Project Proposal:

An Enterprise Information System for retail companies' internal inventory management

Foreword

Enterprise Information Systems are commonly used by large retail companies to effectively manage their business and daily activities. For example, Zara, the international retail giant, uses information systems to optimize its whole supply chain and provide quick response in bringing the latest fashions to retail consumers. Fashion ideas move from the design concept phase to finished products in just 10 days; five days later, shoppers can buy the clothes in more than 850 stores around the world. Zara uses this technology to its advantage to improve both the customers' experience and its prominence in the fast fashion world.

But technology should serve not only big business, but small business as well. With the example of Zara in mind, the idea of adapting technology to support small and start-up retail companies occurred to me. Therefore, I aimed to explore an easy yet effective method for retail companies to manage their inventory and coordinate daily activities with the aid of information systems. Just as small businesses use free Google products such as Gmail, Drive and Docs to improve their efficiency, my hope is that smaller companies without large IT budgets can use this system to enhance their efficiency and performance in today's competitive business world.

Table of Contents

Abstract

The last decade has witnessed a rapid development in Information Systems (IS), the application of information technologies in business processes. This project aims to develop an Enterprise Information System (EIS) which can improve retail companies' daily activity coordination and inventory management. Transaction Processing Systems and Enterprise Applications will be constructed for data transfer between each branch and the central data warehouse of retail organizations. SQL, C++, HTML, and JavaScript codes will be used to implement the logic flow of sales record analysis and the login system. It is hoped that retail companies' staff will find this system to be efficient and serviceable for checking stock levels and requesting product transfers.

1. Introduction

1.1 Background

With the advancement of information technologies, especially Internet technologies, various information systems have been introduced to enterprises, helping them accomplish core business processes through a digital network. Information systems refer to a set of interrelated components which collect, process, store, and distribute information, to support decision making, coordination, and control [1]. Different kinds of Enterprise Information Systems (EIS) can serve various management levels and enhance different business processes, some of which are mainly intended for supply chain management, while others focus on customer relationship management.

However, many retail companies, especially small and start-up retail companies, lack an online system to manage internal inventory information and transfer products within different branches. This may cause a situation in which customers must wait for a long time while employees manually check stock shelves for products or find information on the computer and call another branch for a single item [2]. Consequently, the author proposes to build an EIS for retail companies' internal inventory management which can be easily implemented.

1.2 Literature Review

In the past few decades, the application of information technology has expanded into numerous industries and enterprises. As pointed out by Ma and Wang [3], an enterprise information management and decision support system can effectively achieve the integration of heterogeneous data, which further realizes the potential of the information service for company productivity, sales, and management. Additionally, three Moroccan computer science researchers propose that inter-organizational information systems based on the service-oriented enterprise architecture could improve organizational performance through business process optimization, and also enhance new business collaboration networks [4]. These sources indicate the significant role of the information system in achieving businesses operational excellence.

Furthermore, the inventory of the goods presently stored in a company's warehouse is crucial for optimization of profits in the fast-paced world. Song and Wu [5] state that scientific inventory management is inseparable from the support of information systems. They also find that a large number of Chinese supermarkets lack an inventory management information system, resulting in a slow circulation of goods and a longer cash flow cycle which are disadvantages in this competitive sector [5]. In addition, an inventory management system can solve the oversupply problems which are due to inaccurate information and the tendency to increase inventory levels [6]. The proposed EIS aims to improve these supply chain management and inventory issues for small businesses, as well as offer additional features.

2. Objectives

The primary goal of this project is to build an EIS as a central data processing unit which can be utilized in various retail companies for their daily activities coordination including:

1) Daily Inventory Management: Sharing inventory levels of all branches with employees to respond to customer orders more efficiently.
2) Product Transfers: Providing a platform for staff from different branches to request products online.
3) Sales Analysis: Performing inventory and sales data analysis to understand the customer preferences in different regions, and informing managers' decision-making.

