BILLING SOFTWARE

Project Report

In-House Project (BCA660)

Degree

BACHELOR OF COMPUTER APPLICATION

PROJECT GUIDE:

Mr. Varun Kuttan

Mr. Shivam Saxena

SUBMITTED BY:

Aradhya Bhardwaj (TCA2201122)
Tushar Saini (TCA2201654)

May, 2025

COLLEGE OF COMPUTING SCIENCE & IT

TEERTHANKER MAHAVEER UNIVERSITY, MORADABAD

DECLARATION

We hereby declare that this Project Report titled ***"_Billing Software_"*** submitted to the College of Computing Science & IT, Teerthanker Mahaveer University, Moradabad, is an original and authentic work carried out by us under the guidance and supervision of our project guide. This report has not been submitted, either in part or in full, to any other University or Institution for the award of any degree, diploma, certificate, or for any other purpose, nor has it been published previously.

Date:
Place: Moradabad

Project Name :	Project Name	
Student Name:	Name	Signature
Student Name:	Name	Signature
Project Guide :	Name	Signature

ABSTRACT

This project presents the development of a **Billing Software System**, a desktop-based application designed to streamline and automate the billing and inventory processes for small and medium-sized retail businesses. Developed using **Python** with a **Tkinter-based GUI** and **SQLite** as the backend database, the system comprises essential modules including the **Admin Panel**, **Customer Panel** (used by Cashiers), **billing system**, **product management**, and **sales analytics**.

The software enables administrators to efficiently manage products, monitor inventory, generate reports, and oversee sales data, while cashiers can create and print itemized customer bills with integrated **QR codes** for quick digital verification. It also supports **PDF generation** of bills and sales summaries for seamless record-keeping. Designed with usability, reliability, and performance in mind, the software minimizes manual errors, accelerates the billing workflow, and ensures secure, role-based access. Its modular structure and offline functionality make it a practical, scalable, and cost-effective solution for retail businesses aiming to digitize their operations with minimal infrastructure.

Acknowledgement

We would like to express our heartfelt gratitude to all those who supported and guided us throughout the development of this project titled **"Billing Software: A Retail Billing and Inventory Management System."**

We extend our sincere thanks to **Prof. Dr. Rakesh Kumar Dwivedi**, Dean/Principal (CCSIT), for providing us with the necessary infrastructure and academic environment to undertake this project successfully.

We are deeply grateful to **Dr. Shambhu Bhardwaj**, Head of Department (CCSIT), whose support and encouragement played a vital role in shaping this project.

Our special thanks to **Dr. Harjinder Singh**, Program Coordinator (BCA), for his valuable insights and motivation during the entire duration of the project.

We are especially thankful to our **Project Guide, Mr. Varun Kuttan**, for his continuous guidance, expert advice, and constructive feedback that helped us refine and improve our project at every stage.

Finally, we thank our peers, faculty members, and the entire CCSIT community for their encouragement, suggestions, and technical support. This project has been an enriching experience and a significant step in our academic and professional journey.

Lastly, we express our appreciation to all open-source library and tool contributors whose work made development smoother and more efficient.

Student Name:-	Aradhya Bhardwaj
Student Name:-	Tushar Saini

Table of Contents

1 Project Title

Billing Software: A Retail Billing and Inventory Management System

The project titled “Billing Software: A Retail Billing and Inventory Management System” focuses on delivering a desktop-based software solution to digitize and automate the retail billing and inventory process. It is designed for small and medium-sized businesses to overcome the limitations of traditional manual systems and expensive enterprise software solutions.

- **Target Audience:** Small and medium retail businesses
- **Deployment Environment:** Desktop (Windows)
- **Key Technologies:** Python, SQLite, Tkinter

2 Problem Statement

Despite the growing digitization of commerce, many retail businesses—especially smaller ones—still depend on outdated manual billing and inventory practices. These methods are often inefficient and prone to errors.

Challenges faced include:

- **Human Error**: Manual calculations can result in wrong billing and mismatched inventory.
- **Data Mismanagement**: Paper records or spreadsheets offer no analytics.
- **Cost Prohibitive Solutions**: Most modern ERP systems are expensive and complex.

To address these challenges, this project proposes an easy-to-use, standalone billing and inventory management system that delivers:

- Precise calculations and real-time stock updates.
- Sales insights via data visualizations.
- Secure and accessible interfaces for admins and staff.

3 Project Description

The Billing Software is a GUI-based Python application intended for local deployment in retail environments. Its primary goal is to streamline and automate core retail functions like billing, inventory tracking, reporting, and analytics.

It uses:

- **Tkinter** for GUI development.
- **SQLite** for local data storage.
- **Python Libraries** for additional features (PDF export, QR codes, etc.).

This software provides a user-friendly experience through clear navigation, categorized product panels, and intuitive data entry forms.

Features include:

- One-click billing with QR codes.
- Admin login for security.
- Graph-based analytics dashboard.
- PDF bill and report generation.

Key Highlights:

- Offline capable and resource-efficient.
- No internet dependency.
- Simple to install and operate.

3.1 Scope of the Work

This section outlines the features that fall within and outside the scope of the software.

In-Scope:

- ✧ **Inventory Control**: Admins can add, update, delete, and categorize products, ensuring accurate stock management.
- ✧ **Customer Billing Interface**: Facilitates product selection, cart management, total calculations (including taxes and discounts), and bill generation with embedded QR codes.
- ✧ **Admin Controls**: Secure login mechanisms, user management, and comprehensive report generation.
- ✧ **Sales Analytics**: Graphical dashboard displaying sales trends, top-performing products, and revenue metrics.
- ✧ **Data Export**: Generation of PDF reports for bills, inventory summaries, and sales activities.
- ✧ **Date Filters**: Extraction of sales data within specific timeframes for precise analysis.
- ✧ **Graphical Dashboard**: Visual representation of KPIs such as total sales, stock levels, and category-wise revenue.

Out-of-Scope:

- ✧ **Real-Time Online Access**: The system is designed for standalone, desktop-based operation without cloud synchronization.
- ✧ **Payment Gateway Integration**: Assumes transactions are settled externally and does not include built-in payment processing capabilities.
- ✧ **Mobile Compatibility:** Only desktop platforms are supported.

3.2 Project Modules

The software consists of several interlinked modules.

- ✧ **Homepage**:
  - ❖ Landing screen with navigation to major modules.
  - ❖ UI designed for first-time users.
- ✧ **Login System**:
  - ❖ Validates admin credentials.
  - ❖ Prevents unauthorized access.
  - ❖ Feedback messages on login attempts.
- ✧ **Customer Billing Panel**:
  - ❖ Users select items and input quantities.
  - ❖ Auto calculation of prices and discounts.
  - ❖ Option to print or save bills.
- ✧ **Admin Panel**:
  - ❖ Product inventory management.
  - ❖ CRUD operations on item database.
  - ❖ Export options for reports.
- ✧ **Analytics Dashboard**:
  - ❖ Charts and summaries created using Matplotlib and Pandas.
  - ❖ Identify peak hours, best-sellers, and revenue comparisons.

- **About Page**:
    - Describes application goals.
    - Developer contact and version details.

3.3 Context Diagram (High Level)

Inputs:

- **Admin Inputs**: Login credentials, product details, and inventory updates.
- **Customer Inputs**: Product selection and quantities during billing.
- **System Inputs**: Queries for generating reports or analytics based on user-defined filters.

Outputs:

- **Customer Outputs**: Printed or digital bills with QR codes, including detailed cost breakdowns.
- **Admin Outputs**: Graphical dashboards displaying sales analytics, inventory summaries, and billing logs.
- **System Outputs**: Exported PDF reports and log files for auditing purposes.

External Entities:

- **Admin**: Manages inventory, generates reports, and analyzes sales data.
- **Customer**: Engages with the billing interface to complete purchases.
- **SQLite Database**: Stores all transactional and inventory data.

4 Implementation Methodology

Project adhered to a modular Software Development Life Cycle (SDLC) methodology.

✧ **Planning**:

- ✓ Surveys conducted with small shop owners.
- ✓ Key challenges identified.

✧ **Design**:

- ✓ UI wireframes, DFDs, and ERDs created.
- ✓ Designed for ease of use and clarity.

✧ **Development**:

- ✓ Python 3.11 used with VS Code IDE.
- ✓ Modular functions and reusable classes implemented.

✧ **Testing**:

- ✓ Unit and integration testing.
- ✓ Edge cases tested (invalid inputs, missing data).

✧ **Deployment**:

- ✓ Packaged using cx_Freeze.
- ✓ Compatible with Windows and Linux.

✧ **Documentation**:

- ✓ User manual and technical guide written.
- ✓ Inline comments in code.

5 Technologies to be used

5.1 Software Platform

- ✧ **Python 3.11:** Core programming language.
- ✧ **Tkinter:** For GUI development.
- ✧ **SQLite:** For lightweight, file-based data storage.
- ✧ **VS Code:** IDE for development.
- ✧ **GitHub:** Repository and version control.

5.2 Hardware Platform

- ✧ **RAM:** 4 GB minimum (8GB recommended)
- ✧ **Storage:** 500GB HDD/SSD
- ✧ **OS:** Windows 10/11
- ✧ **Display:** 1366x768 resolution or higher.

