<<Point of Sale (POS) System>>

System Requirements Specification (SRS)

Version 1.0

Produced for:

<<Catherine Hall Auto Parts>>

<<Catherine Hall, Montego Bay>>

<<St. James, JA>>

<<(876)-xxx-xxxx>>

Produced by (with Utech ID's):

<<Taylor - 2209566, Goldson - 2206840, Eastwood - 2210194, Leslie - 2210176, Williams - 2210178 – AMCS 2>>

<<Montego Bay Community College, Alice Eldemire Drive>>

<<St. James, JA>>

<<(876)-xxx-xxxx>>

Executive Overview

Catherine Hall Auto Parts was established in 2010, driven by a passion for automobiles and a commitment to quality assurance, reliability, and customer satisfaction. The company aims to implement a Point-of-Sale system to improve its operations and streamline transactions.

The short-term goals of the business include expanding the product range, improving customer experience through loyalty programs, collaborating with local mechanics and workshops, and transitioning to an inventory management system. The long-term goals involve expanding the company's reach, establishing an e-commerce platform, partnering with local garages and dealerships, implementing eco-friendly practices, and promoting community outreach.

The implementation of a POS system is expected to bring several benefits as it will: support contactless payments; provide seamless integration with credit card gateways; schedule promotional pricing for specific time periods, and alternate/ create product IDs for efficient inventory tracking; support multiple tax rates et cetera. Ultimately, to improve transaction speed, inventory tracking and increase profits.

The current manual approach to data management introduces many risks as it is time-consuming and susceptible to human errors. Balancing staff allocation across sales, inventory management, and customer service can be a challenging and tedious task. Effective prioritization is crucial for managing various tasks such as inventory updates, customer inquiries and transactions and business development.

To successfully execute this project, the company plans to stay informed about new technologies, market shifts, and trends in the automotive industry by reading relevant industry publications, attending trade shows, maintaining close relationships with manufacturers, participating in online communities, and investing in training sessions and workshops to enhance knowledge and skills. A solid and detailed plan of the POS implementation will be made to improve and enhance business operations and customer satisfaction.

Revision History

Date	Version	Description	Author
March 9, 2024	1.0	Chapter 1 Executive Overview Complete	Iyana Taylor
March 15, 2024	1.0	Chapter 1 SD, SO complete IA and references complete. Executive Overview Revised and Specification Overview Complete	Antonio Goldson Kaylen Eastwood Iyana Taylor
March 22, 2024	1.0	Chapter 2 POS Overview	Iyana Taylor
April 03, 2024	1.0	Chapter 3 Functional Requirements	Iyana Taylor
April 7, 2024	1.0	Chapter 3 Functional Requirements Class Diagram Activity Diagrams Sequence Diagrams	Iyana Taylor Antonio Goldson, Julliano Williams, Tyondre Leslie Kaylen Eastwood
April 28, 2024	1.0	Chapter 4 Use Case Realization Tech and Application Architecture Diagrams Database Design Class Diagram User Interface Examples	Iyana Taylor Kaylen Eastwood Tyondre Leslie Julliano Williams Antonio Goldson

Table of Contents

Table of Figures

1 Introduction

The section introduces the system requirements specification (SRS) for the Point-of-Sale (POS) System to its readers.

1.1 Specification Definition

This specification documents the system-level requirements for the Point-of-Sale (POS) System.

A point of sale (POS) is a place where a customer executes the payment for goods or services and where sales taxes may become payable. A POS transaction may occur in person or online, with receipts generated either in print or electronically.

1.2 Specification Objectives

The objectives of this specification of the Point-of-Sale (POS) System are to:

- Provide a system overview of the Point-of-Sale (POS) System including definition, goals, objectives, context, and major capabilities.

Definition: A point of sale (POS) is a place where a customer executes the payment for goods or services and where sales taxes may become payable. A POS transaction may occur in person or online, with receipts generated either in print or electronically.

Goals and Objectives: support contactless payments; seamless integration with credit card gateways; interface with other systems like inventory, accounting, and CRM to manage product, customer, and employee details. Ultimately, to improve transaction speed, inventory tracking and increase profits.

Context: The business lacks a POS system and cites this as a main weak point in business operations i.e. Slowing transactions processes and making it more difficult to track and organize inventory and sales.

Major Capabilities:

1. Invoicing: Selling, Buying, Renting and Repairing - record transactions that the store made.
2. Inventory Management - manage stock in real time and know the quantity of goods owned over a given period.
3. Customer Orders and Suppliers Orders Management - write down a customer's contact information to make alerts of product availability (of which they might be interested).
4. Integrated Supplier Purchasing - record purchases sent to suppliers.
5. Consistent and Customizable Reports - allows reports on various subjects such as accounting, sales, inventory, etc.
6. Multi-Store Management – allows to manage several departments within the same software.

- To formally specify its associated:

FUNCTIONAL REQUIREMENTS **[F-REQ-1]** – the behaviours of the system, i.e., what the system must do:

[F-REQ-1]: The system shall allow the user to login [from step 1].

[F-REQ-2]: The system shall interface with the inventory system and be capable of displaying product information [from step 4].

[F-REQ-3]: The system shall be able to calculate the customer's bill with 100% accuracy [from step 5].

[F-REQ-4]: The system shall interface with the accounting system and save an electronic copy of the transaction receipt from the terminal [from step 6].

[F-REQ-5]: The system shall interface with the accounting system and save an electronic copy of the customer's purchase receipt and interface with the CRM system to save the receipt there as well [from step 7].

[F-REQ-6]: After the cashier generates the bill and completes the transaction the system shall clear the interface to prepare for a new transaction [from step 8].

[F-REQ-7]: Upon wrong login attempts, the system shall keep the interface to process customer purchases closed [from steps 1a and 1b].

[F-REQ-8]: The system shall provide a mechanism to cancel the current transaction or remove a product from the list of customer selections [from step 7a and 4b respectively].

[F-REQ-9]: After a successful transaction the system should interface with the inventory system to decrease the product number [from step 7].

NON-FUNCTIONAL REQUIREMENTS **[NF-REQ-1]** – the properties of the system, i.e., what the system must have:

[NF-REQ-1]: The system should provide an interface for the user to login [constraint on F-REQ-1].

[NF-REQ-2]: The system should provide a 100% friendly and comprehensive interface for the user to read and select product details [constraint on F-REQ-2].

[NF-REQ-3]: If the product is not in the system, an appropriate message should be displayed [constraint on F-REQ-2].

[NF-REQ-4]: The system should display the customer's total and change in the centre of the monitor's screen and be visible to any person with 20/20 vision standing five feet from the oven in a room with a luminance level between 0 and 100 foot-candles. [constraint on F-REQ-3].

[NF-REQ-5]: The system should provide a 100% friendly and comprehensive interface to process customer purchases [constraint on F-REQ-6].

[NF-REQ-6]: Display an error message upon each incorrect login attempt to the system [constraint on F-REQ-7].

- Data requirements

Transaction date and time, name of employee who completed the transaction, name of customer, product information (brand, make, model, price, manufacturer), organization details like name, address, phone, email etc.

- Quality requirements.
  Updated yearly, defects recorded daily to monthly, organized, friendly and comprehensive interface.

- Constraints.
  Costly (considering software upgrades, licensing, and hardware repairs), security risks associated with card machines and digital transactions, slow internet connection.

1.3 Intended Audiences

<<Describe the different types of reader that the document is intended for, such as developers, project managers, marketing staff, users, testers, and documentation writers. Describe what the rest of this SRS contains and how it is organized. Suggest a sequence for reading the document, beginning with the overview sections, and proceeding through the sections that are most pertinent to each reader type.>>

The intended audiences of stakeholders for this specification of the Point-of-Sale (POS) System include:

- **Catherine Hall Auto Parts**
  - Managers
  - Customer Representatives (who must approve it)
  - Cashiers
  - Supervisors
  - Accounts Department
  - Marketing Department
  - Inventory Department
  - IT Department
  -
- **Team Rocket – System Development and Analysis Team**
  - Iyana Taylor
  - Antonio Goldson
  - Kaylen Eastwood
  - T'Yondre Leslie
  - Julliano Williams
- **Users** (Define your users and list them below)
  - Managers - person responsible for controlling or administering the organization or group of staff.
  - Supervisors – person in a lower-level management position who oversees and manages a team or individual to ensure that they are performing effectively and satisfied in their role.
  - Cashiers - person who handles the cash register at various locations such as the point of sale in a retail store.
  -

1.4 References

This specification references or complies with the following documents:

- Point-of-Sale (POS) System **Project Documents:**
  - Success scenario and alternate flows Document
  - Use Case Diagram
  - Actor Identification Form
  - Use Case Identification Form
  - Interview Questions and Answers
  - Domain Class Diagram
  - Sequence Diagrams
  - Activity Diagrams

- Use Case Diagram
- Use Case Realization

- **OPEN Process Framework (OPF) Conventions:**
  - Use Case Modeling Guidelines, which documents the guidelines used to develop the use case model specifying the functional requirements in this specification.
  - System Requirements Specification Content and Format Standard, which specifies the content and format of this specification.
  - System Requirements Specification Inspection Checklist, which is used during the inspection of this specification.
  - System Requirements Specification Template, which provides the skeleton of this specification.

1.5 Specification Overview

This specification is organized into the following sections:

- *Introduction*, which introduces the specification for the Point-of-Sale (POS) System to its readers.
- *System Overview*, which provides a brief, high level description of the Point-of-Sale (POS) System including its definition, business goals, business objectives, context, and capabilities.
- *Functional Requirements*, which specifies the functional system requirements in terms of a use case model consisting of each external's use cases and use case paths.
- *Data Requirements*, which specifies the system data requirements in terms of required data components.
- *Quality Requirements*, which specifies the required system quality factors.
- *Constraints*, which documents required architecture, design, and implementation constraints on the Point-of-Sale (POS) System.
- *Appendices*, which define ancillary information including future envisioned enhancements, open issues, TBDs, and assumptions.

2 Point-of-Sale (POS) System Overview

This section provides a high-level description of the Point-of-Sale (POS) System system including its definition, primary business goal, business objectives, context, and capabilities.

2.1 Definition

A Point of Sale (POS) system is a combination of hardware and software that businesses use to manage and complete transactions. It's the point where a customer executes the payment for goods or services. The system can accept payments from customers, either in person or online, and perform other functions such as printing receipts, tracking sales, managing inventory, and analyzing data. The hardware may include a cash register or a terminal.

2.2 Business Goal

Increase business efficiency via 50% faster transaction speeds and 40% better inventory and record management.

2.3 Business Objectives

The business objectives of the Point-of-Sale (POS) System are to provide the following business benefits to Catherine Hall Auto Parts.

The Point-of-Sale (POS) System will:

Limitations of the business

- Insert objectives from the constraint matrix here. Remember objectives must be quantifiable or measurable.
- Speed up transactions by 50%.
- Improve inventory tracking and management by 40%.
- Derive accurate records quarterly by 50%.

2.4.1 External Hardware

The Point-of-Sale (POS) System interacts, either directly or indirectly, with the following significant external hardware:

- Cash register: machine that stores money and records sales at a point of sale.
- Computer Monitor: electronic device that graphically displays the computer's processed data on a screen – billing information.
- Bar Code Scanner: optical device that reads printed barcodes and sends the data to a computer.
- Card Machine/ POS Terminal: device that handles credit or debit cards, typically used in transactions where a card payment is made.
- Keyboard: device with a set of keys used to input data into a computer – select products and enter their respective information.
- Printer: device that deposits computer output in physical form, usually on paper – to print the receipt.

2.4.2 External Roles

<<Identify the various user classes that you anticipate will use this product. User classes may be differentiated based on frequency of use, subset of product functions used, technical expertise, security or privilege levels, educational level, or experience. Describe the pertinent characteristics of each user class. Certain requirements may pertain only to certain user classes. Distinguish the most important user classes for this product from those who are less important to satisfy.>>

The Point-of-Sale (POS) System interacts, either directly or indirectly, with the following significant client roles:

- **Employees**, who are any actors who works for Catherine Hall Auto Parts:
  - Managers
  - Supervisors
  - Cashiers

- **Users**:
  - Cashiers
  - Customers
  - Managers
  - Supervisors
- Other (name of other systems or organization)
- Inventory Management System
- Accounts and Sales System
- Customer Relationship Management System

2.4.3 External Software

The Point-of-Sale (POS) System interacts, either directly or indirectly, with the following significant client software:

1. Accounting Software: The POS system interacts with accounting software to automate financial processes like bookkeeping and reporting.
2. Payroll Software: It interacts with payroll software to track hours worked, manage expenses, and ensure workers are paid on time.
3. Customer Relationship Management (CRM) Software: The POS system interacts with CRM software to track customer interactions and purchases, enhancing customer loyalty.
4. Inventory Management Software: It interacts with inventory management software to keep track of stock levels in real time.

3 Functional Requirements

<<Itemize the detailed functional requirements associated with this feature. These are the software capabilities that must be present in order for the user to carry out the services provided by the feature, or to execute the use case. Include how the product should respond to anticipated error conditions or invalid inputs. Requirements should be concise, complete, unambiguous, verifiable, and necessary. Use "TBD" as a placeholder to indicate when necessary information is not yet available.>>

<Each requirement should be uniquely identified with a sequence number or a meaningful tag of some kind.>

FUNCTIONAL REQUIREMENTS **[F-REQ-1]** – the behaviours of the system, i.e., what the system must do:

[F-REQ-1]: The system shall allow the user to login [from step 1].

[F-REQ-2]: The system shall interface with the inventory system and be capable of displaying product information [from step 4].

[F-REQ-3]: The system shall be able to calculate the customer's bill with 100% accuracy [from step 5].

[F-REQ-4]: The system shall interface with the accounting system and save an electronic copy of the transaction receipt from the terminal [from step 6].

[F-REQ-5]: The system shall interface with the accounting system and save an electronic copy of the customer's purchase receipt and interface with the CRM system to save the receipt there as well [from step 7].

[F-REQ-6]: After the cashier generates the bill and completes the transaction the system shall clear the interface to prepare for a new transaction [from step 8].

[F-REQ-7]: Upon wrong login attempts, the system shall keep the interface to process customer purchases closed [from steps 1a and 1b].

[F-REQ-8]: The system shall provide a mechanism to cancel the current transaction or remove a product from the list of customer selections [from step 7a and 4b respectively].

[F-REQ-9]: After a successful transaction the system should interface with the inventory system to decrease the product number [from step 7].

NON-FUNCTIONAL REQUIREMENTS **[NF-REQ-1]** – the properties of the system, i.e., what the system must have:

[NF-REQ-1]: The system should provide an interface for the user to login [constraint on F-REQ-1].

[NF-REQ-2]: The system should provide a 100% friendly and comprehensive interface for the user to read and select product details [constraint on F-REQ-2].

[NF-REQ-3]: If the product is not in the system, an appropriate message should be displayed [constraint on F-REQ-2].

[NF-REQ-4]: The system should display the customer's total and change in the centre of the monitor's screen and be visible to any person with 20/20 vision standing five feet from the oven in a room with a luminance level between 0 and 100 foot-candles. [constraint on F-REQ-3].

[NF-REQ-5]: The system should provide a 100% friendly and comprehensive interface to process customer purchases [constraint on F-REQ-6].

[NF-REQ-6]: Display an error message upon each incorrect login attempt to the system [constraint on F-REQ-7].

This section of the SRS specifies the functional requirements of the Point-of-Sale (POS) System in terms of use cases and their associated use case paths. The use case model is primarily organized in terms of the externals that benefit from the use cases.

3.1 Use Case Diagram of Proposed System

The following use case diagrams summarize the functional requirements for the Point-of-Sale (POS) System:

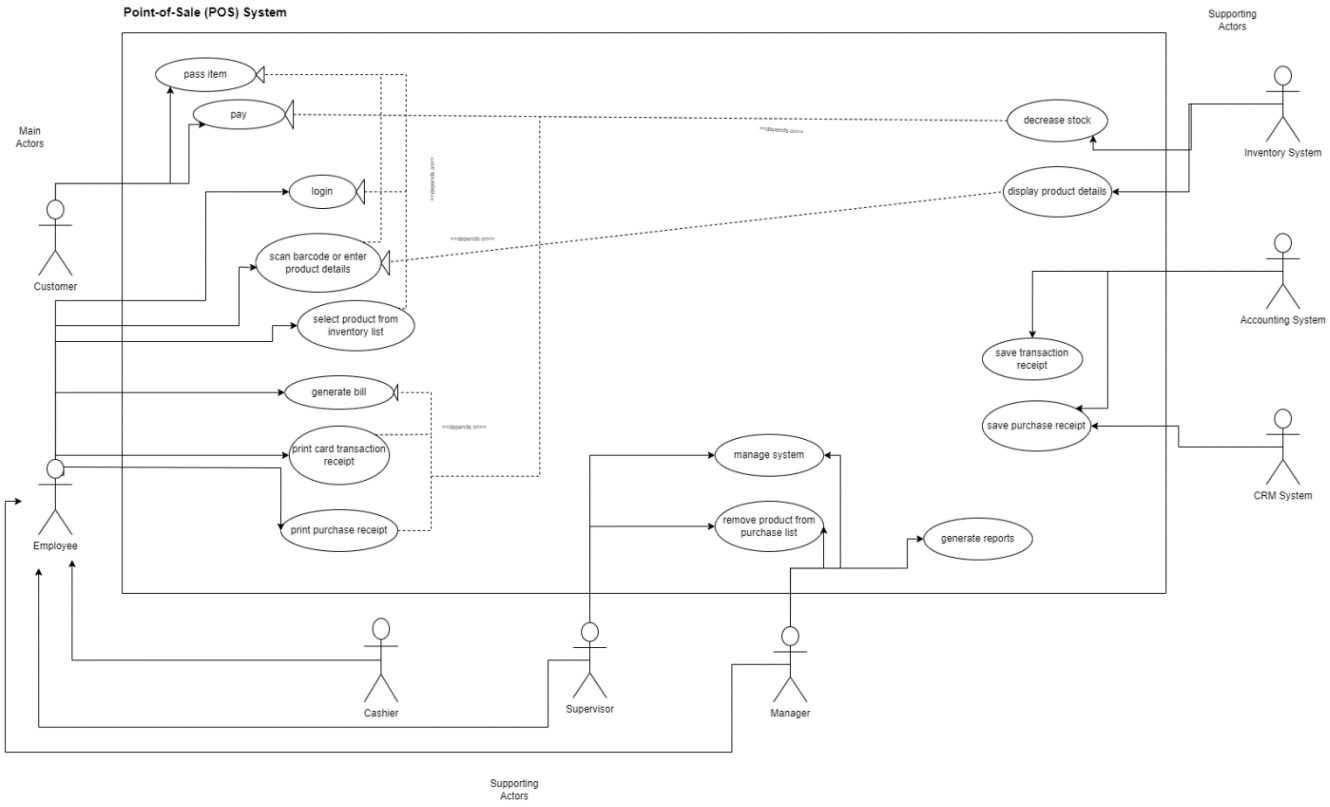

Figure 1: Point-of-Sale (POS) System Use Case Diagram

<< From your use case diagram identify all your actors. For each actor identified do the following:>>

3.2 External Roles

This subsection describes and specifies external roles, the associated responsibilities, and all use cases primarily driven by these externals.