3. Implementation Processes

3.1 Back-end support systems

In this project, two main types of information systems, namely Transaction Processing Systems (TPS) and Enterprise Applications (EA), are adopted to build the inventory management EIS. These are used with fundamental IT tools including database systems, object-oriented development, and SQL and C++ programming languages.

3.1.1 Transaction Processing System (TPS)

A TPS is used to perform and record daily routine transactions for operational managers and staff [1]. For example, each branch of Uniqlo may have its own TPS to help it store the sales records every day and update its inventory level into the database. In this inventory management EIS project, TPS could help to collect data, build a database in MySQL, and generate reports for each independent branch of a retail company, as shown in Figure 1.

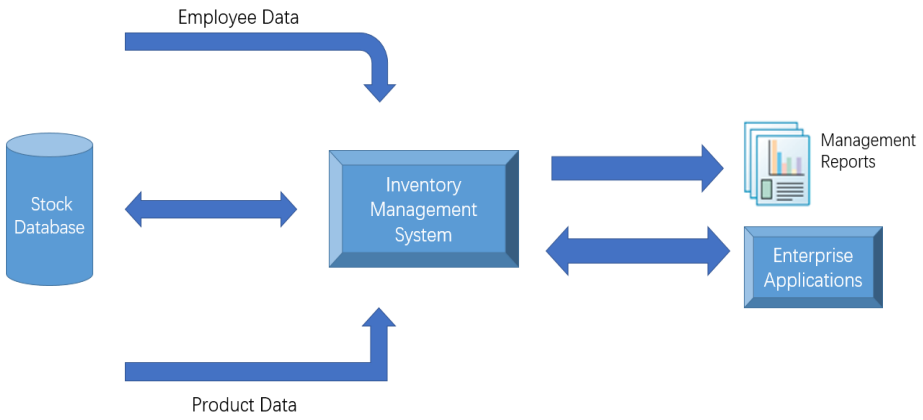

Figure 1. Inventory management TPS for each independent branch of a retail company

MySQL will be used to design the database for data management and storage. The Relational Model Terminology will be applied in this design and used to build the Relational Model Database. This database is a collection of relations with distinct relation names where a relation refers to a table with columns and rows [7]. The object-oriented method is employed in the relationship design. Figure 2 shows a simple Entity Relationship Diagram of the stock database design, using

the Relational Model Terminology. Each block is a table referring to an entity class, meaning a collection that shares common properties. The content inside the block is the attributes of this entity, describing the entity's characteristics.

