POLITEKNIK BANTING SELANGOR

RECORDED EQUIPMENT AND TOOL SYSTEM
(R.E.T.S)

NAME	MATRIC NO.
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DEPARTMENT OF AIRCRAFT MAINTENANCE

DECEMBER 2023

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A REPORT SUBMITTED TO DEPARTMENT OF AIRCRAFT MAINTENANCE IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR A DIPLOMA ENGINEERING IN AIRCRAFT MAINTENANCE

SUPERVISOR:

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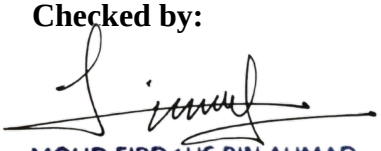
Supervisor's Signature : 

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CERTIFICATION OF PROJECT ORIGINALITY & OWNERSHIP

RECORDED EQUIPMENT AND TOOL SYSTEM

(R.E.T.S)

SESSION: 1 2023/2024

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"We hereby declare that this report is the result of our own work, except excerpts that we have outlined its sources and this project will be the ownership of polytechnic.

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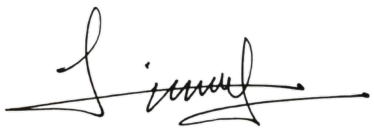

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ABSTRACT

This technique for recording tools and equipment was created to ensure that the tools and equipment had accurate recording data and would last longer and more safely. This technique was designed to shorten the time needed to borrow tools and equipment before beginning any duties in their workshop. This system also can record tools and equipment that are borrowed for extended periods for various activities. This means that the captured record can also be printed in hard copy using this technique. This system can capture records, which can then be printed in physical copy using this method. This system can identify the missing tools and equipment in the tool crib as well as the names of the staff members who have borrowed items in the past and failed to return them after the staff members have completed their tasks in the workshop. The output of the system for recording tools and equipment (R.E.T.S.) allows for the unrestricted recording of tools and equipment, as needed by the personnel to complete a task. This method allows for an infinite number of tools and equipment records. It is evident from this that running this system takes less time. Additionally, by using this approach, less paper will be used, the environment will be protected, and the logbook method will be used less.

ITEMS	CONTENTS	PAGE
	LIST OF TABLES	**10**
	LIST OF FIGRUES	**11**
CHAPTER 1 **(INTRODUCTION)**	**1.1 BACKGROUND OF STUDY**	**15-16**
	1.2 PROBLEM STATEMENTS	**17**
	1.3 PROJECT OBJECTIVES	**18**
	1.3.1 General Project Objectives	**19**
	1.3.2 Specific Individual Project Objectives	
	1.3.2.2 Product Mechanism	
	1.3.2.3 Software and Programming	
	1.4 PURPOSE OF PRODUCT	**19**
	1.5 SCOPE PROJECT	**20**
	1.5.1 General Project Scope	**20**
	1.5.2. Specific Individual Scopes	
	1.5.2.1 software /programming	
CHAPTER 2 **(LITERATURE REVIEW)**	**2.1 GENERAL LITERATURE REVIEW** 2.1.1 Software Industry in Malaysia 2.1.2 Workshop Explanation 2.1.3 Types Of Engineering Software	**21**
	2.2 SPECIFIC LITERATURE REVIEW	**26**
	2.2.1 Introduction Layout	
	2.2.2 Product Mechanisms	
	2.2.3 Software/Programming	
	2.3 REVIEW OF RECENT RESEARCH / RELATED PRODUCTS	**31**
	2.3.2 Recent Market App	
	2.3.1 Xinel system	
	2.4 COMPARISON BETWEEN RECENT RESEARCH AND CURRENT PROJECT	**31**

CHAPTER 3 **(RESEARCH METHODOLOGY)**	**3.1 PROJECT BRIEFING & RISK ASSESSMENT**	**32**
	3.2: OVERALL PROJECT GANTT CHART	**33**
	3.2.1: Gant Chart of RETS	
	3.2.2: Specific Interface Layout	
	3.3 PROJECT FLOW CHART	**34**
	3.3.1 Overall Project Flow Chart	
	3.3.2 Specific Project Design Flow/ Framework	
	3.4 DESIGN ENGINEERING TOOLS	**35**
	3.4.1: Design Requirement Analysis	**36**
	3.4.1.1 Questionnaire Survey	
	3.4.1.2 Pareto Diagram	
	3.4.2: Design Concept Generation	**39**
	3.4.2.1 Function Tree	
	3.4.2.2 Morphological Matrix	
	3.4.3 Evaluation & Selection of Conceptual Design	**40**
	3.4.3.1 Pugh Matrix	
	3.5 PRODUCT DRAWING / SCHEMATIC DIAGRAM	**41**
	3.5.1: General Product Drawing	
	3.5.2: Specific Part Drawing / Diagram	**46**
	3.7 DEVELOPMENT OF PRODUCT	
	3.7.1 Material Acquisition	**47**
	3.8 PRODUCT TESTING/ FUNCTIONALITY TEST	**48**
	3.9 LIST OF MATERIALS & EXPENDITURES	**49**

CHAPTER 4 **(RESULT & DISCUSSION)**	**4.1 PRODUCT DESCRIPTION** **4.1.1 General Product Features & Functionalities** **4.1.2: Specific Part Features** 4.1.2.1 Product Structure 4.1.2.2 Product Mechanisms **4.1.3 General Operation of the Product** **4.1.4 Operation of the Specific Part of the Product** **4.2 PRODUCT OUTPUT ANALYSIS** **4.3 ANALYSIS OF PROBLEM ENCOUNTERED & SOLUTIONS** **4.3.1 Inventory Management Challenges** **4.3.2 Users and Friendly Interface** **4.3.3 Improve Inventory Accuracy**	**50** **51** **57** **60** **61** **63**
CHAPTER 5 **(CONCLUSION & RECOMMENDATION)**	**5.1 ACHIEVEMENT OF AIM & OBJECTIVES OF THE RESEARCH** **5.1.1 General Achievements of the Project** **5.1.2 Specific Achievement of Project Objectives** 5.1.2.1 Product Structure 5.1.2.4 Accessories & Finishing **5.2 CONTRIBUTION OR IMPACT OF THE PROJECT** **5.3 IMPROVEMENT & SUGGESTIONS FOR FUTURE RESEARCH** **5.3.1 Product Structure** **5.3.4 Accessories & Finishing**	**64** **65** **65** **66**
LIST OF REFERENCES		**67-68**
APPENDICES		**14**

LIST OF TABLES

TABEL	TITLE	PAGE
3.1	GANTT CHART FOR RETS	33
3.2	LIST OF MATERIALS & EXPENDITURES	49

LIST OF FIGURES

FIGURES	TITLE	PAGE
1.1	SOFTWARE DEVELOPMENT TRENDS	16
2.1	EXAMPLE OF AUTOCAD 360	24
2.2	SPOTIFY DESIGN OF CALL-TO-ACTION BUTTON (CTA)	26
2.4	SOFTWARE DESIGNATION	29
2.5	XILNEX SYSTEM	30
3.1	PROJECT FLOW CHART	33
3.2	QUESTIONNAIRE SURVEY	34
3.3	QUESTIONNAIRE SURVEY	34
3.4	QUESTIONNAIRE SURVEY	36
3.5	PIRETO DIAGRAM	37
3.6	FUNCTION TREE	38
3.7	MORPHOLOGICAL MATRIX	38
3.8	PUGH MATRIX	39
3.9	LOANING BUTTON	42
3.10	CUSTOMER REGISTRATION	43
3.11	RECEIPT SECTION	44
3.12	SPECIFIC PART DRAWING OR DIAGRAM	45
3.13	OVERALL RETS FLOW	47
4.1	MAIN MENU OF RETS	50
4.2	SELECTION OF TOOLS	50

LIST OF SYMBOLS

%	-	PERCENTAGE
#	-	HASHTAG

LIST OF ABBREVIATIONS

RETS	-	Recorded Equipment & Tools System
PPE	-	Personnel Protective Equipment
RM	-	Ringgit Malaysia
DTAP	-	The Digital Transformation Acceleration Programme
CAD	-	Computer-Aided Design
CAE	-	Computer-Aided Engineering
FEA	-	Finite Element Analysis
CFD	-	Computational Fluid Dynamics
EDA	-	Electronic Design Automation
CTA	-	Call-to-Action

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
A	COVER PAGE OF PROJECT REPORT	1
B	TITLE PAGE OF PROJECT REPORT	2
C	REPORT ENDORSEMENT	3
D	CERTIFICATION OF ORIGINALITY & OWNERSHIP	4
E	ACKNOWLEDGEMENT	5
F	ABSTRACT	6
G	TABLE OF CONTENTS	7-9
H	LIST OF TABLES	10
I	LIST OF FIGURES	11
J	LIST OF SYMBOLS	12
K	LIST OF ABBREVIATIONS	13
L	LIST OF APPENDICES	14

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

This software is not new to this world. Many people are using many different types of software language to ease their work. The growth of computer systems and the development of computer functionality have led to a significant expansion in software development by using many languages. Software technology, such as workshop management software, makes people's jobs easier. Every day, as more individuals turn away from paperback books, technological systems are being upgraded.

Figure 1.1: Software Development Trends (https://www.softermii.com, Inc, n.d)

JavaScript is still #1 and far ahead of everything else, but it ended up with slightly below 50%, a drop from previous years. Java still came in second, but only ahead of TypeScript by a small margin. TypeScript blew up a couple of years ago, and it's still going strong. Python and C# are sitting at the fourth and fifth spot respectively with only marginal changes in percentage. (software-development-trends 2021). The statement indicates that JavaScript is the most popular language worldwide. This indicates that a large number of individuals are developing software using this language, including apps, novel recording data systems, and more. This indicates that an increasing number of software systems are gradually replacing the conventional modalities in people's day-to-day activities. The use of software systems has increased, particularly during pandemics. To work from home and store all of their work on the software system, a large number of industries and other working sectors also use the software. Since they don't want to misplace their hardcopy of a crucial business file. That is the location where the data recording happens.

As a result, every software has a significant data recording mechanism. Put another way, software for data recording systems makes it easier and more enabling for people to use and complete their tasks. In addition, millions of data recording programs exist worldwide. Tools Recorded System is one of the software programs. This system has many features in addition to being provided by record tools. This benefits every member of the

industry personnel, as the industry uses tools for their work and the tools themselves may be identified by their holders. The tools will be safer as a result.

1.2. PROBLEM STATEMENT

For an extended period to be safe to use and functional, every mechanism-based thing in this world requires maintenance. To do an inspection or maintenance, a highly skilled technician and engineer were required. In other words, they had to "borrow" tools from the storekeeper to perform an inspection or maintenance. A complete collection of tools is needed for any maintenance and inspection, such as spanners, Allen keys, and socket wrenches, to eliminate the need to visit the storekeeper repeatedly for each inspection or maintenance procedure. This turns into the primary cause of the hangar or workshop maintenance or inspection process's slowdown. This factor indicates that the previously set deadline is past due. This is due to the possibility that the engineer, technician, or mechanic will take their time while lending the storekeeper the tool or equipment they require for any necessary repair or inspection.

One common problem is that it might be difficult to accurately track the location and availability of tools when there is no effective system in place for tracking them. Requests for particular tools from clients can lead to inefficiencies and delays, which annoys both the facility and the patrons. The absence of an elaborate documentation process is another issue that might lead to misconceptions regarding the terms, conditions, and loan-related liabilities. Disagreements may result from this, damaging the facility's reputation. To address these problems, it is imperative to implement solutions including a robust tool tracking system, well-defined documentation processes, high priority for routine tool maintenance and inspection, improved customer communication channels, increased security measures, and improved return monitoring protocols. By resolving these problems, storage facilities can enhance the lending tool procedure, increase customer satisfaction, lower risks, and maintain a positive image in the industry.