3.2.1

Employee – Cashier, Supervisor, Manager

Definition

A Employee – Cashier, Supervisor, Manager is the role played by a Catherine Hall Auto Parts employee who performs the organizational functions using the Point-of-Sale (POS) System.

Responsibilities

A Employee – Cashier, Supervisor, Manager has the following responsibilities:

- Processing customer purchases

Required Capabilities

A Employee – Cashier, Supervisor, Manager needs the following required technical expertise, experience, and training to effectively interact with the Point-of-Sale (POS) System:

- Basic data entry
- Basic arithmetic
- Reading and writing

Use Cases <<list all use cases for each actor>>

- Login
- Scan barcode or enter product details.
- Select product from inventory list.
- Generate bill.
- Print transaction receipt.
- Print purchase receipt.

Supervisor

Definition

A Supervisor is the role played by a Catherine Hall Auto Parts employee who performs the organizational functions using the Point-of-Sale (POS) System.

Responsibilities

A Supervisor has the following responsibilities:

- Processing customer purchases
- Manage the POS system.

Required Capabilities

A Employee – Cashier, Supervisor, Manager needs the following required technical expertise, experience, and training to effectively interact with the Point-of-Sale (POS) System:

- Basic data entry
- Basic arithmetic
- Simple technical skills
- Reading and writing

Use Cases <<list all use cases for each actor>>

- Remove product from purchase list.
- Manage system.

Manager

Definition

A Manager is the role played by a Catherine Hall Auto Parts employee who performs the organizational functions using the Point-of-Sale (POS) System.

Responsibilities

A Manager has the following responsibilities:

- Processing customer purchases
- Manage the POS system.
- Managing other systems like inventory, accounts, and CRM; generating and reviewing reports

Required Capabilities

A Manager needs the following required technical expertise, experience, and training to effectively interact with the Point-of-Sale (POS) System:

- Basic data entry
- Basic arithmetic
- Simple technical skills
- Reading and writing

Use Cases <<list all use cases for each actor>>

- Remove product from purchase list.
- Manage system.
- Generate reports.

Customer

Definition

A Customer is the role played by a Catherine Hall Auto Parts employee who performs the organizational functions using the Point-of-Sale (POS) System.

Responsibilities

A Customer has the following responsibilities:

- To buy items in the establishment

Required Capabilities

A Customer needs the following required technical expertise, experience, and training to effectively interact with the Point-of-Sale (POS) System:

- not required to have any specific skills
- Reading and writing
- Basic arithmetic

Use Cases <<list all use cases for each actor>>

- Pass item.

- Pay for item.

Inventory System

Definition

A Inventory System is the role played by a Catherine Hall Auto Parts system that performs the organizational functions using the Point-of-Sale (POS) System.

Responsibilities

A Inventory System has the following responsibilities:

- Track, record, and update product information and stock count.

Required Capabilities

A Inventory System needs the following required technical expertise, experience, and training to effectively interact with the Point-of-Sale (POS) System:

- not required to have any specific skills.

Use Cases <<list all use cases for each actor>>

- Decrease stock count.
- Display product details.

Accounting System

Definition

A Accounting System is the role played by a Catherine Hall Auto Parts system that performs the organizational functions using the Point-of-Sale (POS) System.

Responsibilities

A Accounting System has the following responsibilities:

- Track, record, and update all sales and transaction information that takes place in the establishment.

Required Capabilities

A Accounting System needs the following required technical expertise, experience, and training to effectively interact with the Point-of-Sale (POS) System:

- not required to have any specific skills.

Use Cases <<list all uses cases for each actor>>

- Save card transaction receipt.
- Save purchase receipt.

CRM System

Definition

A CRM System is the role played by a Catherine Hall Auto Parts system that performs the organizational functions using the Point-of-Sale (POS) System.

Responsibilities

A CRM System has the following responsibilities:

- Track, record, and update all sales and transaction information involving customers.

Required Capabilities

A CRM System needs the following required technical expertise, experience, and training to effectively interact with the Point-of-Sale (POS) System:

- not required to have any specific skills.

Use Cases <<list all use cases for each actor>>

- Save purchase receipt.

3.2.1.1 – For each use case stated above use the use case narrative template below to develop use case narratives.

<<For a minimum of five use cases use the template below to create as many use case narratives as is needed>>

<< Point-of-Sale (POS) System **>>**

Author (s): Team Rocket | **Date: 04/2024** | **Version: 1.0**

<<blank copy>>

USE CASE NAME:		**USE CASE TYPE** Business Requirements: ☐ System Analysis: ☑
USE CASE ID:		
PRIORITY:		
SOURCE:		
PRIMARY BUSINESS ACTOR		
PRIMARY SYSTEM ACTOR		
OTHER PARTICIPATING ACTORS:	•	
OTHER INTERESTED STAKEHOLDERS:	•	
DESCRIPTION:		
PRE-CONDITION:		
TRIGGER:		
TYPICAL COURSE OF EVENTS:	**Actor Action**	**System Response**
	Step 1:	**Step 2**:
ALTERNATE COURSES:		
CONCLUSION:		
POST-CONDITION:		
BUSINESS RULES	•	
IMPLEMENTATION CONTRAINTS AND SPECIFICATIONS	•	
ASSUMPTIONS:	•	
OPEN ISSUES:		

USE CASE NAME:	Login	**USE CASE TYPE** Business Requirements: ☐ System Analysis: ☑
USE CASE ID:	UC-001	
PRIORITY:	High	
SOURCE:	Stakeholder Interviews	
PRIMARY BUSINESS ACTOR	Company Employee	
PRIMARY SYSTEM ACTOR	POS System	
OTHER PARTICIPATING ACTORS:	•	
OTHER INTERESTED STAKEHOLDERS:	• Cyber Security Team • Customers • Business Owners	
DESCRIPTION:	This use case describes how an approved employee (cashiers, manager, supervisor) logs into the POS system to process customer purchases	
PRE-CONDITION:	The person submitting the credentials must be an employee. The POS system is operational and accessible.	
TRIGGER:	An employee needs to process a customer purchase.	
TYPICAL COURSE OF EVENTS:	**Actor Action**	**System Response**
	Step 1: The employee opens the POS system.	**Step 2**: The system displays the login screen.
	Step 3: The employee enters their credentials.	Step 4: The system validates the credentials.
	Step 5: The employee submits the login form.	Step 6: The system logs the employee in and displays the main menu.
ALTERNATE COURSES:	If the entered credentials are incorrect, the system displays an error message and prompts the employee to try again.	
CONCLUSION:	The use case ends when the employee is successfully logged into the system.	
POST-CONDITION:	The employee is able to process customer purchases.	
BUSINESS RULES	• Only approved employees can log into the system.	
IMPLEMENTATION CONTRAINTS AND SPECIFICATIONS	• The system must securely store and handle employee credentials.	
ASSUMPTIONS:	• All employees have been properly trained on how to use the system.	
OPEN ISSUES:	None	

USE CASE NAME:	Scan Barcode or Enter Product Details		**USE CASE TYPE** Business Requirements: ☐ System Analysis: ☑
USE CASE ID:	UC-002		
PRIORITY:	High		
SOURCE:	Stakeholder Interviews		
PRIMARY BUSINESS ACTOR	Company Employee		
PRIMARY SYSTEM ACTOR	POS System		
OTHER PARTICIPATING ACTORS:	• Inventory System		
OTHER INTERESTED STAKEHOLDERS:	• Customers, Business Owners		
DESCRIPTION:	This use case describes how an approved employee scans a customer's items or enters product details to retrieve information from the inventory system.		
PRE-CONDITION:	The POS and Inventory systems are operational and accessible. The employee is logged into the POS system.		
TRIGGER:	A customer passes an item to be purchased to the employee.		
TYPICAL COURSE OF EVENTS:	**Actor Action**	**System Response**	
	Step 1: The employee scans the barcode or enters the product details.	**Step 2**: The system retrieves the product information from the inventory system.	
	Step 3: The employee confirms the product details.	Step 4: The system adds the item to the customer's purchase list.	
ALTERNATE COURSES:	If the system cannot retrieve the product information, the system displays an error message and prompts the employee to try again.		
CONCLUSION:	The use case ends when the product is successfully added to the customer's purchase list.		
POST-CONDITION:	The employee can process the customer's purchase.		
BUSINESS RULES	• Only approved employees can scan barcodes or enter product details.		
IMPLEMENTATION CONTRAINTS AND SPECIFICATIONS	• The system must securely communicate with the inventory system.		
ASSUMPTIONS:	• All employees have been properly trained on how to use the system.		
OPEN ISSUES:	None		

USE CASE NAME:	Select Product from Inventory List	**USE CASE TYPE** Business Requirements: ☐ System Analysis: ☑
USE CASE ID:	UC-003	
PRIORITY:	High	
SOURCE:	Stakeholder Interviews	
PRIMARY BUSINESS ACTOR	Company Employee	
PRIMARY SYSTEM ACTOR	POS System	
OTHER PARTICIPATING ACTORS:	• Inventory System	
OTHER INTERESTED STAKEHOLDERS:	• Customers • Business Owners	
DESCRIPTION:	This use case describes how an approved employee selects a product the customer wants to purchase from the list provided by the inventory system after the product barcode has been scanned or details have been entered.	
PRE-CONDITION:	The POS and Inventory systems are operational and accessible. The employee is logged into the POS system. The product barcode has been scanned or details have been entered.	
TRIGGER:	A customer passes an item to be purchased to the employee.	
TYPICAL COURSE OF EVENTS:	**Actor Action**	**System Response**
	Step 1: The employee selects the product from the inventory list.	**Step 2**: The system retrieves the product information from the inventory system.
	Step 3: The employee confirms the product details.	Step 4: The system adds the item to the customer's purchase list.
ALTERNATE COURSES:	If the system cannot retrieve the product information, the system displays an error message and prompts the employee to try again.	
CONCLUSION:	The use case ends when the product is successfully added to the customer's purchase list.	
POST-CONDITION:	The employee is able to process the customer's purchase.	
BUSINESS RULES	• Only approved employees can select products from the inventory list.	
IMPLEMENTATION CONTRAINTS AND SPECIFICATIONS	• The system must securely communicate with the inventory system.	
ASSUMPTIONS:	• All employees have been properly trained on how to use the system.	
OPEN ISSUES:	None	

USE CASE NAME:	Generate Bill	**USE CASE TYPE**	
USE CASE ID:	UC-004	Business Requirements:	☐
PRIORITY:	High	System Analysis:	☑
SOURCE:	Stakeholder Interviews		
PRIMARY BUSINESS ACTOR	Company Employee		
PRIMARY SYSTEM ACTOR	POS System		
OTHER PARTICIPATING ACTORS:	• Inventory System		
OTHER INTERESTED STAKEHOLDERS:	• Customers, Business Owners		
DESCRIPTION:	This use case describes how an approved employee uses the system to generate the customer's bill after their purchase list is complete.		
PRE-CONDITION:	The POS and Inventory systems are operational and accessible. The employee is logged into the POS system. The customer's purchase list is complete.		
TRIGGER:	The customer is ready to check out.		
TYPICAL COURSE OF EVENTS:	**Actor Action**	**System Response**	
	Step 1: The employee initiates the bill generation process.	**Step 2**: The system retrieves the prices of the items in the purchase list from the inventory system.	
	Step 3: The employee confirms the bill details.	Step 4: The system generates the bill and displays it to the employee.	
ALTERNATE COURSES:	If the system cannot retrieve the prices of the items, the system displays an error message and prompts the employee to try again.		
CONCLUSION:	The use case ends when the bill is successfully generated.		
POST-CONDITION:	The employee can present the bill to the customer.		
BUSINESS RULES	• Only approved employees can generate bills.		
IMPLEMENTATION CONTRAINTS AND SPECIFICATIONS	• The system must securely communicate with the inventory system.		
ASSUMPTIONS:	• All employees have been properly trained on how to use the system.		
OPEN ISSUES:	None		

USE CASE NAME:	Print Transaction Receipt	**USE CASE TYPE** Business Requirements: ☐ System Analysis: ☑
USE CASE ID:	UC-005	
PRIORITY:	High	
SOURCE:	Stakeholder Interviews	
PRIMARY BUSINESS ACTOR	Company Employee	
PRIMARY SYSTEM ACTOR	POS System	
OTHER PARTICIPATING ACTORS:	•	
OTHER INTERESTED STAKEHOLDERS:	• Customers • Business Owners	
DESCRIPTION:	This use case describes how an approved employee prints a customer's payment receipt from the POS terminal/card machine if they choose to pay using a card.	
PRE-CONDITION:	The POS system and card machine are operational and accessible. The employee is logged into the POS system. The customer has paid by card.	
TRIGGER:	The customer's payment has been processed.	
TYPICAL COURSE OF EVENTS:	**Actor Action**	**System Response**
	Step 1: The employee initiates the receipt printing process.	**Step 2**: The system retrieves the transaction details.
	Step 3: The employee confirms the transaction details.	Step 4: The system sends a print command to the card machine.
	Step 5: The card machine prints the receipt.	Step 6: The system updates the transaction status to 'completed'.
ALTERNATE COURSES:	If the system or card machine cannot print the receipt, the system displays an error message and prompts the employee to try again.	
CONCLUSION:	The use case ends when the receipt is successfully printed.	
POST-CONDITION:	The employee can give the receipt to the customer.	
BUSINESS RULES	• Only approved employees can print transaction receipts.	
IMPLEMENTATION CONTRAINTS AND SPECIFICATIONS	• The system must securely communicate with the card machine.	
ASSUMPTIONS:	• All employees have been properly trained on how to use the system.	
OPEN ISSUES:	None	

USE CASE NAME:	Print Purchase Receipt		**USE CASE TYPE** Business Requirements: ☐ System Analysis: ☑
USE CASE ID:	UC-006		
PRIORITY:	High		
SOURCE:	Stakeholder Interviews		
PRIMARY BUSINESS ACTOR	Company Employee		
PRIMARY SYSTEM ACTOR	POS System		
OTHER PARTICIPATING ACTORS:	• Inventory System • CRM System • Accounting System		
OTHER INTERESTED STAKEHOLDERS:	• Customers • Business Owners		
DESCRIPTION:	This use case describes how an approved employee prints a customer's purchase receipt with relevant details like product information, their name, employee name, establishment name and contact, and the final price, change, tax, and discounts applied.		
PRE-CONDITION:	The POS and Inventory systems are operational and accessible. The employee is logged into the POS system. The customer has paid for the items using any means - cash, card, or online transfer.		
TRIGGER:	The customer's payment has been processed.		
TYPICAL COURSE OF EVENTS:	**Actor Action**	**System Response**	
	Step 1: The employee initiates the receipt printing process.	**Step 2**: The system retrieves the purchase and payment details.	
	Step 3: The employee confirms the purchase and payment details.	Step 4: The system generates the purchase receipt.	
	Step 5: The system prints the purchase receipt.	Step 6: The system updates the transaction status to 'completed'.	
ALTERNATE COURSES:	If the system cannot print the receipt, the system displays an error message and prompts the employee to try again.		
CONCLUSION:	The use case ends when the receipt is successfully printed.		
POST-CONDITION:	The employee is able to give the receipt to the customer.		
BUSINESS RULES	• Only approved employees can print purchase receipts.		
IMPLEMENTATION CONTRAINTS AND SPECIFICATIONS	• The system must securely communicate with the inventory system.		
ASSUMPTIONS:	• All employees have been properly trained on how to use the system.		
OPEN ISSUES:	None		

USE CASE NAME:	Remove Product from Purchase List	**USE CASE TYPE** Business Requirements: ☐ System Analysis: ☑
USE CASE ID:	UC-007	
PRIORITY:	Medium	
SOURCE:	Stakeholder Interviews	
PRIMARY BUSINESS ACTOR	Company Employee (Supervisor & Manager)	
PRIMARY SYSTEM ACTOR	POS System	
OTHER PARTICIPATING ACTORS:	• Inventory System	
OTHER INTERESTED STAKEHOLDERS:	• Customers • Business Owners	
DESCRIPTION:	This use case describes how a supervisor & manager removes an item from the customer's purchase list if it is no longer wanted.	
PRE-CONDITION:	The POS and Inventory systems are operational and accessible. The supervisor or manager is logged into the POS system. The customer's purchase list contains at least one item.	
TRIGGER:	The customer decides they no longer want a particular item.	
TYPICAL COURSE OF EVENTS:	**Actor Action**	**System Response**
	Step 1: The supervisor or manager selects the item to be removed from the purchase list.	**Step 2**: The system confirms the selection.
	Step 3: The supervisor or manager initiates the removal process.	Step 4: The system removes the item from the purchase list.
ALTERNATE COURSES:	If the system cannot remove the item, the system displays an error message and prompts the supervisor or manager to try again.	
CONCLUSION:	The use case ends when the item is successfully removed from the purchase list.	
POST-CONDITION:	The supervisor or manager is able to update the customer's purchase list.	
BUSINESS RULES	• Only approved supervisors and managers can remove items from the purchase list.	
IMPLEMENTATION CONTRAINTS AND SPECIFICATIONS	• The system must securely communicate with the inventory system.	
ASSUMPTIONS:	• All supervisors and managers have been properly trained on how to use the system.	
OPEN ISSUES:	None	

USE CASE NAME:	Manage System	**USE CASE TYPE** Business Requirements: ☐ System Analysis: ☑
USE CASE ID:	UC-008	
PRIORITY:	High	
SOURCE:	Stakeholder Interviews	
PRIMARY BUSINESS ACTOR	Company Employee (Supervisor & manager)	
PRIMARY SYSTEM ACTOR	POS System	
OTHER PARTICIPATING ACTORS:	• Inventory System	
OTHER INTERESTED STAKEHOLDERS:	• Customers • Business Owners	
DESCRIPTION:	This use case describes how a supervisor or manager manages the POS system to ensure it functions as it's supposed to and updates relevant information in the system.	
PRE-CONDITION:	The POS and Inventory systems are operational and accessible. The supervisor or manager is logged into the POS system.	
TRIGGER:	The supervisor or manager identifies a need to manage the system.	
TYPICAL COURSE OF EVENTS:	**Actor Action**	**System Response**
	Step 1: The supervisor or manager initiates the system management process.	**Step 2**: The system provides access to management functions.
	Step 3: The supervisor or manager performs the necessary management tasks.	Step 4: The system updates accordingly and confirms the changes.
ALTERNATE COURSES:	If the system cannot update, the system displays an error message and prompts the supervisor to try again.	
CONCLUSION:	The use case ends when the supervisor successfully manages the system.	
POST-CONDITION:	The supervisor has updated the system as needed.	
BUSINESS RULES	• Only approved supervisors and managers can manage the system.	
IMPLEMENTATION CONTRAINTS AND SPECIFICATIONS	• The system must securely allow supervisors and managers to manage it.	
ASSUMPTIONS:	• All supervisors and managers have been properly trained on how to use the system.	
OPEN ISSUES:	None	