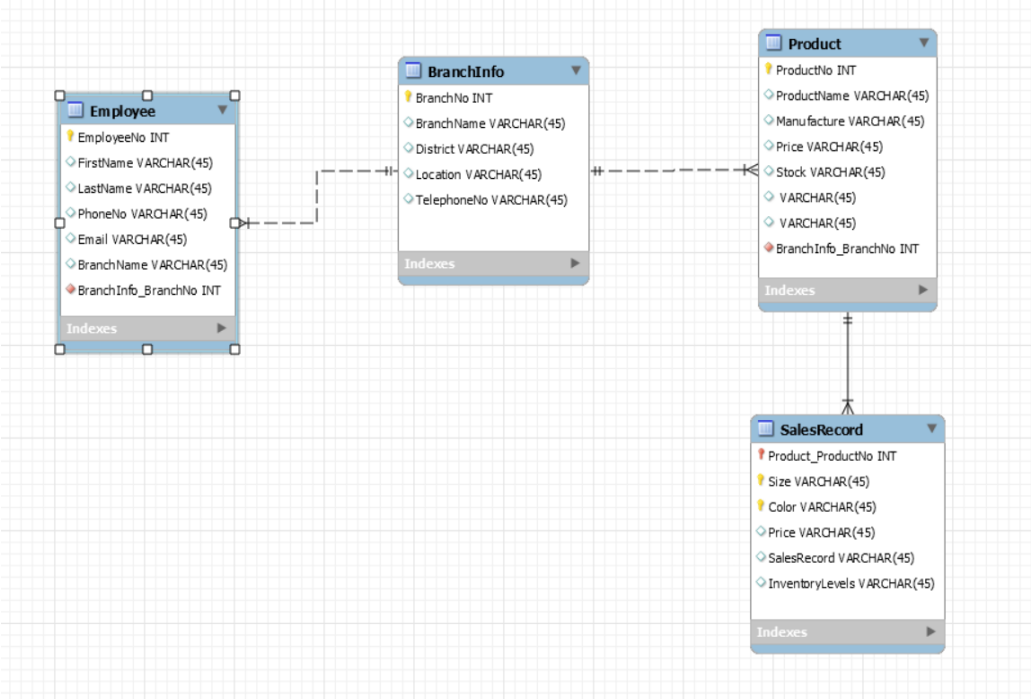

Figure 2. Entity Relationship Diagram of the stock database design

3.1.2 Enterprise Application (EA)

Apart from the basic TPS, the Enterprise System (ES), a major application of EA, will be selected. ES collects information from different branches' TPS and stores these data in a single central data repository, to resolve the problem of data fragmentation and to respond to customer orders more efficiently [1].

ES plays a significant role as the coordinator of data communication between retail branches. It is composed of integrated software modules and a common central database which allow the information entered by one branch to be available to other branches immediately. [1]. Employees from various branches can access the inventory information of other branches and make online requests for product transfers through the ES (see Figure 3).

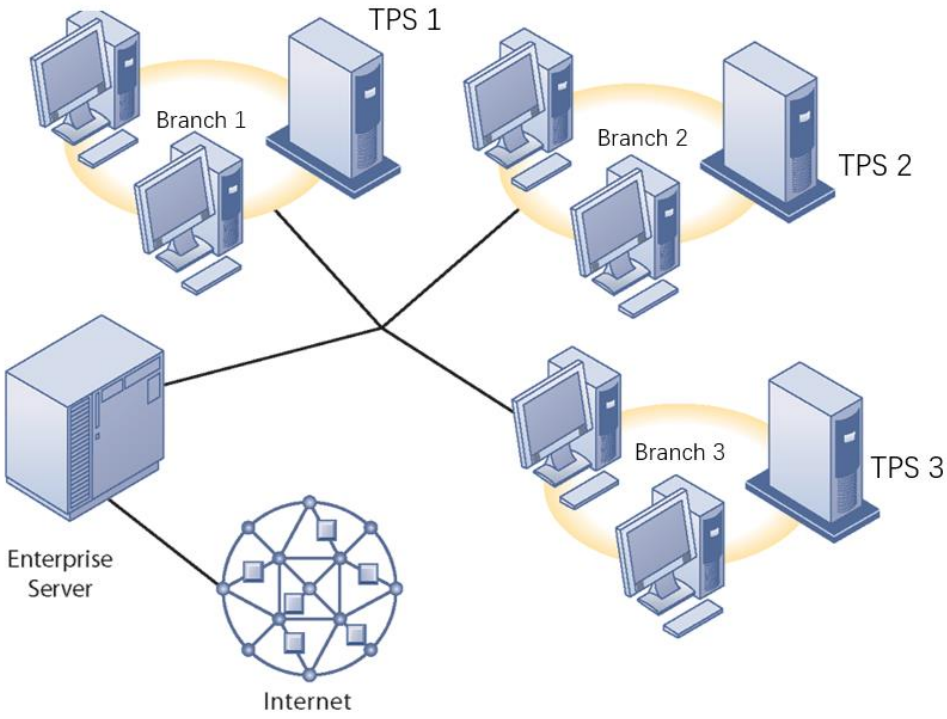

Figure 3. Enterprise System for the communication of intranet information [1]

3.2 Front-end user interface

In addition to TPS and ES, which work together to store and manage the information in the database, SQL will be used with other programming languages, such as HTML5, JavaScript, and C++, to create the user interface and facilitate access to the information in the database.

