

SUPERMARKET MANAGEMENT SYSTEM

(CASE STUDY AREA: SKY SUPERMARKET NAGONGERA
TOWN COUNCIL)

By

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Declaration

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Supervisor's approval

This work was under my supervision for supermarket management system.
Signed  Date ..16/Sept/24 ..
Dr. Lukyamuzi Andrew

Dedication

I give thanks to the all-powerful God who made it possible for me to finish the dissertation and the entire course. I would especially like to dedicate this project to my entire family, including my brother Nagumba Jamil, my supervisor Dr. Lukyamuzi Andrew, my parents Mr. Woyengera Domasco and Mrs. Nabude Oliver for their tireless efforts, and lastly, my fellow colleagues who have done everything in their power to help me get to this point morally. They have been a source of courage and inspiration for me throughout my time in school. This work is the result of your diligent prayers and labor; may the all-powerful God grant each of you a greater life as a unique gift.

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List of acronyms

SQL	Structured Query Language
UML	Unified modeling Language
QR	Quick response
IS	Information System
MIS	Management Information System
RFID	Radio Frequency Identification
WMS	Warehouse Management System
GUI	Graphical User Interface
EPO	Electronic Point of Sale
EDI	Electronic Data Interchange
SDLC	System Development Lifecycle
RAD	Rapid Application Development
DFD	Data Flow Diagram
ERD	Entity Relationship Diagram
HTML	Hypertext Markup Language
CSS	Cascading Language
RDMS	Relational Database Management System
UNIA	Uganda National Investment Authority
SSM	Sky Supermarket

Abstract

This project looks at the merchandise management sector of the business industry. Utilizing computers, the internet, and other electronic devices has made managing various tasks. The sky supermarket current system is inefficient and prone to errors that leads to losses; Therefore, project is to design and implement an electronic supermarket management system that allows for the proper management of merchandise details and data in a centralized, organized manner. It also features an easy-to-use interface so that even users with rudimentary computer knowledge can easily interact with the system.

This project aims to build a platform that will enable both the user and the administrator to monitor daily activities related to merchandise operations and management in the supermarket, such as merchandise record keeping, sales management, revenue and profit computation, and customer order fulfillment. The specifications for a supermarket merchandise management system serve as the foundation for its execution. Managing stock levels and order fulfillment In order to assess the viability and usability of a completed system, this article provides a sufficient description of the merchandise management system.

The system was implemented using a rapid application development method that used software and tools like SQL Server, Hypertext Processor Language, Notepad, Visual Studio Code, XAMPP Server, JavaScript, and UML for modeling.

The main idea is to use extra features for data interpretation when tracking the sales of goods from customer orders. Multiple products can be added to the system in the database and client-server paradigms. This supports the targeted small enterprises and permits expansion in the future.

Chapter 1

1.0 Introduction

A software program called the merchandising management system is made specifically to track and handle items inside a firm. It offers a methodical way to manage merchandise-related responsibilities, like monitoring inventory levels, controlling sales and acquisitions, producing reports, and making sure there is ideal inventory control. Businesses may increase productivity, save expenses related to stock outs and overstocking, and streamline their merchandise operations with the help of the merchandise management system. By putting in place an automated system, a business can see its inventory in real time, make wise judgments, and optimize item levels depending on supply chain dynamics, demand, and sales patterns (Macas, Aguirre et al. 2021)

1.1 Background

The purpose of the research is to create a supermarket management system that can meet the needs of Sky Supermarket, which is situated on Tororo Busolwe Road on the sky building in Nagongera Town Council, for storing product information. Mr. Opio Peter Otori is the owner of this supermarket, which opened in 2019. Consequently, when this prototype is put into use, firm data will be safer and easier to access than it is with the current manual approach, which is prone to errors that result in losses and subpar record keeping. Understanding the nature of the issue in detail and outlining a potential remedy are the main goals of this chapter. Additionally, it highlights the system's importance to the company's primary target, particular goals, and the system's reach.

High-caliber and wise supermarkets are one of the bigger supermarkets in the Nagongera Town Council and have a vast amount of industry experience. Its main interest is in business ventures that cover a large market area with stores and warehouses in Nagongera Town Council. It has one branch there.

The current wholesale services system is characterized by a manual

Among the difficulties the company encounters are field registration and file-based systems that are prone to an excessive number of errors, data redundancy, updating information about the goods in stock, and incurring losses as a result of faulty record management.

The user can choose from the menu once the system has shown all the things whose names start with the letter they have selected. Ultimately, each consumer will receive a different charge. The database will save this. Periodic records are available for viewing at any moment. In the event that the stock is unavailable, the grocer places an order with a recommended vendor. The money will be paid after the entire amount obtained is subtracted from the sales activity. Every employee has a special username and password that the administrator gives them to use to log in.

Customers will be able to choose the products they want and place orders or cancel them as quickly as possible, thanks to the system. The products they choose will have a serial number that makes it simple to track them down in the supermarket's inventory. They will also be able to pay online with a merchant code that the system will generate for them via mobile payment. As a result, the system will keep track of stock details by updating the levels of stock and entering buy and sell data into the database so that the data is always accessible within the system. The sales, buy, and profit computations will be completed in less than half a second, which will save time compared to the manual method of maintaining records for Sky Supermarket (Sheakh 2018)

1.2 Problem Statement

The supermarket's current merchandise management system at Sky is inefficient and prone to errors, which causes merchandise inaccuracies, disruptions in the supply chain, and lost sales. The manual process of monitoring stock levels and orders results in discrepancies, delays in order fulfillment, and errors in merchandise inventory data. As a result, the supermarket is losing money, losing customers, and incurring higher operating costs as a result of holding unnecessary merchandise. As a result, it is imperative to develop a comprehensive and automated system in order to optimize the merchandise management system. Accurately managing product replenishment, tracking sales trends and forecasts, and offering real-time information on stock levels and orders are all expected of the new system. The new system aims to increase the business's competitiveness in the market and improve merchandise management's overall correctness, efficiency, and productivity.

1.3 Main objective

The main goal of this project study is to develop a supermarket merchandise management system which enables a Sky supermarket to streamline its inventory operations, improve efficiency, customer satisfaction, fulfill orders, avoid time wastage, and reduce costs.

Specific objectives

1. To collect and analyze user requirements
2. To design an automated merchandise management system
3. To implement a prototype of the designed system
4. To test and validate the implemented system that ensures all system requirements are met.

1.4 Significance

Cost Reduction: Implementing an optimization supermarket management system helps reduce costs associated with excess inventory, stock outs, and inefficient supply chain processes.

Improved Cash Flow: By minimizing excess merchandise and merchandise carrying costs, the system improves cash flow, allowing the supermarket to allocate resources to other areas of the businesses

Increased Sales: By ensuring products are consistently available on shelves, the system enhances sales opportunities and customer satisfaction, leading to increased revenue.

Reduced Wastage: The system helps prevent overstocking, reducing the risk of products becoming obsolete, expired, or damaged, thereby minimizing wastage.

Efficient Replenishment: With accurate demand forecasting and automated replenishment processes, the supermarket can avoid over ordering and maintain optimal stock levels, leading to efficient use of resources.

Enhanced Customer Service: Customers benefit from a better shopping experience due to the availability of desired products and shorter waiting times at the checkout due to efficient stock processes.

Accurate Financial Reporting: The system provides accurate and real-time data for inventory valuation, aiding in financial reporting, and compliance with accounting standards.

Strategic Decision Making: With access to detailed stock data and analytical reports, the system empowers supermarket management to make informed decisions, optimize operations, and identify opportunities for growth.

1.5 Scope

Content

The project is to implement automated supermarket management system at Sky supermarket, which covers the storage needs of all the products that the company possesses and also shows real-time stock levels. The system has functionalities like order fulfillment scanning QR code, serial number, profit and revenue computation, data backup, registration, sharing, generation of receipts, and updating records, which are based on QR code and serial number key dictionary technology for order fulfillment.

Geographical

The project will be conducted at the Sky supermarket located on the Sky building in Nagongera Town Council, Tororo District, and Eastern Uganda.

Time:

The project lasted for four months and cost about three hundred thousand shillings (300,000).

Chapter 2 Literature Review

2.1 Introduction

This chapter provides a thorough overview of the topics that have been investigated and examined both theoretically and empirically in the current literature that has been prepared by academics and other experts on various topics. A merchandise management system can track almost any type of quantifiable good, such as food, clothing, books, equipment, and other items that customers, retailers, or wholesalers may purchase. The literature review covers system concepts, information systems, supermarket concepts, online marketing, and knowledge of some of the required system tracked with a system. Utilizing technology to track and manage goods is the only foundation of contemporary inventory control systems. Using technology, merchandise management systems operate in real time, sending data to a central computer system as transactions and stock levels are tracked. This keeps the system structured and produces detailed records and reports covering every facet of the company. (Salih, G. Yaseen and Aljanabi 2023)

2.2 System

A system is made up of several connected modules that function as a cohesive whole by following a set of rules. (Backlund 2000) A system's boundaries, structure, and determination define it and are expressed in the way it operates. It is constrained and influenced by its surroundings. Systems are the focus of system science and related fields of research. Systems share a wide range of characteristics, such as interconnection, behavior, structure, and function or functions. The development of the idea of a system in the natural sciences was made possible in the 19th century by the thermodynamics-focused French physicist Nicolas Léonard Sadi Carnot. Regarding the ability of the steam engine system to perform when heat is supplied, he examined the system in 1824 and dubbed it the working material (usually a body of water vapor). The working material may come into touch with a cold reservoir, which is a stream of cold water, a boiler, or a piston, which the working body could press to perform work. The term "working body" was first used in 1850 by German physicist Rudolf Clausius, who understood this image to include the idea of the approximating denoting to the system. Norbert Wiener and Ross Ashby invented the field of robotics in the late 1940s and early 1950s by applying mathematics to the study of control and communication systems. Marshall McLuhan studied media theory in the 1960s

by using general systems theory and what he dubbed a field approach and ground analysis. (Easa 2019)
At the multidisciplinary Santa Fe Institute, John Henry Holland, Murray Gell-Mann, and others coined the phrase "complex adaptive system" in 1980. (Euchner 2016)

2.2.2 Fames in a system

The surroundings and limits the world is seen by system theory as a complex system made up of interrelated pieces. By drawing a system's borders, we may determine which entities belong inside the system and which are part of the surrounding environment. This process is known as scoping a system. Next, we simplify the system using models to gain a better understanding of it and to forecast or influence its future behavior. The behavior and/or structure of the system may be specified by these models. Both natural and man-made systems Natural systems and systems created by humans are both present. Although the outputs of natural systems can be seen as having purposes, they may not appear to have an objective. Output delivery serves as the means by which human-made systems accomplish their goals. Parts of them have to be connected; if they weren't intended to function as a cohesive system, they would be two or more separate systems (Frachtenberg 2022)

Theoretical structure

An open system interacts with its surroundings by exchanging matter and energy. Open systems make up the majority of systems. With its surroundings, a closed system transfers energy but not matter. An isolated system doesn't interact with its surroundings by exchanging matter or energy.

Transformation system:

An alternative way to conceptualize a system is as a set of processes, or as a bounded transformation process, which converts inputs into outputs. Production occurs when inputs are used up.

Subsystem

A subsystem is a group of pieces that together form a system, and it is a part of a larger system.

Model system

There are several viewpoints in a system. Views like planning, requirement analysis, design, implementation, deployment, structure, behavior, input data, and output data may apply to man-

made system perspectives. To explain and depict each of these various points of view, a system model is necessary.

2.3 Information systems

An Information System (IS) is a group of interconnected modules that gather, process, store, and provide information as output required to finish a business job. The term "system" refers to a collection of elements or components that interact with one another to work as a whole. Automated information systems have made it possible to collect, process, store, distribute, and retrieve information more quickly and efficiently. An organization's information system is a dependable instrument for billing the financial data needed for decision-making around appropriate resource planning and budgeting. Information systems can be classified into a variety of categories, such as transaction processing, expert information, decision support, communication support, management, and more.

2.3.1 Transaction processing systems

Transaction systems are fundamental component of information systems that facilitate the collection, processing, and storage of transactions in a business or organization. These systems are crucial for maintaining accurate and up to date records of various business activities.

Types of transaction systems

Real time processing systems: these are systems that process transactions as they occur in real time. They are mainly used in scenarios where immediate processing and response are required such as online banking or retail sales.

Online transaction processing systems: These are systems designed to handle large number of short, interactive transactions in real time. They are optimized for quick response times and high throughputs, making them ideal for applications like order processing or inventory management.

