UNIVERSITI TEKNIKAL MALAYSIA MELAKA

INVENTORY MANAGEMENT SYSTEM FOR MULTI LEVEL GOODS

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering Technology (Process and Technology) with Honours

by

STEPHANIE DUJONG ANAK INGGOM

B071310033

FACULTY OF ENGINEERING TECHNOLOGY

2016

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: **INVENTORY MANAGEMENT SYSTEM FOR MULTI LEVEL GOODS**

SESI PENGAJIAN: **2015/2016**

Saya **STEPHANIE DUJONG ANAK INGGOM**

Mengaku membenarkanLaporan PSM ini disimpan di PerpustakaanUniversitiTeknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaanseperti berikut:

1. Laporan PSM adalah hak milik Universiti Teknikal Malaysia Melaka dan penulis.
2. Perpustakaan Universiti Teknikal Malaysia Melaka dibenarkan membuat salinan untuk tujuan pengajian sahaja dengan izin penulis.
3. Perpustakaan dibenarkan membuat salinan laporan PSM ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. **Silatandakan (✓)

☐ SULIT (Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia sebagaimana yang termaktub dalam AKTA RAHSIA RASMI 1972)

☐ TERHAD (Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)

☐ TIDAK TERHAD

Disahkanoleh:

_____ _____

AlamatTetap: Cop Rasmi:

_____

_____

_____

Tarikh: 9th December 2016 Tarikh: _____

** JikaLaporan PSM ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebab dan tempoh laporan PSM ini perlu dikelaskan sebagai SULIT atau TERHAD.

DECLARATION

I hereby, declared this report entitled Inventory Management System for Multi Level Goods is the results of my own research except as cited in references.

Signature	:	…….
Author's Name	:	STEPHANIE DUJONG ANAK INGGOM
Date	:	9th December 2016

APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor Degree of Engineering Technology Manufacturing Engineering Technology (Process and Technology) with Honours The member of the supervisory is as follow:

EN. HANIZAM BIN HASHIM
(Project Supervisor)

ABSTRAK

Pada dasarnya, inventori boleh digambarkan sebagai sebilangan item, barangan dan bahan-bahan yang disimpan sebagai stok dengan kategori dan kegunaan yang berbeza. Sistem Inventori adalah proses mengesan stok yang boleh didapati di stor itu. Stor 2 JTKP Fakulti Teknologi Kejuruteraan, dipilih sebagai kajian kes, yang mana sistem kawalan inventori di stor berkenaan dapat dibaiki dengan adanya sistem yang lebih sistematik. Objektif kajian ini adalah untuk mereka bentuk sistem rekod inventori di Factory 2, untuk mengubah sistem inventori manual dengan mempraktikkan kaedah mengesan kekurangan stok di Factory 2. Di samping itu, XAMPP telah digunakan sebagai perisian utama dalam membangunkan dan menguruskan sistem inventori. Projek ini juga akan memberi tumpuan kepada dua jenis kategori inventori, iaitu bahan mentah dan bekalan. Sistem Inventori Factory 2 telah mengurangkan masa pengendalian permintaan bahan mentah secara manual, yang dilakukan melalui borang manual sebelum ini. Selain itu sistem mempunyai sistem mengesan kekurangan stok. Sebagai contoh, apabila produk kurang daripada lima belas, tanda amaran daripada had akan dipaparkan pada halaman web. Oleh itu, ia memudahkan pelanggan untuk membuat pesanan mereka dan untuk mengetahui stok yang. Berdasarkan pencapaian sistem ini , beberapa amalan seperti menghantar pemberitahuan melalui e-mel, sistem boleh dilihat di web sebenar dan menambah pangkalan data pembekal pada sistem adalah disyorkan pada masa depan

ABSTRACT

Basically, inventory can be described as a number of items, goods and materials that kept in as a stock by a group of people with a different intentions and categories. Whereby, an Inventory System can be described as a process of tracking a stock that is available at the stor. Concerning about this project, JTKP store of Faculty of Engineering Technology, is selected as a case study, by which the best practice inventory control system for variety storage of goods can be improvise by implement a programmed system. The objective of this study is to design an inventory record system at Factory 2 store, to programmed the manual inventory system with setup triggering stock out limit and to implement the system in Factory 2 store. In addition, XAMPP server was used as a main software in developing and managing the inventory system. This project also will focus on two types of inventory category, which is Purchased Raw Material and Supplies. Factory 2 Inventory System has reduced the handling time in terms of requesting the stock manually, which is done through manual forms previously. Moreover this system comes with triggering system concerning on the stock out limit. For instance, when the product is less than fifteen, a warning sign or a notification stock out limit will appear on the web page. Hence, by this kind of announcement, it ease the customer to place their order and to review on the current stock. Based on the outcome, several practices such as sending notification through email, viewable system in real web and adding the supplier database on the system are recommended in future.

DEDICATION

I would like to express my gratitude towards my loving family, who have been my pillar throughout process in carrying out this task. This project report is adoringly dedicated to my beloved parents and family members who have been my persistent foundation of inspiration. They have given me the drive and discipline to embark upon any task with enthusiasm and determination. Without their love and rigid support, this project would not have been made possible.

ACKNOWLEDGEMENT

First and above all, I praise God, the almighty for giving me this chance and granting me the ability to proceed successfully.

I would like to express my deep appreciation to my well-regarded project supervisor, Mr.Hanizam Bin Hashim for the conviction, the discerning discussion, granting precious advice, for his assist during the entire stage of the project, and particularly for his endurance and guidance throughout the writing process.

I warmly thank to academics staffs for their numerous involvement and assistance, directly or indirectly, in the progress of this project especially to Factory 2 inventory in-charge technician. Deepest gratitude to the Faculty of Engineering Technology, UTeM, for granting me the opportunity, facilities and time to conduct on this project.

I would like to take this opportunity to show appreciation to my adored family for the incessant prayer and precious support throughout this process.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

UTEM	-	Universiti Teknikal Malaysia Melaka
JTKP	-	Jabatan Teknologi Kejuteraan Pembuatan
MySQL	-	My Structured Query Language
XAMPP	-	Cross Platform Apache PHP Perl
C#	-	Visual C Sharp

CHAPTER 1
INTRODUCTION

1.0 Background

Basically, inventory can be described as a number of items, goods and materials that kept in as a stock by a group of people with a different intentions and categories. For instance, inventory applicable at home based stock, such as groceries stock, to a huge institutions of a warehouse, company and a factory. Whereby, an Inventory System can be described as a process of tracking a stock that is available at the stor.

By referencing to a book of ‘ Essential Of Inventory Management’ Inventory is basically divided into raw materials, finished goods and work-in-process. Other categories of inventory should be considered from functional standpoints. In a just-in-time manufacturing environment, inventory is considered as a waste. However, in a environments where an organizations suffers from poor cash flow or lacks strong control over a electronic information transfer among all departments and all significant suppliers, lead times, and quality of material received, inventory plays important roles (Muller, 2011).

Whereby, based on article under ‘Inventory Management System’ (Hayden, 2014)Inventory Management is a system that serve to provide uninterrupted production, sales and/or customer service at a minimum cost. It is an essentials part of any successful business. Whereas, an inventory management system will tracks the sale, purchase and payments related to these elements of inventory. As for that, ineffective inventory management can lead to business failures and losses.

Concerning about this project, JTKP store of Faculty of Engineering Technology, is selected as a case study, by which the best practice inventory control system for variety storage of goods can be improvise by implement an computerized system. In addition, Microsoft Access 2007 will be use as a main software in developing and managing the inventory system. This project also will focus on two types of inventory category, which is Purchased Raw Material and Supplies.

1.1 Problem Statement

Inventory control is a crucial system where certain criteria's must be met to determine the efficiency of the organization or a warehouse. A good criteria of inventory control system is a system that able to predict, tracking and organize the stock systematically.

Current inventory system at Utem JTKP Store is depending on manually record where it consumed time to record and trigger the stock. Moreover, most of the stock or inventory tracking and triggering is done manually, whereas the current process requires more human power and can caused mistake by human error. Therefore the current inventory control can be improvised by implement using a automated software of Microsoft Access. Moreover, based on the current situation, there is some difficulties in trigger the stock. By implement this concept and organized the stock based on their inventory categories, it will less time consumed.

1.2 Objective

The objectives to be achieved in this project are:

i. To design an inventory records system at Factory 2 store.

ii. To computerize the manual inventory system with setup triggering stock out limits .

iii. To implement the system to factory 2 store.

1.3 Project Scope

This study was carried out at JTKP Store of Faculty of Engineering Technology, whereby this study is to purpose an establish best practice inventory control system in a variety storage of goods.

Regarding this project, there are several limitation on this project. For instance, this project will focusing on only two types of inventory categories, which is Purchased Raw Material where it consist of aluminium plate, aluminium block, mild steel and etc. Second category is Consumables/ Supplies which consist of lubricant oil , soap and etc. Therefore, Microsoft Access 2007 is suggest as software to construct an inventory control system and Visual C# software suggest as integrated software to conduct triggering method.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter explain on literature review of general overview on Inventory, Types of Stock, Inventory Management System and current existing Inventory Software . In addition, current existing Microsoft Office Software (Microsoft Access) and Visual C# also being discussed.

2.1 Inventory

Based on Max Muller, the author of ‘ Essential Of Inventory Management’ (Muller, 2011), all organization keep inventory, whereas the inventory includes a company’s raw material, work in process, supplies used in operations and finished goods

2.1.1 Purpose of Inventory

According to Max Muller, (Max Muller 2011) in a just-in-time manufacturing environment, inventory is considered as a waste. However, in a environments where an organizations suffers from poor cash flow or lacks strong control over (1) electronic information transfer among all departments and all significant suppliers, (2) lead times, and (3) quality of material received, inventory plays important roles. Some of the important reasons for obtaining and holding inventory are :

a. Predictability
   - In order to involve in capacity planning and production scheduling, it is necessary to control amount of parts and subassemblies that have process in given time. Inventory prevent process from any harm.

b. Lower Ordering Cost
   - By purchasing large quantity of an item rarely, the ordering cost are less than buying smaller quantities frequently.

c. Quantity Discounts
   - Purchasing large amount of parts often get bulk discounts rather than purchase in small quantities.

d. Unreliability of Supply
   - Inventory as a safety precaution from unreliable supplier, or when an item that scarce (restricted quantity) and steady supply difficult to ensure.

2.1.2 Types Of Stock

Inventory is basically divided into raw materials, finished goods and work-in-process. Other categories of inventory should be considered from functional standpoints (Muller, 2011).

The relationship between three categories of inventory which are raw materials, finished goods and work-in-process can be seen in figure below, Figure 2.1.

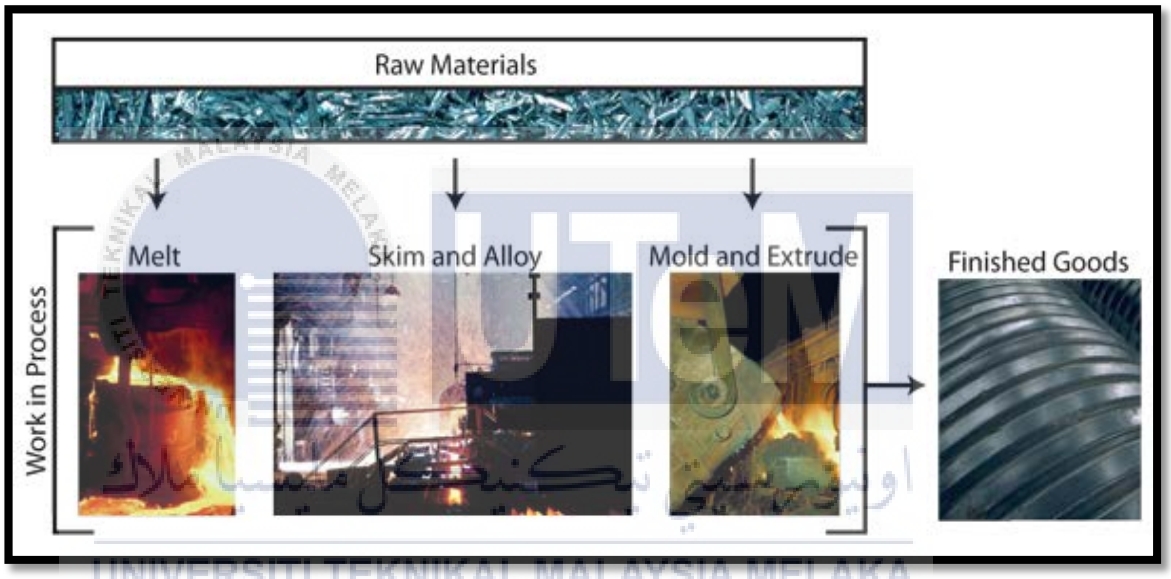


Figure 2.1 : Relationship between Inventory's Category

a. Raw Material
    - Materials to produce partial products and completed goods.
    - Example of raw material are shown in Figure 2.2 below such as aluminium block, mild steel plate, aluminium rod etc.

Figure 2.2 : Raw Material

b. Finished Product

- Product that ready for customer sales. It also beneficial to buffer manufacturing from predictable and unpredictable market demand.

c. Work-In-Process (WIP)

- An items during the raw material is being changed into partial product, finished product and subassemblies.
- WIP exist from work delays and long movement times between operation.

d. Consumables

- Consumables inventory are used in many operation and often treated like a raw material.
- For instance, cleaning materials, lubricants, tapes, hand towels, shown in Figure 2.3 below.

Figure 2.3 : Consumable

2.2 Inventory Management

Based on article under 'Inventory Management System' Inventory Management is a system that serve to provide uninterrupted production, sales and/or customer service at a minimum cost. It is an essentials part of any successful business. Whereas, an inventory management system will tracks the sale, purchase and payments related to these elements of inventory. As for that, ineffective inventory management can lead to business failures and losses (Hayden, 2014).

2.3 Inventory Management System

An inventory management system will tracks the sale, purchase and payments related to these elements of inventory. As for that, ineffective inventory management can lead to business failures and losses (Hayden, 2014) .

2.3.1 Elements Of an Inventory Management System

An effective inventory management system contains of a few basic elements. It is necessary to be clear and descriptive of storage locations, items and numbers of inventory, whereas an unclear descriptions will lead to difficulties during managing the system. Andrea Hyden, believes that Inventory Management System suggested below elements should have in the management system, (Hayden, 2014) .

- A list of purposes and objectives for the inventory tracking system.
- A purchase plan to acquire necessary items for inventory management, to ensure neither too much nor too little is purchased.
- Clear and easy-to-understand storage locations and tags for these locations. These locations can be within the facility or at other accessible storage locations.
- Inventory labels that easy to understand
- Unique and short item numbers for each item.
- Item descriptions that are well-defined and clear.
- Units of measure on how to quantify the inventory (per box, per product piece, per 100 pieces, etc.).
- A starting count of inventory stock.
- Software that tracks inventory activity. Inventory management software that helps in create invoices, purchase orders, printing, payment receipts and more. The software should ideally be usable by multiple people who track and work with the inventory
- Policies and a plan surrounding all inventory management procedures.

2.4 Inventory Tracking System

Based on article under 'What is Inventory Tracking' by Kenneth Hamlett (Hamlett), he describes that an Inventory Tracking System contains of the system and policies designed in order to monitor the inflow and outflow of inventory.

Previously companies tracked their inventory manually by using a system known as the card system. With an technology's improvement, a lot of companies implement automated inventory working flow (Hamlett).

2.4.1 Current Inventory Tracking System Software & Strategies

Nowadays, a lot of tracking software system available in market where the systems and strategies are varies that can be implement according to customer needs. Based to Andrea Hyden, on Current available tracking system software that have been used in industries are Pos Maid, Inflow, Fishbowl Inventory and ABC Inventory Software (Hayden, 2014) .

a. POS Maid:
   - Free software program (POS stands for "point of sale") which is very helpful for small retail businesses. The program makes it easy to fill in inventory, manage customers and employees, generate financial reports and more.

b. InFlow:
   - This program allows users to view their entire inventory by location and category. InFlow allows you to share reports and build item kits.

c. Fishbowl Inventory:
    - As an add-on for QuickBooks, this software can be an easy addition to your current system. The software prides itself on being speedy and accurate, with easy reordering and receiving processes.

d. ABC Inventory Software:
    - Another free system, ABC Inventory has multiple features, including barcode tracking, sale and shipping order management, appointment scheduling, sale quotations, unlimited database record and more.

2.5 MICROSOFT OFFICE SOFTWARE

Microsoft Office is a productivity software that provided with words processing, spreadsheet , presentation and database software. Microsoft Office consist of four primary components which is Microsoft Words, Microsoft Excel, Microsoft PowerPoint and Microsoft Access, whereas each of this components specializing in a particular type of output (Robert T. Grauer, 2011).

2.5.1 Microsoft Access

Microsoft Access is a relational database software that used to store data and convert data into important information. Basically Database Software is used primarily to make a decision for a business that need to compile data from multiple records stored in table in order to comes out with informative reports. In Microsoft Access database consist of four components which is Table, Form, Query and Report (Robert T. Grauer, 2011).

2.5.2 Table

A Table in Microsoft Access is a foundation of every database, which it is a medium that contains collection of related records Figure 2.4 shows an example of Table in Access. In Access, it provides two different ways to view a table, which is Datasheet View and Design View (Robert T. Grauer, 2011) .

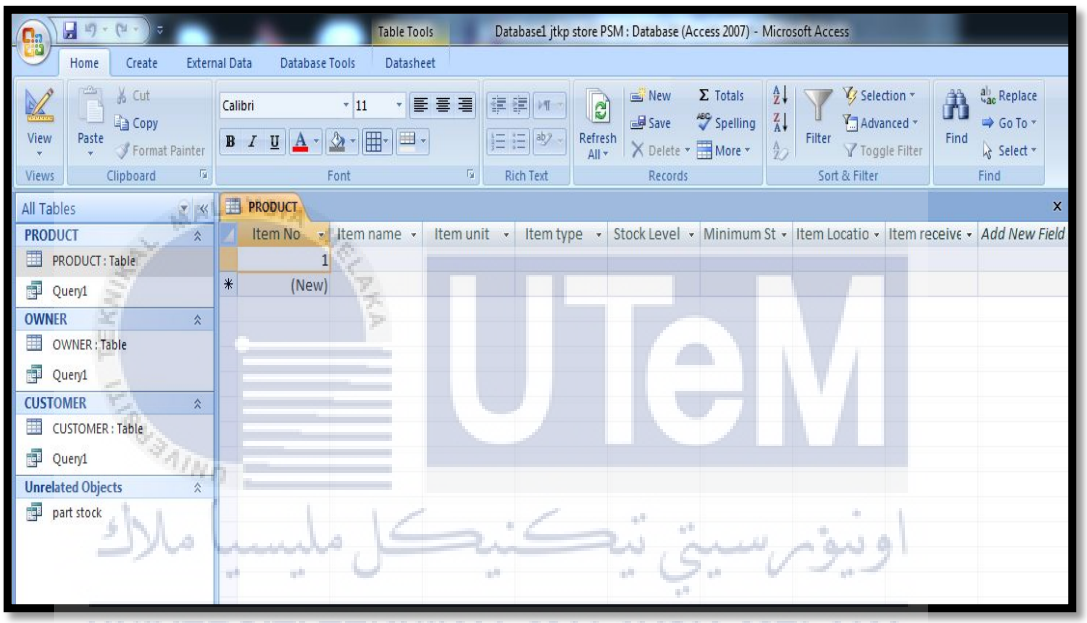


Figure 2.4 : Table in Access

a. Datasheet View

- Datasheet View is a grid which consist of columns (fields) and rows (records). Through Datasheet View, it enable editing add, view and delete record according to needs (Robert T. Grauer, 2011). Figure 2.5 shows a Table in Datasheet View.