1.3 PROJECT OBJECTIVE

1.3.1 General Project Objectives

- To design a digitalized logbook. This to avoid usage of logbook and also reduce the usage of paper and save the nature.
- To develop software that can store data securely. This to ensure that all the record need save securely.
- To demonstrate a system which can reduce time in a process. This is to ensure the borrowing time can be reduced.

1.3.2 Specific Individual Project Objectives

1.3.2.2 Product Mechanism

This project can easily operate with electronic devices. Furthermore, to operate this project with only uses 2 mechanisms specifically which is a laptop or computer and a barcode scanner.

1.3.2.3 Software and Programming

The best option to run this project successfully is to use C++ which has many advantages over others. The reason is because this coding language has many options on adding features compare to other language.

1.4 PURPOSE OF PRODUCT

The solution presented here is meant to decrease the workload for industry employees and owners who are lending out tools and machinery. On the flip side, there will be less need for new tools or any equipment and a decrease in tool loss. On top of that, the industry can lower the cost of logbooks by utilizing this method to decrease their utilization.

1.5 SCOPE PROJECT

1.5.1 General Project Scopes

To begin with, this programming can be used in any industry that has a store or warehouse, outside of aviation. This software's additional goal is to facilitate a business's ability to record and retrieve borrower data for predetermined uses and can reduce the time during the loaning process.

1.5.2 Specific Individual Scopes

1.5.2.1 Software / Programming

C++ is a pretty popular programming language these days. One of the big reasons is that it supports object-oriented programming well. It also integrates super smoothly with the. ET framework, which makes developing applications a lot more efficient. C++ is strongly typed too, which is great for ensuring code safety and reducing errors once programs are running. Having the types checked at compile time catches a lot of mistakes. It also has a massive community of developers using it. This means there's tons of resources and support available if you get stuck. Since C++ is mainly used with Windows, it plays nice on that platform which can be helpful for some projects. C++ is very scalable. This will allow the RETS project to grow and change as needed over time. The language will not get in the way as the project expands in size or needs to adapt to new requirements.

CHAPTER 2

LITERATURE REVIEW

2.1 GENERAL LITERATURE REVIEW

2.1.1 Software Industry in Malaysia

Malaysia's software sector was still in its infancy in the 1990s. The primary emphasis was on software creation for fundamental business requirements, with comparatively little knowledge of software engineering and programming. On the other hand, the software sector has grown and developed considerably in the 2020s. The number of software development firms has increased, and so has the depth and breadth of their knowledge in a variety of fields, including data analytics, cloud computing, artificial intelligence, mobile app development, and web development.

In addition, the government of Malaysia started initiatives to support the software industry's expansion after realizing its potential. In an attempt to draw in foreign investment, technology parks were established together with financial incentives. That ecosystem, though, was quite young. The Digital Transformation Acceleration Programme (DTAP) and the Malaysia Digital Economy Blueprint are two of the many programs the Malaysian government has launched to promote the software sector in the 2020s. With the help of these programs, the software sector hopes to expand even further through encouraging innovation, entrepreneurship, and the development of digital skills.

Moreover, Malaysia's software sector in the 1990s was largely centered on catering to the local market. There was comparatively little software export and outsourcing service offered. Nonetheless, outsourcing and software export have seen Malaysia become a major global player in the 2020s. Malaysian software enterprises service customers from all over the world, and the nation has developed a reputation for producing high-quality software. Competitive prices, a positive business climate, and the availability of qualified software specialists have all contributed to this expansion.

Aside from that, business applications were the primary emphasis of software development, and digital transformation was not a widely accepted idea. Nonetheless, companies in all sectors now consider digital transformation to be of utmost importance in the 2020s. Due to this, a large number of technological start- ups have emerged in Malaysia, using software solutions to challenge established business paradigms and deal with contemporary issues. The software industry has become more vibrant because of the success of startups in the e-commerce, finance, health, and other digital sectors.

Additionally, Malaysia had a restricted internet connection and inadequate technological infrastructure. Software development and deployment were made more difficult as a result. Though broad internet access and the adoption of cutting-edge technologies like 5G have occurred in the 2020s, there has been a notable improvement in the infrastructure of technology. The country's software-as-a- service (SaaS) offerings have grown and software solutions have been developed more easily as a result. Finally, there is no denying that between the 1990s and the 2020s, Malaysia's software sector grew significantly. With a strong emphasis on innovation and digital transformation, the industry

has grown more established, diverse, and export-oriented. This rise has been largely fueled by the backing of the Malaysian government and the availability of highly qualified workers.

2.1.2 Explanation of Workshop

A workshop is a special area set aside for collaborative or individual work on tasks that are frequently associated with a certain profession, skill, or field. It normally has all the resources, tools, and equipment needed to complete projects or hands-on labor. Workshops are found in many different areas, such as technology, manufacturing, automotive, building, and arts and crafts. Within a workshop, individuals partake in tasks like creating, fixing, creating, testing, or picking up skills. Workshops offer a practical learning setting where people can expand their knowledge, gain useful skills, and work with other professionals in their area. Workshop leaders can be specialists or teachers who walk participants through the exercises and offer explanations and examples. A workshop's objectives can change based on the situation. It can be utilized for team building, issue solving, creative exploration, skill development, training, and even as a place for professionals to meet and share ideas. Workshops frequently promote contact, active engagement, and hands-on learning.

2.1.3 Types of Engineering Software

1. The first tool used to create and alter digital models of real-world objects or systems is computer-aided design (CAD) software. Engineers can create 2D or 3D models of parts, structures, machinery, or entire systems with their assistance. With CAD software, engineers can examine designs before implementation thanks to its drafting, visualization, and simulation tools. SolidWorks, AutoCAD, and CATIA are a few popular CAD programs.

2. Computer-Aided Engineering (CAE) Software: Engineering designs and Vsystems are simulated, analyzed, and optimized using CAE software. It enables engineers to test and assess the functionality, robustness, and behavior of electrical, mechanical, fluid, and structural systems. Finite element analysis (FEA), computational fluid dynamics (CFD), and structural analysis are just a few of the areas that are covered by CAE software. A few well-known CAE programs are COMSOL, Abaqus, and ANSYS.

3. Software for Electronic Design Automation (EDA): EDA software is used for the design, analysis, and testing of electronic systems. Electronic systems, printed circuit boards, and integrated circuits (ICs) are all developed with its help. SIGINT analysis, layout design, circuit simulation, and schematic capture are all supported by EDA software. Cadence, Altium Designer, and Mentor Graphics are examples of well-known EDA software.

4. GIS software is used to organize, analysis, and visualize spatial and geographical data. It is also known as geographic information system software. For projects like urban planning, infrastructure design, environmental evaluation, and site selection, it helps engineers to combine and interpret geographic data. Geospatial modeling, data visualization, spatial analysis, and mapping are all made possible by GIS software. ArcGIS, QGIS, and MapInfo are a few popular GIS programs.

5. Software used for Manufacturing and Process Simulation: Production systems and manufacturing processes can be optimized and simulated using this kind of software. Engineers can use it to create effective workflows, examine production lines, and assess how various factors affect the production process. Production scheduling, resource allocation, and process optimization are all made easier with the use of manufacturing and process modeling tools. A few examples are Flex Sim, Simul8, and Siemens Tecnomatix.

6. Project Management Software: Engineering projects are planned, scheduled, and monitored using project management software. It helps engineers with work management, resource allocation, progress monitoring, and teamwork. Tools for Gantt charts, task dependencies, resource management, and document sharing are all included in project management software. Asana, Trello, and Microsoft Project are a few popular project management programmes.

7. Finger CAD - Finger CAD is a technical drawing computer-aided design program. You can sketch virtually anything in the same manner as you would on a desktop computer, including buildings, bridges, mechanical parts, and geometric objects.

8. AutoCAD 360 - The official AutoCAD app, this app lets engineers view, edit, and share DWG drawings. You can annotate and revise drawings while on location in the field, in meetings or out of the office, then share your genius ideas with others.

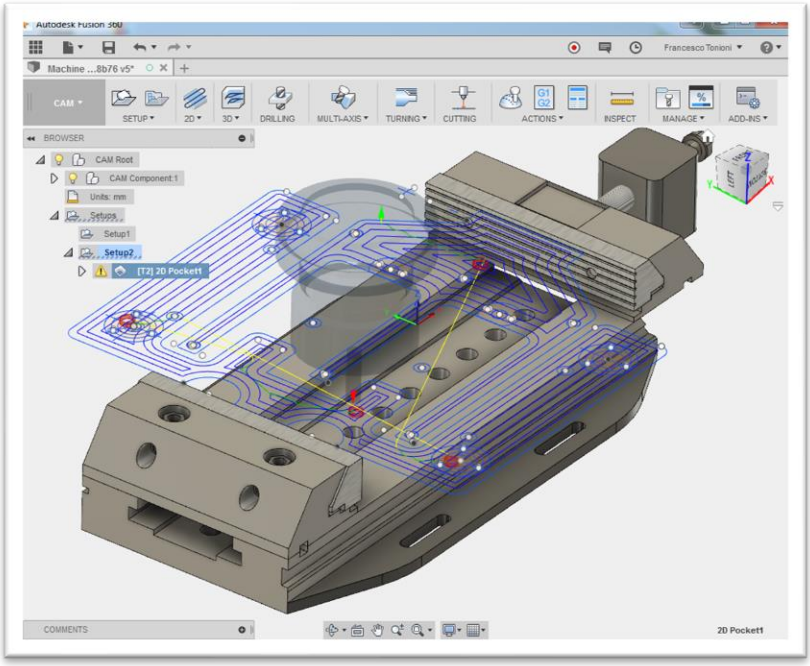

Figure 2.1: Example of AutoCAD (https://www.autodesk.com/, Inc, September 25, 2017)

2.2 SPECIFIC LITERATURE REVIEW

2.2.1 Introduction Layout

A platform for executing additional software applications is provided by system software, which also maintains and controls the computer hardware. System software includes things like utility programs, device drivers, firmware, and operating systems (including Windows, macOS, and Linux). System software is essential to resource management, improving hardware-software connection, and maintaining a computer system's smooth operation. Moreover, software engineering, which includes designing, creating, testing, and maintaining programs, is the process by which software is developed. Writing code in programming languages such as Python, Java, C++, and many more can be done by individuals, groups, or software development organizations. Problem-solving abilities, programming concepts, data structures, and algorithmic understanding are necessary. Furthermore, there are several ways that software can be distributed: as pre-installed software on devices, as physical media like CDs or DVDs, or as downloadable files. Updates and patches are frequently made available to fix security flaws, add new features, and enhance functionality. the tool names, the template design, the introduction page for this Recorded Equipment and Tools system, and the images that will be utilized. Almost all app introductions have a Call-to-Action (CTA) button that prompts users to either log in or create a new account before going into the full software description.

