

Sri Lanka Institute of Information Technology

**Inventory Management System with RESTful Web Service for CODEX-Solutions**

Project Proposal

Information Technology Project 2017

Project ID: **ITP-17-MLB-WK-15**

Submitted by:

1. IT16158764 - Basnayake M.C.S.B.
2. IT16160330 - Amarasinghe U.P.A.S.D
3. IT16154490 - Rodrigo U.S.D
4. IT16423534 - Bimali Y.M.Y.
5. IT16225916 - Rajapakshe R.W.D.K.P
6. IT16130562 - H.S.K.Wijesekara
7. IT16161566 - U.S.O.Vindula
8. IT16133914 - L.L.K.S.Lokuge

Submitted to:

…………………………..

Name of the supervisor

Date of submission

# Abstract

Our client, CODEX solutions is a Software Development Company and IT consultancy service in Sri Lanka established in 2005. They have developed and implemented many innovative technology solutions such as XBanker banking solution, XPay payroll software and etc.

This Inventory Management System (IMS) becomes significant as it can be deployed in many types of organizations such as supermarkets, pharmacy, bookshop and etc. to handle their inventory as well as sales.

The system includes Representational State Transfer (RESTful) web service as per client’s request for backend developed using C#, ASP.NET CORE framework Web Application Programming Interface (API) which ensures efficient concurrent access to the central database and security.

For frontend, web application developed with HTML 5, Bootstrap, JQuery, Angular 2 and NodeJS which facilitates platform independency and desktop application developed with C#, ADO.NET,XAML, WPF application and SQLite Database as the in-built database to ensure reliability in case of connectivity errors.

# Table of Contents

[Abstract II](#_Toc330011717)

[Table of Contents III](#_Toc330011718)

[1. Introduction 1](#_Toc330011719)

[1.1 Problem Specification 1](#_Toc330011720)

[1.2 Solution Outline 1](#_Toc330011721)

[1.3 Key Benefits 1](#_Toc330011722)

[2. Objectives 2](#_Toc330011723)

[3. Procedure 3](#_Toc330011724)

[3.1 Flow of the Project 3](#_Toc330011725)

[3.2 Project Plan 3](#_Toc330011726)

[4. Personnel and Facilities 4](#_Toc330011727)

[5. Software and Hardware Requirements 5](#_Toc330011728)

[6. Budget 6](#_Toc330011729)

[7. References 7](#_Toc330011730)

[Appendix 8](#_Toc330011731)

# Introduction

*“A sales and inventory system is a software-based business solution used to simultaneously track sales activity and inventory. Manufacturers and trade resellers can both benefit from a thorough solution, where single transaction entry records necessary details on the customer, products purchased, price and date while also updating inventory levels.”* [1]

A complete IMS should facilitate management of the entire flow of goods from the storages to distribution centers eventually to the customer, also returns and wastage items.[2] Therefore, the corresponding information flow includes real time updating of the inventory………….

Our core concern is to create an IMS with the functionalities mentioned above, that can be deployed at many types of organizations such as supermarkets, bookshops etc. and those with different cluster levels i.e., the organizations which is in a single geographical location, having a single machine or that with an extended branch network having numerous employees.

This will be beneficial to the organization as it can replace a manual inventory and sales system which is inefficient, inconsistent with no backup and recovery, tedious with reduced usability and also to improve the same in existing systems by means of the indemnified software technological approaches which are mentioned in the following sections at the same time it is also able to

## Problem Specification

Basically following issues should be resolved in the proposed system.

Usability issues:

The existing system might be not user friendly as there can be lot of unnecessary data entry and at the same time it can be lacking most wanted references.

Products and stocks related Issues:

* Wastage resulted by unawareness of the expiration period of goods
* Unrecognizable categorization of items
* Not maintaining minimal and eventually run-out-of-products
* Interrupt the normally carried out procedure during the time of stock recount

User and authentication issues:

* All the users are given same priority in some systems implemented in small scale organizations
* Circumstances where access permission should be granted for restricted functions in extended systems

Billing and invoicing:

* Failing to connect to the servers due to connection issues so that invoices cannot be generated electronically
* Not having facility to do a single payment via several payment methods

Promotional and discount schedules:

* Failing to maintain real-time status update can lead to chaos among customers
* Improper management of promotions/discounts which can create losses

## Solution Outline

According to the client’s basic requirement, the system should be sort of generic emphasizing user-friendliness and security. User-friendliness in the sense, is being customizable so as to match the organization, with their references and functionalities.

