



Sri Lanka Institute of Information Technology

Supermarket Management System

Project Proposal

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Introduction

Problem and Motivation

In supermarkets there are various activities going around in a single day. Many people are interacting with their services and many information need to be stored and managed in order to provide a satisfying service towards customers. This is a tedious task to be done using a manual system. With the improvement of online based services, it is crucial to manage the information and other service-related processes and information using an online based system.

With the inclinations of using automated systems for company's activities, customer-based services have become very effective, reliable, accurate and safe. Therefore developing a system to manage all the tasks of supermarket is crucial. With the expansion of customers and service it is intricate to keep files, cabinets, and all other physical items to store data and it is not wise to take this sort of approach since it can raise security deprivities. Many unauthorized personals can view and access data, and it is unable to analyze the past data since secrecy is not guaranteed to all information and data. The staff can face difficulties with storage, and it can raise a negative impact on the company's good name. With given circumstances it is not easy to update, delete, and edit using manual methods.

Manual systems use considerable amount of paperwork and many human computational errors when entering and calculating data and the cost to maintain a company with a manual methods are very high and the time consumption to use manual methods are also high these sort of approach can cost a company its loss of profit as well.

Major Problems Supermarkets with manual systems are facing

Inventory loss

- The inventory and stock can be misplaced or lost due to mismanagement or lack of management in the system.

Time and storage consuming manual process

- With large amount of stocks, it can waste lot of quality time of staff and requires extra space to store the records.

Lack of efficiency and reliability of using manual system

- Comparing to automated systems manual systems can never achieve the efficiency and reliability of automated system.

Insufficient security

- The user access levels cannot be monitored using a manual system. Unauthorized access is possible. Sensitive data can be accessed by unauthorized users.

Data inconsistencies

- It is not possible to maintain a manual database with large number of staff and stock and inventory details.
- The risk of record discrepancy is substantially higher.

Benefits of the System

- Real – time data
- Availability
 - 24/7 Availability of service
- Easy and Accurate
 - Storing data and accessing them are more accurate
- Reduce Cost
 - Less money needed than using a manual system and help in increasing the profit
- Data security
- Ease of Management
 - Easy to manage day to day information
- Improve Effectiveness and reliability

Aim and Objectives

As a result of issues mentioned above, we have decided to develop an automated system for a supermarket. The system is robust, user friendly and simplifies day to day activities of the supermarket.

The goal is to provide an effective standardization and efficiency secrecy to the supermarket, which will benefit when managing staff, stock, and registered customers. This system will store all the information about staff, registered customers and stock information and other company related information. This systems helps in managing lot of functions of a supermarket and suitable for automating financial management, marketing management, delivery management, maintenance management etc. This system allows registered customers to deliver items of their choosing to their doorstep. The system keeps list of all information about above functions and manage them with utmost surety. This system also manages databases to appropriate functions and keep track of all the necessary data and information.

Product Scope

This System will cover all aspects of supermarket management. This system will eliminate all the current flows and increase the productivity of the system by introducing more functions under single system. Inventory and stock will be managed by this system in an efficient manner. Keep track of all the information related to a product, its manufacturer distributor, buyer details, warehouse details, stock details, transport cost labor charges and all the information regarding stock and inventory. Financially this systems keeps track of revenue lost and profit details, billing, salaries and fund details all information needed in financial management. This system manages all the maintenance details of the supermarket under premises management. This system covers all the registered client information and staff information as well. This system allows registered customers to make online deliveries to their homes. And to promote the business this system will cover all the information and activities of marketing management. And manages all the details about security measures undertaken in the supermarket to provide a better and reliable service. This system consists of,

1. Stock and Inventory Management
2. Purchase and Sales Management
3. Financial Management
4. Premises Management
5. Delivery Management
6. Marketing Management
7. Staff Management
8. Client Management

