.00
1	Kilo	Cotton waste	75-	75.00
2	Yds. 3m. S. Paper * 100	Total Sales (VAT Inclusive)	215-	430.00
5	PCS. w/p. S. " * 150	Less: VAT	15-	75.00
VAT-able Sales		Amount : Net of Vat		
VAT-Exempt Sales		Less: SC/PWD Discount		
Zero Rated Sales		Amount Due		
VAT Amount		Add: VAT		
TOTAL AMOUNT DUE				5,895.00

5,263.39
631.61
5,895.00

Received in good order and conditions. subject to the terms and conditions therein.

TERMS: Cash unless otherwise stipulated. In case of non payment at date of maturity buyers agrees to pay interest at 3% per month, the goods to remain the property of seller until fully paid. All interest due not paid at the end of each month shall be added to the principal the total amount to bear the same rate of interest until fully paid. Buyer agrees to submit to the jurisdiction of the courts of Marikina on any legal action arising out of this transaction and to pay an additional sum equal to 25 percent of the total amount cover collection expenses in addition to court cost. Buyer

Figure 2.2: Manually written invoice from <https://www.pinterest.com/pin/handwriting--337347828336203217/>

Figure 2.2 shows the manually written invoice. It includes the unit, unit price, amount and total of the invoice. Despite it has quite the benefit, it has many remarkable limits, especially compared to digital invoices. Manually one of the primary downside of the written invoice is the time -consuming nature. Each invoice should be written, filed manually, calculated, which can lead to inefficiency, especially for companies that handle a large amount of transactions. For small companies experiencing rapid growth or having high turnover, this process can be cumbersome and may be subject to errors.

Error in calculation, incorrect data registration and missing information are common problems when invoices are manually written by hand. Manual calculations can cause errors in adding totals, applying taxes or providing the correct amount. A poor written invoice can lead to misunderstandings between business and customer..

Another downside is difficulty tracking and storing the written invoice manually. Unlike digital systems that can automatically store and organized, handwritten invoice require physical storage, which takes valuable space and can be disorganized over time. In addition, it may be a time-consuming process compared to searching through a digital database. If an invoice is lost or damaged, companies may face challenges in restoring financial information, which can cause arguments with customers or difficulties in managing tax reporting and auditing.

Security is also a concern while relying on manually written invoice. Paper -based records are more vulnerable to theft, damage or loss than digital records. Companies that store invoice in physical archiving cabinets should ensure that they are properly safe to prevent unauthorized access. If sensitive customers or financial data are compromised, it can cause branding damages to the company, legal problems or loss of trust from customers.

2.2.3 Invoiceit software

Bukku The introduction of invoicing software, including Invoiceit, has largely been operated on by the need to address the inefficiencies of manual invoicing methods. Before the arrival of digital tools, companies depend on handwritten challenges, spreadsheets or generic templates to generate bills, a process that took time and prone to errors. Invoiceit is a software emerged with the adoption of automation in various business fields, which solved the complexity of economic transactions and real -time reporting and analysis requirements.

Invoiceit software, as part of this trend, offers companies an effective and reliable equipment to create and track invoice digitally. This software has attract the attention of companies with user-friendly interface, which simplifies the invoice process for users with different levels of technical expertise. Invoiceit has been integrated into those who want to modernize and streamline their accounting tasks.

Invoiceit Software offers many functions that provide the business significant benefits in terms of efficiency, accuracy and scalability. One of the main benefits of Invoiceit is its ability to automate invoices. Software allows companies to quickly generate invoices based on adaptable templates, preset customer details and automatically by making calculations. Automation is important especially for high volume of transactions, as it reduces the possibility of manual input and errors. It also include features such as billing generation, payment and overdue reminder which allows companies to focus on their main operations, such as product development and customer service.

Another great advantage of the Invoiceit software is its integration with accounting systems. The software enables businesses to sync invoices with accounting platforms and ensures that the financial records remain consistent and up -to -date. This integration eliminates the requirement for manual data introduction and reduces the risk of deviations between invoices and accounting items. For small companies that cannot have a dedicated accounting team, this integration can be a groundbreaking by streamlining financial management and reducing the possibility of costly errors.

In addition, the invoice gives the business the opportunity to customize invoices. Users can add company branding, logos and choose between different templates to match their commercial identity. Invoiceit allow companies to create recurrent invoices for subscription based services, ensuring that customers are constantly and timely billed.

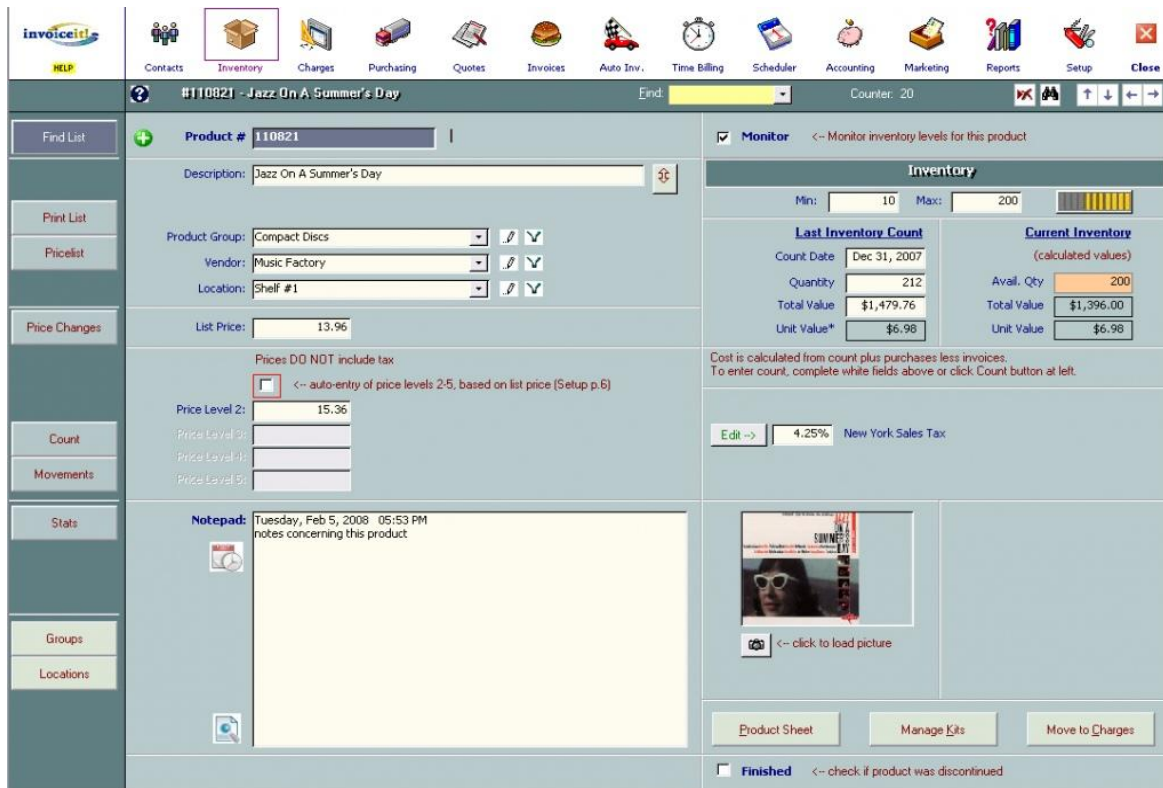


Figure 2.3: Invoiceit Dashboard

Figure 2.3 shows the dashboard of InvoiceIt software. It has all the basic need of invoicing. Despite it has many benefits, there are limitations associated with Invoiceit software. One of the main challenges is the cost of implementation. While many invoice equipment offers free or affordable versions, companies may upgrade to reach more features such as advanced reporting, support for multiple currencies or integration with third -party platforms. The cost of subscription-based software may be restrictive for companies, especially for tight budget start-ups and small businesses.

Another challenges of Invoiceit software is the learning curve associated with the implementation. Although the software is designed to be user -friendly, user will have adjustment period to become familiar with their various features and features. Companies may need to invest time and resources in the training staff to use software efficiently without their own technical expertise.

In addition, there is a significant concern for companies that use cloud -based invoice platforms such as data security. While Invoiceit software uses encryption and other security measures to protect sensitive financial data, businesses should still be careful about the risk associated with customer and financial information online.

2.2.4 Freshbooks

FreshBooks, a popular cloud-based accounting software Offering a comprehensive suite of invoicing solutions designed to simplify the billing and financial management process, FreshBooks Invoice is especially known for its user-friendly interface, customizable templates and strong integration ability in which provides efficiency and professional invoicing solutions It is an interesting option for businesses looking for.

FreshBooks Invoice is designed with a variety of resources that aim to simplify the invoicing process for small businesses and freelancers. Some of the most important functionality includes:

- Invoice Customization: FreshBooks offers a wider range of customizable invoice formats. Users can add logos, adjust color schemes, and edit other fields, in order to match their brand. This personalization increases professionalism and increases customer confidence.
- Client Management: FreshBooks allows users to manage clients directly on the platform. Users can store customer contact information, billing settings and past billing information.
- Payment Integration: With FreshBooks, companies can integrate their billing system with multiple payment gateways, including PayPal, Stripe, and credit card processors. Allows customers to pay bills directly from their email or billing link. This could improve cash flow of the company.
- Tempo control and billing: FreshBooks has an integrated tempo control framework. Helping companies track billable hours and add them to invoices. This is especially useful for service companies such as consultants and freelancers who charge clients per hour.
- Recurring invoicing: For companies with assigned services, FreshBooks recurring invoicing resource automatically manages and sends invoices according to scheduled time. This reduces resources or administrative work and ensures consistent billing.
- Tracking and Balance Sheets: FreshBooks provides tools to record and categorize trade balance sheets, which

can be tracked and analyzed for financial reporting purposes. The app also creates tax reports that can help you.

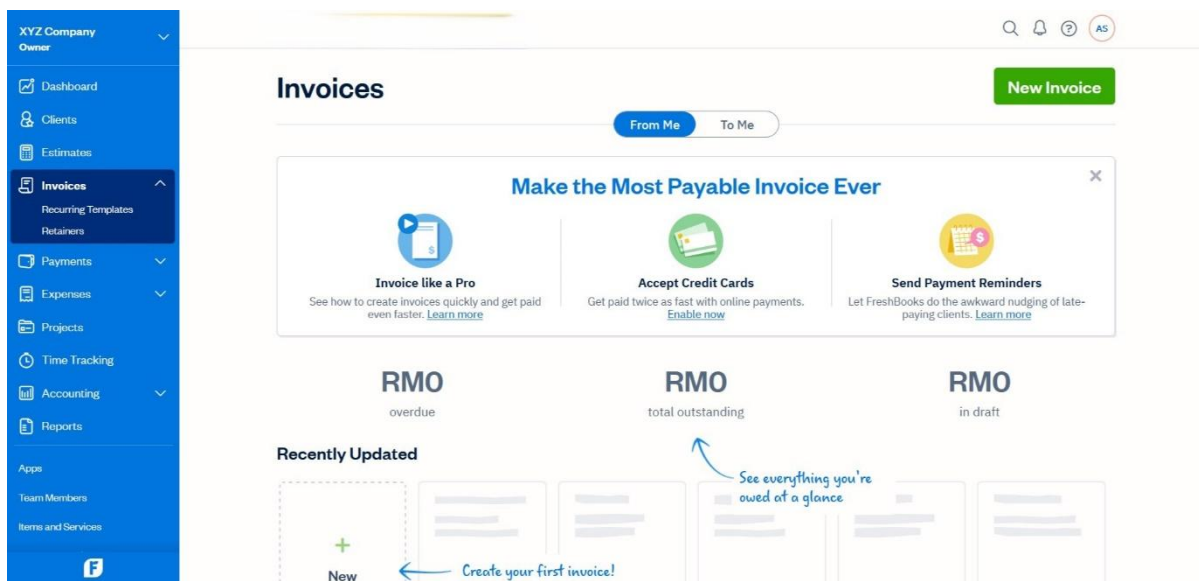


Figure 2.4: FreshBooks Dashboards

Figure 2.4 shows the dashboard to create an invoice by FreshBooks. FreshBooks Invoice offers a powerful set of resources. There are some down side that user need to consider:

- Pricing Structure: FreshBooks is generally considered more expensive than some basic charges. This can be a drawback for small businesses with tight budget. The pricing model is tiered based on the number of customers and resources. This may not be economical for companies with small customer bases.
- Limited advanced accounting resources: FreshBooks offer basic accounting resources such as tracking and balance sheets. It cannot meet the needs of companies that require more advanced accounting methods, such as inventory management or detailed tax statements. For companies with more complex accounting needs, there are better option.
- Limited customization options: Even there are more custom models available, but some users report that the level of customization in FreshBooks is limited compared to other platforms. For example, companies with specific billing requirements or branding needs may choose limited customization options.
- International Payment Support: FreshBooks offer support for billing in multiple currencies. Some international

payment methods may not be supported. Or, this may be a constraint for companies dealing with customers in countries with specific payment settings.

