SUPERMARKET BILLING SYSTEM

A PROJECT REPORT

Submitted by

HARITHA K (2303811710422057)

in partial fulfillment of requirements for the award of the course

CGB1201 - JAVA PROGRAMMING

In

COMPUTER SCIENCE AND ENGINEERING

K. RAMAKRISHNAN COLLEGE OF TECHNOLOGY

(An Autonomous Institution, affiliated to Anna University Chennai and Approved by AICTE, New Delhi)

SAMAYAPURAM – 621 112

NOVEMBER- 2024

K. RAMAKRISHNAN COLLEGE OF TECHNOLOGY (AUTONOMOUS)

SAMAYAPURAM – 621 112

BONAFIDE CERTIFICATE

Certified that this project report on **"SUPERMARKET BILLING SYSTEM"**is the bonafide work of **HARITHA K (2303811710422057)** who carried out the project work during the academic year 2024 - 2025 under my supervision.

SIGNATURE	**SIGNATURE**
Dr.A.Delphin Carolina Rani, M.E.,Ph.D.,	Mr. M. Saravanan, M.E.,
HEAD OF THE DEPARTMENT	**SUPERVISOR**
PROFESSOR	ASSISTANT PROFESSOR
Department of CSE	Department of CSE
K.Ramakrishnan College of Technology (Autonomous)	K.Ramakrishnan College of Technology (Autonomous)
Samayapuram–621112.	Samayapuram–621112.

Submitted for the viva-voce examination held on 02.12.2024

INTERNAL EXAMINER	EXTERNAL EXAMINER

DECLARATION

I declare that the project report on **"SUPERMARKET BILLING SYSTEM"** is the result of original work done by us and best of our knowledge, similar work has not been submitted to **"ANNA UNIVERSITY CHENNAI"** for the requirement of Degree of **BACHELOR OF ENGINEERING**. This project report is submitted on the partial fulfilment of the requirement of the completion of the course **CGB1201 - JAVA PROGRAMMING.**

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Signature

HARITHA K

Place: Samayapuram

Date: 02.12.2024

ACKNOWLEDGEMENT

It is with great pride that I express our gratitude and in-debt to our institution "**K.Ramakrishnan College of Technology (Autonomous)**", for providing us with the opportunity to do this project.

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I express our deep expression and sincere gratitude to our project supervisor **Mr. M. SARAVANAN, M.E.,** Department of **COMPUTER SCIENCE AND ENGINEERING,** for his incalculable suggestions, creativity, assistance and patience which motivated us to carry out this project.

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VISION OF THE INSTITUTION

To serve the society by offering top-notch technical education on par with global standards

MISSION OF THE INSTITUTION

- Be a center of excellence for technical education in emerging technologies by exceeding the needs of the industry and society.
- Be an institute with world class research facilities
- Be an institute nurturing talent and enhancing the competency of students to transform them as all-round personality respecting moral and ethical values

VISION OF DEPARTMENT

To be a center of eminence in creating competent software professionals with research and innovative skills.

MISSION OF DEPARTMENT

M1: Industry Specific: To nurture students in working with various hardware and software platforms inclined with the best practices of industry.

M2: Research: To prepare students for research-oriented activities.

M3: Society: To empower students with the required skills to solve complex technological problems of society.

PROGRAM EDUCATIONAL OBJECTIVES

1. PEO1: Domain Knowledge

To produce graduates who have strong foundation of knowledge and skills in the field of Computer Science and Engineering.

2. PEO2: Employability Skills and Research

To produce graduates who are employable in industries/public sector/research organizations or work as an entrepreneur.

3. PEO3: Ethics and Values

To develop leadership skills and ethically collaborate with society to tackle real-world challenges.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1: Domain Knowledge

To analyze, design and develop computing solutions by applying foundational concepts of Computer Science and Engineering.

PSO 2: Quality Software

To apply software engineering principles and practices for developing quality software for scientific and business applications.

