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Design of Stock Control System for Petrol Station

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ABSTRACT

A stock control system is basically a database; it must keep the up-to-date records of all the stock. Adequate stock must be maintained to supply the customers with their needs and minimum delay. In manual inventory system, the information is difficult to share from one person to another and unexpected difficult is human error. To alleviate these difficulties and to ascertain the exact stock level of a company, this paper presents a design of stock control system on a petrol station using stock levels of inventory system such as reorder level, economic order quantity, and maximum level. To demonstrate the presented system, we apply it to a number of sale data in Lucky 7 petrol station in Mandalay. The stock control system is implemented by C# programming language and SQL server database.

Keywords : Stock Control, Petrol Station, Design System

I. INTRODUCTION

Today many companies are facing the greatest struggle to survive their business in marketplace. Customers are the lifeblood of any business enterprise. The success of a company depends on customer satisfaction. One of the major factors in customer satisfaction is the availability and timeless of the delivery of products. If the customers occur products are regularly out of stock, they will go elsewhere. So for this, inventory control and maintenance are important in any business. In manual inventory system the data of sale stock, ordering and purchasing are recorded in stock book. People are prone to make mistakes that are difficult to track and result in inaccurate inventory records. Manual inventory records are difficult to transfer and irretrievable. A computerized system is a good option for business dealing with different types of stock. Therefore, having a stock control system on petrol station needed to supply the customer demand at the time and the right amount. The system presented in this paper is to provide a familiar interface for the cashier and manager to their daily stock. Manager can manage, update and retrieve recorded data concerning the station with a quick and easy way. The stock database always maintain accurate stock level and manager can get a message to hold the required order, whenever the stock goes under a certain limit by utilization the stock levels of inventory system.

II. METHODOLOGY

Stock control also known as inventory control which is applied as the operation for continuously arranging receipts and issues to ensure that stock balances are adequate to support the current rate of consumption with regard to economy.

A. Major Types of Stock Levels of Inventory

There are several levels of inventory to refine the stock control system.

- Reorder Level

In a business, reorder level or reorder point of stock is a pre-set level of stock or inventory at which the business places a new purchase order with its suppliers to replenish inventory stock. Every business has to maintain a specific certain level of raw materials or finished goods in its store. This is done in order to sustain the continuity of production and continuity of sales for raw materials and finished goods respectively. Therefore, the business must set a specific level at which a new order should be placed with the suppliers of inventory. The computation of reorder levels varies depending on the inventory's consumption rate and amount of safety stock [1].

If a business does not maintain safety stock:

$$\text{Reorder Level} = \text{Maximum Demand or Usage} \times \text{Maximum Lead Times} \quad (1)$$

If a business maintains safety stock:

$$\text{Reorder Level} = \text{Maximum Demand or Usage} \times \text{Maximum Lead Times} + \text{Safety Stock} \quad (2)$$

Lead time: the period of time, between placing an order with the supplier and arrivals of the goods for use.

Safety stock: which is the minimum level of inventory that is held as a protection against shortages due to fluctuations in demand.

- Economic Order Quantity

In inventory management, one of the oldest classical production scheduling models is economic order quantity (EOQ). EOQ is the order quantity that minimizes the sum of ordering and holding costs. In other words, it is the optimal inventory size that should be ordered with the supplier to minimize the total annual inventory cost of the business [2].

The basic EOQ formula is given below:

$$\text{EOQ} = \sqrt{\frac{2 \times \text{Anual Usage in Units} \times \text{Order Cost}}{\text{Anual Carring cost per Unit}}} \quad (3)$$

- Maximum Level

The maximum level of stock is the level above which a business cannot hold in its store. The maximum level of stock is usually achieved when those goods arrive which were ordered at the reorder level of the stock. This stock is then used in the production process for the case of raw materials or sold for the case of finished goods and then reordered again at the reorder level which again fills up the stock to the maximum level [3].