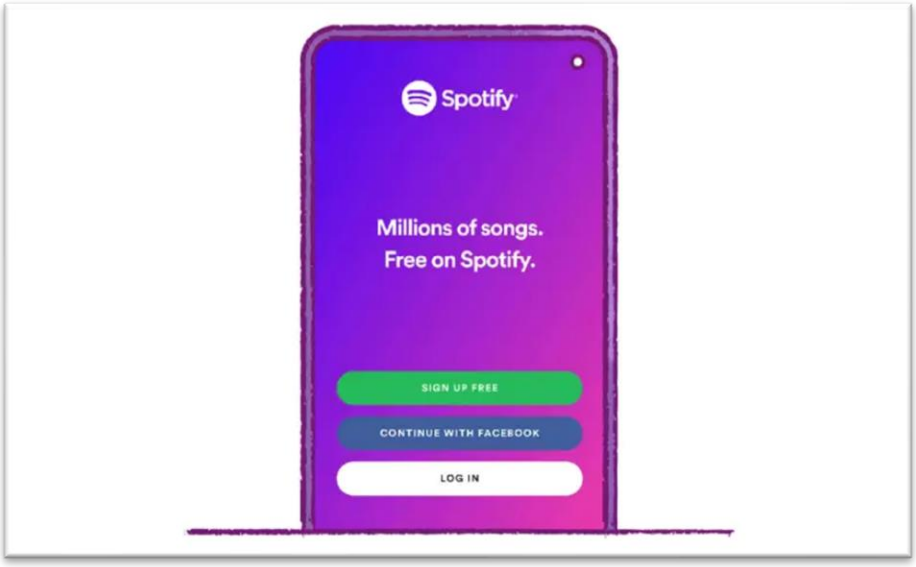

Figure 2.2: Spotify design of Call-to-Action button (https://clevertap.com/, KC Karnes, n.d)

2.2.2 Product Mechanism

The term "workshop tools" describes a group of tools, machinery, and apparatus used for a variety of human and mechanical operations performed in a workshop or other comparable environment. These tools are made especially to help people with jobs, like metallurgy, woodworking, auto repairs, assembling electronics, and general maintenance and repair. A workshop's supply of tools can include power equipment like drills, saws, grinders, and sanders as well as hand tools like pliers, wrenches, screwdrivers, and hammers. In a workshop setting, they are necessary for carrying out accurate and productive tasks that allow people to build, fix, or alter materials and items. Considering this, the RECORDED EQUIPMENT & TOOLS SYSTEM will undoubtedly assist in identifying the kind of items given as well as the individual accountable for them. It will also enable industry personnel to loan out additional tools and equipment, all of which will be safe.

2.2.1 Software / Programming

We provide downloading the software as one method of opening it. It will ask users to register and log in to their own company accounts after they access the apps. It will then go directly to the home screen, where the document and all the app's capabilities are available. after the users' account login. A description of tools together with tool figures will be displayed on the home page. Following that, users will be able to record the date of loaning and the day the system was in open mode by using the calendar feature on the home page. After that, users can immediately fill up a pop-up window by clicking the "+" button on the relevant date.

Following that, there will be a feature called "loan" on the left side of the software. This function is crucial to the operation of the system. This feature allows you to store data on the person lending the tools and the kind of tools in a table style. At the end of the table, there are two boxes labelled IN and OUT as well as PCS. While it only opens once, this feature can allow employees to keep information indefinitely. As a result, many employees may be able to borrow tools after using the same feature. In addition, it displays the current state of the tools as well as the number of tools that have been borrowed.

Beyond that, there is another function in this software called HISTORY, which will display the loaner's past as well as the tools, computers, and other equipment that they have borrowed. Furthermore, following the barcode scan, this system will automatically fill up the first column. Subsequently, the system holder must manually complete the quantity (PCS) and IN OUT columns. Aside from that, the information about the tools, such as their size, serial number, and calibration date, will automatically fill the table because the information is contained within the barcode, and the equipment administrator only needs to manually complete the part number.

Lastly, users merely need to select the "Account Information" area and update their information by reentering their data there. Users may save their information by clicking the "save and confirm" button after confirming that the information is correct. Users merely need to click the "exit" part of the programme to terminate it; a pop-up window will then appear asking them to select "yes" or "no." The apps will wait if you choose yes, and the homepage will appear if you click no.

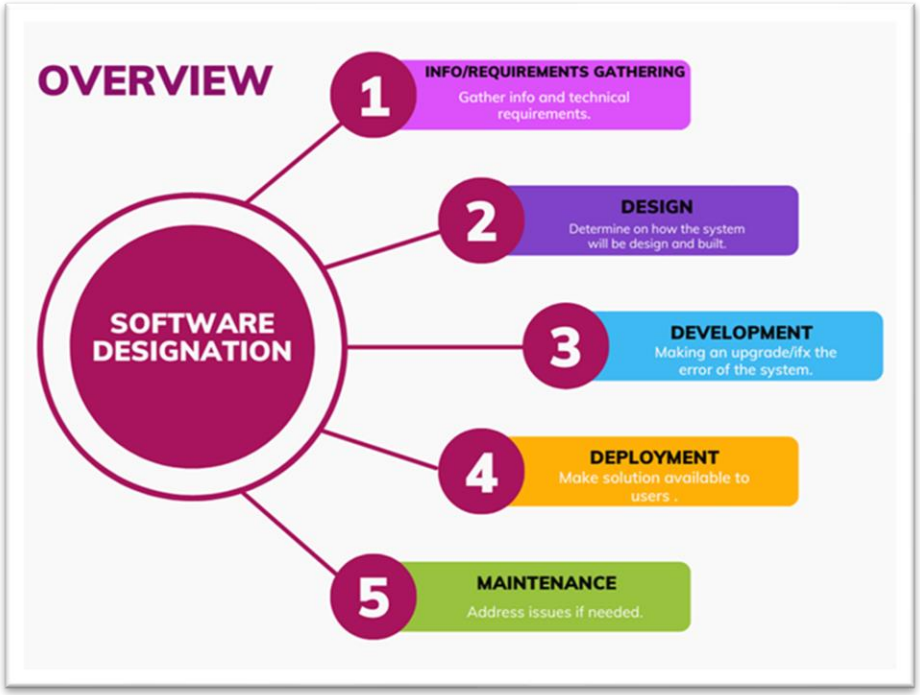

Figure 2.4: Software Designation (https://www.biggerplate.com**. Inc, n.d)**

For the apps to work well, there are a few factors that need to be considered for the software classification. Of course, the initial stage in software categorization is to collect data about the apps we plan to develop. gather information and technical requirements for a guideline. Then, every app needs a strong design to attract users or clients. Making decisions on how a system will be created and designed is the process of design. After that, creating apps requires understanding how to make them more user-friendly. Upgrades to the system and bug fixes are examples of development. Subsequently, deployment guarantees that users can obtain the solution and utilize the applications to enhance their education. Finally, since mistakes will eventually happen and we must correct them when needed, maintenance is essential.

2.3 REVIEW OF RECENT RESEARCH AND RELATED PRODUCT

2.3.1 Recent Market Products

Figure 2.5: Xilnex system(https://www.eisol.net Inc. n.d)

2. 4 COMPARISONS BETWEEN RECENT RESEARCH AND CURRENT PROJECT

This system enjoys strong global marketing and is highly well-liked by the entire industry. Moreover, there are similarities between our system and this system. However, our system has certain benefits and is designed for a particular industry that uses tools and equipment. Furthermore, unlike our system, which can safely store data on a computer or laptop, the above system typically stores data using receipt forms. In addition, the system mentioned above has a single feature called bill processing. To contrast, our system has the ability to issue bill forms for the replacement of tools or equipment and store staff data.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 PROJECT BRIEFING & RISK ASSESSMENT

In this chapter, we will be briefing about our project and various steps to make it successfully work and be used for everyone to achieve our goal. During this course, a lot of stages were involved in our process of making this software such as coding, designing, editing, and testing our product. Even though our product is software and does not involve using any machine, it is still having its difficult to create it and all safety precautions need to be followed to avoid any unnecessary event happening.