- Transaction Fees: FreshBooks charges transaction fees for payments made through integrated payment gateways. It may increase with time especially for companies with high transaction volumes.

2.3 Comparisons of Reviewed Systems and Proposed Systems

Features	Excel invoice	Manually-written invoice	Invoiceit Software	FreshBooks Invoice	Proposed System
Target Audience	Small businesses, freelancers, and companies comfortable with spreadsheets	Small businesses, freelancers, or businesses with low transaction volume that don't need automation	Small to medium-sized businesses, freelancers	Small to medium-sized businesses, freelancers, service providers	Freelancers, small businesses
Recurring Invoices	No	No	Yes	Yes	Yes
Invoice Customization	Yes, Customizable in Excel (adjust columns, format, etc.) but limited to design and branding	Yes, very basic with handwritten or simple template	Yes	Yes	Yes

Payment Integration	No	No	Yes	Yes	No
Time Tracking	No	No	Yes	Yes	No
Multi-Language Support	Yes but limited to Excel's language options	No, unless manually translated or created	Yes	Yes	No
Mobile Application	No	No	Yes	Yes(IOS and Android)	Yes(Web Browser)
Cloud-Based Storage	No	No	Yes	Yes	Yes
Pricing	Free	Free)	Starts at \$10/month, with different plans offering additional features like advanced reporting, recurring invoices, etc.	Paid plans starting at \$15/month (free trial available)	Free plans

Table 1: Comparisons of Reviewed Systems and Proposed Systems

2.4 Proposed System: Free Web-Based Invoice System

The proposed system would deliver a free plans of invoicing system with a simple interface for new user that transition from manual invoicing method. The proposed web-based invoicing system will be a simple yet powerful online tool that can create, submit and manage invoices for small businesses and freelancers with ease, reduce human error ,speed up payment collection and improve cash flow, an easy way for business owners to manage finances and this system will be designed to provide. The system offers a free plan that includes essential coverage, with an emphasis on convenience, availability and affordability.

While mainly the existing systems have their own pricing and it comes with their own benefits and advanced tools and existing system provides payment gateway but there are some similarity between the proposed system and the existing systems such as:

1. Cloud-based and accessible from anywhere

Existing systems: Almost all major invoicing systems that are reviewed are cloud-based, which means they can be accessed from any device with an internet connection This option is important for small businesses and freelancers who need changes to process invoices and financial statements , once they're gone.

Proposed system: Like these systems, the proposed web-based invoicing system will be completely cloud-based. Users can create, view, and manage payments from any Internet-connected device, whether desktop, laptop, or mobile (web browser).

Similarity: Existing systems and proposed systems maintain cloud access to ensure user flexibility and mobility.

2. Invoice creation and customization

Existing systems: Invoicing platforms like Invoiceit and FreshBooks offer users customizable invoice templates, where they can add business logos, personalized text, and other branding elements in line with their professional identity.

Proposed System: Similarly, the proposed system will provide a set of pre-made templates that users can customize. Features such as logos, performance information, and color changes will ensure that the invoice looks professional

and consistent with the user's logo.

Similarity: The ability to create and edit invoices is a key shared feature between the existing platforms and the proposed system.

3. Mobile Access Management

Existing systems: FreshBooks and Invoiceit that allow users to manage payments, track payments and access customer data through smartphones and tablets from anywhere

Proposed system: The proposed system will also be optimized for mobile devices, providing a functional web application that allows users to create and send invoices, track payments and manage financial transactions when they are going

Similarity: The proposed system shares mobile access capabilities through the web browser as it optimized to mobile phone view, and allows users to access their invoicing system from a smartphone or tablet like existing invoicing tools.

4. Easy to use interface

Existing systems: Systems like Excel and FreshBooks are known for their user-friendly interfaces designed to allow users, even those with no accounting background, to quickly create invoices, manage payments after.

Proposed System: Similarly, the proposed system will prioritize intuitive and simple interactions, ensuring that users can easily access the platform without having to own it extensive training or prior experience with accounting software.

Similarities: The proposed system will have a simple user-friendly approach that reflects the ease of use found in popular payment systems. This can be useful to new user that transitions from manual invoicing.

5. Free plan

Existing Plans: Manually-written and Excel offer free plans with basic functionality for freelancers and small businesses. Free Plans often provide users with the ability to create and send a large number of invoices, while the paid system offers advanced features and multiple customization options.

Proposed System: The proposed web-based invoicing system will follow the same model offering a free system with required invoicing features. This will help small businesses and freelancers just starting out or working on tight budgets meet their payment needs without incurring additional costs.

Similarities: Existing plans and the proposed plan offer users a free plan, with free basic features of invoice with no additional cost.

2.5 Summary

The proposed web-based invoicing system shares various key features and functions with existing invoicing platforms such as FreshBooks, Excel and Invoiceit and these similarities include customizable invoice template, cloud-based invoicing, mobile accessibility, an easy-to-use interface and other invoicing features in which the proposed system will provide small businesses and freelancers with an affordable, efficient solution for invoicing, while maintaining simplicity and accessibility as found in existing invoicing tools.

The main advantage of the proposed system is that it will provide these basic features for free, making it ideal for small businesses and freelancers who need an affordable solutions in processing invoices and payments.

Chapter 3: Methodology

3.1 Introduction

As the title suggests, this chapter provides a detailed description and explanation of the methodology, along with a diagram and the project's intended tasks. Hardware and software requirements, functional requirements, and non-functional needs will all be divided into user types. This topic also covers system design and analysis. Each methodologies has its own roles, sequence of phases and there are different ways to implement them. For example, Agile methodologies a project management framework that breaks projects into phases, called sprints, and encourages teams to reflect and improve after each sprint.

3.2 Methodology

The Web Development Life Cycle (WDLC) methodology builds upon previous techniques to create a structured approach for web application development, aiming to design and develop the system according to specific objectives. The combined elements from each method into a distinctive strategy that will conserve time during development, offer structure to a disordered issue, and maintain user engagement throughout the development life cycle. Users look for three elements in online applications: coherence, complexity, and readability. Coherence is defined by how well the user can navigate the website and how easy the content is to understand. The webpage layout, featuring diverse images, is complex as it meets the visitor's desire to understand more about their environment. The clarity of the website is evaluated through user feedback. It's the concept that the site is notable and unique. The visual element affects a website's aesthetics, while the database component impacts its functionality. The design's aesthetic appeal and a website's functionality are both significant, though they differ from each other. Since the intended system will focus mainly on a web-based approach, the selected methodology will related to the web development process.

3.3 Web Development Life Cycle(WDLC)

Web Development Life Cycle is primarily focused on web development while Software Development Life Cycle focused on computer software in general. Similar to Software Development Life Cycle(SDLC), Web Development Life Cycle also have five phases:

- 1) Planning
- 2) Analysis
- 3) Design
- 4) Implementation and Development
- 5) Testing and Maintenance

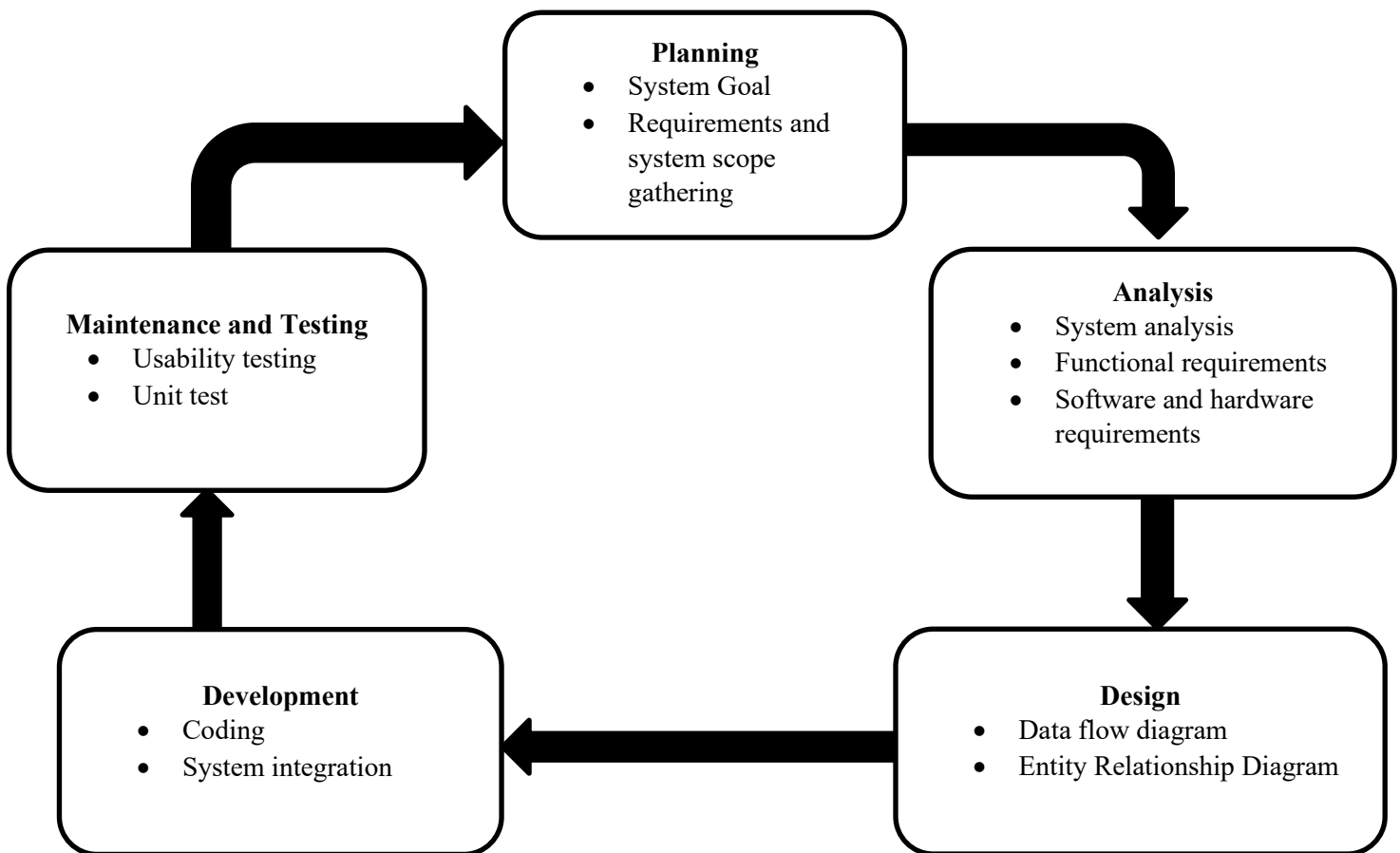


Figure 3.1 Web Development Life Cycle

3.3.1 Planning

The planning stage includes conceptualizing all areas of the website, such as design, technology, content, and marketing. Informed decisions on the structure and features of the website are made based on the information obtained and assessed in the previous step. Before creating a website, it is critical to decide on the content structure, wireframe (schematics and preliminary designs), technological stack, and software development methods. The Planning phase also includes creating a sitemap, forecasting schedules, defining deliverables, and allocating resources. Finally, before going on to the analysis and design step, the website's branding must be decided which programming languages, frameworks, and software that are used to build. The task for planning and strategy is based on the project schedule that has been created to assist in planning for building this system. The tools or software to use to complete all planning and strategy is Microsoft excel template to ensure that all work is organized according to the schedule that has been set and certainly has a change that is not too significant in planning and strategy.

The proposed system goals and objective is identified during the planning phase. The main goal is to develop a web based invoice system for freelancers, small businesses and organizations. It is a system that enables businesses to quickly create invoice, track, and store business payments so for future reference. The main objective that is identified during planning phase is to analyse the common feature of an invoice system, to design a web-based invoice system and to evaluate the functionality of the web-based invoice system.

As for the scope of the system, freelancers, small businesses and organizations are the targeted market. The system features includes :

Client Management:

- Add, edit, and delete client details such as name, address, and contact information.
- View a list of all clients in a table with search and filter options.

Invoice Creation:

- Create an invoice by entering product/service details, quantities, unit price, and applicable taxes.
- The system will automatically calculate the total amount, taxes, and apply any discounts.
- Generate invoices in a downloadable PDF format.

Payment Status:

- Track payment status of each invoice (Paid, Unpaid, Partially Paid).
- View outstanding amounts and update the payment status.

Invoice History and Reporting:

- Maintain a history of all invoices issued.
- Allow users to filter invoices by client, date, or payment status.
- Generate basic reports.

User Interface:

- Simple, intuitive, and responsive UI to easily navigate the system and manage invoices.
- Add company logos and branding

3.3.2 Analysis

The system need to meet people's needs must be usability and convenient. Another common need is having some control over the system and has to do with the information. The system has to be responsive and has run properly at the functional level. The task in this phase is going to collect a data analysis to get a user requirement to develop this system. The tools or software used to obtain analysis to develop this system is google form to help get some information to be obtained to meet the criteria desired by the user. The expectation of this system will look good and run smoothly to create a presence to establish a business as a going concern, communicate the value proposition and convey professionalism. The outcome of this phase is to target what users need in the system for the future and facilitate the user to use the system through the analysis that has been filled by the user from the google form that has been provided.