2.3.2 Management information systems (MIS)

Systems are known as management information systems use data that has been recorded and collected by other systems, including transaction processing systems, concerning transactions that have an impact on the company. These systems then provide the reports that management requires for effective planning and business control. Records serve as our source of information on ownership, legal status, received accounts, and specific duties from public or private entities,

so it is crucial to protect and maintain them from destruction. (Chennupati, Seguin and Liu 2011) The organization's ability to operate and run smoothly depends on the management of both critical and relevant records, including financial statements.(Katu 2010)

Supermarkets and retail establishments are increasingly utilizing Management Information Systems to safeguard their inventory and consumer data. To realize the advantages and difficulties of a complicated manual system, computerized technology is being used to capture and record inventory and staff details. Gain a thorough understanding of inventory issues by using the internet and exchanging experiences with others both inside and outside the company. To aid in company decision-making, management information systems offer data in the form of pre-defined reports and presentations. (Raj 2018) Superior system quality results in superior information quality. According to Raymond & Bergeron, there is a strong correlation between the technical and service components of a patient records management information system, or system quality, and the quality of the information that the system produces. Information can be presented to users in an understandable fashion by a system that makes use of contemporary, user-friendly technology like GUIs, or graphical user interfaces. This allows users to make efficient use of information systems.

Generally speaking, management information systems offer the precise, timely, pertinent, and comprehensive data required to support organizational decision-making. It facilitates the effective and efficient execution of operational, control, and planning tasks. The workforce benefits greatly from the clinic's quick access to pertinent data and documents, improved departmental and organizational procedures, reduced labor costs, effective and efficient departmental coordination, and rapid and dependable referencing.

2.3.3 Merchandise management system

Merchandise is the amount of goods and resources that a manufacturer has on hand to serve as examples of those items that are kept in stock for sale, according to Microsoft (Schryver 2003). A merchandise control system is a collection of software- and hardware-based instruments designed to automate stock tracking.

2.3.4 Types of merchandise management systems

Products need to be managed properly, which calls for some kind of system. It makes no difference if the system uses the most advanced radio frequency identification system or writes

inventory levels on the back of an envelope. Similar to the adage "there are many ways to skin a cat," there are advantages and disadvantages to each type of merchandise control system. Ultimately, the decision comes down to which system is most valuable to the business.

2.3.5 There are four types of merchandise management systems:

These include: Barcode technology, radio frequency identification (RFID), manual stock management system, and warehouse management system.

2.3.6 Manual stock management system

Many small business owners use spreadsheets to manually maintain stock, especially if their company sells few products. Spreadsheets are used to determine when new orders of products are necessary. The owner manually counts the goods and supplies on hand at the beginning of each week, inputs the numbers into the spreadsheet, and calculates the anticipated usage based on the orders that have already been placed. The owner can figure out whether he has adequate supplies for the coming week or if he needs to make any purchases by using the relevant spreadsheet formulas. Small business owners can handle their merchandise using manual systems with very minimal system or training expenditure. One of the main drawbacks of manual stock management is maintaining data integrity because it requires a single data entry or formula error can cause major inaccuracies in the data output (Wedell 2009)

2.3.7 Bar codes

The 1950s saw the invention of bar coding. Barcodes expedite the movement of goods and data inside a company. The Electronic Point of Sale (EPO), which is frequently used in supermarkets and records sales by scanning a product barcode at the checkout tills, is the most well-known example of its application. The EPO's systems exchange data and communications within and between businesses, verify, check, and charge transactions. They also provide quick sales reports, monitor, and adjust prices. Supermarkets and suppliers can communicate more efficiently if Electronic Data Interchange (EDI) is integrated at the electronic point of sale. This is achieved by increasing the effectiveness of stock replenishment through information exchange. Typically, barcodes serve as a product identification that a computer can read when looking up the code. The retailer will be able to determine how much has been brought into the store, how much has been removed from it as sales, and consequently, how much should remain

on the shelves thanks to this. It lets them know which products are doing well and when to place new orders. (Suvittawatt 2017)

2.3.8 Radio frequency Identification (RFID)

An RFID tag is made up of an antenna that may send the identification number to a reading device and a silicon chip that holds the number. Using this tool leads to better replenishment and inventory management procedures. As a result, sales are reduced, interrupted, or lost because of out-of-stock merchandise.

2.3.9 Stock control systems are important

In order to reduce product waste and obsolescence, inventory control systems (Axsäter 2006) serve as a blueprint for selecting, packaging, and shipping goods from a warehouse and receiving goods into a warehouse or other storage sites.

In companies handling consumer products transactions, inventory control is crucial to maintaining quality control. A crucial item in a large retail store's stock could run out if effective inventory control isn't followed. When it's time to place a new order, an effective stock control system will notify the store. Systems for stock control are crucial tools for tracking huge shipments automatically.

A computerized stock control system reduces the possibility of mistakes. Stock control systems at retail establishments assist in monitoring goods theft, offering important insights on shop profitability and the necessity of theft-prevention measures.

Furthermore, the systems utilize real-time data regarding bin utilization to guide and optimize stock placement. The movement of goods through the warehouse is tracked by a WMS. It includes the actual infrastructure of the warehouse, tracking tools, and inter-product station communication.

To be more specific, warehouse management is the receiving, storing, and transportation of goods typically finished goods to end customers or intermediate storage facilities. Barcode scanners, mobile computers, wireless technology, and other automatic identification and data capture tools are frequently used in warehouse management systems LANs and potentially radio-frequency identification (RFID) to efficiently monitor the flow of products.

Following collection, data is wirelessly transmitted in real-time to a central database or is synchronized with it in batches. Subsequently, the database can offer valuable reports regarding the condition of the merchandise in storage.

A logical management module is part of the warehouse management system. Following collection, data is wirelessly transmitted in real-time to a central database or is synchronized with it in batches. Subsequently, the database can offer valuable reports regarding the condition of the merchandise in storage.

A logical management module is part of the warehouse management system. Information management module to update the data synchronously to the data storage module information display module to synchronously display the data-on-data processing devices; and an information input module to enable the retailers and suppliers to enter information. Integration of warehouse management is made possible by the warehouse management system, which improves both the financial gains and management efficiency.

2.3.10 Actual functioning of stock control systems

First, barcodes or RFIDs identify to scanners which products customers are purchasing. By scanning barcodes and transferring the information to the software, the scanners transfer data to computers. Subsequently, the software deciphers the barcode numbers and correlates them with the respective goods kind. This keeps the business informed about which products are selling by enabling the merchant to track sales and inventory at the checkout counter or via a handheld scanner. (Czinkota, Kotabe et al. 2021)

But it's crucial to remember that effective systems allow for human judgment. Although the technologies offer useful data to aid in decision-making, managers ultimately make the ultimate decision. Once managers make a reorder decision, the system uses Electronic Data Interchange (EDI) to communicate its needs for additional merchandise to a vendor. This allows managers to see their stock levels in real time, as specialized software tracks how much stock is going out the door via purchases and how much remains on shelves and in the warehouse.

The process of sending and receiving data between two parties such as a vendor and a store over data transmission channels like the internet is known as interchange. At both ends of the connection, managers can view the data that is kept in a computer's memory bank.

Although vendors and merchants can benefit greatly from stock management systems, there are several drawbacks as well. Retailers may find themselves short-staffed if an item turns out to be

an unexpected best-seller because the system is designed to maintain the least amount of stock in stock. In order to avoid that, retailers have historically kept buffer stock, also known as safety stock, on hand; however, many have stopped doing so. Additionally, these kinds of systems are susceptible to the consequences. RFID technology has also drawn criticism from some computing groups who feel that it violates their privacy by disclosing personal information and purchasing patterns. They contend that the data might be sold to other companies for comparable transactions, or it might be used to pitch other products to specific consumers. Accurate readings can also be challenging since the RFID signals can trip over or collide with one another.

Nonetheless, the majority of retailers have accepted the enormous benefits that these technologies provide. These include increased sales, lower cash invested in inventory, less need for warehousing space, and high efficiency. Additionally, the platforms encourage improved information exchange between the seller and the merchant, which lowers costs for both parties as well as for the customer. Stock control systems can encode shipment data, such as tracking numbers and delivery addresses, and help workers identify the products on the order list in the warehouse. They can also delete purchased items from the inventory tally in order to maintain an accurate count of things that are in stock. Modern inventory control systems have advantages beyond the manufacturing and retail industries. They also have a lot to offer any company in charge of overseeing consumables supply chain. Inventory control systems are everywhere we look, ensuring that goods are available when we need them. They do this by giving organizations access to real-time inventory tracking data, which can be easily found and analyzed via a straightforward database search. They also have a lot to offer any company in charge of overseeing consumables supply chain.

2.3.11 Automated inventory management system

An automated computer-based method for monitoring product levels, orders, sales, and deliveries is the automated inventory control system software. It can also be used to create work orders, bills of materials, and other production-related documents in the industrial sector. Inventory management software is used by businesses to organize inventory data, which was previously typically kept in paper form, and to prevent product outages and overstock.

The software consists of the following parts that work together to form a coherent inventory control system:

Asset tracking is the process of following products in a warehouse or retail location using their barcodes and additional tracking information, including their serial number.

Order management: An organization's inventory control system can be set up to notify managers to place new orders for a product when it reaches a certain low level. This assists businesses in preventing product shortages and excessive capital expenditures on inventories.

Service management: Businesses that focus more on providing services than on selling products can use this software to keep tabs on the price of the supplies they need to do so. In this manner, they are able to charge for their services at a rate that corresponds to the whole cost of providing them.

Automated inventory control systems have improved manufacturing and are effective and efficient business, increasing warehouse security and enhancing customer service

2.4.1 Overview of the supermarket

A supermarket is a sizable version of a regular grocery shop; it is a self-service establishment that offers an extensive selection of food items and household goods arranged into aisles. It is bigger and offers a greater assortment than a typical grocery store, but it is smaller and offers a more constrained selection of goods than a big-box or hypermarket.

It was Vincent Astor who pioneered the idea of a low-cost food market that relies on massive economies of scale. In 1915, he founded the Astor Market, dedicating \$750,000 of his future to a 165 by 125 corner in the well-known 95 Manhattan, creating an outdoor mini-mall that featured produce, meat, fruit, and flowers for sale franchises. Another prosperous early grocery store chain that operated in both Canada and the United States was the Great Atlantic & Pacific Tea Company, which was founded in 1859 and spread throughout North American cities in the 1920s. Since then, stocking shelves at night so that consumers can get their own products the next day and bring them to the front of the store to pay for them has been the general tendency in retail. Even while there's a greater chance of stealing, ideally lower labor expenses will offset the expense of proper security measures.

The market changed in 1917 despite the expectation that customers would travel great distances ("miles around"). It proved to be difficult to attract clients who were only 10 blocks away. With his Wiggly stores, businessman Clarence Saunders created the idea of the mega market. He launched his first company in 1916. Saunders was the recipient of multiple honors for the ideas

he brought to his companies. Owing to the stores' prosperity, Saunders began offering the invention of the supermarket was once the subject of controversy, with Californian Ralphs and King Kullen making compelling arguments. Other competitors included

Big Food Markets in Weingarten and Henke & Pilot in order to put an end to the discussion, the Food Marketing Institute conducted study on the subject with money from H.J. Heinz and in collaboration with the Smithsonian Institution. It clarified

It has been shown that the first authentic supermarket in the United States was established on August 4, 1930, in a 6,000-square-foot (560-square-meter) former garage in Jamaica, Queens, New York City, by Michael J. Cullen, a former Kroger employee. The store King Kullen, which took its name from the fictitious King Kong, ran under the motto "Pile it high. Sell it low." There were seventeen King Kullen establishments open when Cullen passed away in 1936. Cullen expanded on Saunders' concept of self-service, uniform storefronts, and national marketing by establishing distinct food departments, offering bulk food at discounted rates, and constructing a parking area.

Other well-known American grocery chains from the 1930s, like Safeway and Kroger, initially opposed Cullen's proposal, but as the economy collapsed into the Great Depression, they were eventually compelled to construct their own supermarkets because customers were growing more price-sensitive than they had ever been. Kroger expanded on the concept and pioneered the first supermarket surrounded on all four sides by a parking lot.

2.4.2 Supermarket types

Supermarkets are divided into many types based on their size, scope, range of products, store layout, and trends. While retail food stores are referred to as "grocery stores," "hypermarkets," and "big box markets" interchangeably, industry observers provide more detailed rules about several categories of supermarkets. On the larger end of this range, "hypermarkets" offer a wide variety of general goods and food. Not all nomenclature is the same. Financial Institutions Fund solely considers the grocery segment of the supercenter, placing Wal-Mart in the same category as supermarkets. Superstores are classified as a large form of supermarket by the Food Marketing Institute, whereas warehouse stores are classified as grocery shops.

Grocery Store: Food is the main product sold in a grocery store, which is a type of retail establishment. A grocery store sells food in bulk. Non-perishable food is frequently available in grocery stores, and some even have fresh vegetables, bakeries, delis, and butchers.

Supermarkets are large grocery stores that carry a substantial assortment of non-food items, such as apparel and home furnishings. A pharmacy and an electronics department, which sells DVDs, headphones, digital alarm clocks, and other comparable goods, can also be found in certain sizable supermarkets. Grocery stores operate in a variety of ways: from major supermarket chain stores to rural family-owned businesses like Trader Joe's and Whole Foods Market, as well as boutique brands. Food cooperatives, sometimes known as "co-ops," are owned by their own customers and have gained popularity in several areas. Still, recently, there has been a shift toward bigger stores covering wider regions.