PSO 3: Innovation Ideas

To adapt to emerging Information and Communication Technologies (ICT) to innovate ideas and solutions to existing/novel problems

PROGRAM OUTCOMES (POs)

Engineering students will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

ABSTRACT

The Supermarket Billing System is a robust and scalable software application designed to streamline billing operations in retail environments. It is built to handle various types of transactions, including cash, card, and digital payments, ensuring a seamless checkout experience for customers. The system incorporates functionalities for managing product inventories, generating invoices, applying discounts, and maintaining customer loyalty programs. This system also supports the management of multiple sales counters, real-time inventory tracking, and integration with external devices like barcode scanners and receipt printers. Additionally, it includes a user-friendly interface for cashiers and administrators, along with detailed reporting tools to provide insights into sales trends and inventory performance. The solution aims to reduce manual errors, optimize checkout processes, and enhance operational efficiency, ultimately improving the overall shopping experience. Scalable and customizable, the system can be tailored to fit the requirements of supermarkets of varying sizes.

ABSTRACT WITH POs AND PSOs MAPPING

CO 5 : BUILD JAVA APPLICATIONS FOR SOLVING REAL-TIME PROBLEMS.

ABSTRACT	POs MAPPED	PSOs MAPPED
The Supermarket Billing System is a robust and scalable software application designed to streamline billing operations in retail environments. It is built to handle various types of transactions, including cash, card, and digital payments, ensuring a seamless checkout experience for customers. The system incorporates functionalities for managing product inventories, generating invoices, applying discounts, and maintaining customer loyalty programs. This system also supports the management of multiple sales counters, real-time inventory tracking, and integration with external devices like barcode scanners and receipt printers. Additionally, it includes a user-friendly interface for cashiers and administrators, along with detailed reporting tools to provide insights into sales trends and inventory performance.	**PO1 -3** **PO2 -3** **PO3 -3** **PO4 -3** **PO5 -3** **PO6 -3** **PO7 -3** **PO8 -3** **PO9 -3** **PO10 -3** **PO11-3** **PO12 -3**	**PSO1 -3** **PSO2 -3** **PSO3 -3**

Note: 1- Low, 2-Medium, 3- High

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CHAPTER 1

INTRODUCTION

1.1 Objective

The objective of the supermarket billing system is to develop a comprehensive solution capable of efficiently handling various types of transactions while streamlining the management of sales, inventory, and customer data. The system should support functionalities such as product scanning, generating detailed invoices, and processing payments through multiple modes, including cash, card, and digital wallets. Additionally, it should maintain real-time inventory updates, provide detailed sales reports, and ensure the seamless integration of loyalty programs or discounts to enhance customer satisfaction. By automating these processes, the system aims to minimize errors, reduce checkout times, and improve overall operational efficiency in a supermarket environment. Handle various payment types (cash, card, and digital) seamlessly while reducing checkout time. This system seeks to improve operational efficiency, reduce labor-intensive tasks, and contribute to a better overall shopping experience.

1.2 Overview

The supermarket billing system is a versatile and efficient software solution designed to automate and streamline the billing and transaction processes in a supermarket setting. It encompasses a wide range of functionalities, including product scanning, inventory management, payment processing, and customer data handling. The system ensures smooth and accurate transactions by integrating multiple payment options and offering features like real-time stock updates, sales reports, and loyalty program integration. Its user-friendly interface simplifies operations for staff, while its robust back-end capabilities ensure reliable performance and data security. By addressing the complexities of supermarket operations, the system enhances customer satisfaction and improves overall business efficiency. By reducing manual tasks, minimizing errors, and enhancing customer service, the Supermarket Billing System serves as a critical tool for modernizing supermarket operations.