5.3 Tools, if any

- ✧ **FPDF:** Used for creating PDF documents.
- ✧ **OpenCV:** Enables QR code reading functionality.
- ✧ **qrcode:** Used to generate QR codes on receipts.
- ✧ **Matplotlib & Pandas:** For creating analytics visuals and handling data.
- ✧ **tkcalendar:** Implements date pickers for filtering data.

6 Advantages of this Project

This section outlines the benefits of using the Billing Software over traditional methods or commercial solutions.

- ✧ **Error Reduction in Billing**: Automates calculations, eliminating manual errors.
- ✧ **Flexible Inventory Management**: Allows dynamic inventory adjustments.

- ✧ **Offline Functionality**: Operates without internet connectivity.
- ✧ **User-Friendly Design**: Intuitive GUI reduces the learning curve.
- ✧ **Actionable Data Insights**: Provides graphical analytics for informed decision-making.
- ✧ **Enhanced Security**: Secure login system protects business data.
- ✧ **Multi-Category Support**: Organizes products into categories for efficient management.
- ✧ **Cost-Effective Solution**: Built using open-source technologies, reducing costs.
- ✧ **QR Code Integration:** Integrated QR Code generation for each bill to enable quick digital access and verification.

7 Assumptions, if any

To ensure the effectiveness and proper functioning of the system, several key assumptions have been made:

- ✧ The user operating the software has basic computer literacy and is comfortable navigating desktop applications.
- ✧ The system is assumed to run on a single machine in a standalone environment.
- ✧ The administrator will regularly update product and stock details.
- ✧ Users are expected to perform data backups periodically.
- ✧ In case of power outages, manual receipts will be temporarily used.

These assumptions form the foundation upon which the application's simplicity, efficiency, and design decisions were based.

8 Future Scope and further enhancement of the Project

The project has room for significant upgrades in future iterations. Proposed enhancements include:

- ✧ **Online Payment Integration:**
  - ✓ Include payment gateways for real-time transactions.
  - ✓ Support for UPI, credit/debit cards.
- ✧ **Web-Based Dashboard**:
  - ✓ Access inventory and reports from remote branches.
  - ✓ Real-time syncing through a centralized database.
- ✧ **Mobile App Extension**:
  - ✓ Admins can track sales via mobile.
  - ✓ Salesmen can perform billing via smartphones.
- ✧ **Multilingual Interface:**
  - ✓ Support regional Indian languages.
  - ✓ Improve accessibility for non-English users.
- ✧ **Intelligent Analytics**:
  - ✓ Suggest stock refill schedules based on sales trends.
  - ✓ Predict future demands using AI models.
- ✧ **Role-Based Access**:
  - ✓ Allow cashier/staff logins with restricted permissions.
  - ✓ Monitor employee activity.

These enhancements will make the system scalable and aligned with modern retail expectations.

9 Project Repository Location

The entire project, including source code and documentation, is hosted on GitHub.

✧ **URL:** https://github.com/AradhyaBhardwaj/Billing-Software

Repository contains:

- Source code files
- ERD, DFD, and UCD diagrams
- Installation guide
- Sample outputs and test case.

10 Definitions, Acronyms, and Abbreviations

Abbreviation	Description
ERP	**Enterprise Resource Planning**
GUI	**Graphical User Interface**
QR CODE	**Quick Response Code used in bills**
SQLite	**Lightweight Database Management System**
Pandas	**Python library for Data Analysis**
Matplotlib	**Python plotting library**
FPDF	**PDF document generation library**
KPI	**Key Performance Indicator**
IDE	**Integrated Development Environment**
API	**Application Programming Interface**

11 Conclusion

In conclusion, this project successfully meets its goal of simplifying retail billing and inventory operations through a well-structured, user-friendly desktop application. It not only solves the inefficiencies of manual systems but also empowers business owners with smart analytics and robust inventory tools.

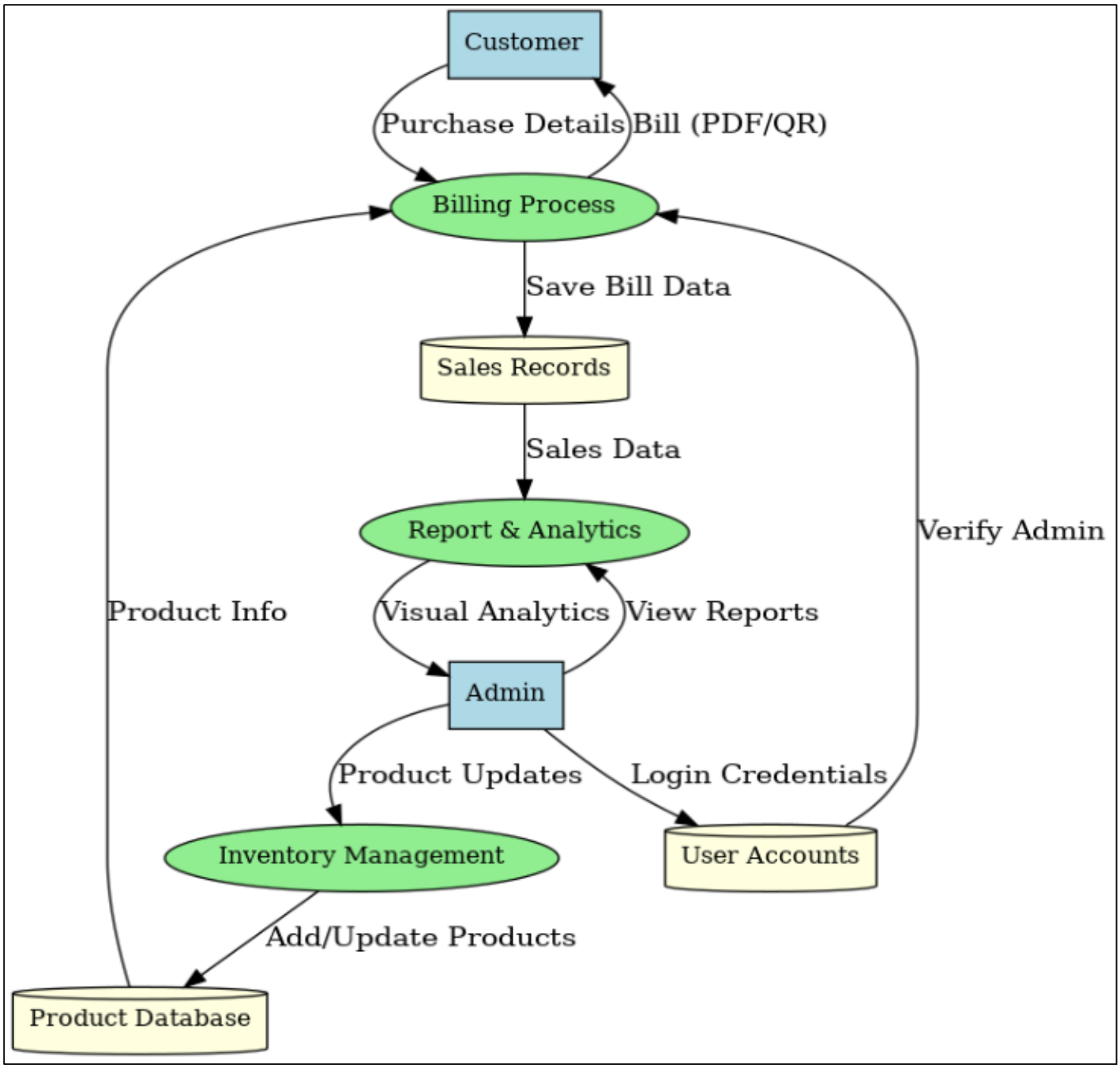
- ✧ It is designed with simplicity at its core.
- ✧ Functionality and scalability have both been prioritized.
- ✧ The project demonstrates practical application of core programming and UI/UX principles.

As retail demands grow, this software can evolve into a full-fledged POS solution with cloud support, mobility, and advanced reporting. With its modular architecture and solid foundation, future upgrades can be implemented with minimal disruption.