Hypermarket is a cutting-edge supermarket with a second department store. The end result is a large retail space that houses a variety of goods, including complete grocery and general merchandise lines. Hypermarkets theoretically enable patrons to fulfill all of their regular shopping requirements in a one visit. Franchise regulations that restricted the amount of economic leverage that hypermarket chains could exert upon their suppliers and made it more difficult to create hypermarkets were implemented in response to the success of supermarkets and hypermarkets, as well as concerns that smaller retailers would be put out of business. Although some are located in the city center, hypermarkets in France are primarily found at shopping centers (also known as centers dachas or centers commercial) outside of cities. There are numerous cars all around them parking lots, as well as typically by other specialty superstores that offer apparel, sporting goods, vehicle accessories, etc.

Big box market: Is a huge physical retail store that is typically a part of a chain. Occasionally, the phrase also indirectly alludes to the business that runs the store. Even if it may sell broad merchandise, big-box stores are thought to be unsustainable and the result of poor urban planning since they are typically inaccessible to pedestrians and are frequently only reachable by car.

Given that big-box stores are frequently linked to high traffic in the neighborhoods surrounding their locations, some conservatives are concerned about the financial effects these stores may have on long-standing downtown retailers or the potential for these stores to detract from the distinctiveness of these projects. In order to make sure that the superstores have a better relationship with their surroundings and neighbors, several municipalities have implemented stricter architectural treatment guidelines. Many controls landscape and signage.

Concerns about roads and traffic are also present. In addition to raising taxes to pay for road maintenance, increased traffic also pollutes the local air.

2.5. Rapid application development (RAD)

According to (Salehi Nejad 2014), rapid application development is an object-oriented software development methodology that comprises software tools and a development process. A RAD's main objective is to expedite the systems development process. A RAD, according to (Salehi Nejad 2014), has three phases:

Planning Requirements, RAD Workshop, and Implementation

2.6 Summary of chapter two

After reviewing the body of knowledge, the researchers hope to develop an automated management system that is both secure and competitive within the company. Chapter 2 includes a thorough search on inventory management systems, with some of the articles protected from books, online articles, etc. It also emphasizes the benefits of implementing or deploying inventory management systems in an organization.

Chapter 3 Methodology

3.1 Introduction

The techniques employed to accomplish the study's goals are covered in this chapter. This explains how data was gathered through focus groups, interviews, observations, and literature reviews. It also explains how the data will be processed to support system development.

The strategy selected for this project's data collection is qualitative, which is frequently the best and most effective way to get comprehensive information from the administrator's direct communication with the tiny population. Research utilizing open-ended investigation of people's actions, statements, thoughts, and intentions is done using qualitative approaches. Focus groups, interviews, and observation are examples of qualitative approaches. The System makes use of the RAD (Rapid Application Development) paradigm. Life Cycle of Development (SDLC) with Rapid Application Development (RAD), a software prototype is iteratively produced until it satisfies all client requirements and is updated quickly based on user feedback.

3.2 Area of study

This study was carried out at Sky Supermarket in Tororo district in Nagongera Town Council. Due to the system's identification of current issues, quality and well-chosen supermarket was selected; moreover, it is conveniently located and makes data collection simple. The Supermarket that directly handle retail services were included in the analysis, and only inventory records such as inventory level, sales, purchase orders, customer orders, supplier information, and auto profits were taken into account computation, inventory updates, cancellation of orders, barcode scanning and enhance inventory control in Quality and good choice supermarket in Nagongera Town council, Tororo district.

3.3 Population and sampling

A population is the total set of individuals, events, or topics of interest that the researcher wants to study; on the other hand, sampling is the process of choosing a representative sample (or elements) from the population. The number of participants in the research was decided by its goal. The study benefited from the participants' segregation based on a variety of criteria, including age, gender, and occupational title. Twenty people took part in the study for this research. One (01) Executive Director was involved, and the remaining participants were from

two Focus Groups consisting of employees and customers. As indicated in table 3.1 below, the study included a total sample size of three (3) male and two (2) female subjects, ranging in age from 20 to 40 years. The Executive Director is one example of a key informant someone with in-depth expertise of the subject under investigation who was chosen using the purposeful sampling method. At Sky Supermarket, simple random sampling was used to choose additional focus group members.

Sample Size of Participants

Focus Groups	Executive Director	Employee (s)	customer (s)	Total
Number of Participants	01	02	02	05
Male	01	01	01	03
Female	—	01	01	02
Day	Day 1	Day 2	Day 3	05

Table 1 3.1 Sample size of participants

3.4 Data collection techniques

This clarifies the many techniques the researcher employed to get the data. The steps, techniques, and instruments used are listed below;

3.4.1 Interview technique

In order to get information from participants face-to-face, researchers most frequently employ this most practical fact-finding strategy. Interviewing can serve a variety of purposes, including obtaining information, piquing users' interest and sense of engagement, determining needs, and obtaining suggestions and ideas. The following are the reasons interview technique is credited: it enables the interviewer to probe further into an intriguing remark made by the interviewee, it also permits the interviewer to adopt or reward questions during the interview, it permits the interviewer to watch the interviewee's body language, and the interviewee can also reply frankly and freely to inquiries. But it has disadvantages as well: it's quite expensive and time-consuming, so it might not be feasible; the interviewee's communication skills are crucial to the process' success.

3.4.2 Observation

Using this method allowed for the accurate collection of data, especially regarding processes, regarding the real workings of the system. The researcher was able to methodically watch and document the features of the operations and procedures in the store thanks to this technique. The approach provides more context-relevant and in-depth information, allows for data gathering, enables evaluations of the responses' dependability when viewing a system's activities in real time, and is flexible enough to adjust to changing circumstances. It is significant because it enables the observer to see precisely what is being done, validates facts and data, is reasonably priced, and provides information on the task's physical surroundings. People may, consciously or unwittingly, behave differently while they are being observed, and certain tasks may not always be completed in the way that is observed, making the observation technique unworkable.

3.4.3 Document review

Using this instrument, it was possible to comprehend the written content on the topic of Sky Supermarket's inventory record capacity building. The store underwent a comprehensive document assessment in order to examine its operations and identify areas in need of improvement. It permits the researcher to look at the shortcomings, issues, and advantages of the current system. Numerous papers were examined, including registers, tally sheets, periodic reports, inventory charts, and supermarket reports. This method was chosen since it is low-cost due to data availability, it allows for the analysis of historical trends, it doesn't interfere with the client's or program's routine, and there aren't many information biases. Using the previously mentioned data collection method, the researcher will employ document reviews to gain an understanding of the literature pertaining to inventory record capacity building.

3.4.4 Focus group discussion.

A Focus Group is one kind of group interview in which the researchers organize the interview subjects into groups. Additionally, focus groups should not be performed in parallel with multiple one-on-one interviews; rather, they should be used to create an environment of open discussion about the subject of the investigation in which all participants feel comfortable sharing their opinions and responding to those of others. Prior to the Focus Group meeting starting, open-ended questions are established by the researcher to provide him the chance to

facilitate conversation among the focus group participants (Raudeliuniene 2018), however, pointed out that one of the main difficulties with focus groups is that they need resources to assemble participants. Furthermore, it's possible that the participants didn't provide the researcher with the accurate information needed for the study.

3.5 Data analysis and presentation

In order to construct the appropriate outcomes for the research and achieve the goal, (Andiyappillai 2019) explained the process of analyzing the acquired data as a translation of the gathered data by different approaches through research and relate gathered data to the literature review. The data collected from research participants was subjected to consensus analysis and presented verbatim in a descriptive manner.

The qualitative analysis method was used to examine the qualitative data gathered through focus groups, observations, document reviews, and interviews. Using non-quantifiable techniques to assess investment or business prospects and make decisions is known as qualitative analysis. Based on the method of collection, the data is organized in a correct sequence for qualitative analysis. According to (Tsushima 2015), qualitative methods are used to gain a greater understanding of problems pertaining to the creation, use, and interpretation of language assessments. In order to present the data in a form that is appropriate for interpretation, categorization of the common data was used. The data based on selected topics that will clarify the important conclusions of the conducted discussions was described as the coding process moved forward.

3.6 System design

This explains the process used to implement the features of the merchandise Records Management Information System. This was accomplished by using system design techniques that may be utilized to construct the system and its databases, such as DFDs, Context Diagrams, and ERDs.

The Object-Oriented Unified Modeling Language (UML) was used to merge the Architectural and Module Design to create the system. UML uses the UML standards to help define and clarify how the system operates. The requirements analysis's requirements specifications will be examined in order to create the system design, which aids in defining the hardware and software specifications, as well as outlining the general system architecture. According to

(Ishtiaq 2019), system designs are significant because they offer guidelines for conducting thorough research in order to effectively achieve specific goals.

3.7 System implementation software and tools

The merchandise Records Management Information System is an online system in which the user's computer or mobile device, as well as the web server, will be installed with the backend software. The system will be implemented using Notepad, Visual Studio Code, JavaScript, HTML, PHP, and WAMP Server in order to allow the entire system to function fully.

Because Notepad contains programming languages like PHP for generating dynamic and interactive Web Pages and HTML (Hyper Text Markup Language) for JavaScript is used to validate the system web pages, CSS files are used to change the font and web page appearance, and system interfaces are connected to databases. In contrast, the MYSQL components of the WAMP server allow us to build system databases and tables, which serve as the foundation for storing system data. WAMP is a Relational Database Management System (RDMS) with MYSQL as its principal Query Language. Among the various data types that MySQL offers are primary types including integer, float, decimal, char (including character strings), varchar (varying length character strings), binary (for unstructured data blobs), and text (for textual data), plus others.

3.8 Testing

Every part of the system is put through testing to make sure it functions properly. They come together to create a system that works perfectly.

System testing is the process of putting hardware or software linked to a computer system to the test in order to determine whether the system complies with its set requirements. No understanding of the logic or inner workings of the code is necessary for this testing. System requirements and functional requirements should be taken into consideration when conducting system testing on the complete system. To make sure the client cannot submit blank fields, particularly those that are required, system testing is done. To test if the system can send an alert message, you can accomplish this by leaving some fields empty.

This is a thorough explanation of the chosen methodology, or the methodical procedures one plans to follow in order to accomplish the study's goals.

The project design part includes the following topics: data collecting, analysis, synthesis, design, logical flow, implementation, testing, validation, and so on. It also includes information about the primary algorithms and data structures that will be used in the research study, as well as tools, instruments, approaches, processes, and techniques.

Chapter 4

Study area and design

4.1 Introduction

This chapter presents the results from the field and system design. The chapter presents the following sections: 4.1 introductions, 4.2 backgrounds, and 4.3 the strength of the current system. The examination of the current system, its strengths and weaknesses, its requirements, which are both functional and non-functional, and its design, which includes its architecture, context diagram, data flow diagram, use case diagram, and ERD, are all covered in this chapter.

4.2 Current system of study

The director, who serves as the top administrator, together with other administrators within the business and the supermarket manager, who is in charge, oversee the manual file-based system that currently operates at SSM. In addition, the customer is responsible for maintaining the manual file that houses the data that is entered, processed, and distributed. The system has been in place for the past six years. SSM is authorized by the Uganda national investment authority (UNIA) to provide its services, including product sales and marketing products that are locally produced in Uganda by its infant industries, for example, agriculturally based processing industries for producing soft drinks like juice, and others, to name but a few. The supermarket is a single, segregated building located on sky building, and each supermarket's customer's records are kept separately in manual files, with little automation in the system where the supermarket uses an Excel sheet for managing sales, profits and customer related records.

As soon as the customer shows up at the supermarket for purchases, the customer arrives at the front desk, where the cashier notes their information in the sales point in the supermarket and directs them to the employee who can guide customers on those commodities that he or she may be interested in. The customer picks the product in product shell and brings it to the sales point where the price of the product is prescribed to him or her. The cashier sum amount that met to be paid by the customer at the sales point and definitely the customer pays the amount and the details about sales, purchases made by the customer are recorded manually in files then excel for calculating profits, sales, revenue and purchases in this tiresome manner. These calculations are done manually by cashier at sales point in the supermarket, and recorded

in files for the sake of accountability and decision making by the managers and top management, as well as for future reference. There is no receipt given to customer at this point, the customer just picks up the products purchased and departs. The manager checks the details of supermarket operations of the day in the manual files and the Excel sheet to determine the progress of the business.