3.2 OVERALL PROJECT GANTT CHART

3.2.1 Gantt Chart for RETS

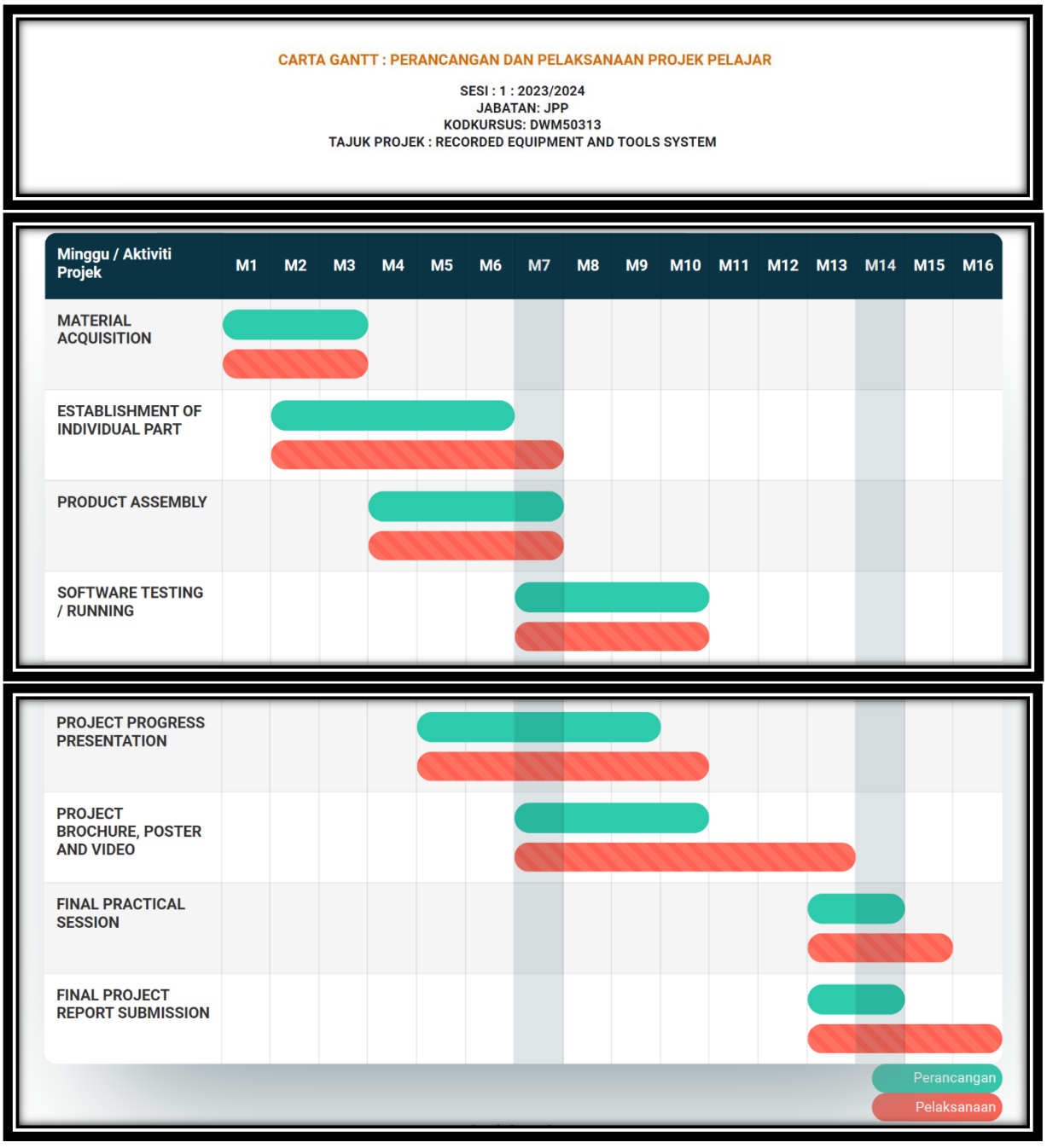

Table 3.1: Gantt Chart for RETS

3.3 PROJECT FLOW CHART

3.3.1 Overall Project Flow Chart

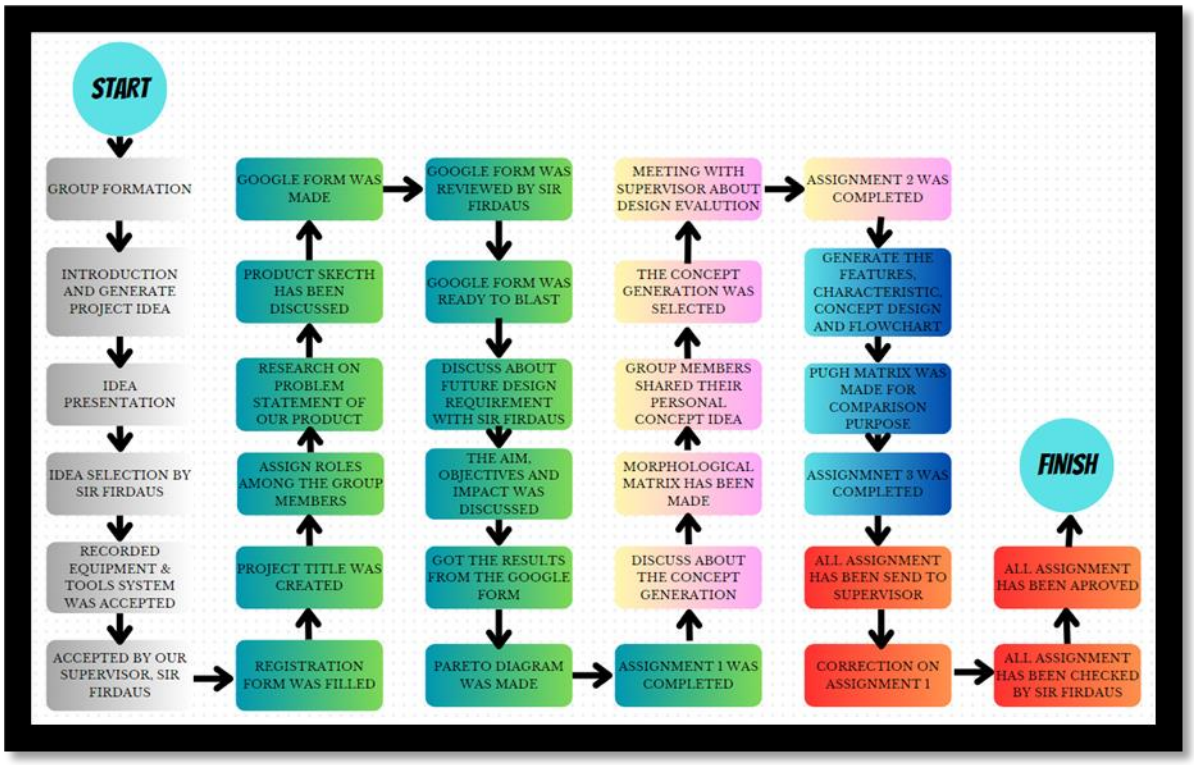

Figure 3.1: Project Flow Chart

3.3.2 Specific Project Design Flow/ Framework

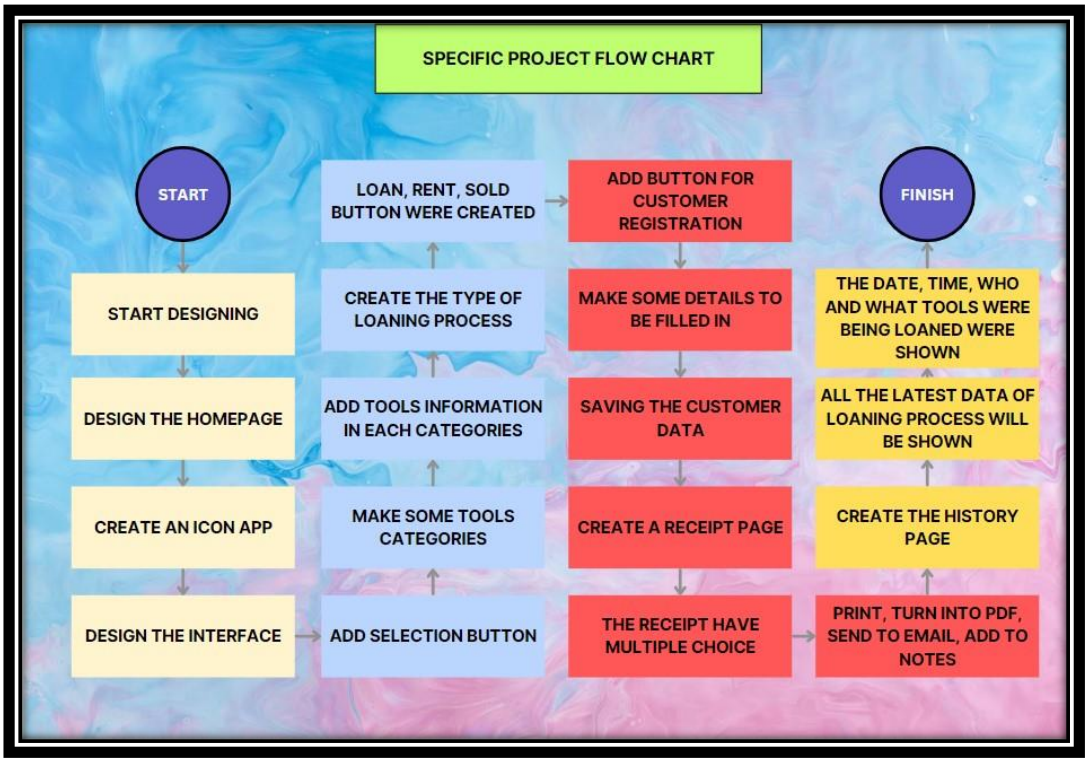

Figure 3.2: Specific Project Flow Chart

3.4 DESIGN ENGINEERING TOOLS

3.4.1 Design Requirement Analysis

3.4.1.1 Questionnaire Survey

A questionnaire is a research tool that consists of a series of questions designed to elicit information from respondents via survey or statistical analysis. A research questionnaire is often composed of both closed-ended and open-ended items.

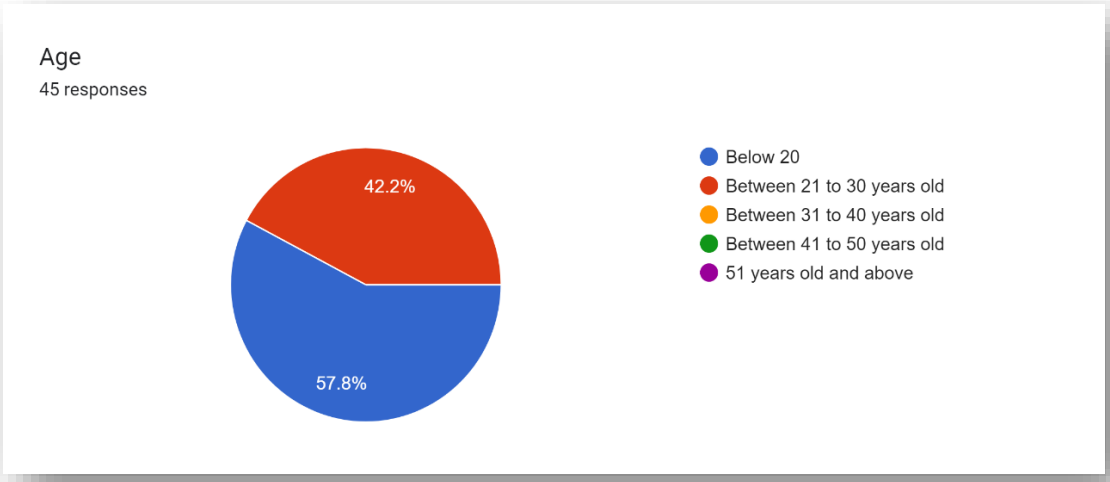

Figure 3.2

This is the example data from our questionnaire by using Google form. Our respondents were majority below 20 years old but minority were between 21 to 30 years old. Our target is achieved which is to get over 40 responses.

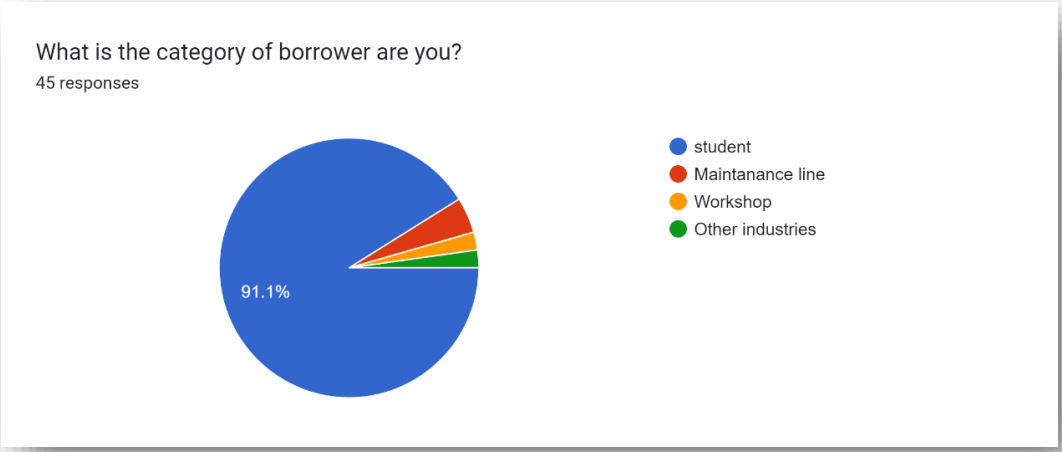

Figure 3.3

Based on the charts, it is clear that most of our respondents are students but not just from our polytechnic, some of them also from another institute. There are also people who work at maintenance line, workshop, and other industries.

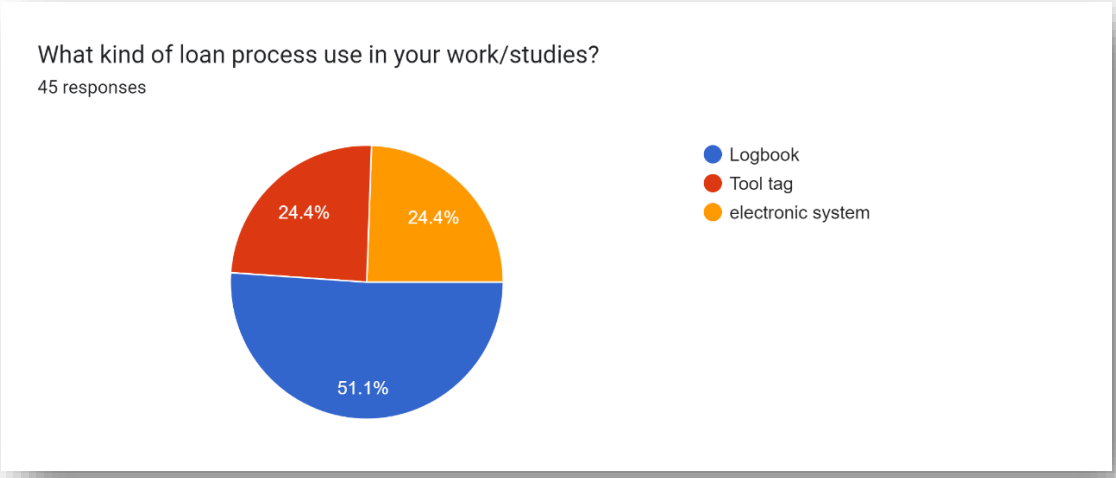

Figure 3.4

Based on our survey, our loaning process still using logbook for loaning tools. It will take quite a long time for a person to loaning tools. The percentage for the logbook to be lost and damaged is high. So, our project is to computerized this system which will save more time and the data is securely stored.