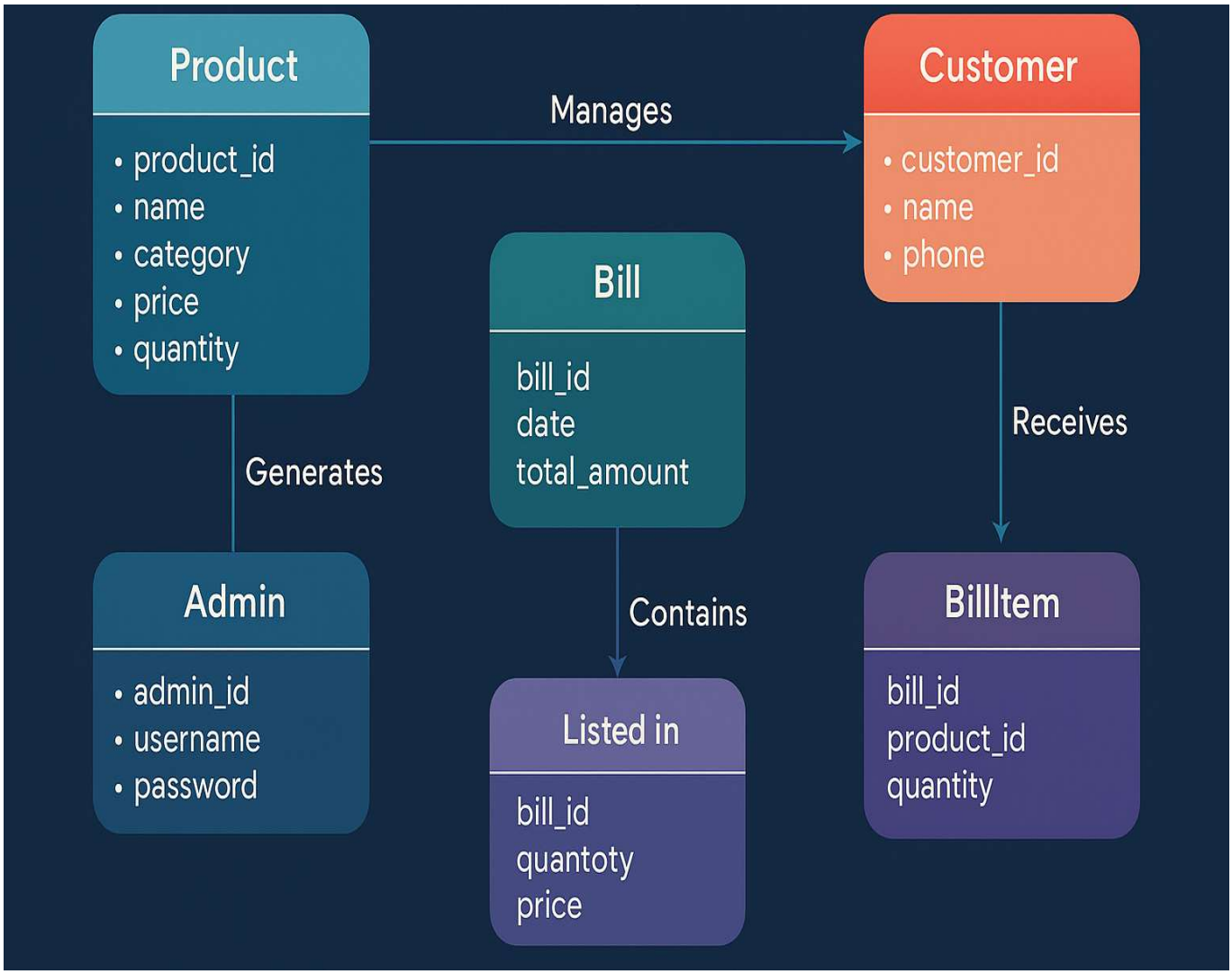
12 References

- ✧ **Python Software Foundation. Python. Available at:** https://www.python.org
- ✧ **SQLite. Lightweight Database. Available at:** https://www.sqlite.org
- ✧ **Tkinter Library Documentation. Available at:** https://docs.python.org/3/library/tkinter.html
- ✧ **Matplotlib Documentation. Available at:** https://matplotlib.org
- ✧ **Pandas Documentation. Available at:** https://pandas.pydata.org
- ✧ **FPDF Library. PDF Documents. Available at:** http://www.fpdf.org
- ✧ **OpenCV Official Site. Available at:** https://opencv.org
- ✧ **qrcode PyPI Page. Available at:** https://pypi.org/project/qrcode
- ✧ **GitHub Project Repository. Available at:** https://github.com/AradhyaBhardwaj/Billing-Software

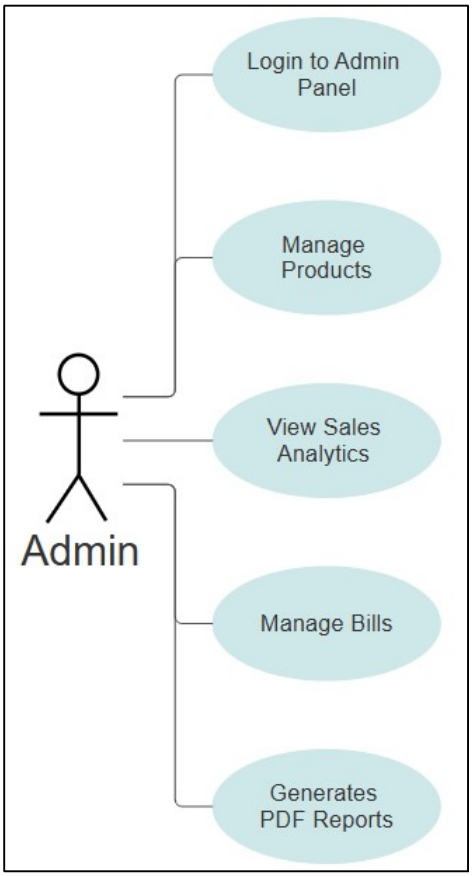
13 Annexure A
Data Flow Diagram (DFD)

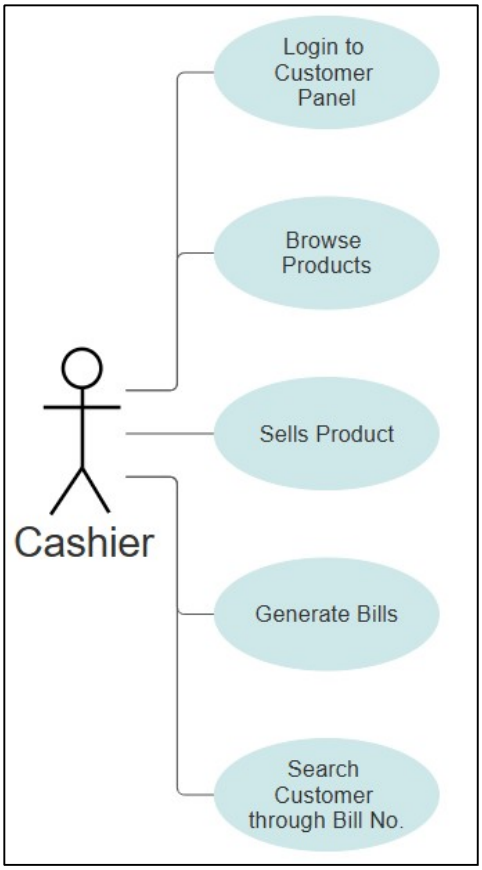


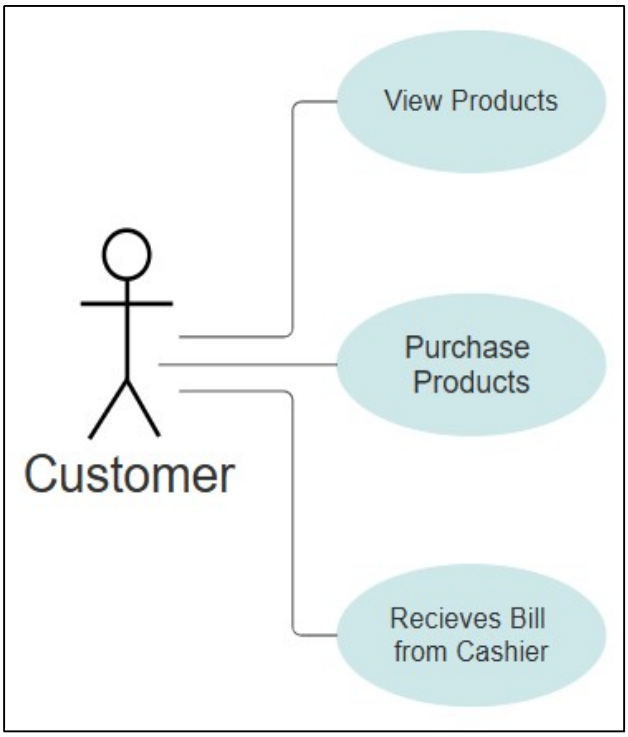
Annexure B
Entity-Relationship Diagram (ERD)



Annexure C
Use-Case Diagram (UCD)







Annexure D
Data Dictionary (DD)
(Mandatory)

Admin Table:-

Field Name	Data Type	Description	Constraints
admin_id	INT	Unique ID of the administrator	Primary Key, Auto Increment
username	VARCHAR(50)	Login name of the admin	Unique, Not Null
password	VARCHAR(100)	Hashed password of the admin	Not Null

Customer Table:-

Field Name	Data Type	Description	Constraints
customer_id	INT	Unique identifier for a customer	Primary Key, Auto Increment
name	VARCHAR(100)	Name of the customer	Not Null
phone	VARCHAR(15)	Customer's contact number	Unique, Not Null

Product Table:-

Field Name	Data Type	Description	Constraints
product_id	INT	Unique identifier for a product	Primary Key, Auto Increment
name	VARCHAR(100)	Name of the product	Not Null
category	VARCHAR(50)	Type/category of the product	Not Null
price	DECIMAL(10,2)	Unit price of the product	Not Null, ≥ 0
quantity	INT	Available stock quantity	Not Null, ≥ 0

Bill Table:-

Field Name	Data Type	Description	Constraints
bill_id	INT	Unique identifier for each bill	Primary Key, Auto Increment
customer_id	INT	ID of the customer (FK)	Foreign Key → Customer(customer_id)
admin_id	INT	ID of the admin who created the bill	Foreign Key → Admin(admin_id)
date	DATE	Date of bill creation	Not Null
total_amount	DECIMAL(10,2)	Total bill amount	Not Null, ≥ 0