A common scenario which illustrates the use is when a customer asks an employee to locate a specific item, and the employee then consults a handheld device for accurate details. Figure 4 outlines the process of searching the sales records from the system by illustrating the logic design of the programming language and codes.

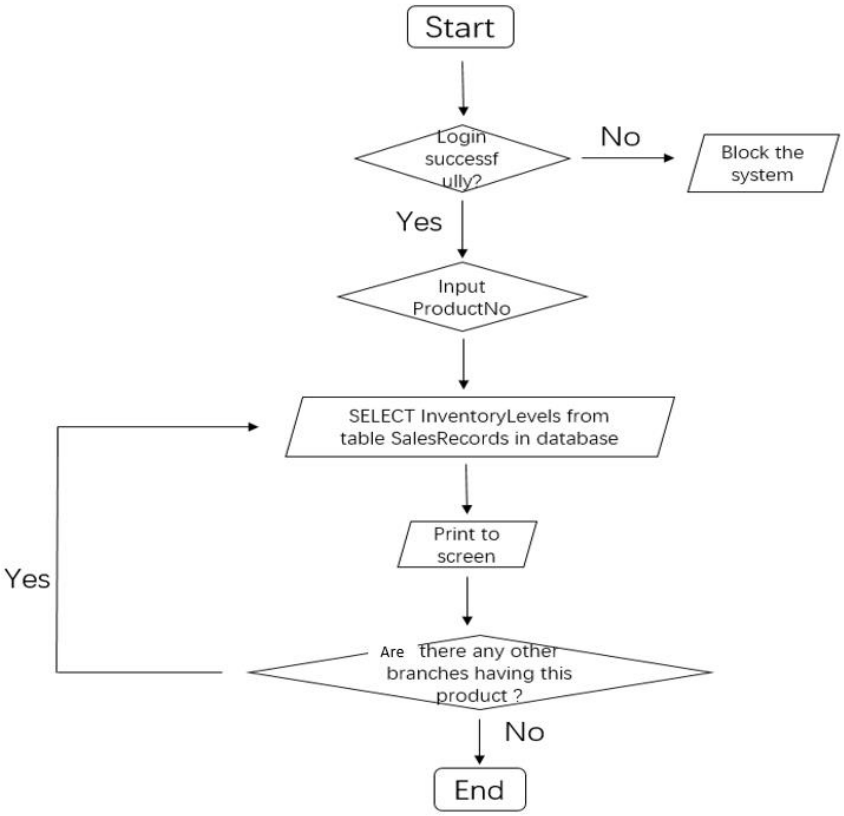

Figure 4. Flow chart of searching for sales records

Finally, a login system will be constructed based on the C++ Virtual Studio to ensure that only the internal staff can access the data (see Figure 5).