The structure of the organization

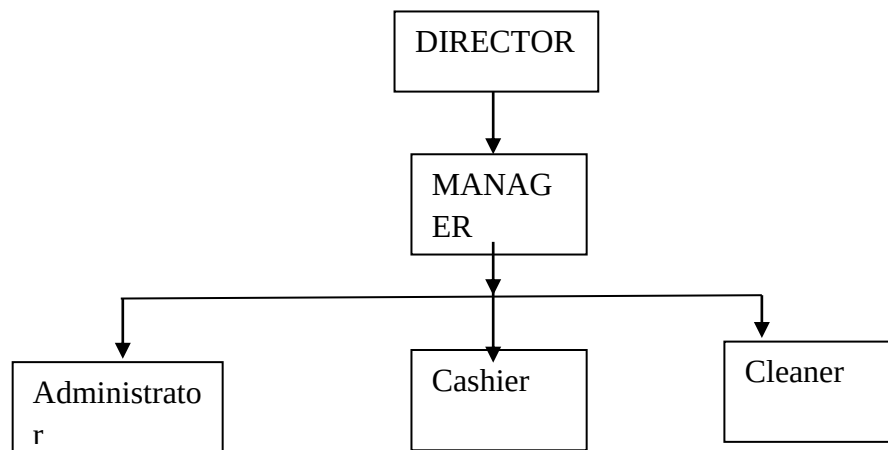


Figure 14.1 Organization structure

4.3 Strengths of the Current System of Study

Customers at SSM have the opportunity to engage themselves with employees in person using the current information system, which enables them to fully express their needs and difficulties.

The director closely supervises the employees in their management of customer services.

Customers are given the option to attend any other employee within the supermarket on duty discharge summary outlining their prior service.

Handling customer issues and records does not require specialized IT knowledge or abilities.

4.4 Weaknesses of the current system of the study

There is difficulty in retrieving records of interest quickly when needed for quick decision making by top management.

To store book records, a large physical storage area (rooms) is needed.

Information deteriorates with time since book-based recordings tend to degrade.

There is a high chance of losing data in the event of a calamity, including earthquakes, floods, and fires, among others.

The manual recording process takes a long time, which slows down the system.

The director needs to visit the supermarket in person to gain access to the system from a distance.

Traditional payment methods use actual currency, which can be readily destroyed by a dishonest cashier and leaves no tracking traces when stolen.

Because the method is entirely manual, it is prone to errors. The employees must perform manual labor.

When Collecting merchandise data, keep in mind those errors are inevitable in human endeavors.

It can be challenging for a manager to find out when a customer last purchased of a given product since some employees misplace customer's records on merchandise records paper or records.

Untrustworthy employees that mishandle customers and incorrect stock intakes hence leading to lose of customer contact and losses in the business generally since the owner normally has a tight schedule with other activities

There are price fluctuations of commodities that require tireless explanations to customers to attain their satisfaction.

Loss of products due to their expiration period leading loss of quality which ends up being thrown away hence losses to supermarkets in terms of revenue and profits.

4.6 System requirements

This section covers the requirements of the system that include functional requirements of the system and the nonfunctional requirements, as all are covered under this section since the data gathered from the Sky supermarket was analyzed using a variety of techniques, including observation and interviews, from which valuable information was gleaned. The functional and non-functional requirements were identified and listed in an orderly and structured fashion.

User	Summary	Requirement for every user
Employee or cashier	This is a supermarket cashier whose role is to add products, make orders, view	Login, view customer records, add products, save product records, search

	products, view orders made, receive customers and service them according to their needs.	products, view; products and orders
Admin	This is the administrator of the supermarket whose role is to add employees, add products, modify products, update products, delete products, make customer orders, add product category types and categories, remove employees, update employee's details.	Login, add products, update products, and add employees, view customer's orders, view employees, view revenue and profits, and generate reports

Table 2 4.1 System requirements

Functional requirements

The functional requirements, which comprise the following, outline the features or services the system will provide to its final customers.

Any additional merchandise information, as well as all pertinent customer purchase data should be captured by the system.

Merchandise and sales data should be efficiently stored by the system to facilitate retrieval.

It should always be possible for system users, particularly the director, to access the system and other pertinent internet services, such as research on uncommon or unidentified products and how to manage them.

Additionally, the data should be able to be uploaded by the system for cloud storage and backup.

For every transaction, the system ought to be capable of automatically completing mathematical calculations like revenue, profits.

How easy it is to use and how distant accessed, meaning that all individuals with permission might access at the same time.

Non-functional requirements

The Non-Functional Requirements, which focus on improving the system's accuracy, dependability, and performance rather than its specific functions, comprise the following:

User-friendly: The system ought to assist people in utilizing it effortlessly.

Backup recovery: In the event of a calamity, records ought to be preserved.

To ensure that only authorized users may access product details and to stop unauthorized users from accessing or corrupting the information, the system should have rigorous security measures in place.

In addition to electricity, readily available backup power sources include solar power and generators.

For the system to be used properly, users must possess basic computer abilities.

Assure appropriate upkeep and ongoing system updates for seamless operation of the system.

4.7 system design

System design is the process of defining the architecture, interfaces, and modules required for the system to accomplish the required functionality. System design techniques like system architecture, context diagrams, DFD, ERD, and use case modeling diagrams were utilized to comprehend how different processes interact with one another and their links.

4.7.1 System architecture

The supermarket merchandise Records Management Information System is a web-based architectural system that shows users how to interact with the system database online. For the system, each user will have a username and password. The user has to proceed to enter their proper login credentials typically their username and password after viewing the system's welcome screen. A new user must initially register in order to gain access to the system.

The sole authority to authorize new users and administrators to use the system is vested in the SSM director, who also supervises all system operations. The receptionist records the customer's information after extending a warm greeting and enters it into the system.

When an employee needs to access product records, they use the stock module on the computer system's dashboard. After the product has been scanned with a QR code scanner software on a phone or computer, either online or offline, to obtain the product's unique serial number, they can use that number to fulfill customer orders. Once the customer has paid, the employee submits the order to the system. When the consumer eventually receives the printed receipt for

the item they purchased, it is generated automatically. All records are also recorded and kept in the database.

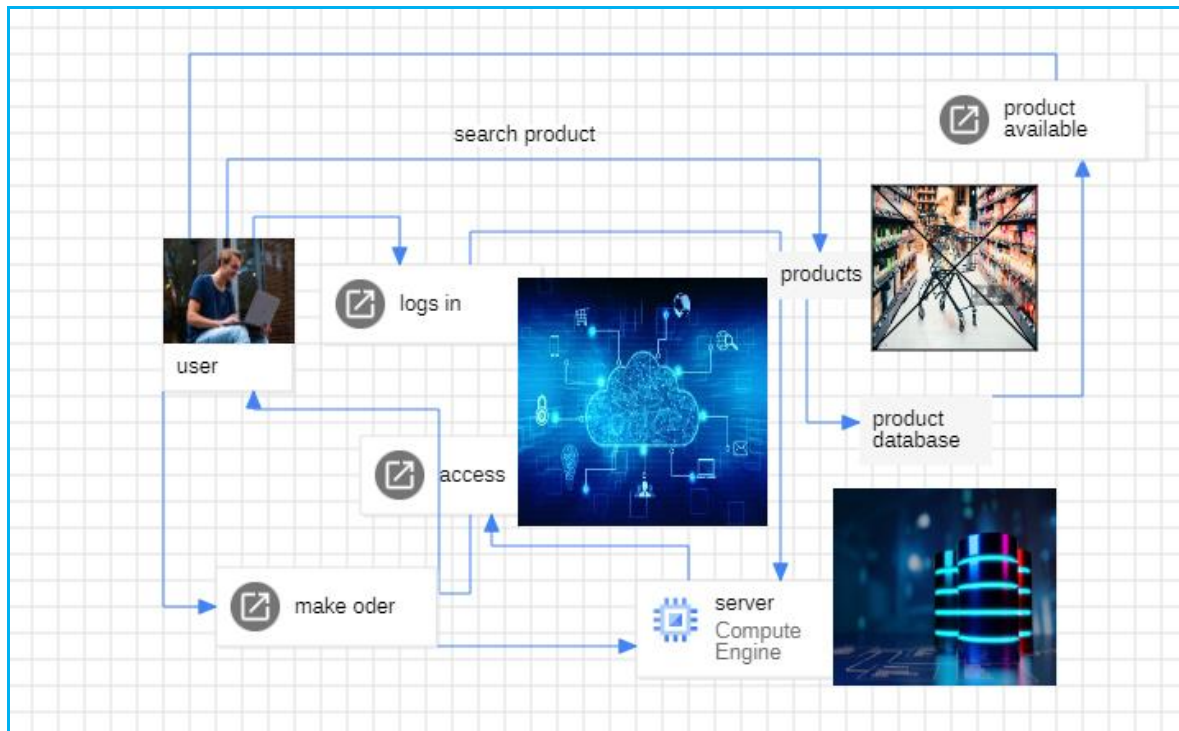


Figure 2 4.2 System Architecture

4.7.2 Context diagram

At the highest level, this data flow diagram shows the boundaries, the extent of the system, and how it interacts with other entities. An "outward" perspective of the system is also provided. Together with any other subsystems or user groups that interact with the system, the context diagram also shows the main data flows. Below is a depiction of the data flows and procedures.

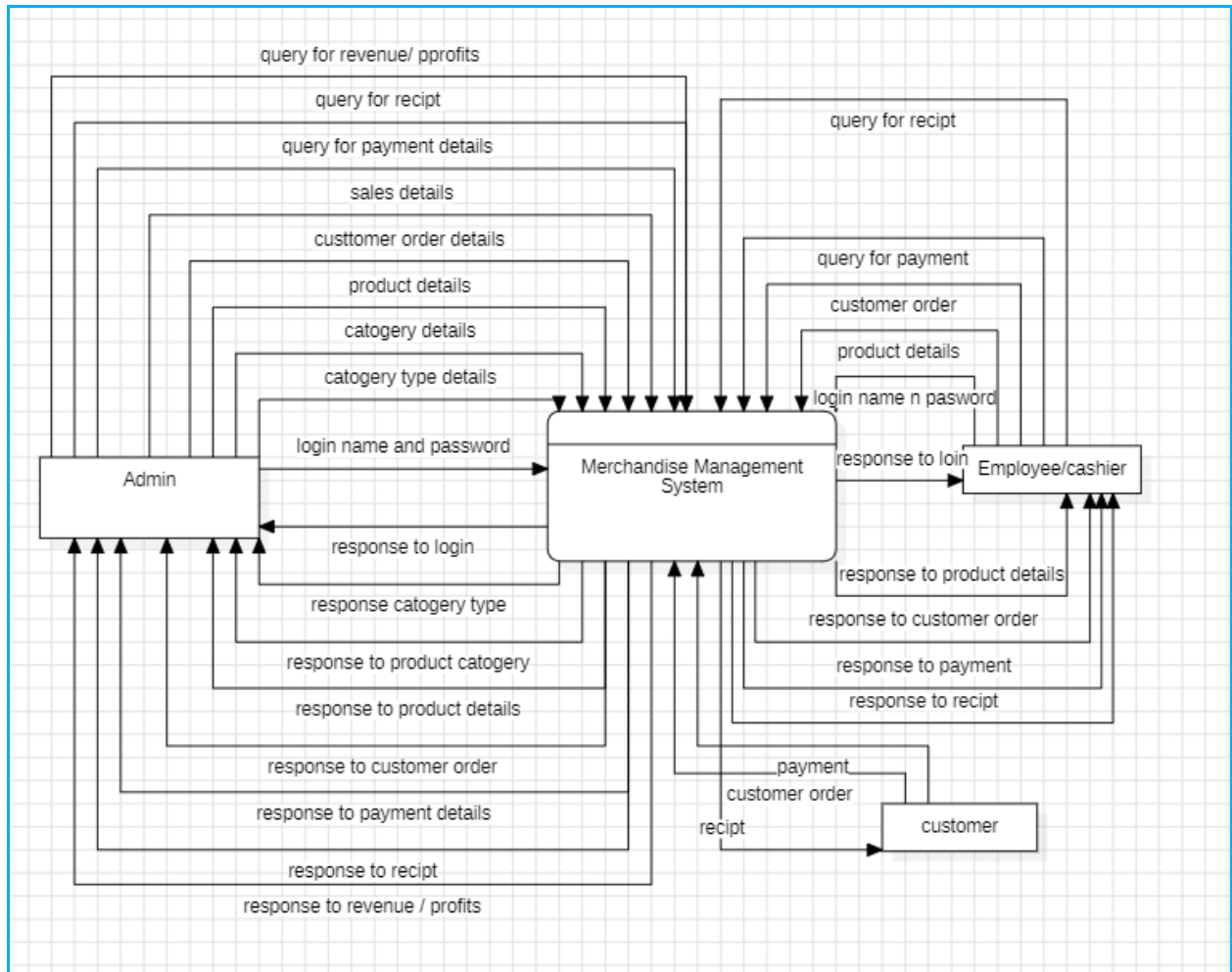


Figure 34.3 Context diagram

4.7.3 Data flow diagrams

Data flow diagrams, which depict the system's elements, operations, and interfaces graphically and top-down, illustrate how data flows or changes through a predetermined sequence. Analyzing the information system's inputs, outputs, and procedures for merchandise records management is beneficial.

