

Software Requirement Specification Document for Supermarket Management System

Jana Ibrahim, Mariam Mahmoud, Maya Walid, Sara Mostafa, Sara Yasser
Supervised by: Prof. Mostafa Elgendy , Eng. Nada Nofal

June 28, 2024

Table 1: Document version history

Version	Date	Reason for Change
1.0	19-March-2024	SRS First version's specifications are defined.

GitHub: <https://github.com/Supermarket-Management-System>

Contents

1	Introduction	3
1.1	Purpose of this document	3
1.2	Scope of this document	3
1.3	Business Context	3
2	System Description	4
2.1	Problem Statement	4
2.2	System Overview	4
2.3	System Scope	4
2.4	System Context	4
2.5	Objectives	5
2.6	User Characteristics	5
3	Functional Requirements	6
3.1	System Functions	6
3.2	Detailed Functional Specification	8
4	Design Constraints	9
4.1	Standards Compliance	9
4.2	Other Constraints as appropriate	10
5	Non-functional Requirements	10
6	Data Design	11
7	Preliminary Object-Oriented Domain Analysis	13
8	Operational Scenarios	13
8.1	Design Patterns	13
8.2	Solid Principles	14
8.2.1	Scenario 1: Valid Cashier Login	14
8.2.2	Scenario 2: Invalid Cashier Login	14
8.2.3	Scenario 3: Cashier searches for products	15
8.2.4	Scenario 4: Cashier adds used payment method	15
8.3	Admin Scenarios	15
8.3.1	Scenario 1: Successful admin login	15
8.3.2	Scenario 2: Admin adds a new cashier	15
8.3.3	Scenario 3: Admin adds product information	16
8.3.4	Scenario 4 : Admin views cashiers	16
8.3.5	Scenario 5: Admin deletes cashier account	16
9	Project Plan	17

Abstract

The Supermarket Management System (SMS) is an innovative solution designed to address the significant challenges of inventory mismanagement and inefficient sales tracking in supermarkets by integrating a dynamic management system with advanced big data analytics. The system introduces a user-friendly interface that streamlines the management of products, discounts, and managing staff, making it easier for supermarkets to adapt to market changes and consumer demands. This comprehensive system will simplify complex processes, ensuring accurate stock levels and pricing, thereby reducing customer complaints and significantly improving satisfaction rates.

1 Introduction

1.1 Purpose of this document

The purpose of this document is to provide a detailed description for the Supermarket management system. It will explain how the system works, who are the target audience, benefits of the system, the constraints under which the system will operate and how it will respond with different stimulus. It serves as a guide for developers, designers, and stakeholders to understand the objectives, features, and constraints of system. Additionally, the document serves as a reference for evaluating the success of the final product and ensures that the delivered solution meets the needs and expectations of all stakeholders involved in the supermarket management.

1.2 Scope of this document

The requirements and features of the Supermarket Management System (SMS) are described in the document, with a focus on the aspects of access control and authentication. It describes the permissions and roles given to cashiers and administrators, including role-based access control and safe login. In addition, it has functions for creating reports, tracking product information, and managing cashier accounts. The purpose of this paper is to implement these functions in order to improve the security and efficiency of supermarket operations.

1.3 Business Context

Supermarkets struggle to effectively manage their operations in order to satisfy the changing needs of their customers in the modern retail landscape. The Supermarket Management System (SMS) presents itself as a customized approach to solve these complex issues. Supermarkets have to adapt by incorporating strong technology solutions because customers' expectations are becoming more and more focused on convenience and seamless experiences. The SMS provides an extensive feature set intended to improve customer happiness, expedite processes, and boost overall productivity. The system makes sure that only authorized personnel can access sensitive data and carry out necessary tasks by providing role-based access control and secure login capability. Moreover, the SMS makes inventory, sales data, and customer interactions easier to control, giving supermarkets the power to decide wisely and use their resources to the fullest. In the cutthroat market of today, Supermarkets can stay ahead of the curve thanks to the SMS, giving them a strategic

advantage in situations when flexibility and agility are critical. Supermarkets may not only meet but also surpass customer expectations by utilizing cutting-edge technology to optimize workflows and improve the shopping experience. In the end, the SMS is a critical tool that supermarkets need to succeed in a retail environment that is changing quickly in order to drive growth and long-term success.