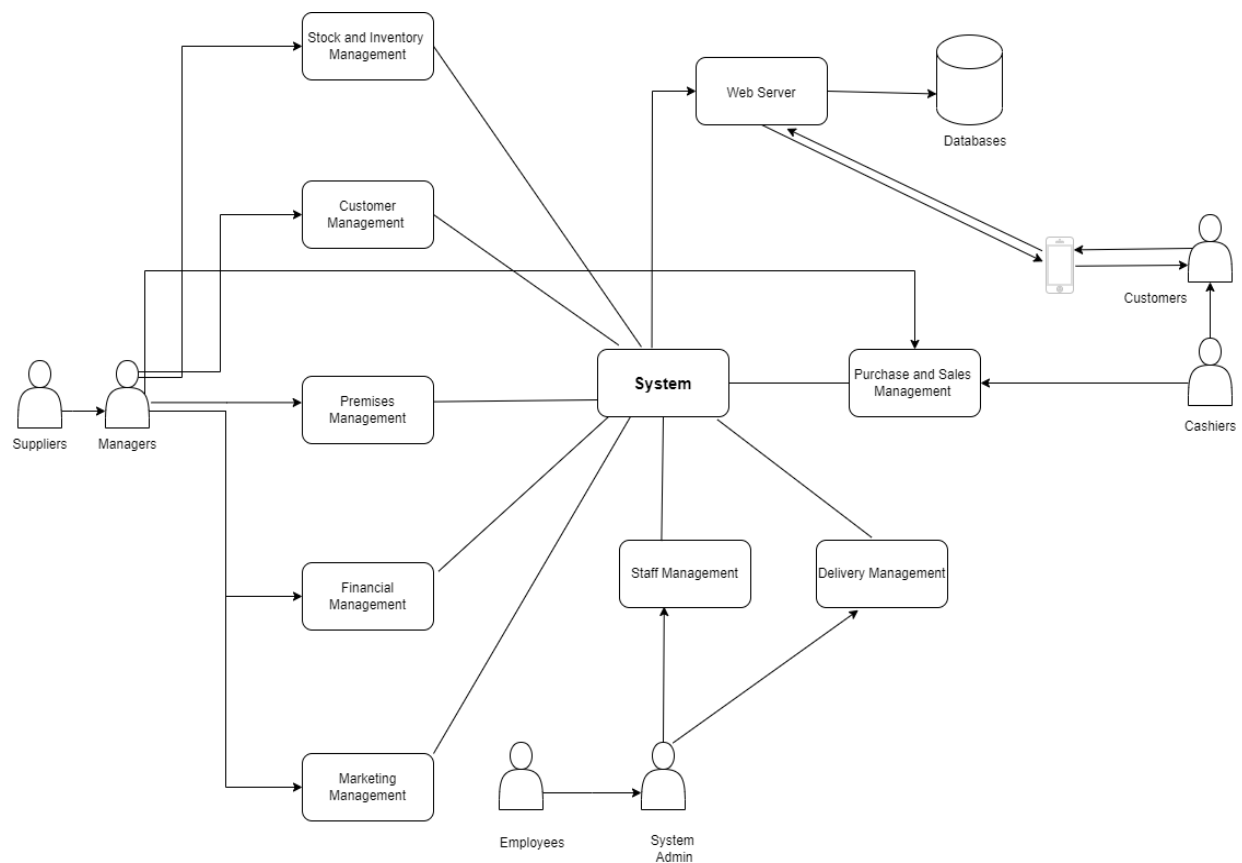


Figure 1

System Functions

Stock and Inventory Management

Stock and inventory management mainly based on managing all the items in a supermarket. This basically stores information about stocks and other related information. System Admin and Supermarket manager are responsible for managing this information and updating it whenever necessary. The System admin and manger can Add, Delete, Update, and view all the information regarding stocks. All items are gets serial numbers before stocking them in shelves this will help in what gets sold through registers. All registered and unregistered users can view the stocks available to sell at the moment and registered customers can order items via application. Also, there are some safety stocks for emergency purposes. In order to add stocks to the list there should be some information needed to save in the database of that particular item. Adding Bar code to each item manages the database when items get sold. [1]