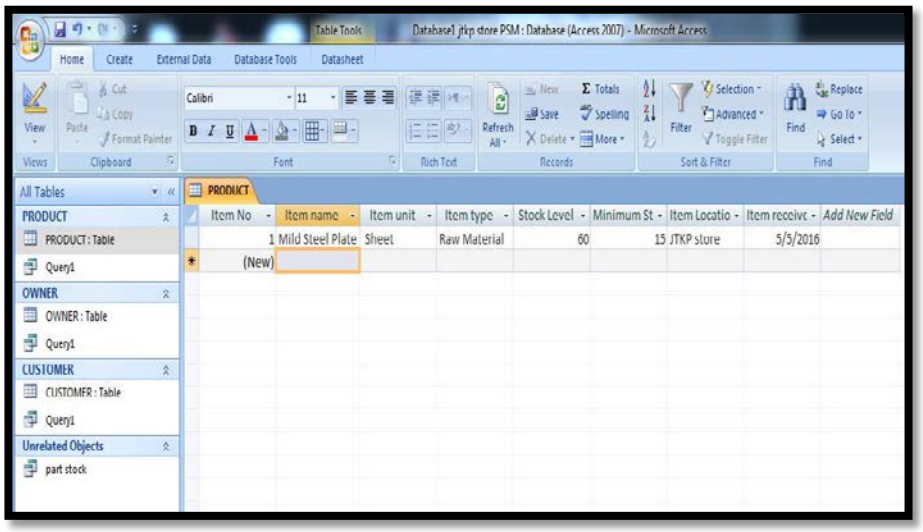


Figure 2.5: Table in Datasheet View

b. Design View

- In Access, Design View used to modify and create a table design by indicating the fields it will contain, the fields' data type and their acquaintances properties. Type of data that stored in field, such as text, number, data and currency will be define by data types whereas the field properties define the characteristic of the fields in more details (Robert T. Grauer, 2011). Design View shows in Figure 2.6 below.

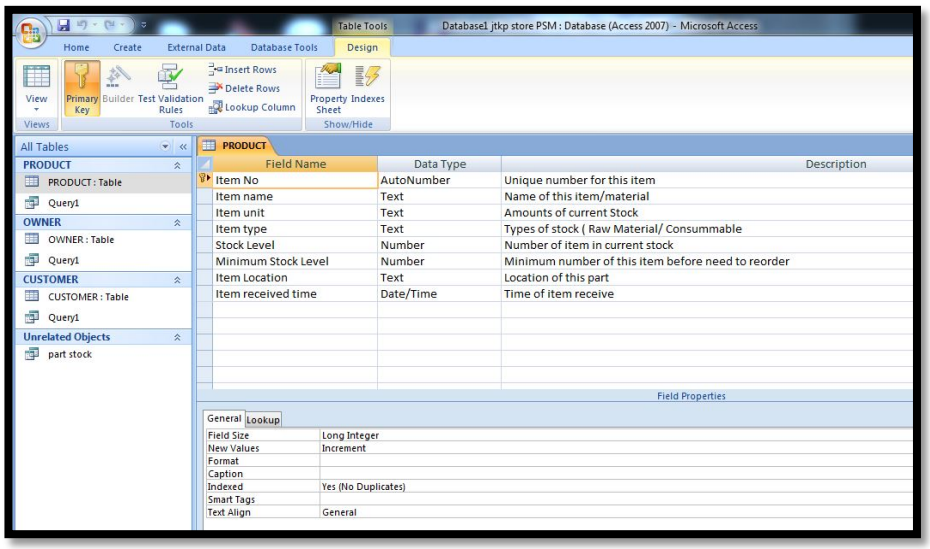


Figure 2.6 : Table in Design View

2.5.3 QUERY

Query is a medium which consist of question that been ask in database. Query will display an answer and only display records that that meet certain criteria in which fields that required. On top of that, criteria is a number, a text phrase or an expression which used to filter data in table. Query also allows editing and modifying existing data (Robert T. Grauer, 2011) . Figure 2.7 shows Query in design view.

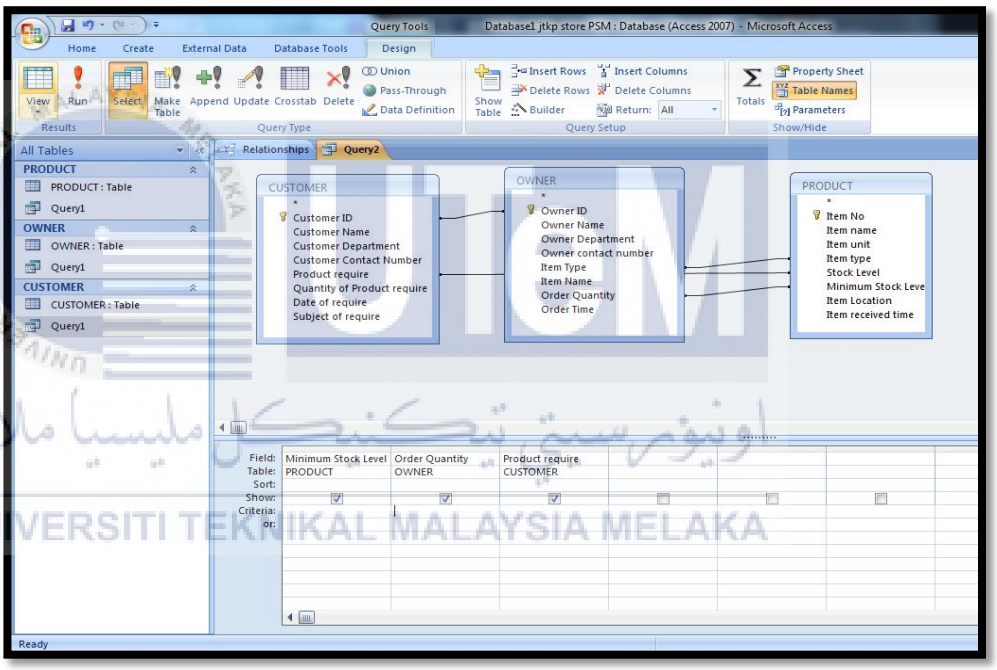


Figure 2.7 : Query in Design View

2.5.4 FORM

A form in Access is a medium that enables entering, editing or deleting table data. Form will restrict the user to view only a one record at a time, which helps the user concentrate on the data being entered and also offer more consistent data entry (Robert T. Grauer, 2011). Figure 2.8 shows example of Form in Microsoft Access.

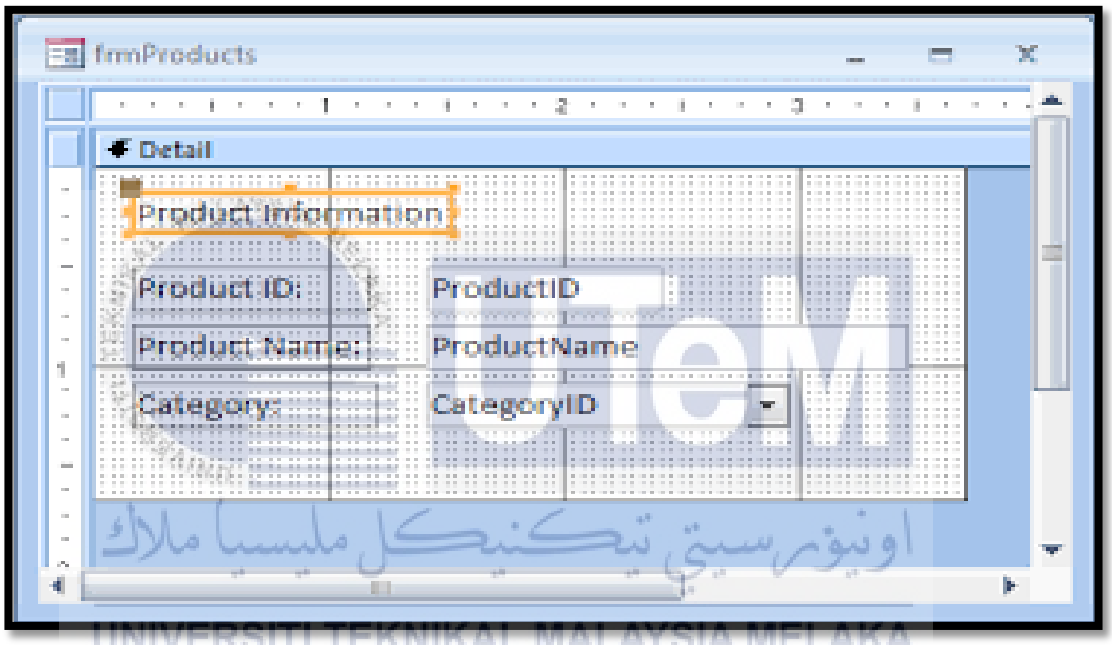


Figure 2.8: Form in Microsoft Access

2.5.5 Report

A Report in Microsoft Access provides professional -looking formatted information from query, which normally report will be used to present database information (Robert T. Grauer, 2011). Figure 2.9 shows an example of Reports in Microsoft Access.

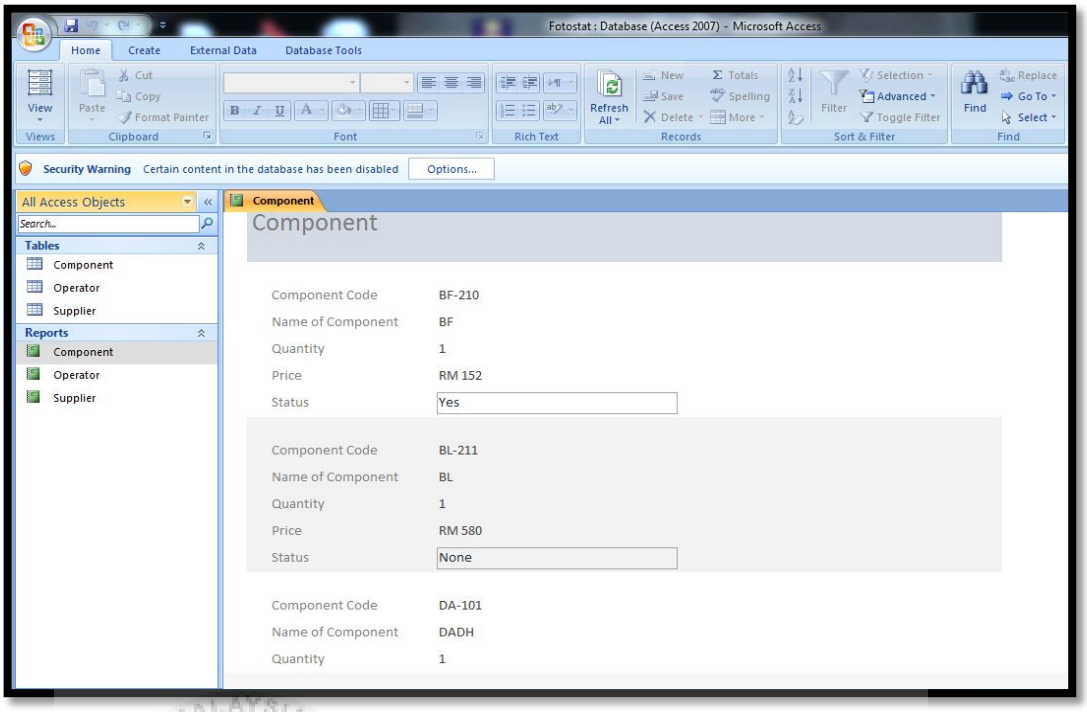


Figure 2.9 : Report in Microsoft Access

2.5.6 Comparison between Microsoft Access and Microsoft Excel

Comparison below shows a frequent situation in Table 2.1. and application in using Microsoft Access and Excel.

Table 2.1 : Comparison Common Situation of Using Access and Excel

	Microsoft Access	Microsoft Excel
1.	Managing Contact - Access helps in manage contacts and mailing addresses.	Accounting - Reliable in calculating in many financial accounting statements.

	- Creates report and merge data with Microsoft Word to print the form letters, envelopes or mailing labels.	Such as cash flow statement.
2	Inventory and Asset Tracking - Create an inventory of an items in business and store photo and other related documents along with the data	Budgeting - Create any type of budget such as marketing budget plan, event budget.
3	Order Tracking - Enables to enter information about products, customer and orders. - Create a report that show sales by employee, region, time period, or some other value.	Billing and Sales - Useful to managing billing and sales data. - Easy to create forms such as sales invoices, packing slips and purchase order.
4	Task Tracking - Tracks task for group of people and updating existing task in the same database.	Reporting - Creates various types of reports that reflect data analysis such as project performance, forecast data.
5	Organizing lending libraries - Access can be used to store data about books and keep track of whom who borrow it.	Planning - Create useful planner such as marketing plan, weekly class plan
6	Event Planning - Access enables entering information about events dates, location and	Tracking - Track data in a time sheet such as inventory list that keeps tracks of equipment.

	participants. - Summary about that event can be print.	
7	Nutrition Tracking - Keep track recipes	Using Calendars - Create calendar such as academic calendar to keep tracks activities in school or a business calendar to track business events and milestone.

2.5.7 Advantages of Microsoft Access

In very common condition , Access offer the best option when in tracking and record data regularly, and then display, export, or print subsets of that data. Moreover Access forms grant a more suitable interface than an Excel worksheet in working with data. Access can be reliable to automate frequently performed actions, and Access reports let you summarize data in printed or electronic form. Other than that, Access offer more structure for the data for instance, it can control what types of data can be entered, what values can be entered, and can specify how data in one table is linked to data in other tables. This structure assist to ensure that only the exact types of data are entered. Hence, Access tables are designed for complex querying in relation to data stored in other table.

Therefore, Microsoft Access a dependable on below situation.

- Expect a lot of people working in the database and need a robust options that safely handle updates to your data, such as record secure and conflict resolution.

- Expect the necessity to add more tables to a data set that originated as a flat or non relational table.
- Require to run complex queries.
- Require to produce a variety of reports or mailing labels.

2.6 Visual C# Software

C# is a software that describes as a object-oriented language which consist of a rich set of instruction statements. Furthermore, C# was the language used for development of much of .NET, the Microsoft programming paradigm that exclude a collection of 2000 predefined classes which make up the Framework Class Library (FCL) (Doyle, 2011).

Consequently, C# has access to a wide set of predefined classes alike to those offered in Java. C# consist of tools which make it simple to form graphical user interfaces. Thus, C# present the pure data crunching horsepower to which C and C++ programmers have become comfortable (Doyle, 2011).

Beside, C# was designed to adapt Internet and Window Application which make it known as simple and elegant object-oriented language that tolerates programmer in build a width of application (Doyle, 2011).

2.6.1 C# Working with Databases

Database defines as a collection of store records stored in computer in a systematic way, which computer program are used to manage and query a database and known as Database Management System (DBMS) (Doyle, 2011) .

DBMS ease storage, retrieval, manipulation and reporting large amounts of data. DBMS consist of several programs such as SQL Server, Oracle, DB2 and Microsoft Access. Basically all DBMS present reporting capabilities, though, these capabilities can be restricted and regularly need for processing data beyond DBMS capabilities. Therefore C# software make it easy to view and modify data stored in an Access or SQL Server database (Doyle, 2011).

2.6.2 Advantages of C#

Based on article under 'What is C#' by Bradley L, C# is a language derived from C and C++, but it was created from the ground up. Microsoft establish with what worked in C and C++ and consist of new features that would make these languages simpler to use. A lot of these features are very related to what have Java offered. Eventually, Microsoft had a number of purpose when building the language (L.Jones, 2011).

There are several benefits offered by C# software, for instance C# is a simple software, modern and flexible (L.Jones, 2011).

a. C# is Simple

- C# eliminate some of the complexities and difficulty of languages such as Java and C++, including the removal of macros, templates, multiple inheritance, and virtual base classes. These are all areas that cause either uncertainty or potential problems for C++ developers.
- C# is simple because it is based on C and C++ which Statements, Expressions, Operators, and other functions are taken through from C and C++, but development make the language simpler.

b. C# is Modern

- C# contains a language features that expected in modern language , such as exception handling, garbage collection, extensible data types, and code security.

c. C# is Powerful and Flexible

- C# are limited only by imagination. The language places no restriction on what can be made. Therefore, C# can be used for projects as diverse as creating word processors, graphics, spreadsheets, and even compilers for other languages.

CHAPTER 3
METHODOLOGY

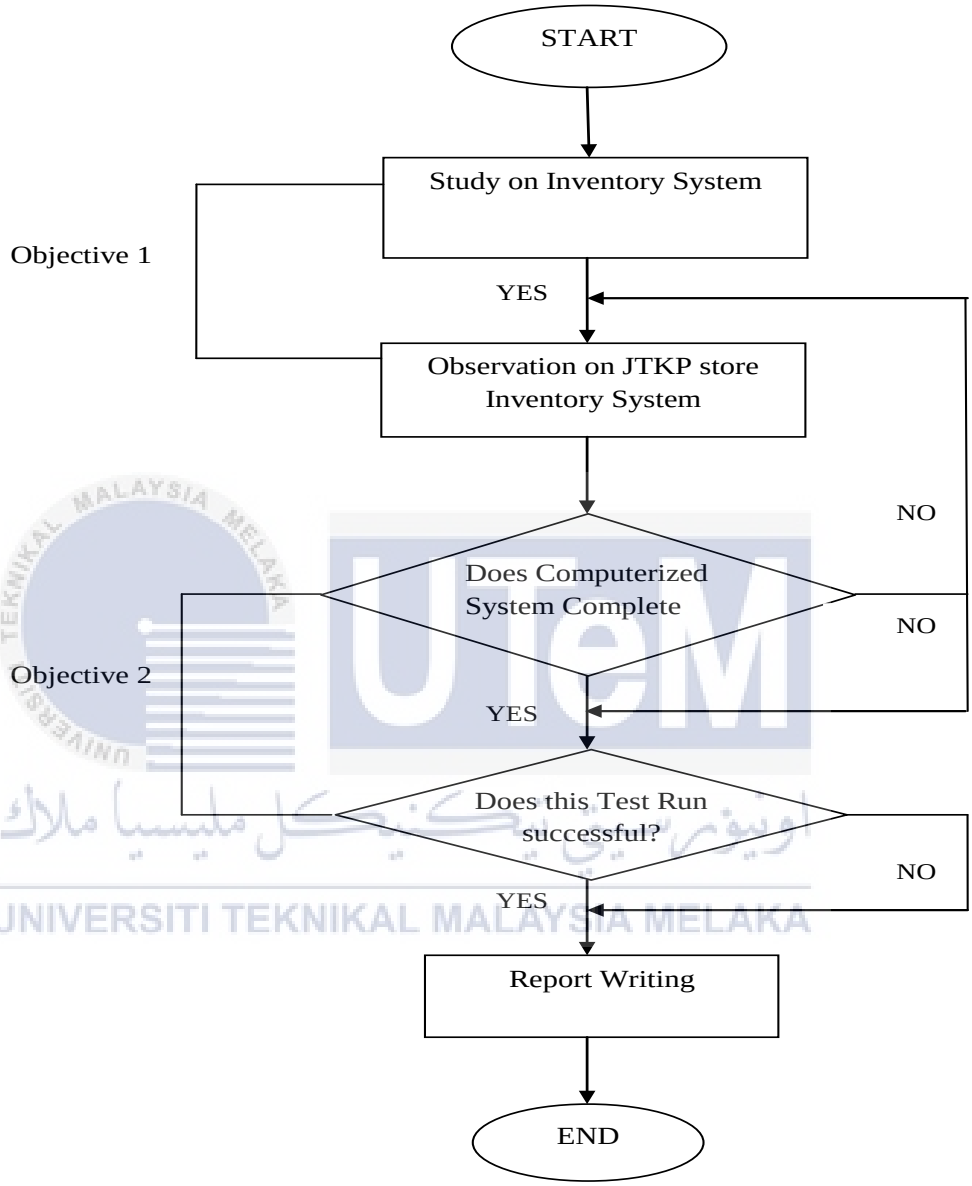
3.0 Introduction

This chapter correspond to further details regarding methodologies that involve in develop this project (Inventory System). Flow chart used to represent the review of project flow from beginning of system development until the complete Inventory System.