2 System Description

2.1 Problem Statement

The management of supermarkets nowadays has a number of difficulties, such as ineffective appointment scheduling, poor staff-customer communication, and insufficient control over inventory and sales data. Long checkout lines and trouble scheduling convenient dates for appointments sometimes cause inconvenience to customers. Employees may also make mistakes and become confused when handling goods and scheduling appointments. The market is in dire need of a Supermarket Management System (SMS) that can effectively manage inventory, schedule appointments, and facilitate smooth communication. Current systems are inadequate in offering secure login, role-based access control, and comprehensive supermarket operations management. A system like this would enhance customers pleasure, streamline supermarket operations, and give employees more authority over their duties.

2.2 System Overview

Our supermarket management system controls access levels for different users, such as admins and cashiers. The admin and cashier roles work collaboratively to ensure the efficient and effective operation of the supermarket management system. While the admin focuses on system configuration, security, and overall management, the cashier handles day-to-day operations, Processing invoices and printing receipts.

2.3 System Scope

The system is composed of two actors :

- **Cashier:** He can search for products,specify quantities for each selected product,apply discounts and print receipts.
- **Admin:** He is responsible to manage the website, do all the crud operations and observe the website statistics.

2.4 System Context

The system is very beneficial for the supermarkets as currently most of them lose a significant portion of revenue annually due to errors in inventory management and sales tracking caused by our reliance on manual processes. This integrated system will simplify processes, reduce errors,

and provide valuable insights to optimize product placement, leading to cost savings, increased efficiency, and improved customer satisfaction

2.5 Objectives

- **Effective Admin Management:** Make it possible for admin to effectively create, maintain, and update staff accounts in the system.
- **Cashier Processing for Transactions:** Equip cashiers with the necessary skills to complete tasks quickly and accurately, such as entering goods, estimating quantities, applying discounts, accepting payments, and producing receipts.

2.6 User Characteristics

User Characteristics for the Supermarket Management System (SMS) focused on administrators and cashiers.

- **Administrators:** Taking control of cashier accounts, products and categories and overall system functionality. Also, he views generated reports.
- **Cashiers:** Processing invoices and printing receipts.