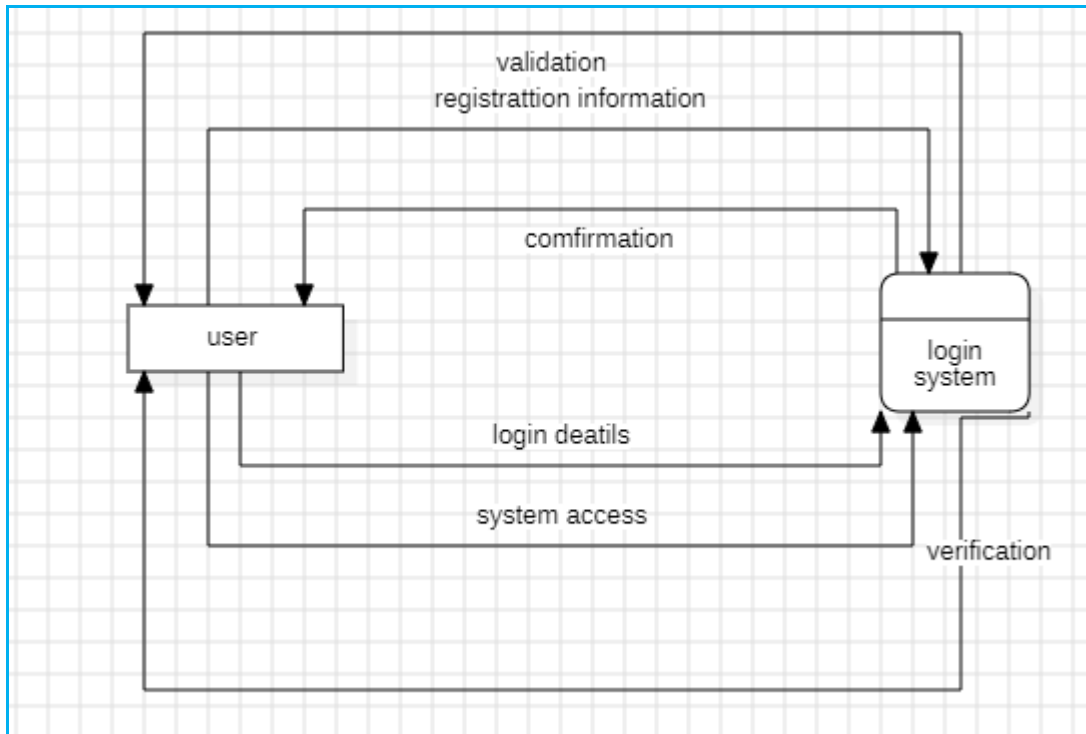


Figure 4 4.4 Data flow diagram for login level 1

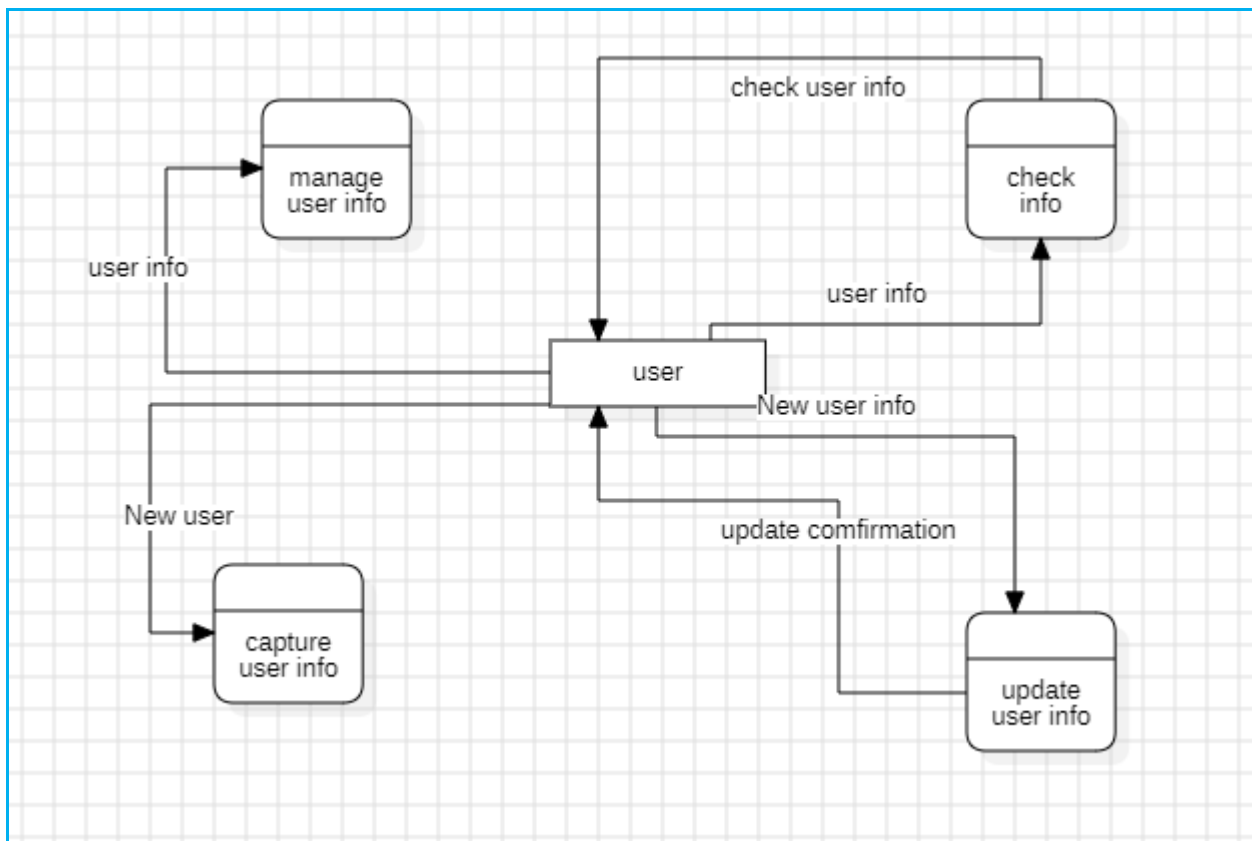


Figure 5 4.5 Data flow diagram for login level 2

Figure 6 4.6 Data flow diagram level 1

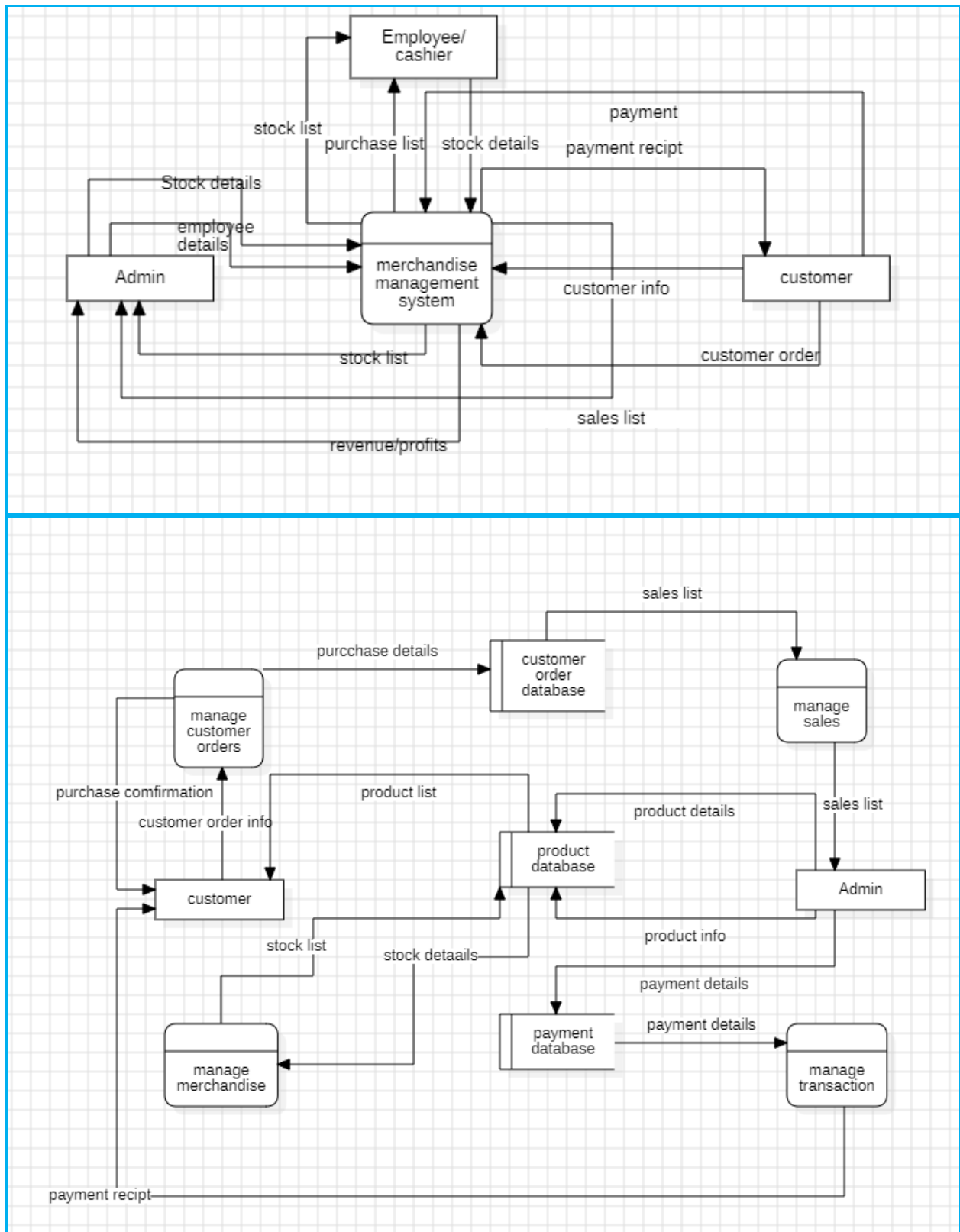


Figure 7 4.7 Data flow diagram level 2

4.7.4 Flow chart diagram (FCD)

The graphical top-down representation of the system's components, operations, and interfaces in a data flow diagram below illustrates how data flows or changes through a given sequence. Analyzing the patient records management information system's inputs, outputs, and procedures is beneficial.

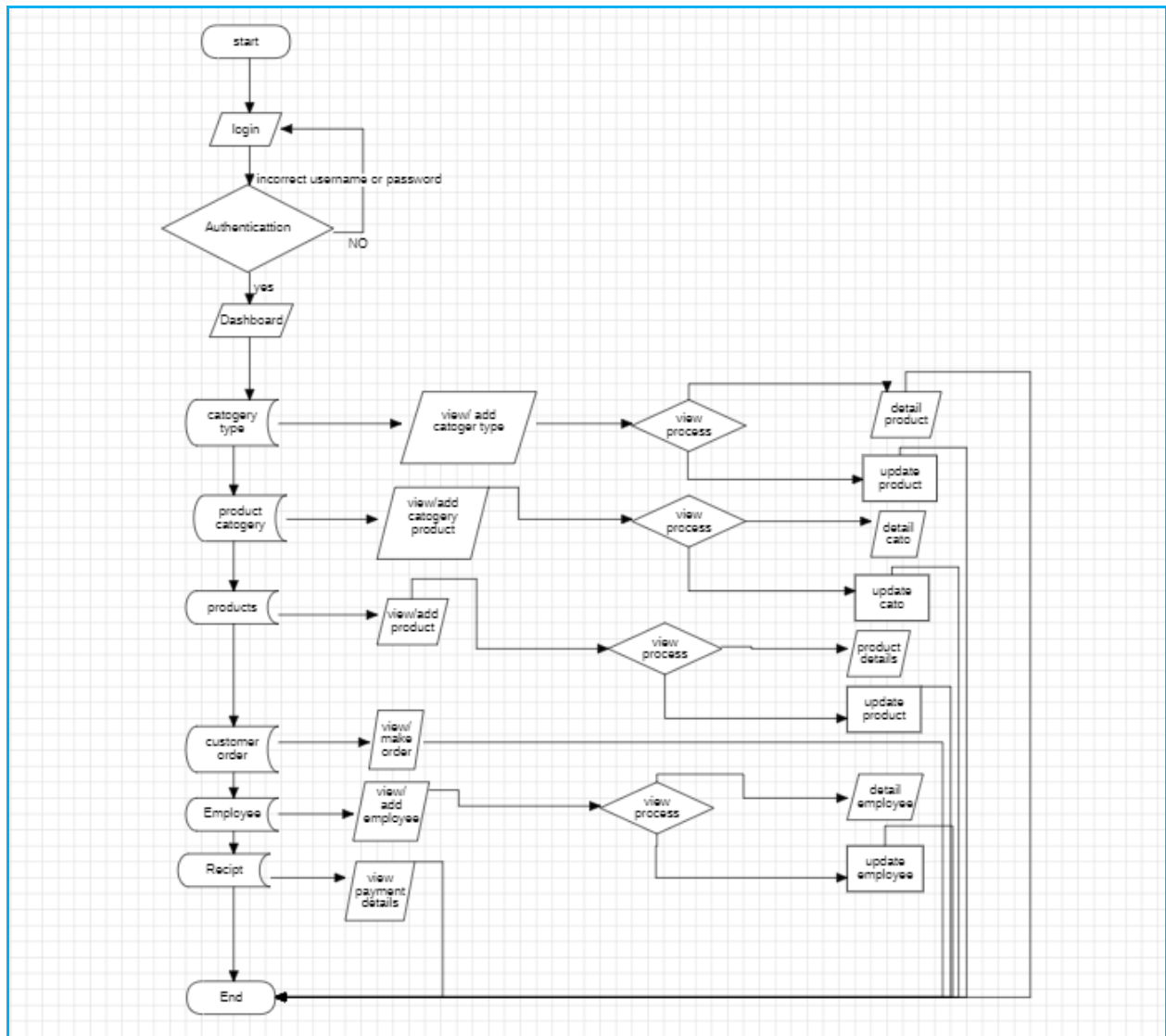


Figure 8 4.8 Flow chart data diagram

4.7.5 Use case diagram

This is the use case diagram that users and their roles in the system.