To calculate the maximum level of stock is as follow:

$$\text{Maximun level} = \text{Reorder level} + \text{Reorder Quantity} - (\text{Minimum Usage} \times \text{Minimum Lead Times}) \quad (4)$$

- Minimum Level

The minimum level of stock is a certain predetermined minimum quantity of raw materials or merchandise inventory which should always be available in stock in the normal course of business [4].

The formulas to calculate the minimum level of stock is given below:

$$\text{Minimun level} = \text{Reorder level} - (\text{Average Usage} \times \text{Average Lead Time}) \quad (5)$$

- Reorder Quantity

At the time of purchase of items, one of the important problems to be faced is how much quantity of a particular items to be purchased. If items are purchased frequently in small amounts it will result in loss of trade discounts and economies in purchasing. On the other hand, if items are purchased in large amounts it will lead to over stocking and cost of storage will be high. The ordering quantity should be economic and reasonable by all aspects [5]. In some

types of inventory control systems this is the EOQ, but in some other systems a different value is used.

III. SYSTEM FRAMEWORK

The simulation focused on the Unified Modeling Language (UML) as a tool for requirement specification and design. UML is an object-oriented modeling language using graphical notation for specifying, visualizing, constructing and documenting the analysis and the design phase of the system [6].

A. Use Case Diagram for Manager

Use case diagrams are excellent to describe the problem domain requirements and commutating with the system users [6]. The stock control system is designed using use case notation offered by UML. The UML use case diagram for manager of petrol stock control system is shown in fig. 1.

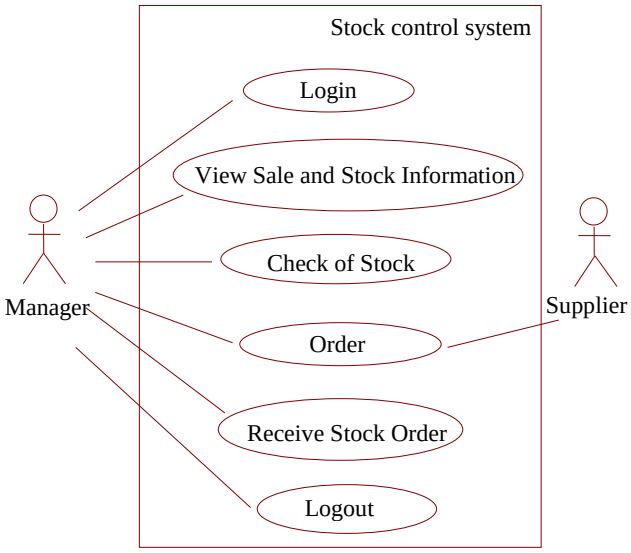


Figure 1: Use case diagrams for manager

- Manager

Login: Activity that used for entry in the system

View Sale Record: Activity that used to view the sale report by daily, monthly and yearly.

Check Stock: Activity that used to check for each stock item.

Order: Activity that used to make order to the supplier

Receive Order: Activity that used to receive order from supplier

Logout: Activity that used for exist from the system

- Supplier

Order: Activity that used for supply stock item for order to manager

B. Use Case Diagram for Cashier

The use case diagram for cashier of petrol stock control system is shown in fig. 2.

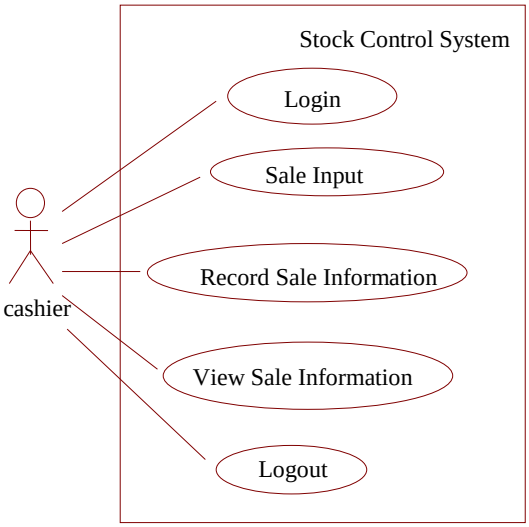


Figure 2 : Use case diagrams for cashier

- Cashier

Login: Activity that used for entry in the system.