3.4.1.2 Pareto Diagram

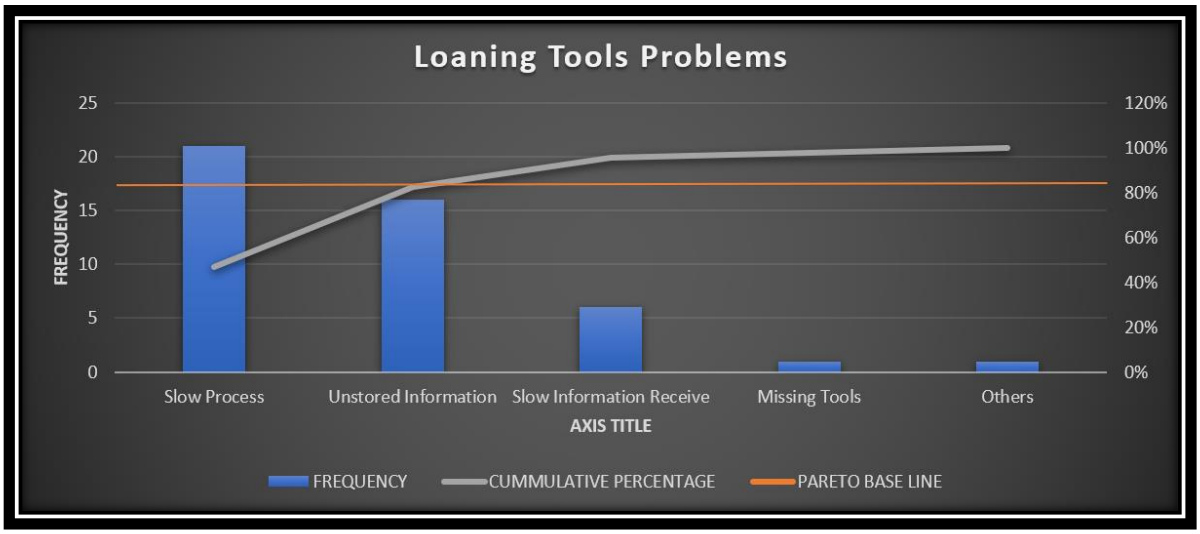

Figure 3.5: Pareto Chart

By referring to the pareto chart, we can conclude that the main reason why the loaning process is not unsatisfactory is the slow process during loaning any tools. The reason was the logbook need to be written by hands which took a lot of time. Next, the stored information was not secure. They could be gone anytime without any backup files. The last possible reason was the tools could be missing and we cannot remember who was borrowing it last time.

3.4.2 Design Concept Generation

3.4.2.1 Function Tree

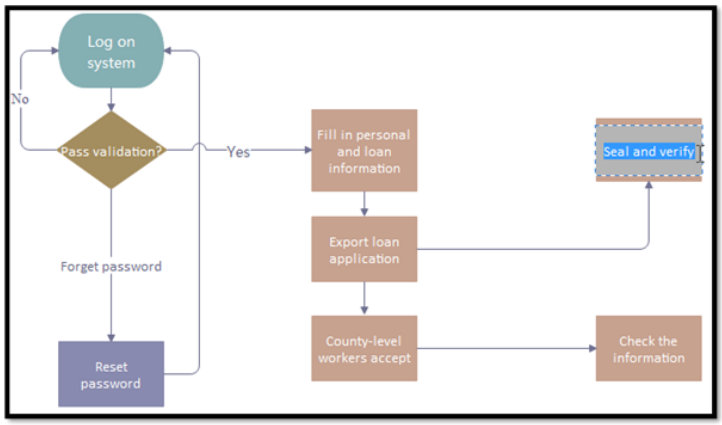

Figure 3.6: Function Tree

3.4.2.2 Morphological Matrix

	OPTION 1	OPTION 2	OPTION 3
FONT	*CALIBRI* (body)	*Century Gothic*	*ARIAL*
THEME	DARK	COLORFUL	LIGHT
DIAGRAM	2D	3D	2D
SOFTWARE	C++	JAVA	PYTHON

Figure 3.7: Morphological Matrix

These are the options that we provided and each one has different characteristics. So, after all possibility that we could though, the best choice is the option 1.

3.4.3 Evaluation and Selection of Conceptual Design

3.4.3.1 Pugh Matrix

CITERIONS	FACTOR	CONCEPT 1	CONCEPT 2	CONCEPT 3
COST	0.2	**D**	1	1
DESIGN	0.3	**A**	6	5
TECHNOLOGIE /SOFTWARE	0.5	**T** **U**	4	5
TOTAL SCORE	1.0	**M**	2.2	2.0
RANKING		1	2	3

Figure 3.6: Pugh Matrix

After survey all concept that we made, we decided to choose concept 1 as our datum for our project. It has the best ranking among the others.

3.5 PRODUCT DRAWING AND SCHEMATIC DIAGRAM

3.5.1 General Product Interface Layout

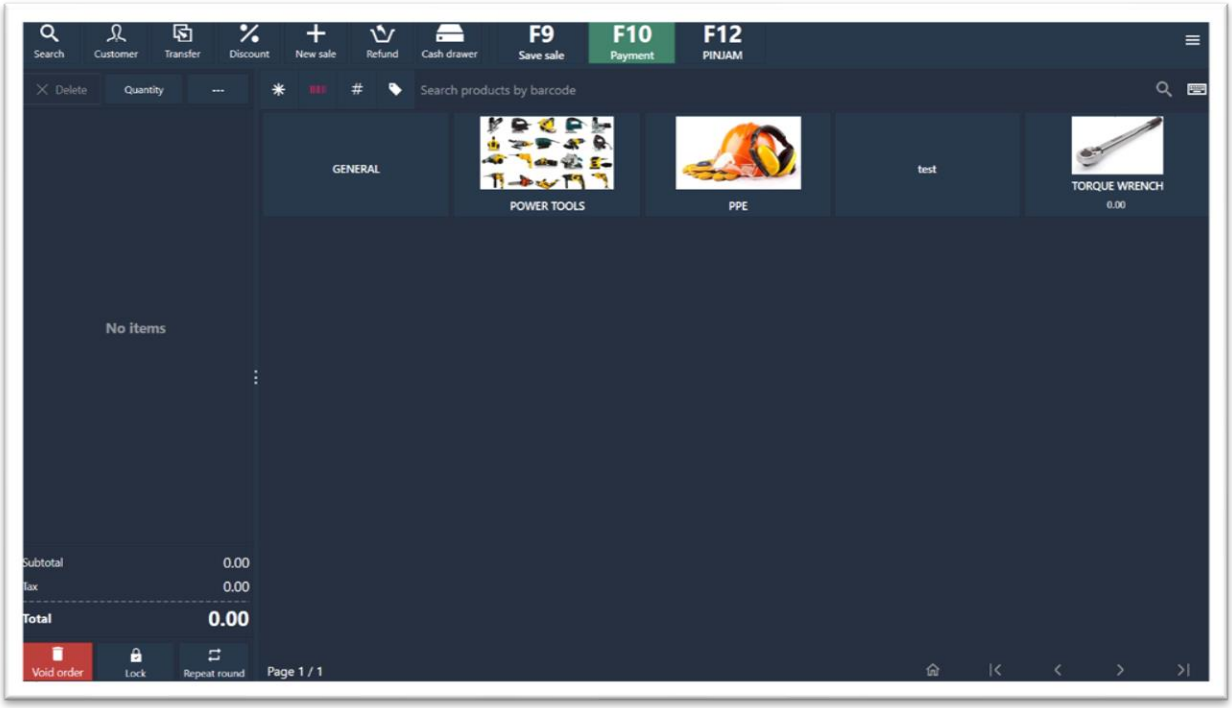

Figure 3.7: General Product Interface Layout

When logging into our app, this is the interface that will come out. You can see there are various categories of tools that can be selected. Some of the categories are general tools, power tools, Personnel Protective Equipment (PPE), and torque wrenches. These tools can be selected to be borrowed, rented, or sold.

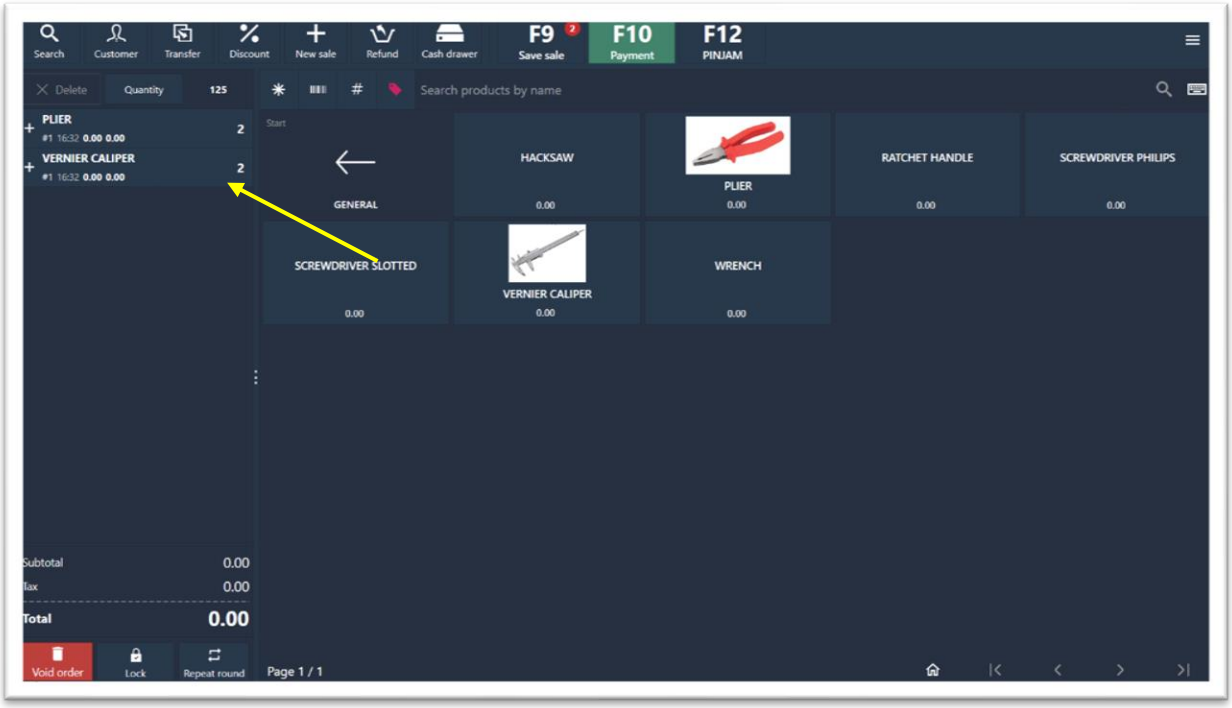

Figure 3.8: Types of tools

After you selected any categories of tools before, now choose what kind of tools you want to borrow. If you need more than one, then click again on that tool. Then, if there are any other tools that you want, just click on them.

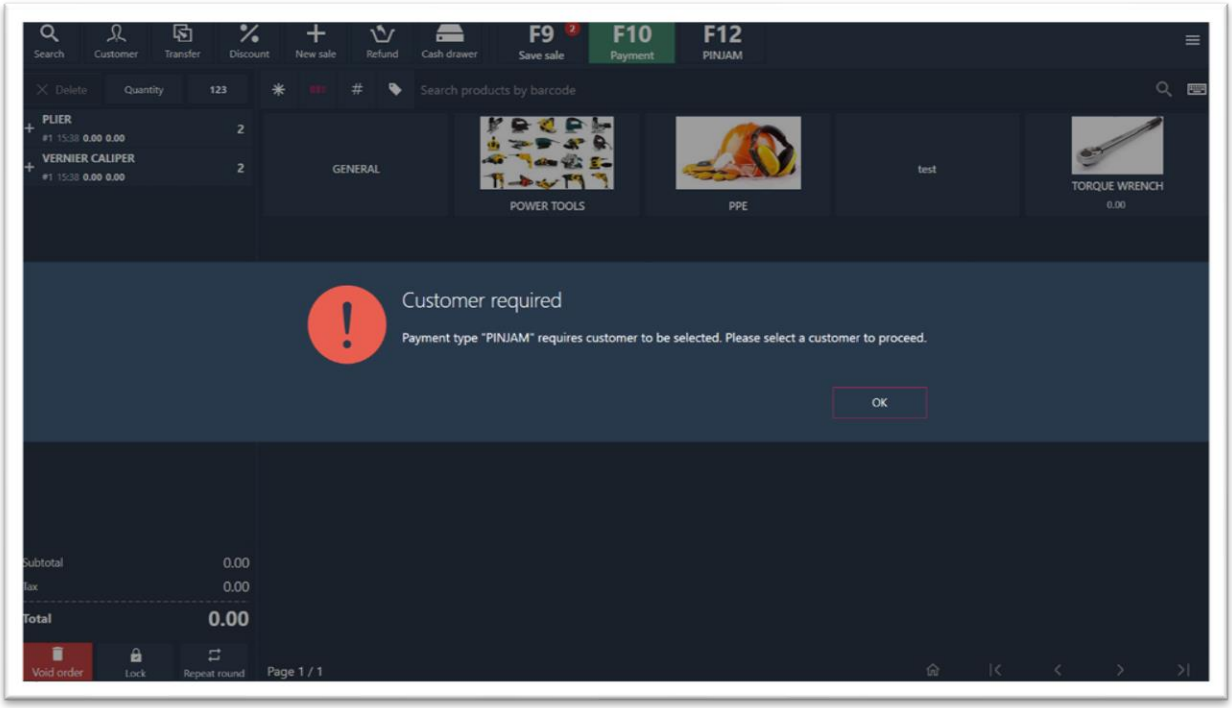

Figure 3.9: Loaning Button

Next, click on the loan button for the loaning process. If you want to buy or rent, this app also can do that.