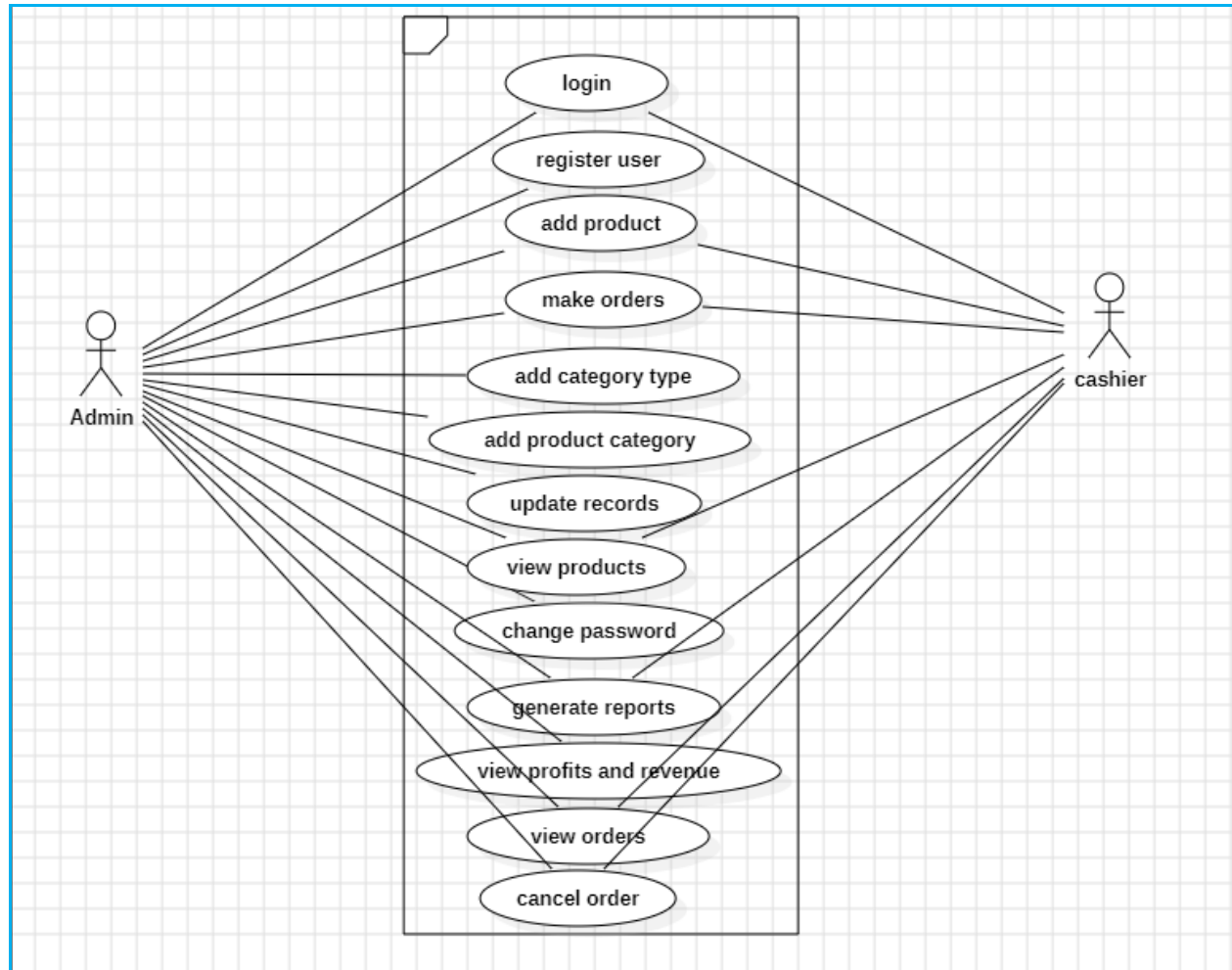


Figure 9 4.9 Use case diagram

Use case tables

Access Table (use case 1)

User activity	System response
Admi login by providing username and password	Authentication
Employee login by providing user name and password	Authentication

Table 3 4.2 Access table use (case 1)

Registration table (use case 2)

User activity	System response
Admin adds the employee by filling in details	
Contact Surname First name Email Telephone number Address Status Username Password	Captures employee's details

Table 4 4.3 Registration table (use case 2)

Use case 3	Description	System response	Results
Add category type	Responsible for adding, updating, and deleting category type by the admin.	If category is added, the system pops up that a new category successfully has been added.	Successful

Table 5 4.4 Add category type (use case 3)

Use case 4	Description	System response	Results
Add product category	Responsible for adding, deleting, and updating product category.	If product is added, the system pops up that a new product category successfully has been added	Successful

Table 6 4.5 Add product category (use case 4)

Use case 5	Description	System response	Results
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Add product	Responsible for adding, deleting, and updating products in the supermarket.	If new product is added, it pops up that a new product successfully has been added	Successful
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Table 7 4.6 Add product (use case 5)

Use case 6	Description	System response	Results
Product	Responsible for the sale of the products by the cashier or admin.	Order successfully inserted, if the cashier or admin store the product that was bought by the customer.	Successful

Table 8 4.7 product (use case 6)

User case 7	Description	System response	Results
Add employee	The system automatically generates employee id number and the admin provides username, and password for employee	If all employee details are entered well, it will pop up employee successfully has been added	Successful

Table 9 4.8 Add Employee (use case 7)

Use case 8	Description	System response	Results
Customer orders report	Records of customers about what they have purchased.	All products that are bought by customers, and their records are kept for future notice.	Successful

Table 10 4.9 customer order report (use case 8)

User case 9	Description	System response	Results
Admin report	List of products in the store, revenue, profits, and customer orders.	Price, quantity, total revenue, profits, and more details are here.	Successful

Table 11 4.10 Admin report (use case 9)

Order fulfillment table (use case 10)

User activity	System response
Customer picks the product, and come to the check point for purchase	
Cashier scans the product, obtains the serial number and enters to the system, and then searches the product. If more than one product is needed, cashier can add the quantity of the product, description, and current price of the product is presented.	Determines selling price of the product, and adds product information to running sale transaction
After product serial number is entered to the system, the cashier indicates to post that the product entry is completed, and clicks calculate button.	Calculates, and presents the sales total
The cashier tells the customer the total amount to be paid	
The customer gives the cashier cash payment which is greater than the sales total	
The cashier records the cash received amount.	Show balance due to generated receipt for customer order.
Cashier deposits cash received and give balance demanded to the customer.	Logs the completed sale and submits order fulfillment, and the system pops up order

	successfully has been inserted.
The customer leaves with the item purchased	

Table 12 4.11 order fulfilment (use case 10)

Use case 11	Description	System response	Results
Update product	Responsible for making new changes on the existing product like increased quantity.	If any field of the product is updated, the system pops up a window saying a product successfully has been updated.	Successful

Table 13 4.12 update product (use case 11)

4.8 Entity Relationship diagram

The relationship between the entities and characteristics in a proposed database for the system is shown graphically in the entity relationships diagram. Entities pertaining to the data comprise of employee or cashier, administrator, product, sales, Transactions, and customer

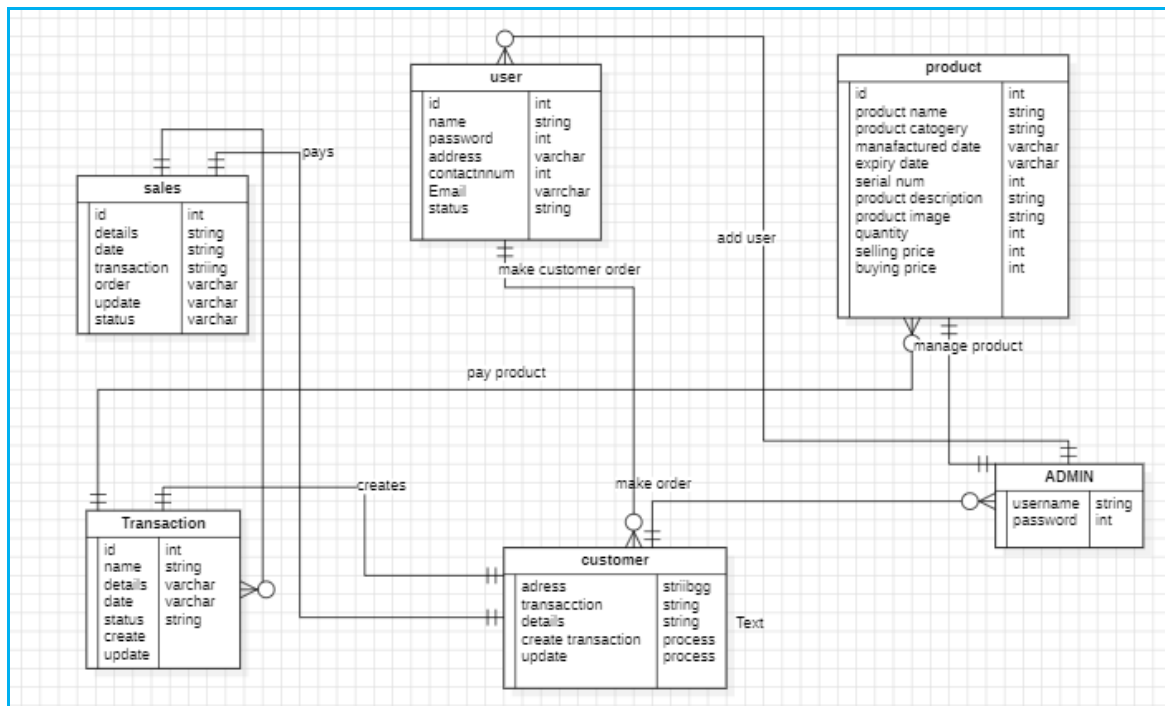


Figure 10 4.10 Entity Relationship Diagram

Chapter 5

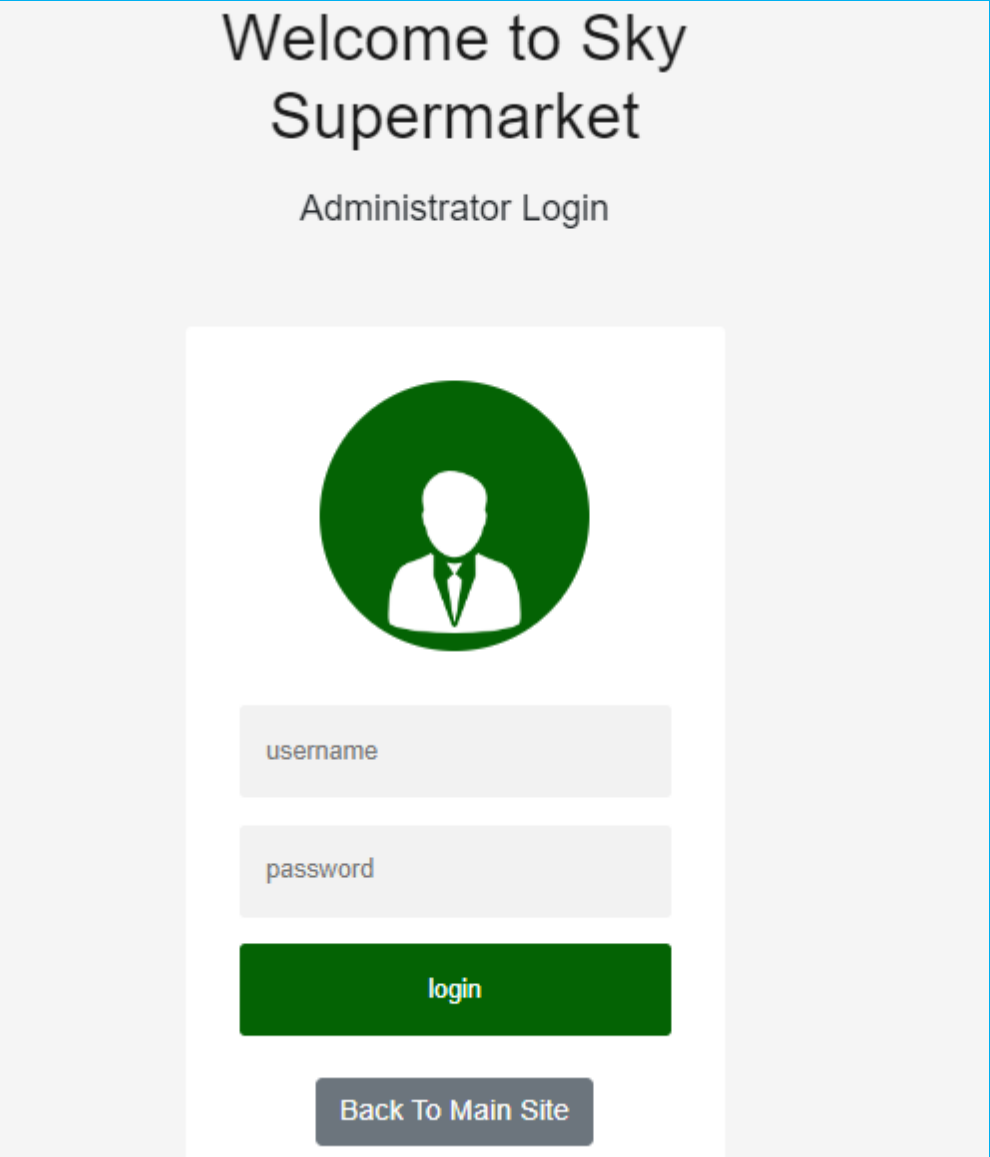
Implementation

5.1 Introduction

This is a detailed description of the results and findings of the project.