Bill Item Table:-

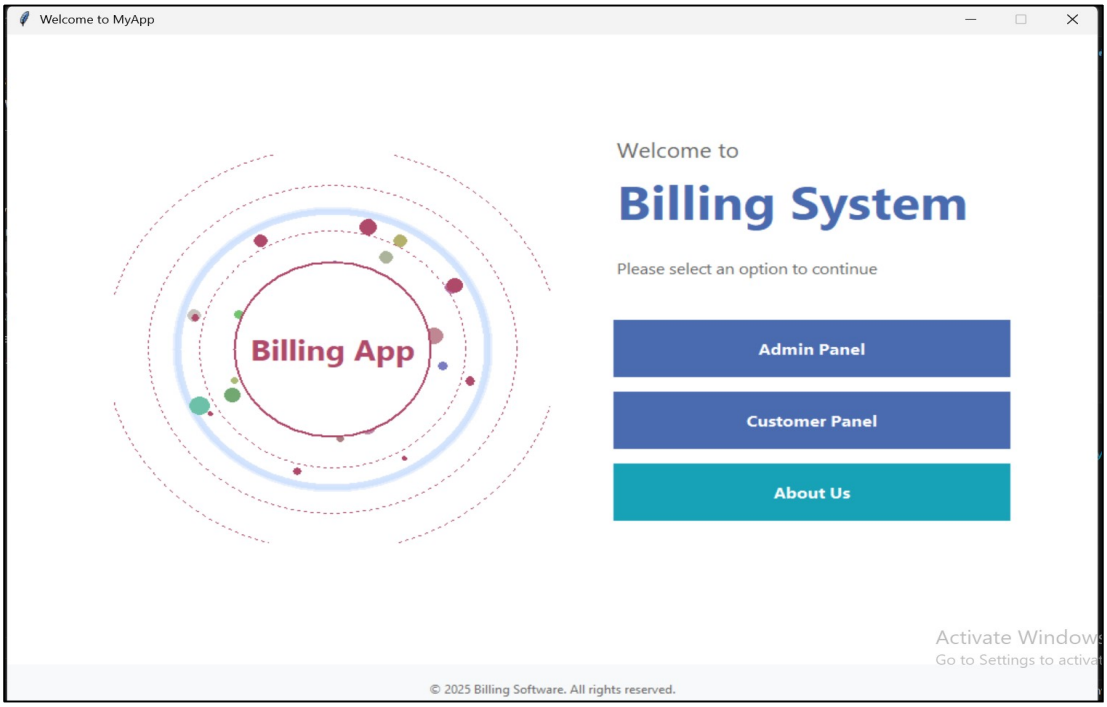
Field Name	Data Type	Description	Constraints
bill_id	INT	ID of the bill (FK)	Foreign Key → Bill(bill_id), Composite PK
product_id	INT	ID of the product (FK)	Foreign Key → Product(product_id), Composite PK
quantity	INT	Number of units sold	Not Null, ≥ 1
price	DECIMAL(10,2)	Price per unit at time of billing	Not Null, ≥ 0

◆ Notes

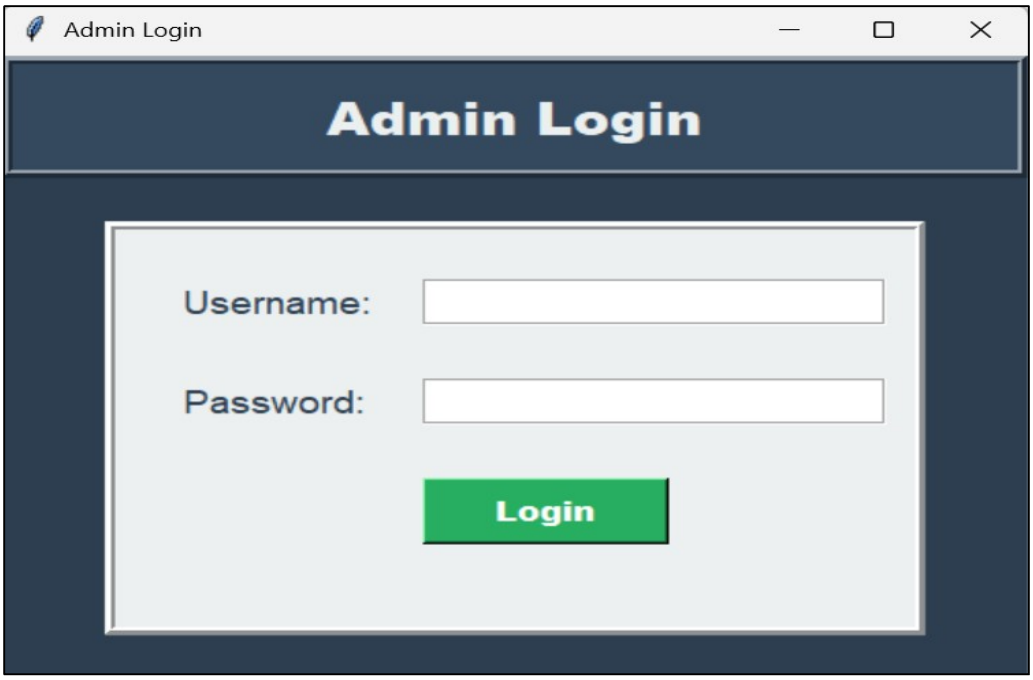
- ✧ Composite Primary Key for BillItem is (bill_id, product_id), ensuring that each product appears only once per bill.
- ✧ Foreign Key constraints maintain referential integrity between tables.
- ✧ All monetary fields use DECIMAL(10,2) to preserve accuracy in financial calculations.

Annexure E
Screen Shots

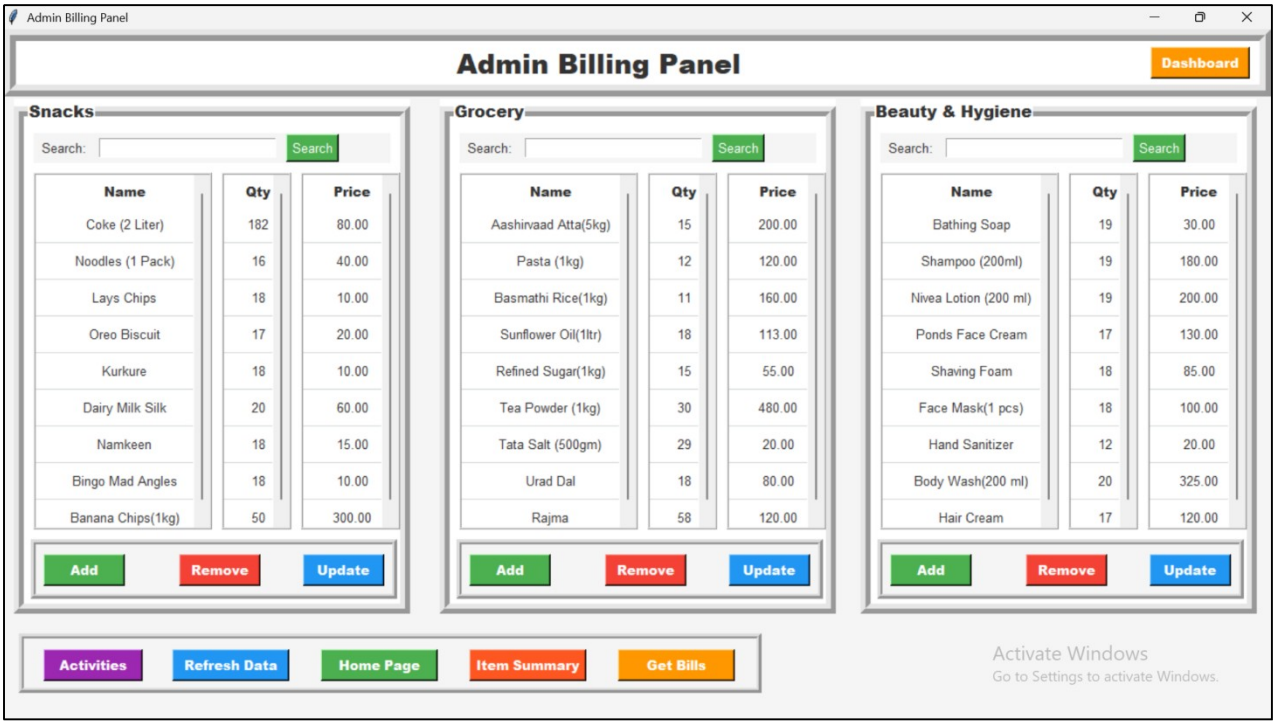
✧ Home Page (Entry Point of the Software):



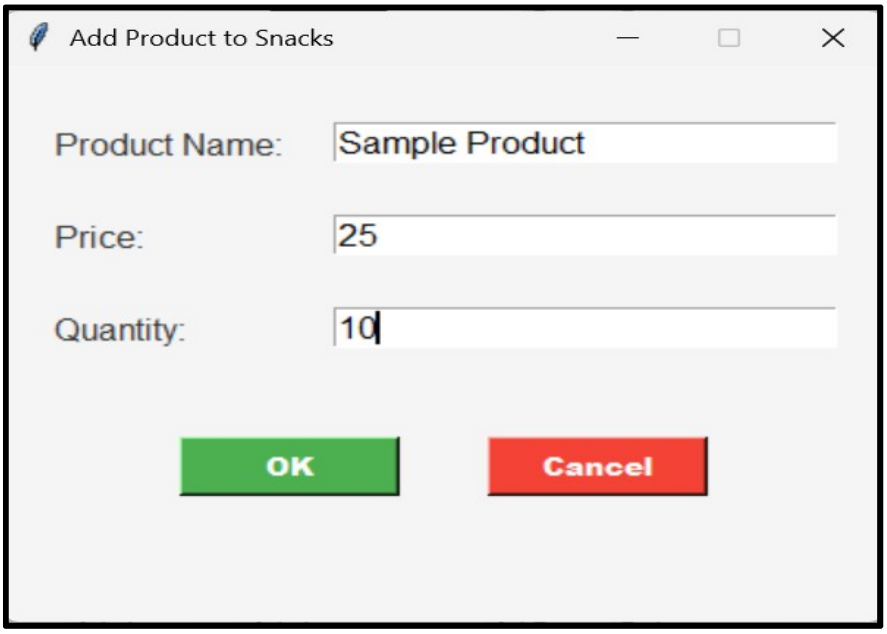
✧ Admin Login (Authentication to get in):



