

Project Proposal

Software Engineering CS-360

Shop Management System

Group 13

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Submitted in partial fulfillment
of the requirements of a
Software Engineering course project

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Maintain version history here

VERSION 1.0.1

PROJECT PROPOSAL

VERSION HISTORY				
VERSION	APPROVED BY	REVISION DATE	DESCRIPTION OF CHANGE	AUTHOR
1.0.0		02/02/2025	Provided only basic feature description	Talha, Rayyan, Yamsheen
1.0.1		03/02/2025	Final submission	Hadeed, Walid, Talha, Rayyan, Yamsheen

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1.0 Overview

1.1. Purpose

The purpose of this project is to create a cost-effective and user-friendly Point of Sale (POS) system designed to streamline store operations, reduce manual errors, and enhance decision-making for small and medium-sized retail businesses.

Current POS solutions are often costly or lack necessary features, leading to inefficiencies and data inaccuracies. This project addresses these issues by offering a reliable, intuitive, and real-time digital system.

This project aims to meet the operational needs of small retailers, providing an efficient and affordable POS solution. Will require users to just have a simple PC setup in their shop with this app installed to use this system.

1.2. Project Scope

1.2.1. In Scope

The POS application will handle inventory management, record sales, and generate detailed reports. It will display information in a clear and user-friendly format to Managers, enabling easy access to key data for better decision-making.

- Inventory Management system
- levels of access based on role of employee
- POS system to record information surrounding sales of Products

- Display relevant Financial Data as well as creating relevant reports.
- Recording, analyzing information regarding Suppliers and Purchases

1.2.2. Out of Scope

The following features will not be included in our application:

- recording of employee data: attendance, shifts
- recording of customer data: loyalty points, repeat customers
- automatic reordering when stock is low

1.3. Project description

1.3.1. Project Goals and Objectives

The main goal is to create an intuitive, reliable and cost-friendly POS solution that removes tedious tasks, cuts down on errors and elevates efficiency in routine store activities.

Objectives:

1. Increase Data Transparency and Accuracy

Reduce errors brought on by manual entry by keeping sales and inventory information current in real time. Using a central dashboard, provide rapid access to important facts to expedite decision-making.

2. Streamline Workflows

By recording sales, stock changes, and employee actions in a single digital system, you can do away with paper-based procedures. Allow employees to focus more on improving store management and customer service.

3. Put User-Friendliness First

Provide a simple user interface that requires less training to use for both new and current staff. Put role-based controls into place to ensure that only authorized users may access private features like financial reporting and pricing.

4. Enable better Decision-Making

Help owners recognize top-selling products, pinpoint trends and address inefficiencies quickly. Provide detailed reports on sales, inventory turnover as well as staff performance.

Intended Users and Stakeholders are store employees: Cashiers, inventory handlers and floor managers who need a reliable system for their everyday tasks as well as Business Owners and Managers: Individuals seeking timely data on store performance , which they will then use to guide strategy and resource allocation.

Advantages Compared to Existing Solutions:

1. Lower Cost Without Compromising Features – Provides essential POS functionalities at a fraction of the cost of enterprise solutions, making it ideal for small and medium-sized businesses..
2. User-Friendly and Easy to Implement – Designed with an intuitive interface that requires minimal training, reducing onboarding time for employees and ensuring quick adoption.

Deployment and Potential Customer Base: Ideal for local convenience stores, single-outlet retailers and small family-run businesses looking for practical but robust POS functionalities but is a complete shop management system.

1.3.2. Business Drivers

Business Driver #1: Human error and manual procedures

Problem: A lot of small businesses record sales and manage inventory using antiquated software or paper-based techniques, which frequently results in errors, time-consuming data entry, and trouble tracking real-time information.

The answer is to offer a POS module that is integrated, automated, and records sales transactions while updating inventory in real time. This minimizes errors, cuts down on human data entry, and provides instant access to vital operating information.

Business Driver #2: There is a need of an Affordable POS Solution

Issue: Many existing commercial POS solutions are expensive to acquire and maintain. They often include features irrelevant to businesses which leads to unnecessary complexity and costs.

Solution: Develop a lightweight, open-source or relatively low-cost platform that offers complete POS functions. Compared to the similar systems with the same features, it will be relatively cheaper compared to the other options people have. It has a modular nature that allows incremental enhancements and simplifies maintenance. This makes it an economical option for businesses.