3.3.2.1 Analysis on the current system

Currently, many online invoice system that are available in the internet. Mostly of the systems are paid or subscription based. This leads to small companies and freelancers finding it difficult to invest due to tight budgets and they just want a simple invoice system where they can create invoice, track and store business payment history. Some of the current system has a complex user interface for new user to experience and has a high learning curve to adapt to the system. Existing system also has additional and complex feature that freelancers, small companies and organizations might no need such as accounting tools, CRM tools and integrations with other system.

As for business that relies on traditional method of invoicing, there are few advantages such as low costs, no dependency to technologies where internet is unavailable in certain areas or lacks budget to buy pc and good to maintain authenticity of the invoice. These process often comes with challenges such as time consuming, hard to manage files of invoices, prone to error and lack of important feature such as payment tracking and business invoice generation capabilities. There are 2 primary method of traditional invoicing:

1. Paper-based invoicing

Paper-based invoicing are invoice that creates physically that is created and printed. The invoice is printed then signed and stamped. The copy of the invoice usually handed over to the clients and the main invoice are kept in a document files.

2. Manual digital invoicing

Manual digital invoicing is where business manually creates invoices by using Microsoft Words or Excel. The file then saved as a digital copy in the computers and can be converted to PDF files to be emailed to clients.

3.3.2.2 Proposed System Analysis

The proposed system is planned to solve the problems and to ease the issues in the analysis on the current system. In the proposed system, user can create an invoice with ease as the system consist an easy learning curve for new user. This could give advantage to small businesses and freelancers to make invoice without any additional cost to their budget. They could manage their invoice easily as it is saved in the cloud.

The system has 2 user: the administrator and users.

Here is the list of user types and features that the user expected from the system:

Admin	1. Add user data for the registry 2. Edit user data 3. Delete user data 4. Update user data 5. Create invoice 6. Delete invoice 7. Search invoice
User	1. Log in as a user 2. Create invoice 3. Delete invoice 4. Search invoice 5. Generate report

Table 2: List of user types and features

3.3.2.3 User Requirements

For the user requirements, a Google form was used to create a survey based on the features, service, and data information to develop a website. All questionnaires provided are based on the existing system to find the suitable requirements to build the systems . The target audiences to complete this form are non-governmental organizations, individuals who are freelancers, and small companies.

Each respondent will be distributed with a list of questionnaires online and their answers will be recorded online.

The main question in the questionnaires are:

1. What is the size of your business?\
2. Please specify what industry does your business operate in?
3. Do you currently use any invoicing system or software?
4. How frequent do you generate invoice for your business?
5. What do you think is the most important features in invoicing system?
6. What device do you mainly use to generate invoice?

These questions will be analyzed to meet the user requirements.

3.3.2.4 Functional Requirements

User type	Requirement
Admin	- Admin should be able to add, edit, delete data - Admin can create, delete and search invoice
User	- Users should be able to log in when complete registration - User can create, delete and search invoice

Table 3: Functional requirement

The admin will be able to:

The system shall allow the admin to add, edit, delete data.

The system shall allow the admin to create, delete and search invoice.

The user will be able to:

The system shall allow the user to register and login into the system.

The system shall allow the user to create, delete and search invoice.

3.3.2.5 Non-Functional Requirements

User type	Requirement
Admin	- How will it perform data to the system? - How easy is it to use? - How well will it perform under adverse conditions?
User	- How well does it utilize the system? - How easy is it to use it?

Table 4: Non-functional requirement

Admin and user must log in for all operations. The password is encrypted before it is stored in the database. If a user wants to use the system, it should always be available. The level of accessibility is 24/7.

3.3.2.6 Hardware and Software Requirements

Front-end development is to design a requirement collected while back-end development is to create a database with a link to make a web app's real functionalities.

The hardware and software tools that can be used to implement the system are such below:

Hardware/Software	Requirement
Operating system	Windows 10
Supporting software	1. Xampp localhost 2. Notepad++ 3. Visual Studio Code 4. Microsoft Excel 5. Axure RP9
Scripting language	1. HTML 2. PHP 3. MySQL 4. CSS 5. JsPDF 6. Java Script
Central processing unit (CPU)	Intel(R) Core(TM) i5-8300H CPU @ 2.30GHz 2.30 GHz
Main Memory	8.00 Gigabytes

Data storage	200 GB Solid State drive(SSD) + 1 TB Hard Disk drive(HDD)
--------------	--

Table 5: Hardware and software requirements

3.3.3 Design

In this part what is needed to get a design for a database or user interface to transform the requirements into a design of the future system which can help to mapping a strong system architecture and adapt the design to the implementation environment and designing for performance.

3.3.3.1 Context Diagram

Context diagram is a diagram that clearly defines the boundaries within the system or parts of the system and its environment, and shows the entities with which they interact. It shows a high-level view of a system.

Figure 3.4 shows the illustration of the context diagram for Web-based invoice system. There are 2 main entities for the system which are:

1. Admin
2. User

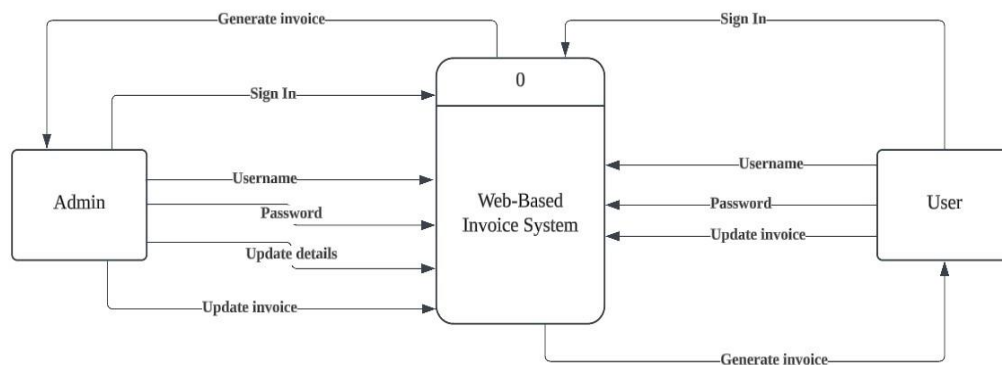


Figure 3.2: Context Diagram

3.3.3.2 Level 0 Diagram

Level 0 diagram is the expansion of the previous context diagram. The process are expand into more elaborated process. Figure 3.5 shows the Level 0 Diagram of the proposed system.

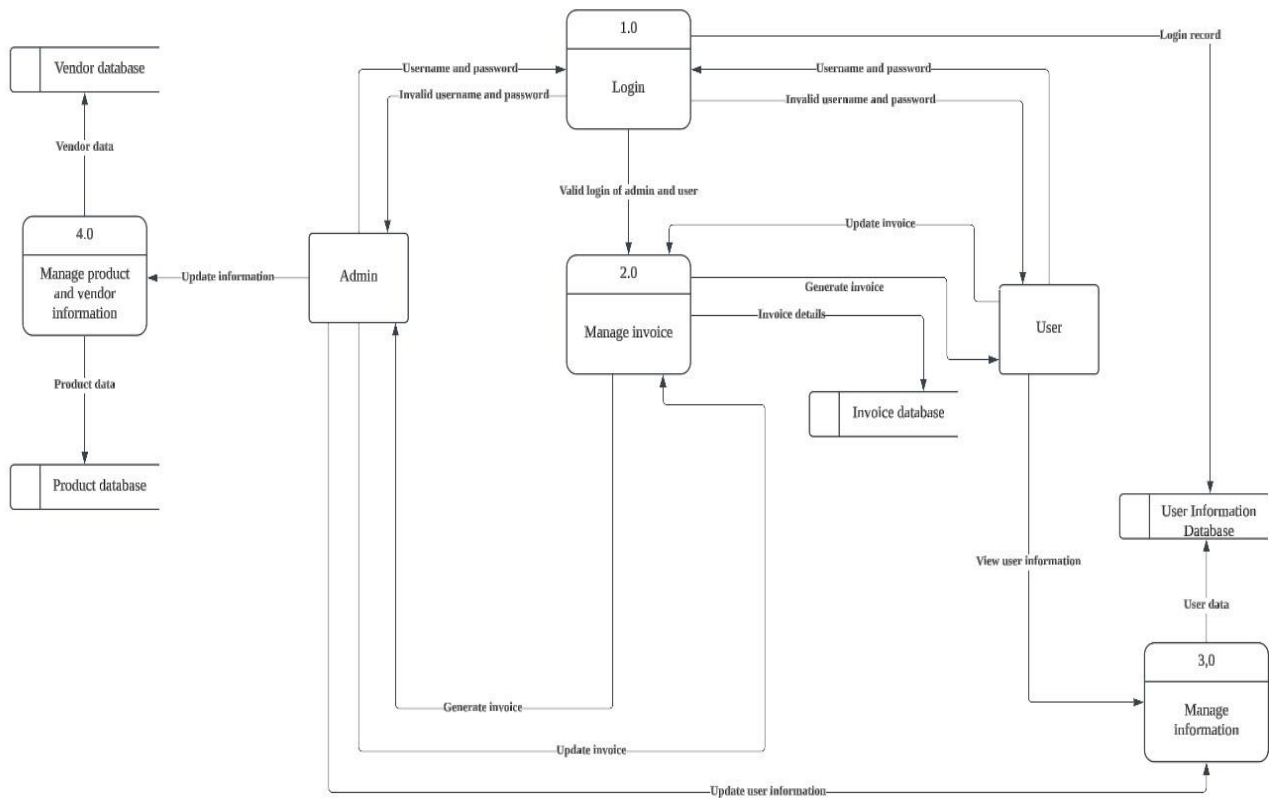


Figure 3.3: Level 0 diagram

3.3.3.3 Data flow diagram level 1

- System login

Figure 3.4 shows a feature that the admin and user must enter a valid username and password, or they will be redirected back to the login page. All the user's details and information are stored in the database. The administrator can also access the system by providing his username and password.

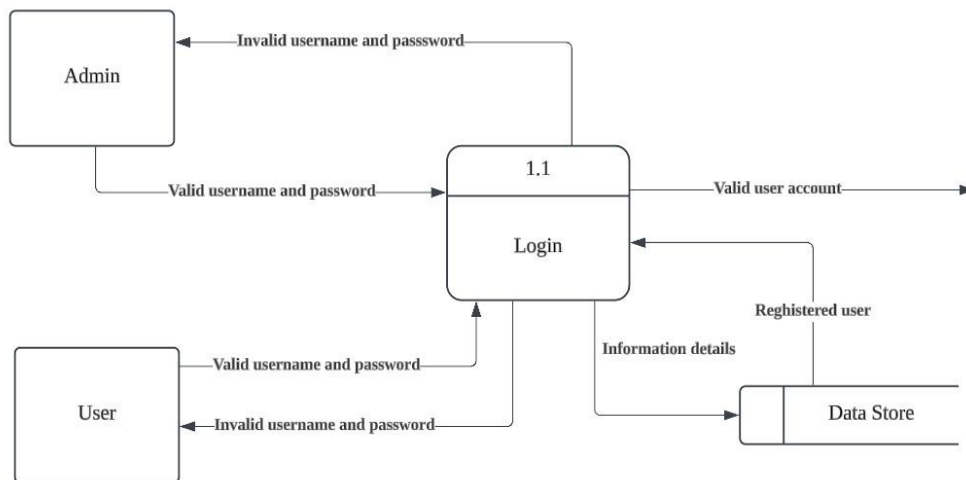


Figure 3.4: DFD Level 1 for system login

- Invoice management

Process 2.0 is described in detail regarding the invoice management where admin and user can create, edit and delete invoice. The invoice details will be stored in the database.