3 Functional Requirements

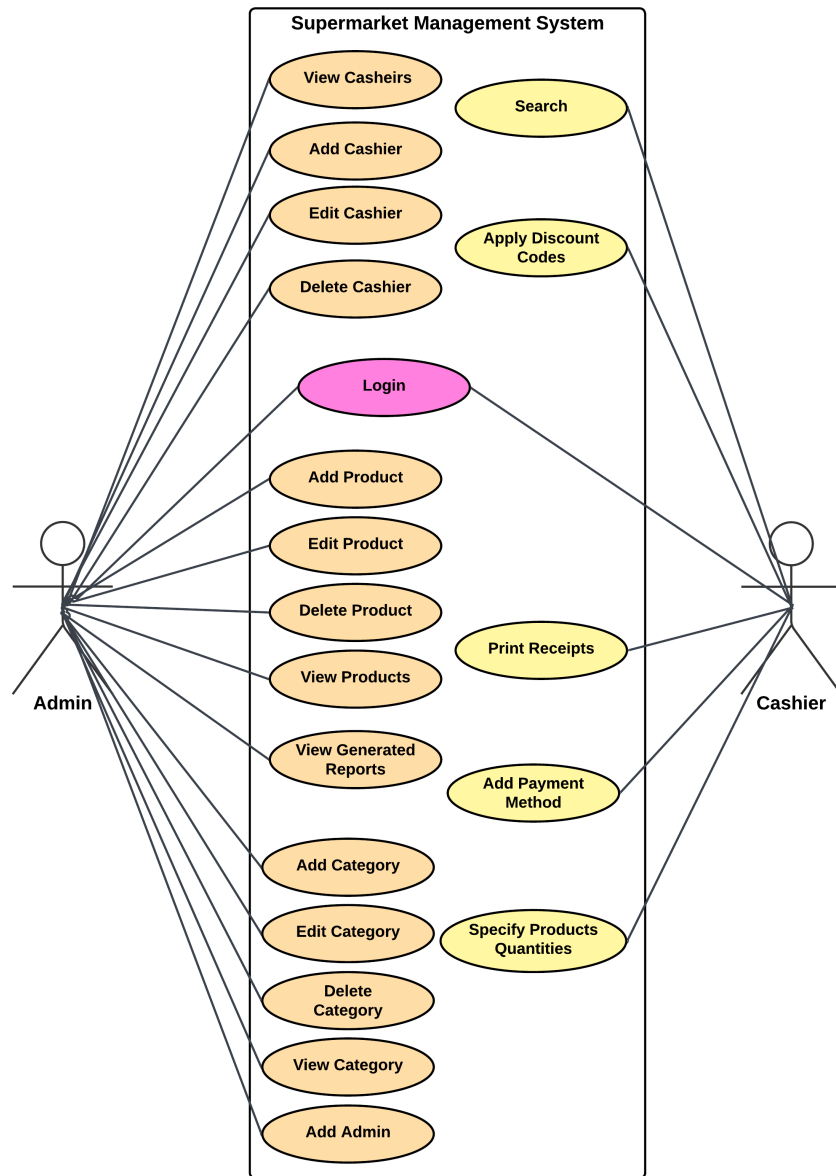


Figure 1: Use Case diagram

3.1 System Functions

1. Authentication:

- The system shall provide secure login functionality with user authentication (email and password).

2. Role-Based Access Control:

- The system provides different user roles (cashier, administrator) access to specific functionalities based on their permissions.

3. Admin

- The system shall allow admins to:
 - Add cashier accounts. (A01)
 - Edit cashier accounts.(A02)
 - Delete cashier accounts. (A03)
 - Add product information. (A04)
 - Edit product information. (A05)
 - Delete product information. (A06)
 - Add category. (A07)
 - Edit category. (A08)
 - Delete category. (A09)
 - View generated reports on current stock levels for all products, purchases, and sale records. (A10)
 - View cashiers. (A11)
 - View products. (A12)
 - View category. (A13)
 - Add admin. (A14)

4. Cashier

- The system shall allow cashiers to:
 - Search for products. (C01)
 - Specify quantities for each selected product. (C02)
 - Apply discount codes. (C03)
 - Print receipts for completed transactions. (C04)
 - Add used Payment Method. (C05)

3.2 Detailed Functional Specification

Name	Add cashier accounts within the system
Code	A01
Priority	Extreme
Critical	This is one of the most crucial functionalities in the system as the admin must add cashier as it is necessary to manage sales transactions.
Description	This functionality allows the admins to add new cashier accounts to the system. A cashier account includes essential information such as personal details, and credentials necessary for system access.
Input	Cashier's name, gender, email Address, phone number, password
Output	None
Pre-Condition	The user must be logged in as an administrator with the necessary privileges.
Post-Condition	The cashier's account details are stored securely in the system database. The cashier can log in using the provided credentials.
Dependency	Proper authentication and authorization mechanisms should be in place to ensure that only administrators can access this functionality.
Risk	1. Incorrect or incomplete information provided during account creation may lead to issues with the cashier's account or compromise data integrity. 2. Inadequate authentication may pose a security risk, allowing unauthorized access to the system.

Name	Delete product information.
Code	A06
Priority	Extreme
Critical	This is one of the most crucial functionalities in the system as the admin must delete any unwanted product as it is necessary to manage sales transactions.
Description	This functionality allows the admin to delete an existing product.
Input	None
Output	Confirmation deletion message
Pre-Condition	The user must be logged in as an administrator with the necessary privileges.
Post-Condition	The product details are permanently deleted from the system.
Dependency	Proper authentication and authorization mechanisms should be in place to ensure that only administrators can access this functionality.
Risk	1. Deleting an product that doesn't exist in the system may lead to issues with the cashier's account or compromise data integrity. 2. Inadequate authentication may pose a security risk, allowing unauthorized access to the system.