- Item type
- Item ID
- Serial number
- Item Serial Number
- Expire date
- No of Items bought
- No of Items returned
- Price
- Wight / volume
- Date and time when stocks received

In addition to these information there can be some directly related information stored under this function. Whenever there is new stock arrival admin or manger should update the details. In addition to these details system should store information about departments those stocks belong and categories them under each department. And some items like vegetables and fruits can be packed and sell as packages. And keep details about remaining stocks and out of them how many items can be put up to sell for upcoming months, how many waste items are there (non – usable) such as rotten fruits and vegetables and meat etc. At the end of the month Store manager or System Admin Generate the Stock report for that particular month. Some additional information can be saved under stock management. [2]

- No of departments
- No of items reserved as safety stock
- Stock shelf information
- Applying bar codes to the items
- Packaged items
- Waste products
- Remained items from previous month
- Theft items

Staff Management

Staff management means otherwise Human Resource management. Mainly, Staff Management Considered How to Help Staff Manage Their Workload and Achieve the Goals of the Company.

Staff Member Has to Enter Staff ID and Password. Therefore, System Can Prevent Unauthorized Access. If Not in the Already Staff Member, You Have to Register to the Grocery System. When Staff Member Registering System, System Admin Has to Get Following Details from the Staff Member. [3]

- First Name
- Last Name
- Date of Birth
- Contact Number
- Email Address
- Home Address
- Staff Member Type
- Staff Member Position

If Staff Member New to the Company, Staff Member Should Enter as Trainer. After Ending 1 Month, Grocery System Shows Upgrade to The Permanent.

If You are in the Trainer Period, You Get a Basic Salary Only. After End of Trainer Period, Staff Member Want to Resign from The Company. Therefore, System Remove Staff Member in System. Not Only That, but Staff Member also Wants to update in Trainer Statue to Permanent Statue System Can Update It.

After End of The Month, System Will Generate Report in Each Staff Member's Account. Report Has Total Number of Working Days in the Month and Salary. [4]

Delivery Management

First, the customer has to register to the system by giving the following details.

- First name
- Last name
- username
- email
- password

Customer is able to browse through the content. The customer can add items that he/she wishes to purchase into the shopping cart. The customer can proceed with the payments once he/she decides to Purchase an item.

The payment is made by the following details:

- payment method
- promo code
- phone number

The customer's order status will be displayed also allowing it to be tracked. The customer can Cancel the order within 15 minutes from the time the purchase was made, and the customer will be prompted with an error message upon clicking the 'Cancel order' button after 15 minutes. If any delays occur with the delivery, the customer will be notified through a text message. The estimated delivery time will be updated accordingly

Marketing Management

Customer management is an important function of the supermarket management system. Customer should register to the system so that he can get a better shopping experience. And also, the supermarket can provide them a better service . Supermarket provides special discounts and promotions for their registered customers.

First the customer should create an account by providing a username and a password. Then he should register to the system by providing his

- First Name
- Last Name
- Email Address
- Phone Number
- Home Address

Already registered customers can log in to the system by giving their username or email address and the password .

Customer management admin can view all the customer details in the system . He can add customers to the system and update customer details in the system . He has the right to remove or block customers from the system. Then he generates the report of the customer. [5]

Customer Management

Customer management is an important function of the supermarket management web application. Customer should register to the system so that he can get a better e shopping experience and the supermarket management can provide them a better service. First the customer should register to the system by giving the [6]

- First name
- Last name
- Email address,
- phone number

Customer should create his account by providing his username and a password.

Already registered customers can log in to the system by giving their username or email address and the password . Customer management administrator can view all the details of the customers registered to the system . He can add customers directly to the system and update customer details. He has the right to delete or block customers from the system [7]

Financial Management

Financial management is the main division in any organization. It's prioritized mainly the activities of a firm are one of the most heavy and complex activities. In order to focus on them, the management performs all the necessary activities. There are key principles in financial management. Some of them are Market prices reflect information, Risk return trade off, Cash flows are source of values, Individuals respond to Incentives and Money has time value. Based on these principles, management can take decisions such as,

- Allocation of Funds
- Profit planning
- Raising of Funds
- Understanding capital markets.