5.2 Administrator login interface

This is a login form interface for the admin, where he or she logs in by providing a username and password.

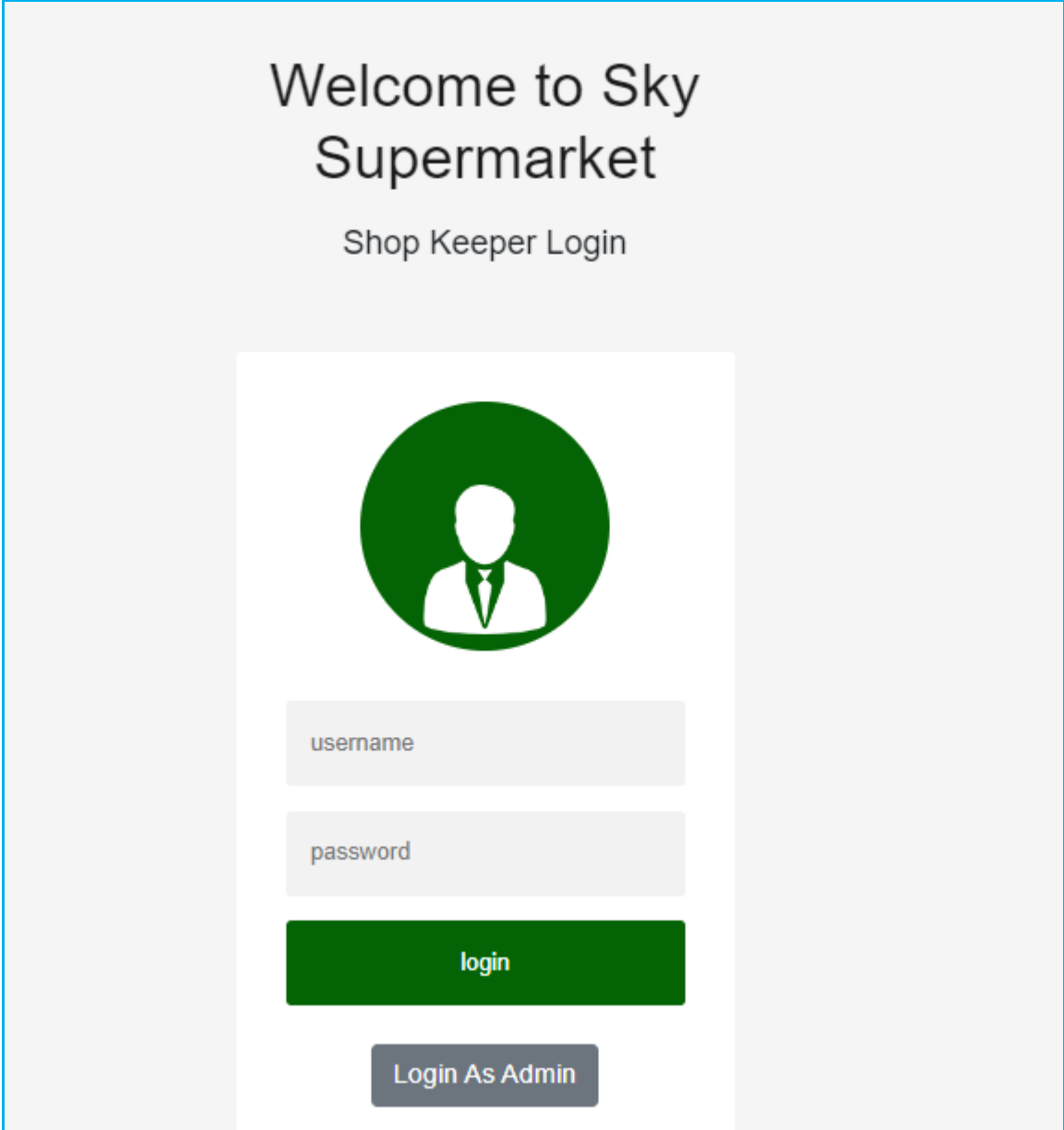


The image shows a web interface for the 'Administrator Login' of 'Sky Supermarket'. The page has a light gray background. At the top, the text 'Welcome to Sky Supermarket' is displayed in a large, dark gray font, with 'Administrator Login' centered below it in a smaller, dark gray font. In the center of the page is a white rectangular box containing the login form. Inside this box, there is a circular green icon with a white silhouette of a person wearing a suit and tie. Below the icon are two light gray input fields: the first is labeled 'username' and the second is labeled 'password'. Below these fields is a solid green button with the word 'login' in white text. At the bottom of the white box is a dark gray button with the text 'Back To Main Site' in white.

The admin logs in to the system by clicking on the button blowing the interface, then admin enters his or her username and password, and finally clicking login button. If login details are correct, it pops login successfully, and admin accesses his or her dashboard.

5.3 Employee or cashier login interface

This is the login interface for the employee or cashier, where he or she logs in by entering correct login details.

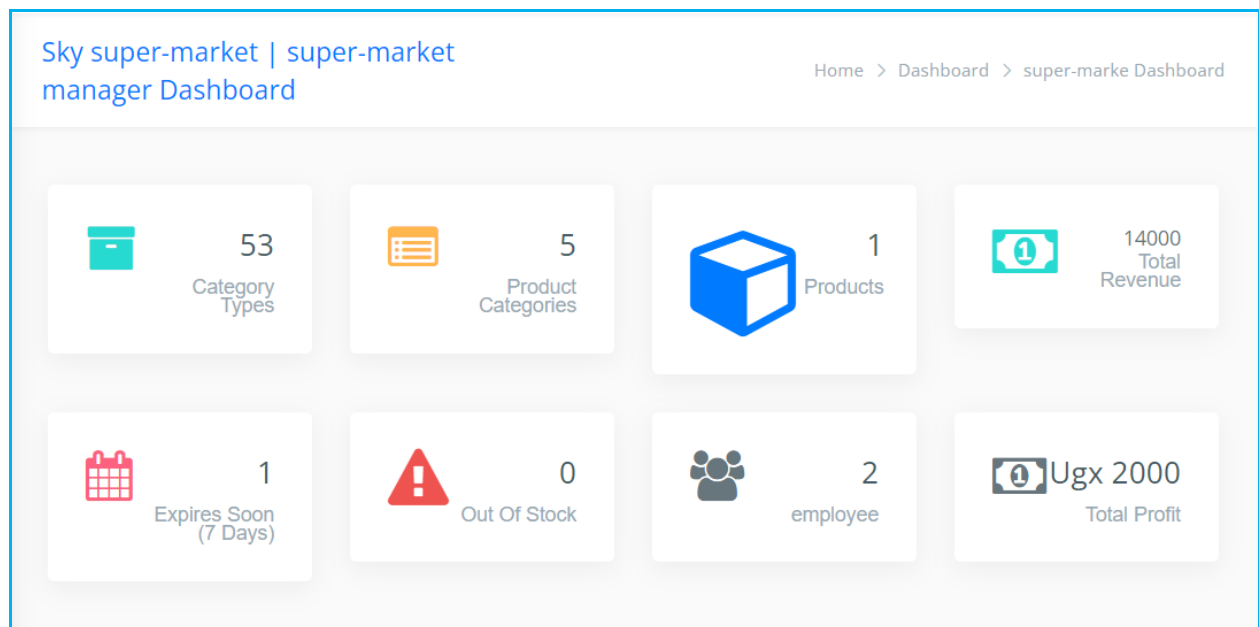


The image shows a login interface for 'Sky Supermarket'. At the top, it says 'Welcome to Sky Supermarket' in a large, dark font, followed by 'Shop Keeper Login' in a smaller, dark font. Below this is a white rectangular box containing a green circular icon of a person in a suit. Under the icon are two light gray input fields: the first is labeled 'username' and the second is labeled 'password'. Below these fields is a large green button labeled 'login'. At the bottom of the white box is a smaller, dark gray button labeled 'Login As Admin'.

The employee logs in to the above form by entering the correct password and username, and then clicks the login button. If the login details are correct, the system pops login successfully, and the employee accesses his or her dashboard.

5.4 Admin dashboard interface

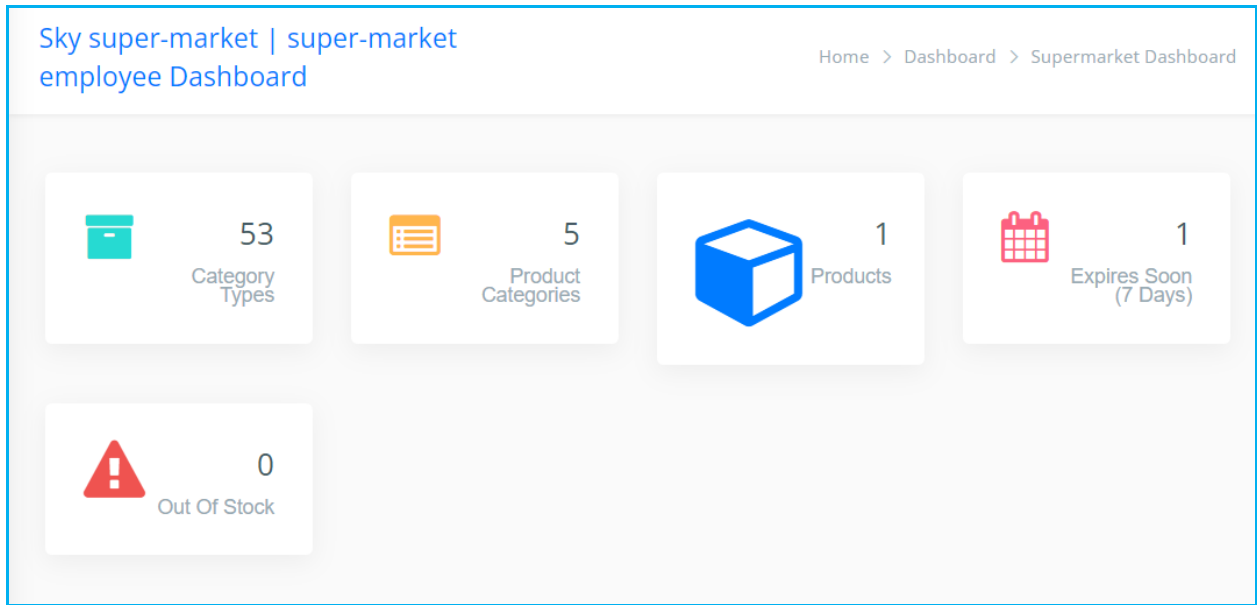
This is the admin dashboard that shows up after admin has logged in successfully.



The admin dashboard contains all the roles that are entitled to the admin, and admin is able to view revenue, profits, add all category type and category products by clicking on their icons on side bar, and complete the task

5.5 Employee dashboard interface

The employee or cashier dashboard has the roles that are to be played by the cashier in the system



The cashier uses all the functionalities that are reflected on the dashboard to perform all task that he or she is privileged to do in the system.

5.6 Add category-type interface

This is the form used to add the category- type in to the system by filling in all fields as required.

The screenshot shows the 'Sky super-market | Category Type Management' page. The breadcrumb trail is 'Product Management > Category Types > Manage Category Types'. The form is titled 'Add Product Category Type' in a purple header. It contains a label 'Category Type' above a text input field with the placeholder 'Enter Category Type Name'. At the bottom of the form are two buttons: a green 'save' button and a dark grey 'Cancel' button.

The admin adds the category-type for the product by entering the category type name in the field of the form above for category type and click save button. If the category type is added correctly, the system will up; new category type successfully has been added. The admin can view it in the category type in the sidebar on the home page of the admin dashboard.