Name	View products
Code	A12
Priority	Extreme
Critical	This functionality is crucial as it allows admin to view the details of their employees.
Description	After the admin adds all the cashier accounts, the cashiers are presented to the admin
Input	None
Output	cashier details.
Pre-Condition	Admin should have the necessary permissions to view cashiers' information
Post-Condition	Any changes made by the user (cancellations) are updated in the system.
Dependency	None
Risk	None

Name	Specify quantities for each selected product
Code	C02
Priority	Extreme
Critical	This functionality is crucial as it allows cashier to add the quantity of the product the customer wants to buy.
Description	The cashier specify the quantity of each item the customer wants
Input	Quantity of each selected product
Output	None.
Pre-Condition	Cashier should have the necessary permissions to specify the product quantity
Post-Condition	Any changes made by the user (cancellations) are updated in the system.
Dependency	Proper authentication and authorization mechanisms should be in place to ensure that only cashiers can access this functionality
Risk	Add invalid input(Negative values)

4 Design Constraints

The roles of cashiers and administrators are at the center of the (SMS) design restrictions. These limits include those related to technology, finances, and functionalities-specific regulatory compliance. The system needs to be easy to use, efficient in processing transactions, and hardware compatible for cashiers. Administrators require functionalities for user management, access control, and system configuration within budget and time constraints. For both roles, regulatory compliance is crucial, particularly with regard to data security and privacy. Additionally, the system needs to be adaptable and scalable in order to handle future expansion and shifting business requirements. Through the resolution of these limitations, the SMS can efficiently assist supermarket operations.

4.1 Standards Compliance

Standards compliance ensures that the Supermarket Management System (SMS) adheres to industry regulations and best practices for security, usability, and interoperability.

4.2 Other Constraints as appropriate

In addition to hardware compatibility and system performance issues, regulatory compliance, scalability requirements, and security considerations are additional technological limitations that could affect the Supermarket Management System (SMS) and affect its design and functionality.

5 Non-functional Requirements

- **Performance**

- The system should ensure that the website loads within the specified time of the user's request to open.
- Database queries should return results within 1 second, even if there are load conditions.

- **Security**

- Data Protection: features such as data encryption should be employed to protect sensitive information stored in the system's databases from unauthorized access.
- Access Control: User authentication should be implemented to ensure that only authorized users can access specific measures.

- **Usability**

- User interface design(UI): - It should be intuitive and easy to navigate for users with different levels of technical skills.

- **Scalability**

- Database capacity should be able to add new cashiers and products.

- **Compatibility**

- The user can use the system in different web browsers such as Chrome, and Firefox.

- **Maintainability**

- The system code should be well-documented to facilitate future maintenance and modifications.