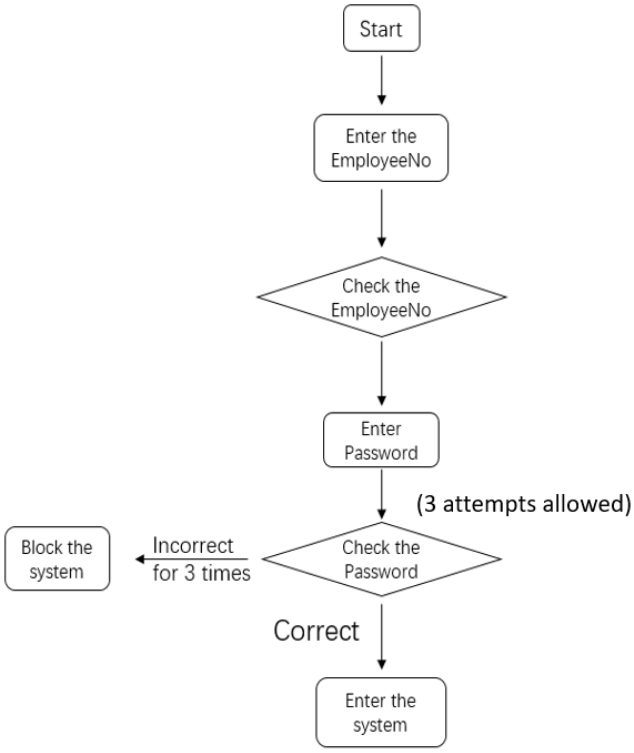

Figure 5. Flow Chart of the login system

4. Schedule

Table 1: Intended Project Schedule

Stage	Duration	Tasks	Deliverables
System design and programming	2 months	Construct database for TPS; Build TPS connection and ES server; Formulate C++, HTML5, SQL and JavaScript;	Database systems; C++, HTML5, SQL, and JavaScript software code; TPS and ES server; User interface
Testing	3 weeks	Test functionality and compatibility of the system; Meet with clients;	Demonstration
Project finalization	2 weeks	Deliver final presentation; Launch promotion	Oral presentation

5. Budget

Table 2: Proposed Budget

Budget Function	Time required	Amount Requested (in HK$)
(1) Human Resources	5-month contract	480,000
(2) Enterprise and TPS server	6-month lease	18,000
(3) Software: Visual Studio 2017 Enterprise	6-month lease	12,000
(4) Marketing & Promotion	Up to 1 month after project-finalization	8,000
		Total: 518,000

Cost-justification:

(1) Human Resources: 2 Programmers, 1 Internet Engineer, 1 Hardware and Electronic Engineer and 1 Marketing Officer will be hired. They will work 8 hours per day, 5 days a week full time (HK $120/hour). 5 people * ($120/hour * 8 hours/day * 5 days/week * 4 weeks/month * 5 months)/people = HK$480,000 in total.

(2) Servers: The authorized subscription fee for the X-Power 12 Intel server is $3000/month. The total price of six months' lease is $3000 * 6 = HK$18,000.

(3) Visual Studio 2017 Enterprise is charged at 250 USD/month on the official website, equivalent to about 2000 HKD/month. The total price of six months' lease is $2000 * 6 = HK$12,000.

(4) Marketing & Promotion: Exhibitions will be held, and the rental expenses of suitable venues are around $8000.

6. Conclusion

This project proposes building an EIS to be utilized by small retail companies for their daily activities coordination to increase sales and profits and offer more customized services to today's modern consumers.

Long-term possibilities for the project include the following:

1) Transforming this information system into a mobile application-based program.
2) Enhancing the platform to allow customers to access the inventory information of branches directly.
3) Developing an EIS Protocol and applying for a patent.
4) Improving the compatibility of the system and promoting its use internationally.

It is hoped that these concepts can be adopted to benefit smaller retail shoppers and enterprises, so that IT can be best utilized by all for the improvement and enhancement of our quality of life.

References

1. K. C. Laudon and J. P. Laudon, *Management Information Systems, Managing the Digital Firm*. Essex: Pearson Education, 2016.

2. RTInsight Team, *Real-Time Retail: Why Uniqlo Employees Use Handhelds*, 2015 [Online]. Available: https://www.rtinsights.com/real-time-retail-why-uniqlo-employees-use-handhelds/ [Accessed Nov. 18, 2015].

3. C. Ma and J. Wang, "Enterprise information management system integration based on Internet of Things technology," *Management & Engineering*, vol. 22, no. 3, pp. 12-15, Oct. 2016.

4. A. Elmir, B. Elmir, and B. Bounabat, "Service oriented enterprise architecture frameworks review for information system management of collaboration networks," *International Journal of Computer Science Issues,* vol. 13, no. 3, pp. 9-18, May 2016.

5. C. Song and W. Wu, "The application of information system in inventory management," *Computers and Applied Chemistry*, vol. 29, no. 7, pp. 847-850, Jul. 2012.

6. Z. Zahariev, "Influence of the information system on inventory management," *Engineering Costs and Production Economics*, vol. 19, no. 1, pp. 101-103, May 1990.

7. T. Connolly and C. Begg, *Database System: A Practical Approach to Design, Implementation, and Management.* Essex: Pearson Education, 2015.