Following these actions will affects the profitability, Growth, and wellbeing of the organization. And also, it's important to maintain a good balance between equity and debt. Once the funds are raised through different sources and sells, the next important function to execute is allocate the funds in a proper manner. [8]

To handle all the insights, Managers receives admin privileges in the system. First, they need to access the finance directory through root directory. In order to login, managers have to enter their Staff Id and password as the login credentials. Accessing to the system will authorize to make changes in the system. The system generally creates reports regarding to the customers transactions and keeping records of sells invoice.

- Calculate the net profit at the end of month.
- Keeping reports of staff member's salary sheets
- Keeping records of fixed assets.
- Keeping records of income statements and cash flow statements.

At the end of the month, A full report will generate for future analysis.

Premises Management

Premises management ensures that it manages company premises and equipment in an efficient, and compliant way. Maintenance and smooth running of premises uses are mainly managed by Premises Management. [9]

The manager is stands for ensuring relevant risk assessment are conducted and for reporting to the department .

The manager has to register to the system by entering Staff ID and Password.

When the manager discovered about inspected issues following details should be stored and analyze by the manager for a better maintenance.

- inspected issue.
- inspected area or item.
- inspected date.
- maintenance work routine.
- replacement and upgrades.

- estimated date of maintenance.

The site manager responsible for inspecting and maintaining the company premises, assign maintenance workers to inspected maintenances, notify managers about maintenance, generate monthly report on done maintenances details, and update maintenance routine progress. [10]

Purchase and Sales Management

This functionality manages all the information of sales details and purchasing items of the company. This function also allows us to keep track of our supplier details such as supplier type (large scale / small scale), products we purchase, and the quantity purchased. And the admin will be able to update, delete suppliers and to add by giving the following information:

- Supplier ID.
- Name.
- Type (Large scale / small scale).
- Product.

This function provides sales reports and purchase reports to monitor both income and expenses of the company such as costs, number of items sold, total sales of each item, with keeping track of all the sales records and the expenses of the company and with provided sales reports and income reports the company to identify unnecessary expenses and get rid of them by helping the company to maximize profit as well as to deliver the best possible value to customers. This allows us to keep track of all the sales made products sold in which quantity. The admin will be able to update, delete sales information and to add by giving the following information: [11]

- Date.
- Product.
- Customer.
- Quantity.

Non-Functional Requirements

Security

- the initially proposed system consists of a cheque system where the clients can pay their bills and the security of these payment details should be handled by keeping them secured all the confidential data should be able to access by authorized personals only.

Reliability

- the system should be able handle all the business operations without performance lack. Managing all business operations under given conditions without any constant repairs.

Scalability

- If the client is expanding their business, it is important to increase the performance parallelly to the expansion performance should not be decreased with the demand.

Availability

- the system should be able to access at anytime from anywhere around the world and the system should not fail while operating. Maintaining the system often could lead to client unsatisfaction and can cost the process.

Ease of use

- The Client will be able to use it even without the help of expertise. Should be easily manageable and understandable.

Speed

- The responsiveness of the system is crucial if the system is too slow or lagging too much client will not be happy about the outcome and it will cost lot of money to take it back to where it is supposed to

Literature Review

The main objective of building this system is to manage the inside functions in a supermarket in an efficient way when looking at other retail companies like Walmart and Ikea and local companies such as keels super and Arpico, the main strategy that affects all of those businesses is inventory management and buying and selling. Like Walmart our main concern should be keeping a small margin between buying and selling rates and sell more items. This could help us in high foot fall, quick stock movement which will benefit in adding more fresh , new items to the shop and adding more new products to the store. We will also be planning on allowing customers to self-weighing the grocery items when purchasing specially vegetables, fruits meat and fish. So, this will reduce number of staff members need to be assigned for that task which will helps us in reducing the operating cost. When buying products to the store buy the products directly from the manufacturer also going to save us some money. With keeping less margin when tagging the