3.1 Project Flowchart

Project Flowchart shows in flowchart 3.2 is based on the process flow regarding the development of this project. Based on the flowchart, this project is done by following the guidelines of the flowchart. First step of this project is carried out a study on inventory system and make an observation on current system at JTKP store. Based on the findings, computer approach suggested as an alternative of current inventory system. Finally after done with the computerized approach, test run will be done to determine the performance of new the Inventory System.

FLOWCHART OF PROJECT REVIEW



Flowchart 3.1 : Flowchart of Project Review

3.2 Inventory System

An effective Inventory System consist of several crucial elements. Basically, to obtained a good Inventory system, below basic elements must be considered and vital to be clear. The suggested basic elements are :

- Well organized storage location
- Well defined location labels (ease of understanding and reading)
- Short and unique item numbers
- Simple and clear item description
- Unit of measure (per box, per piece)
- Suitable software to records all inventory activity

3.2.1 Well Organized Storage Location

A well organized storage location will ease the tracking process of stock. An organized location will helps people or stock keeper to find the stock. It will avoid placing the stock in wrong location and less time consuming by means if tracking stock.

3.2.2 Well Defined Location Labels

Each of location label must have an unique name. An unique and logic name scheme will help in determine the stock shelf. Any open shelf also must be label to avoid misplace and saving some space to other stock. Well defined labels must have a suitable size with clear printing feature. An arrow can be added to ease stock's tracking.

3.2.3 Short & Unique Items Numbers

Short and unique item numbers will help in determine items especially when making transactions, tracking inventory, filling orders, filtering or searching reports. An unique item numbers consist of five or six character or numbers in length instead of a long item description.

3.2.4 Simple and Clear Item Description

Simple and clear item description must be implement. Without suitable item's description, people tend to be confused regardless what items that still have stock and items need to be order. A complicated item description will make it hard to search items in report.

3.2.5 Unit of Measure

By applying rational unit of measure, it will ease to understand the stock levels, ordering quantities and shipping quantities. Unit of measure describes quantities that is outside of description and number of metric field, for instance, per box, per sheet and per piece.

3.2.6 Suitable software to records all inventory activity

A suitable and good inventory software will helps in tracking inventory and manage an accurate historical record. Software also helps in assist the inventory activity and accessible to every parties,

3.3 JTKP Store Inventory

Based on the observation, JTKP store consist only several suggested basic elements in Inventory system. Table 3.1 shows the implementation of current inventory element at the store.

Table 3.1 : JTKP Store Inventory

No.	Inventory Basic Element	Implementation
1.	Organize Location	Based on stock's application (Laboratory requirement/use)
2.	Location Label	None
3.	Unique Item Number	None
4.	Item Description	Based on item name and size
5.	Unit of Measure	Based on stock types (per pieces)
6.	Inventory Software	None

3.4 Computerized Approach

A competent tracking inventory is a compulsory components to a successful operation. An efficient inventory system will provide up to date data regarding raw material and others types of stock. Therefore, computerized approach will grant benefits through time saving, accuracy and consistency (Henderson). Regarding this project, computerized approach will adapt through this Inventory system by adopting Microsoft Access and Visual C Sharp (C#) Software. This project also done by considering the data from the observation at current JTKP Store.

3.4.1 Microsoft Access 2007

Microsoft Access 2007 comes with Microsoft Office Fluent that have an interactive design capabilities and user interface. Figure 3.1 shows the feature of Microsoft Access 2007.

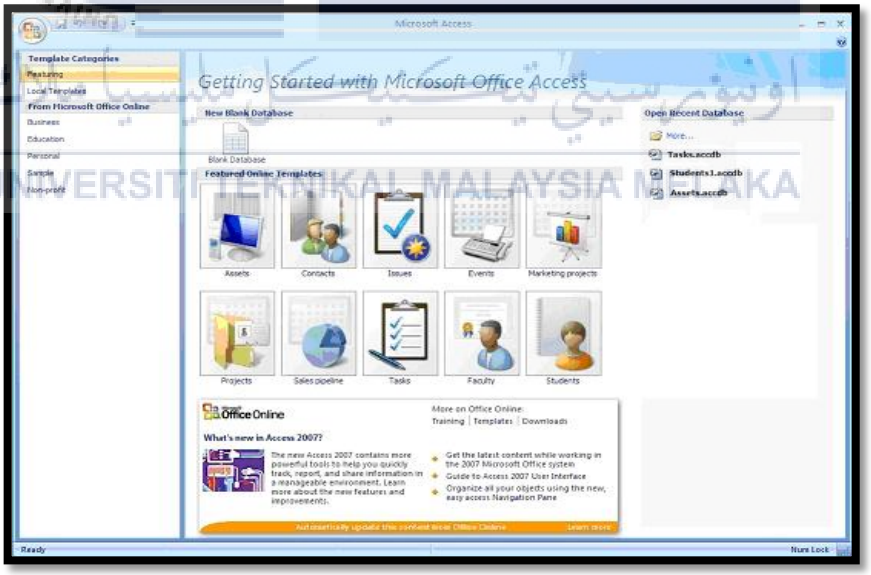


Figure 3.1 : Microsoft Access 2007

With the capabilities, it does not require broad knowledge to understand it, whereas it is a software that helps in tracking and ease on report information. Prebuilt

application that provide in Microsoft Access ease a modification and adaption according to business needs. Microsoft Access provides a library of prebuilt database solutions. There are several advantages offered by Microsoft Access 2007, which are :

- Tracking Information
- Create and adapt meaningful reports
- Shared tracked information with others
- Manage and audit sensitive information

3.4.2 Visual C Sharp (C#) Software

C# Software is where C# source code compiles into managed code. Managed code known as intermediate language (IL), where it is halfway between high-level language (C#) and the lowest level language (assembly/machine code). C# sharp programs run on the .Net Framework which is an integral Windows that provide with a virtual execution system which is known as common language runtime (CLR) (Nash, 2010) .

Figure 3.2 shows compile-time and runtime relationship of C# source code files, the .NET Framework class libraries, assemblies and the CLR. Various action take based on the manifest when C# program executed and assembly loaded into CLR. When the security requirement met, CLR perform just in time (JIT) compilation and then convert the IL code to native machine instruction.

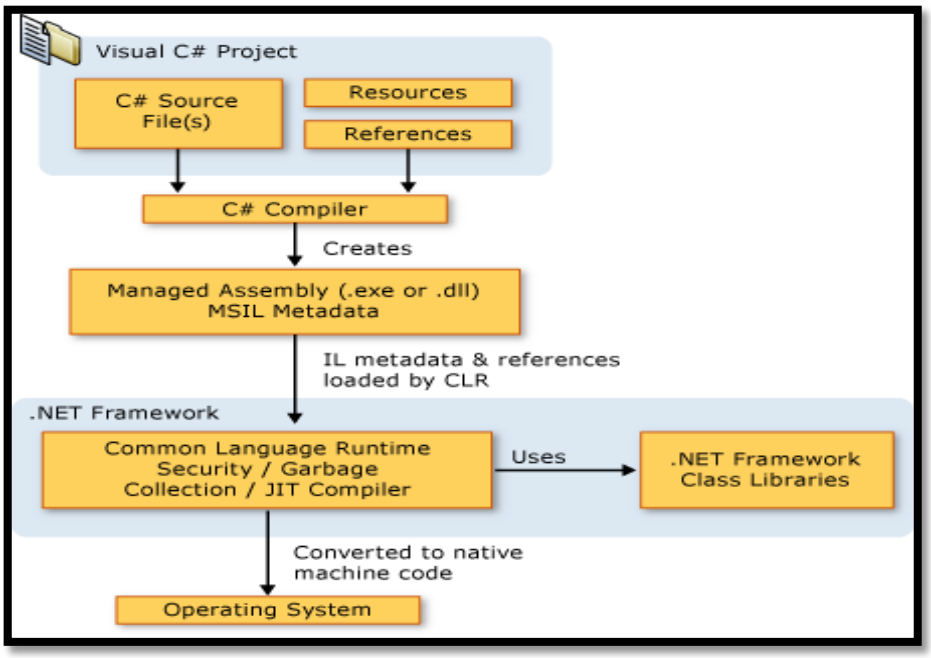
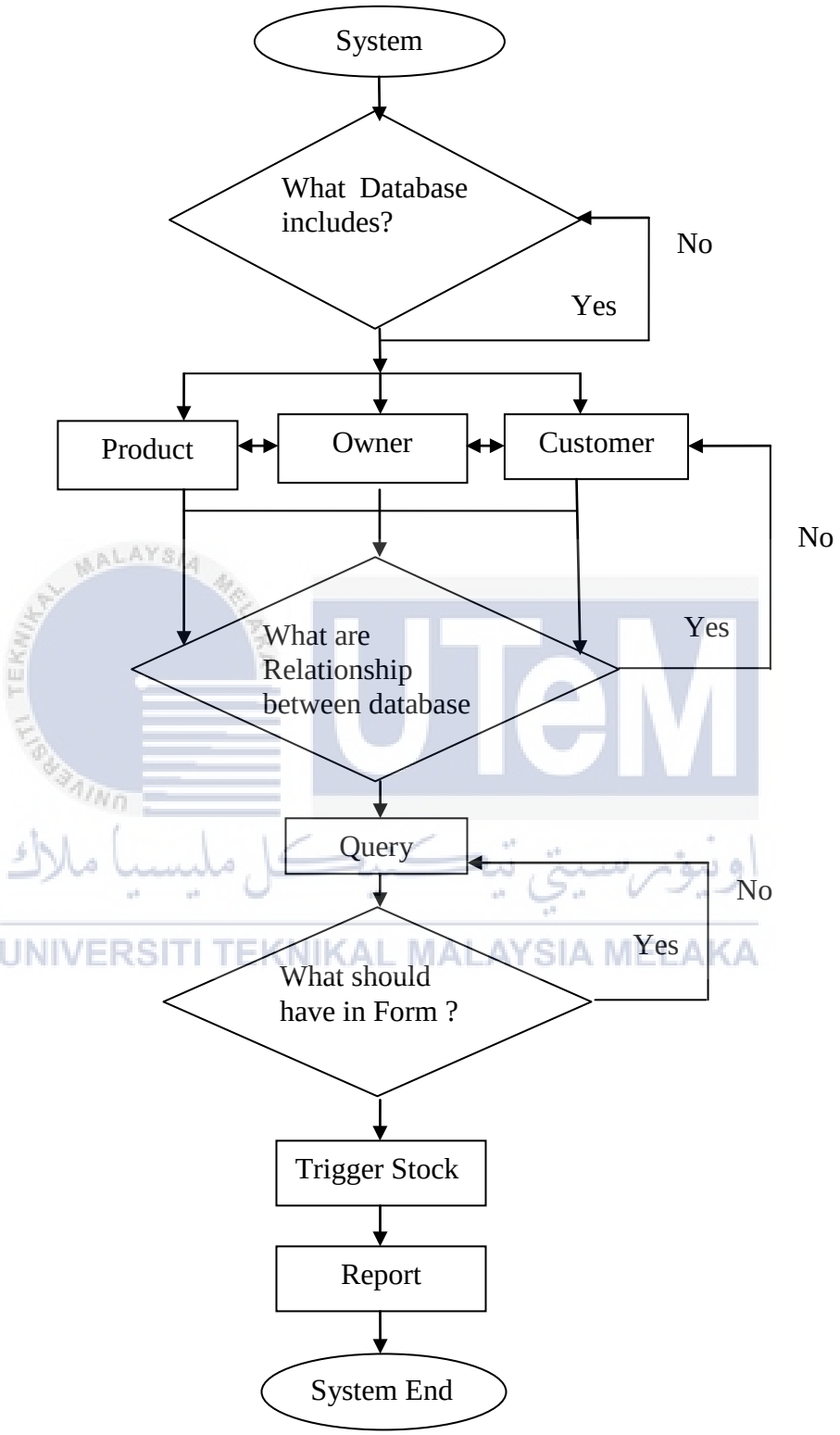


Figure 3.2 : Compile Time & Runtime Relationship

3.5 Inventory System Flow Procedure

Inventory System flow procedure is regarding the process or procedure in developing this project. This process consist of two elements, which is database and stock outs limits triggering procedure. Microsoft Access 2007 and Visual C# software used as main software to develop this system. Flowchart 3.2 describes process flow of inventory system.

FLOWCHART OF SYSTEM FLOW



Flowchart 3.2 : Flowchart of System Flow

3.6 Database

Database consist of several components, which are table, form, query and report. A database contains of one or more tables to store data, one or more forms to enter data into the table and one or more reports to output the table data as organized information (Robert T. Grauer, 2011).

3.6.1 Starting Access

The following procedures are regarding procedures to starting access in Microsoft Access 2007 (Gary B.Shelly, 2008).

1. Click the START button on the Window 7 taskbar to display start menu.
2. Click All Programs at the bottom of the left pane on the Start menu to display the All Program list and then click Microsoft Office on the All Program List to display Microsoft Office List.
3. Click Microsoft Office Access 2007 to start Access and display the Getting Started with Microsoft Office Access window.

3.6.2 Create New Database & Table

Table is one of the component of a database. Table describes as a primary container for database data. Therefore, table is the foundation of every database which consist of collection of related records (Robert T. Grauer, 2011) . Following steps are the guidelines of creates a new database table in access.

1. Click on Microsoft Access and Backstage view New selected by default will appear as shown in figure 3.3 below.

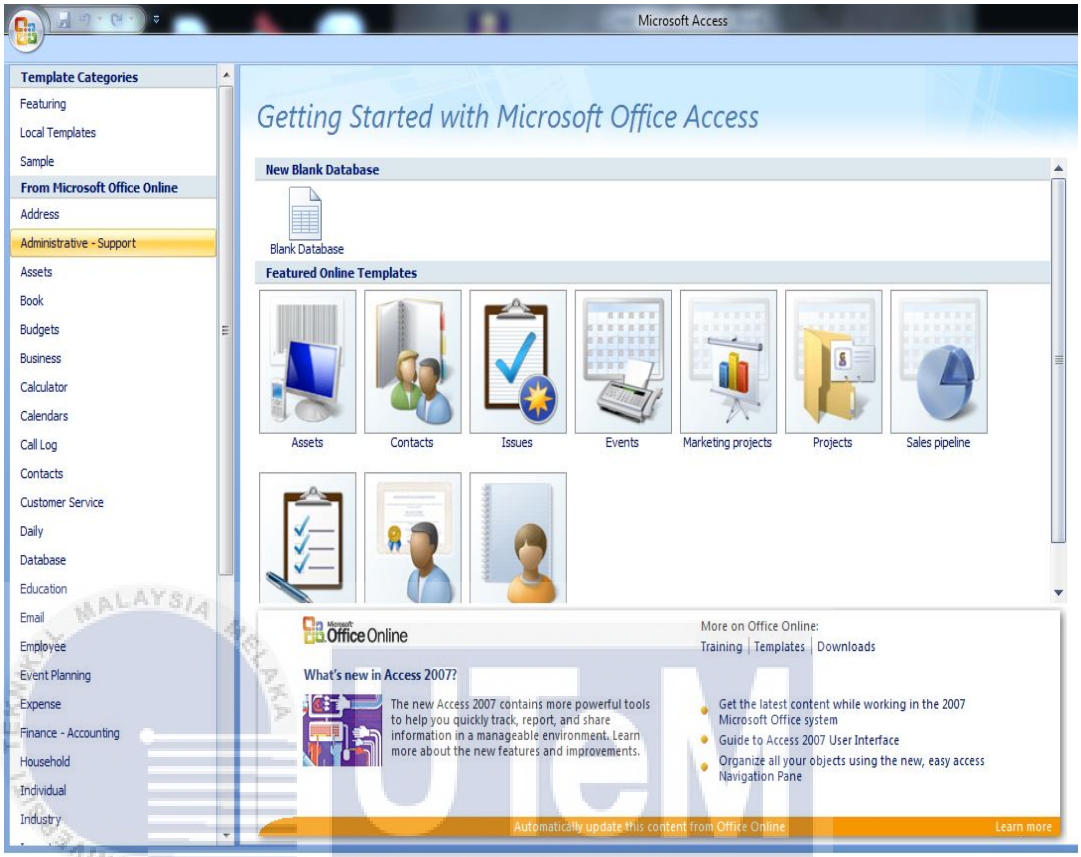


Figure 3.3: Backstage View

2. Click Blank Database in the new blank database section of backstage view.
3. Type database file name in the File Name as shown in Figure 3.5 below.
4. Click Browse (yellow folder icon) to determine folder location and then clock OK.