5.7 Add product category form interface

This is the form for adding the category product to the system.

Sky super-market | Product Management

Product Management > Product Categories > Add Product Category

Add Product Category

Category Name

Enter Category Name

Image

Choose File

No file chosen

Select Category Type

--Select Product Category Type--

Category Description

Enter Category Description

Save

Cancel

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The admin adds the category product to the system by filling out the product category form and all fields have to filled as specified, then admin clicks the save button. If all fields are filled correctly, the system response that a new product category successfully has been added, then the added category can be seen under all product categories in the sidebar.

5.8 Add product form interface

Sky super-market | Product Management

Product Management > Products > Add Product

Add Product to Product Database

Product Name

sugar

Product Description

Describe The Product

Buying price (Ugx)

5000

Selling Price (UGX)

8000

Upload Product Image

Choose File

Super Market Management System_4.jpeg

Manufacturing Date

14/04/2024

Expiry Date

26/05/2024

Quantity

1000

Serial Number

493673

Select Product Category

food

Upload Downloaded QR Code (PNG)

Choose File

sugarxxxx.png

Generate QR Code

Save

Cancel

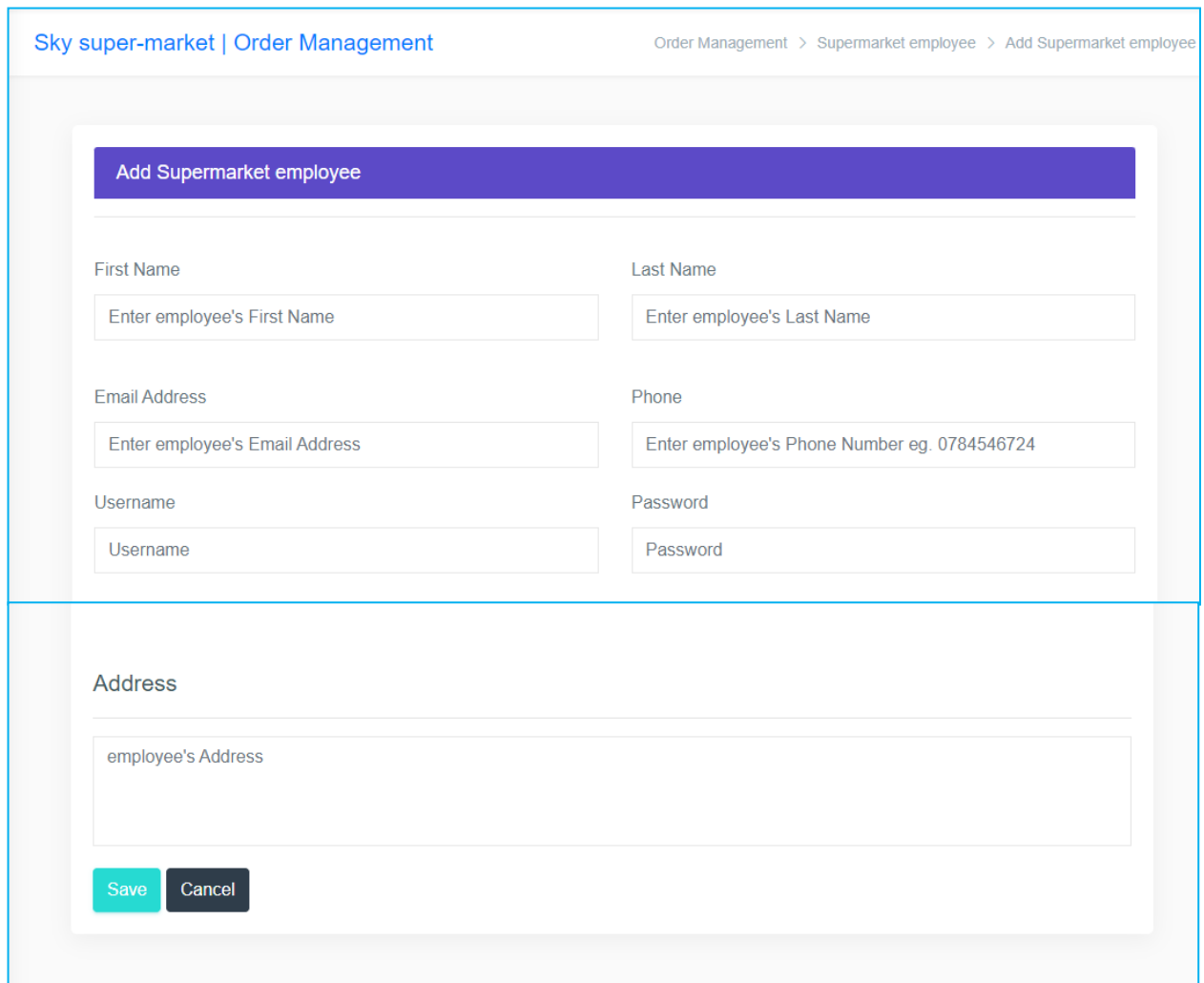
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This is the form that administrators or cashiers use to add products in product database in the system. The admin or the cashier can add the product to the product database to the system by filling out the provided fields in the add product pop-up window form. All fields are to be filled out before clicking the save button except for the first, which generates the QR code for the product and saves it. After saving the QR code, the user can then upload the QR code, in the field of uploading the QR code and the serial number is generated automatically. All the attributes of the product are captured in the QR code, and as you move the cursor on the QR code, all attributes can be displayed then you can click save. If product addition was successfully done;

the system pops up a new product successfully has been added, and when the user check product in stock, they can see it.

5.9 Add employee form interface

This is the used by the admin to register Employees in the system.



The screenshot displays a web application interface for adding a new supermarket employee. At the top, the header shows 'Sky super-market | Order Management' on the left and a breadcrumb trail 'Order Management > Supermarket employee > Add Supermarket employee' on the right. The main content area features a form titled 'Add Supermarket employee' in a purple header bar. The form is divided into two sections. The upper section contains six input fields arranged in two columns: 'First Name' and 'Last Name' (top row), 'Email Address' and 'Phone' (middle row), and 'Username' and 'Password' (bottom row). Each field has a placeholder text indicating the required information. The lower section is titled 'Address' and contains a single large text area for the employee's address. At the bottom of the form, there are two buttons: a green 'Save' button and a dark grey 'Cancel' button.

The administrator registers employees by filling out their details in the above form and saving the details. If all details are successfully added, the system display “new employee added successfully”. The admin sees the added user in all employee icons in the sidebar.

5.9 customer order fulfillment

This is the form that is used to make orders for customers.

Add Product to Product Database

Product Name

coffee

Price (UGX)

35000.00

Quantity

5

Unique Number

502099

Stock available

Search

Calculate

Reset

Selected Products:

coffee (Quantity: 5): 175000 UGX

Total Amount: 175000 UGX

Generate Receipt

Insert Selected Products

The user makes orders for the product that has been picked up in the supermarket by scanning the QR code of the product, and then the cashier obtains the serial number of products which he or she put in the field, and then clicks the search button to search for product. The product name and its selling price are displayed in the fields, then cashier enters the quantity wanted by the customer, and the system calculates the amount after a receipt is generated for the customer order. After there after click on insert selected product to complete the order, the system pops up order successfully inserted.

5.10 Update the product form interface

This is the form that is used by admin when there is a need for the product in stock.

Update Product Information

Product Name

coffee

Description

ugandan made

Price (UGX)

35000.00

Image

Choose File

coffeee.png

Quantity

54

Select Product Category

Drinks

save

Cancel

Administrators can update the product by updating the fields of the product. Then click the save button to save the changes that have been made. The system pops the product successfully updated.

Chapter 6

Discussion of results, Conclusion, Recommendations, and future work

6.1 Introduction

This section presents a conclusion to the project report highlighting in the summary the results and any recommendations from the project and way forward.

6.2 Discussion of results

Our discussion is guided by the objectives of the study which include;

1. To determine the requirement of the proposed system.
2. To design the system
3. To implement the system
4. To test and validate the functionalities of the system

1. The theme was to determine the requirements of the proposed system after collecting data and all requirements were realized. In the study, the data were collected and analyzed from which the system requirements were determined and broken down into functional requirements and nonfunctional requirements. This is presented in Chapter 4 under sections 4.5. This is in line with the work of (Apvrille and de Saqui-Sannes 2013) , who said that in developing and implementing the system, one must first determine the requirements of the system

2. System design. The second theme was to design the system. In this study, the system was designed following these stages that includes; system architecture section 4.7.1, context diagram section 4.7.2, data flow diagram, flow chart, Entity relationship diagram, and use case diagram. This is in line with the work of (Salehi Nejad 2014) who said that to design the system, one must follow those stages.

3. Implement the system. The third theme was to implement the system. In the study, the system was implemented using the rapid application development method, where requirement planning was done and refined to produce the prototype iteratively until the best results were realized. This is in line with the work of (Salehi Nejad 2014) who said that for quick and faster system development, one should use the rapid application development method.

4. Test and validate. Testing and validating the system's requirements was the fourth theme. The software units in a system, which are modules and routines created and integrated to carry

out a certain function, were evaluated and validated in this study. Unit testing was conducted, initially focusing on modules apart from one another in order to identify flaws. This made it possible for us to find logical and coding mistakes in every module. This testing entails inputting data and determining whether the value matches the type and size provided by ASP.NET. It also tests different controls to make sure each one operates as needed. Additionally, integration testing was carried out, testing the combination of both. Integration testing is a methodical process used to find interface-related problems. Building a software structure out of unit-tested modules is the goal. Each module is put together and tested together. The options for the server and client modules are combined and evaluated here. The application's seamless data movement and well-integrated functional unit are guaranteed by this testing.

Additionally, user acceptability was completed, which is essential to any system's success. In order to verify user acceptance, the system under consideration is continuously updated while it is being developed, consulting with users as needed.

6.4 Conclusion

From the above discussion, the results show that this study has achieved all its objectives, and the system is better than the existing system since all its functionalities were realized which include; QR code scanning, automatic revenue and profit computation, and expiry time detection.

6.5 Recommendation

Any supermarket can benefit from this work due to its many advantages and the outcomes of the system that was put in place. Consequently, it is advised for any supermarket, but notably for those with high consumer traffic and frequent product information loss. In addition to enhancing the quality of the services offered, this will safeguard the interests of the supermarket owners.

It is advised that ongoing research be done and that regular updates be made to increase the reliability of the current system because there will always be an increase in customer expectations and demands, as well as demands from supermarket owners and administrators for greater effectiveness and efficiency of any system and prevention of unauthorized access into the system.

Other researchers can utilize the work to investigate this topic further.

This system should be used by the government to manage its inventory stores.

6.7 Future work

To provide adequate system security and prevent impersonation and illegal access to stored data, biometric methods like fingerprint recognition should be incorporated into the system. The online payment module's implementation could make it easier for customers to pay for their orders, which could encourage potential customers to interact (in a restricted way) more with the system and the supermarket in general. PayPal is one such online payment tool. Enough space should be provided for customers to utilize their mobile phones to engage with approved supermarket users in order to place orders.

Appendices

Appendix A: Interview guide submitted sky supermarket Nagongera town council.

My name is Wofakale Godfrey, a Students of Busitema University, Nagongera campus faculty of science and education pursuing a bachelor's degree of science education. I am doing a research project in conjunction with Dr. Angole Richard, head of department computer science to help me design and develop an Automated merchandise Management System with your corporation, I would be very delightful for your assistance.

Name of the interviewee Title of the Interviewee

Appendix B: supermarket manager interview guide

1. How long have you been working with this Company?

.....

2. What is your present Position?

.....

3. How many employees are under your Supervision?

.....

4. Do you have any knowledge of using Computer?

YES ☐

NO ☐

5. Please tell me the Business Process that occurs within the existing system.
.....
6. What kind of reports do you use in monitoring the business activities?
.....
7. What kind of challenges do you face within the existing system when monitoring the business activities?
.....
8. Any thoughts of how you see how these challenges can be reduced? And how if yes?
YES ☐ NO ☐

Appendix C: Sales Manager Interview Guide

1. How long have you been working for the supermarket?
.....
2. Does your supermarket have any Information System?
YES ☐ NO ☐
3. What current system does the supermarket have in storing the product information?
.....
4. How does the system track the Inventory level in the stores?
.....
5. What are the Procedures you follow when serving the Customers? Do you keep any records for the Customers if you have any Can we check on them please?
.....
YES ☐ NO ☐
6. What are the challenges of the existing Inventory Management System?
.....
7. Are the Customers satisfied to the services you offer them?
YES ☐ NO ☐
8. Does the system perform to your expectations?
.....

Appendix D: Customer interview guide

1. How did you come to Know about the Company?

.....
2. How long have you been Buying Products from this Company?

.....
3. What kind of services does the supermarket offer you?

.....
4. What kind of challenges do you face when buying products from this supermarket?

.....
5. What would you love to see being improvised in this company?

.....
Thank you so much for your time and patience has a nice day.

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