Business Driver #3: Inadequate Reporting and Analysis of Sales

Problem: Shop owners and managers are unable to determine which items are selling best and which promotional tactics are working without comprehensive sales information. Making strategic decisions is hampered by this lack of understanding.

Answer: By using tools that produce sales reports on a daily, weekly, and monthly basis, highlighting top-selling items, stakeholders are empowered by these reports to make data-driven choices about pricing and product placement.

Business Driver #4: Absence of Access Controls Based on Roles

Problem: All staff members in many small businesses use the same login credentials, which presents a security concern and makes it challenging to monitor each employee's actions and accountability.

Answer: Design a role-based access control system with distinct login credentials for every user. By defining permissions, administrators may make sure that only authorized workers can access critical functionality (such as changing prices or creating financial reports).

Business Driver #5: Inefficient Inventory Tracking (most important one)

Issue: Shops often struggle with stockouts, overstocking as well as misplaced items due to limited visibility of current inventory status, which results in lost sales opportunities and wasted storage space.

Solution: Implement a robust inventory management feature that monitors stock levels, sends reorder alerts when inventory is low and generates reports for efficient restocking decisions. This will optimize storage space and prevent lost sales.

1.3.3. Features

- Feature 1: User Login & Role Based Access Levels

Description: Allow users to log in using their credentials, The admin can add more users and assign them credentials. We will implement authorization and authentication using either JSON Web Tokens or APIs.

- Feature 2: Main Dashboard

Description: For easy viewing and access of different stats, reports and other pages. Will be implemented ourselves.

- Feature 3: POS System

Description: Allow sale of added products directly from the management system. It will allow adding products using code/name, will calculate total including GST/Discounts etc. Will be implemented ourselves.

- Feature 4: Payment System

Description: Allow cash payment and card payments. (Extra feature: Actually do authentication and integration with card machines.) Card option will just be add card number manually etc. Will be implemented ourselves, may use APIs if we add the debit card integration.

- Feature 5: Receipt Generation:

Description: Will give option to generate a pdf receipt for the sale. TBD using API for pdf generation.

- Feature 6: Product Management:

Description: List all the products added to the system, allow addition of new products, removal of products, changing stock, create new categories, brands etc. (Extra Feature: Allow extraction of all products into a csv file and allow addition of products using a csv file) To be implemented ourselves.

- Feature 7: Purchases Management

Description: Also allow management of purchases made by the shop. Will integrate with the products part to add these to the products. Will show details of payments and whether they have been completed.

Option for addition of purchases. Will also show details of suppliers, their contact details, location etc.

(Extra feature: allow addition of previous purchases through a csv file) To be done ourselves with integration with a database.

- Feature 8: Sales overview and management

Description: Gives info about all of the sales done including info about the amount of sale, the payment status either paid or pending, name of the worker who carried out the sale. Also date and serial number of the purchase. Just like purchases there could be an option to add sales from csv files or just directly in case of sales made without using the POS system. Filter sales by date range, worker, payment status, or amount. Sort sales by date, highest/lowest amount, or unpaid first. Also calculate employee's commission based on their sale. To be implemented ourselves.

- Feature 9: User details

Description: Allow admin to manage users/ employees, manage their access levels, view their contact details. Will also allow admins to add new accounts with access to the POS system. To be implemented ourselves.

- Feature 10 Settings section

Description: Settings section to allow management of user roles, shop features such as logo, phone number etc (maybe to display on receipt. Can be used to change privileges. To be implemented ourselves.

- Feature 11: Extensive Stats

Description: Show details of all stats of the shop in a selected time range Such as profits, amount spend, revenue, best selling items etc. Will also show graphs of different useful stats for easy visual understanding of the user. TBD ourselves or maybe get some help form API for graph generation/

- Feature 12: Report Generation

Description: Allow generation of reports in pdf form. Such as sales report, purchase report, best selling items, revenue generation etc. Use an API for this to generate reports from the data.

- Feature 13 : Promotion/Sales Management

Description: Allow Promotions and sales on items. Promotions could include giving discounts on items, bundles leading to less per unit price. Also could give away some promotional items for free if the customer buys products worth higher than a amount chosen. To be implemented ourselves.