✧ Admin Panel:

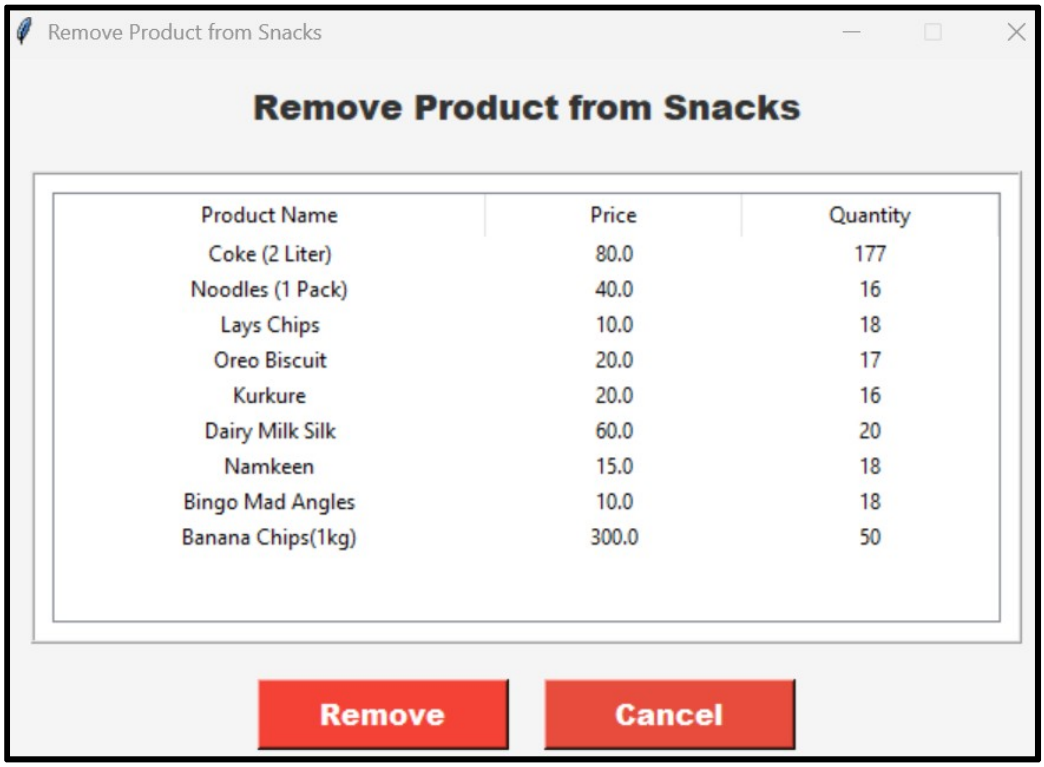


✧ Allows adding products in the product management section.



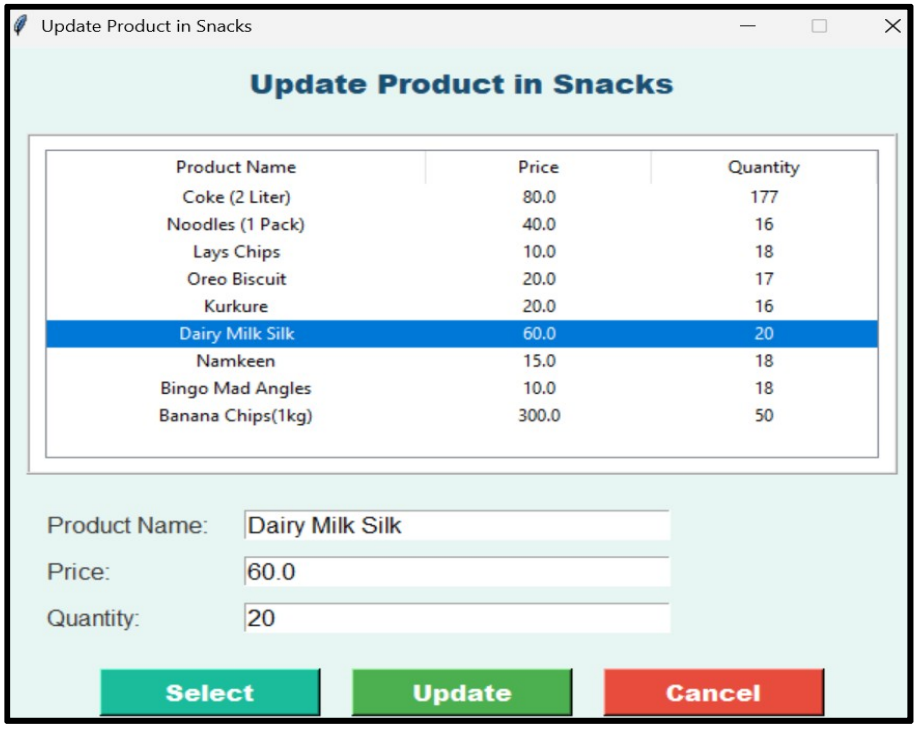
<u>For Adding new Products into their respective product section</u>

✧ **Allows removing products in the product management section.**



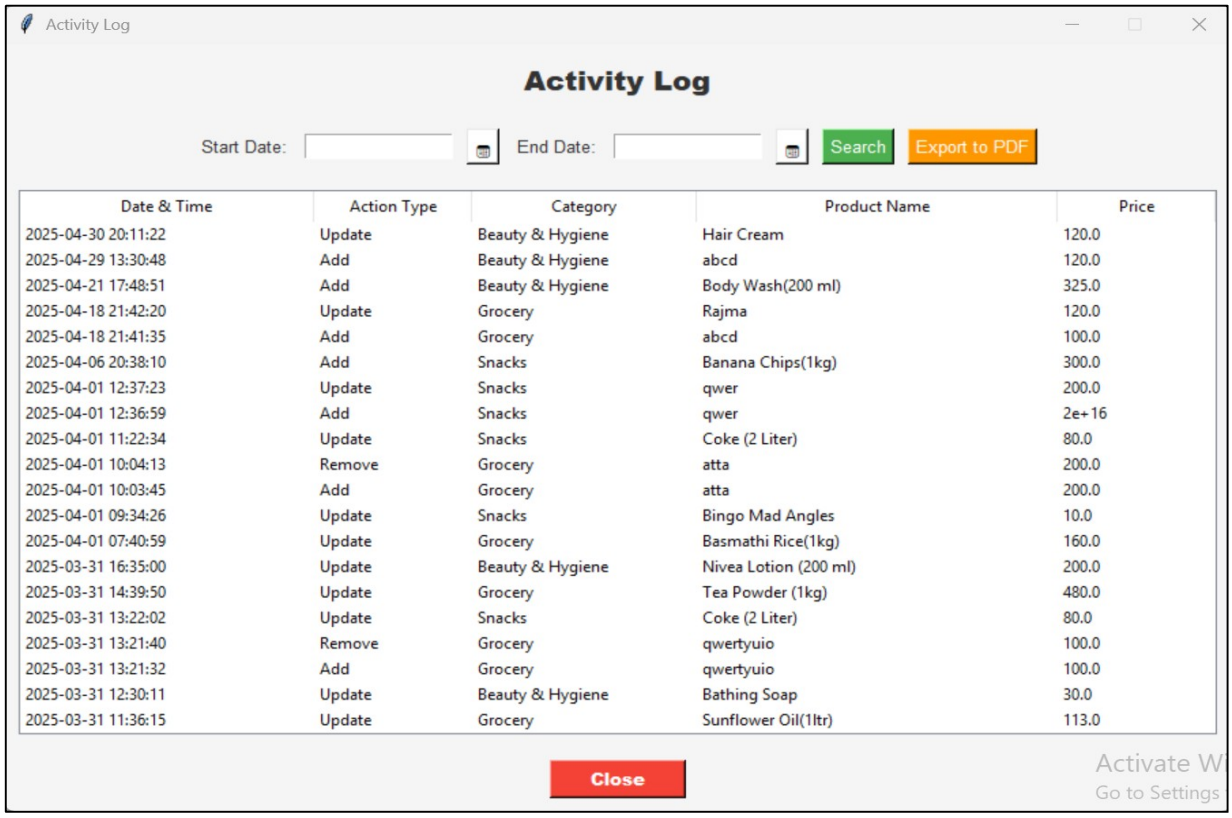
For Removing Products from their respective product section

✧ **Allows Updating products in the product management section.**



For Updating Products into their respective product section

✧ Activities (CRUD Operations done by the Admin):