To minimize wastage and to remind the minimal stock level, the system is going to generate corresponding alerts. Categorization and sub-categorization of products and labelling is done in a way which it becomes more recognizable and tangible. For the stocks recounts there going to be special functions which ensures to carry out the normal procedures during the relevant time duration.

The system is having a RESTful web service at its backend as per client’s request which is able to facilitate concurrent access and let users to retrieve restricted content depending on authentication levels with the facility to customize the permissions when needed.

The IMS is having a WPF application basically to handle invoices and billing service with an inbuilt database for possible circumstances such as connection failures. Also it is having functions to facilitate multiple payment modes per payment.

Functions to aid proper management and update of promotional schedules with clearly defined time period and relevant products or rates are there to avoid above mentioned issues.

[Architecture diagram]

## Key Benefits

The IMS is responsible for maintaining up-to-date status of the inventory and sales done at the organization. Achievable benefits through the new system can be summarized as follows.

* User-friendliness as it is customizable
* The REST API is beneficial in following ways.
  + Evaluation of the system, Maintenance and Further development becomes easy as REST protocol separate business logic and the user completely, as it improves the portability of the interface to other platforms, allowing different components of the development to evolve independently [3]
  + Have to implement the business logic once for multi-platform users
  + Enhances security of data since access can be restricted
* Reliable up-to-date inventory status

Since many of the functions related to inventory are carried out through web application, real-time amendments are done.

* A range of reports which will satisfy the statistical requirements

# Objectives

**Employee management**

Every organization have human resource management tasks to be achieved.

This function is responsible for entering core information about the company to the system, then initialize state admin, and customize delivered functions. Other than that, regular features such as adding new members, revoke access types for different users and implementing routes and maintaining user log are implemented in this function.

Subtasks of the function:

* System Initializing
* Employee Management
* User Account Management
* User Roles Management
* User Privileges Handling
* Branches Management
* Routes Management
* User Logs Management
* Higher Authorization Request
* Reports Generating

**Products management**

* Add, Update, Delete Products
* Categories & Subcategories price codes, add, update, delete & display
* Products Sections managing
* Label generating
* Products expire notifications handling.
* Reports generating

**Customer and Loyalty Cards Management**

* Add, delete, update & view customer
* Customer credits limit handling
* Customer registrations (Sign Up/Login)
* Loyalty Cards add, update, delete, view
* Loyalty points handling
* Loyalty points redeem
* Pre-Order request add, delete, update display
* Reports generating

**Supplier Management and Stocks Ordering**

* Automatic order calculation
* Additional cost handling
* Supplier management
* Supplier payment handling
* Returning day notifications
* Reports generating
* External services handling

**Invoice handling**

When it comes to sales, invoicing is an unavoidable chore which is valuable to customers. It adds some meticulousness for a company. [6]

This function is among the most essential as it should be up and running almost 24/7, regardless of reckless situation such as connection failure. There are several types of invoices basically those issued at the checkout, invoices of return goods and etc. the function is going to handle those as well as address the common tedious practical situations such as bill holding and record multiple paying for a single invoice.

Subtasks of this function:

* Add purchased items to Invoice
* Invoice Add and Print Bill, Edit, Delete
* Customer return items invoice handle
* Multiple payment methods for single
* Multiple Invoice holding
* Syncing local DB from Web API
* Internet connectivity checking & data source selection
* Reports generating

**Promotion and Discounts scheduling and management**

Sales offers and discounts is one of the major aspects of promotional mix. [4] Discounts can be a price deal depending on Festive season, non-cumulative quantities, trade-up credit, Educational or Student/discipleship, Employee discount and age-related discounts while Promotions can be price-pack or bonus pack deals, checkout dispensers and related cents-off deals, and sampling.[5] Since our concern is to create a system which is deployable in any organization, we are going to handle all the types of discounts and promotions mentioned above.