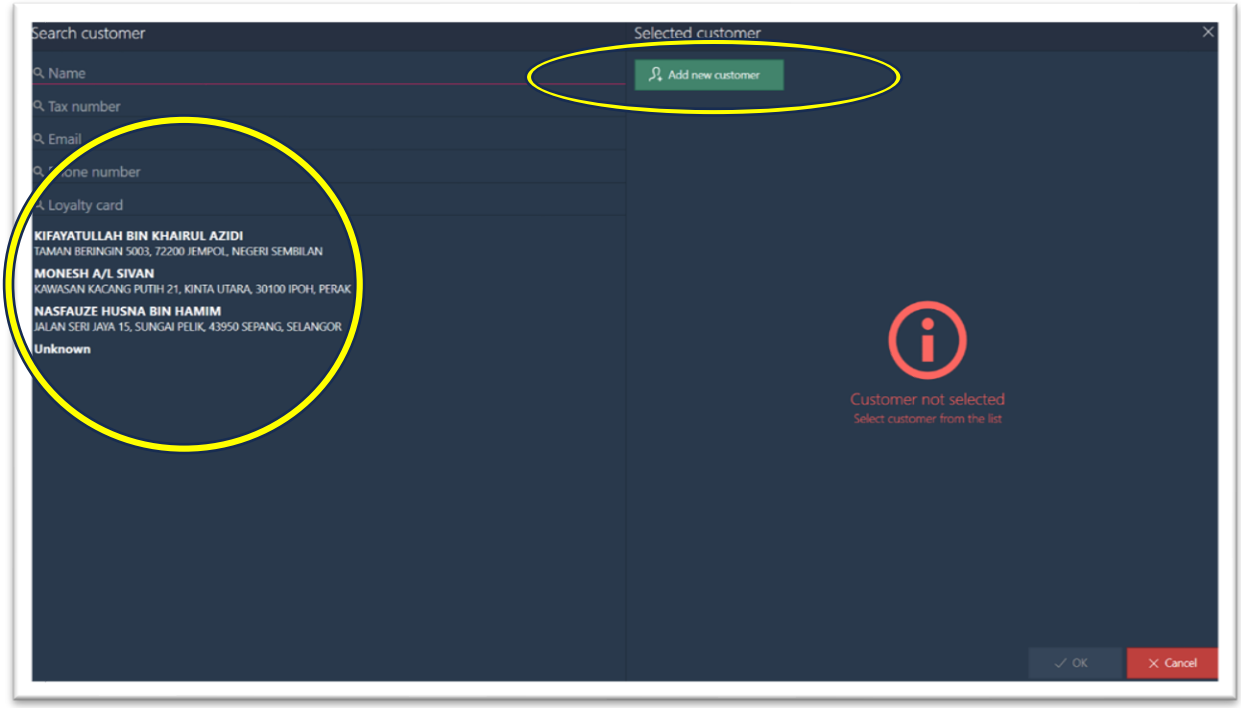

Figure 3.10: Customer Registration

Then, choose the person who wants to borrow the tools. If the staff member is already been registered, his name will appear on the screen. For a new staff member, they need to register first by filling in some details so their data can be saved to the system and save time.

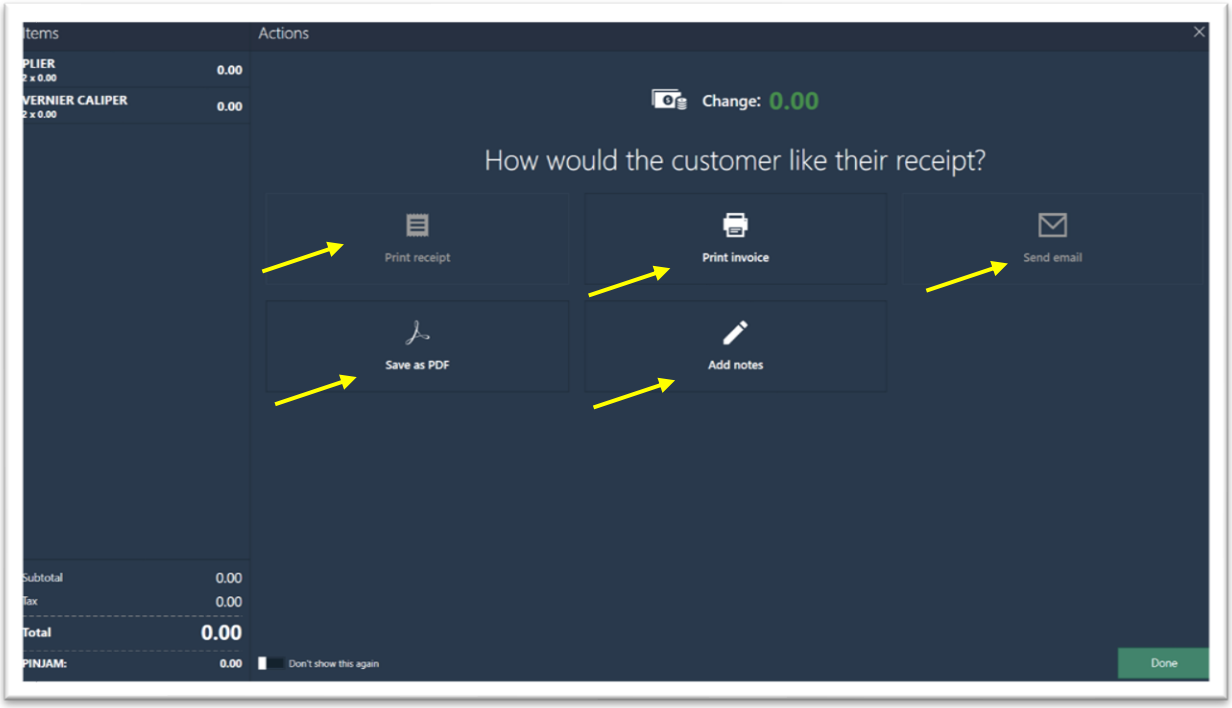

Figure 3.11: Receipt Section

This is the last part of the loaning process and as you can see on the screen, the receipt can be done to various things such as print it, save it to a PDF file, and it can also send it to your email. Worry about the data will be lost? Do not worry, you can save it directly to your laptop file.

3.5.2 Specific Part Drawing/Diagram

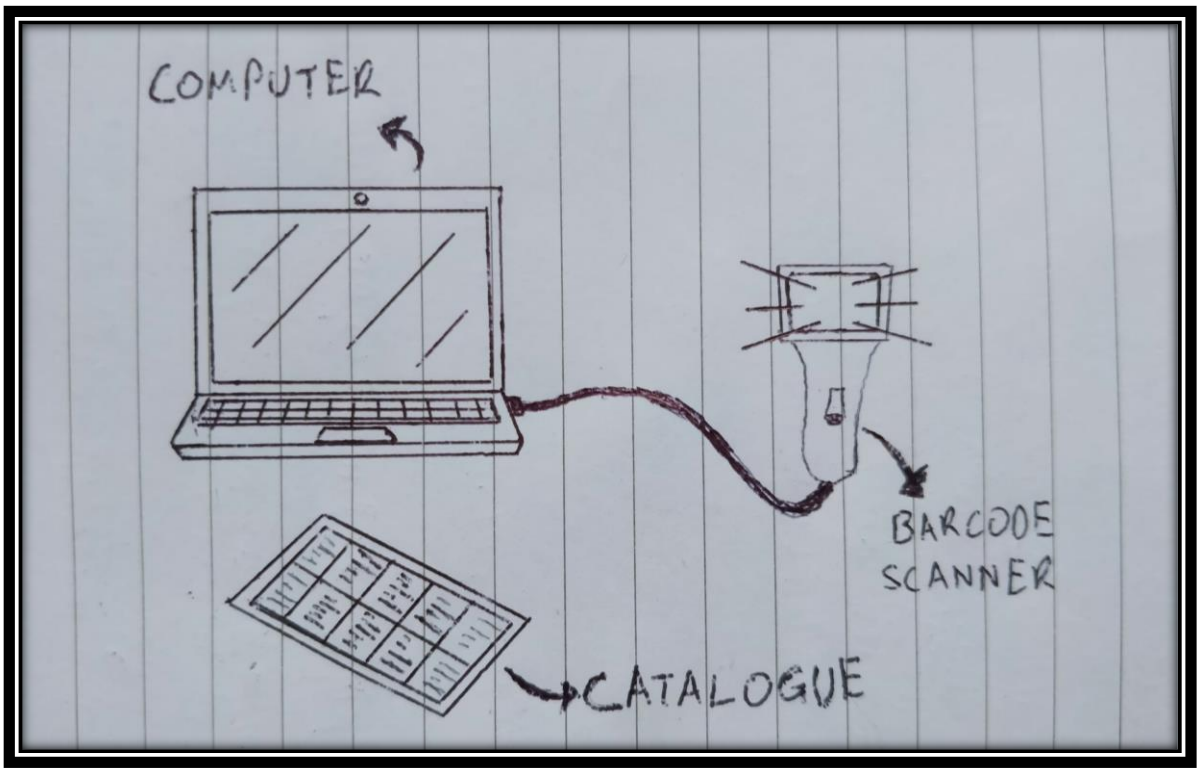

Figure 3.12: Specific Part Drawing/Diagram

3.7 DEVELOPMENT OF PRODUCT

3.7.1: Material Acquisition

MATERIAL	DESCRIPTION
	A platform for coding in our app. This type of language makes it easier to manipulate code than other languages. The compilation and execution time of C++ is much faster than others. Other than that, this type of language is rich in library support which means it has many functions available to help write code quickly.