Date & Time	Action Type	Category	Product Name	Price
2025-04-30 20:11:22	Update	Beauty & Hygiene	Hair Cream	120.0
2025-04-29 13:30:48	Add	Beauty & Hygiene	abcd	120.0
2025-04-21 17:48:51	Add	Beauty & Hygiene	Body Wash(200 ml)	325.0
2025-04-18 21:42:20	Update	Grocery	Rajma	120.0
2025-04-18 21:41:35	Add	Grocery	abcd	100.0
2025-04-06 20:38:10	Add	Snacks	Banana Chips(1kg)	300.0
2025-04-01 12:37:23	Update	Snacks	qwer	200.0
2025-04-01 12:36:59	Add	Snacks	qwer	2e+16
2025-04-01 11:22:34	Update	Snacks	Coke (2 Liter)	80.0
2025-04-01 10:04:13	Remove	Grocery	atta	200.0
2025-04-01 10:03:45	Add	Grocery	atta	200.0
2025-04-01 09:34:26	Update	Snacks	Bingo Mad Angles	10.0
2025-04-01 07:40:59	Update	Grocery	Basmathi Rice(1kg)	160.0
2025-03-31 16:35:00	Update	Beauty & Hygiene	Nivea Lotion (200 ml)	200.0
2025-03-31 14:39:50	Update	Grocery	Tea Powder (1kg)	480.0
2025-03-31 13:22:02	Update	Snacks	Coke (2 Liter)	80.0
2025-03-31 13:21:40	Remove	Grocery	qwertyuio	100.0
2025-03-31 13:21:32	Add	Grocery	qwertyuio	100.0
2025-03-31 12:30:11	Update	Beauty & Hygiene	Bathing Soap	30.0
2025-03-31 11:36:15	Update	Grocery	Sunflower Oil(1ltr)	113.0

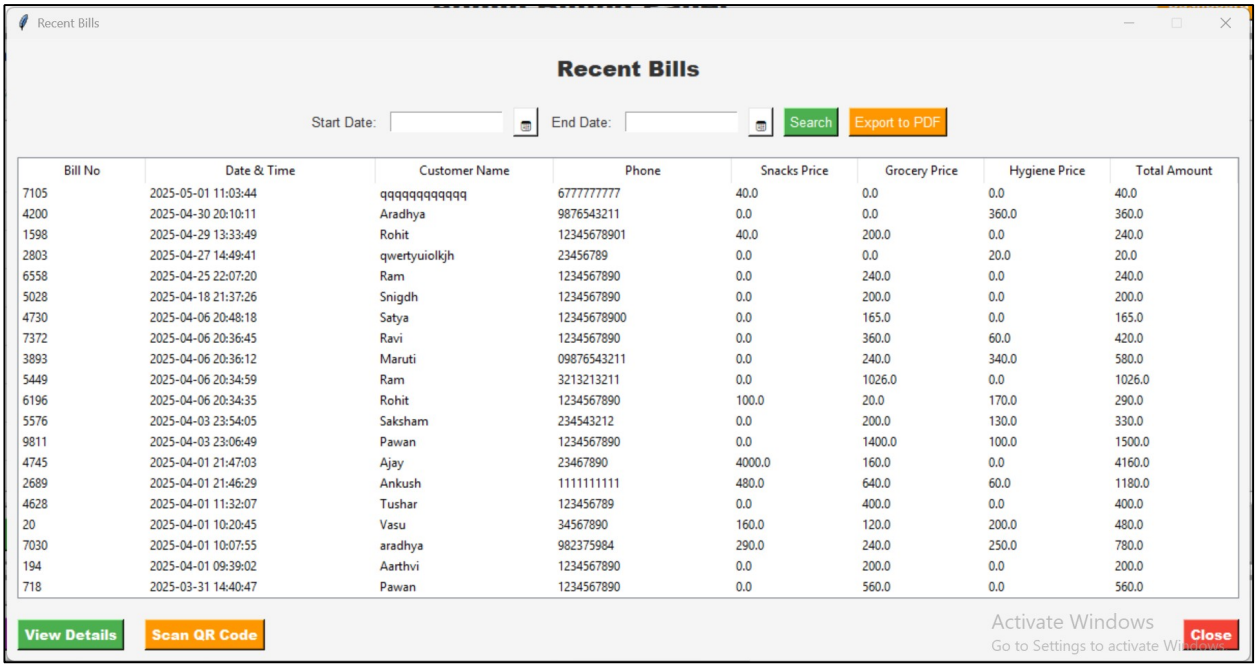
✧ Generates Activities in PDF format for printing & record-keeping (Admin only):-

Activity Log

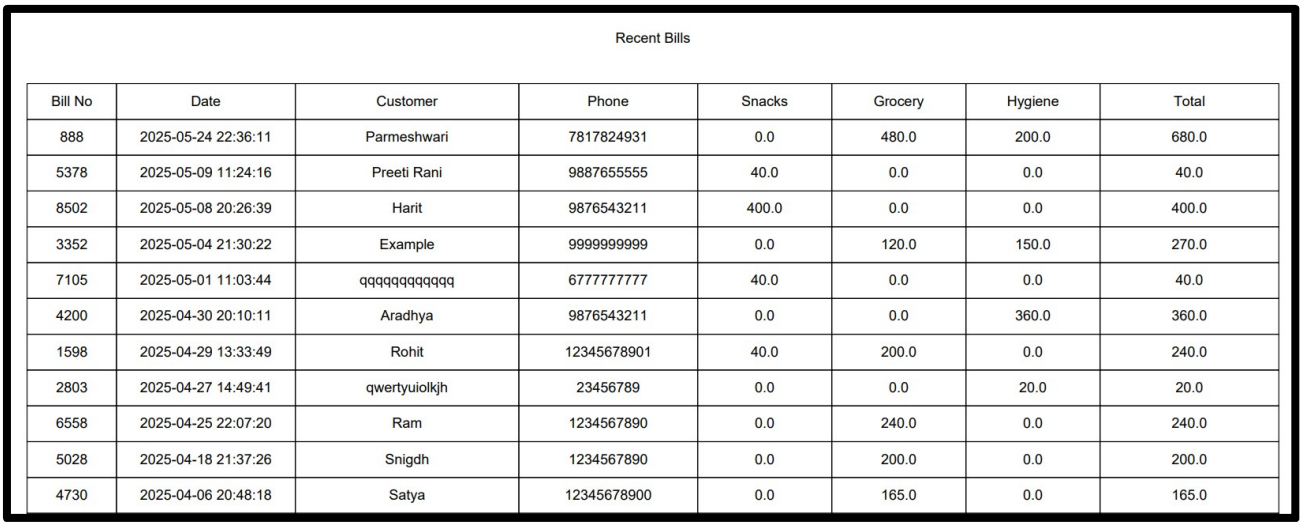
Date Range: 2025-04-24 to 2025-06-01

Date	Type	Category	Product	Price
2025-05-09 11:22:54	Update	Snacks	Kurkure	20.00
2025-04-30 20:11:22	Update	Beauty & Hygiene	Hair Cream	120.00
2025-04-29 13:30:48	Add	Beauty & Hygiene	abcd	120.00

✧ Total Bills (Admin can access bill details using the bill number and QR code):



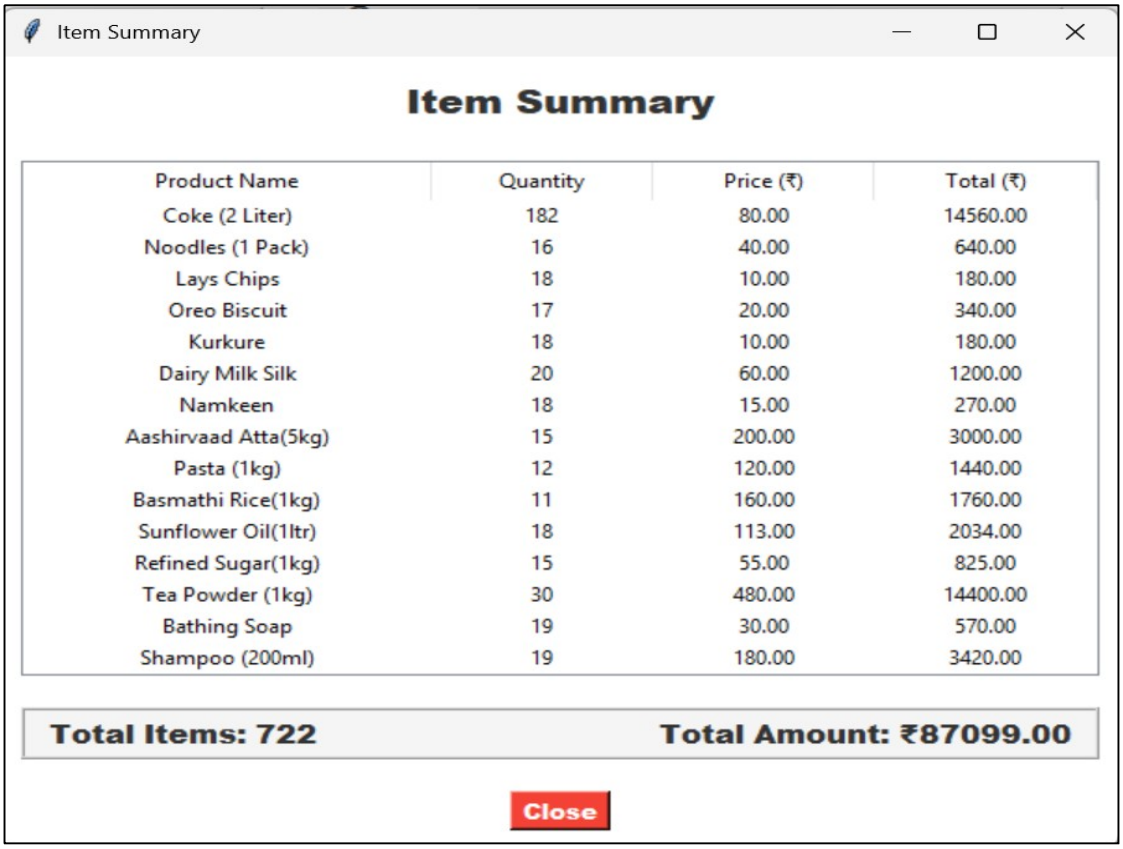
✧ Generates bills in PDF format for printing and record-keeping (Admin only):-