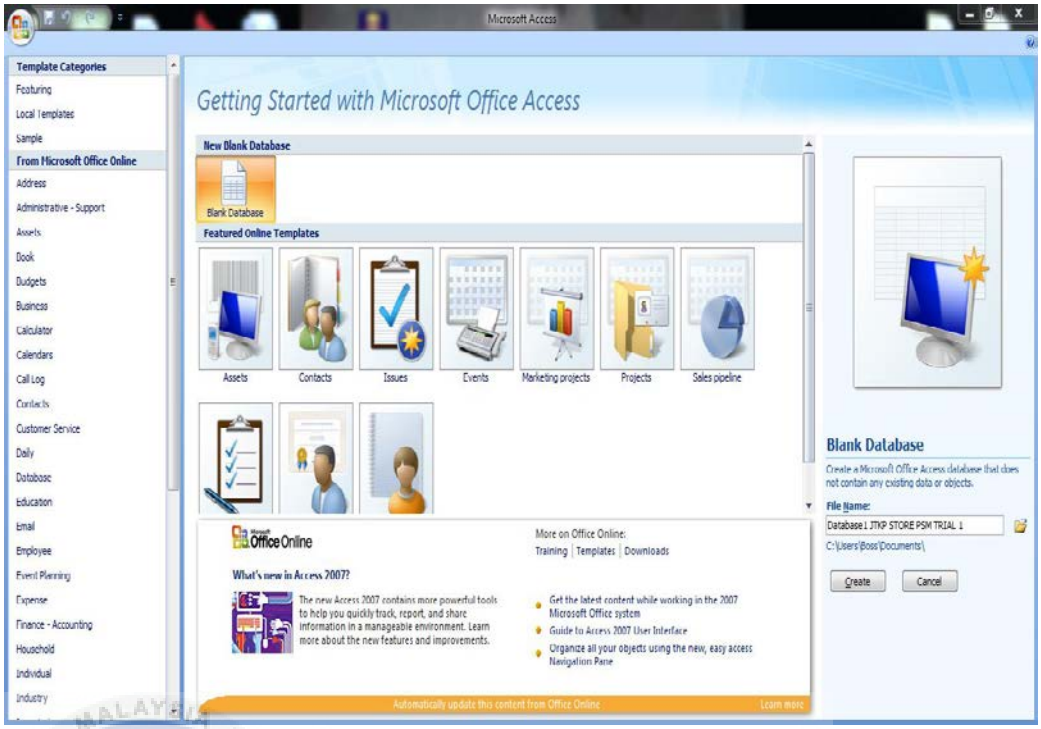


Figure 3.4 : Create File Name

5. Click Create to create new database and Access will create new database as a saved file name. New table will appear in Datasheet view as shown in Figure 3.5.

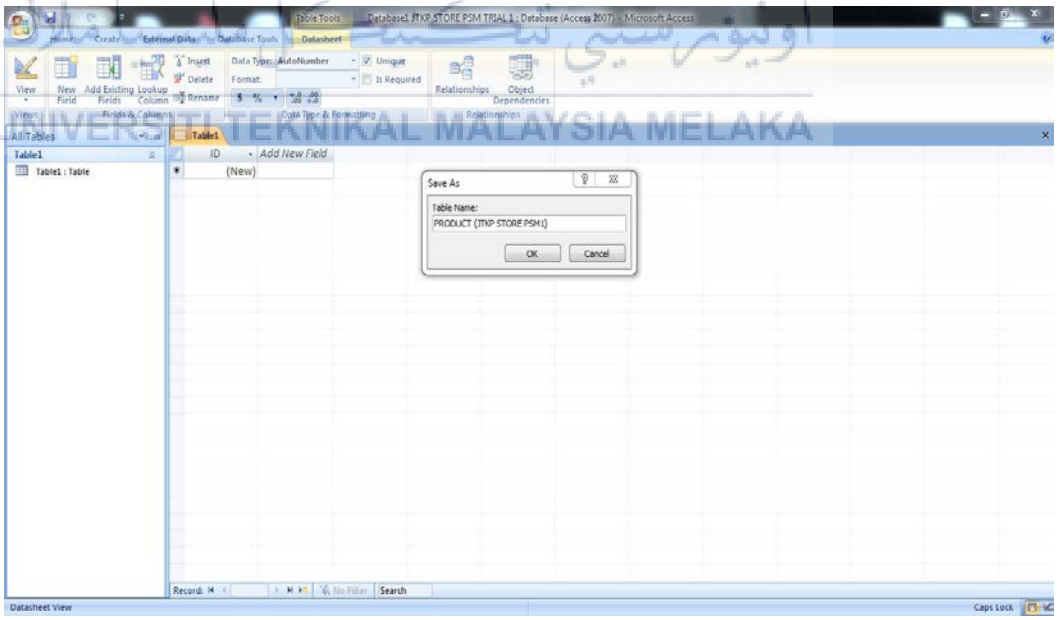


Figure 3.5 : New Table

After create a new database, second step is to create a table. Table created by entering the data. Following guidelines to create a new table by entering collection of data.

1. Right click on the name of table name that have save in previous step (Database JTKP Store PSM). Select Design View and click OK.
2. Click in the top row, first column.
3. Enter the first field with name (Item Number)
4. Use the Tab key to go to the next column to define data type. Click drop-down and select Auto Number.
5. Use Tab key to go to next column, and enter a description for new field.
6. Click the second raw to define the next field in the table and proceed. Table 1 (Product Table) shown in Figure 3.6 below.

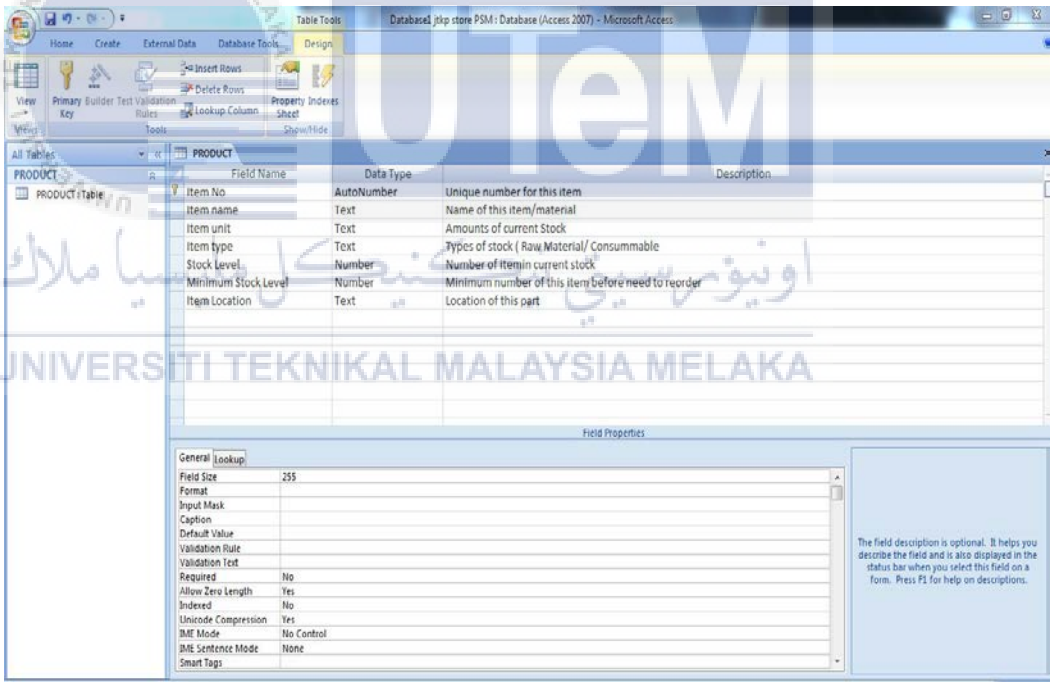


Figure 3.6 : Table 1 Product

7. To create a new table, Table 2 Owner, click Create tab on the ribbon and click on Table. Click View and select Design View and click OK as shown in Figure 3.7 below.

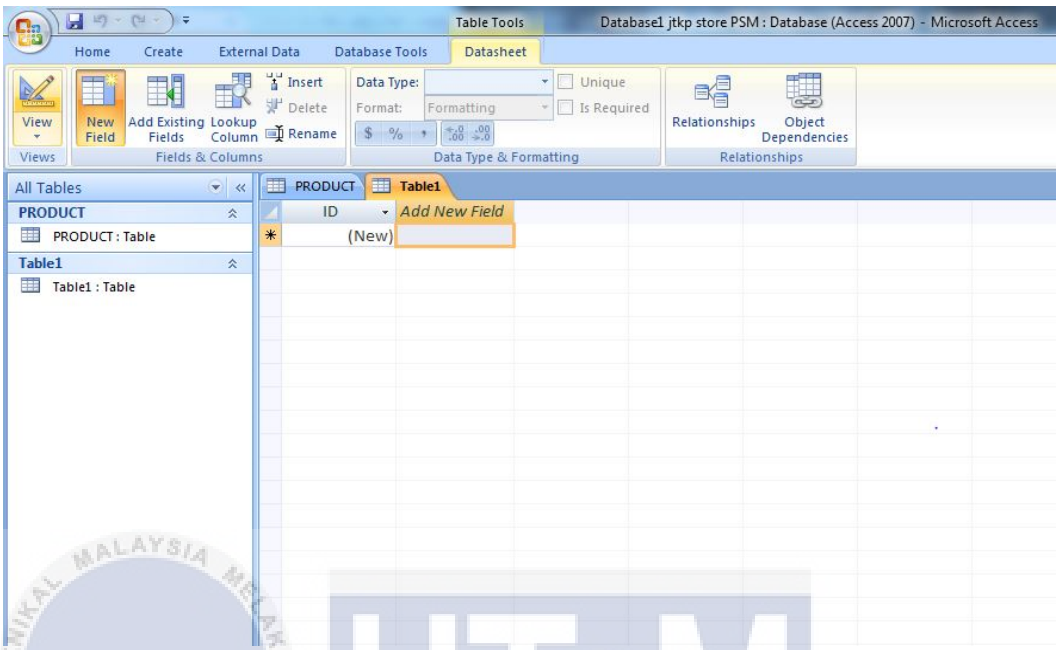


Figure 3.7 : Table 2 Owner

8. By following previous step in creating Table 1 for product, Table 2 Owner shown as Figure below.
9. Next table name as Customer and procedures follow as previous procedure.
10. After done with desired table, save the table and close it by clicking X (close) in the top right hand corner.

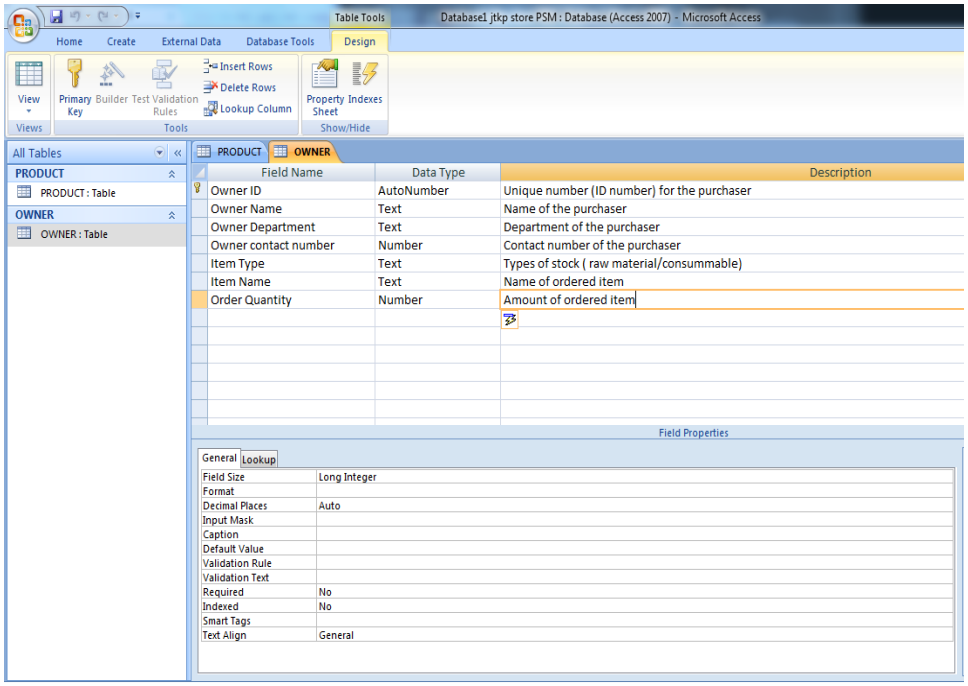


Figure 3.8 : Complete Table for Owner

3.6.3 Query

Query can be describes as a question asked of database which produces subsets of table data. Answers will be shown in query results. A query only can be used to display records that meets certain criteria of required fields (Robert T. Grauer, 2011). Following guideline shows a procedure to do a Query.

1. First step, select Create tab, click Query Design and it appear as in Figure 3.9 below.

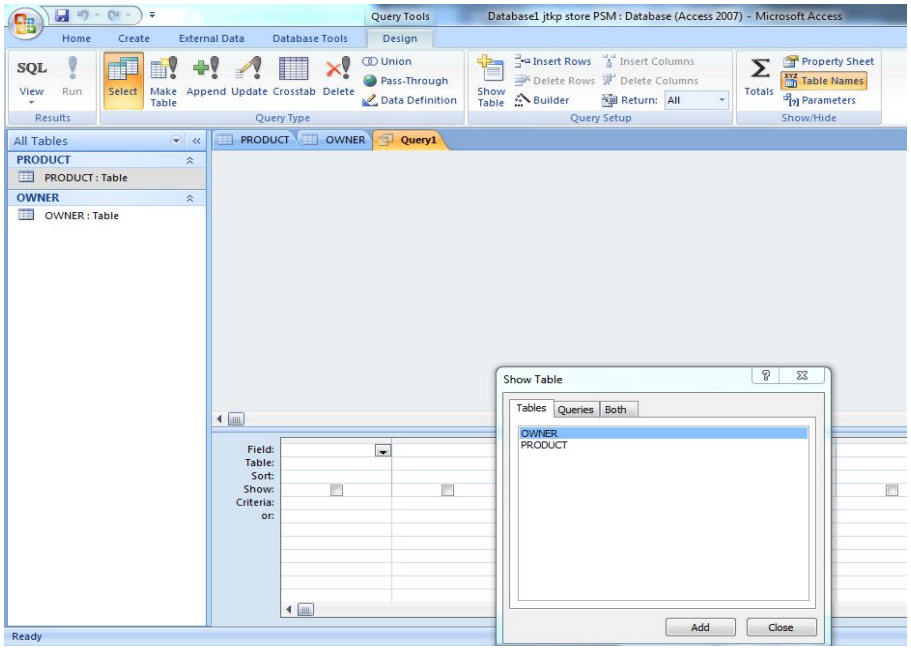


Figure 3.9 : Create Query

2. In the Show Table box, select Product, Owner and Customer, click Add and then click Close.
3. The Query design is displayed with the chosen table as shown in Figure 3.10 below. Field included in the query are added by double click.

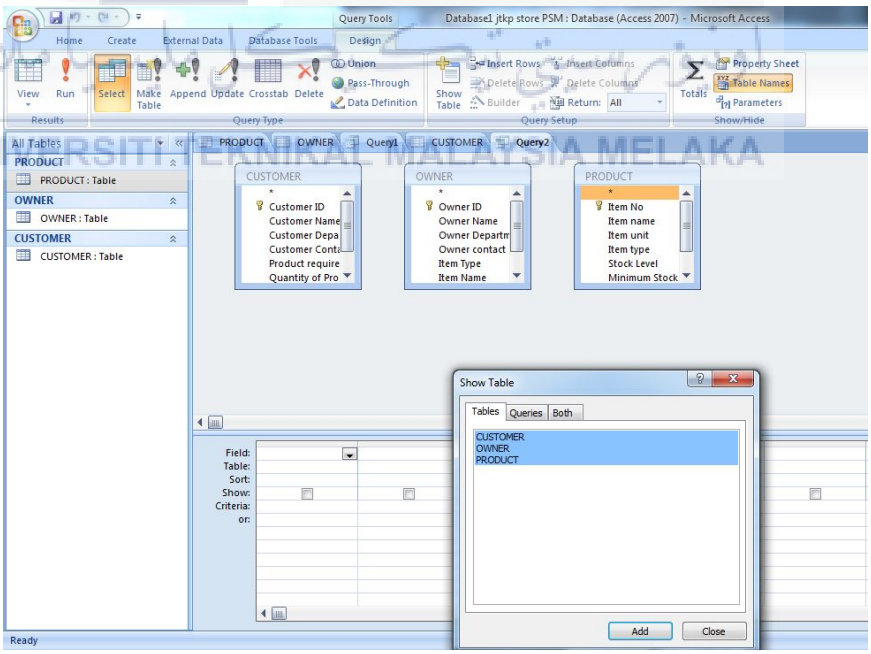


Figure 3.10 : Query Design

4. Select the field that desire to include in Query as shown in Figure 3.11 below.

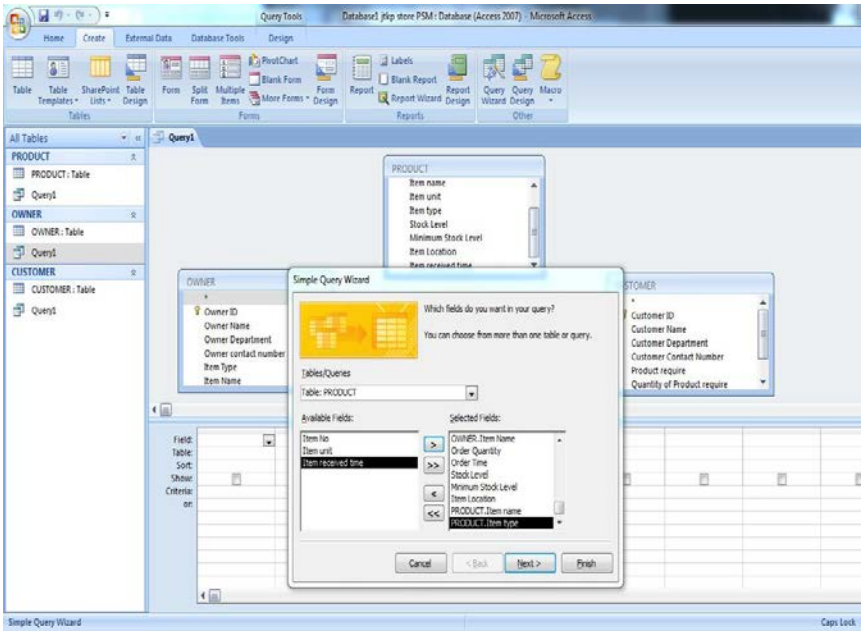


Figure 3.11: Field of Query

5. Define a relationship between the database table. Select Database tools click Relationship and at the Show Table select the database by click Add and then close. It will appear as shown in Figure 3.12.

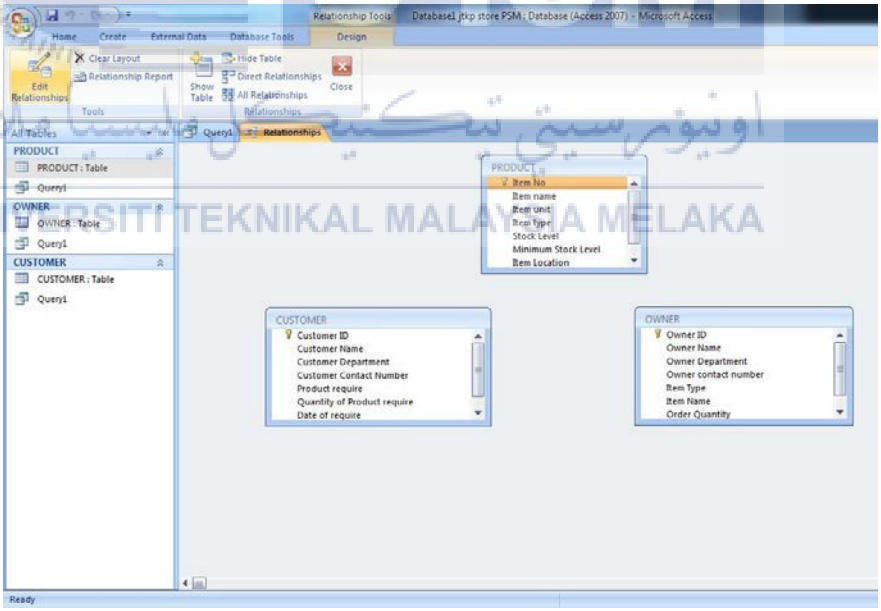


Figure 3.12 : Create Relationship

6. Relationship between database relates by double click or dragging the data to another box. Complete relationship shown as Figure 3.13 below.