USE CASE NAME:	Generate Reports	**USE CASE TYPE** Business Requirements: ☐ System Analysis: ☑
USE CASE ID:	UC-009	
PRIORITY:	High	
SOURCE:	Stakeholder Interviews	
PRIMARY BUSINESS ACTOR	Company Employee (Manager)	
PRIMARY SYSTEM ACTOR	POS System	
OTHER PARTICIPATING ACTORS:	• Inventory System	
OTHER INTERESTED STAKEHOLDERS:	• Business Owners	
DESCRIPTION:	This use case describes how a manager uses transaction details to generate appropriate reports periodically (quarterly, yearly etc).	
PRE-CONDITION:	The POS and Inventory systems are operational and accessible. The manager is logged into the POS system.	
TRIGGER:	The end of a reporting period is reached.	
TYPICAL COURSE OF EVENTS:	**Actor Action**	**System Response**
	Step 1: The manager initiates the report generation process.	**Step 2**: The system retrieves the transaction details for the reporting period.
	Step 3: The manager selects the type of report to generate.	Step 4: The system generates the report based on the transaction details.
	Step 5: The system presents the report to the manager.	Step 6: The manager reviews and approves the report.
ALTERNATE COURSES:	If the system cannot generate the report, the system displays an error message and prompts the manager to try again.	
CONCLUSION:	The use case ends when the report is successfully generated and approved.	
POST-CONDITION:	The manager has a report for the reporting period.	
BUSINESS RULES	• Only approved managers can generate reports.	
IMPLEMENTATION CONTRAINTS AND SPECIFICATIONS	• The system must securely store and handle transaction details.	
ASSUMPTIONS:	• All managers have been properly trained on how to use the system.	
OPEN ISSUES:	None	

USE CASE NAME:	Pass Item		**USE CASE TYPE** Business Requirements: ☐ System Analysis: ☑
USE CASE ID:	UC-010		
PRIORITY:	High		
SOURCE:	Stakeholder Interviews		
PRIMARY BUSINESS ACTOR	Customer		
PRIMARY SYSTEM ACTOR	POS System		
OTHER PARTICIPATING ACTORS:	• Company Employee		
OTHER INTERESTED STAKEHOLDERS:	• Business Owners		
DESCRIPTION:	This use case describes how a customer passes their chosen item for purchase to the employee to begin the transaction.		
PRE-CONDITION:	The POS system is operational and accessible. The employee is available at the counter. The customer has chosen an item to purchase.		
TRIGGER:	The customer is ready to make a purchase.		
TYPICAL COURSE OF EVENTS:	**Actor Action**	**System Response**	
	Step 1: The customer passes the chosen item to the employee.	**Step 2**: The system waits for the employee to scan the item or enter its details.	
ALTERNATE COURSES:	If the item cannot be scanned or its details cannot be entered, the employee informs the customer and tries again.		
CONCLUSION:	The use case ends when the item is successfully passed to the employee.		
POST-CONDITION:	The employee is ready to process the item for purchase.		
BUSINESS RULES	• The customer must pass the item to the employee before the transaction can begin.		
IMPLEMENTATION CONTRAINTS AND SPECIFICATIONS	• The system must be able to handle multiple items being passed by the customer.		
ASSUMPTIONS:	• All customers are aware of the process of passing items to the employee.		
OPEN ISSUES:	None		

USE CASE NAME:	Pay	**USE CASE TYPE** Business Requirements: ☐ System Analysis: ☑
USE CASE ID:	UC-011	
PRIORITY:	High	
SOURCE:	Stakeholder Interviews	
PRIMARY BUSINESS ACTOR	Customer	
PRIMARY SYSTEM ACTOR	POS System	
OTHER PARTICIPATING ACTORS:	• Company Employee	
OTHER INTERESTED STAKEHOLDERS:	• Business Owners	
DESCRIPTION:	This use case describes how a customer pays for the item they'd like to purchase using cash, card, or online transfer.	
PRE-CONDITION:	The POS system is operational and accessible. The employee is available at the counter. The customer has chosen an item to purchase and a bill has been generated.	
TRIGGER:	The customer is ready to make a payment.	
TYPICAL COURSE OF EVENTS:	**Actor Action**	**System Response**
	Step 1: The customer chooses a payment method (cash, card, or online transfer).	**Step 2**: The system waits for the employee to process the payment.
	Step 3: The customer makes the payment.	Step 4: The system updates the transaction status to 'paid'.
ALTERNATE COURSES:	If the payment cannot be processed, the employee informs the customer and tries again.	
CONCLUSION:	The use case ends when the payment is successfully processed.	
POST-CONDITION:	The customer has paid for their purchase.	
BUSINESS RULES	• The customer must pay for the items before they can be taken.	
IMPLEMENTATION CONTRAINTS AND SPECIFICATIONS	• The system must securely handle payment transactions.	
ASSUMPTIONS:	• All customers are aware of the payment methods available.	
OPEN ISSUES:	None	

USE CASE NAME:	Decrease Stock	**USE CASE TYPE** Business Requirements: ☐ System Analysis: ☑
USE CASE ID:	UC-012	
PRIORITY:	High	
SOURCE:	Stakeholder Interviews	
PRIMARY BUSINESS ACTOR	Inventory System	
PRIMARY SYSTEM ACTOR	POS System	
OTHER PARTICIPATING ACTORS:	• Company Employee	
OTHER INTERESTED STAKEHOLDERS:	• Business Owners	
DESCRIPTION:	This use case describes how the inventory system updates itself by decreasing the stock count on items purchased by customers.	
PRE-CONDITION:	The POS and Inventory systems are operational and accessible. A complete and successful payment by the customer has been made.	
TRIGGER:	The customer's payment has been processed.	
TYPICAL COURSE OF EVENTS:	**Actor Action**	**System Response**
	Step 1: The inventory system receives a notification of a completed transaction.	**Step 2**: The system retrieves the details of the purchased items.
	Step 3: The inventory system updates the stock count of the purchased items.	Step 4: The system confirms the update.
ALTERNATE COURSES:	If the system cannot update the stock count, the system logs an error and notifies the appropriate personnel.	
CONCLUSION:	The use case ends when the stock count is successfully updated.	
POST-CONDITION:	The inventory system reflects the decreased stock count.	
BUSINESS RULES	• The inventory system must accurately track the stock count.	
IMPLEMENTATION CONTRAINTS AND SPECIFICATIONS	• The system must securely handle inventory data.	
ASSUMPTIONS:	• The inventory system is properly integrated with the POS system.	
OPEN ISSUES:	None	

USE CASE NAME:	Display Product Details	**USE CASE TYPE** Business Requirements: ☐ System Analysis: ☑
USE CASE ID:	UC-013	
PRIORITY:	High	
SOURCE:	Stakeholder Interviews	
PRIMARY BUSINESS ACTOR	Inventory System	
PRIMARY SYSTEM ACTOR	POS System	
OTHER PARTICIPATING ACTORS:	• Company Employee	
OTHER INTERESTED STAKEHOLDERS:	• Customers • Business Owners	
DESCRIPTION:	This use case describes how the inventory system displays items matching the details entered so the right item can be selected by the employee and added to the customer's purchase list.	
PRE-CONDITION:	The POS and Inventory systems are operational and accessible. The employee has scanned a product barcode or entered product details.	
TRIGGER:	The employee has entered product details or scanned a product barcode.	
TYPICAL COURSE OF EVENTS:	**Actor Action**	**System Response**
	Step 1: The inventory system receives the product details or barcode.	**Step 2**: The system retrieves the matching product details.
	Step 3: The inventory system displays the product details.	Step 4: The system waits for the employee to select the product.
ALTERNATE COURSES:	If the system cannot retrieve the product details, the system displays an error message and prompts the employee to try again.	
CONCLUSION:	The use case ends when the product details are successfully displayed.	
POST-CONDITION:	The employee can select the product for the customer's purchase list.	
BUSINESS RULES	• The inventory system must accurately display product details.	
IMPLEMENTATION CONTRAINTS AND SPECIFICATIONS	• The system must securely handle product data.	
ASSUMPTIONS:	• The inventory system is properly integrated with the POS system.	
OPEN ISSUES:	None	

USE CASE NAME:	Save Card Transaction Receipt	**USE CASE TYPE** Business Requirements: ☐ System Analysis: ☑
USE CASE ID:	UC-014	
PRIORITY:	High	
SOURCE:	Stakeholder Interviews	
PRIMARY BUSINESS ACTOR	Accounting System	
PRIMARY SYSTEM ACTOR	POS System	
OTHER PARTICIPATING ACTORS:	• Company Employee	
OTHER INTERESTED STAKEHOLDERS:	• Business Owners	
DESCRIPTION:	This use case describes how the accounting system saves a copy of the transaction receipt after a customer pays with their card.	
PRE-CONDITION:	The POS system and accounting system are operational and accessible. A complete and successful card payment by the customer has been made.	
TRIGGER:	The customer's card payment has been processed.	
TYPICAL COURSE OF EVENTS:	**Actor Action**	**System Response**
	Step 1: The accounting system receives a notification of a completed card transaction.	**Step 2**: The system retrieves the transaction receipt details.
	Step 3: The accounting system saves a copy of the transaction receipt.	Step 4: The system confirms the save operation.
ALTERNATE COURSES:	If the system cannot save the receipt, the system logs an error and notifies the appropriate personnel.	
CONCLUSION:	The use case ends when the transaction receipt is successfully saved.	
POST-CONDITION:	The accounting system has a saved copy of the transaction receipt.	
BUSINESS RULES	• The accounting system must accurately save transaction receipts.	
IMPLEMENTATION CONTRAINTS AND SPECIFICATIONS	• The system must securely handle transaction data.	
ASSUMPTIONS:	• The accounting system is properly integrated with the POS system.	
OPEN ISSUES:	None	

USE CASE NAME:	Save Purchase Receipt	**USE CASE TYPE** Business Requirements: ☐ System Analysis: ☑
USE CASE ID:	UC-015	
PRIORITY:	High	
SOURCE:	Stakeholder Interviews	
PRIMARY BUSINESS ACTOR	Accounting System and CRM System	
PRIMARY SYSTEM ACTOR	POS System	
OTHER PARTICIPATING ACTORS:	• Company Employee	
OTHER INTERESTED STAKEHOLDERS:	• Customers • Business Owners	
DESCRIPTION:	This use case describes how the accounting system saves a copy of the complete purchase receipt (including product details, customer and employee names, final price, change, taxes, and discounts).	
PRE-CONDITION:	The POS and Accounting systems are operational and accessible. A complete and successful payment by the customer has been made and a purchase receipt has been generated.	
TRIGGER:	The customer's payment has been processed and a purchase receipt has been generated.	
TYPICAL COURSE OF EVENTS:	**Actor Action**	**System Response**
	Step 1: The accounting system receives a notification of a completed transaction and generated purchase receipt.	**Step 2**: The system retrieves the purchase receipt details.
	Step 3: The accounting system saves a copy of the purchase receipt.	Step 4: The system confirms the save operation.
ALTERNATE COURSES:	If the system cannot save the receipt, the system logs an error and notifies the appropriate personnel.	
CONCLUSION:	The use case ends when the purchase receipt is successfully saved.	
POST-CONDITION:	The accounting system has a saved copy of the purchase receipt.	
BUSINESS RULES	• The accounting system must accurately save purchase receipts.	
IMPLEMENTATION CONTRAINTS AND SPECIFICATIONS	• The system must securely handle purchase receipt data.	
ASSUMPTIONS:	• The accounting system is properly integrated with the POS system.	
OPEN ISSUES:	None	

3.2.1.2 << Using the use case narratives and/or the use case, write the functional requirement for each use case – see page 22 of GPM SRS. >>

FUNCTIONAL REQUIREMENTS **[F-REQ-1]** – the behaviours of the system, i.e., what the system must do:

[F-REQ-1]: The system shall allow the user to login [from step 1].

[F-REQ-2]: The system shall interface with the inventory system and be capable of displaying product information [from step 4].

[F-REQ-3]: The system shall be able to calculate the customer's bill with 100% accuracy [from step 5].

[F-REQ-4]: The system shall interface with the accounting system and save an electronic copy of the transaction receipt from the terminal [from step 6].

[F-REQ-5]: The system shall interface with the accounting system and save an electronic copy of the customer's purchase receipt and interface with the CRM system to save the receipt there as well [from step 7].

[F-REQ-6]: After the cashier generates the bill and completes the transaction the system shall clear the interface to prepare for a new transaction [from step 8].

[F-REQ-7]: Upon wrong login attempts, the system shall keep the interface to process customer purchases closed [from steps 1a and 1b].

[F-REQ-8]: The system shall provide a mechanism to cancel the current transaction or remove a product from the list of customer selections [from step 7a and 4b respectively].

[F-REQ-9]: After a successful transaction the system should interface with the inventory system to decrease the product number [from step 7].

NON-FUNCTIONAL REQUIREMENTS **[NF-REQ-1]** – the properties of the system, i.e., what the system must have:

[NF-REQ-1]: The system should provide an interface for the user to login [constraint on F-REQ-1].

[NF-REQ-2]: The system should provide a 100% friendly and comprehensive interface for the user to read and select product details [constraint on F-REQ-2].

[NF-REQ-3]: If the product is not in the system, an appropriate message should be displayed [constraint on F-REQ-2].

[NF-REQ-4]: The system should display the customer's total and change in the centre of the monitor's screen and be visible to any person with 20/20 vision standing five feet from the oven in a room with a luminance level between 0 and 100 foot-candles. [constraint on F-REQ-3].

[NF-REQ-5]: The system should provide a 100% friendly and comprehensive interface to process customer purchases [constraint on F-REQ-6].

[NF-REQ-6]: Display an error message upon each incorrect login attempt to the system [constraint on F-REQ-7].

<<Mirror the following where applicable to write your own non-functional requirements. >>

4 System Quality Requirements

This section specifies the required system quality factors that are not related to the specific functional requirements documented in the use case model.

NON-FUNCTIONAL REQUIREMENTS **[NF-REQ-1]** – the properties of the system, i.e., what the system must have:

[NF-REQ-1]: The system should provide an interface for the user to login [constraint on F-REQ-1].

[NF-REQ-2]: The system should provide a 100% friendly and comprehensive interface for the user to read and select product details [constraint on F-REQ-2].

[NF-REQ-3]: If the product is not in the system, an appropriate message should be displayed [constraint on F-REQ-2].

[NF-REQ-4]: The system should display the customer's total and change in the centre of the monitor's screen and be visible to any person with 20/20 vision standing five feet from the oven in a room with a luminance level between 0 and 100 foot-candles. [constraint on F-REQ-3].

[NF-REQ-5]: The system should provide a 100% friendly and comprehensive interface to process customer purchases [constraint on F-REQ-6].

[NF-REQ-6]: Display an error message upon each incorrect login attempt to the system [constraint on F-REQ-7].

4.1 Accessibility

- The system should be usable by 95% of individuals, including those with disabilities, as per WCAG 2.1 Level AA standards.
- The system should support voice commands to enhance accessibility for visually impaired users.

4.2 Auditability

This subsection specifies the following requirements associated with the degree to which the system must support independent auditing of its transactions and finances:

- The system should allow for independent auditing of all transactions with a traceable log history of at least 5 years.
- The system should provide real-time alerts for transactions exceeding a threshold of $10,000 for immediate audit attention.

4.3 Branding

This subsection specifies the following requirements associated with the degree to which the system must support the brand of Point-of-Sale System.

- The system should display the company’s logo on all customer-facing screens.
- The system should incorporate the company’s primary color scheme within the user interface.

4.4 Configurability

This subsection specifies the following requirements associated with the degree to which the system must exist in multiple simultaneous configurations or variants:

4.4.1 Variant Capabilities

- The system should support at least 3 different hardware configurations for scalability.

4.4.2 Internationalization

- The system should offer multilingual support for at least 5 major languages.

4.4.3 Personalization

- The system should allow users to customize their dashboard with at least 10 different widgets.

4.5 Correctness

This subsection specifies the following requirements concerning the degree to which the system can contain defects and still be acceptable to the customer.

4.5.1 Latent Defects

This subsection specifies the following requirements concerning the maximum number of allowable latent defects in released work products.

- The system should have no more than 0.1% latent defects in released work products.

4.5.2 Accuracy

This subsection specifies the following requirements concerning the degree of correctness of the system's outputs:

- The system should ensure transaction accuracy with a margin of error less than 0.01%.

4.5.3 Precision

This subsection specifies the following requirements concerning the resolution of the system's numerical outputs:

- The system should handle financial calculations up to two decimal places without rounding errors.

4.5.4 Timeliness

This subsection specifies the following requirements concerning the degree to which the system must ensure that its persistent information is current (i.e., up to date):

- The system should update its persistent information within 2 seconds of any transaction.

4.6 Efficiency

This subsection specifies the following requirements associated with the degree to which the system effectively uses its resources:

- The system should utilize no more than 70% of CPU and memory resources during peak operation times.

- The system should optimize power consumption, not exceeding 500 watts during standard operations.

4.7 Extensibility

This subsection specifies the following requirements associated with the degree to which the system can be modified to meet changing requirements or goals.

- The system should be designed to allow for the addition of new features with a maximum of 10% code modification.
- The system should support integration with future payment methods within a maximum of 3 months' development time.

4.8 Installation

This subsection specifies the following usability requirements associated with the ease with which the system can be installed.

- The system should be installable within 2 hours by a technician with standard IT skills.
- The system should provide a step-by-step installation guide accessible via the company's website.

4.9 Interoperability

This subsection specifies the following requirements associated with the ease with which the system can be integrated with other system (e.g., browsers, legacy applications, and required databases).

 The Point-of-Sale System shall interoperate with the following browsers:

- The system should be compatible with the latest versions of Chrome, Firefox, Safari, and Edge browsers.
- The system should integrate with existing legacy applications using standard API protocols.

4.10 Maintainability

This subsection specifies the following requirements associated with the ease with which the system can be maintained:

- The system should allow for routine maintenance to be performed with no more than 1 hour of system downtime per month.
- The system should have a modular design to facilitate easy replacement of components without affecting overall functionality.

4.11 Operational Availability

This subsection specifies the following requirements associated with the percent of time that the system must function correctly.

- The system should be operational 99.9% of the time, excluding scheduled maintenance windows.
- The system should have a failover mechanism to ensure less than 5 minutes of downtime in case of a system failure.

4.12 Performance

This subsection specifies the following requirements associated with the speed with which the system shall function.

4.12.1 Capacity

This subsection specifies the following requirements concerning the minimum number of objects that the system can support:

- The system should support a minimum of 10,000 products and 1,000 concurrent users.

4.12.2 Latency

This subsection specifies the following requirements concerning the maximum time that is permitted for the system to execute specific tasks (i.e., system operations) or use case paths end to end:

- The system should execute end-to-end use case paths within 3 seconds.

4.12.3 Response Time

This subsection specifies the following requirements concerning the maximum time that is permitted for the system to respond to requests:

- The system should respond to user input within 1 second under normal operating conditions.

4.12.4 Throughput

This subsection specifies the following requirements concerning how many executions of a given system operation or use case path must the system be able execute in a unit of time:

- The system should process at least 100 transactions per minute during peak hours.

4.13 Portability

This subsection specifies the following requirements associated with the ease with which the system can be moved from one environment (e.g., hardware, operating system) to another.