1.3 Java Programming Concepts

The basic concepts of Object-Oriented Programming (OOP) are:

- The Alumini Management System utilizes Java concepts such as Object-Oriented Programming (OOP) with classes for data encapsulation, and Array List for dynamic storage of alumni records.
- Scanner is used for user input, while methods perform tasks like adding and displaying alumni.
- Conditional statements and switch manage program flow, and an enhanced for-loop iterates over the list.

Project related concepts:

- **Inventory Management:** Add, update, and delete products. Track stock levels, reorder alerts, and categorize products.

- **Customer Management:** Maintain customer profiles for loyalty programs. Store transaction history for personalized marketing.

- **Transaction Handling:** Support refunds and exchanges. Generate and print receipts.

- **Billing System:** Scan products via barcode or manual entry. Apply discounts, taxes, and loyalty points. Support multiple payment modes (cash, card, mobile wallets).

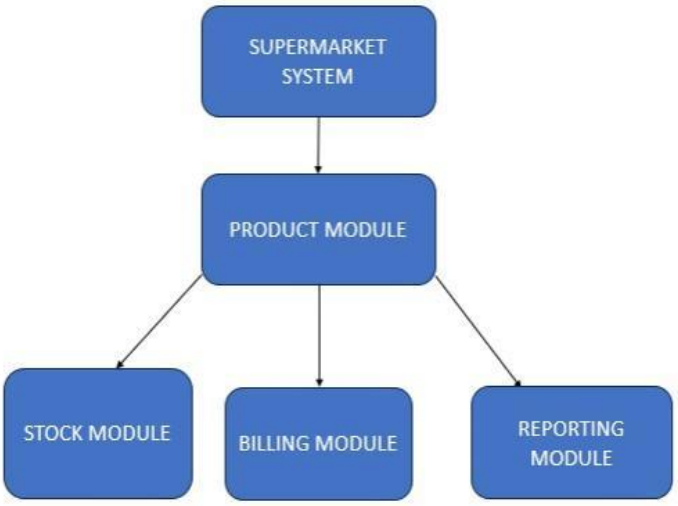
- **Reports and Analytics:** Daily/weekly/monthly sales reports. Stock movement reports. Customer transaction history.

CHAPTER 2
PROJECT METHODOLOGY

2.1 Proposed Work

The proposed work for the supermarket billing system involves designing and developing a robust solution that automates billing, manages inventory, and processes transactions efficiently. The project will begin with a thorough requirement analysis to identify functional and non-functional needs, including product scanning, payment handling, real-time inventory updates, and reporting. The system architecture will be modular, following object-oriented principles, to ensure ease of maintenance and scalability. Key modules will be developed for product management, transaction handling, and payment processing, allowing seamless integration of various payment methods, discounts, and promotions. The database will be integrated to store product details, transaction history, and customer information, while ensuring secure and efficient data management. The final system will aim to improve operational efficiency, reduce errors, and enhance the customer experience in the supermarket environment.

2.2 Block Diagram



CHAPTER 3
MODULE DESCRIPTION

3.1 Product Management

The Product Management module in the supermarket billing system is responsible for handling all aspects related to product data and inventory. This module allows for the addition, updating, and removal of products in the system, ensuring that product information such as ID, name, price, and stock levels are accurately maintained. It includes functionality to track inventory levels in real time, update stock quantities based on sales, and calculate total prices based on the quantity purchased. Additionally, the module supports the application of discounts and promotions on specific products. Through this module, users can easily manage the supermarket's product catalog, ensuring accurate product availability and pricing for efficient transaction processing.

3.2 Stock Management

The Stock Management module in the supermarket billing system is designed to efficiently track and manage the inventory of products in real time. It handles the updating of stock levels whenever a sale is made, ensuring that the quantity of each product is reduced accordingly. The module allows for stock adjustments, such as restocking products or removing items from inventory. It also provides features for monitoring stock thresholds, generating alerts when inventory levels are low, and ensuring that products are always available for customers. By maintaining accurate stock records, the module helps prevent stockouts, minimizes overstocking, and supports the smooth operation of the supermarket.