3.8 PRODUCT TESTING / FUNCTIONALITY TESTS

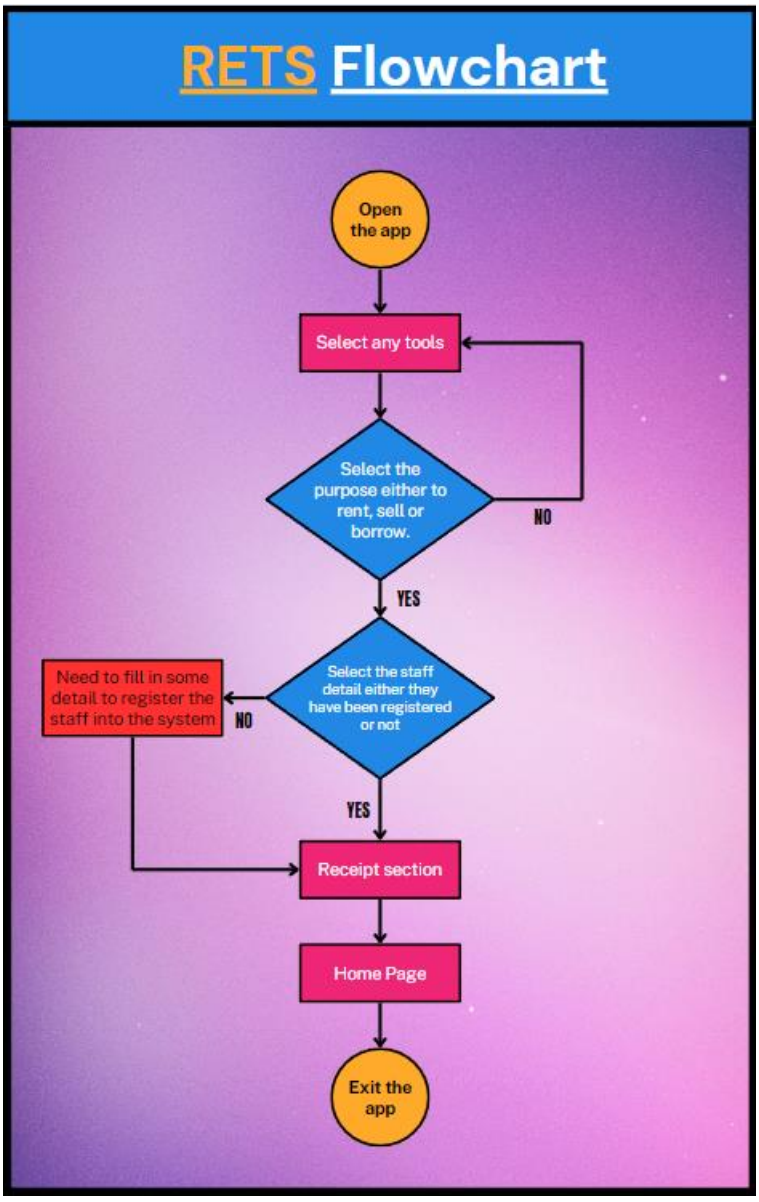

Figure 3.13: Overall RETS flow

3.9 LIST OF MATERIALS & EXPENDITURES

3.7.1 Material Acquisition

No.	Items	Units	Price/Unit	Total (RM)
1	Barcode Scanner	1	RM44.00	RM44.00
GRAND TOTAL				**RM44.00**

Table 3.2: List of Materials & Expenditures

CHAPTER 4

RESULT & DISCUSSION

4.1 PRODUCT DESCRIPTION

4.1.1 General Product Features & Functionalities

Our product can bring significant improvements in efficiency and productivity. By eliminating the need for paper logbooks, our system can streamline the lending process of tools and equipment. It can also provide real-time accessibility to logbook data, making it easier for aviation personnel to track and manage equipment usage. Additionally, this product also come out with a feature which is other companies also can loan the tools or equipment for a long time and all the detail will be recorded. These functionalities can enhance safety management and support predictive maintenance in the aviation industry.

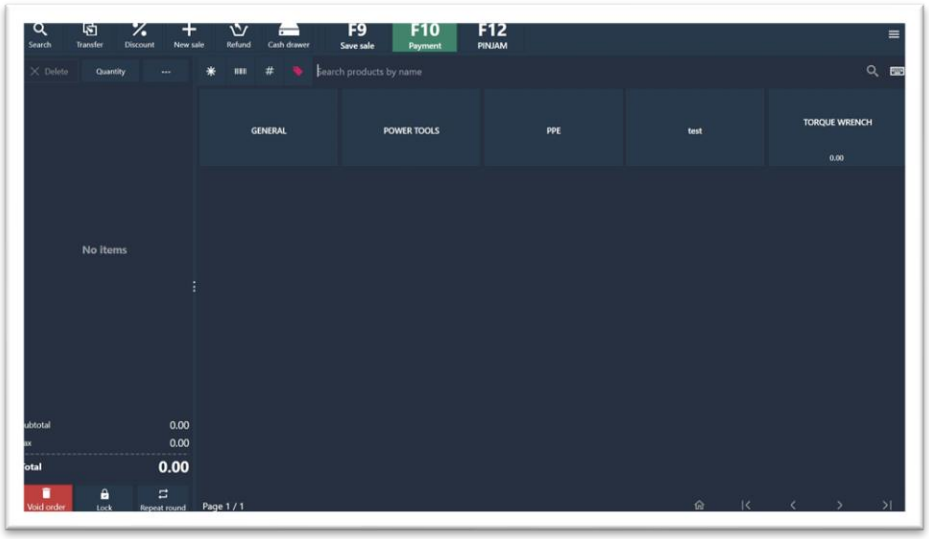

Figure 4.1: Main Menu of R.E.T.S

4.1.2 Specific Part Features

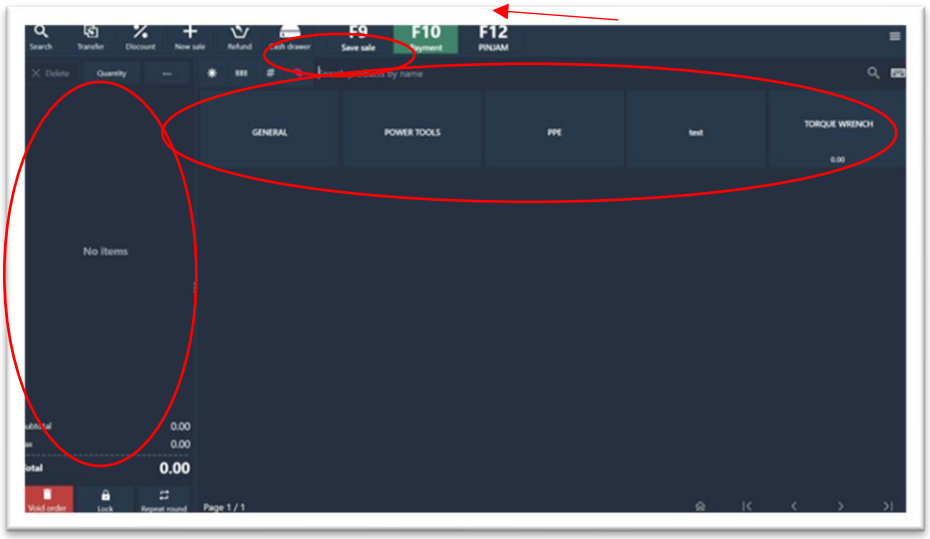

Figure 4.2: Selection of tools

4.1.2.1 Product Structures

The Recorded Equipment & tools System offers a new digitalized system that can hasten the loaning process of tools and equipment and also can be use by other industries other than aviation that have tools cribs and warehouses. These systems will be very useful to companies that usually face the problem of missing tools and data of current borrowers are not secure.

1. **Search Product by Name:**

This feature is where the storekeeper can search name of the tool by name, there also many other ways to search the tools or equipment which is by scan barcode that been edit or barcode that have been generate by the system itself.

2. **List of Tools and Equipment**

On the main menu, users can browse to select tools or equipment that want to be lent also it also can be categorized within its category such as general tools, PPE, and power tools. This column also can be added based on the tools and equipment that the company has.

3. **Selected items**

After the items have been selected, it will be displayed on the left of the main menu as well as the quantity of the items. After that, the select items also can be canceled by clicking the button on the bottom of the square which is void order.

4. **Lending button**

Lastly, after select all tools and equipment user need to click the lending button then will go straight to the borrower option which is there will be option if the borrower has lent before their name will appear on the screen also, they will be an option to add new borrower for new comer.

4.1.2.2 Product Mechanism

The Recorded Equipment & Tools System is a combination of technology and data management to deliver its functionality. There is common product mechanism for this system included:

1. **User Interface**

Our system has a user interface that is simple to use and easy to understand. Our UI represents our understanding of how important it is to give our users a smooth experience. Users may easily browse our system and execute activities without misunderstanding or irritation thanks to its easy navigation, clear and concise labels, and visually appealing design features. Our objective is to create a user interface that is both aesthetically pleasing and practical, making it simple for users to access the features and functionalities they require. The user interface of our system will make your interactions easy and fun regardless of your level of experience.

2. **Backend infrastructure**

RETS system's backend infrastructure is robust and efficient, guaranteeing smooth operations. The backend is designed to handle heavy loads and process data accurately and quickly. My system's scalability allows it to grow and adapt to changing requirements without compromising functionality. The highly secure backend design protects critical data, and you can be sure that your users' privacy and confidentiality are respected. RETS

system's solid base enables it to offer clients stable, top-notch services that enhance their overall experience.

3. **Tools & Equipment Search Bar**

A search bar designed to provide users with an easy and efficient way to search. The search bar's simplicity and ease of use allow people to find the stuff they're looking for quickly. Users can easily access it because of its strategic placement in a well-trafficked region. The search bar also features a search icon to increase its visibility and usefulness. Users may quickly type their search queries and receive relevant results thanks to placeholder text, barcode reader, and code reader. Furthermore, users on different devices will always have a consistent experience thanks to the search bar's user-friendly design.

4. **Staff List and Registration**

A simple and easy-to-use registration feature is part of our system. With the simple registration process, new users can set up an account and start using it right away. Clear instructions and prompts are provided by the user-friendly interface to assist users in completing the necessary steps. Additionally, the system ensures a secure registration process by safeguarding user data with robust encryption and privacy controls. With this simple and useful registration feature, users can quickly sign up and utilize all the features on our platform.

4.1.2.3 Interface Layout

The layout of the interface is intended to be simple and easy to use. It improves the user experience overall, is aesthetically pleasing, and is well-organized.

This included:

1. App Icon

Users are easily drawn in by the striking, simple design of the RETS app icon. Its clean, minimalist design makes it stand out in an ocean of disorganized icons. The tasteful and sophisticated color scheme and crisp lines immediately catch the eye. The ease of use of the system is reflected in the icon's simplicity, which offers a hassle-free and straightforward experience. Its subtle charm adds a delightful touch to any device as it blends in seamlessly with the user's home screen. The RETS app icon represents the system's commitment to usability, practicality, and aesthetic appeal.

2. Main Menu Layout

The intuitive main menu layout of the user-friendly RETS system ensures smooth navigation. A seamless user experience is produced by carefully thought- out interface design. With its straightforward, minimalistic design, RETS presents simplicity at its best. The options on the main menu are clear and concise, making it easy for users to locate and access the desired features. RETS's simple main menu layout makes it a popular choice for users seeking efficiency and simplicity. It guarantees a hassle-free and enjoyable experience for all users, regardless of their level of experience.

3 Secure Data Able to Convert

The cutting-edge setup and the smooth import and export features of RETS are made possible by its incredibly safe database. With RETS, users can easily transfer their data between multiple platforms and systems, ensuring greater flexibility and convenience. The system's database's easy conversion from hard copy to soft copy enables users to access and manage their information more efficiently and quickly. This feature enhances data security and streamlines data management processes. Because it offers users a seamless and secure data experience, RETS is an essential tool for the modern world.

4 Responsive Design

The cutting-edge setup. The smooth import and export features of RETS are made possible by its incredibly safe database. With RETS, users can easily transfer their data between multiple platforms and systems, ensuring greater flexibility and convenience. The system's database's easy conversion from hard copy to soft copy enables users to access and manage their information more efficiently and quickly. This feature enhances data security and streamlines data management processes. RETS is an essential tool for modern businesses because of its capacity to give users a seamless and safe data experience.

5 Accessibility Features

The RETS system's responsive design ensures a seamless user experience across a variety of screens and devices. Its layout adapts dynamically to the screen, providing optimal functionality and readability. Reachable via a desktop, tablet, or smartphone, RETS offers a consistent and intuitive user interface. Its responsive design not only improves the system's visual appeal but also increases user efficiency by making it easy to access the features and functionalities while on the go. Users can take advantage of a smooth and hassle-free experience with RETS regardless of the device they select to use.