prices will increase in selling more products which will leads to buying more products from the supplier which will benefit in when bargaining. This will help us in increasing fast moving products in the store, also Use discounts and offers method to attract customers to buy slow and non-moving inventory and use package offer method by attaching fast moving products with slow or non-moving targets. Since we are building a supermarket management system, large and complicated systems like in Ikea and Walmart wound not be suitable for the system we are about to build. But there are common processes that are similar to each systems, such as managing inventory and using methods to attract more customers, cutting unnecessary maintenance costs off. [12] [13] [14]

Methodologies

Requirements engineering methods

Requirements elicitation and analysis

All the requirements for this system were found by observing existing systems and we are aiming to build fully functioning Supermarket managements system with highest reliability and efficiency.

Requirements specification

- User stories
- Use case diagram
- Activity diagram

Design methods

Object Oriented Design

Structural Models

- Class Diagram

Dynamic models

- Use case diagram
- Activity Diagram
- Sequence diagram

draw.io use as the tool to design these diagrams

Development tools and technologies

MERN Stack (MongoDB, Express, React, Node)

- MongoDB – document database (cloud Database)
- Express.js – Node.js web framework (Back end)
- React.js – a client-side JavaScript Framework (Front end)
- Node.js – the premier JavaScript web server (Back end)
- Development IDE – Visual Studio Code