3.3 Transaction Handling

The Transaction Handling module in the supermarket billing system is responsible for managing the entire process of a sale, from adding products to generating the final invoice. It handles the calculation of totals, taxes, and discounts, ensuring that the correct amount is charged for each transaction. This module tracks the items being purchased, their quantities, and applies any promotions or loyalty discounts. It also integrates with the payment processing system, validating and recording payments made by customers through various methods such as cash, credit/debit cards, or digital wallets. After payment is confirmed, the module updates the inventory in real time and generates a receipt or invoice for the customer. By efficiently handling all transactional details, this module ensures accurate billing, smooth payment processing, and real-time updates to the stock and sales records.

3.4 Billing System

The Billing System module in the supermarket billing system is designed to streamline the entire checkout process, ensuring accurate and efficient generation of invoices for customers. It calculates the total price of the products purchased, including taxes, discounts, and loyalty rewards, based on the items added to the cart. The system generates a detailed bill showing the product names, quantities, individual prices, and the total amount due. It integrates with the payment processing module to handle different payment methods such as cash, card, and digital wallets, ensuring secure and seamless transactions. Once the payment is confirmed, the system updates the inventory, reduces stock levels accordingly, and provides the customer with a receipt. The billing system ensures error-free calculations, quick checkouts, and maintains transparency for both the customer and the supermarket.

3.5 Report Generating

The Report Generation module in the supermarket billing system is designed to provide insightful and comprehensive reports for business analysis and decision-making. It generates various types of reports, including daily, weekly, and monthly sales summaries, inventory status, and financial overviews. The module tracks key performance metrics such as total sales, revenue, discounts applied, and payment methods used, helping managers evaluate sales trends and monitor the effectiveness of promotions. Additionally, it produces inventory reports showing stock levels, low stock alerts, and restocking needs, ensuring timely replenishment of products. By automating the report generation process, this module helps the supermarket management make informed decisions, optimize operations, and maintain accurate financial and inventory records.

CHAPTER 4
CONCLUSION & FUTURE SCOPE

4.1 Conclusion

In conclusion, the supermarket billing system is a comprehensive solution designed to automate and streamline various operations within a supermarket, enhancing efficiency, accuracy, and customer satisfaction. By incorporating key modules such as product management, stock management, transaction handling, billing, and report generation, the system ensures smooth and error-free transactions, real-time inventory tracking, and insightful business reporting. It simplifies the checkout process, optimizes inventory control, and provides valuable data for decision-making. Ultimately, this system not only improves operational productivity but also fosters a seamless shopping experience for customers, positioning the supermarket for growth and success in a competitive market.

4.2 Future scope

The future scope of the supermarket billing system includes expanding its capabilities to meet evolving business needs and technological advancements. This could involve integrating advanced features such as mobile app support for customers to view and manage their shopping carts, digital payment methods like cryptocurrency, and AI-driven personalized discounts or recommendations based on customer purchasing behavior. Additionally, incorporating cloud-based solutions for real-time data synchronization across multiple locations would enhance scalability and improve inventory management. The system could also support advanced analytics and machine learning to predict demand, optimize stock levels, and forecast sales trends. Furthermore, integrating with supplier systems for automated restocking and offering more advanced reporting and analytics tools could provide deeper insights into business performance and customer preferences, further streamlining operations and improving profitability.