Also, our system enhances Range of gift vouchers are issued with a unique and unpredictable code ensuring neither misuses nor theft.

Subtasks of this function:

* Discount schedule add, update, delete & display
* Promotions schedule add, update, delete & display
* Gift vouchers handling
* Reports generating on the discounts and promotion schedules
* Promotion expire notification is displayed under following circumstances
* When an offer is declared expired by the management
* When the offer is based on a particular stock and that reserved stock is over

This expiration notification also helps users to remind to delete the particular schedule details.

**Stock Management, Return and Wastage management**

Stock management part of this function is about assessing the inventory by ensuring the possibility to meet the demand and prevent running out of critical material and goods.

Return and wastage management is also handled through the system as efficient reverse logistics and inbound returns can enhance the value recovery and reselling when done adhering to state laws.

Subtasks of the function:

* Stocks add, update, delete, & display
* Trans in/out stocks handling
* Recounting stocks and rectifying
* Promotional stocks handling
* Low-stock notification
* Products returned to suppliers
* Products returning from customers and replacements
* Updating stocks with returning goods
* Wastage stocks handling
* Report Generating

# Procedure

This section provides details of how the project will be conducted.

## Flow of the Project

Length : 4 pages

Concrete description of what you plan to do and the order they will perform must be explained here. Your research plan must include clear milestones for every week until the project due date. Divide the work into various subtasks; schedule these tasks in a way that the work is completed in time.

## Project Plan

Length : 2 pages

The proposal should provide a realistic timetable given the tasks to be accomplished. According to the flow of the project described in the above section show the schedule as GANTT chart.

# Personnel and Facilities

Length : 1 page

This section should include all people working on the project, their roles, and resources involved.

# Software and Hardware Requirements

* Software Requirements
  + Web Application
    - Any Updated Web Browser
      * Any Platform.
* WPF Application
  + Windows 7 Service Pack 1 or above
* Windows 10 recommended
* Hardware Requirements
  + Web Application
    - 512MB RAM recommended
* WPF Application
  + 1GHz processor, Dual Core processor recommended
  + 512MB RAM
  + 1GB storage recommended (Depends on database size)
  + Printer (Optional)
  + Barcode Reader (Optional)

# Budget

Length : 1 page

The budget should be an accurate reflection of the complete project cost.

# References

Under this section you should list all referred work such as books, conference papers, journal papers, etc. References should be listed according to the IEEE format.

[1] santiago, k. (2017). *Sales and Inventory System Thesis Documentation*. [online] Academia.edu. Available at: https://www.academia.edu/16863814/Sales\_and\_Inventory\_System\_Thesis\_Documentation [Accessed 6-Aug-2017]

[2] C.A.P. Calicdan, Warehouse management system on RFID. 2013, p.4,5

[3] BBVAOpen4U. (2017). *REST API: What is it, and what are its advantages in project development?*. [Online] Available at: https://bbvaopen4u.com/en/actualidad/rest-api-what-it-and-what-are-its-advantages-project-development [Accessed 6 Aug. 2017].

[4] YourArticleLibrary.com: The Next Generation Library. (2017). *4 Most Important Elements of Promotion Mix | Business Marketing*. [Online] Available at: http://www.yourarticlelibrary.com/marketing/4-most-important-elements-of-promotion-mix-business-marketing/8796/ [Accessed 9 Aug. 2017].

[5]En.wikipedia.org.(2017). *Promotional mix*[online] Available at: https://en.wikipedia.org/wiki/Promotional\_mix [Accessed 9 Aug. 2017].

[6] Marin, M. (2017). *Managing Receivables: Importance of Promptly Invoicing Customers*. [Online] Business Financial Fitness Program| Gateway Commercial Finance. Available at: https://gatewaycfs.com/bff/managing-account-receivables [Accessed 9 Aug. 2017].

Appendix

Appendices may be used to provide data of peripheral benefit to the project.