 The Point-of-Sale System shall enable users to use the following environments (e.g., platform and operating system) to interact with the Point-of-Sale System:

- The system should be operable on both Windows and macOS platforms without any feature degradation.
- The system should allow data migration between different hardware setups within 4 hours.

4.14 Reliability

This subsection specifies the following requirements associated with the reliability (e.g., mean time between failures, number of failures per unit time) of the system.

- The system should have a mean time between failures of at least 10,000 hours.
- The system should ensure data integrity with a backup and restore feature that has a recovery success rate of 99.5%.

4.15 Reusability

This subsection specifies the following requirements associated with the degree to which the system can be used for purposes other than originally intended (e.g., as part of other applications).

- The system should provide APIs that can be reused in other applications with minimal adaptation.
- The system's codebase should be documented to allow for 80% of its functionality to be repurposed for similar applications.

4.16 Robustness

This subsection specifies the following requirements associated with the degree to which the system continues to properly function under abnormal circumstances.

- The Point-of-Sale System should gracefully handle invalid input (i.e., detect invalid input, request valid input, and not crash) from all externals:
  - The human actors.
  - <<other>>
- The Point-of-Sale System should gracefully handle hardware failures (i.e. provide hot failover, notify the system operator, and not crash).

4.17 Safety

This subsection specifies the following requirements associated with the degree to which the system does not directly or indirectly (e.g., via inactivity) cause accidental harm to life or property (e.g., loss of money or data).

- The Point-of-Sale System should not accidentally lose user account information.
- The Point-of-Sale System should accurately calculate user fees.
- The Point-of-Sale System should not accidentally lose auction information.

4.18 Scalability

This subsection specifies the following requirements associated with the degree to which the system can scale (e.g., can handle more simultaneous users or clients, can store more information in its databases).

- The system should be able to scale to support a 50% increase in user load without performance degradation.
- The system should maintain its performance with a database size increase of up to 1TB.

4.19 Security Requirements

This subsection documents the security requirements that specify the extent to which the Point-of-Sale System should protect itself and its sensitive data and communications from accidental, malicious, or unauthorized access, use, modification, destruction, or disclosure.

4.19.1 Identification Requirements

This subsection documents the identification requirements that specify the extent to which the Point-of-Sale System should identify its externals (e.g., human users and external applications) before interacting with them:

- The system should uniquely identify users before allowing system interaction.

4.19.2 Authentication Requirements

This subsection documents the authentication requirements that specify the extent to which the Point-of-Sale System should verify the identity of its externals (e.g., human users and external applications) before interacting with them:

- The system should authenticate users with at least two-factor authentication methods.

4.19.3 Authorization Requirements

This subsection documents the authorization requirements that specify the access and usage privileges of authenticated users and client applications:

- The system should enforce role-based access control with a minimum of 5 distinct roles.

4.19.4 Immunity Requirements

This subsection documents the immunity requirements that specify the extent to which the Point-of-Sale System shall protect itself from infection by unauthorized harmful programs (e.g., computer viruses, worms, and Trojan horses):

- **Scanning** – The Point-of-Sale System shall scan all entered or downloaded data and software against the published definitions of known computer viruses, worms, Trojan horses, and other similar harmful programs.
- **Disinfection** – If possible, the Point-of-Sale System shall disinfect any data or software found to contain such a harmful program.
- **Prevention** – The Point-of-Sale System shall delete the infected file if it cannot disinfect the infected data or software.
- **Current Definitions** – The Point-of-Sale System shall daily update its list of published definitions of known harmful programs.
- **Notification** – The Point-of-Sale System shall notify a member of the security team if it detects a harmful program during a scan.

4.19.5 Integrity Requirements

This subsection documents the integrity requirements that specify the extent to which the Point-of-Sale System shall protect its data and communications from intentional corruption via unauthorized creation, modification, or deletion:

- **Communications** – The Point-of-Sale System shall protect a minimum of 99.999% of its communications from unauthorized intentional corruption during transit including communications with the:

- **Persistent Data** – The Point-of-Sale System shall protect a minimum of 99.999% of its persistent data from unauthorized intentional corruption including:

4.19.6 Intrusion Detection Requirements

This subsection documents the intrusion-detection requirements that specify the extent to which the Point-of-Sale System shall detect attempted access or modification by unauthorized individuals or programs:

- **Repeated Authentication Failure** – A minimum of 99.99% of the time, the Point-of-Sale System shall notify the security officer within one minute if it cannot successfully verify the identity of any actor in less than four attempts within anyone-hour period.

- **Authorization Failure** – A minimum of 99.99% of the time, the Point-of-Sale System shall notify the security officer within one minute if any actor attempts to perform a use case for which it is unauthorized.

4.19.7 Nonrepudiation Requirements

This subsection documents the nonrepudiation requirements that specify the extent to which the Point-of-Sale System shall prevent a party to one of its interactions (e.g., message, transaction) from denying having participated in all or part of the interaction:

- The system should log all user actions to ensure nonrepudiation with timestamped records.

4.19.8 Privacy Requirements

The privacy goal of the Point-of-Sale System is to ensure the confidentiality of all information entrusted to it, whether stored or communicated, except for such information that an operational requirement explicitly makes public.

The following privacy requirements specify the extent to which the Point-of-Sale System shall support anonymity and keep its confidential data and communications private from unauthorized individuals and programs.

- **User Privacy** – A minimum of 99.999% of the time, the Point-of-Sale System shall restrict access as indicated to the following confidential user information, whether communicated or stored:
  - Credit Card Information (restricted to the user, accountants, and user support agents):
  - The credit card number (employees may only see the last 4 digits)
  - The credit card expiration date
  - The name on the credit card
  - Financial Information (restricted to the user, accountants, and user support agents):
  - Account Balance
  - Past Due Amount
  - Password Information (restricted to the user and user support agents):
  - Password
  - Password Confirmation
  - Postal Address (restricted to the user and user support agents):
  - Street Address
  - City
  - State
  - Zip Code
  - Telephone Number (restricted to the user and user support agents)

4.19.9 Security Auditing Requirements

This subsection specifies the following privacy requirements:

- The system should perform monthly security audits and provide comprehensive reports.

4.19.10 Survivability Requirements

This subsection specifies the following privacy requirements:

- The system should maintain core functions during a cyber-attack with a recovery time of less than 4 hours.

4.19.11 Physical Protection Requirements

This subsection specifies the following privacy requirements:

- The system should have tamper-evident seals on all physical access points.

4.19.12 System Maintenance Security Requirements

This subsection specifies the following system-maintenance requirements:

 The Point-of-Sale System shall ensure that authorized modifications during maintenance will not inadvertently allow unauthorized individuals access to the system.

4.20 Testability

This subsection specifies the following requirements associated with the ease with which the system can be tested.

- The system should include automated test suites covering at least 90% of the codebase.
- The system should allow for end-to-end testing to be completed within 4 hours.

4.21 Usability

This subsection specifies the following requirements associated with the ease with which the system can be used.

- The system should enable at least 90% of novice users to complete a transaction without assistance on their first try.
- The system should provide help documentation that resolves 85% of user queries without the need for direct support.

5 System Constraints

The section documents the major architecture, design, and implementation constraints on the system.

5.1 Business Rules

The subsection documents all required data design constraints.

- The system should enforce all transactions to comply with the **ISO 8583 standard** for financial transaction card originated messages.

5.2 Data and Content Constraints

The subsection documents all required data constraints.

5.2.1 Databases

The subsection documents all required design constraints regarding the use of databases.

- The system should use **ACID-compliant databases** to ensure transaction integrity, consistency, isolation, and durability.

5.3 Hardware Constraints

The subsection documents all required constraints associated with minimum or actual hardware.

- The system should be compatible with hardware supporting **TCP/IP network protocols** for communication and data exchange.

5.4 Software Constraints

The subsection documents all required software constraints.

- The system should operate within a **64-bit server environment** exclusively, ensuring compatibility and performance optimization.

5.4.1 High-Level Languages

The subsection documents all required design constraints associated with the use of high-level programming languages.

- Application server software shall be written in Java.

5.5 Industry Standards

The subsection documents all required design constraints associated with industry standards.

The system shall conform to ISO 10646 (Unicode UTF-8) and ISO 10646-1 (Unicode UTF-16) standards for character set encoding.

- www.unicode.org
- ftp.informatik.uni-erlangen.de/pub/doc/ISO/charsets/ISO-10646-UTF-8.html
- ftp.informatik.uni-erlangen.de/pub/doc/ISO/charsets/ISO-10646-UTF-16.html DC-STD-2) The system shall conform to ISO 4217, codes for the representation of currencies. □ www.xe.net/gen/iso4217.htm

DC-STD-3) The system shall conform to ISO 31, codes for units of measure.

- www.unece.org/trade/rec/rec20en.htm

DC-STD-4) The system shall conform to ISO639-1 Languages, codes for the representation of languages.

□ http://sunsite.berkeley.edu/amher/iso_639.html

DC-STD-5) The system shall conform to ISO 3166-1, codes for the representation of names of countries.

- www.din.de/gremien/nas/nabd/iso3166ma/codlstp1/index.html

DC-STD-6) The system shall conform to ISO 8601, representation of dates and times.

- www.state.ak.us/local/akpages/ADMIN/info/iso8601.htm

5.6 Legal and Regulatory Constraints

The subsection documents all required design constraints associated with legal and regulatory constraints.

□ None

Appendices

This section documents the following appendices:

- Envisioned Future Enhancements
- Open Issues
- Major TBDs
- Assumptions

A. Envisioned Future Enhancements

TBD

B. Open Issues

This appendix documents the following open issues to be resolved:

- How long should user accounts be stored as deleted after being deleted by the user?
- Should the Point-of-Sale System force users to update their passwords on a regular basis? If so, how often.
- Should there be buyer fees (e.g., for insurance and escrow services)?
- Should escrow include seller's items in addition to winning buyers' payment?
- Should sellers be allowed to update their auction including lowering the minimum bid, lowering the reserve price, increasing the quantity, and adding a picture? If so, when?
- In how many ways can the results of searches be sorted?
- Can a buyer use their credit card to pay for electronic money from Point-of-Sale System which pays the seller?
- Can auctions that do not have winners be automatically relisted?
- Are keywords input by sellers, or are they input by buyers and run against the item title and description?
- Should we allow first buyer discounts to spur on bidding?
- Should the start of auctions be delayed briefly to allow time to change/cancel the auction?
- If the instant win price = the minimum bid, then it is a fixed price sale rather than an auction.
- Should there be a limit on the dollar amount and number of transactions in a time period for a user?
- Should FAQs be on a general information page basis rather than their own page?

D. Assumptions

TBD

REFERENCE DOCUMENTS:

<Interview Questions and answers>

SWE Interview Answers – CH Auto Parts

Background

1. When was the business created?

2010

2. What was the idea behind creating the business, the motivation or inspiration?

To supply the best quality auto parts to the car owners of Montego Bay.

Passion for automobiles led to a desire to contribute to the automotive industry. Montego Bay's traffic and automotive culture provided an opportunity for reliable auto parts. The vision was to prioritize quality and service, contributing to safer roads and improved vehicle performance. Starting from scratch was exciting for learning and growth.

3. What are the company's core values?

Our commitment to quality assurance, reliability, customer-centric approach, continuous learning, community impact, integrity, and adaptability is evident in our commitment to providing high-quality auto parts. We prioritize customer needs, offer personalized service, and strive to build lasting relationships. We prioritize learning and staying informed about industry trends, ensuring integrity and transparency in our interactions. Our flexibility and adaptability enable us to serve our customers better.

4. Can you describe your ideal customer?

car owners, mechanics, bus driver, all types of people, mostly people with car problems

The ideal customer is an automotive enthusiast, quality-conscious, informed, and curious about auto parts. They value reliable, high-quality components and seek knowledge about industry trends. They value local businesses and are problem-solvers, seeking solutions for vehicle issues. Clear communication is crucial, and they build long-term relationships with the auto parts store. Their trust in recommendations and commitment to quality keeps them coming back.

5. What are your short-term and long-term goals for Catherine Hall Auto Parts?

Be more advanced when it comes to certain products, keep in terms of keeping up to date with the trends in the car parts market.

The short-term goals include expanding product range, improving customer experience through loyalty programs, collaborating with local mechanics and workshops, and transitioning to an inventory management system to streamline stock control and improve order fulfilment.

In the long term, the company aims to expand its reach by opening branches in neighbouring towns, establishing an e-commerce platform, partnering with local garages and dealerships, implementing eco-friendly practices, and promoting community outreach through safety workshops and events.

6. How do you envision technology supporting your business growth? // Are there specific areas of your business you are looking to expand or improve with technology?

would like to implement a POS system.

Implementing inventory management software, transitioning to accounting software, implementing a CRM system, and implementing an e-commerce platform can streamline stock management, improve accuracy, streamline financial reporting, and enhance customer service.

Implementing an intuitive inventory management system can revolutionize operations by tracking stock levels, reorder points, and sales trends, preventing stockouts, reducing errors, and minimizing storage costs.

Launching an online store expands our global reach, provides convenience, boosts visibility, and enhances customer satisfaction through real-time order tracking.

CRM systems centralize customer data, offer personalized recommendations, nurture relationships for repeat business, and gather feedback for service improvement.

Digital marketing involves using social media, email, and targeted ads to increase brand awareness, promote discounts, and lead generation by engaging with the community.

Data analytics plays a crucial role in analyzing sales patterns, customer preferences, and market trends, providing informed decisions, a competitive edge, and optimization of pricing, promotions, and inventory.

Cybersecurity measures aim to protect customer data, financial records, and business information, building trust and adhering to legal compliance.

8. How do you stay informed about trends in the motor vehicle industry?

Staying informed about new technologies, market shifts, and trends in the automotive industry involves reading industry publications, attending trade shows, maintaining close relationships with manufacturers, participating in online communities, and investing in training sessions and workshops to enhance knowledge and skills.

Current Operations & Automation Systems

1. What systems/ software do you have in place to help run the business/ automate tasks like scheduling, payroll etc.? Who has access to each program?

None, not yet.

No software in place.

2. Do you have a database to record employee info including their exact role/ what they're getting paid for? (If they don't this could mean the company is losing money paying employees they don't need or people who aren't contributing to business).

No.

No system in place to manage employee and payroll info.

3. How do you record client and supplier information?

Using excel.

Excel spreadsheets are used to track client and supplier details, organized into columns and filters for quick access. Regular updates are made to ensure data protection, and backups and security are implemented to protect sensitive information.

5. Do you have a system to calculate projected profits and losses for the coming months? Do you think it would be beneficial to have a system like that? (do we really want to ask this? if they want a system like that and we can't deliver that would be a problem… questioning the feasibility).

No, just a use of the calculator.

Calculates profits and losses manually, tracks expenses, and regularly reviews financial statements to assess the business's financial health, including tracking sales revenue and managing expenses.

Profit = Total Revenue - Total Costs

Loss = Total Costs - Total Revenue

6. Do you make deliveries? How does that process work? Do you have a system to automate the process (online or in store)?

N/A.

Assuming no deliveries are made.

7. Can you give an average benchmark for the systems you currently use (in terms of development and maintenance)?

No systems in use.

Therefore, no budget.

8. How do you source auto parts? Do you make special orders for customers if they ask for something you don't typically have in stock?

Yes, we do not source parts overseas only locally.

Yes, custom orders are made. Products are only sourced locally.

9. Can we get a run through of any of these systems to assess the interface and user experience?

N/A.

No systems in use therefore, no run-through.

Challenges and Risks

1. What challenges do you currently experience with any of the systems you currently use and wish to solve (in terms of management, resource allocation, and prioritization of various tasks)?

No software in place.

The current manual approach to employee data management, including payroll, is time-consuming and susceptible to errors.

Balancing staff allocation across sales, inventory management, and customer service can be a challenging task.

Effective prioritization is crucial for managing various tasks such as inventory updates, customer inquiries, and business development.

2. Have you ever experienced situations where your programs were delayed or made miscalculations?

Employee data entry errors can lead to incorrect payroll calculations, missed bonuses, and typos in personal details such as names, addresses, or contact information.

Pricing miscalculations can occur due to incorrect discount application and inaccuracies in tax calculations, affecting promotions and potentially affecting the final price.

3. What measures are currently in place to manage risks, and how effective have they been? This question will give insight into the current risk management strategies and their effectiveness.

Regular inventory audits, price reviews, employee data accuracy, customer satisfaction, market trends, and resource allocation are key measures to mitigate inventory, pricing, and profit margin risks.

4. Which areas do you need or wish to progress in most critically (i.e. most beneficial to the business)?

Implementing advanced inventory management systems, integrating e-commerce, improving employee efficiency, implementing CRM systems, optimizing delivery routes, and strengthening cybersecurity measures can all benefit the business. Implementing an advanced inventory management system, integrating a robust e-commerce platform, adopting HR software, implementing a CRM system, optimizing delivery routes, and regularly conducting security audits can all contribute to a more efficient and secure business.

final analysis ()

There are indeed a lot of systems because they recently did some renovations and changed over and lost everything so everything is being done the old-fashioned way, so we could just choose something.

Our Suggested Systems

- **POS (Point of Sale) – top choice**
- **Delivery Service**
- **Client and Supplier management**
- **Employee & Payroll management**
- **Task management system**
- **Inventory management.**
- **Accounting System**
- **CRM**
- **E-commerce platform (online store)**

1. *How do you envision the new POS system improving your business operations? This question is aimed at understanding the business's expectations and how they see the new system impacting their operations.*

Core Requirements / Must-haves / Functional Requirements:

The POS system should support contactless payments, PCI/PA-DSS compliance, seamless integration with credit card gateways, efficient catalogue management, customer-based pricing, product tax classes, quantity-based tier pricing, time-based promotions, and alternative product IDs for efficient inventory tracking. It should also support multiple tax rates, offer discounts based on purchase quantities, and schedule promotional pricing for specific time periods.

Desired Features / Nice-to-haves / Non-functional Requirements:

The desired features include mobile inventory management, EMV payment security, seamless integration with eCommerce, staff access control, multi-location support, reporting and analytics, and a user-friendly interface. These features are essential for businesses expanding online, managing multiple locations, and ensuring informed decision-making.

<Success Scenario and alternating Flows>

POS SYSTEM

MAIN SUCCESS SCENARIO

1. Cashier for the shift logs into the POS system with appropriate user and password details.
2. Customer hands over chosen product to cashier.
3. Cashier uses the barcode scanner to scan the barcode on the product to get information about the product.
4. Cashier selects the right product and its details from the list of products displayed (via the inventory system) on the monitor which are collected through the scanner to make up the customer's purchase list.
5. Based on the details on the product(s) the system generates the customer's bill.
6. The customer pays using the POS terminal (card machine), the card can be swiped, tapped, or dipped and a transaction receipt is printed from the terminal.
7. Cashier completes the transaction on the system monitor, then generates and prints the customer's receipt (for the product purchased), and the product number should decrease in the inventory system.
8. The system stores transaction information so later the manager can generate reports via other systems like payroll, accounting, and inventory, then clears previous transaction data to prepare for a new transaction.