6 Data Design

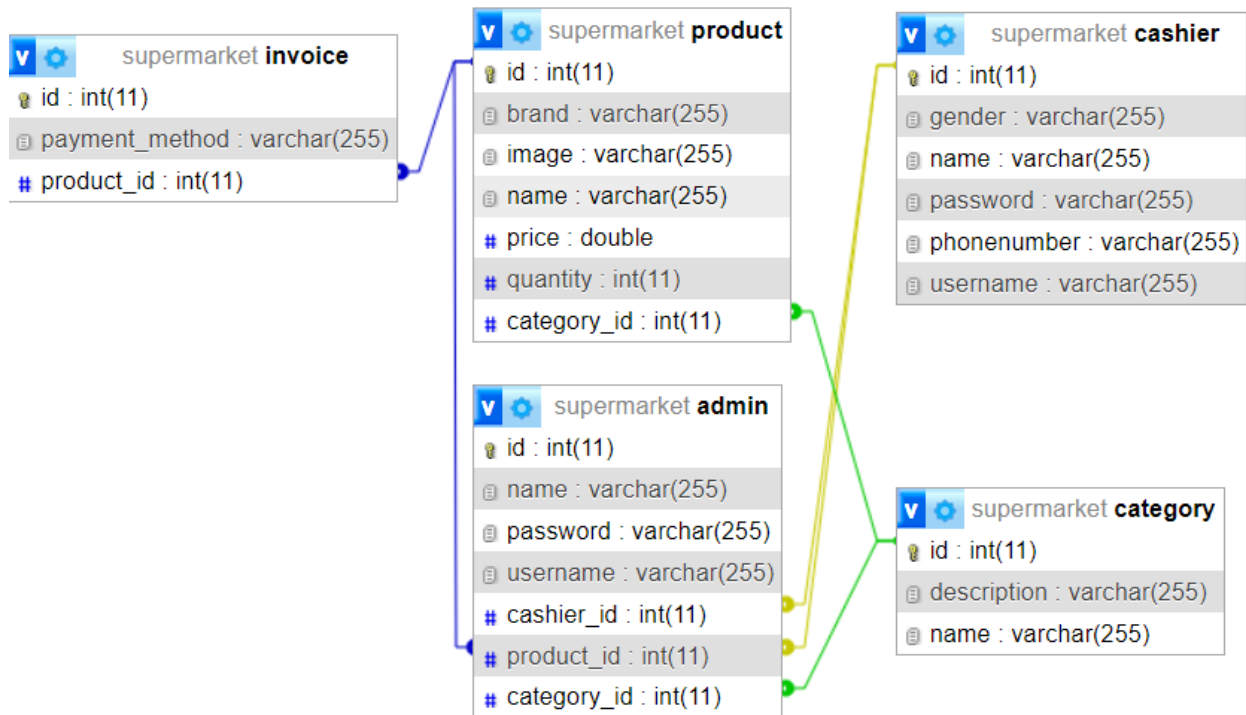


Figure 2: ER Diagram

- **Database Name:** Supermarket DB
- **Database Description:** Supermarket DB is a database designed to store and manage the data required for the functioning of the supermarket management system. It will store information about admins, cashiers, products, categories and any other relevant entities in the system.
- **Tables:**

1. Admin:

- Description: Stores information about the admin at the supermarket.
- Columns:
 - * id: INT - Unique identifier for the admin(Primary Key)
 - * name: VARCHAR - Name of the admin
 - * username: VARCHAR - username of the admin
 - * password: VARCHAR - Password of the admin
 - * cashier_id: INT - Unique identifier for the cashier(Primary Key)
 - * category_id: INT - Unique identifier for the category(Primary Key)
 - * product_id: INT - Unique identifier for the product(Primary Key)

2. Cashier:

- Description: Stores information about the cashiers at the supermarket.
- Columns:
 - * id: INT - Unique identifier for the cashier. (Primary Key)
 - * name: VARCHAR - Name of the pet.
 - * username: VARCHAR - username of the cashier.
 - * gender: VARCHAR - Breed of the pet.
 - * password: VARCHAR - Type of the pet.
 - * phonenumber: INT - Age of the pet.

3. Category:

- Description: Stores details about the categories
 - * id: INT - Unique identifier for the category. (Primary Key)
 - * name: VARCHAR - Name of the category.
 - * description: VARCHAR - description of the category.

4. Product:

- Description: Stores the details for each product.
- Columns:
 - * id: INT - Unique identifier for the product. (Primary Key)
 - * name: VARCHAR - Name of the product.
 - * brand: VARCHAR - Name of the brand.
 - * image: VARCHAR - path of the image.
 - * price: DOUBLE -price of the product.
 - * quantity: INT -quantity of the product.
 - * category_id: INT - Unique identifier for the category. (Foreign Key)