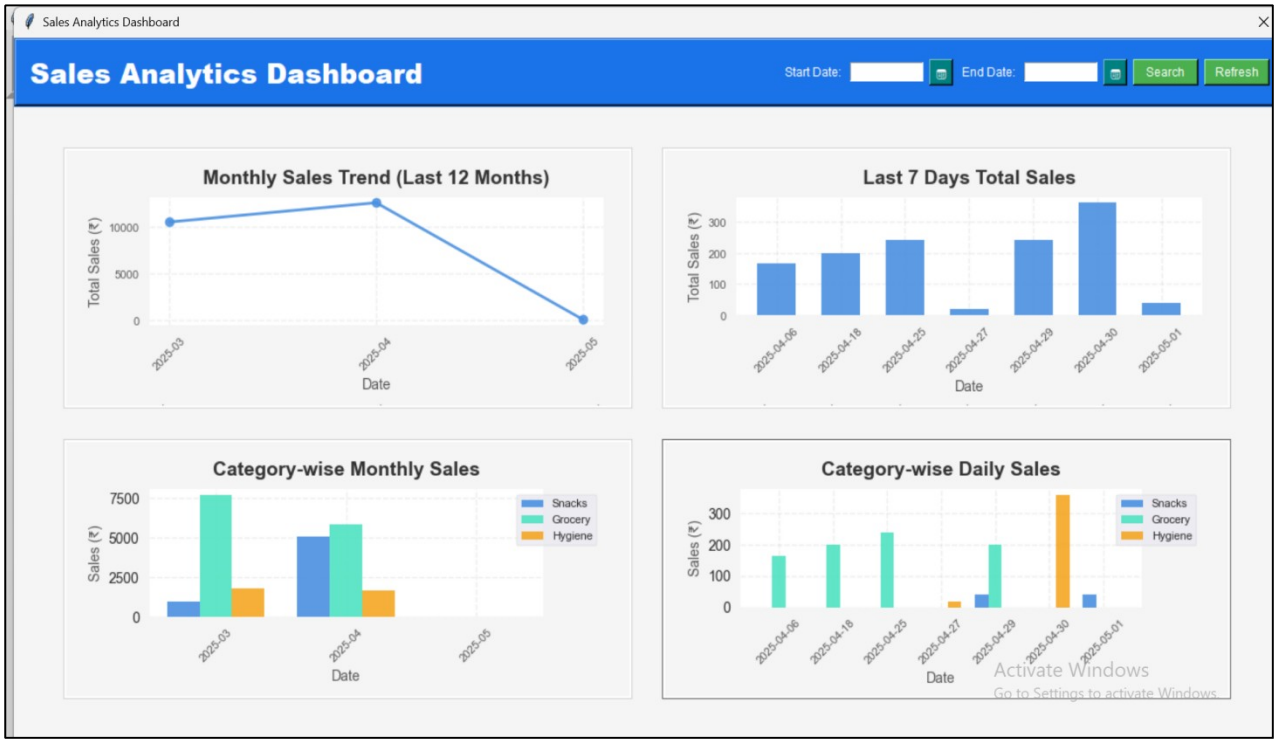
Recent Bills

Bill No	Date	Customer	Phone	Snacks	Grocery	Hygiene	Total
888	2025-05-24 22:36:11	Parmeshwari	7817824931	0.0	480.0	200.0	680.0
5378	2025-05-09 11:24:16	Preeti Rani	9887655555	40.0	0.0	0.0	40.0
8502	2025-05-08 20:26:39	Harit	9876543211	400.0	0.0	0.0	400.0
3352	2025-05-04 21:30:22	Example	9999999999	0.0	120.0	150.0	270.0
7105	2025-05-01 11:03:44	qqqqqqqqqqq	6777777777	40.0	0.0	0.0	40.0
4200	2025-04-30 20:10:11	Aradhya	9876543211	0.0	0.0	360.0	360.0
1598	2025-04-29 13:33:49	Rohit	12345678901	40.0	200.0	0.0	240.0
2803	2025-04-27 14:49:41	qwertyuiolkjh	23456789	0.0	0.0	20.0	20.0
6558	2025-04-25 22:07:20	Ram	1234567890	0.0	240.0	0.0	240.0
5028	2025-04-18 21:37:26	Snigdh	1234567890	0.0	200.0	0.0	200.0
4730	2025-04-06 20:48:18	Satya	12345678900	0.0	165.0	0.0	165.0

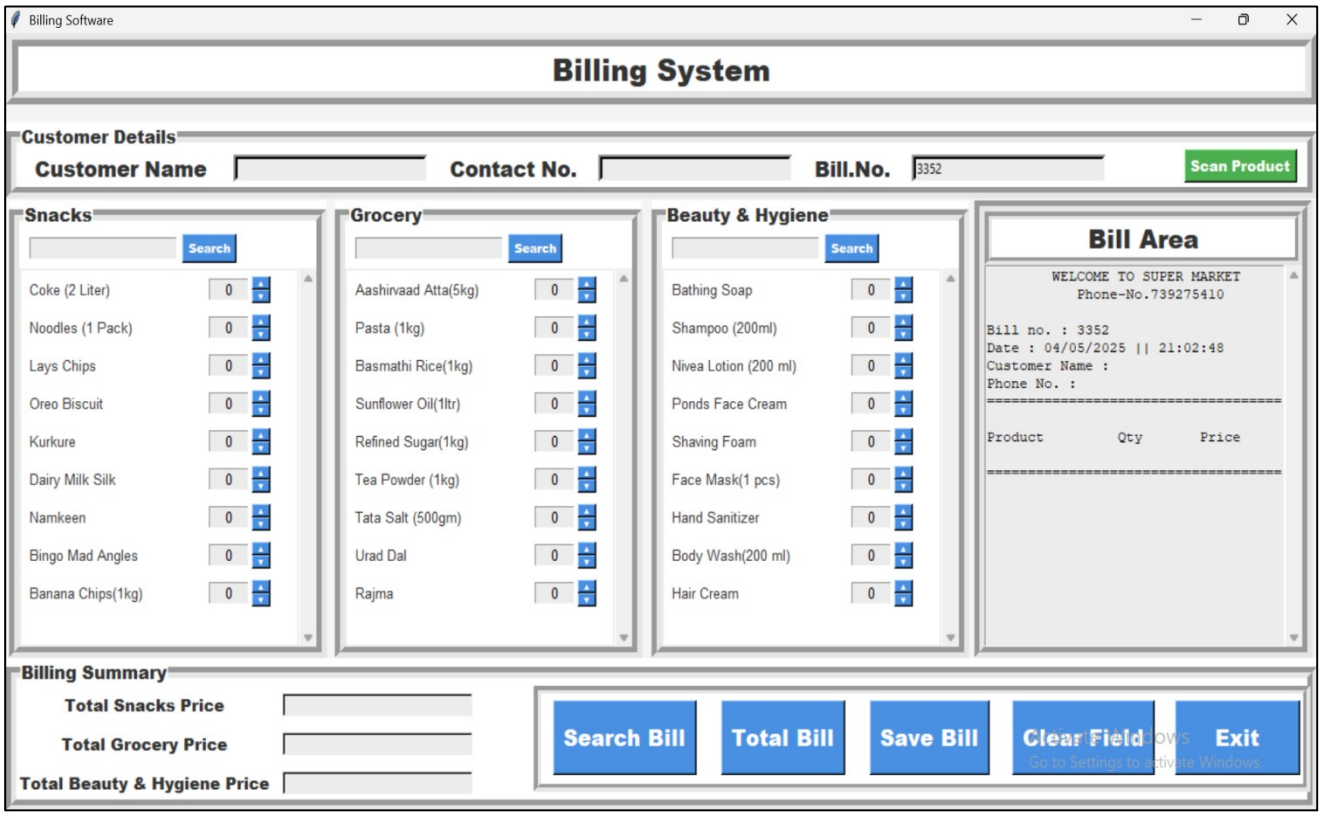
✧ Item Summary (Total Items in the Inventory):