ALTERNATE FLOWS

1a. If the cashier does not login properly, no transactions can be carried out.
1b. The cashier gets 3 login attempts, if they are all wrong the system shuts down.
1c. If a cashier is unavailable a supervisor or manager can login to carry out transactions.
2a. If the customer does not hand over a product, no product can be scanned (step 3) nor selected (step 4).
3a. If there is no barcode on the product, the cashiers must enter product details manually and select the right one from the list displayed via the inventory system (step 4).
4a. If there are no product details on the system, the cashier must go to the inventory section or find a supervisor to get product details.
4b. If the cashier no longer wants a product on their purchase list the cashier can request that a supervisor or manager remove the product.
6a. If the customer does not wish to use card they can pay online or use cash, the cashier must collect and store the money in the cash register; if they pay online, an electronic transaction receipt will be generated for the customer.
6b. If the customer does not pay using card, a transaction receipt will not be printed from the terminal.
7a. If the customer does not pay, the transaction will not be completed, and a purchase receipt will not be generated or printed, and the stock count in inventory will not change.

Functional Requirements [F-REQ-1]

[F-REQ-1]: The system shall allow the user to login [from step 1].
[F-REQ-2]: The system shall interface with the inventory system and be capable of displaying product information [from step 4].
[F-REQ-3]: The system shall be able to calculate the customer's bill with 100% accuracy [from step 5].
[F-REQ-4]: The system shall interface with the accounting system and save an electronic copy of the transaction receipt from the terminal [from step 6].

[F-REQ-5]: The system shall interface with the accounting system and save an electronic copy of the customer's purchase receipt and interface with the CRM system to save the receipt there as well [from step 7].
[F-REQ-6]: After the cashier generates the bill and completes the transaction the system shall clear the interface to prepare for a new transaction [from step 8].
[F-REQ-7]: Upon wrong login attempts, the system shall keep the interface to process customer purchases closed [from steps 1a and 1b].
[F-REQ-8]: The system shall provide a mechanism to cancel the current transaction or remove a product from the list of customer selections [from step 7a and 4b respectively].
[F-REQ-9]: After a successful transaction the system should interface with the inventory system to decrease the product number [from step 7].

Non-Functional Requirements [NF-REQ-1]

[NF-REQ-1]: The system should provide an interface for the user to login [constraint on F-REQ-1].
[NF-REQ-2]: The system should provide a 100% friendly and comprehensive interface for the user to read and select product details [constraint on F-REQ-2].
[NF-REQ-3]: If the product is not in the system, an appropriate message should be displayed [constraint on F-REQ-2].
[NF-REQ-4]: The system should display the customer's total and change in the centre of the monitor's screen and be visible to any person with 20/20 vision standing five feet from the oven in a room with a luminance level between 0 and 100 foot-candles. [constraint on F-REQ-3].
[NF-REQ-5]: The system should provide a 100% friendly and comprehensive interface to process customer purchases [constraint on F-REQ-6].
[NF-REQ-6]: Display an error message upon each incorrect login attempt to the system [constraint on F-REQ-7].

<Actor Identification Form>

ACTOR IDENTIFICATION FORM

Who or what provides inputs to the system?	Customer	Cashier	Inventory System	
Who or what receives outputs from the system?	Customer Cashier	Cashier Customer	Cashier Customer	
Are interfaces required to other systems?	yes - POS terminal?	Yes – inventory, accounting, and CRM	No	
Are there events that are automatically triggered at a predetermined time?	No	yes - tax and discount applications	No	
Who will maintain information in the system?		Supervisors and Managers	Managers	

<Use Case Identification Form>

USE CASE IDENTIFICATION FORM - Use cases should be named with a verb phrase.

ACTORS	What are the main tasks of the actor?	What information does the actor need form the system?	What information does the actor provide to the system?	Does the system need to inform the actor of any changes or events that have occurred?	Does the actor need to inform the system of any changes or events that have occurred?
Customer	• Pass chosen items to cashier. • Pay using card, cash, or online means.	• Product details (name, price etc.)		No	No
Cashier	• Scan barcode or enter details. • Select product(s) from inventory list. • Generate bill. • Print transaction and purchase receipts. • Login to system.	• Product details (name, price etc.)	• Customer information (name) • User login (name and pass)	Yes – change in product details/ availability, invalid login	Yes – change in customer info
Supervisor	• Scan barcode or enter details. • Select product(s) from inventory list. • Generate bill. • Print transaction and	• Product details (name, price etc.)	• Customer information (name) • User login (name and pass)	Yes – change in product details/ availability, invalid login	Yes – change in customer info, product removal from purchase list

	purchase receipts. • Remove selections from customer purchase list if necessary. • Login to system • Manage information in the system and interfacing systems.				
Manager	• Scan barcode or enter details. • Select product(s) from inventory list. • Generate bill. • Print transaction and purchase receipts. • Manage information in the system and interfacing systems. • Login to system. • Remove selections from customer purchase list if necessary.	• Product details (name, price etc.)	• User login (name and pass) • Customer information (name)	Yes – change in product details/ availability, invalid login	Yes – change in customer info, product removal from purchase list

	• Generate reports using the saved details from the system.				
Inventory System	• Display product details. • Decrease stock after each successful purchase.	• Product details (name, price etc.)		Yes – successful transactions (and decrease stock amount)	Yes – change in product details/ availability
Accounting System	• Save electronic copy of transaction and purchase receipts.	• Product details (name, price etc.)		Yes – successful transactions (and send receipts)	No
Customer Relationship Management System	• Save an electronic copy of the customer's purchase receipt.	• Product details (name, price etc.) • Customer information (name)		Yes – successful transactions (and send receipts)	No

<Domain Class Diagram>

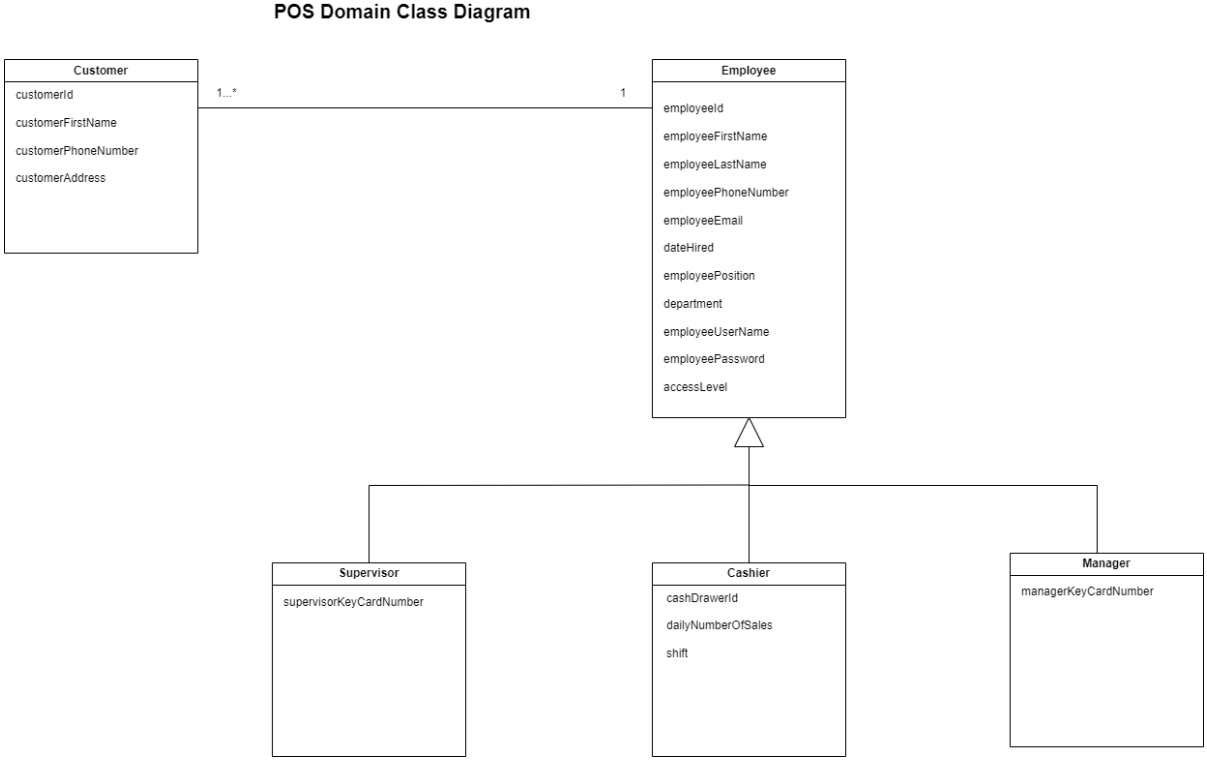

Figure 2: Point-of-Sale (POS) System Domain Class Diagram

<Activity Diagram 1 - Login>

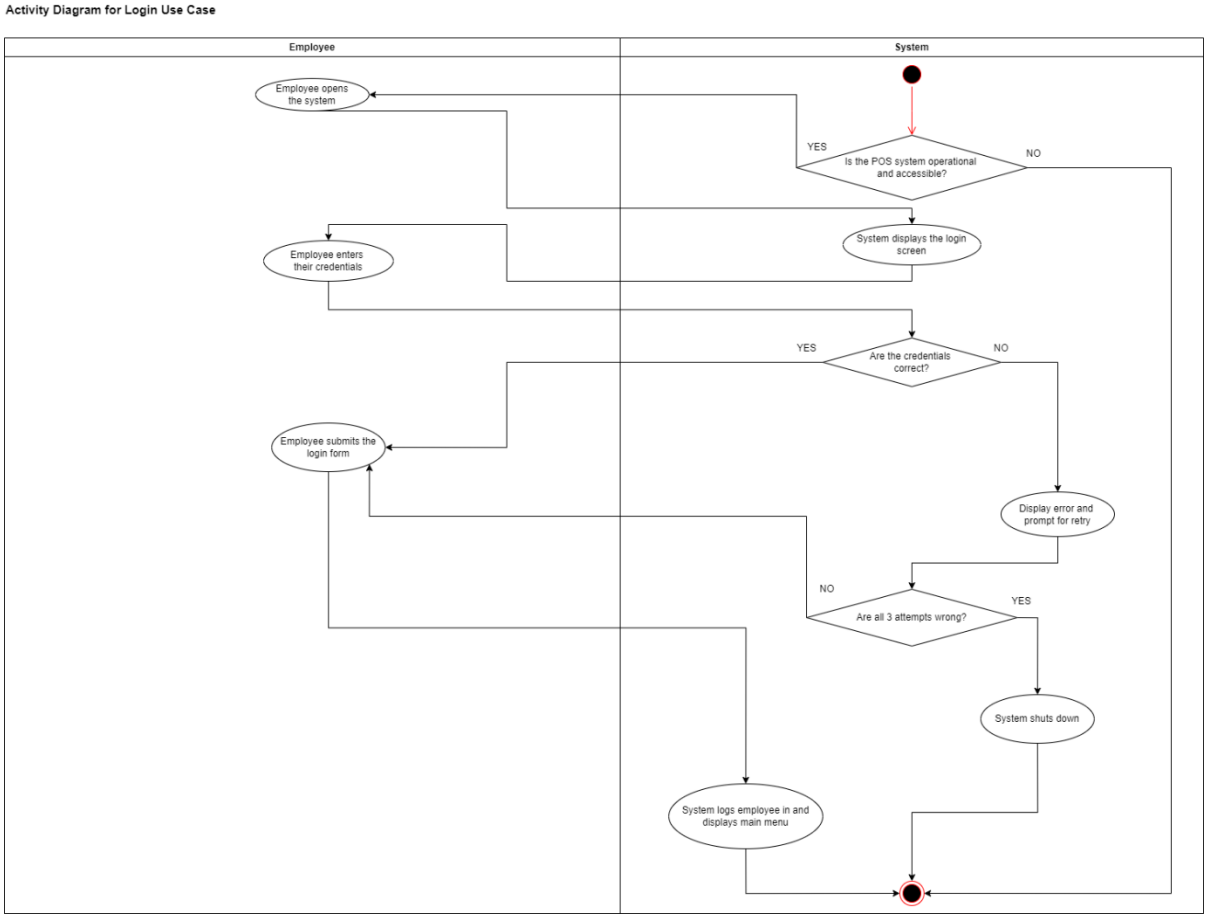

Figure 3: Point-of-Sale (POS) System Login Activity Diagram

<Activity Diagram 2 - Print Card Transaction Receipt>

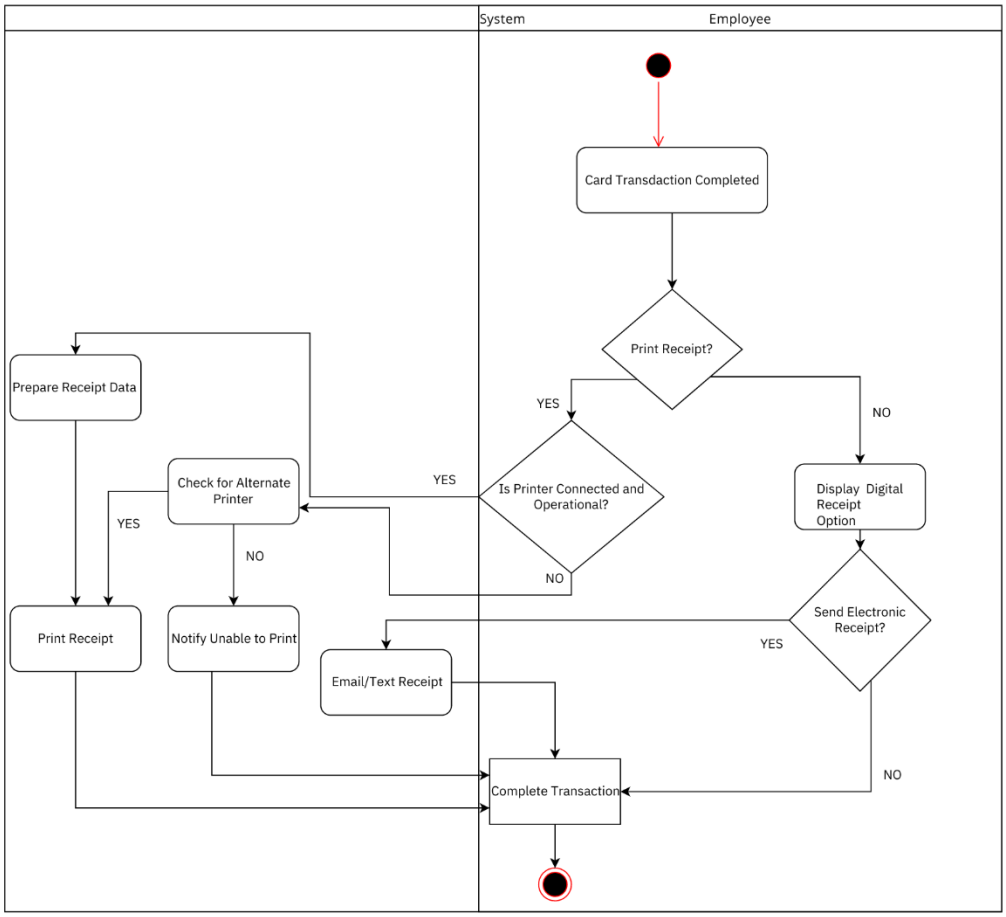

Figure 4: Point-of-Sale (POS) System Print Card Transaction Receipt Activity Diagram