- Feature 14: Employee Tracking

Description: Will log actions like sales, stock changes, and price updates in a database table with details such as employee ID, action performed, timestamp, and affected data. An admin dashboard will allow managers to view, filter, and sort logs by employee, date, or action type. This can be implemented using database triggers or explicit logging in the code.

- Extra Feature: AI to provide advice

Description: Integrate AI to help manage the shop by looking at the reports. Will suggest what items to get more of for the next month and what items to not get looking at sales trend of previous data. Will use API to integrate AI

- Extra Feature: Loan System

Description: Loan or Khata system is very common in the country and most POS system do not have this option. This will allow the admin to add users who are allowed to buy based on their 'khata'.

- Extra Feature: Sale notification

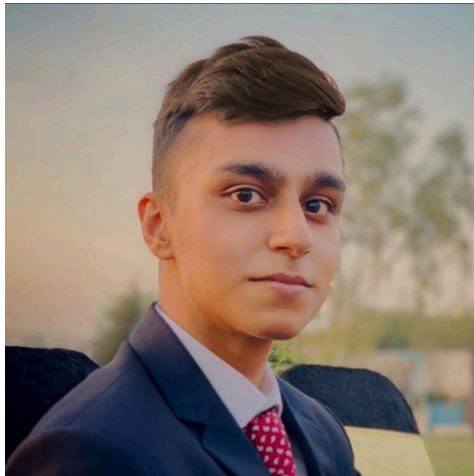
Everytime a sale is made a notification of the sale would be sent to the admin/owner of the store. We would use an API for this.


- Extra feature: Digital Receipts


An option of digital receipts would be given instead of the paper receipts to avoid paper usage. The receipt would either be emailed or sent to the customer via SMS depending on the customer's preference. We would use APIs to implement this feature.


1.4. Team profile


Profile card:

Name: Muhammad Rayyan Khan	
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Interests and strengths: web development	

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Name: Muhammad Talha	
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Interests and strengths: Networks and System	

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Interests and strengths: AI, Networks, Team Management	

1.4.1 Expertise in a specific tool

<If one of your team members has expertise in a particular tool/technology (relevant to the SE course e.g. Github, Slack, AWS, etc.) and would like to present, please mention here. You can list multiple tool and give your priority>

1.5. Assumptions and Constraints

Assumptions:

1. ***Designed for Small to Medium Businesses*** – The system is intended for local retailers, convenience stores, and family-run businesses, assuming their operational requirements align with the provided features.
2. ***Users Have Basic Technical Knowledge*** – Assumes store employees and managers can operate a digital POS system with minimal training.
3. ***Scalability for Future Enhancements*** – The system is designed to allow future updates and feature expansions based on business growth.

Constraints:

1. ***Budget and Resource Constraints*** --To keep costs low, enterprise-level features and extensive third-party integrations will be excluded. Development will focus on core functionalities over advanced customizations.
2. ***Limited Inventory Data and Item Recognition*** -- The system relies on store owners manually inputting product details, which may lead to incomplete or inconsistent inventory data.

(Barcode integration is assumed, but some small businesses may lack barcodes for all products, requiring manual entry.)

3. **Security and Compliance Limitations** -- While basic security measures (such as username/password) will be included, advanced security features like fraud detection or biometric authentication may require additional investment.

1.6. Project Deliverables

Deliverables include

- Software Project Proposal
- Requirement Specifications
- Design Specifications
- Development Plan
- Test plan
- Demo + source code
- Final document
- Final presentations (showcase)

2.0 Project Organization

TA - Maira Kamal

Teaching Fellow - Niaz Ahmad

3.0 References

<https://www.businessnewsdaily.com/10449-time-saving-pos-reports.html>

<https://steveondigital.com/small-businesses-need-data-analysis/>

4.0 Definitions

<Insert here any technical word for which the meaning may not be known. Do not assume that the readers have specialized knowledge in the *application*. Use a table format for these. >

<Word 1>	<Meaning>
<Word 2>	<Meaning>

Check next page for Marking Rubric

Marking Rubric

Total marks: 45

Component	Marks
Purpose	5
Project Scope	2+2 (in scope + out of scope)
Project Goals and Objectives	5
Business Drivers	5
Features	10
Assumptions and Constraints	2
References, Definitions, Profile and Project Organization	4
Concise and to-the-point descriptions	5
Writing Quality (Descriptions should be coherent and should covers all questions asked under the heading)	3
Following the format (as mentioned under business drivers, features, team profiles and definitions)	2