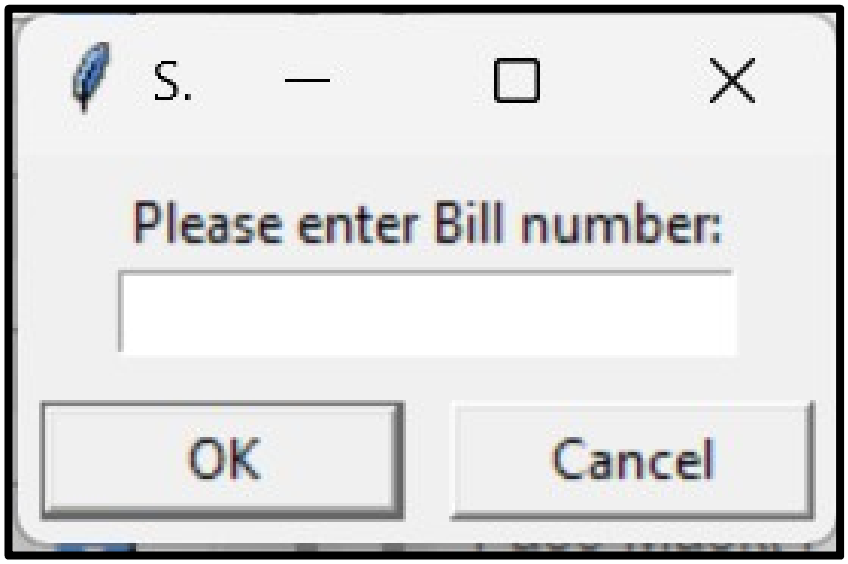
✧ Sales Analytics Dashboard:-



✧ Customer Panel (Billing Panel):

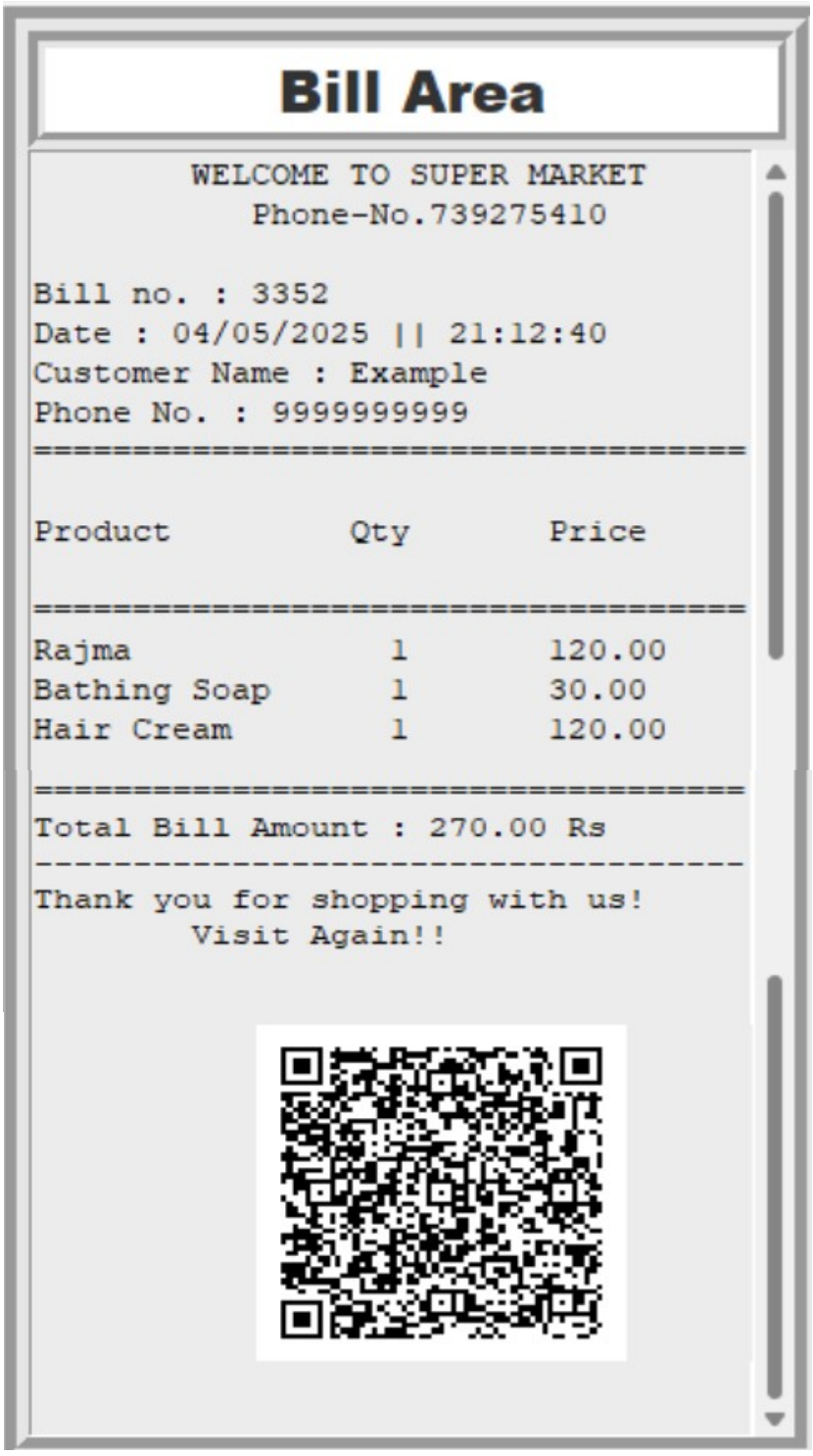


✧ Cashier can search bills by bill number in the billing panel for quick access.

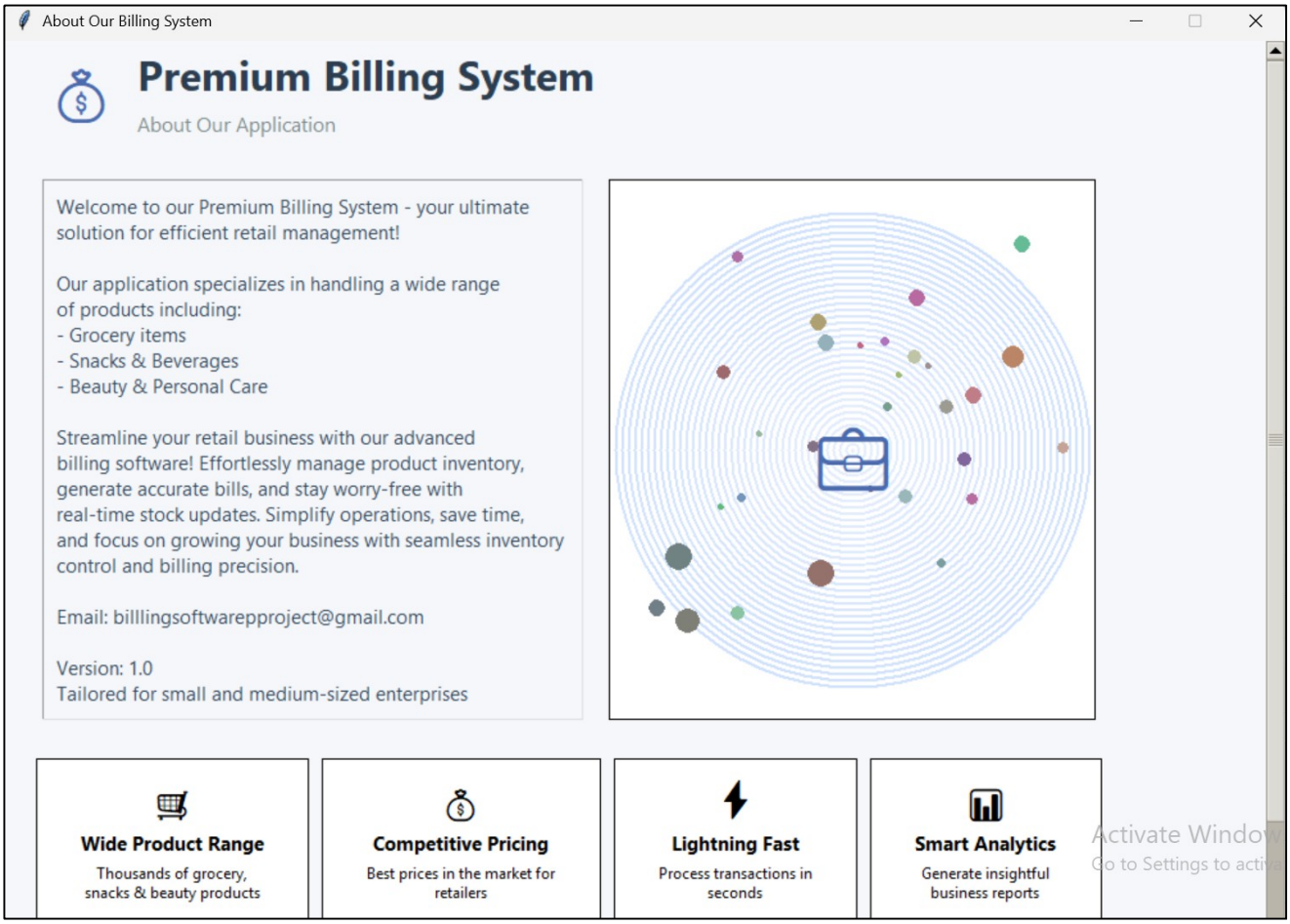


Cashier can quickly retrieve bills using the "Search Bill" button in the billing panel.

✧ **Bill Area (Details of the bill purchased by the customer):**



✧ About us Page (A Comprehensive Overview of Our Billing Software and Its Distinctive Features):



Sample ScreenShots of the QR codes

✧ **Screenshot of Some Bills:-**

✧ **Screenshot of Some Products:-**

End of Report