APPENDIX A
(SOURCE CODE)

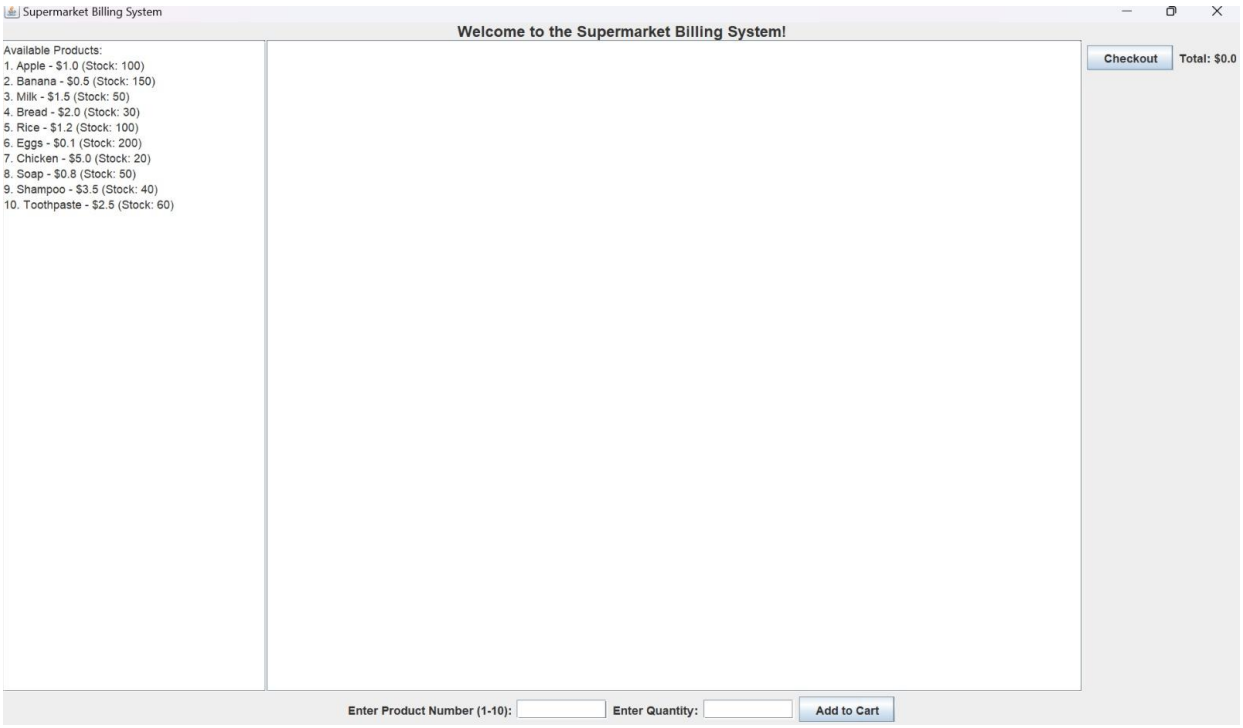
```
import javax.swing.*;
import java.awt.*;
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;

public class SupermarketBilling {
   public static void main(String[] args) {
      // Sample products with prices and stock
      String[] products = {"Apple", "Banana", "Milk", "Bread", "Rice", "Eggs", "Chicken", "Soap",
"Shampoo", "Toothpaste"};
      double[] prices = {1.0, 0.5, 1.5, 2.0, 1.2, 0.1, 5.0, 0.8, 3.5, 2.5};
      int[] stock = {100, 150, 50, 30, 100, 200, 20, 50, 40, 60}; // Initial stock for each product

      JFrame frame = new JFrame("Supermarket Billing System");
      frame.setSize(600, 400);
      frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);

      // Components
      JLabel titleLabel = new JLabel("Welcome to the Supermarket Billing System!", JLabel.CENTER);
      titleLabel.setFont(new Font("Arial", Font.BOLD, 16));

      JTextArea productList = new JTextArea(10, 30);
      productList.setEditable(false);
      StringBuilder productDetails = new StringBuilder("Available Products:\n");
      for (int i = 0; i < products.length; i++) {
         productDetails.append((i + 1))
               .append(". ")
               .append(products[i])
               .append(" - $")
               .append(prices[i])
               .append(" (Stock: ")
               .append(stock[i])
               .append(")\n");
      }
      productList.setText(productDetails.toString());

      JLabel productLabel = new JLabel("Enter Product Number (1-10):");
      JTextField productField = new JTextField(10);

      JLabel quantityLabel = new JLabel("Enter Quantity:");
      JTextField quantityField = new JTextField(10);

      JButton addButton = new JButton("Add to Cart");
      JButton checkoutButton = new JButton("Checkout");

      JTextArea cartDetails = new JTextArea(5, 30);
      cartDetails.setEditable(false);

      JLabel totalLabel = new JLabel("Total: $0.0");
```