Input Sale: Activity that used to entry the sale data into the system every day and within the time constraint. Record Sale Information: Activity that used to list sale information by monthly or yearly.

Display Sale Information: Activity that used for viewing the sale information.

Logout: Activity that used for exist from the system

C. System Database

The petrol stock control system has a MySQL database which is useful for entering data and viewing stock information to and from the database. As depicted in fig. 3, the database is composed of five tables: stock item table, supplier table, sale table, receive order table, and stock status table as shown below. Each table has its own operation and different number of fields.

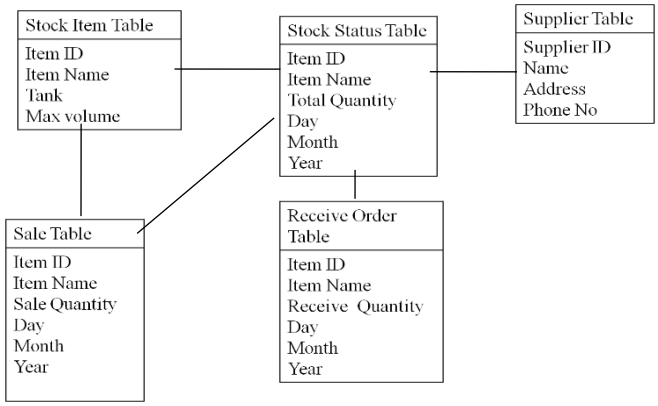


Figure 3 : Database

- stock item table

Table shows the list of all stock items present at the station. The Item_ID number identifies each stock item. Also includes the Tank and Max_Volume fields to give the maximum storage capacity of a tank for a particular item, where storage capacity is measured in gallons.

- supplier table

It includes the supplier's name and contacts such as address and phone number. These details are referred at the time of ordering stocks.

- sale table

The sale items are recorded in this table by describing the sale quantity and sale date.

- receive order table

When the manager receives the order from the supplier, the order details are stored in this table. This includes item type, amount and the date of the order receiving, and the supplier ID.

- stock status table

Stock status table is used to find out the information of what quantities of stock item are left in the respective tanks. The quantity of item sold is removed from the current quantity of tank list. The quantity of ordered items is added to the current tank list. So, this table is based on the daily sale records and receive order list. Manager refers this detail information at the time of checking the reorder point of stocks.

IV. IMPLEMENTATION

This work designs and implements a stock control system using a case study of Lucky 7 petrol station on 78th street, Mandalay. Before the design phase explored in the previous section, we interviewed with the staff of the petrol station to get the complete knowledge about the study area. After acquiring and collecting the necessary information from the manager and staff, the requirement specification document was created for this work. Review of existing documents recorded by manually were a good reference when working for the final requirement specification. After all of these, preliminary observation is carried out with stock levels of inventory processes. In this study, five types (Diesel, Premium Diesel, Octane 92, Octane 95, and Gasoline) of stock items are considered to demonstrate the stock controlling system. Implementation is accomplished using the C# programming language and SQL server database.

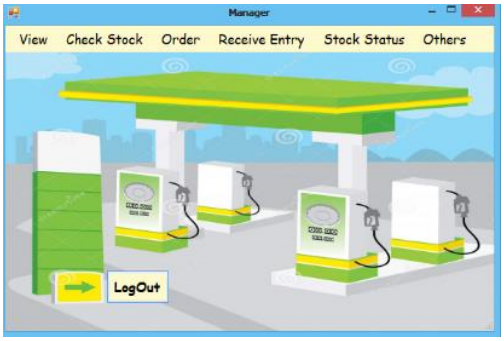
The system is intended for 2 levels of users with different right upon the data that can be stored, retrieved or modified. Each user of the system must be filled identification requirements in order to login in its personalized interface and use the application and its feature. Login interface is shown in fig. 4.