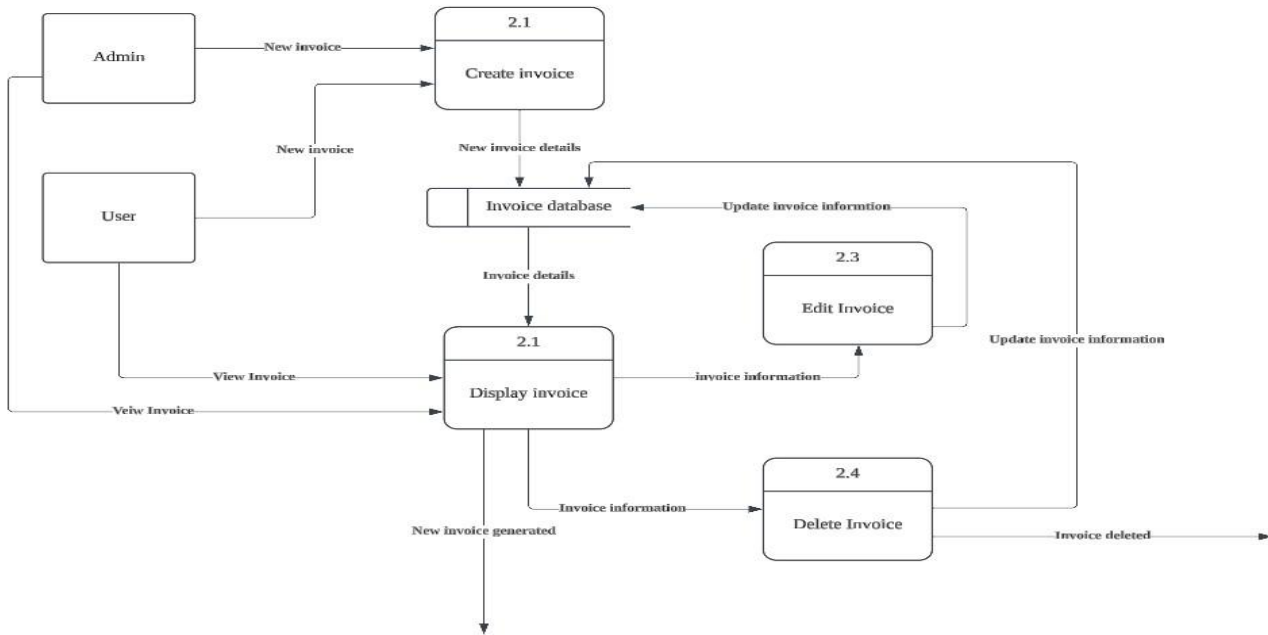


Figure 3.5: DFD Level 1 for invoice management

- Managing information

The information management flow where it describes Process 3.0 in detail as shown in Figure 3.6. In this figure, it shows only the admin is responsible in updated new information. The contents can be view, edit, and save the information and store in a database as well. The user can only view their information details

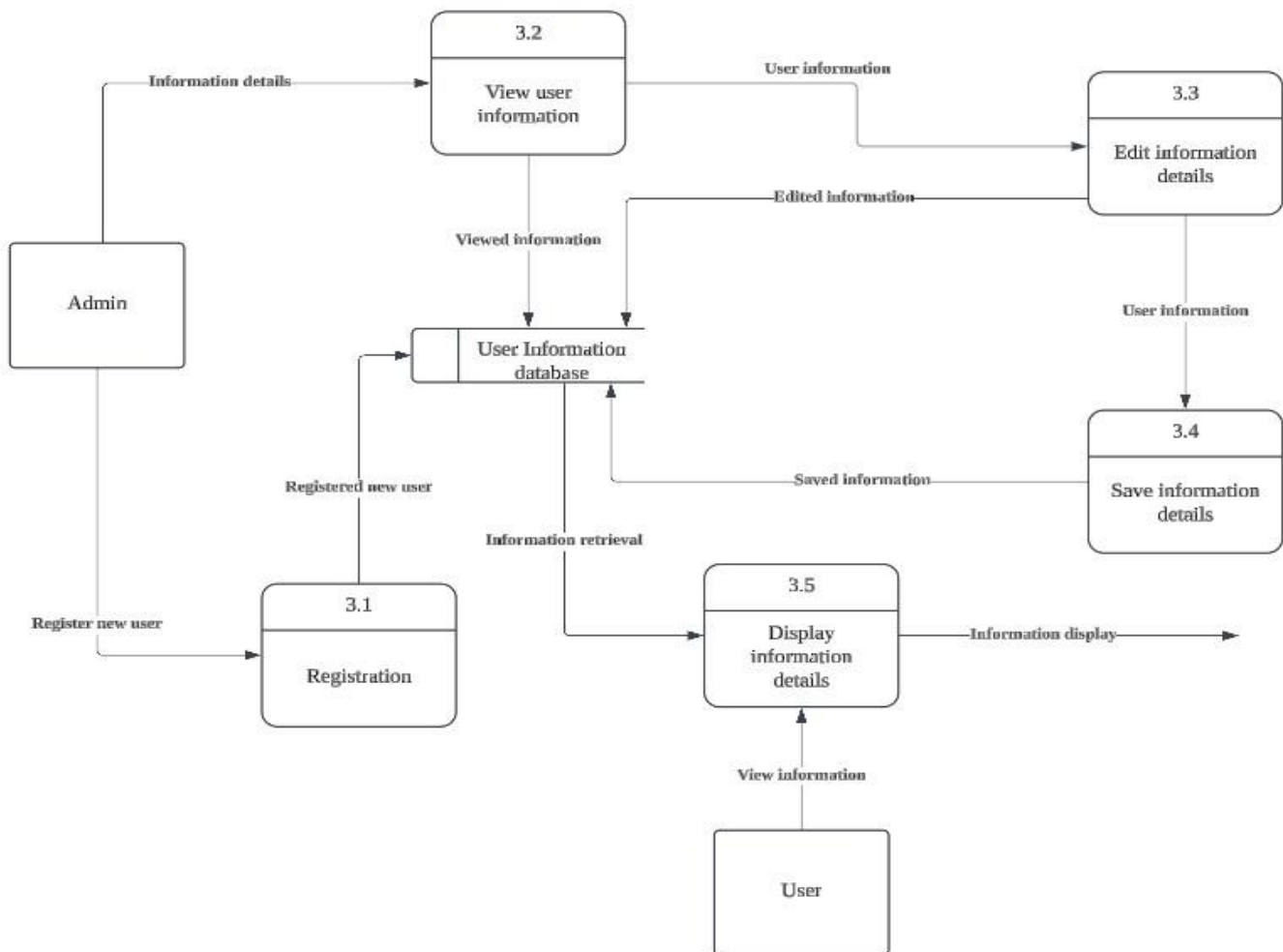


Figure 3.6: DFD Level 1 for Managing information

- Product and vendor management

The process 4.0 shows product and vendor management in detail as shown in figure 3.7. This figure shows only admin can add edit and delete product and vendor information. The information then will be stored in the database. User can only view the product and vendor information.

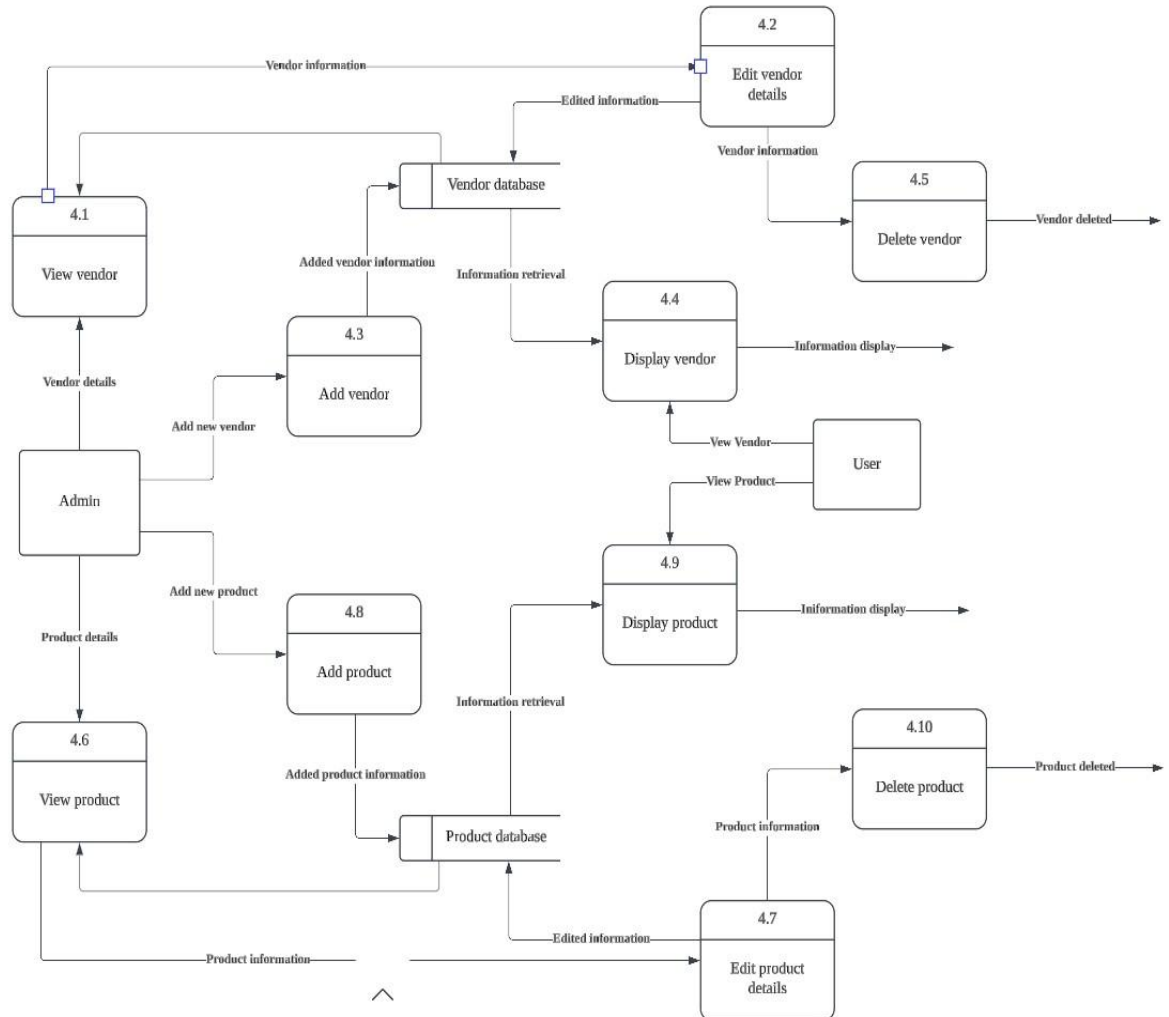


Figure 3.7: DFD Level 1 for Managing product and vendor information

3.3.3.4 Entity Relationship Diagram

The purpose of entity relationship diagram is to design a database with a proper function. Every table has an attribute name with a primary key and a foreign key. There are different connections from table to table with a relationship connection based on the user and the system. Figure 3.6 shows the ERD to shows the relationship between all entities and process involved in the database.

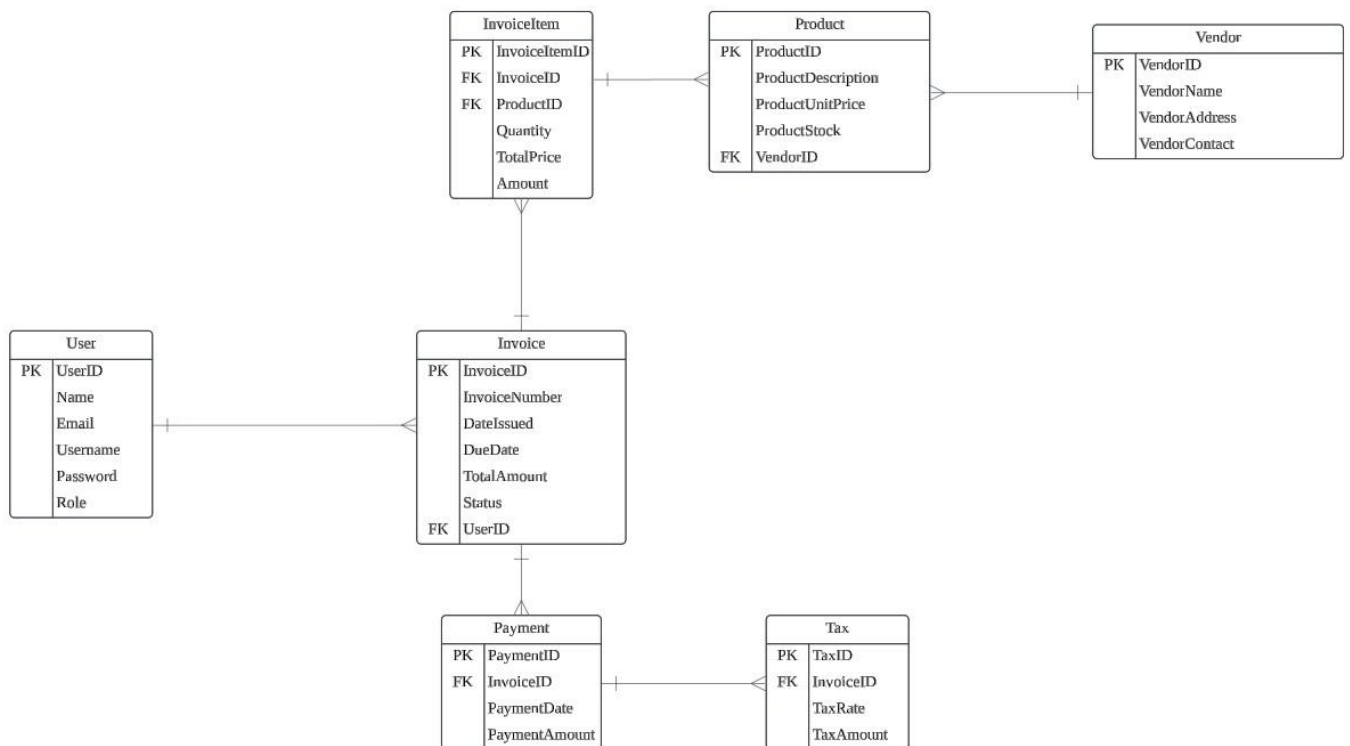


Figure 3.8: Entity Relationship Diagram

3.3.3.5 Data dictionary

Table Name: User

Attribute Name	Data Type	Constraints
UserID	INT	Primary Key, Auto Increment
Name	VARCHAR(100)	NOT NULL
Email	VARCHAR(100)	NOT NULL, Unique
Username	VARCHAR(100)	NOT NULL
Password	VARCHAR(255)	NOT NULL
Role	ENUM('Admin', 'User')	Default: 'User'