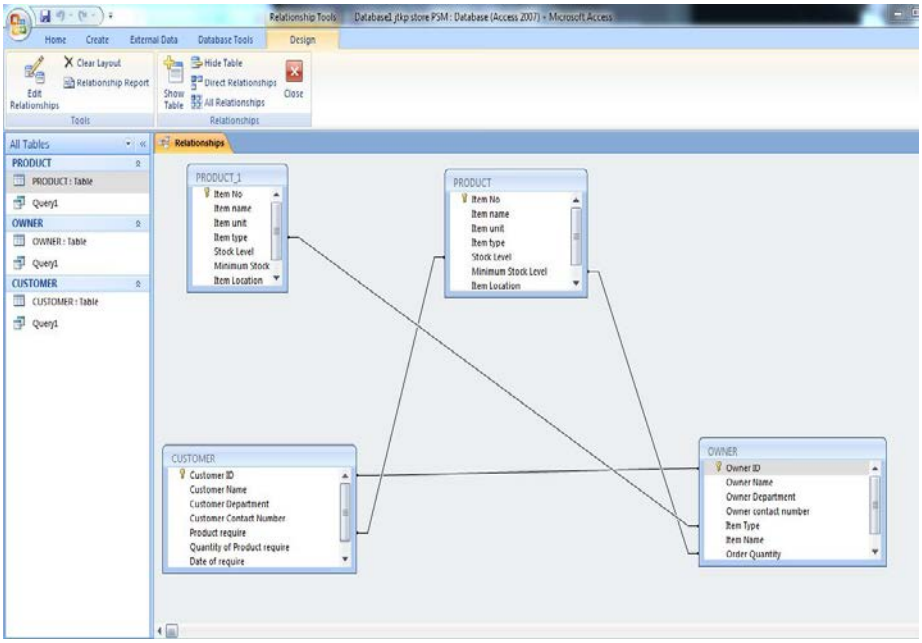


Figure 3.13: Complete Relationship

7. After done with the relationship, we can display require field as shown in Figure 3.14 below.

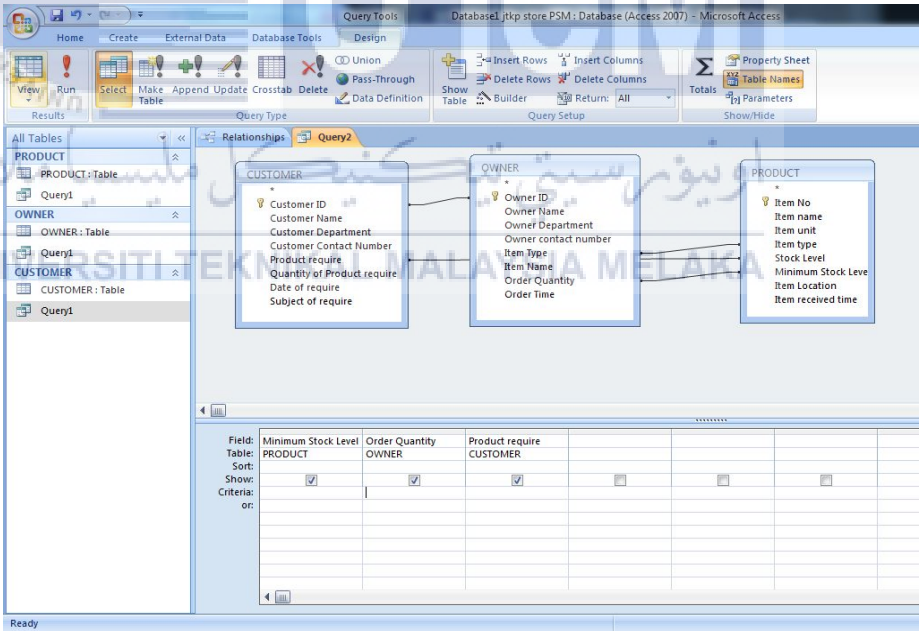


Figure 3.14 : Complete Query

3.6.4 Forms

Form displays data one record at a time and it is useful to for editing and inputting data. Form helps in manipulating data in Datasheet View as required and it helps user to focus on entering data (Robert T. Grauer, 2011). Below is the guidelines to create a form in access.

1. To create a form in Design View, click Create on the ribbon to display the Create tab.
2. Click Form Design on the Create tab to create a new form in Design View.
3. Make sure that the Design tab under Form Design Tools is open on the Access ribbon. Click on Property Sheet. This will open the Property Sheet panel.
4. In the Property Sheet window, click on the tab labeled Data. From the Record Source dropdown list, select the table that contains the fields that want to include in the form.
5. After selecting a table, click on the Add Existing Fields button on the Access ribbon. In the right panel shows a list of all available fields from the table that chose in Step 4.
6. Click on a field in the Field List panel that to add it on the form Hold down the mouse key and drag the field to the position on the form where to locate the form. Example of complete Form shows in Figure 3.15 below.

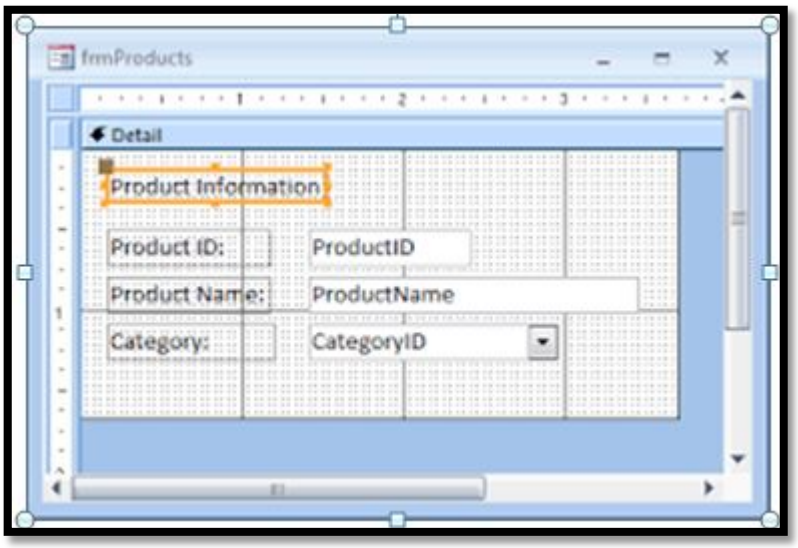


Figure 3.15: Example of Form

3.6.5 REPORT

Report can be describes as a displays data in formatted output with groups and totals. It is a printed document which displays information from a database format that consist of meaningful information to the readers.

1. Click Create on the Ribbon to display the Create Tab.
2. Click Report Wizard button on the Create tab to start Report.
3. Select field to include in the report and click the Add Field Button to add the selected field as shown in figure 3.16.

Figure 3.16 : Report Field

4. By followed the same technique, select all the desired field.
5. Click the Next button to display the next Report Wizard screen.
6. Select on the Module Part and choose Tabular layout and Portrait orientation as shown in figure 3.17.

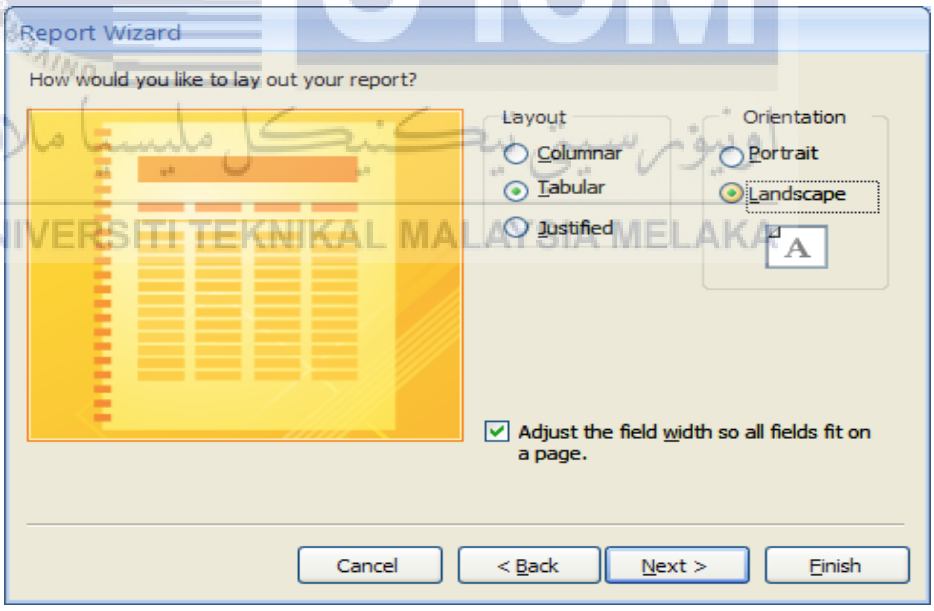


Figure 3.17 : Module Part

7. Click the next button to display the next Report Wizard screen and choose the desired styles.

8. Click the Next Button and then type the title of the report as shown in example of Figure 3.18.

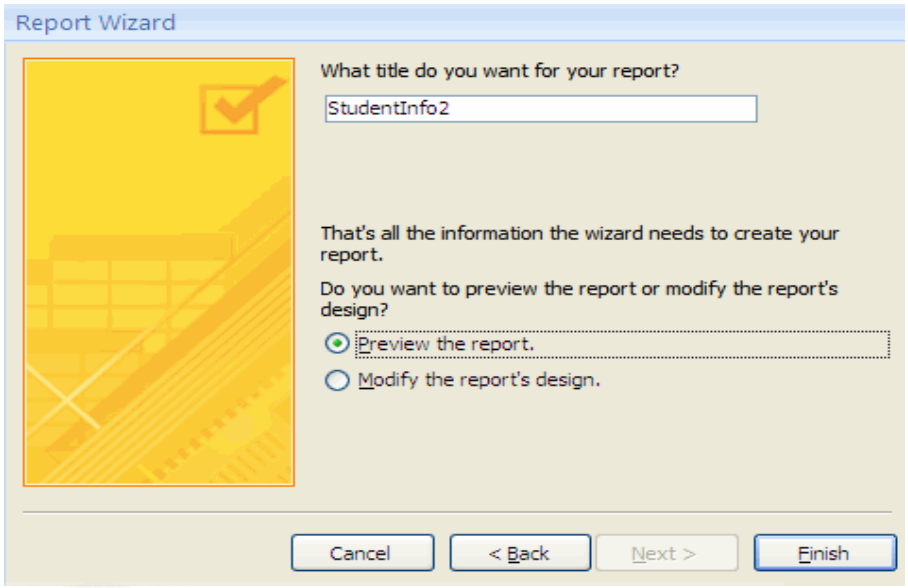
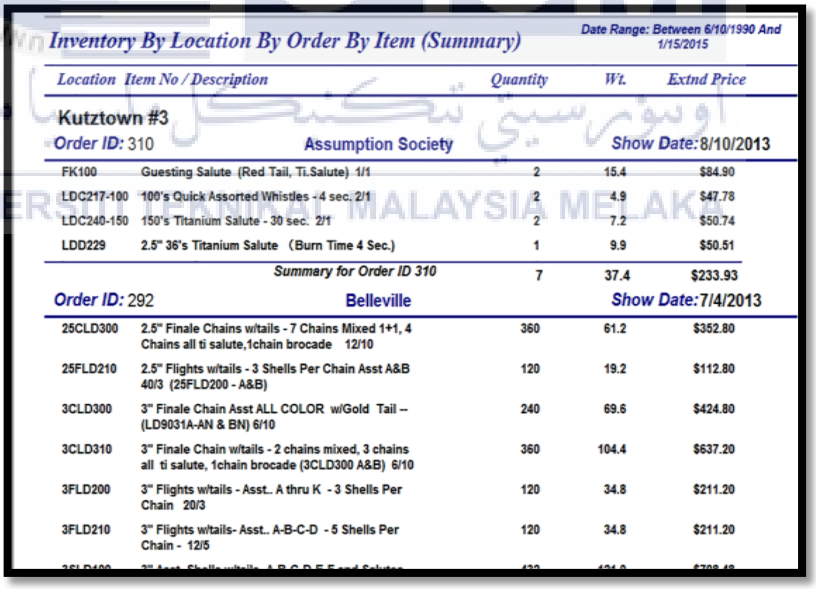


Figure 3.18: Report Title

9. Click the Finish button to produce the report. Figure 3.19 below shows an example of Report in Microsoft Access.



Inventory By Location By Order By Item (Summary)

Date Range: Between 6/10/1990 And 1/15/2015

Location	*Item No / Description*	*Quantity*	*Wt.*	*Extnd Price*
Kutztown #3				
Order ID: 310	**Assumption Society**		*Show Date:* 8/10/2013	
FK100	Guesting Salute (Red Tail, Ti.Salute) 1/1	2	15.4	$84.90
LDC217-100	100's Quick Assorted Whistles - 4 sec. 2/1	2	4.9	$47.78
LDC240-150	150's Titanium Salute - 30 sec. 2/1	2	7.2	$50.74
LDD229	2.5" 36's Titanium Salute (Burn Time 4 Sec.)	1	9.9	$50.51
	Summary for Order ID 310	7	37.4	$233.93
Order ID: 292	**Belleville**		*Show Date:* 7/4/2013	
25CLD300	2.5" Finale Chains w/tails - 7 Chains Mixed 1+1, 4 Chains all ti salute,1chain brocade 12/10	360	61.2	$352.80
25FLD210	2.5" Flights w/tails - 3 Shells Per Chain Asst A&B 40/3 (25FLD200 - A&B)	120	19.2	$112.80
3CLD300	3" Finale Chain Asst ALL COLOR w/Gold Tail -- (LD9031A-AN & BN) 6/10	240	69.6	$424.80
3CLD310	3" Finale Chain w/tails - 2 chains mixed, 3 chains all ti salute, 1chain brocade (3CLD300 A&B) 6/10	360	104.4	$637.20
3FLD200	3" Flights w/tails - Asst.. A thru K - 3 Shells Per Chain 20/3	120	34.8	$211.20
3FLD210	3" Flights w/tails- Asst.. A-B-C-D - 5 Shells Per Chain - 12/5	120	34.8	$211.20

Figure 3.19 : Report in Microsoft Access

3.7 Triggering Method

In this project, triggering method implement by apply Visual C# Software integrates with Microsoft Access to trigger product's stock out limit. Visual C# is a object – oriented language that consist of set of instruction statements (Doyle, 2011). Coding shows an examples of programming code of trigger stock out limit.

```
public InventoryForm()
{
    InitializeComponent();

    Program.CheckInventoryEvent += Program_CheckInventoryEvent;

}

private void Program_CheckInventoryEvent(object sender, EventArgs e)
{
    try
    {
        connection.Open();
        OleDbCommand command = new OleDbCommand();
        command.Connection = connection;
        string query = "select Item, Quantity from Inventory WHERE
Quantity < 15";
        command.CommandText = query;

        // Find low Inventory items and display in dialog
        StringBuilder sb = new StringBuilder();
        OleDbDataReader reader = command.Execute();
        while (reader.Read())
        {
            sb.AppendLine(string.Format("{0} qty: {1}"),
reader["Item"].ToString(), reader["Quantity"].ToString());
        }
        connection.Close();

        MessageBox.Show(sb.ToString(), "Low Inventory Items");
    }
    catch (Exception ex)
    {
        MessageBox.Show("Error " + ex);
    }
}
```

3.8 Test Run

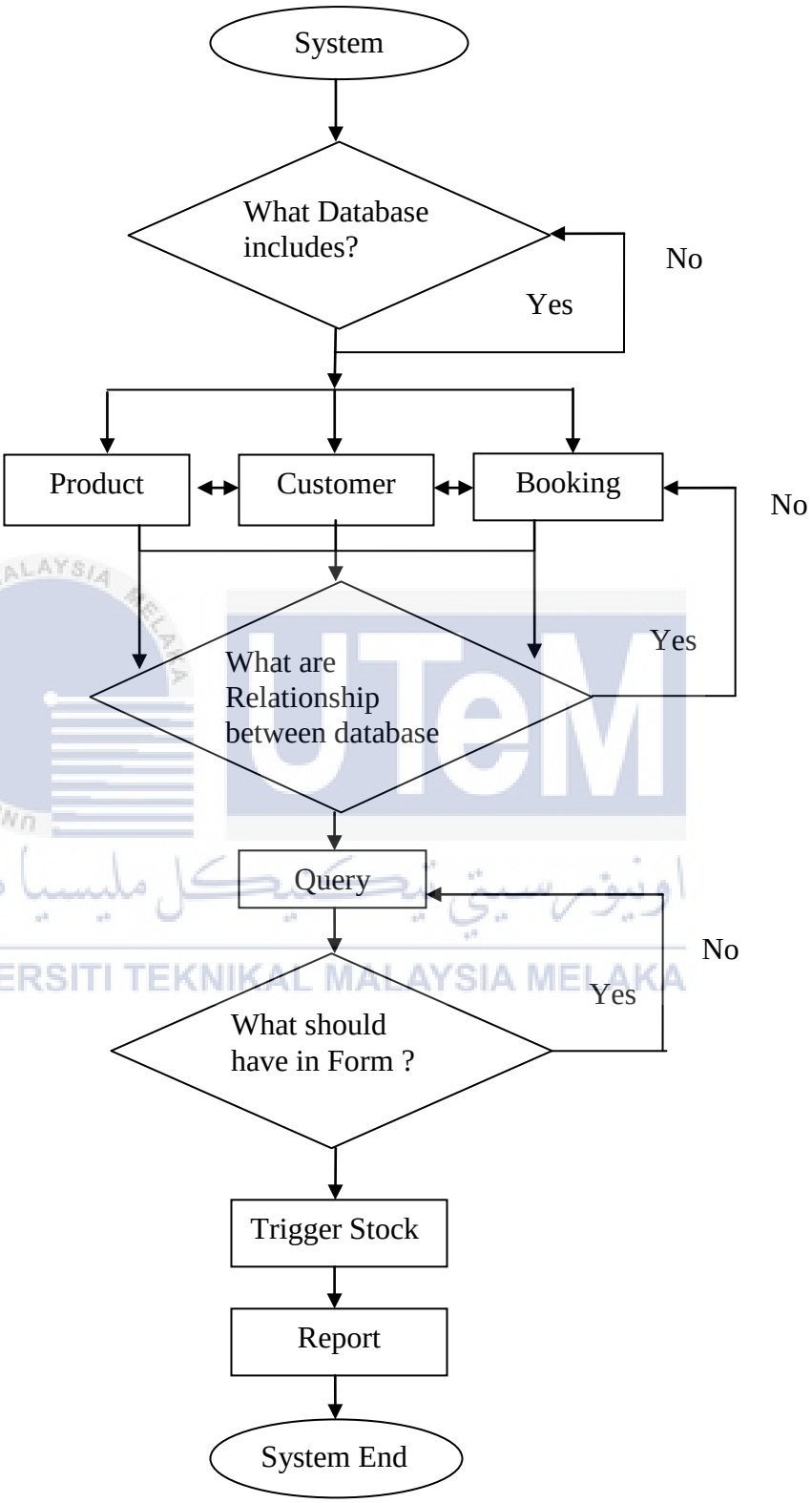
Test run for this project done by implement this Inventory System in JTKP Store's computer. Performance of this system are based on its reliability regardless of its function and accessibility.