4.1.3 General Operation of Product

The RETS system, an updated tool and equipment logbook system, is transforming how businesses handle their resources. This system makes tool and equipment management simple with its intuitive interface and many features that boost productivity. RETS maximizes efficiency and makes record-keeping easier by streamlining the procedures for choosing tools and equipment, registering borrowers, and securely storing data. This thesis will examine the various advantages that the RETS system offers to organizations as well as how it operates.

Choosing the required tools or equipment is the first step toward using the RETS system. This can be easily accomplished thanks to the user-friendly interface, which also provides a comprehensive inventory of all the available resources. After selecting the required tools, users can proceed to the borrower registration process. If a user has previously borrowed tools, all they have to do is click on their name to get their information back. However, if a user is utilizing the system for the first time, they will need to register and fill out all the required fields, such as their name, contact information, and any required forms of identification.

The RETS system's ability to securely store borrower data is one of its main benefits. Authorized personnel have easy access to a centralized database containing all borrower information, including registration details and borrowing history. By doing this, it is guaranteed that borrower records will always be accessible for review or examination. Strong data management features in the system enable users to swiftly search for and retrieve particular borrower information. This simplified method of data storage lowers the possibility of data loss or misplacement considerably and does away with the need for manual record-keeping.

The RETS system offers the capacity to store borrower data in both digital and physical formats. Users have the option to store data in softcopy formats, such as PDFs or spreadsheets, which facilitate data sharing, backup, and access across various devices. This digital storage solution makes data more accessible and fosters teamwork. Additionally, for companies that still prefer traditional record-keeping methods, the system allows hardcopy creation. It is possible to create physical copies of reports and summaries that can be stored in file cabinets or real logbooks by printing them.

Ensuring data security is crucial for any logbook system. RETS implements strict security measures to address this concern. Encryption techniques are employed by the system to safeguard confidential borrower data against any unauthorized access or breaches. Additionally, access controls are in place to guarantee that data can only be viewed or modified by authorized personnel. By placing a high priority on data security, RETS gives its users peace of mind by guaranteeing that their important data is secure.

The RETS system offers a user-friendly interface, fast borrower registration, secure data storage, and customizable data-saving options, thereby revolutionizing the management of tools and equipment. With RETS's emphasis on productivity and data security, organizations can simplify record-keeping, increase efficiency, and streamline operations. By putting the RETS system into place, organizations can streamline their resource management processes and focus on their core competencies instead of worrying about the intricate details of tool and equipment administration.

4.1.4 Operation of the Specific Part of the Product

The objective of this project is to improve efficiency and accuracy by optimizing the R.E.T.S. inventory management module's operation. The project aims to transform tool and equipment tracking, monitoring, and management through the application of cutting-edge data management, UI design, and machine learning algorithms.

The project will entail creating an intuitive user interface that enables users to carry out tasks quickly, retrieve pertinent information with ease, and traverse the inventory management module with simplicity. To forecast demand, analyze historical usage data, and optimize inventory levels, machine learning techniques will also be used.

Additionally, data management will be a key component of the project, guaranteeing that current and accurate information is always accessible. To preserve data integrity, this will entail putting in place reliable means for data retrieval and storage as well as procedures for data validation and verification.

The overall goal of this project is to improve R.E.T.S.'s inventory management procedure, which will increase productivity, accuracy, and efficiency. Organizations may optimize their inventory of tools and equipment, cut expenses, and improve user experience by utilizing cutting-edge approaches in data management, UI design, and machine learning algorithms.

4.2 PROJECT OUTPUT ANALYSIS

4.2.1 Analysis of Interface Design

Every software project's success is largely dependent on the design of the user interface. We will examine the project's output in this chapter about the R.E.T.S. inventory management module's user interface design.

The goal of the user interface design was to make using the inventory management module as smooth and simple as possible for users. To improve usability and efficiency, the project team researched user interface design best practices in detail and added essential components.

The results of the project's analysis show that the goals of the user interface design were effectively met. The user interface is clear, aesthetically pleasing, and simple to use. User-friendly controls, labeling, and clear iconography make it easy for users to rapidly grasp the function and goal of each feature.

To get input and refine the user interface design iteratively, the project team also held user testing sessions. The end-users' wants and preferences were addressed in the final design thanks to this iterative process.

4.2.2 Analysis of Data Management Techniques

Data management is a critical aspect of any inventory management system. In this subchapter, we will analyze the output of the project in terms of the data management techniques implemented to ensure accurate and up-to-date information within R.E.T.S.

Furthermore, data validation and verification processes were established to maintain data integrity within the system. This involved implementing data validation rules and checks to ensure that only accurate and valid data is entered into the system. Additionally, data verification processes were put in place to periodically validate the integrity of the stored data.

The analysis of the project output reveals that the data management techniques implemented have been successful in ensuring the availability of accurate and up-to-date information within R.E.T.S. The use of an RDBMS has facilitated efficient data storage and retrieval, while the data validation and verification processes have maintained the integrity of the stored data.

Overall, the analysis of the project output in subchapter 4.2 demonstrates the success and effectiveness of the user interface design, machine learning algorithms, and data management techniques implemented within the inventory management module of R.E.T.S. These outputs have significantly improved the efficiency, accuracy, and productivity of the inventory management process, leading to reduced costs and increased user satisfaction within the organization.

4.3 ANALYSIS OF PROBLEM ENCOUNTERED & SOLUTIONS

4.3.1 Inventory Management Challenges

One of the main challenges faced during the project was related to inventory management. The existing system had limitations in terms of tracking and managing the inventory effectively.

Machine learning algorithms were used to analyze historical data and predict inventory needs accurately. These algorithms considered factors such as usage patterns, seasonality, and equipment lifespan to generate accurate forecasts. This helped in optimizing inventory levels and reducing the chances of overstocking or understocking.

4.3.2 User-Friendly Interface

The user interface of the R.E.T.S system was redesigned to be more intuitive and user-friendly. This included features such as easy navigation, clear visualizations of inventory data, and streamlined workflows. These improvements enhanced the user experience and made it easier for employees to interact with the system.

4.3.3 Improved Inventory Accuracy

With real-time updates and automated tracking, the system records were always up to date, leading to improved accuracy in inventory management. This reduced the chances of errors and discrepancies between physical inventory and system records.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 ACHIEVEMENT OF AIM AND OBJECTIVES OF THE RESEARCH

5.1.1 General Achievement of the Project

Our product achieved our goals and objectives exactly as we had hoped. The software's two main purposes are to speed up the lending process and protect all userdata. This approach can be used to other businesses with warehouses in addition to the aviation industry. Additionally, we were able to create a user-friendly design. The user interface is intuitive, making it possible for pupils to locate the information they require without difficulty or delay. Additionally, the app is device-neutral, allowing students to access and learn about the workshop tools.

5.1.2 Specific Achievements of Project Objectives

5.1.2.1 Product Structure

Our objectives were to digitalize current loaning system which is logbook an etc. For this to be completed, we need to identify students' problems regarding that commonly faced during loaning process. Our product was designed to make it user friendly and can be used by many other industries other than aviation.

5.1.2.2 Accessories and Finishing

Our product also come with catalogue which the idea is if there are any tool that are commonly used store keeper does not need search for tool on the search bar that will take much time.

5.2 CONTRIBUTION OR IMPACT OF THE PROJECT

The contribution of our project to industries are to reduce loss of the company because of missing tool and to systemize the process. Next, the system was design to hasten the loaning process and the easy-to-use interface that we can call user-friendly. The impact of our product to industries are the company doesn't have to worry on missing tools problem that been usually faced by big company that have many staff in it.

5.3 IMPROVEMENT AND SUGGESTIONS FOR FUTURE RESEARCH

5.3.1 Product Structure

The improvement that we aim for in the future is to link the system with the server. To achieved that, we must collaborate with bigger company that have their own server and develop or can develop our own data server so it is no need to reset all the data on the system because of low on memory or the data will corrupt. Many features can be added if there are expert on developer team. Suggestions for our future research is to, create a new system that are more advanced on all aspect such as server, coding, and database based on our objective which is loaning will be easier and faster, example on aviation industries which is line maintenance. Technicians need to do all maintenance in a short time so, as not to disturb the flight schedule.

5.3.2 Accessories and Finishing

To collaborate with a bigger company to achieve our improvement to enhance our experience in IT industries.

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	MONESH A/L SIVAN
1.1	BACKGROUND OF STUDY
1.2	PROBLEM STATEMENTS
1.3	PROJECT OBJECTIVES
1.3.1	GENERAL PROJECT OBJECTIVES
1.3.2	SPECIFIC INDIVIDUAL PROJECT OBJECTIVE
1.4	PURPOSE OF PRODUCT
1.5	SCOPE PROJECT
1.5.1	GENERAL PROJECT SCOPE
1.5.2	SPECIFIC INDIVIDUAL SCOPE
1.5.2.1	SOFTWARE / PROGRAMMING
2.1	GENERAL LITERATURE REVIEW
2.1.2	SOFTWARE INDUSTRY IN MALAYSIA
2.1.1	SOFTWARE INDUSTRY IN MALAYSIA
2.1.2	EXPLANATION OF WORKSHOP
2.1.3	TYPES OF ENGINEERING SOFTWARE
2.2	SPECIFIC LITERATURE REVIEW
2.2.1	INTRODUCTION LAYOUT
2.2.2	PRODUCT MECHANISMS
2.2.3	SOFTWARE / PROGRAMMING
2.3	REVIEW OF RECENT RESEARCH AND RELATED PRODUCT
2.3.1	RECENT MARKET PRODUCTS
2.4	COMPARISON BETWEEN RECENT RESEARCH AND CURRENT PROJECT

	KIFAYATULLAH BIN KHAIRUL AZIDI
3.1	PROJECT BRIEFING & RISK ASSESSMENT
3.2	OVERALL PROJECT GANTT CHART
3.2.1	GANTT CHART FOR AEM
3.2.2	GANTT CHART FOR AEP
3.3	PROJECT FLOW CHART
3.3.1.1	OVERALL AEM PROJECT FLOW CHART
3.3.1.2	OVERALL AEP PROJECT FLOW
3.4	LIST OF MATERIALS & EXPENDITURES
3.5	INTERFACE LAYOUT
3.5.1	GENERAL PRODUCT INTERFACE LAYOUT
3.6	DEVELOPMENT OF PRODUCT
3.6.1	MATERIAL ACQUISITION
1.3.2.1	INTRODUCTION LAYOUT
1.3.2.2	INTERFACE LAYOUT
1.3.2.3	STORYBOARD
1.3.2.4	SOFTWARE DESIGNATION

	NASFAUZE HUSNA BIN HAMIM
4.1	PRODUCT DESCRIPTION
4.1.1	GENERAL PRODUCT FEATURES & FUNCTIONALITIES
4.1.2	SPECIFIC PART FEATURES
4.1.2.1	PRODUCT STRUCTURES
4.1.2.2	PRODUCT MECHANISM
4.1.2.3	INTERFACE LAYOUT
4.1.3	GENERAL OPERATION OF PRODUCT
4.1.4	OPERATION OF PRODUCT FEATURE
4.1.4.3	SAFETY PRECAUTION
4.2	PROJECT IMPACTS/PURPOSE OF PRODUCT
1.4	SCOPE OF PROJECT
1.4.1	GENERAL PROJECT SCOPES
1.4.2	SPECIFIC INDIVIDUAL SCOPES
1.4.2.1	INTRODUCTION LAYOUT
1.4.2.3	INTERFACE LAYOUT
1.4.2.3	STORYBOARD
1.4.2.4	SOFTWARE DESIGNATION
1.5	PROJECT IMPACT

RECORDED TOOLS AND EQUIPMENT SYSTEM

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