Testing methods

- Integration testing
- System Testing

Gantt chart

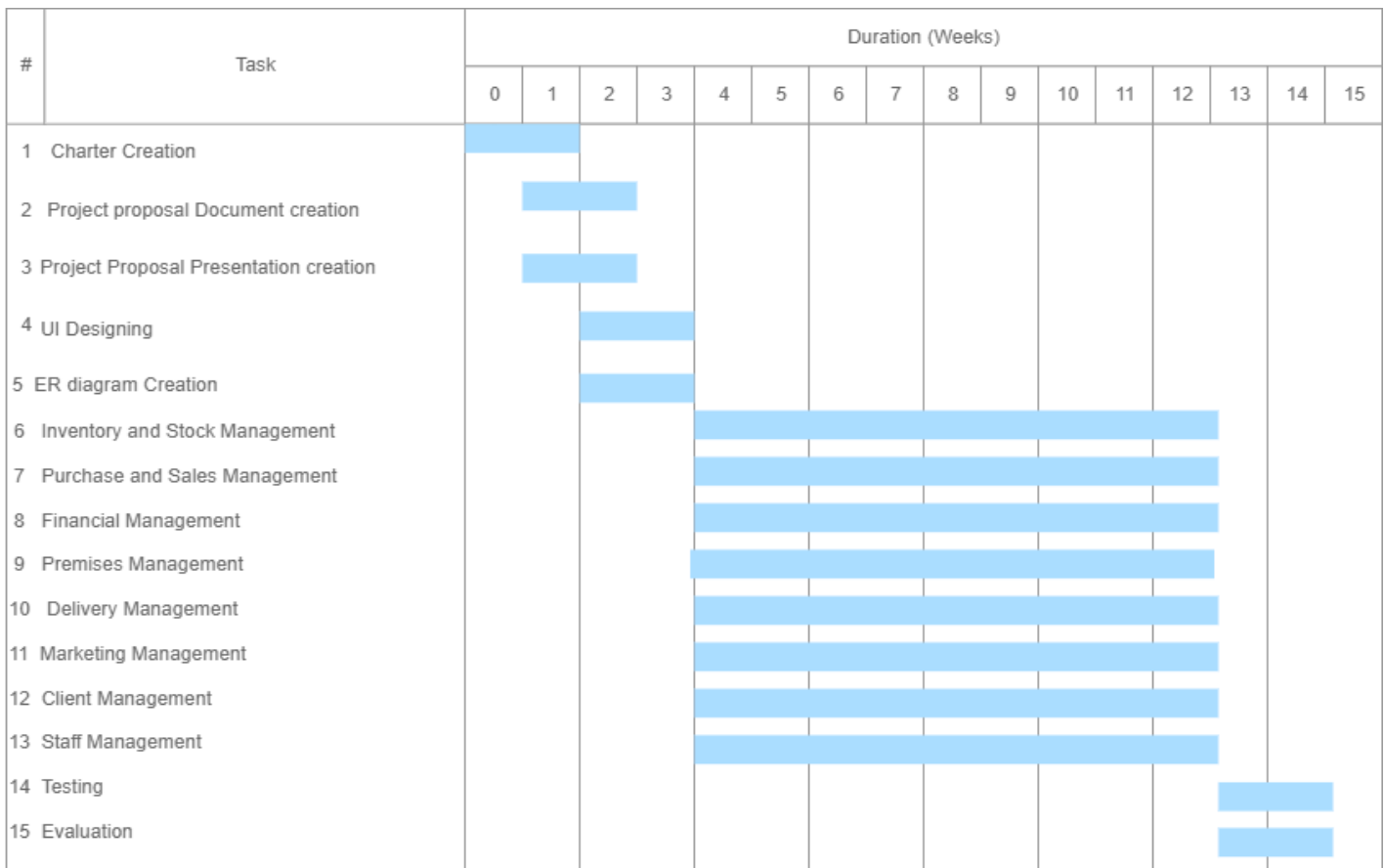


Figure 2

Work Breakdown Chart

	Student ID & Name with initials	Brief Description of the Function
1	IT21006548 Liyanage S.D.K	<p><u>Inventory and Stock Management</u></p> <ul style="list-style-type: none"> • Add stock details, stock sample details of every item. • Update stock and inventory details, update the current stock details according to remaining amount • Delete unwanted records of stocks and inventory. • Retrieve all the information about sold stocks and remaining stocks • Generate monthly report of stocks and inventory according to sales details.
2	IT21002342 Yapa D.G.A.B.S	<p><u>Purchase and Sales Management</u></p> <ul style="list-style-type: none"> • Add suppliers to the system • Update supplier information and supply information • Delete resigned suppliers form the system. • Generate supplier details and supply details report every month • Retrieve all supplier and supplied items details monthly
3	IT21060380 Lakshan P.R.D	<p><u>Staff Management</u></p> <ul style="list-style-type: none"> • Add staff members to the system, • Update staff member details when a staff member leaving the company or joining the company • Delete non existing staff members from the system

		<ul style="list-style-type: none"> • Generate monthly report of staff Details • Retrieve all the existing staff information monthly
4	IT21050626 Gamage A.G.R.U	Customer Management <ul style="list-style-type: none"> • Add registered customers to the system • Update customer information • Delete customers from the system • Generate customer details report • Retrieve all existing customer information monthly
5	IT21446030 Fernando W.C.S	<u>Delivery Management</u> <ul style="list-style-type: none"> • Add drivers and vehicles to the system • Update driver and vehicle details • Delete resigned drivers and vehicles from the system • Generate monthly driver and vehicle report • Retrieve driver and vehicle details monthly
6	IT21004186 Medawatta H.M.H.N	<u>Financial Management</u> <ul style="list-style-type: none"> • Add staff member salary records • Update staff member salary records • Delete resigned staff member salary records • Calculate monthly salary and Generate Staff member salary details reports

		<ul style="list-style-type: none"> • Retrieve Staff member salary information monthly
7	IT21001802 Panditharathne I.G	<p><u>Premises Management</u></p> <ul style="list-style-type: none"> • Add maintenance and maintenance workers • Update maintenance details • Delete completed maintenance • Generate monthly done details report • Retrieve all the maintained details reports monthly •
8	IT21446108 Fernando W.A.M	<p><u>Marketing Management</u></p> <ul style="list-style-type: none"> • Add promotion notices and points to the system • Delete promotion notices and points from the system • Update points and notices • Generate reports on promotion details • Retrieve all the details about given promotions and discounts monthly

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