<Activity Diagram 3 - Print Purchase Receipt>

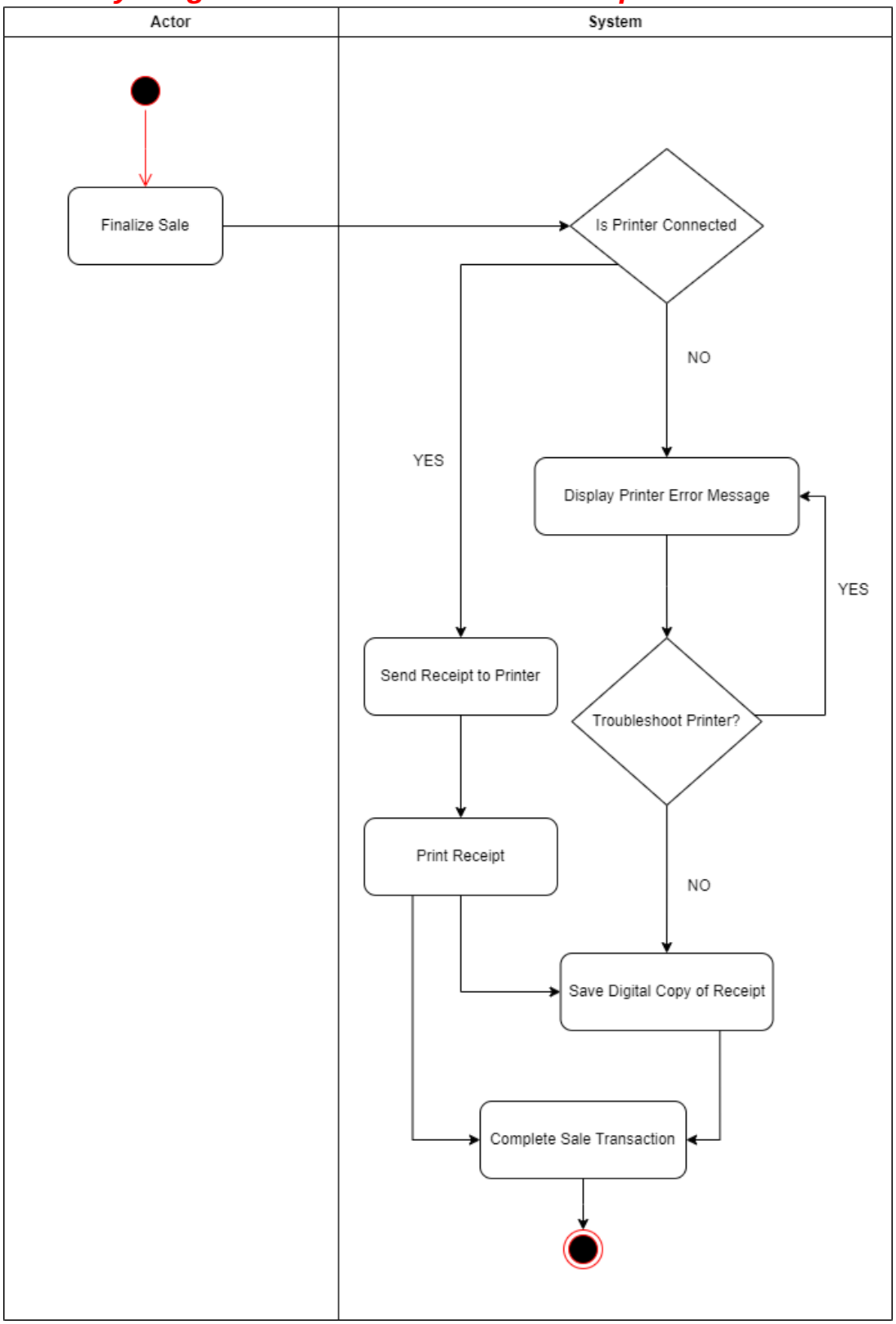

Figure 5: Point-of-Sale (POS) System Print Purchase Receipt Activity Diagram

<Activity Diagram 4 - Save Purchase Receipt>

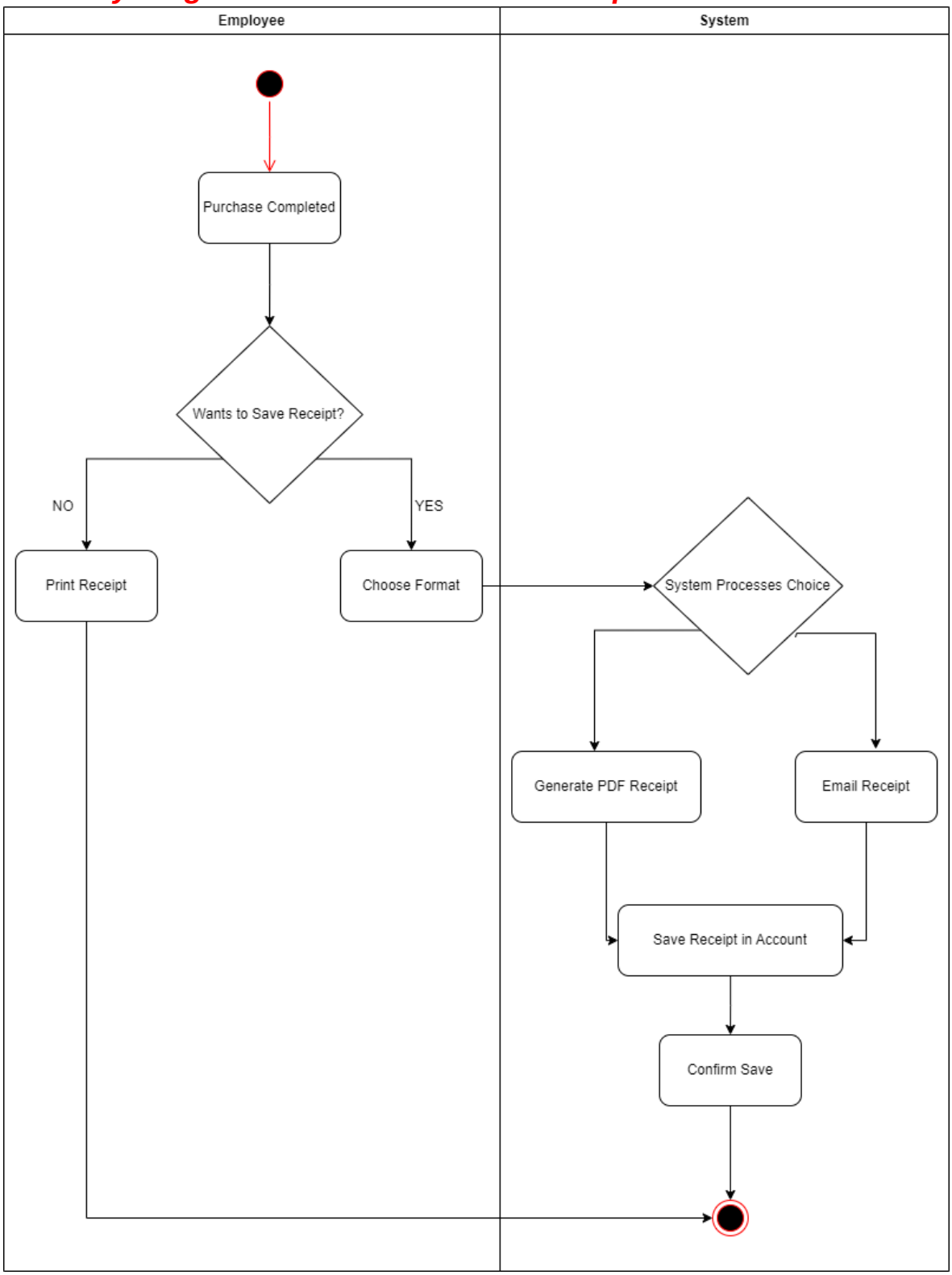

Figure 6: Point-of-Sale (POS) System Save Receipt Activity Diagram

<Activity Diagram 5 - Scan Barcode or Enter Product Details>

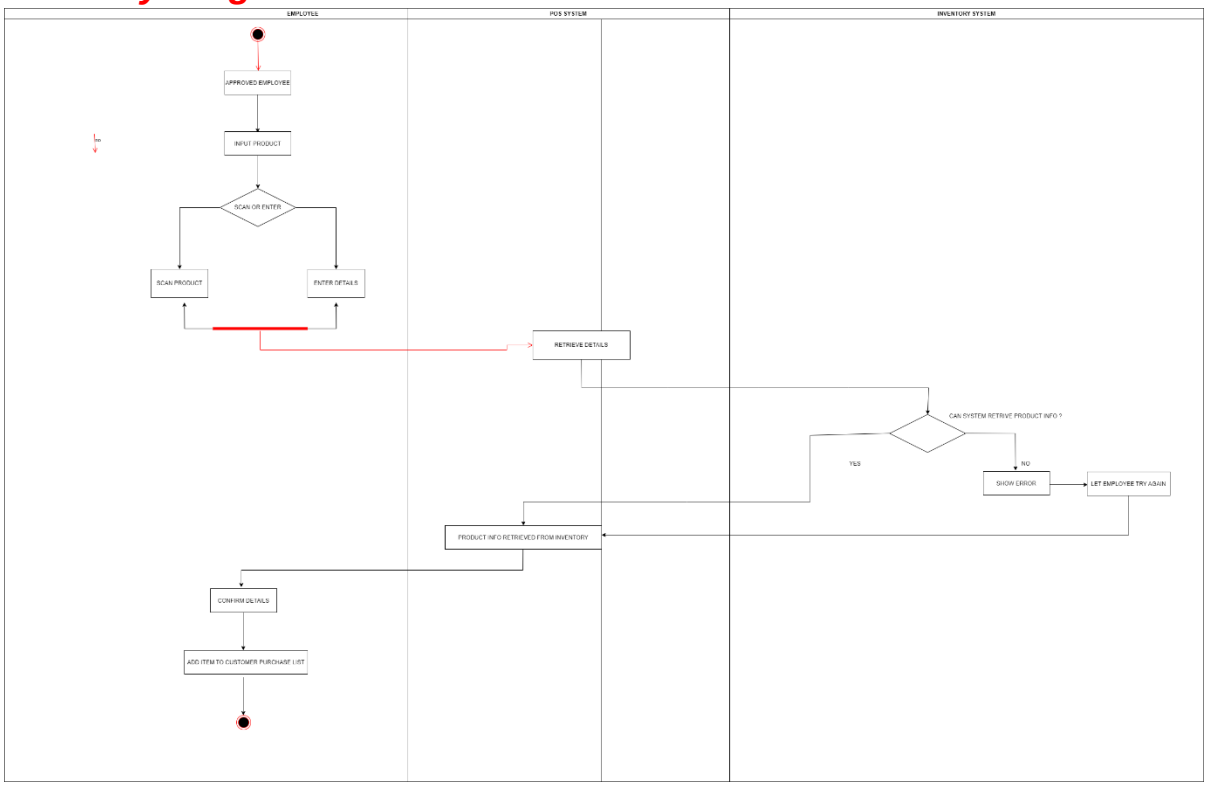

Figure 7: Point-of-Sale (POS) System Scan Barcode or Enter Product Details Activity Diagram

<Sequence Diagram 1 - Generate Report>

Figure 8: Point-of-Sale (POS) System Generate Report Sequence Diagram

<Sequence Diagram 2 - Generate Bill>

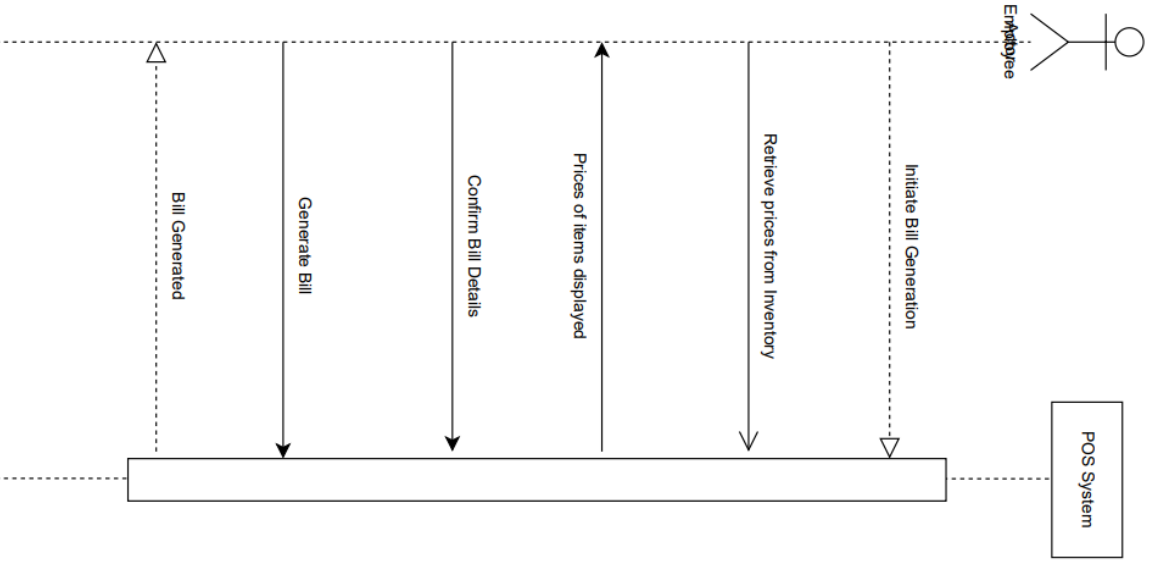

Figure 9: Point-of-Sale (POS) System Generate Bill Sequence Diagram

<Sequence Diagram 3 – Manage System>

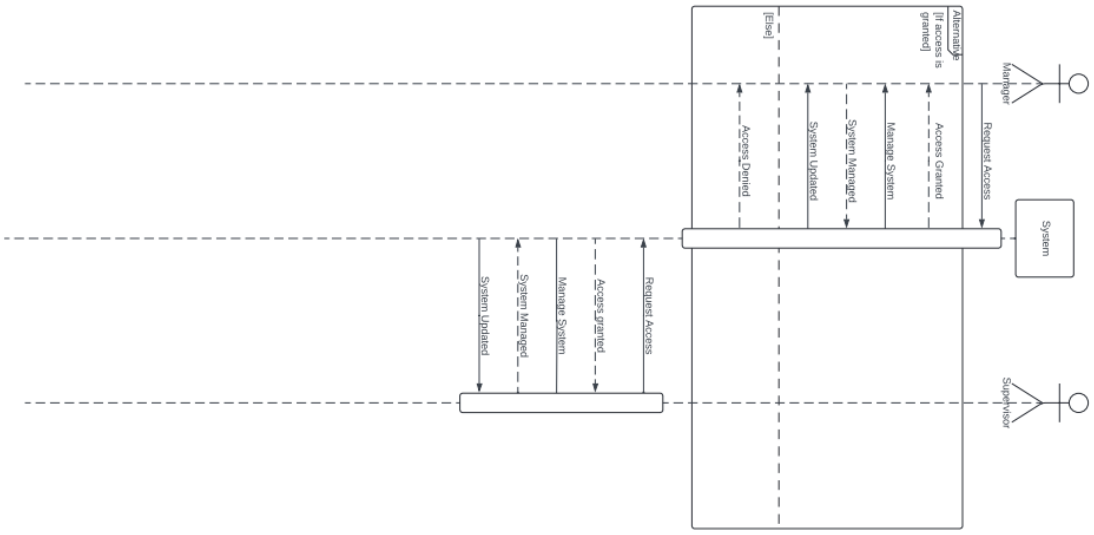

Figure 10: Point-of-Sale (POS) System Manage System Sequence Diagram

<Sequence Diagram 4 - Remove Product from Purchase List>

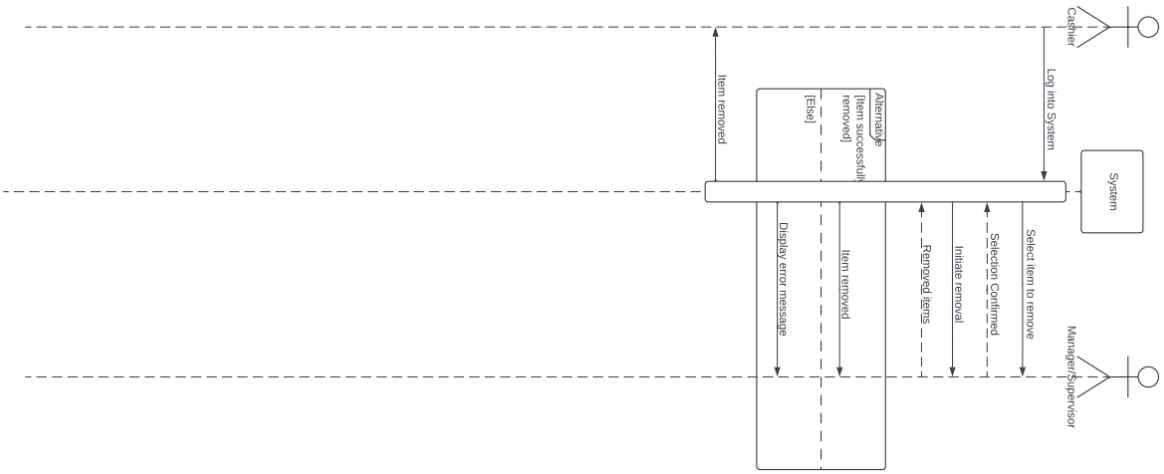

Figure 11: Point-of-Sale (POS) System Remove Product from Purchase List Sequence Diagram

<Sequence Diagram 5 - Select Product from Inventory List>

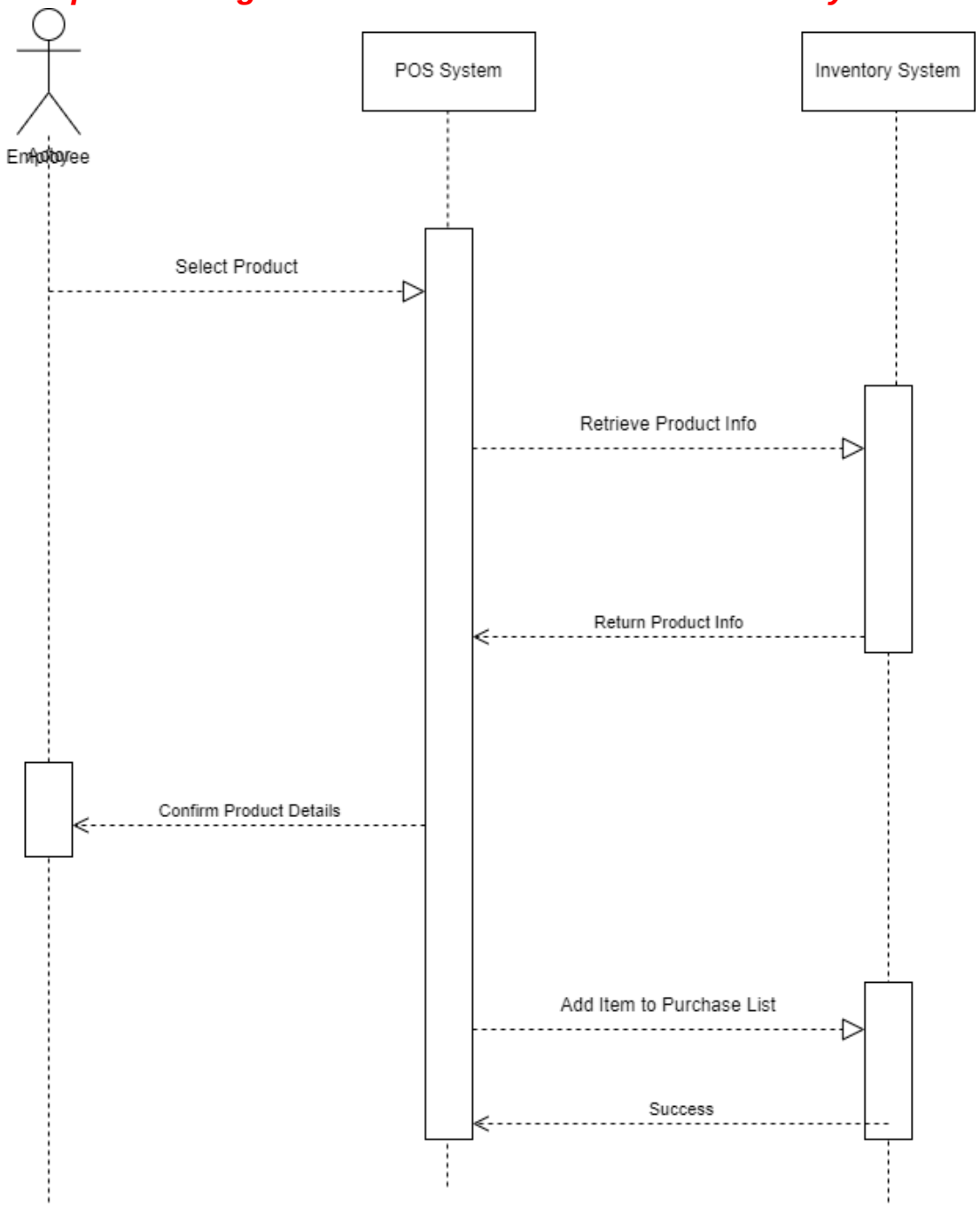

Figure 12: Point-of-Sale (POS) System Select Product from Inventory List Sequence Diagram

<Use Case Realization - Sequence Diagram: Scan Barcode or Enter Product Details>

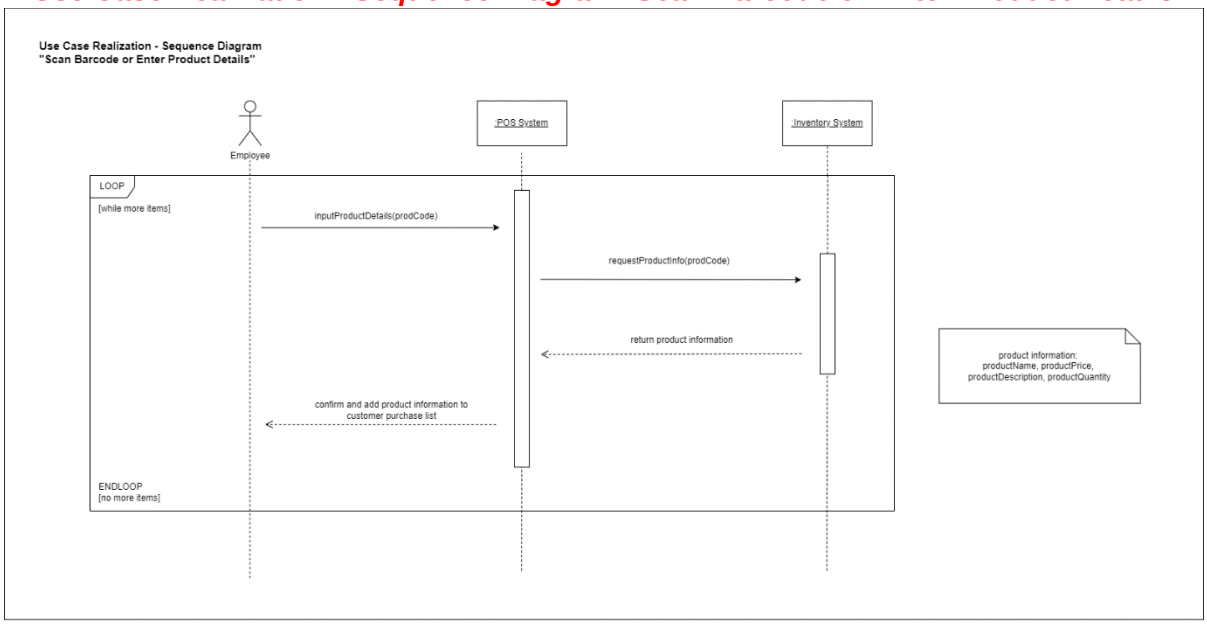

Figure 13: Point-of-Sale (POS) System Use Case Realization Sequence Diagram

<Use Case Realization - Communication Diagram: Scan Barcode or Enter Product Details>