Table 6

Table Name: Invoice

Attribute Name	Data Type	Constraints
InvoiceID	INT	Primary Key, Auto Increment
InvoiceNumber	VARCHAR(50)	NOT NULL, Unique
DateIssued	DATE	NOT NULL
DueDate	DATE	NOT NULL
TotalAmount	DECIMAL(10, 2)	NOT NULL

Status	ENUM('Paid', 'Pending', 'Overdue')	Default: 'Pending'
UserID	INT	Foreign Key, NOT NULL

Table 7

Table Name: InvoiceItem

Attribute Name	Data Type	Constraints
InvoiceItemID	INT	Primary Key, Auto Increment
InvoiceID	INT	Foreign Key, NOT NULL
Description	VARCHAR(255)	NOT NULL
Quantity	INT	NOT NULL
TotalPrice	DECIMAL(10, 2)	NOT NULL
Amount	DECIMAL(10, 2)	NOT NULL
ProductID	INT	Foreign Key, NOT NULL

Table 8

Table Name: Payment

Attribute Name	Data Type	Constraints
PaymentID	INT	Primary Key, Auto Increment
InvoiceID	INT	Foreign Key, NOT NULL
PaymentDate	DATE	NOT NULL
PaymentAmount	DECIMAL(10, 2)	NOT NULL

Table 9

- **Table Name:** Tax

Attribute Name	Data Type	Constraints
TaxID	INT	Primary Key, Auto Increment
InvoiceID	INT	Foreign Key, NOT NULL
TaxRate	DECIMAL(5, 2)	NOT NULL
TaxAmount	DECIMAL(10, 2)	NOT NULL

Table 10

- **Table Name:** Product

Attribute Name	Data Type	Constraints
ProductID	INT	Primary Key, Auto Increment
ProductDescription	VARCHAR(255)	NOT NULL
ProductUnitPrice	DECIMAL(10, 2)	NOT NULL
ProductStock	INT	NOT NULL
VendorID	INT	Foreign Key, NOT NULL

Table 11

- **Table Name:** Vendor

Attribute Name	Data Type	Constraints
VendorID	INT	Primary Key, Auto Increment
VendorName	VARCHAR(100)	NOT NULL
VendorAddress	VARCHAR(255)	NOT NULL
VendorContact	VARCHAR(11)	NOT NULL
VendorEmail	VARCHAR(100)	NOT NULL, Unique

Table 12

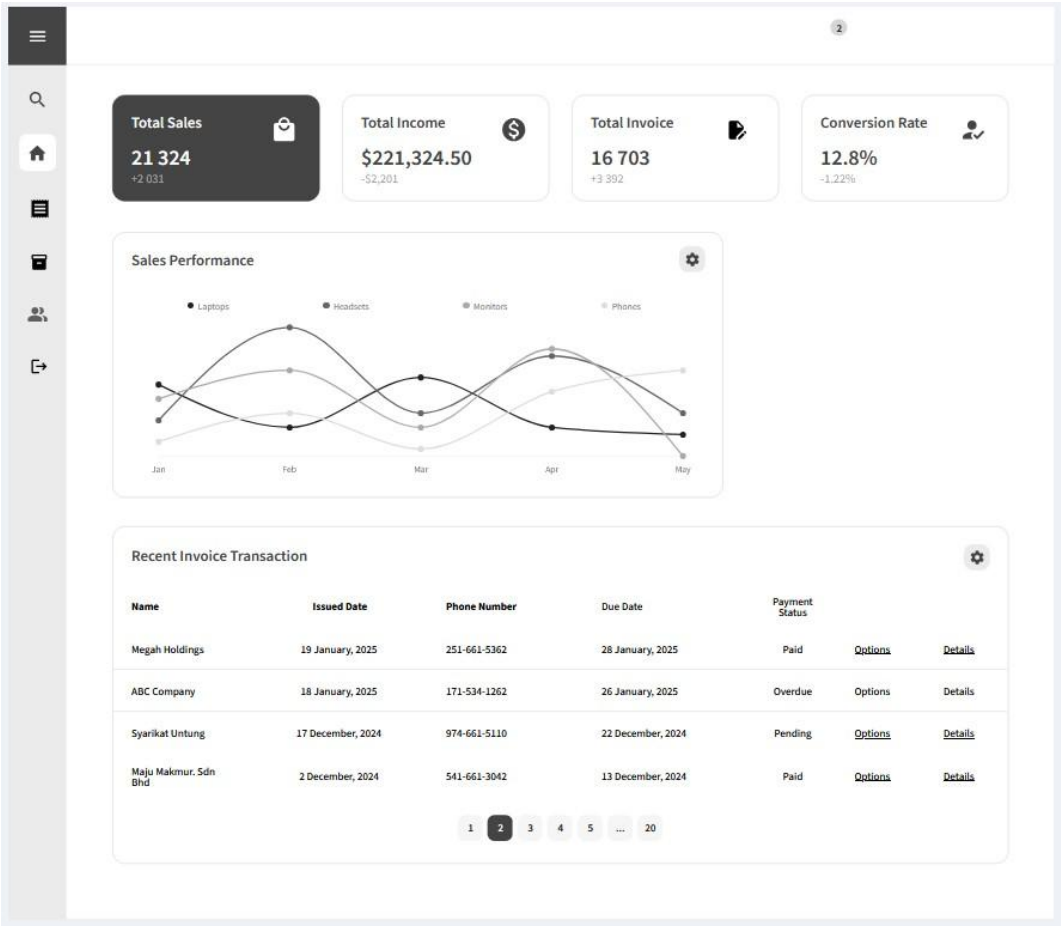
3.3.3.6 Wireframes

Page 1: Log In

The wireframe shows a login interface within a rounded rectangle. At the top, the heading "Sign in" is displayed in a bold font. Below it, a subtext reads "Log in by entering your email address and password." The form consists of two input fields: the first is labeled "User Name" and contains a user icon and the text "User"; the second is labeled "Password" and contains a series of dots for masked input, a lock icon on the left, and an eye icon on the right to toggle visibility. Below the password field is a link labeled "Forgot password?". A dark "Log in" button is positioned below the link. At the bottom, there is a "Remember me" toggle switch, which is currently turned off.

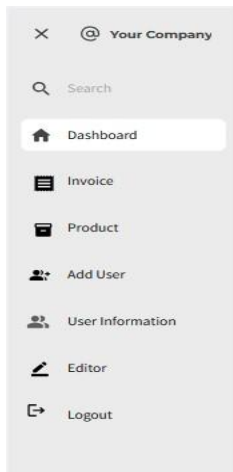
This is the first page when user want to use the system. The user need to log in to use the system.

Page 2: Homepage dashboard



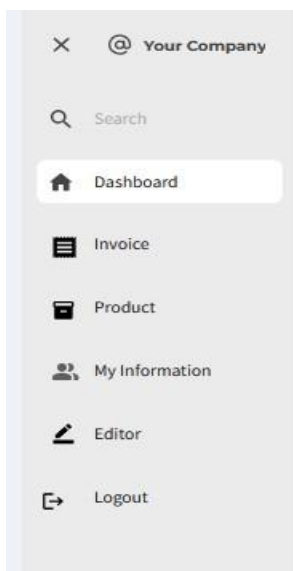
This page shows the homepage dashboards for user after log in the system, It shows some recent invoice transactions table.

Page 3: Admin sidebar



This page shows the admin sidebar. It has extra sidebar functions to add new user and edit the user information.

Page 4: User sidebar



This is the user sidebar. It is different from admin side bar as it only has My Information.

Invoice Creation

INVOICE

My Company Name,
My Company Address

Invoice Number

INV-16

Invoice Date

Placeholder

Due Date

Placeholder

Bill To:
Client Company Name,
Client Company Address

Name	Quantity	Price	Total Amount
Macbook Pro 15"	12	RM2 999.00	RM 35988.00
Macbook Pro 13"	1	RM2 999.00	RM 2999.00
iPhone 13 Mini	1	RM2 999.00	RM 2999.00
Select Item	1		

+

Add Item

+

Add Custom Item

Notes
Type here

Subtotal

RM 41988.00

Tax Rate:

0 %

Total Amount:

RM 41988.00

Change Theme

Save And Print

This page shows the invoice creation. User fills up the information needed. It also has theme changer at the bottom of the page.

Page 6: Add user

The screenshot shows a web application interface with a dark sidebar on the left containing icons for search, home, calendar, mail, and settings. The main header area includes the company logo "@ Your Company", a notification bell, and the user profile "Renee McKelvey, Product Manager". A white modal window titled "Add new user" is centered on the screen. Inside the modal, under the heading "User details", there are four input fields: "Username *" (empty), "Email *" (containing "email@address.com"), "First Name" (containing "John"), and "Last Name" (containing "Doe"). A "Role" dropdown menu is set to "Select". At the bottom of the modal are two buttons: "Add User" (dark) and "Cancel" (light).

This page is for admin to add new user.

Page 7: Edit user

The screenshot shows the same web application interface as Page 6. A white modal window titled "Edit user information" is centered on the screen. It contains the same "User details" section with input fields for "Username *" (containing "user"), "Email *" (containing "email@address.com"), "First Name" (containing "John"), and "Last Name" (containing "Doe"). The "Role" dropdown menu is also set to "Select". At the bottom of the modal are two buttons: "Edit User" (dark) and "Cancel" (light).

This page is for admin to edit user information.

Page 8: My information

×

@ Your Company

Search

Dashboard

Invoice

Product

My Information

Editor

Logout

My Information

Name:

Antonio

Email:

Antonio@mycompany.com

Role:

User

This is a page for user to view their information.

Page 9: Product

@ Your Company

Products

+ Add Product

Export data Sort by: ID

Name	Stock Availability	Description	Price	Vendor	ID	
Macbook Pro 15"	15	Laptops	RM2 999.00	Epal,Inc	39842-231	...
Macbook Pro 13"	0	Laptops	RM2 999.00	Epal,Inc	39842-231	...
iPhone 13 Mini	13	Phones	RM2 999.00	MIMI Tel	39842-231	...
iPhone 14	2	Phones	RM2 999.00	MIMI Tel	39842-231	...
AirPods 2	85	Electronics	RM2 999.00	MIMI Tel	39842-231	...

12345...20

This is a page for product where user can view and add products.

 Your Company

Vendor

Add Vendor

Export data 

Sort by: ID 

Name	Address	Contact	Email	Details
MIMI Tel	No. 12, Jalan Bunga Raya 3, Taman Sri Maju, 43000 Kajang, Selangor, Malaysia.	123456789	support@mimitel.com	...
EpaLinc	Lot 45, Persiaran Merdeka, Kampung Baru, 88000 Kota Kinabalu, Sabah, Malaysia.	987654321	contact@epalinc.my	...
Syarikat Maju	Unit 5-2A, Blok C, Residensi Harmoni, Jalan Ampang, 50450 Kuala Lumpur, Malaysia.	135798642	info@syarikatmaju.com.my	...
Syarikat Telefon	No. 88, Lorong Kenanga 5/7, Bandar Indah, 14000 Bukit Mertajam, Penang, Malaysia.	975312468	sales@syarikattelefon.my	...
OMG Phone	Lot 23, Jalan Puteri 1/2, Bandar Puteri, 47100 Puchong, Selangor, Malaysia.	111111111	hello@omgphone.com	...

1

2

3

4

5

...

20

This is a page for vendor where user can view and add vendor.

3.3.4 Development

The system that was proposed and designed will be developed and documented. During this phase, the programming task will be conducted to develop the system. The code will be written in editors such as Notepad++. The main programming language for this project is PHP with other languages such as JavaScript and HTML. After completion, the codes will be checked for any errors either it is syntax error or run time error. Validations of functions will be included for error-checking in the client side. All the process and errors will be documented throughout the project duration.

3.3.5 Maintenance and Testing

Once the system is completed and published, a complete and thorough compatibility test will be conducted to ensure that the system is compatible with different versions and types of web browsers. If there is any errors occurred, the error logs will be created and documented. After the testing phase is done, the system will be released to the target audience and maintenance will be carried out to improve the system based on user feedbacks.

3.4 Summary

This chapter discusses the methodology to use to develop a web-based system. All details have been explained in every phase according to the methodology to follow the flow. All requirements needed have been recorded to improve the features of the system. The analysis design is to design what the system will be running based on the flow diagram while the database also created to store the data entry as shown in the figure entity relationship diagram.