7 Preliminary Object-Oriented Domain Analysis

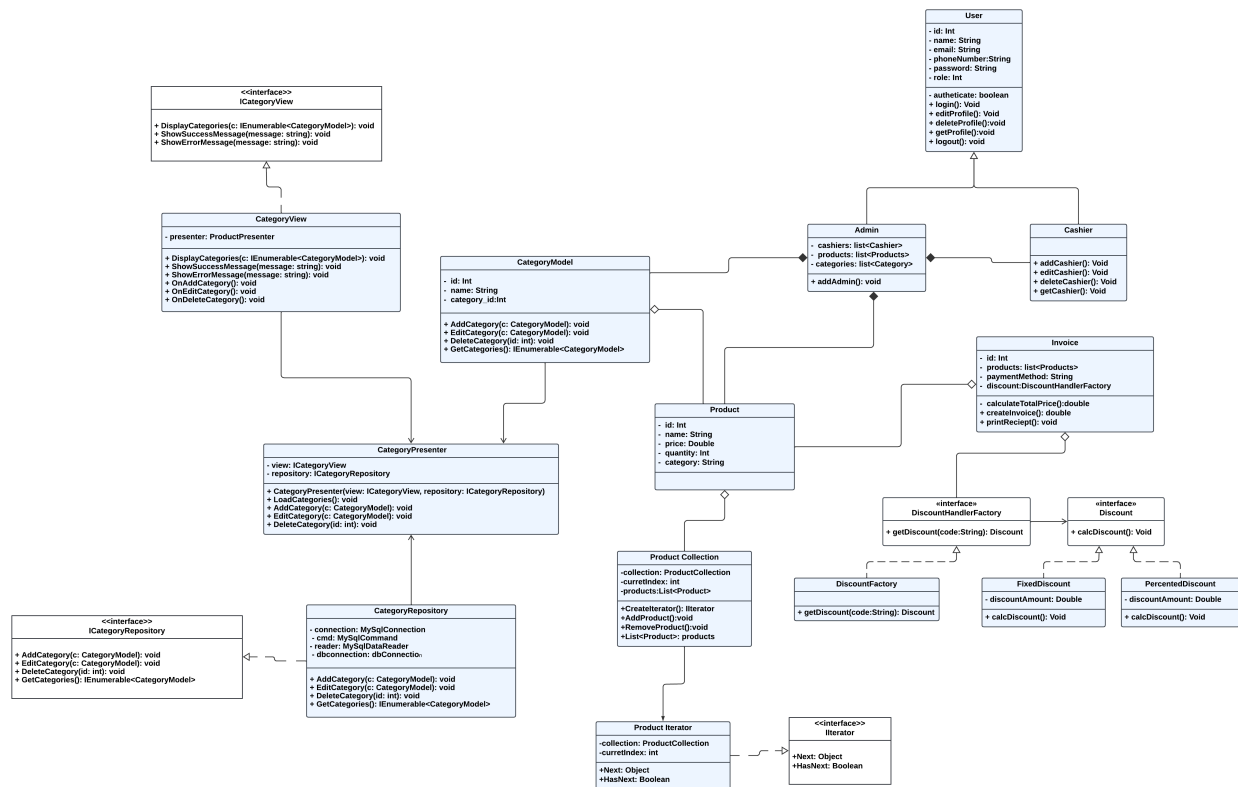


Figure 3: Class Diagram

8 Operational Scenarios

8.1 Design Patterns

1. MVP is a design pattern that separates the concerns of an application into three components: Model, View, and Presenter.
 - Model: Represents the data and business logic of the application. It is responsible for retrieving, storing, and managing data.
 - View: Displays the data to the user and sends user commands to the Presenter. It is the interface that the user interacts with.
 - Presenter: Acts as an intermediary between the Model and the View. It retrieves data from the Model, formats it, and updates the View.
2. The Iterator pattern an interface used in Add products provides a way to access the elements of a collection (such as an array or a list) sequentially without exposing the underlying representation.

3. The Factory Method pattern used in Applying discount code and it is defines an interface for creating an object but allows subclasses to alter the type of objects that will be created. It delegates the instantiation of objects to subclasses.