Figure 14: Point-of-Sale (POS) System Use Case Realization Communication Diagram

<Architecture Diagram 1 - Technology>

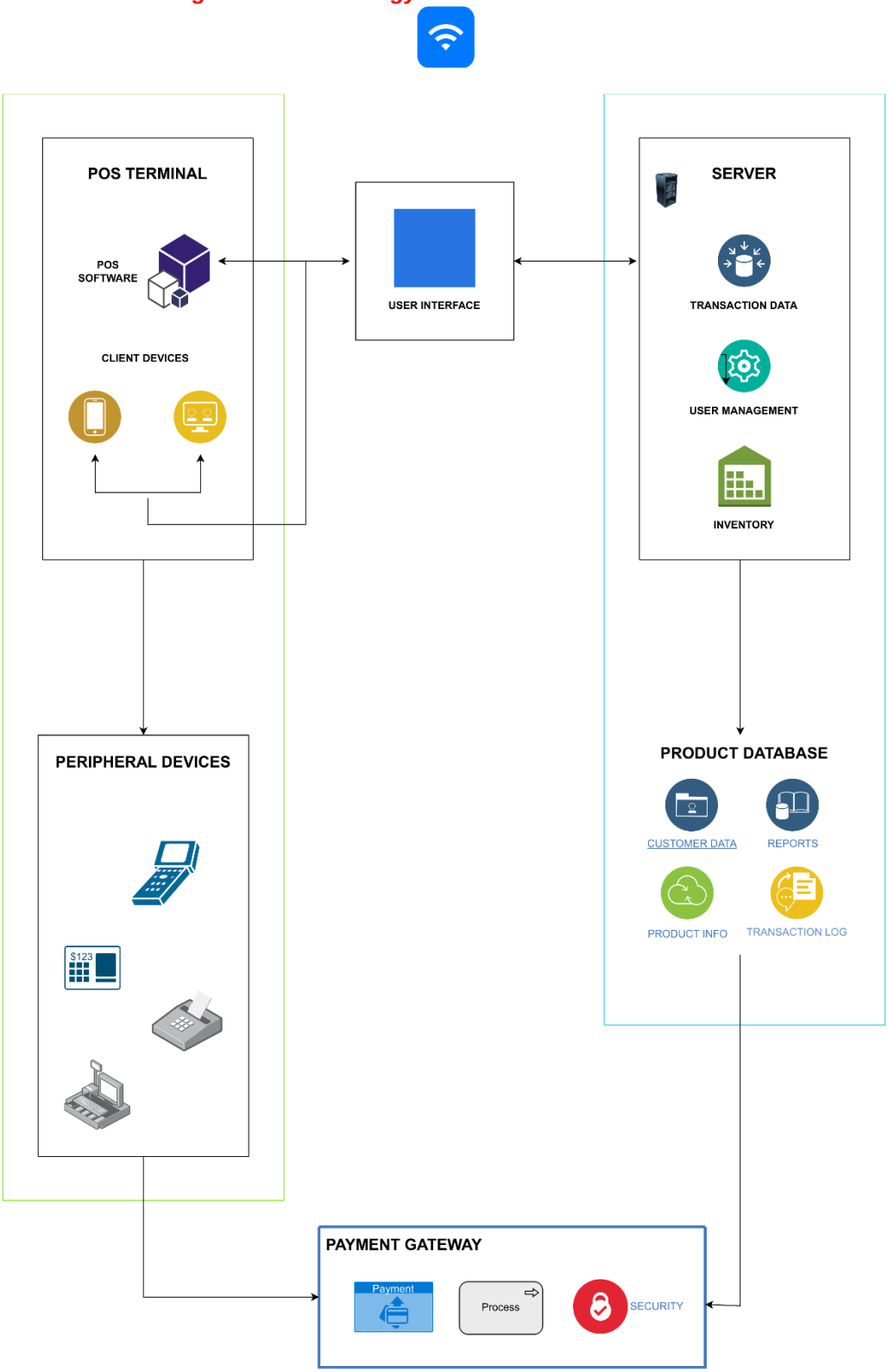

Figure 15: Point-of-Sale (POS) System Technology Architecture Diagram

<Architecture Diagram 2 - Application>

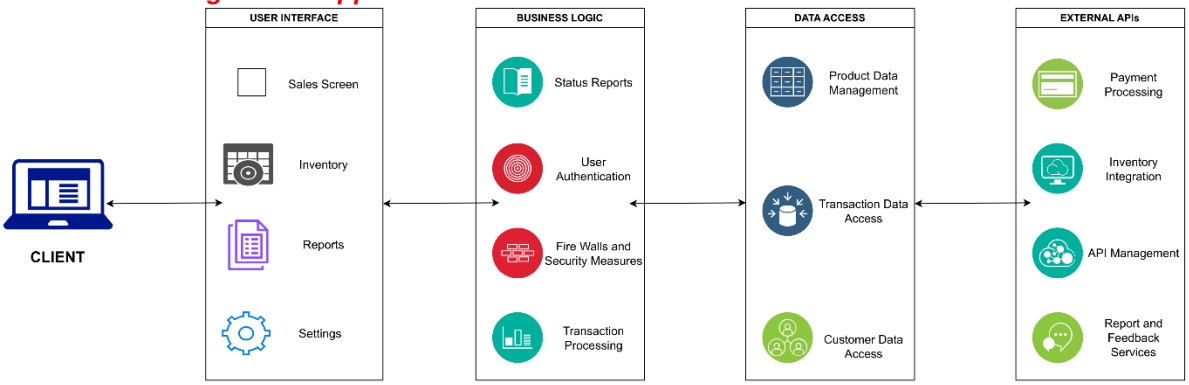

Figure 16: Point-of-Sale (POS) System Application Architecture Diagram

<User Interface Examples>

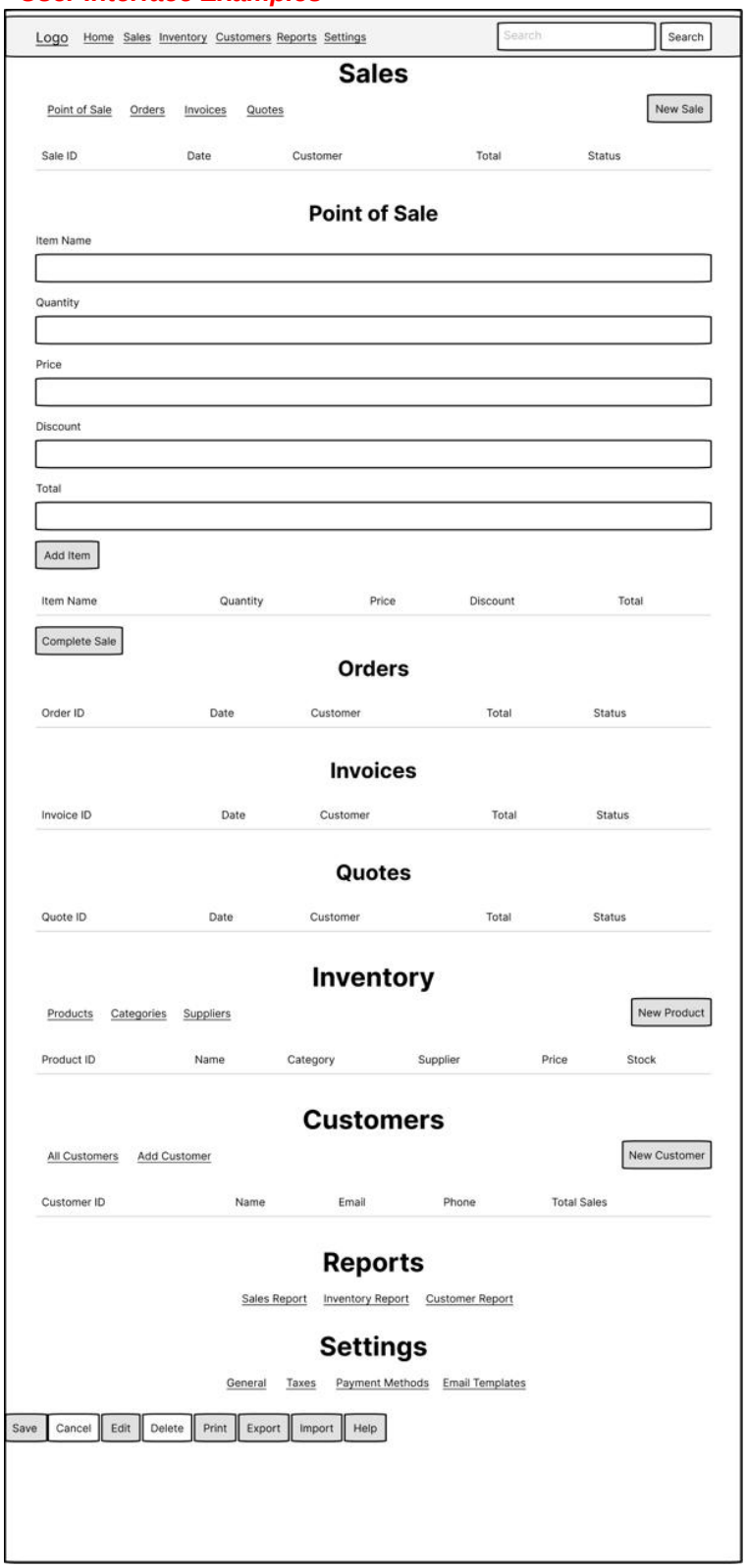

Figure 17.1: Point-of-Sale (POS) System User Interface Examples

Figure 17.2: Point-of-Sale (POS) System User Interface Examples

Figure 17.3: Point-of-Sale (POS) System User Interface Examples

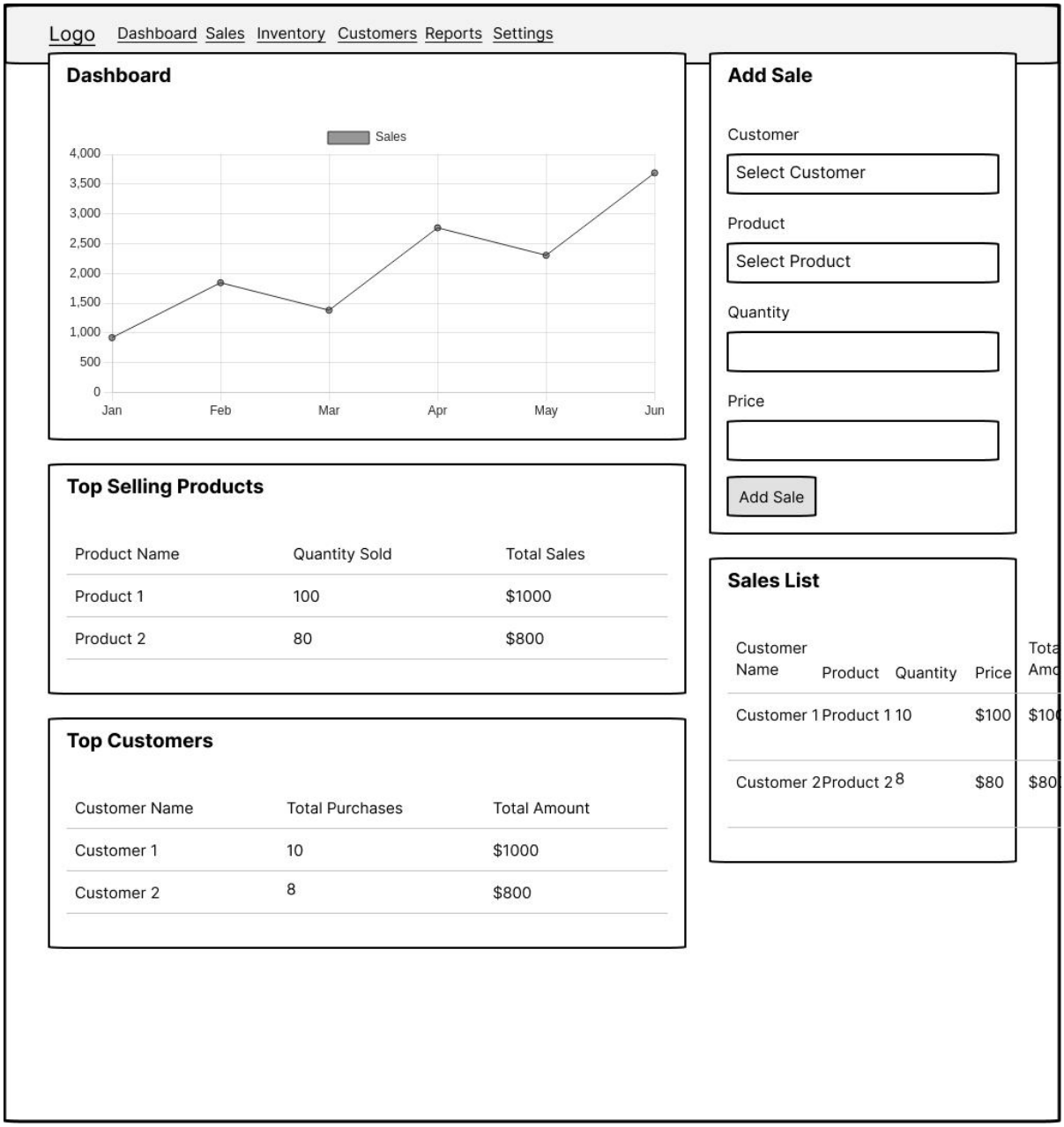

Figure 17.4: Point-of-Sale (POS) System User Interface Examples

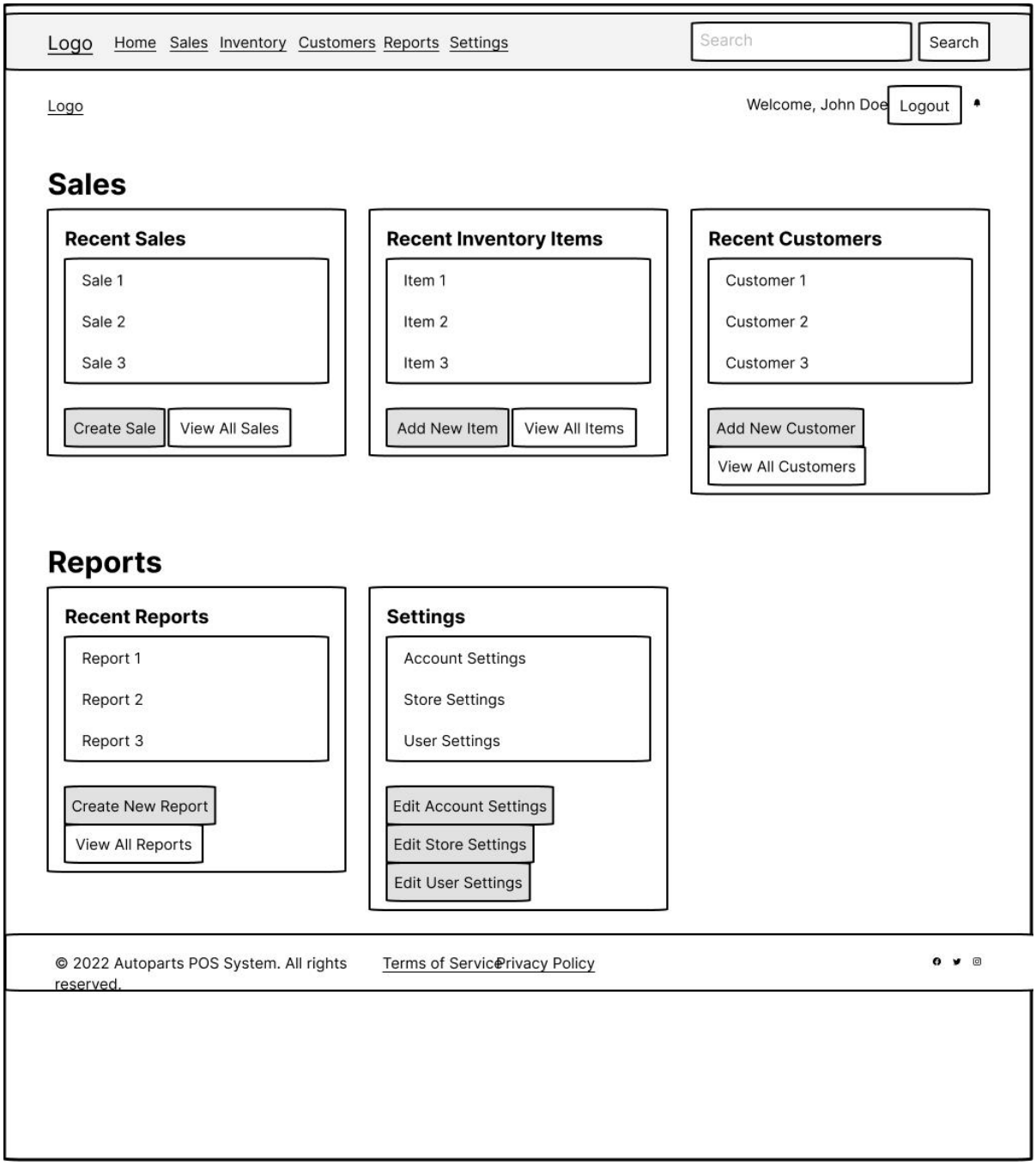

Figure 17.5: Point-of-Sale (POS) System User Interface Examples

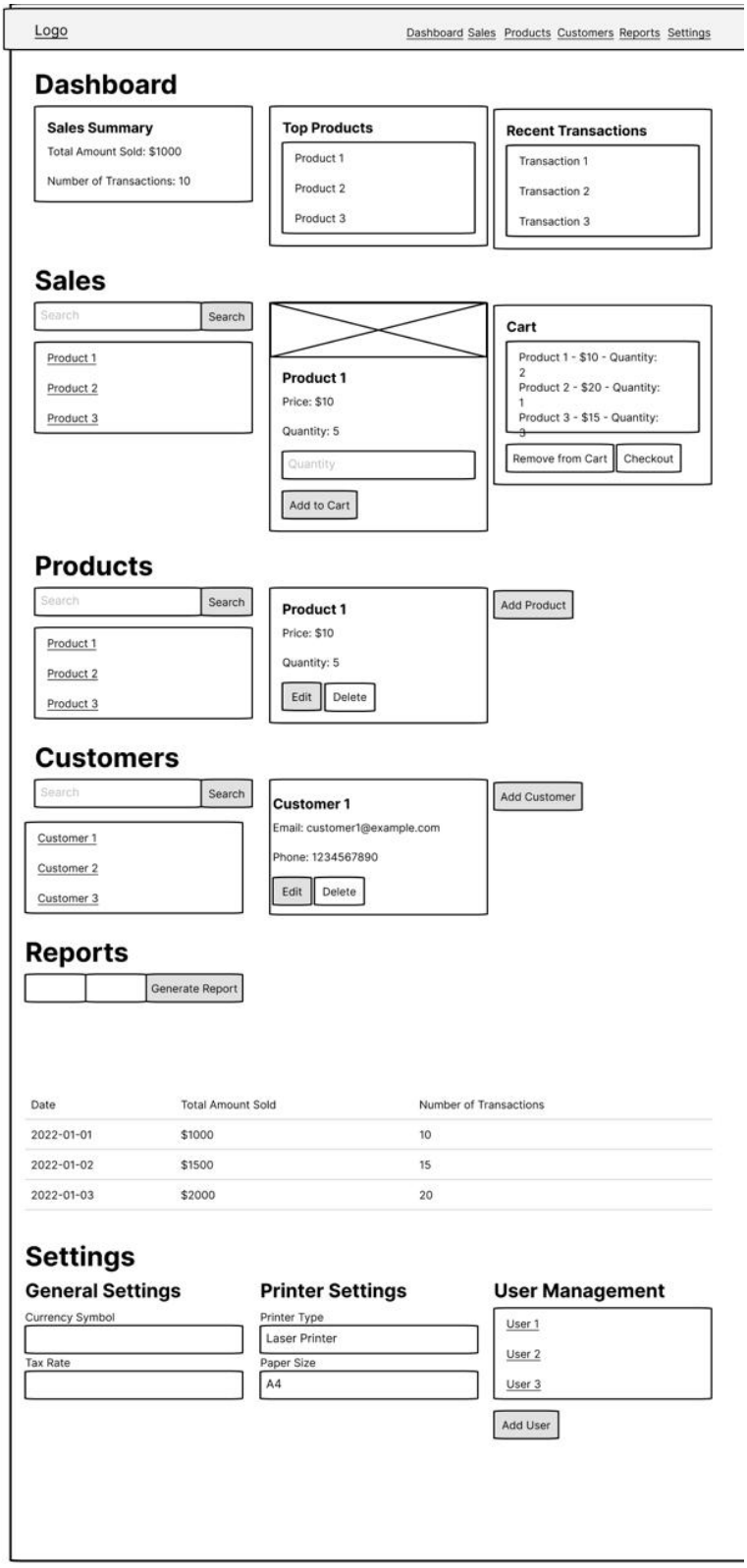

Figure 17.6: Point-of-Sale (POS) System User Interface Examples

Figure 17.7: Point-of-Sale (POS) System User Interface Examples

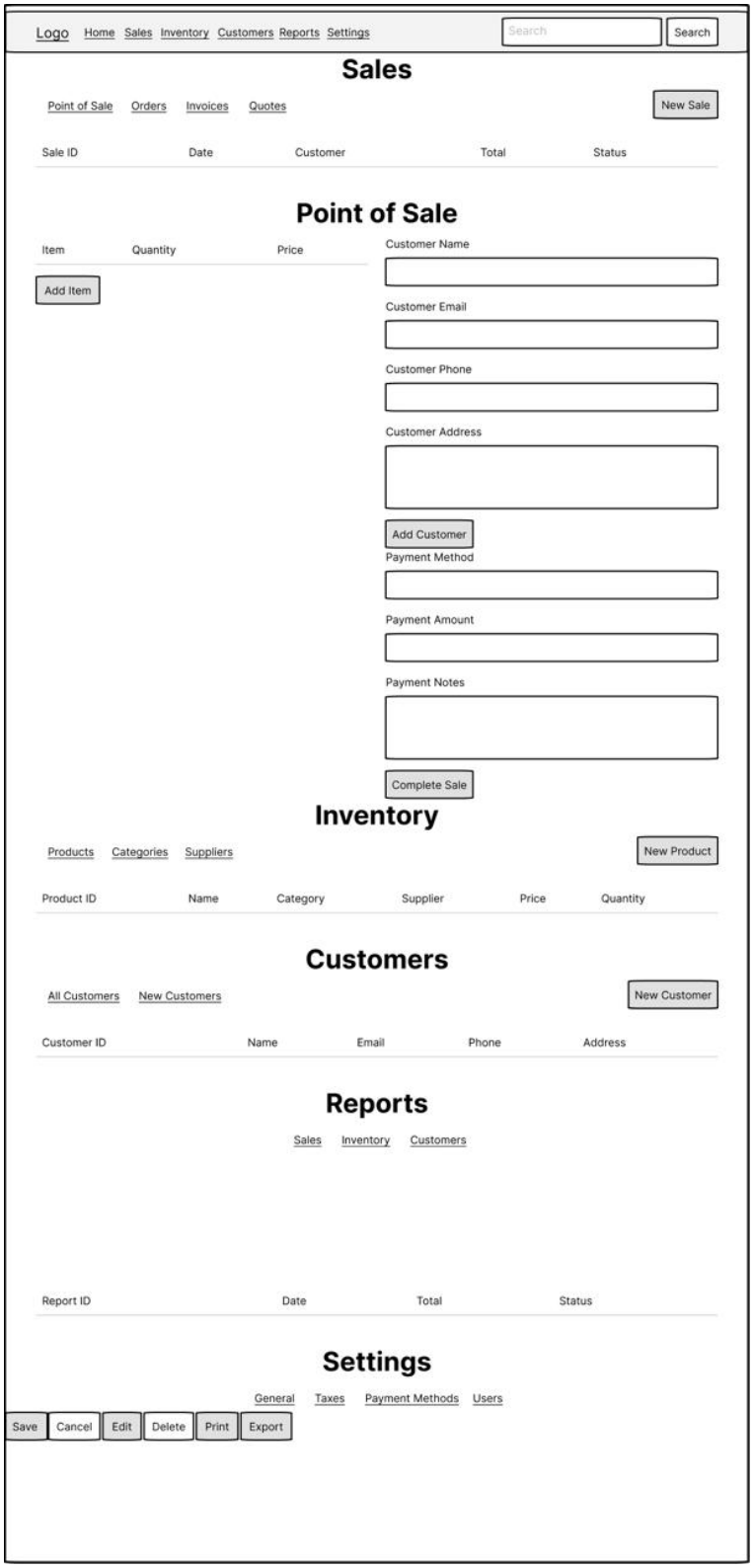

Figure 17.8: Point-of-Sale (POS) System User Interface Examples

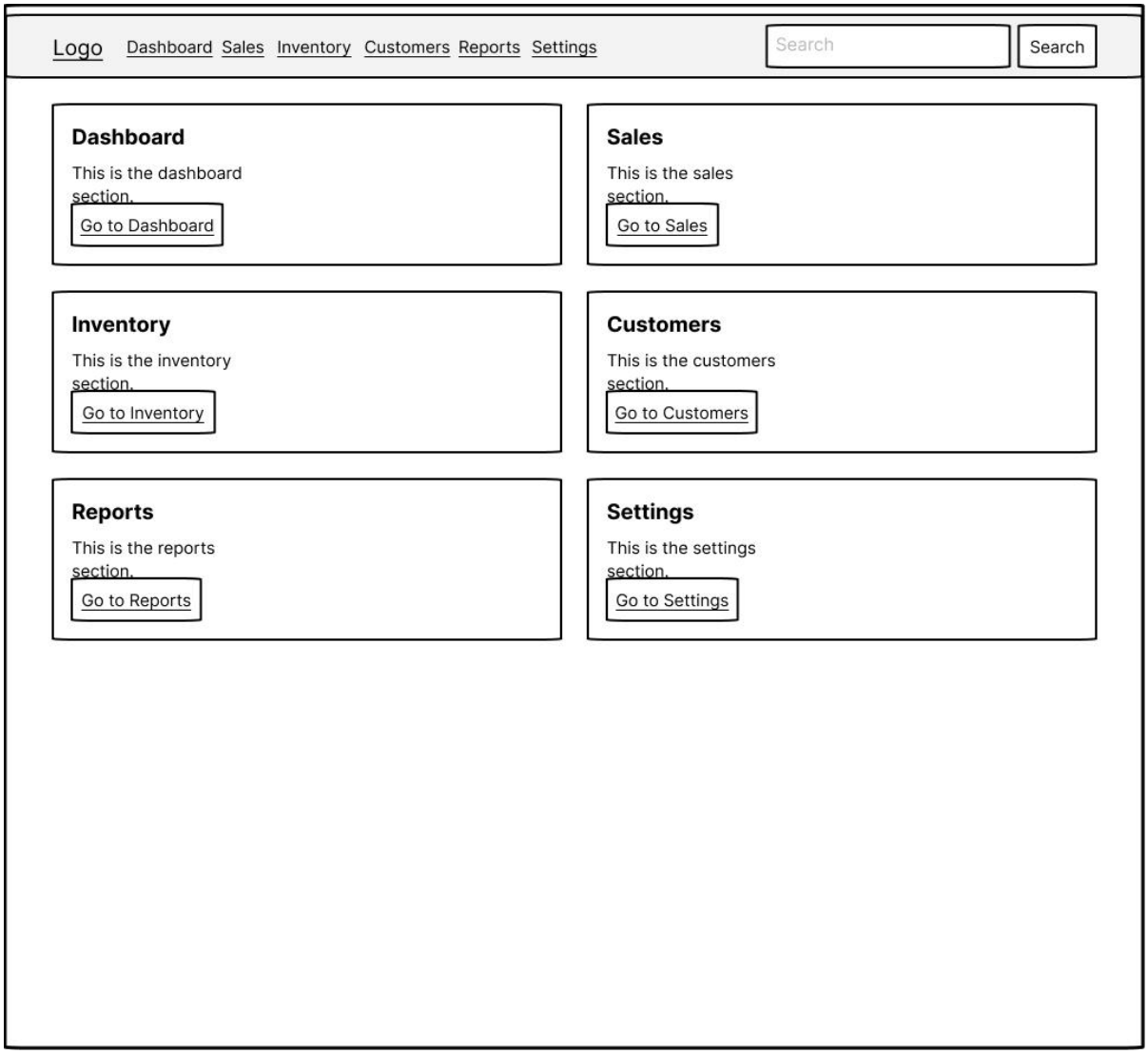

Figure 17.9: Point-of-Sale (POS) System User Interface Examples