Chapter 4: Implementation and Testing

4.1 Introduction

This chapter will explain the implementation and the development of the web-based invoice system. Implementation phase is where the system will be developed and tested such as database setup, system interface, user training and system maintenance. The system implementation will be based on the design that had been proposed on the previous chapter. User training will be done to make sure the functions in the system are going well, and the systems are enabled to be used after the prototype is done.

The system need to be completed and functioning as described in the user requirement to achieve the objective for this project. Testing will be done in this chapter to identify the flaw of the system and the needed for improvement in the system according to user needs.

4.2 System Deployment

The implementation of web-based invoice system is developed by using a database engine called XAMPP for its localhost. XAMPP allows web development software that allows user to test their website on computers without the internet. It uses PHPMyAdmin to develop the database for the system. The system is coded in Notepad++ and by using PHP language as it programming language.

After the development from the localhost is done, the system then transferred online via FTP Software called SmartFTP Client. It allows the website to be online through the internet by transferring the files using SmartFTP Client to the paid or free domain hosting. The web-based invoice system can be access through the World Wide Web with the URL name invoicelite.free.nf.

4.2.1 Installation and Configuration of system tools

XAMPP is most common and easy to use to do any MySQL-related work. XAMPP is fully free and simple to install Apache distributions that include PERL, MariaDB, and PHP. It is also a package that is open source. To make it easier to manage the database data, HeidiSQL is chosen. HeidiSQL is free software that allows the user to edit data and structures on the computer that run database systems such as MySQL, MariaDB, SQLite, PostgreSQL, and Microsoft SQL. XAMPP can be downloaded for free from Apache Friends website at <https://www.apachefriends.org/download.html>.



Figure 4.0 XAMPP Control Panel

Figure 4.0 shows a control panel for XAMPP after the installation. It has 5 modules for a server that are Apache, MySQL, FileZilla, Mercury and Tomcat. For this project, only Apache and MySQL will be use to develop the system. After starting both server, visit <http://localhost/> to check if the XAMPP tools are functioning well.

4.2.2 Database Implementation

Database creation for the system is created by using PHPMyAdmin. PHPMyAdmin mainly used to create modify adn delete database. To access PHPMyAdmin, visit <http://localhost/phpmyadmin>.

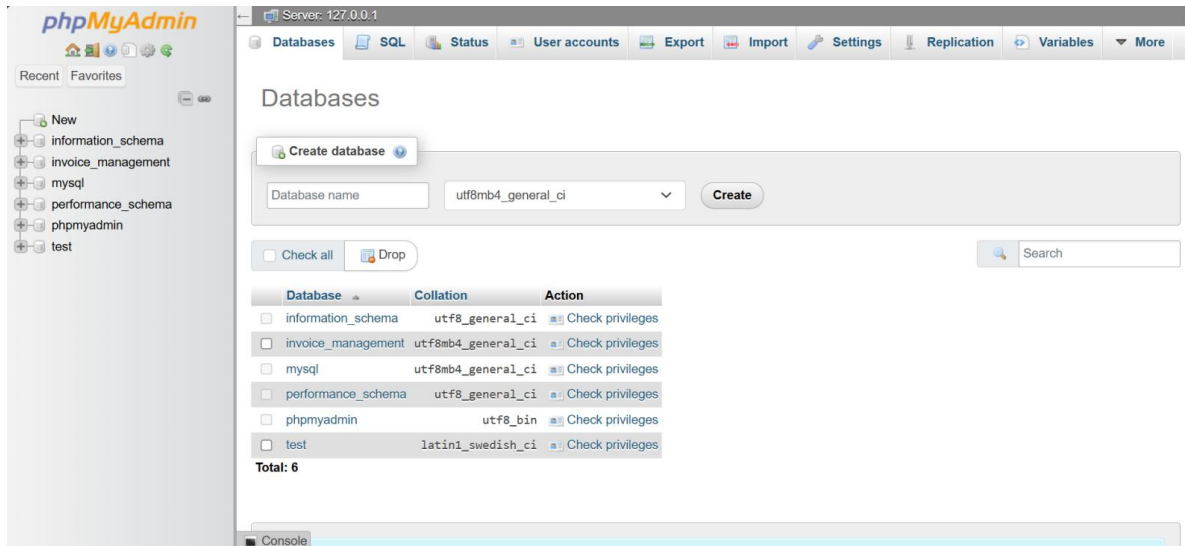


Figure 4.1 PHPMyAdmin Dashboard

Figure 4.1 shows PHPMyAdmin dashboard. Under the database tab, enter a new database name to create a new database. After a new database is created, add table for the database. For each table, enter data type and assign value for attributes in each column. If the data type is a primary key or foreign key, there is a column that specified INDEX and choose primary key or foreign key from the drop down menu. Once the table is created, data insertion can be done. There are 3 primary command that usually used. To add new record, INSERT command is used. To modify/edit the existing data in the table, UPDATE command will be used. To delete records in the table, DELETE command will be used.

4.2.3 Database connection using PHP

PHP is commonly use to intergrate with database especially MySQL. To established connection between PHP and MySQL, a code is used as shown below:

```
$conn = new mysqli(DB_HOST, DB_USER, DB_PASS, DB_NAME);
```

The \$conn requires to have 4 parameters: database host, user, password and database name. For a connection to the PHPMyAdmin:

Database host : “localhost”

Database user : “root”

Database password: “ ”

Database name : “invoice_management”

The database user and password may varies depends on the profile that use to create the database.

To select data from the database, \$mysqli_query command is used to fetch data from the database. The command function returns a results from a set of objects from the database, which contains the result of the query includes table creation statement and updates. The following code is use for the query command.

```
Mysqli_query(“SELECT * FROM users”);
```

4.3 Operation of the web system

There are 2 users to access the system which is admin and user. Users are required to log in to the system before they can access the web-based invoice system. On the login page, there are 2 text fields are shown to let users input their email address and password. If either username or password does not match in the database, they won't be able to login into the system, and an error message alert will display to them. On the other way, when username and password are matched in the database, they are authorized users by the system and redirected to the home page of the system.

4.3.1 Operation of the web system by admin

1. Admin can add, edit, update and delete user data in the system.
2. Admin can create, edit, search and delete invoice in the system.

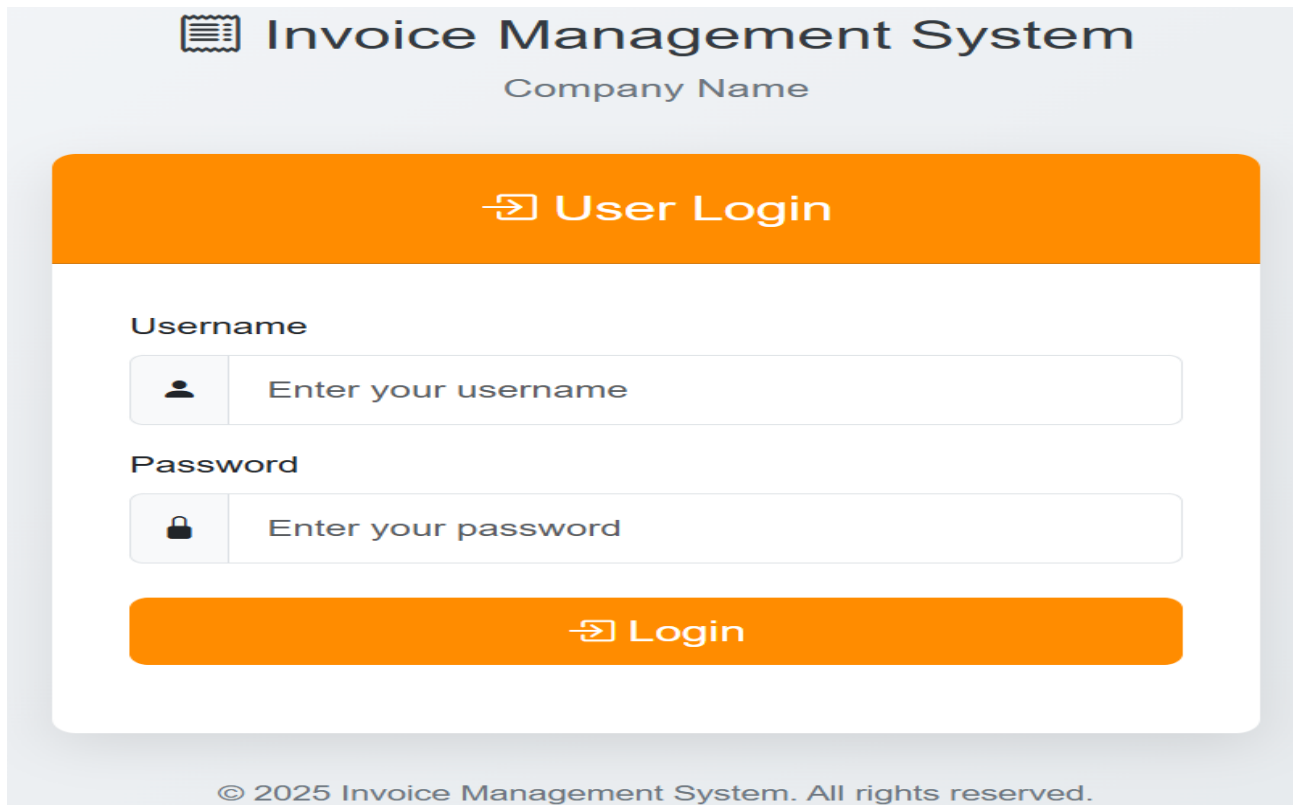
4.3.2 Operation of the web system by user

1. User can create, edit, search and delete invoice in the system.

4.4 User Interface Implementation

User interface is the main component thewe system. It provide an interaction between end users to the system.

User interface commonly includes buttons, menus, forms, images, text, icons and more. For the proposed system, a simple and user friendly user interface is developed to ease the end user.



The screenshot displays the login interface for the 'Invoice Management System'. At the top, the system name is accompanied by a document icon and a placeholder for the 'Company Name'. Below this, an orange header bar contains the 'User Login' title with a right-pointing arrow icon. The login form consists of two input fields: 'Username' with a person icon and 'Password' with a lock icon, both containing placeholder text. An orange 'Login' button with a right-pointing arrow icon is positioned below the fields. The footer contains the copyright notice: '© 2025 Invoice Management System. All rights reserved.'

Figure 4.2 Login Page

Figure 4.2 shows a login page for the users. The users need to enter their username and password to access the web system. The system will detect the users log in as an admin or user by checking the data in the database. If leave empty, the system will deny entry to the user or it will display error message “Invalid username and password” if the user entered the wrong username or password.

4.4.1 Admin user interface

Admin main role is to create ,edit and delete users in the system.

Invoice System

UsersInvoices

admin

Invoice Management

Create Invoice

Invoices

All Status

Search invoices...

Filter

Invoice #	Date	Due Date	Client	User	Status	Total	Actions
INV-20250521-948004	May 21, 2025	Jun 20, 2025	N/A	adam	Draft	RM 0.00	   
INV-20250520-B7A5B5	May 20, 2025	Jun 19, 2025	Ayam sdn bhd	antonio	Overdue	RM 68.40	   
INV-20250506-BA4FB3	May 06, 2025	Jun 21, 2025	N/A	adam	Sent	RM 8.06	   
INV-20250506-8D0274	May 06, 2025	Jun 07, 2025	Joe	adam	Overdue	RM 11.00	   

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Figure 4.3 Admin dashboard

Figure 4.3 shows the admin dashboard after the users log in as admin. Admin has only 2 tabs that is users and invoices. Admin can create a new invoice by clicking on the “Create Invoice”. Admin also can take actions on the invoice for viewing the invoice, edit the invoice, delete the invoice or generate a pdf file for the invoice.

Invoice System

Users

Invoices

admin

User Management

+ Add New User

Users List

Search users...

ID	Username	Full Name	Email	Role	Created	Actions
1	admin	Admin User	admin@example.com	Admin	May 05, 2025	
2	adam	Adam	adam@gmail.com	User	May 06, 2025	
3	antonio	Antonio	antonio@dummy.com	User	May 20, 2025	

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Figure 4.4 Admin Users tab

Figure 4.4 shows the users tab for the admin. In this page, admin can add new user by clicking on the “Add New User” button. Admin also can edit or delete user by clicking on the respective icons.

Invoice System

Users

Invoices

admin

Create New User

Username

Password

Full Name

Email

Role

User

← Back

Save

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Figure 4.5 Create a new user

The figure 4.5 shows if the admin want to create a new user. Admin needs to fill the username, password, full name, email and the role of newly created user. After that, click “Save” to save the details of the new created user.