3.9 XAMPP Server

Xampp server is recognized as open source and free server that offered several operating system. This open source server is implement in PHP website which operate as a local server. Xampp server enclose with several operating system such as Apache, MySQL and PERL.

3.9.1 Flowchart XAMPP

XAMPP flowchart below described on the system flow of inventory system in the server. It also include the three main data collected which involves inventory activities in that particular Inventory System. Three main data collected are Product, Customer and Booking database.



Flowchart 3.3 : XAMPP Flowchart

3.9.2 Create Database in MySQL

A collected data can be store in a database tools. MySQL is used as database management tools to record the related desired activities. As for this system, MySQL will be use to record inventory activities in Factory 2 Inventory System. Procedure below described on how to create a database in Xampp MySQL database which is based on MAGENTECH website at;
<https://www.magentech.com/documentation/how-to-create-a-mysql-database-using-xampp/>

1. Once install XAMPP server, user can click to open browser and enter http://localhost/phpmyadmin and it will directed to MySQL setup page as illustrate in figure 3.20.

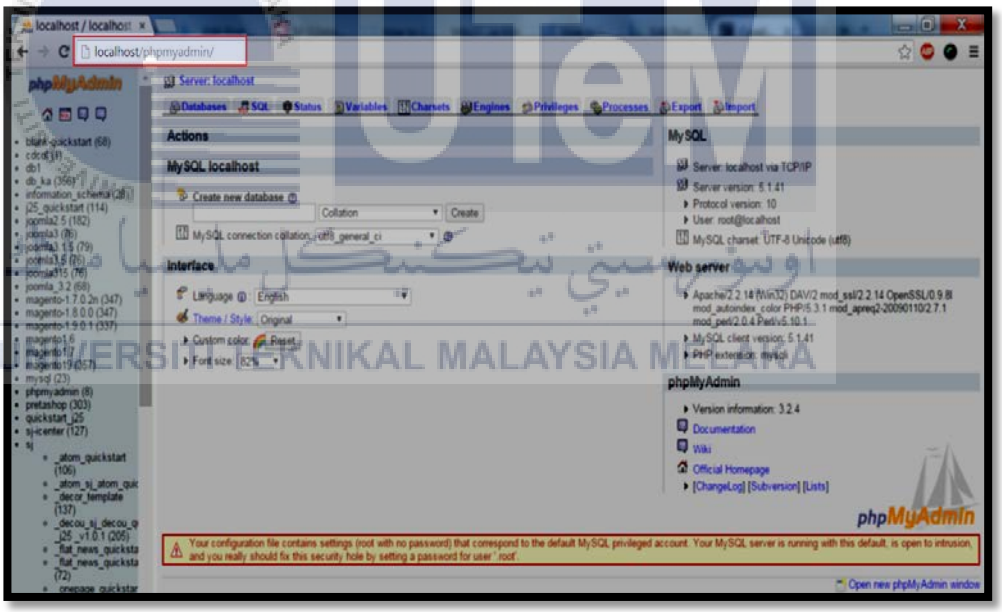


Figure 3.20 : Localhost PHP

2. Next, insert a database name and click on ‘Create’ icon. Database name required to have maximum 64 character or less and create contain of number, letter and underscore. Using numbers at the beginning of database name must be avoid. A fine database name supposed to point out the intention of the database. For instance : your_database as show in Figure 3.21.

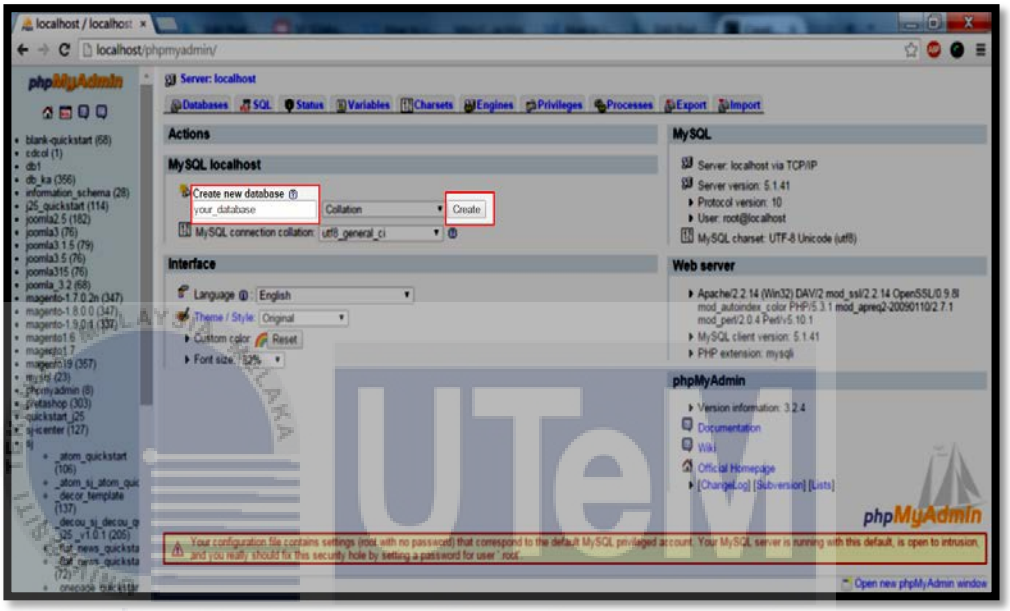


Figure 3.21 : Database Name

3. Final step, make certain that the database successfully create.

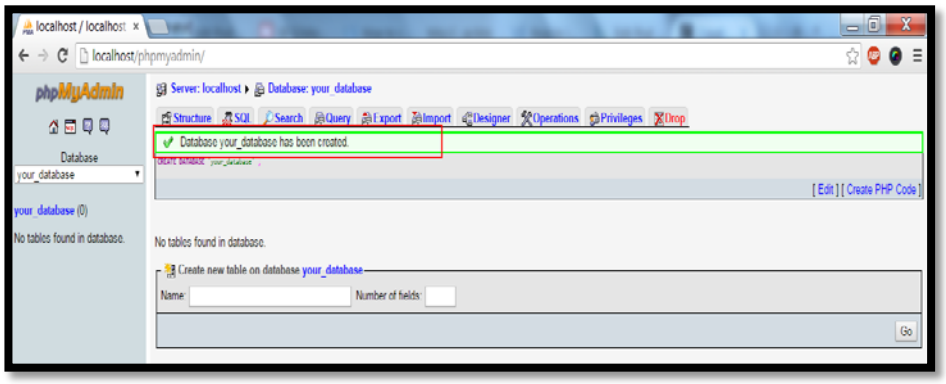


Figure 3.22 : Database Created

3.9.3 Create Table in MySQL

Creates table in MySQL by means of desire data collected to be added in the system. For this inventory system three main data collected are based on Product, Customer and Booking database. Procedure to create table in PHPmyadmin MySQL are based on Bluehost website at ;

<https://my.bluehost.com/cgi/help/2160>

1. Choose desire database to work with.
2. Within the structure tab, below list of table, there will be a location to 'Create tables on database'.
3. On the 'Name' icon, insert the name of the table.
4. On the 'Number of Columns', insert desire number of columns to construct. Additional desire column able to add more later.
5. Next, press the 'Go' button to continue on the following screen.
6. Define the column by entering subsequent information ;
    a) Column name
    b) Data type of that column will hold such as ;
        - INT – integer (number without decimal point)
        - CHAR – character (hold text to a specific length)
        - VARCHAR- variable length character (text field is not a fixed width)
        - TEXT- hold large amount of text
        - DATE – hold dates
        - DATETIME - hold date and time
7. Finally, click on 'Save' once complete defining columns.

A notification representing the created table will come display, and the new table will show on the list of tables in the database. Hence, by click on the table, user able to see the previous created columns.

CHAPTER 4

RESULT AND DISCUSSION

4.0 Introduction

In this section, relevant result from the inventory system which include three basic element in database, Product, Customer, Booking will be discussed. In addition, the function of the inventory system such as requesting order, restock and triggering stock out limit will be highlighted.

4.1 Function of Inventory System

Factory 2 inventory system is a system that helps in display the product in a webpage format. In this system, product will display on the webpage to ease the request and to restock. Moreover, this system is included with triggering and tracking system of the product in term of current stock and current location.

4.1.1 Start up System

To start the system, Xampp must be activated. Figure 4.1 below shows the earliest step to run the system. Apache and MySQL need to activated by click on start button.

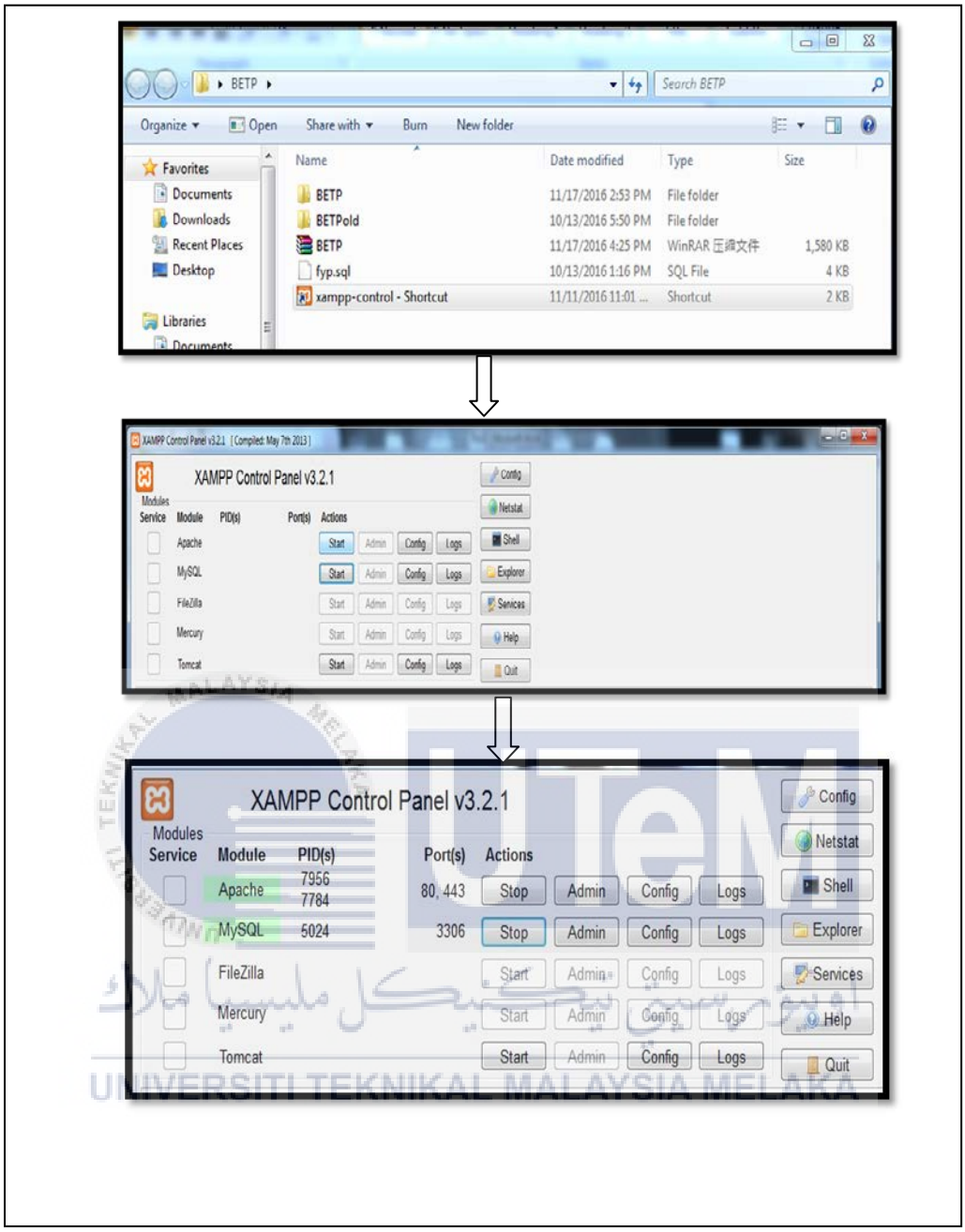


Figure 4.1 : Start Up System

In the figure above, it shows the earliest step to activate or to enter the system. The sequence involved are :

i. Double click on Xampp-Control

ii. Click ‘ START’ button on both Apache and MySQL, wait a few seconds until the box turns into green highlight.

Once the Xampp activated, user must browse Google Chrome in order to directed to the Factory 2 Inventory webpage as shown in Figure below. Steps involve in this section are:

i. Click on Google Chrome browser
ii. Type ‘ localhost/ BETP/index.php’

Figure 4.2 : Browse in Google Chrome

Figure 4.3 : Factory 2 Inventory Webpage

4.1.2 Customer Registration

After directed to the webpage, a new or first time customer must register at the webpage and fill in the compulsory requirement in that section. Figure below shows the sequence in customer registration.

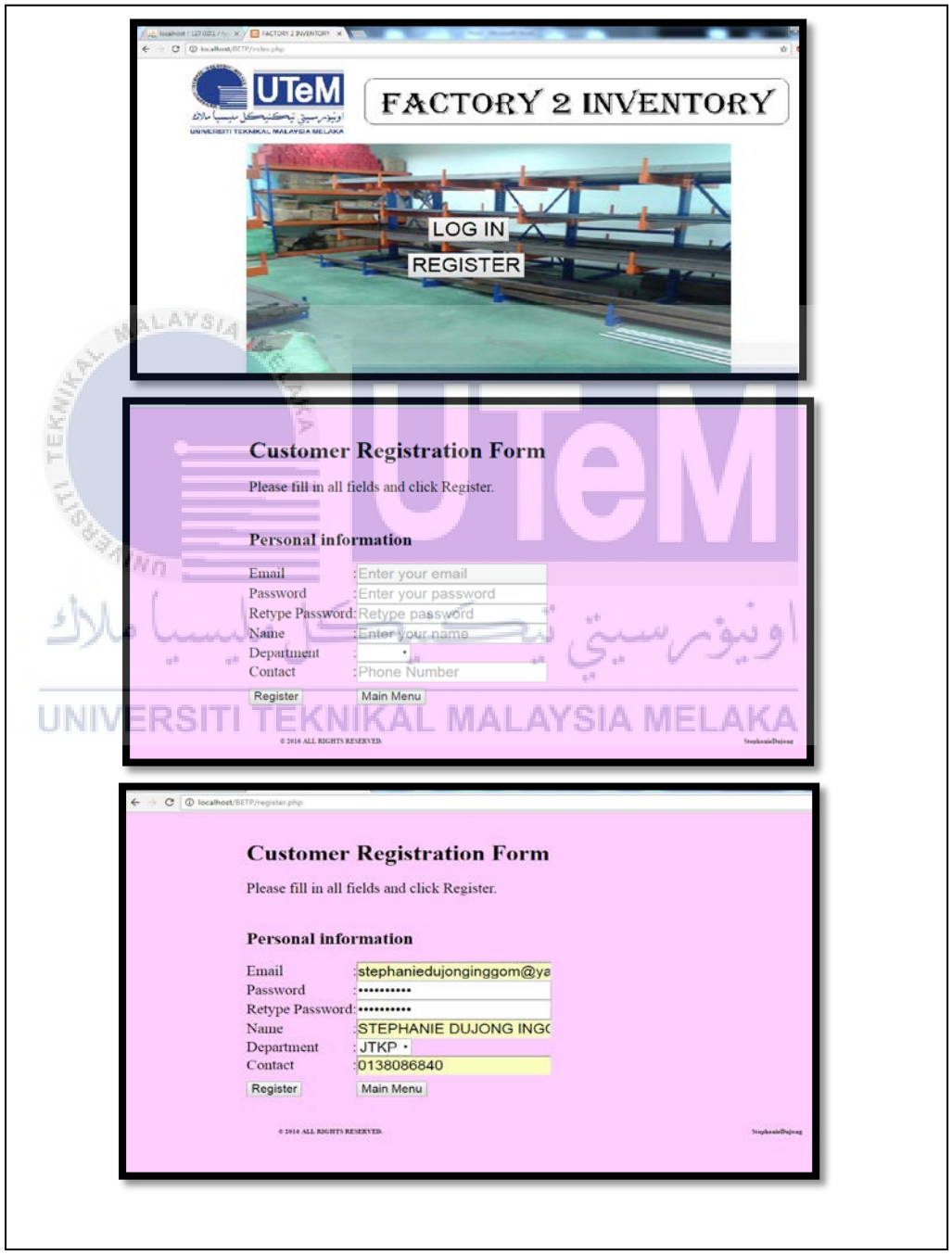


Figure 4.3 : Customer Registration

For example, new customer must registered by fill in Personal Information such as below text.

i.	Email	:	stephaniedujonginggom@yahoo.com
ii.	Password	:	B071310033
iii.	Re- Type Password	:	B071310033
iv.	Name	:	STEPHANIE DUJONG INGGOM
v.	Department	:	JTKP
vi.	Contact	:	0138086840

4.1.3 Request Product

Once successful registered as a customer, it will directed to the front webpage, where the registered customer can log in into the product catalogue. All of the figure below represent the sequence involve in this section.

Figure 4.4 : Customer Log In

Figure 4.4 point up the steps in customer log in. Once success in log in, customer will directed into the webpage, which customer will able to place their order. Figure 4.5 shows that customer has succeed log in.