Figure 4 : Login Interface

Personalized interface for cashier is described in fig. 5(a). He can record the data of daily sale stock item into the database through this interface.

Once a manager login to the system, he can access various activities. Personalized interface for manager is shown in fig. 5(b).

(a)



(b)

Figure 5 : Personalized Interface for (a) Cashier, and (b) Manager

Manager can retrieve daily and monthly sale record. These recorded sale list are shown in fig. 6.

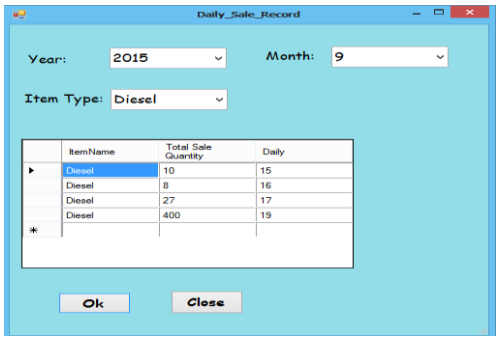
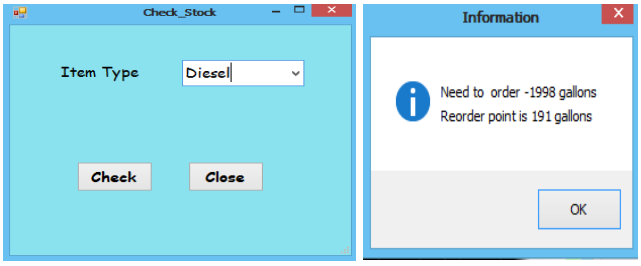


Figure 6 : Frame for Displaying Daily Sale Record

The system supports to manager to view the monthly sale record by bar graph as in fig. 7. This graph representation shows that the Diesel item is best seller than the other item types.

Figure 7 : Bar Chart Representation

The core activity for stock control of petrol station is to calculate the reorder level. Manager check on particular item to know whether the stock item is reached the reorder point or not. The system will notify to manager if the stock item reaches the reorder point by displaying on message box as shown below.



(a) (b)

Figure 8: (a) Frame for Checking the Stock Item, and (b) Notification Message for Reorder Level

Manager can fill the order amount for required stock item in the order form by looking the information of check result list. When the order from the relevant suppliers return to the station, manager records the order information in the receive order form. The current quantity of each tank is crucially important in order to ensure that the exact output result in computing the reorder level of stocks. In this ways, the stock database always maintains the adequate stock level and customers get their satisfaction.

V. CONCLUSION

The need of computerized inventory control system is growing rapidly as an important part in businesses dealing with different types of stock. Therefore, in this paper, the stock control system is built based on the retail business process in Lucky 7 petrol station, taking into consideration all possible situations and functionalities of the daily work in this station. The system implemented from this work may be considered as a useful application software. This application is not only helping the cashier and manager to their daily work but also satisfying the customer to fulfil their needs. In this work, we considered solely on five types of petroleum stocks. Another possible work may be considered by adding other stock items. The presented design system is based on the functionality of a single station. If the owner has multiple stations, we have a plan to provide the multiple access to the station's owner to view the statistics of the multiple stations through the Internet in the future.

VI.REFERENCES

[1]. Reorder level of stock posted in: Inventory and material cost control (explanation), 2012-2018, https://www.accountingformanagement.org/

[2]. Economic order quantity (EOQ), posted in: Inventory and material cost control (explanation), 2012-2018, https://www.accountingformanagement.org/

[3]. Maximum level of stock posted in: Inventory and material cost control (explanation), 2012-2018, https://www.accountingformanagement.org/

[4]. Minimum level of stock posted in: Inventory and material cost control (explanation), 2012-2018, https://www.accountingformanagement.org/

[5]. S. Achar, Fixation of Stock Levels: Formulas and Calculations, Articles, http://www.youtarticlelibrary.com/

[6]. G. Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", printed in 10th May 2003, ISBN 0201-57168-4.

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