4.4.2 User Main Interface

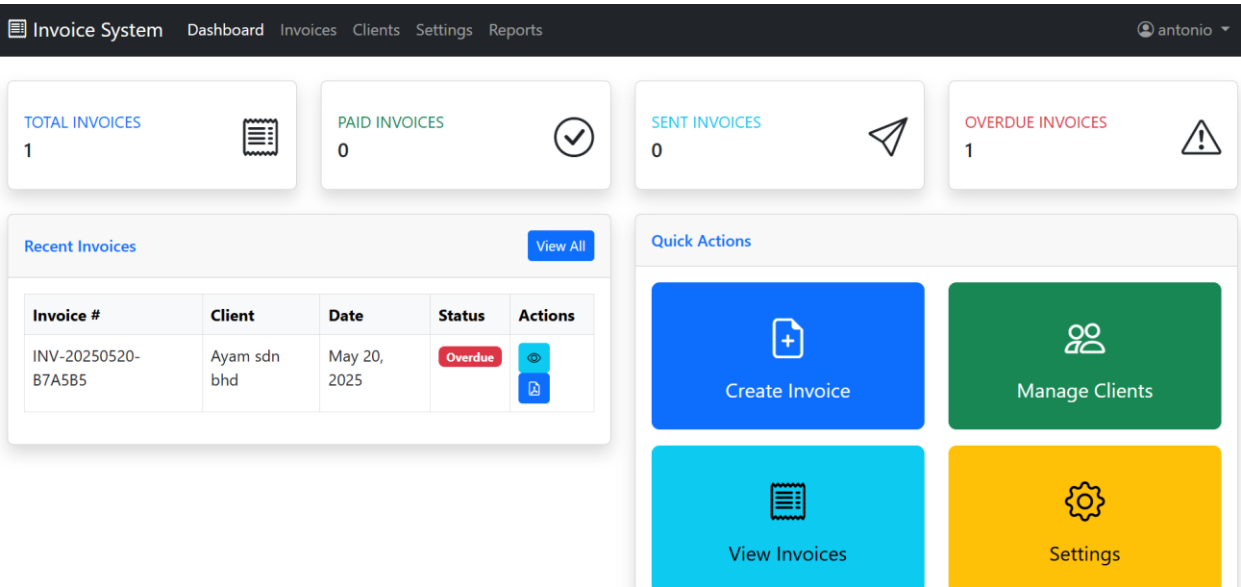


Figure 4.6 User Main Dashboard

Figure 4.6 shows the main dashboard for the user if they log in as the user. It has 5 tabs which are Dashboards, Invoices, Clients, Settings and Reports. The main dashboard shows on how many total invoices, paid invoices, sent invoices and overdue invoices. It also show the recent invoices created by the user. The quick actions is provided for ease of use. It has Create Invoice for invoice creation, Manage clients for client management, View invoices and Settings.

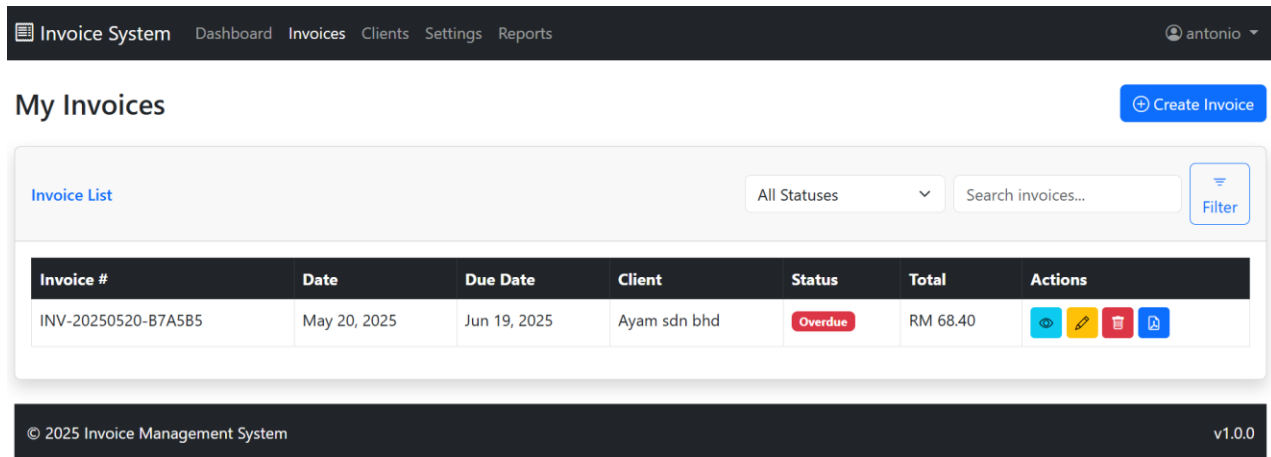


Figure 4.7 Invoices

Figure 4.7 shows the invoices tab or view invoice if the user enter from the quick actions. It shows the list of invoice available. The invoice can be search and sorted out by status whether the invoices are in draft, sent, paid or overdue. The table on the invoice also show the invoice number, date issued, the due date, client, status and the total of invoice. The actions column provided are for view invoice, edit invoice, delete invoice and generate a pdf for the invoice.

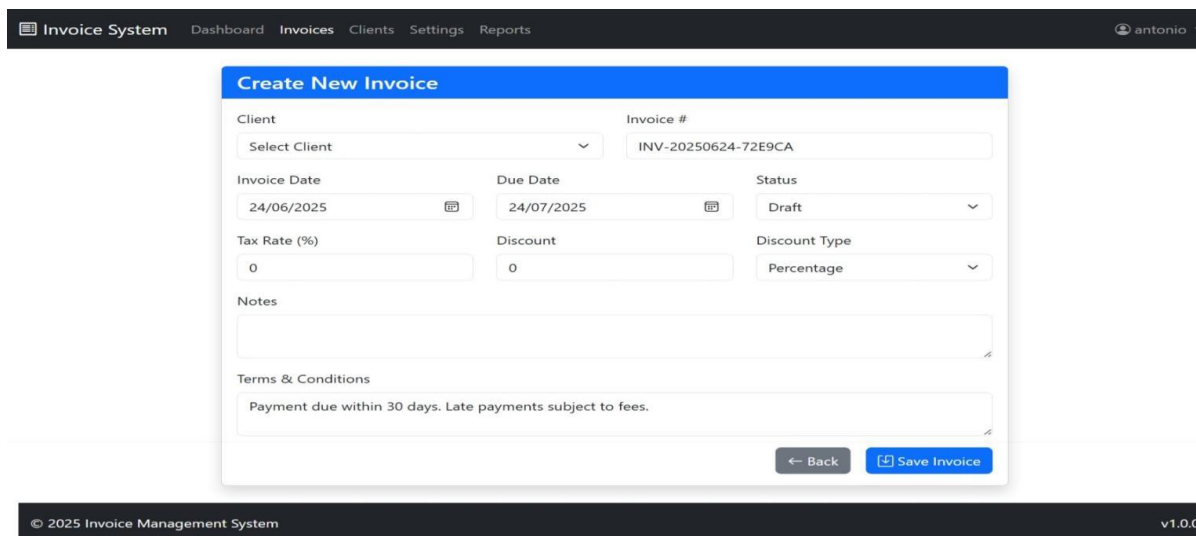


Figure 4.8 Invoice creation

Figure 4.8 shows if the invoice are created. The user need to select client for the invoice, the invoice date, the due date, status of the invoice, the tax rate, discount if available and notes for the client. After the invoice is

created, then the user will be able to add products on what the invoice is issued for.

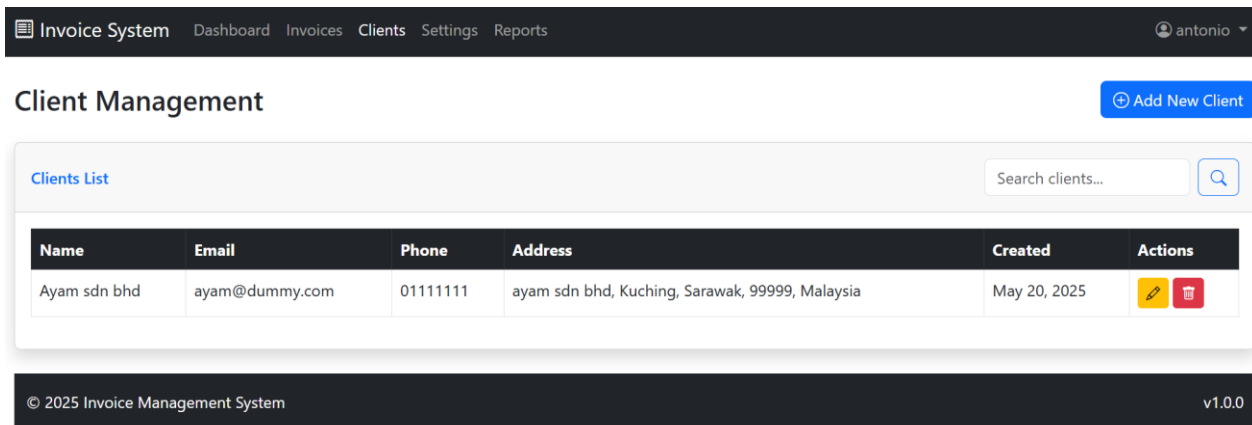


Figure 4.9 Client Management

Figure 4.9 shows the clients tab. User can add, edit, search and delete clients. The client list table shows the client name, email, phone, address and date created. The action icon shows edit and delete client. User can type the name of client for quick search.

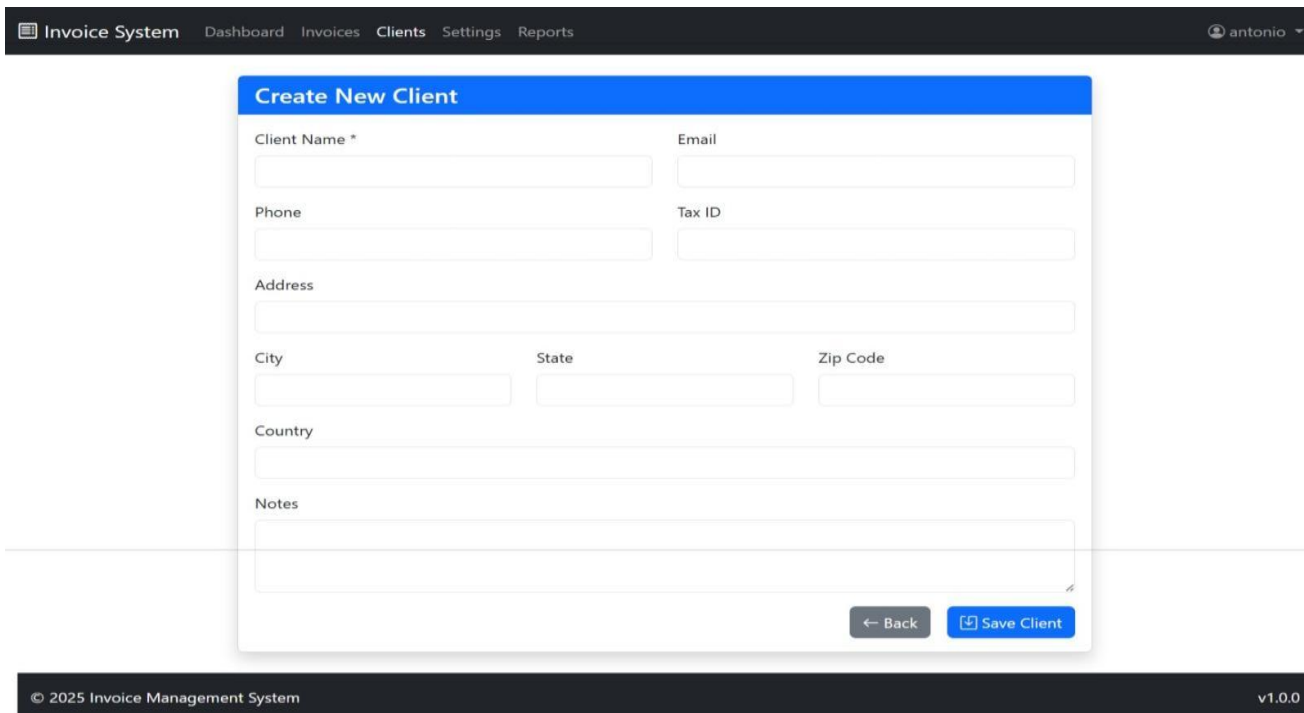


Figure 4.10 Create New Client

Figure 4.10 shows if the user creates a new client. The user needs to fill in the form and click on the “Save Client”

to save the client's details. The clients details will be then saved in the database.

The screenshot displays the 'Invoice Settings' interface within the 'Invoice System'. The top navigation bar includes 'Dashboard', 'Invoices', 'Clients', 'Settings' (the active tab), and 'Reports'. A user profile for 'antonio' is visible in the top right corner. The settings form is organized into several sections: 'Company Name' with a text input 'My Company'; 'Company Logo' with a 'Choose File' button, 'No file chosen' text, a logo placeholder, and a 'Remove logo' checkbox; 'Address' with a text input 'My company'; 'City', 'State', and 'Zip Code' with inputs 'Kucing', 'Sarawak', and '99999' respectively; 'Country' with input 'Sarawak'; 'Phone' with input '01111111'; 'Email' with input 'mycompany@dummy.com'; 'Website' with input 'www.comapny.com'; 'Default Tax Rate (%)' with input '0.00'; 'Currency Symbol' with input 'MYR'; 'Header Color' with a blue color picker; and 'Invoice Footer Text' with a large text area. A 'Save Settings' button is located at the bottom right of the form. The footer of the page contains the text '© 2025 Invoice Management System' and 'v1.0.0'.