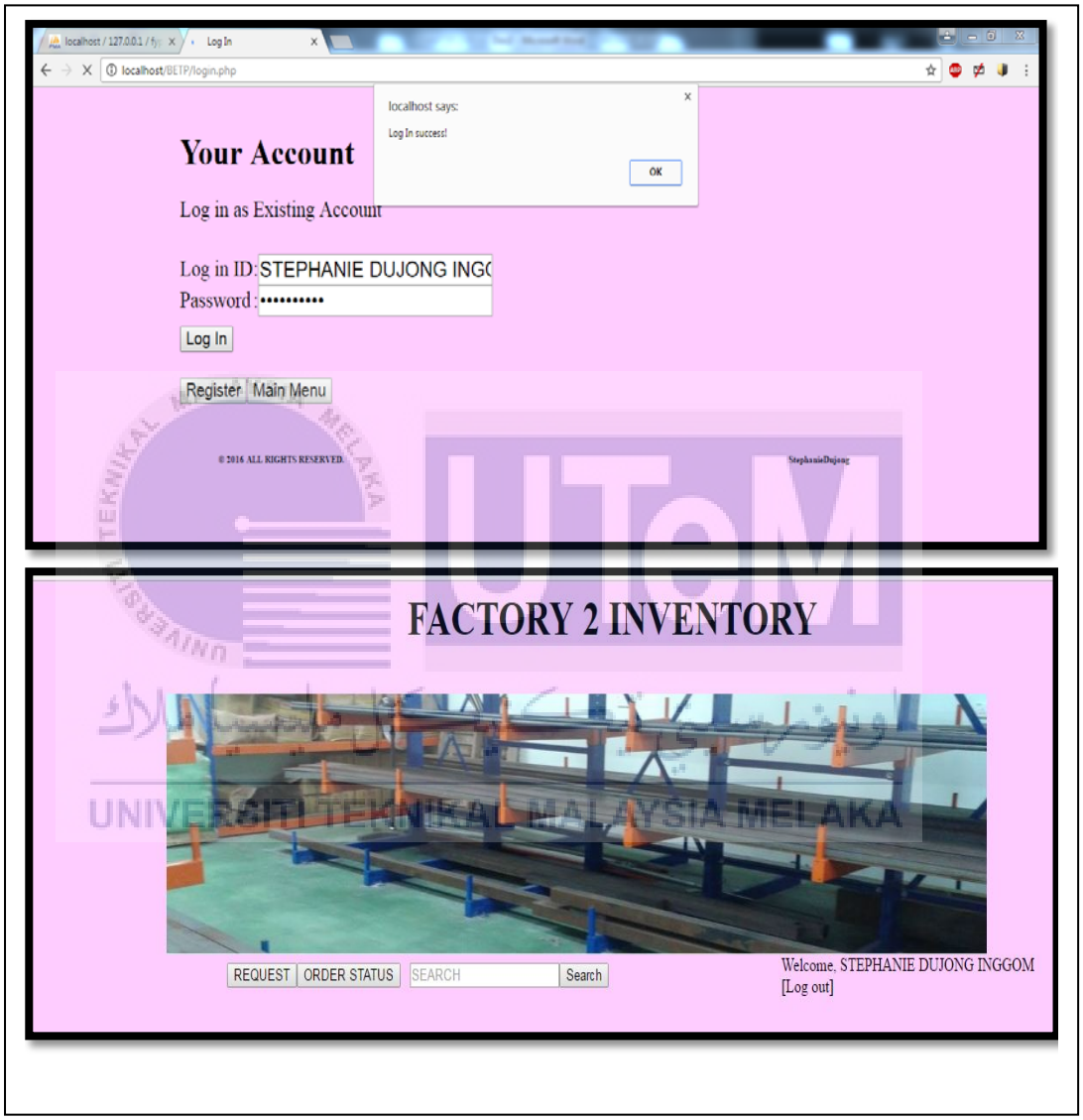


Figure 4.5 : Log In Success

Once entering the webpage, customer will able to proceed with request order. Request order sequence are shown in figure below.

Figure 4.6 : View Product

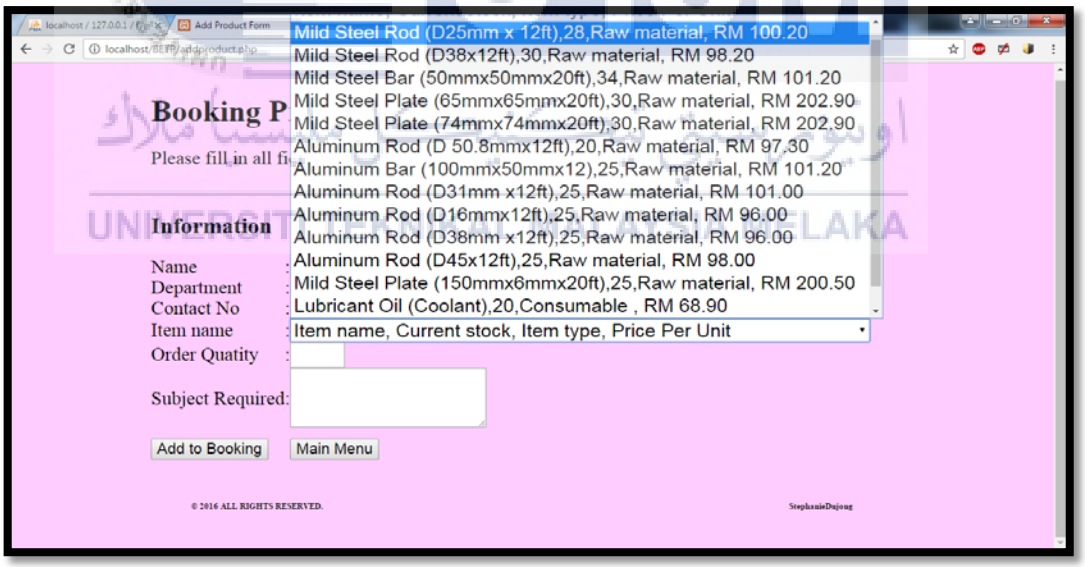


Figure 4.7 : Select Product

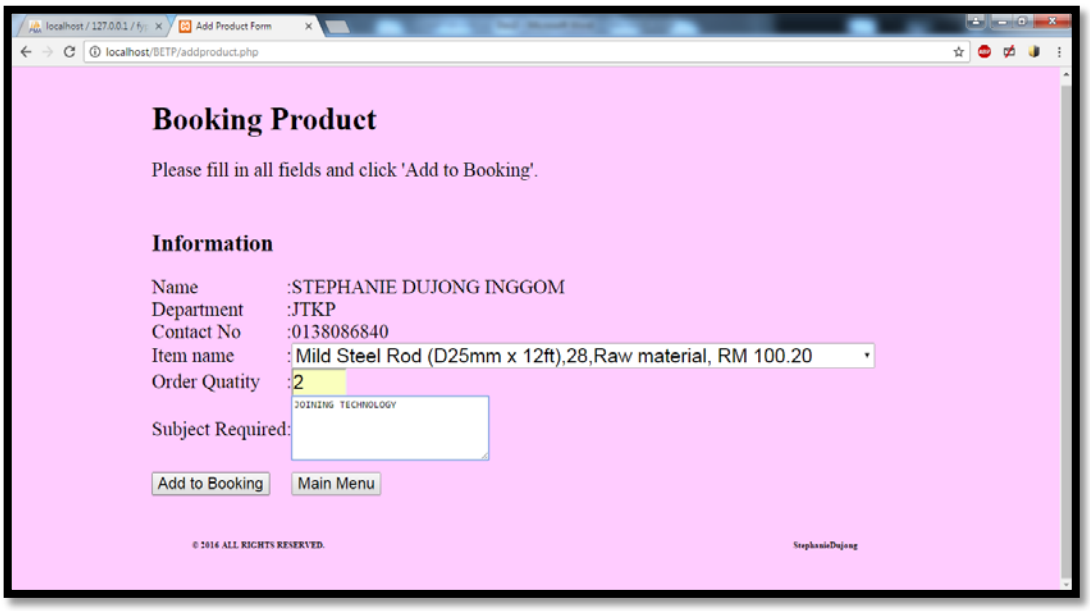


Figure 4.8 : Add Booking

Based on three figure above, it shows three main stage necessitate in placing the request. Figure 4.6 illustrate the first page in reviewing product. In this page, customer be able to view the product in that catalogue. As soon as customer click on the product name, it will directed to next step which is selecting product as demonstrate in Figure 4.7. Subsequent to previous step, customer can add booking by fill in the essential information as shown in Figure 4.8. Below are the example of information that need to be fill.

i.	Name	:	STEPHANIE DUJONG INGGOM
ii.	Department	:	JTKP
iii.	Contact Number	:	0138086840
iv.	Order Quantity	:	2
v.	Subject Require	:	Joining Technology

4.1.4 Review Status Order

After complete the booking, customer able to review their status only after the admin response to the order. Reviewing status order are demonstrate in Figure 4.9 below.

Figure 4.9 : Review Order Status

Customer can assess their request status by clicking on 'ORDER STATUS' icon. This page will display the customer request status as illustrate in figure 4.10 below. At this page, customer will get the message from admin whether their order approve or reject.

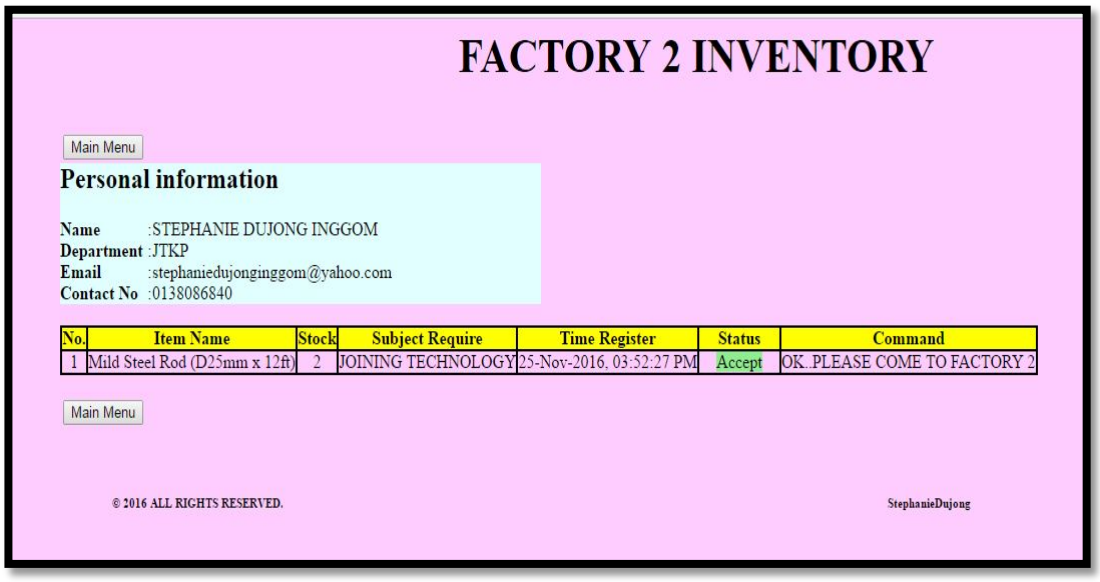


Figure 4.10 : Approve Request

4.1.5 Admin Log In

Log in as a admin is similar to customer log in. Figure 4.11 explain the step involve in log in as an admin. As for this inventory system, the admin is as present below ;

i. Log in ID : Stephanie
ii. Password : 890507

The difference is, admin page has additional two icon which is ‘Restock’ and ‘ List All Booking’ as display in Figure 4.12.

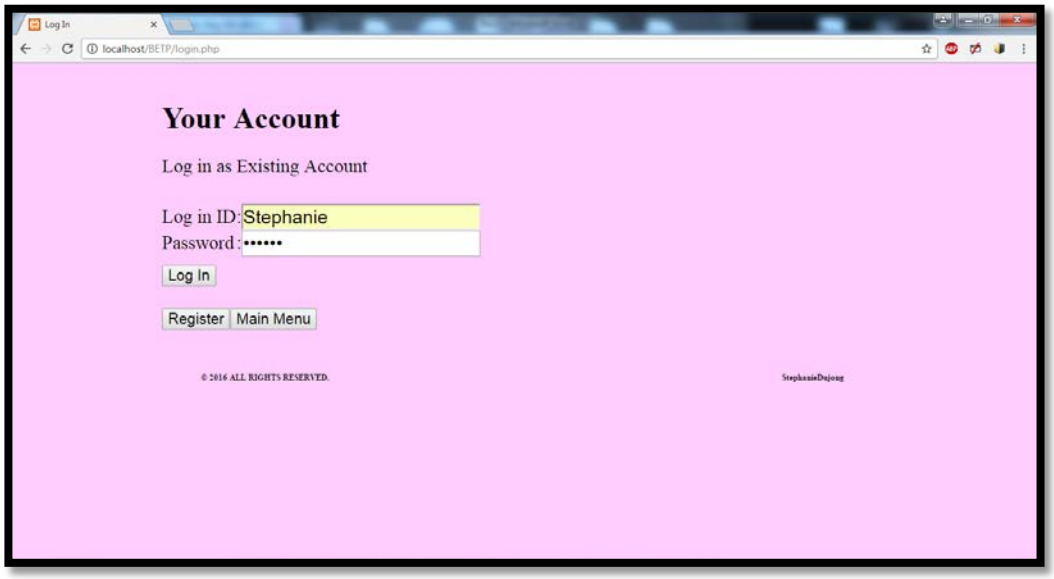


Figure 4.11 : Log in Admin

4.12 : Admin Page

4.1.6 Update Order Status

Admin as an in charge of this system has a responsibility to update the customer's order status. Update status by means of determine the order approve or refuse.

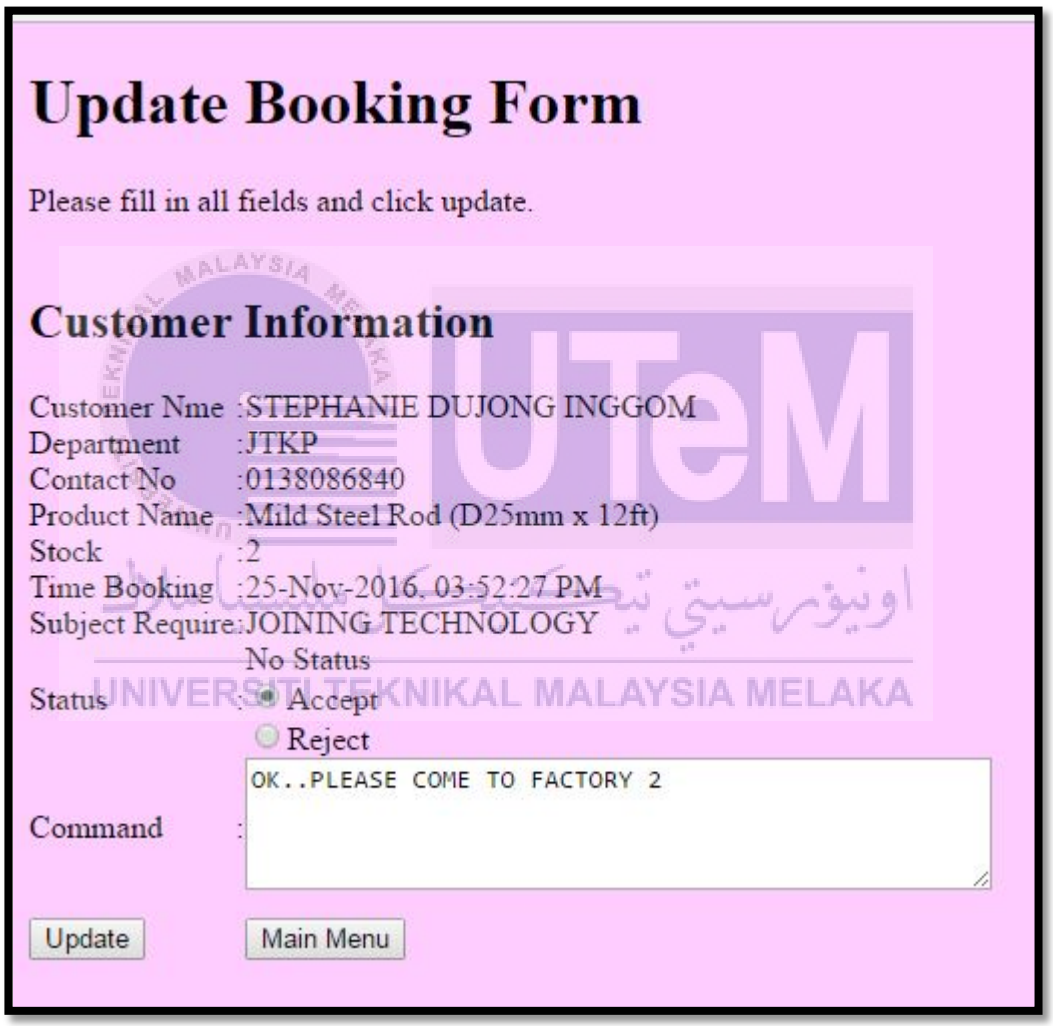


Figure 4.13 : Update Booking Form

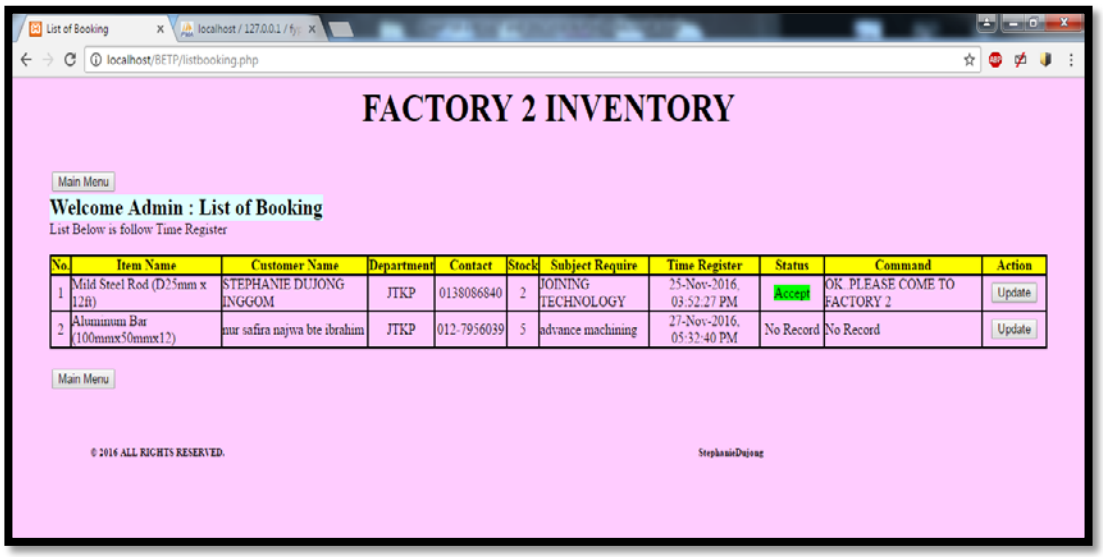


Figure 4.14 : Update Request Success

To update customer order status, admin has to click on ‘ List All Booking’. After that, admin has to determine whether the customer approve by click on ‘Accept’ or refuse by click on ‘Reject’ as shown in figure 4.13. Admin be required to leave a comment by means of mention next action to be taken by customer. If the request rejected, admin must give appropriate remark about the disapproval request. Completed action then by click on ‘Update’ icon as shown in Figure 4.14.

4.1.7 Restock

Restock is employ during replenish the stock. To proceed with this task, admin must click on ‘Restock’ icon, which then it will heading for the Update Product page as illustrate in Figure 4.15. Afterward, continue with update the stock by select the product to be restock such as in figure 4.16 by fill in the compulsory fields and only then click on ‘Restock’ icon. For instance;

i. Select item to Restock : Mild Steel Plate (150mm×60mm×20 feet)
ii. Add No. of Quantity : 1 pieces

As soon as the Restock procedure accomplish, the current stock will display in table as display in Figure 4.17.