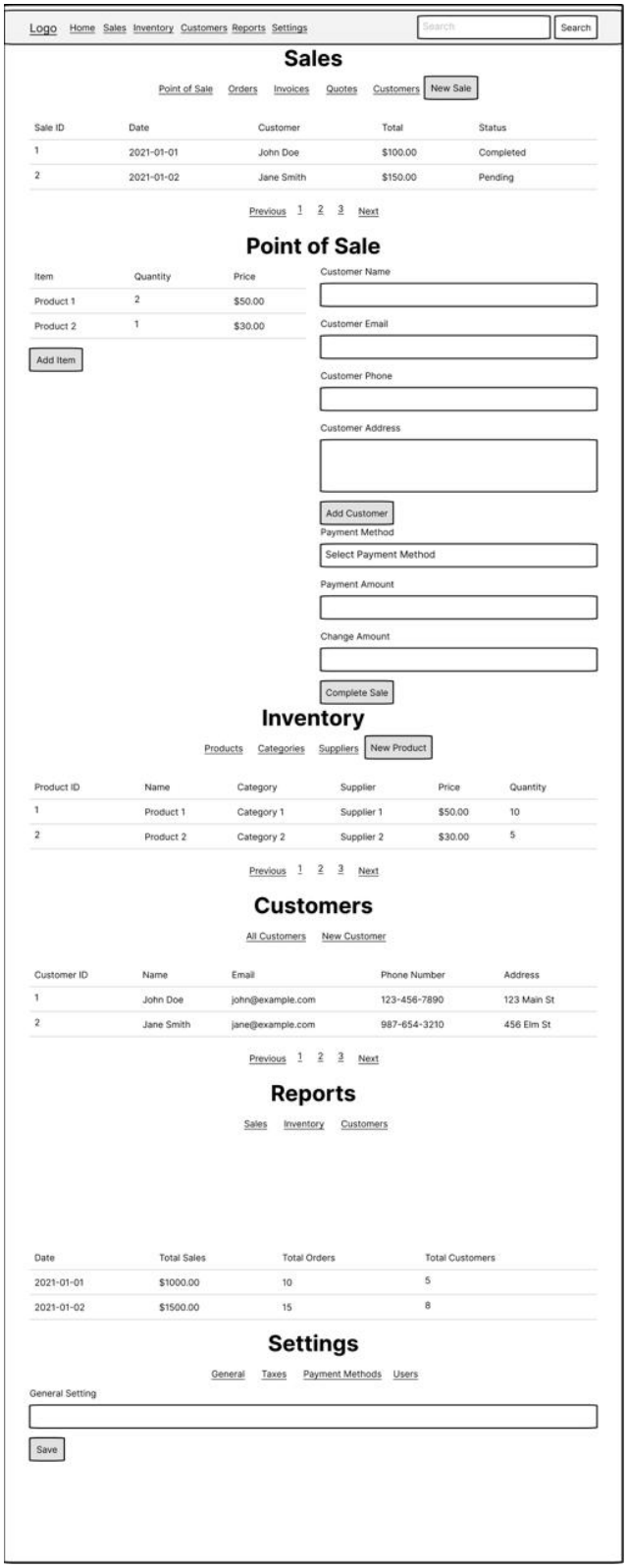

Figure 17.10: Point-of-Sale (POS) System User Interface Examples

<Class Diagram>

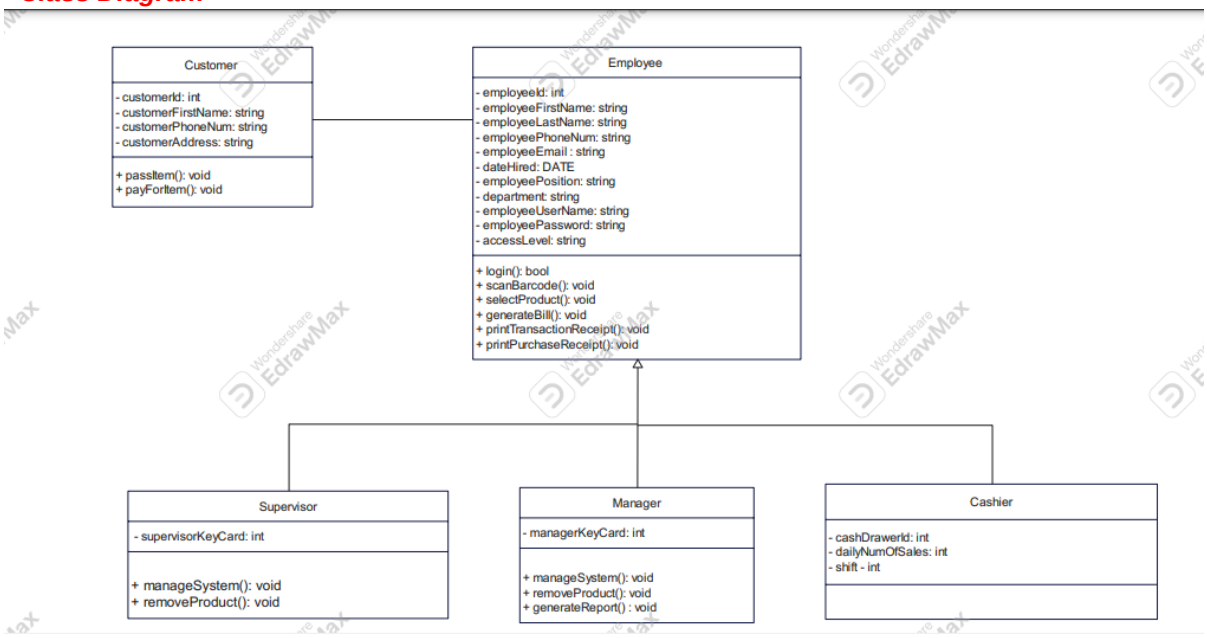

Figure 18: Point-of-Sale (POS) System Class Diagram

<Database Design (3NF)>

Database Design (3NF)

Relational Notation

Customer (customerId, customerFirstName, customerLastName, customerPhoneNumber, customerAddress)

Item (itemCode, itemName, quantity, price)

Purchase History (customerId, itemCode, tax, discount)
*FK customerId references Customer(customerId)
*FK itemCode references Item(itemCode)

Employee (employeeId, employeeFirstName, employeeLastName, employeePhoneNumber, employeeEmail, dateHired, employeePosition, department, employeeUserName, employeePassword, accessLevel)

Supervisor (employeeId, supervisorKeyCardNumber)
*FK employeeId references Employee(employeeId)

Cashier (employeeId, cashDrawerId, dailyNumberofSales, shift)
*FK employeeId references Employee(employeeId)

Manager (employeeId, managerKeyCardNumber)
*FK employeeId references Employee(employeeId)

Figure 19.1: Point-of-Sale (POS) System Class Diagram

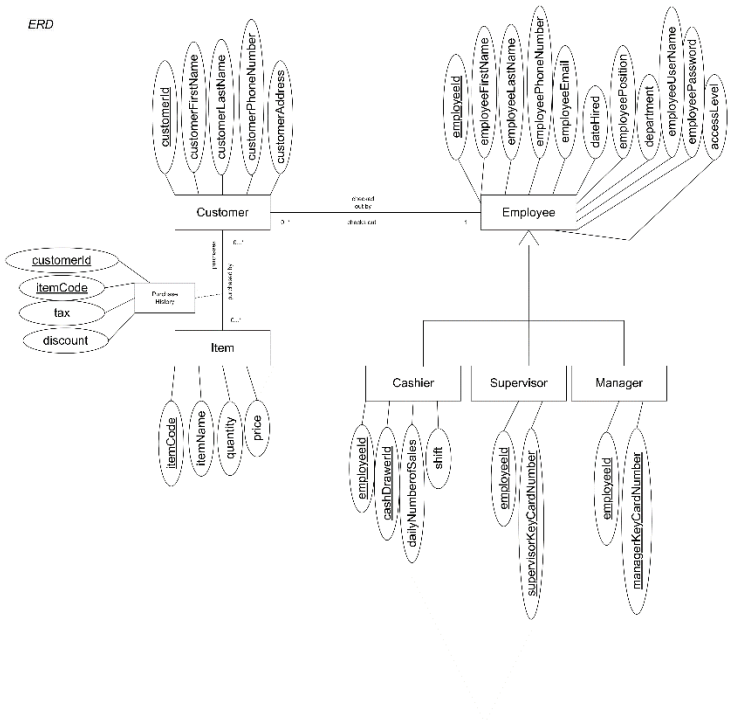

Figure 19.2: Point-of-Sale (POS) System Class Diagram