Figure 4.11 Settings

Figure 4.11 shows the settings tab. It is for the user to customize the invoice. The user can add company name, company logo into the invoice. The address for the company also need to be fill. There is also default tax rate for the company and it will only applied for the company. User also can enter currency symbol for their invoice including header color and invoice footer text.

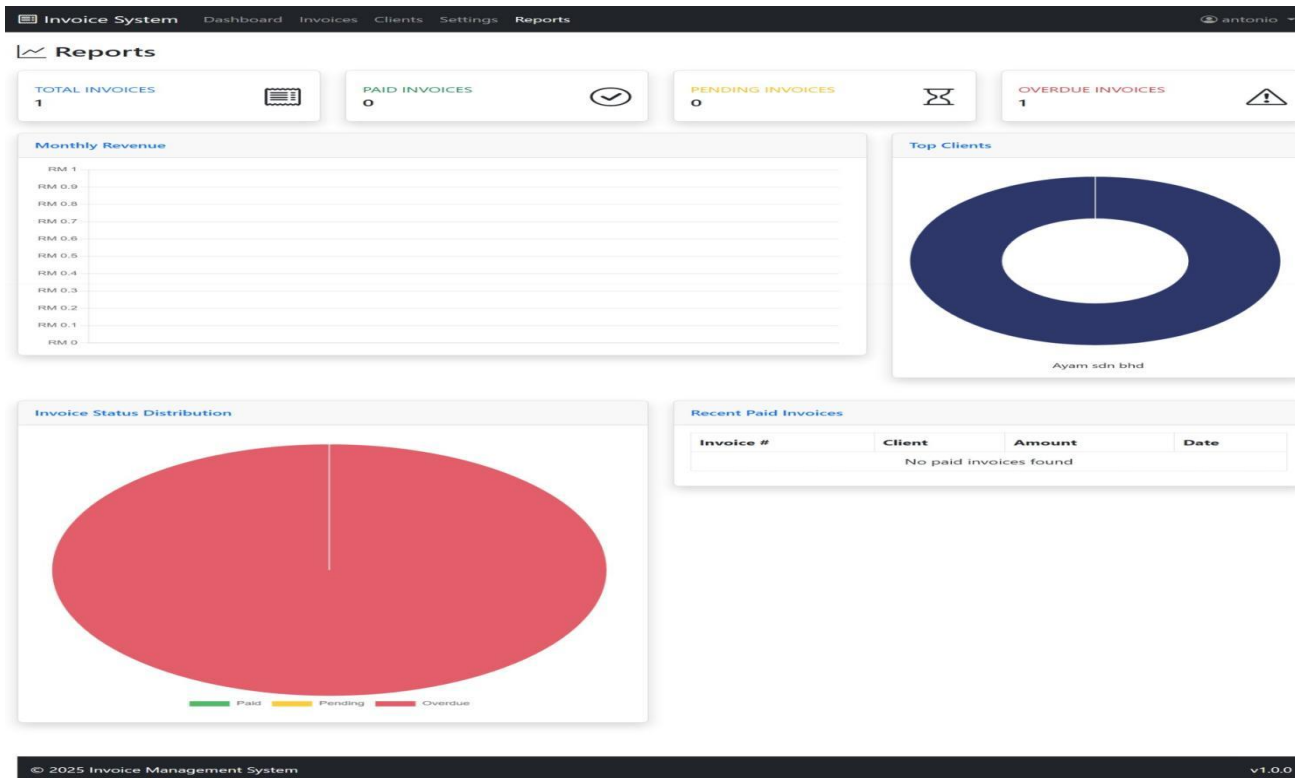


Figure 4.12 Reports

Figure 4.12 shows the reports tabs. User can monitor the company performance based on the invoice report. It includes total invoice, paid invoice, pending invoice and overdue invoice. It also include the monthly revenue for the invoice, top clients, invoice status distributions and recently paid invoice.

4.5 Testing

Testing is required to evaluate the system and to make sure it meets all the operational requirements and the conditions of the proposed system. Testing is performed throughout the development phase and not just at the end of the development. This is to ensure the system is well maintained and bug free before it is launched to the market. The testing of the proposed system covers two parts: functional testing and non-functional testing.

4.5.1 Functional testing

Functional testing is a type of testing to verify each components and functions of the system meets the user requirements and specifications. The system's functionality is evaluated by entering the correct input and checking whether the actual outcome aligns with the anticipated result. Unit testing will be performed to evaluate the functions for the system.

4.5.1.1 Unit testing

Unit testing takes small and individual parts of the system are tested to ensure the system meets the expected result. This method helps to identify bugs early in the development process thus increase the reliability and the level of quality of the system.

4.5.1.2 Test Item

Previous chapter include the breakdown of the system functions in which result in two modules, admin and user. Several key functions in each module are chosen and undergo the unit testing.

1. Admin

(a)Manage User

2. User

(a)Log in

(b)Add new invoice

(c)Customize invoice

4.5.1.2.1 Test Item: Admin Manage User

Project Name	Web-Based Invoice System		Design By	Antonio Spencer	
Actor Name	System administrator		Pre-requisite	Admin is Logged in	
Test Title	Add New User				
Test ID	Test Case	Input Data	Expected Result	Actual Result	Status
F01	Add User	Click “Add New User” and fill the field and click “Save” Button.	Successful message should be display.	Successful message display.”User Created Successfully”	Pass
		Click “Save” button with empty field	The system will not redirect the user to proceed with registration.	The user need to fill all the field or the system will not proceed to the next step.	Pass
F02	Edit User	Click edit icon and refill the field and click “Save” Button.	Successful message should be display.	Successful message display.”User Created Successfully”	Pass
		Click “Save” button with empty field	The system will not redirect the user to proceed with registration.	The user need to fill all the field or the system will not proceed to the next step.	Pass
F03	Delete User	Choose any user, click the delete icon.	The system will ask a confirmation prompt to the user.	Successful confirmation prompt. “Are you sure you wan to delete this user?”	Pass

Table 5.1 Test case for Admin manage user

4.5.1.2.2 Test Item: User Login

Project Name	Web-Based Invoice System		Design By	Antonio Spencer	
Actor Name	User		Pre-requisite	User is Registered	
Test Title	User Login				
Test ID	Test Case	Input Data	Expected Result	Actual Result	Status
F01	Login	Access to login for User	User should be access to User dashboard after login	Show User dashboard after login	Pass
		Click “Login” with empty field	The system will not redirect the user to proceed with login.	The user need to fill all the field or the system will not proceed to the next step.	Pass
		Input Invalid Username and Password	Error message appear	Error message appear, ”Invalid username or password”	Pass
		Input valid	User login successfully	User login	Pass

		Username and Password		successfully and redirect to user dashboard.	
--	--	--------------------------	--	---	--

Table 5.2 Test case for user login

4.5.1.2.3 Test Item: User Add New Invoice

Project Name	Web-Based Invoice System		Design By	Antonio Spencer	
Actor Name	User		Pre-requisite	User is Registered	
Test Title	Add New Invoice				
Test ID	Test Case	Input Data	Expected Result	Actual Result	Status
F01	Create Invoice	Click on the “Create Invoice”	Create invoice form is displayed	The form for invoice creation is displayed.	Pass
		Invalid enter the date and click “Save Invoice”	Error message appear	Error message appear, ”Due date must be after invoice date”	Pass
		Select Client from the dropdown list	List of all client’s names listed.	The dropdown shows the list of all clients available.	Pass
		Input tax	Tax correctly calculated	The actual total of invoice is shown after tax is applied.	Pass
		Input Discount	Discount correctly calculated	The actual total of invoice is shown after discount is	Pass

				applied by percentage or fixed amount.	
		Add product/item to the invoice	Item are added and the subtotal will be calculated.	The subtotal of all items are correctly calculated	Pass
		Click “Save Invoice”	Successful message should be display.	Successful message display “Invoice created successfully. Add items now”	Pass

Table 5.2 Test case for Add New Invoice

4.5.1.2.4 Test Item: User Customize Invoice

Project Name	Web-Based Invoice System		Design By	Antonio Spencer	
Actor Name	User		Pre-requisite	User is Registered	
Test Title	Customize Invoice				
Test ID	Test Case	Input Data	Expected Result	Actual Result	Status
F01	Customize Invoice	Click on the “Settings” for invoice customization	User should be access to the settings page.	A form is displayed on the page.	Pass
		Upload custom logo	The logo is uploaded and previewed.	The logo successfully uploaded and previewed after uploaded.	Pass
		Change header color	Color applied in the invoice	The header of the invoice is applied by the color chosen.	Pass
		Add footer note	Footer displays in preview	The footer is applied on the invoice.	Pass

Table 5.2 Test case for Customize Invoice

4.5.2 Non-functional testing

Non-functional testing is conducted to ensure the behavior and performance of the system runs well under various circumstances. A few non-functional testing techniques are used to evaluate the different aspect of the system.

- 1) **Compatibility Testing:** Ensure the invoice web-based system can be accessed other than a PC Desktop such as tablet or mobile phone.
- 2) **Load Testing:** By key in many invoice and evaluate the system ability to handle many invoice transactions.
- 3) **Security Testing:** To ensure the system cant be log in if the username and password are incorrectly enetered.
- 4) **Usability Testing:** To ensure the system is user-friendly and easy to use by new user.

4.5.2.1 Approach and Environmental Needs

To ensure the proper functionalities of the system, it is crucial to build an effective approach towards different types of the test required. The preconditions for the test is check beforehand to ensure it is been fullfilled. Notepad++ is use for maintanance and debugging of the system. Proper hardware and software are also required to support the testing of the system as follows:

- a) A desktop PC/notebook/laptop or a computer device with minimum Intel Core i3 processors and above, 2GB RAM or above and minimum 250 GB Hard Disk.
- b) Input and outpur devices: Keyboard, Mouse and Monitor.
- c) Machine with XAMPP installed(localhost environment) and connected to the internet network.

4.6 Summary

This chapter discuss on the implementation and development of the system proposed. After the implementation phase is completed, the development phase will takes place. The system is first developed using a localhost web application technology,XAMPP as it tools. The code for the system is written in Notepad++. The system is develop based on the requirement analysis. All the installation and setup process of the softwate and framework were explained step-by-step in this chapter. Beside that, screenshots and explanation also included for the better understanding for the user. This chapter also include the testing phase which include two types of testing: functional testing and non-functional testing. Functional testing is to evaluate the functions of the system whether the outcome of the system is match with expected result. It include two modules that is admin and user. A few functions will be selected from each modules for the testing. For non-functional testing, it covers the overall performance and usability of the system. A monitoring is required to conduct the test. The test is conducted by checking the hardware and software requirements for the system. A few non-functional testing techniques are used for the non-functional testing: Compatibility testing, load testing, security testing and usability testing.

CHAPTER 5: FUTURE WORKS

5.1 Introduction

This chapter will first state the achievements of the project based on the objectives and the limitations. Then, future works of Web-Based Invoice System and some improvements that is possible will be discussed.

5.2 Objective Achievement

The objective of Web-Based Invoice System that are proposed at the beginning of the project development has been achieved. Based on the table below shows the achievement gained from this project:

- To analyse the common feature of an invoice system	- A literature review is conducted in the previous chapter to analyse the common functions of an invoice system. Based on the requirements needed, a few key features of an invoice system is developed in the Web-Based Invoice System.
- To design a web-based invoice system	- By using the requirements analysis, a web-based system is developed.
- To evaluate the functionality of the web-based invoice system.	- The functions of the invoice system are evaluated and tested to meet the requirements analysis.

5.3 Project Limitations

There are few project limitations that the system is unable to provide to its user. The system is a simple invoice that is aimed towards small business and freelancers. It may lack some functionalities such as accounting functions that are needed for some medium to big companies. The system also does not provide any notifications for the user if the invoice is overdue or unpaid.

Beside that, there is no recurring time in the system as its aim is for invoice on the go. User also can't send email and notify clients about their unpaid and overdue invoice.

5.4 Future Works

There are a few recommendations suggested for improving the Web-Based Invoice System. The system can add recurring invoices by adding support to automatically generating and sending recurring invoice. This will provide ease of use for the user as they don't need to enter the same invoice multiple times. Beside that, a payment gateway integration can be provided to allow clients pay invoices online either by online banking or e-wallet. Item and product management also can be added into the system by adding a catalog for a quick invoice generation.

5.5 Conclusion

This project aims to develop a web-based invoice system that can be used by freelancers or small business. There are 3 objectives set in Chapter 1, and all of the objectives are achieved. Implementations, development and testing also been conducted to get requirement analysis match with the result for the invoice system. But, there are also some limitations that still exist in this project. Recommendations have been determined to make the Web-Based Invoice System become better in future.

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