Product No	Item Name	Item Location	Current Stock	Item Type
1	Mild Steel Rod (120mm x 20ft)	Factory 2	15 Not Enough	Raw material
2	Mild Steel Rod (D25mm x 12ft)	Factory 2	26 Enough	Raw material
3	Mild Steel Rod (D38x12ft)	Factory 2	30 Enough	Raw material
4	Mild Steel Bar (50mmx50mmx20ft)	Factory 2	34 Enough	Raw material
5	Mild Steel Plate (65mmx65mmx20ft)	Factory 2	30 Enough	Raw material
6	Mild Steel Plate (74mmx74mmx20ft)	Factory 2	30 Enough	Raw material
7	Aluminum Rod (D 50.8mmx12ft)	Factory 2	20 Enough	Raw material
8	Aluminum Bar (100mmx50mmx12)	Factory 2	20 Enough	Raw material
9	Aluminum Rod (D31mm x12ft)	Factory 2	25 Enough	Raw material
10	Aluminum Rod (D16mmx12ft)	Factory 2	25 Enough	Raw material
11	Aluminum Rod (D38mm x12ft)	Factory 2	25 Enough	Raw material
12	Aluminum Rod (D45x12ft)	Factory 2	25 Enough	Raw material
13	Mild Steel Plate (150mmx6mmx20ft)	Factory 2	25 Enough	Raw material
14	Lubricant Oil (Coolant)	Factory 2	20	Consumable

Figure 4.15 : Restock

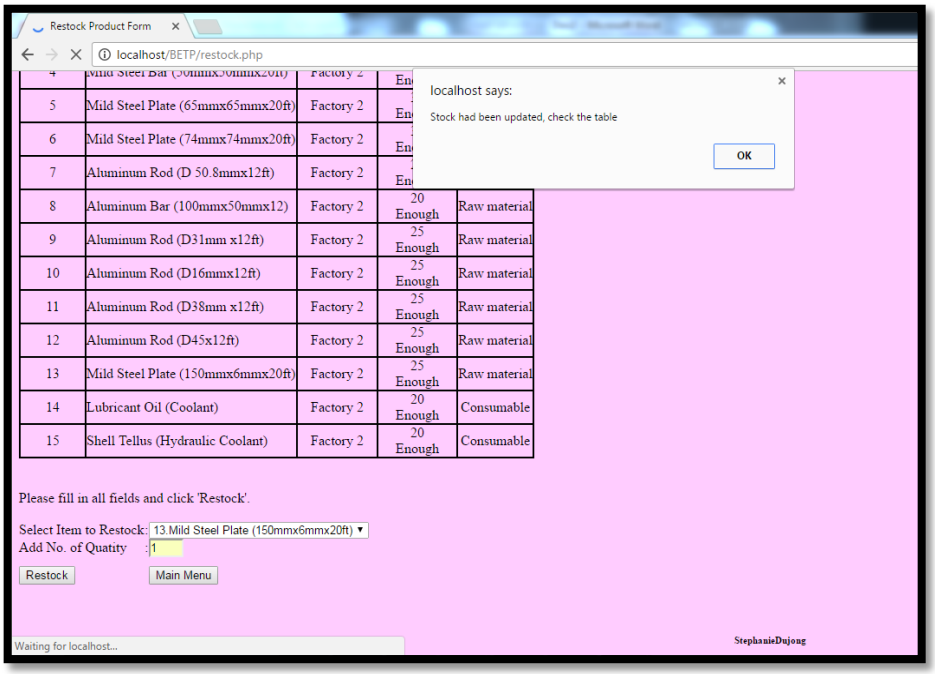


Figure 4.16 : Stock before Restock

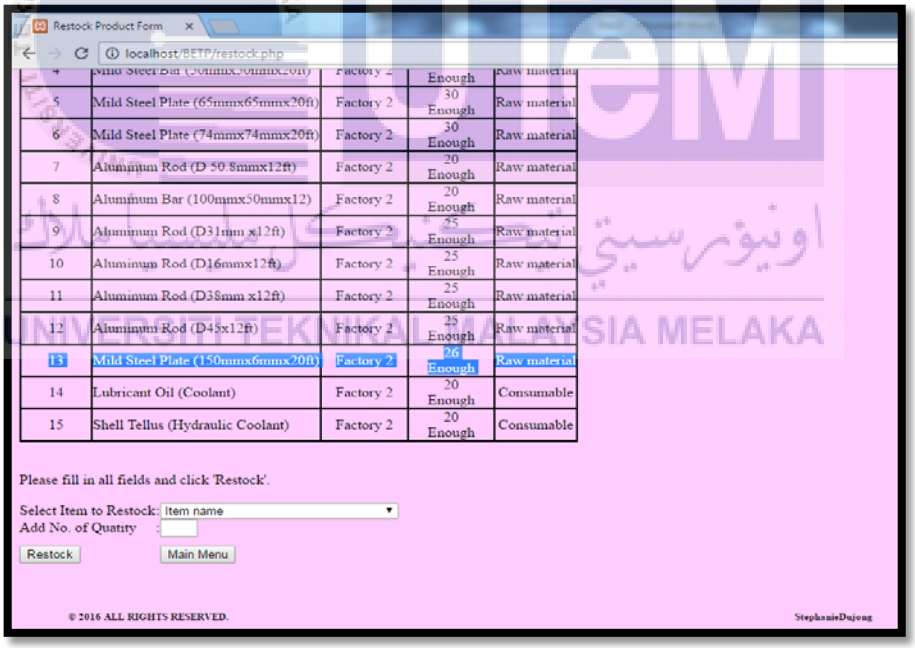


Figure 4.17 : Stock After Restock

4.2 Database

There are three main database in this Factory 2 Inventory system which include Product, Customer and Booking list. MySQL is a database management system that used to store collected data in this Factory 2 Inventory System.

4.2.1 Product Database

Product database include item name, current stock, type of inventory, item location and price per unit. Table 4.1 below shows the raw data of product which consist in product database.

Table 4.1 : Raw Data of Product

	Item Name	Item Location	Current Stock	Item Type	Cost Per Unit (RM)
1	Mild Steel Rod (120mmx12ft)	Factory 2	15	Raw material	101.20
2	Mild Steel Rod (D25mmx12ft)	Factory 2	26	Raw material	100.20
3	Mild Steel Rod (D38x12ft)	Factory 2	30	Raw material	98.20
4	Mild Steel Bar (50mmx50mmx12 ft)	Factory 2	32	Raw material	101.20
5	Mild Steel Plate (65mmx65mmx20ft)	Factory 2	30	Raw material	202.90
6	Mild Steel Plate (74mmx74mmx20ft)	Factory 2	30	Raw material	202.90
7	Aluminum Rod (D 50.8mmx12ft)	Factory 2	20	Raw material	97.30
8	Aluminum Bar (100mmx50mm)	Factory 2	20	Raw material	101.20
9	Aluminum Rod (D16mmx12ft	Factory 2	25	Raw material	101.00

10	Aluminum Rod (D38mmx12ft)	Factory 2	25	Raw material	96.00
11	Aluminum Rod (D45x12ft)	Factory 2	25	Raw material	96.00
12	Aluminum Rod (D38mmx12ft)	Factory 2	25	Raw material	98.00
13	Mild Steel Plate (20ftx150mmx6mm)	Factory 2	26	Raw material	200.50
14	Lubricant Oil (Coolant)	Factory 2	20	Consumable	68.90
15	Shell Tellus (Hydraulic Coolant)	Factory 2	20	consumable	68.90

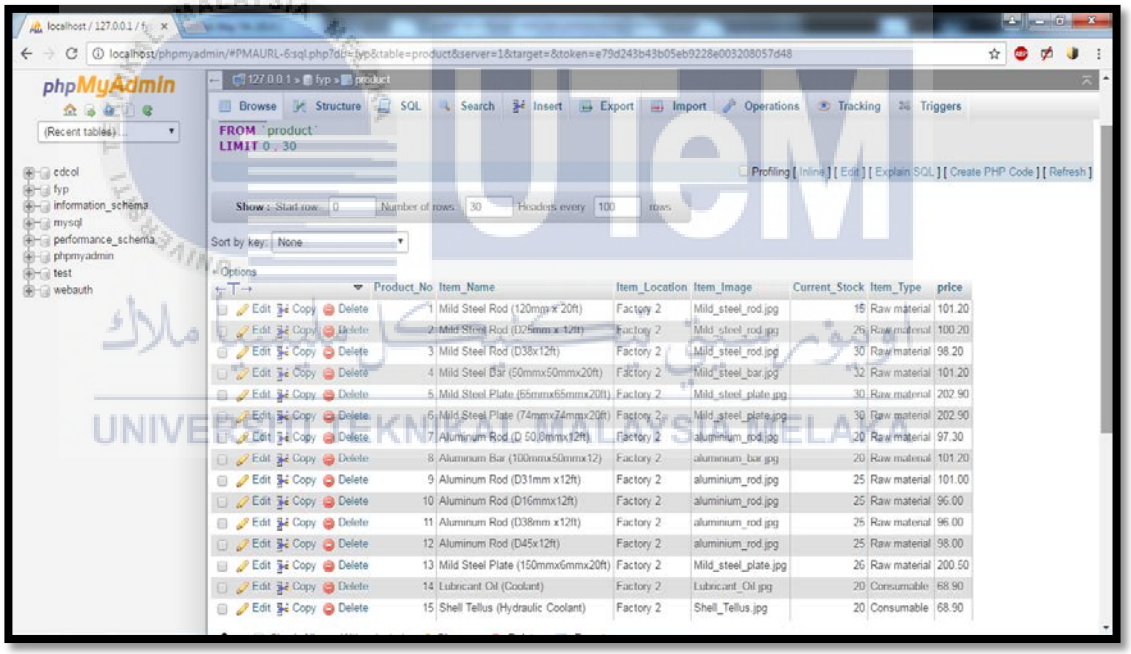


Figure 4.18 : Product Database

Figure 4.18 illustrate the Product database in MySQL format.

4.2.2 Customer Database

Figure 4.19 illustrate the customer database in Factory 2 inventory system. Customer database only updated only if there is a customer entering the system. Customer database will include the information that they had fill in on the previous registration requirement.

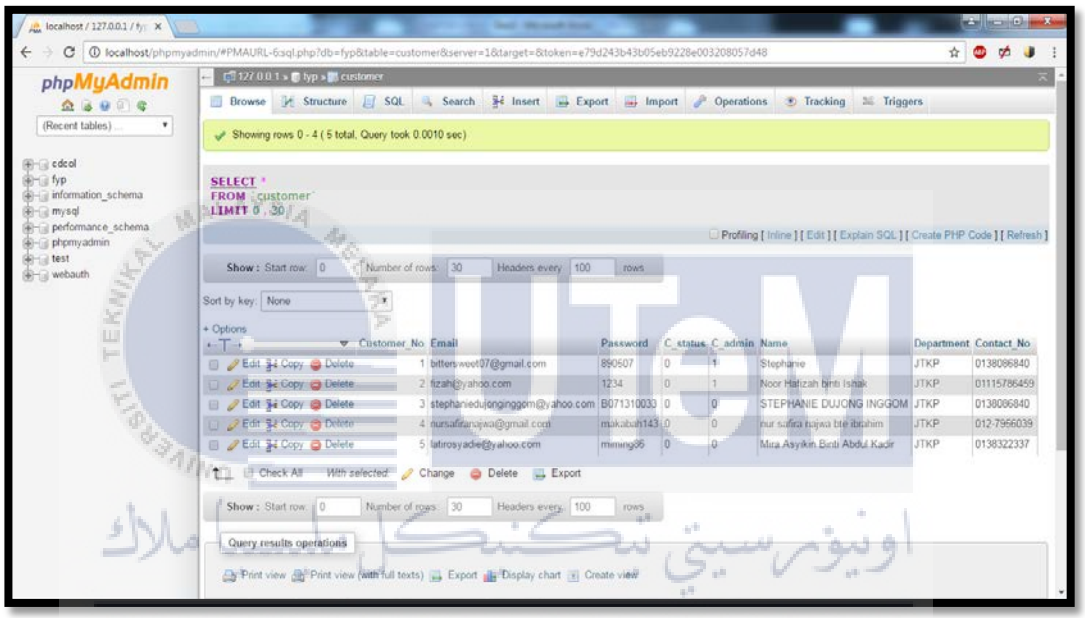


Figure 4.19 : Customer Database

4.3 Triggering Stock Limit

Figure 4.21 and 4.22 below exemplify the triggering system stock out limit of the product. When the product reach the stock limit, fifteen, notification will appear on the page. Customer will not able to perform or request order.

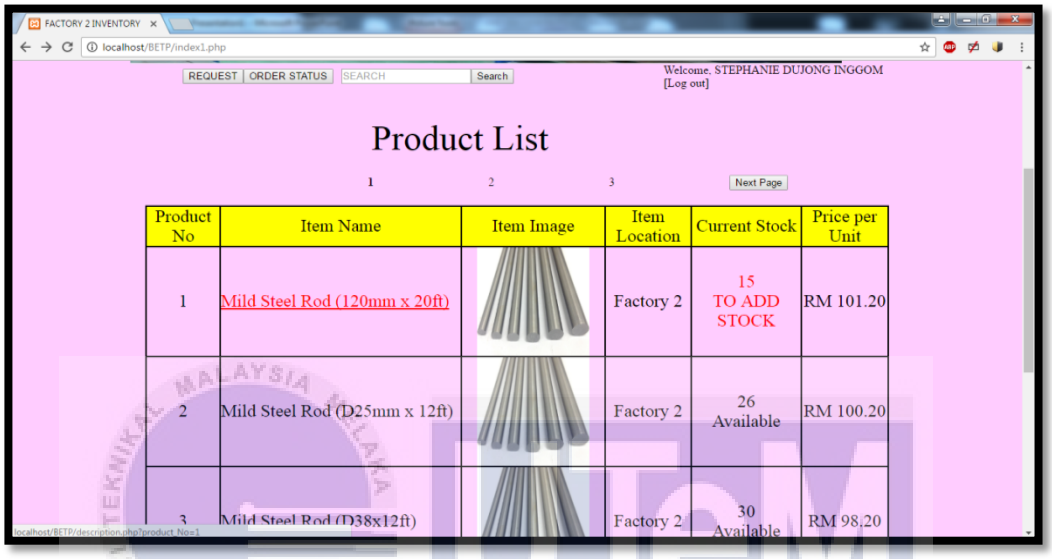


Figure 4.21 : Trigger Stockout Limit

Figure 4.22 : Stock out Warning

Based on previous chapter, Microsoft Access as a database management tools in this Factory 2 system. Throughout some studies, as a final selection, Xampp server is selected to built this inventory system.

Xampp is a known as open source and free server that consist of a varies number of operating system. This open source server is used in PHP website which perform as a local server. Moreover this server is act as a testing platform where developer of system can test their website locally before upload it to the real server without any error in that particular system.

Regarding Factory 2 Inventory System, priority is to store related data concerning on inventory activities in Factory 2. Hence, Xampp server is selected as it consist of MySQL and Apache operating System. MySQL is an open source database management system that used in this inventory system, while Apache is a web server that allowed the developer a to view the desirable webpage on the server.

In relation to database management tool, MySQL is selected as it offer numerous benefits pertaining to data storage. Below table is comparison between database management tools of MySQL and Microsoft Access.

Table 4.2 : Comparison MySQL and Microsoft Access

	MySQL	Microsoft Access
1	Robust and server based database management.	Local database and incompetent accessed via other server.
2	Design for thousands user which able to access in several time.	Appropriate for desktop use with a minor number of user access it at once.
3	Fit for database driven websites hosting.	Complicated by means of modify database and upload it to the server if the database size increase gradually.
4	Consist of database management tools that permit user to planned task, obtain alert, optimize database, organize security and transfer file between different source.	Inadequate to security in terms of username or password on database.

5	Able to use Window Authentication that tolerate directly access to domain user and groups inside the interface.	Adding more data to the access file will consume time to retrieve.
6.	Suitable for professional use as it consist of multiple custom storage engines. Employ in airline reservation system, inventory control system and banking system.	Frequently use and relatively build to a beginner in Database Programming.

CHAPTER 5
CONCLUSION AND FUTURE WORK

5.0 Introduction

This section will clarify brief explanation on the findings of this Factory 2 Inventory System. Additional to that, future works being discussed to improve the further studies.

5.1 Conclusion

In brief, this study or system are accomplished the objective by ;

i. Inventory record store system of Factory 2 was designed by using Xampp server that consist of MySQL operating system as a data collection medium.

ii. Manually previous inventory system regarding the inventory activities has programmed or computerize by implemented setup of triggering stock.

iii. This Factory 2 inventory system significant to practice in Factory 2 store.

Inventory defined as a number of items, goods and materials that kept in as a stock by different group of peoples with different intention and categories. While in the other hand, Inventory Management System can be described as a system that tracks inventory activities.

Concerning about this study Factory 2 Inventory System, this system is developed by using Xampp server that consist of varies operating system such as Apache to design the webpage and most crucial MySQL as a main database management tools used in this system.

In brief, previous objective are considerably achieved. Factory 2 Inventory System has reduced the handling time in terms of requesting the stock manually, which is done through manual forms. Moreover this system comes with triggering system concerning on the stock out limit. For instance, when the product is less than fifteen, a warning sign or a notification stock out limit will appear on the web page. Hence, by this kind of announcement, it ease the customer to place their order and to review on the current stock.

As regards on Database, this system consist of three main data collected which is customer that represents the lecturer, ones who requires the material, second is product database that existing in current inventory system and third database related to booking, which represents amount, item and use by means of subject that required the products. MySQL is employed as a main database management tools.

Factory 2 Inventory System is built in order to ease or to track the inventory activities in this particular area.

5.1 Future Works

Even though there were considerable outcome and conclusion regardless of this Inventory System, recommendation are crucial to be execute in order to improve this system in further studies. Based on the result, practices that can be develop in future works are ;

1) Notification of status order to the customer through email.
2) Includes Supplier database in the system.
3) Include lecturer in charge of the product in the database.
4) Stock out limit notification send to lecture in charge through email.
5) Design an apps that ease the customer request through mobile phone. Apps that compatible to android and iphone user.
6) Include database of Restock.
7) Make this system viewable at the real web server.
8) Include Barcode system in this inventory system to ease the retrieval and download the product.

REFERENCES

Bibliography

http://stackoverflow.com/questions/33181343/c-sharp-with-access-db-put-alert-box-in-inventory-when-critical-level-is-reach
(Accessed 13 May 2016)

Inventory Basic All About Inventory Management. Clearly Inventory.
http://www.clearlyinventory.com/inventory-basics/inventory-management
(Accessed 12 May 2016)

Doyle, B. (2011). *C# Programming From Analysis to Program Design* (Third ed.). Boston, USA: Course Technology Cengage Learning.

Gary B.Shelly, T. J. (2008). *Microsoft Office 2007 Advanced Concept and Technique.* Boston Massachusetts, USA: SHELLY CASHMAN SERIES.

Hamlett, K. *What is Inventory Tracking.* Demand Media.
http://smallbusiness.chron.com/inventory-tracking-methods-3965.html
(Accessed 12 May 2016)

Hayden, A. (2014, July 15). Inventory Management.

Henderson, K. (n.d.). What are the Benefits of Using Computerized Approach Inventory System.
http://smallbusiness.chron.com/benefits-using-computerized-inventory-system-2044.html
(Accessed 12 May 2016)

L.Jones, B. (2011, November 12). What is C#.
http://www.developer.com/net/asp/article.php/922211/What-is-C.htm
(Accesed 15 May 2016)

Muller, M. (2011). *Essentials of Inventory Management* (Second Edition ed.). United States of America: Amacon.

Nash, T. (2010). *Accelerated C# 2010.* New York: Springer.

Robert T. Grauer, K. M. (2011). *Microsoft Office 2010 Introductry.* New Jersey: Pearson.

https://www.magentech.com/documentation/how-to-create-a-mysql-database-using-xampp/
(Accessed on 24 November 2016)
https://my.bluehost.com/cgi/help/2160
(Accessed on 24 November 2016)

APPENDICES