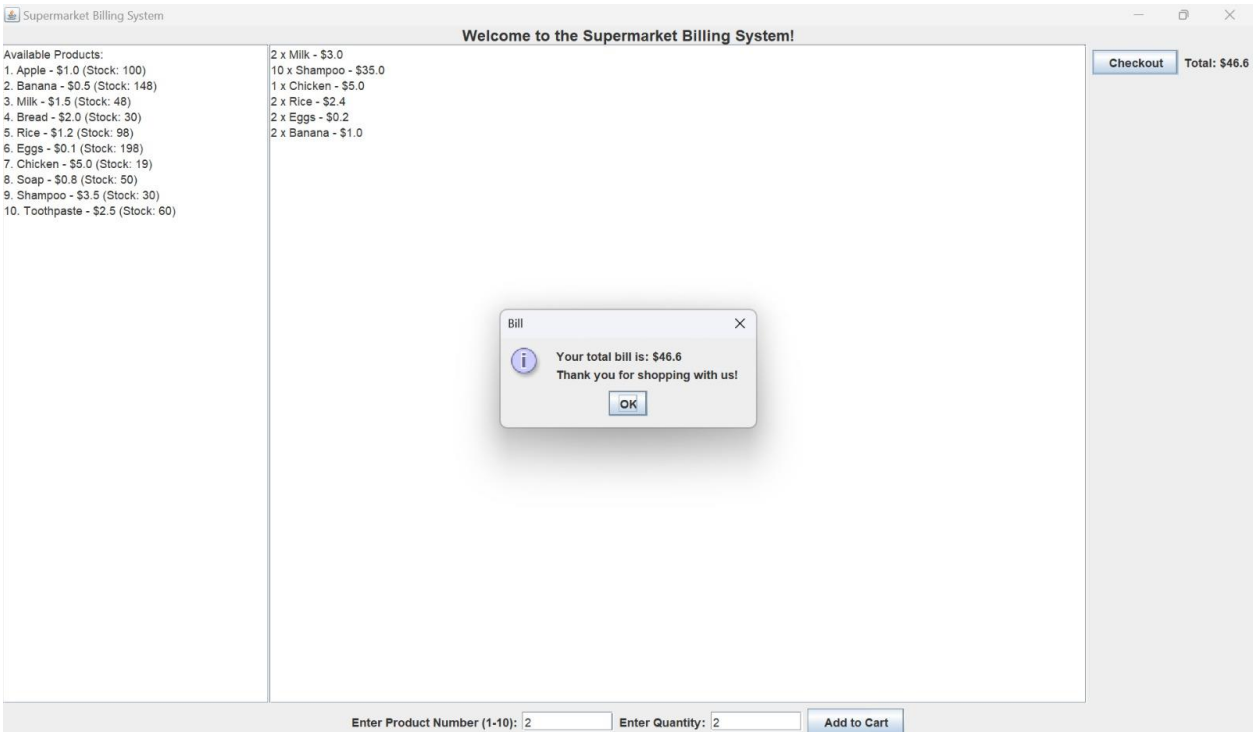
```
        JPanel inputPanel = new JPanel();
        inputPanel.add(productLabel);
        inputPanel.add(productField);
        inputPanel.add(quantityLabel);
        inputPanel.add(quantityField);
        inputPanel.add(addButton);

        JPanel bottomPanel = new JPanel();
        bottomPanel.add(checkoutButton);
        bottomPanel.add(totalLabel);

        // Layout
        frame.setLayout(new BorderLayout());
        frame.add(titleLabel, BorderLayout.NORTH);
        frame.add(new JScrollPane(productList), BorderLayout.WEST);
        frame.add(new JScrollPane(cartDetails), BorderLayout.CENTER);
        frame.add(inputPanel, BorderLayout.SOUTH);
        frame.add(bottomPanel, BorderLayout.EAST);

        // Cart and total
        StringBuilder cart = new StringBuilder();
        final double[] totalAmount = {0};

        // Button actions
        addButton.addActionListener(new ActionListener() {
            @Override
            public void actionPerformed(ActionEvent e) {
                try {
                    int productChoice = Integer.parseInt(productField.getText());
                    int quantity = Integer.parseInt(quantityField.getText());

                    if (productChoice < 1 || productChoice > products.length) {
                        JOptionPane.showMessageDialog(frame, "Invalid product number. Please try again.",
"Error", JOptionPane.ERROR_MESSAGE);
                        return;
                    }

                    if (quantity > stock[productChoice - 1]) {
                        JOptionPane.showMessageDialog(frame, "Sorry, not enough stock available!", "Error",
JOptionPane.ERROR_MESSAGE);
                        return;
                    }

                    // Update stock and calculate price
                    stock[productChoice - 1] -= quantity;
                    double price = prices[productChoice - 1] * quantity;
                    totalAmount[0] += price;

                    // Update cart
                    cart.append(quantity).append(" x ").append(products[productChoice - 1]).append(" -