8.2 Solid Principles

1. Single Responsibility: Used throughout the code. It is a design principle in software development that states that a class should have only one reason to change, meaning it should have only one responsibility.
2. Dependency Inversion: Used in repositories interfaces. It is a design principle in object-oriented programming that states high-level modules should not depend on low-level modules.
3. Open Closed Principle: The Open-Closed Principle (OCP) in software development suggests that classes and modules should be open for extension but closed for modification and used throughout the code.

8.2.1 Scenario 1: Valid Cashier Login

- **Preconditions:**

- The cashier has a valid account on the system.
- The cashier credentials are correct (username and password).
- The system is online and functioning normally.

- **Post-conditions:**

- The cashier is successfully logged in to the system.
- The cashier is redirected to the cashier dashboard.

8.2.2 Scenario 2: Invalid Cashier Login

- **Preconditions:**

- Provided cashier credentials are either incorrect or incomplete.

- **Post-conditions:**

- The cashier is not logged in to the system.
- The system displays error message (e.g., invalid credentials).

8.2.3 Scenario 3: Cashier searches for products

- **Preconditions:**

- The cashier is logged in to the supermarket management system at the checkout terminal.
- The customer has finished selecting their items and is ready to pay.

- **Post-conditions:**

- The selected product(s) and their corresponding quantities are added to the customer's order in the system.
- The total purchase amount for all selected items is displayed on the cashier interface.

8.2.4 Scenario 4: Cashier adds used payment method

- **Preconditions:**

- The cashier has completed selecting all customer items.
- The total purchase amount is displayed on the cashier interface.
- The cashier is ready to finalize the customer's payment.

- **Post-conditions:**

- The chosen payment method is recorded in the system for the current transaction.
- The transaction is finalized, and a receipt is printed for the customer.

8.3 Admin Scenarios

8.3.1 Scenario 1: Successful admin login

- **Preconditions:**

- The admin has a valid administrator account on the system.
- The admin credentials are correct (username and password).

- **Post-conditions:**

- The admin is successfully logged in to the system.
- The admin is redirected to the administrator dashboard.

8.3.2 Scenario 2: Admin adds a new cashier

- **Preconditions:**

- The admin is logged in to the system and has the necessary permissions to add cashiers.

- **Post-conditions:**

- A new cashier account is successfully created in the system.

8.3.3 Scenario 3: Admin adds product information

- **Preconditions:**

- The administrator is logged in to the system with appropriate access rights.
- The administrator is on a dedicated product management interface within the system.

- **Post-conditions:**

- The new product information is added to the system's product database.
- The product becomes searchable and available for selection during cashier product lookups.

8.3.4 Scenario 4 : Admin views cashiers

- **Preconditions:**

- The admin is logged in to the system.
- The admin has the necessary permissions to view cashiers information

- **Post-conditions:**

- The system fetches and displays cashier information.
- The system presents detailed information about each cashier, including:
 - * Name
 - * Phone Number
 - * Email
 - * Gender

8.3.5 Scenario 5: Admin deletes cashier account

- **Preconditions:**

- The administrator is logged in to the supermarket management system with appropriate access rights.
- The administrator is on a cashier accounts interface within the system.

- **Post-conditions:**

- The selected cashier account is permanently deleted from the system
- The deleted cashier can no longer log in to the system and access cashier functionalities.

9 Project Plan

Task no.	Task name	Task Description	Duration in days	Assigned to
1	CRUD cashier	The admin add, edit , view and delete cashiers' accounts	5 days	Jana Ibrahim
2	CRUD product	The admin add, edit , view and delete supermarket products	5 days	Sara Mostafa
3	CRUD category	The admin add, edit , view and delete products' categories	5 days	Mariam Mahmoud
4	Profile Management	The users can edit , view and delete their accounts	3 days	All
5	Login	creating login functionality to the system with proper authentication and authorization mechanisms	2 days	Maya Waleed
6	Search products	Cashier can search for products	2 days	Sara Mostafa
7	Invoice management	calculate total price, apply discounts and printing the receipt	8 days	Sara Yasser
8	Add Admin	The admin can add another admin	1 day	Sara Yasser