$").append(price).append("\n");
```

```
                cartDetails.setText(cart.toString());
                totalLabel.setText("Total: $" + totalAmount[0]);

                // Update product list
                StringBuilder updatedProducts = new StringBuilder("Available Products:\n");
                for (int i = 0; i < products.length; i++) {
                    updatedProducts.append((i + 1))
                            .append(". ")
                            .append(products[i])
                            .append(" - $")
                            .append(prices[i])
                            .append(" (Stock: ")
                            .append(stock[i])
                            .append(")\n");
                }
                productList.setText(updatedProducts.toString());
            } catch (NumberFormatException ex) {
                JOptionPane.showMessageDialog(frame, "Please enter valid numbers.", "Error",
JOptionPane.ERROR_MESSAGE);
            }
        }
    });

    checkoutButton.addActionListener(new ActionListener() {
        @Override
        public void actionPerformed(ActionEvent e) {
            JOptionPane.showMessageDialog(frame, "Your total bill is: $" + totalAmount[0] + "\nThank
you for shopping with us!", "Bill", JOptionPane.INFORMATION_MESSAGE);
            System.exit(0);
        }
    });

    // Show frame
    frame.setVisible(true);
  }
}
```

APPENDIX B

(SCREENSHOTS)




Supermarket Billing System
Welcome to the Supermarket Billing System!
Available Products:
1. Apple - $1.0 (Stock: 100)
2. Banana - $0.5 (Stock: 148)
3. Milk - $1.5 (Stock: 48)
4. Bread - $2.0 (Stock: 30)
5. Rice - $1.2 (Stock: 98)
6. Eggs - $0.1 (Stock: 198)
7. Chicken - $5.0 (Stock: 19)
8. Soap - $0.8 (Stock: 50)
9. Shampoo - $3.5 (Stock: 30)
10. Toothpaste - $2.5 (Stock: 60)
2 x Milk - $3.0
10 x Shampoo - $35.0
1 x Chicken - $5.0
2 x Rice - $2.4
2 x Eggs - $0.2
2 x Banana - $1.0
Checkout
Total: $46.6
Bill
Your total bill is: $46.6
Thank you for shopping with us!
OK
Enter Product Number (1-10): 2
Enter Quantity: 2
Add to Cart

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