SUPERMARKET BILLING SYSTEM

A PROJECT REPORT

Submitted by

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in partial fulfillment of requirements for the award of the course
CGB1201 – JAVA PROGRAMMING

in

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

K. RAMAKRISHNAN COLLEGE OF TECHNOLOGY

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

SAMAYAPURAM – 621 112

DECEMBER, 2024

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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 **JANAKIRANI V (2303811724322040)** who carried out the project work during the academic year 2024 - 2025 under my supervision.

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Mrs. JOANY FRANKLIN M.E.,
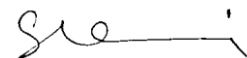
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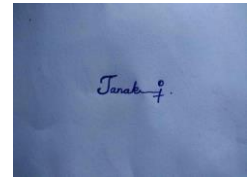Submitted for the viva-voce examination held on 07.12.24

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 TECHNOLOGY**. This project report is submitted on the partial fulfillment of the requirement of the award of the **CGB1201 – JAVA PROGRAMMING.**

Signature

V Janakirani

Place: Samayapuram

Date: 07/12/2024

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

VISION AND MISSION OF THE DEPARTMENT

To excel in education, innovation and research in Artificial Intelligence and Data Science to fulfill industrial demands and societal expectations.

Mission 1: To educate future engineers with solid fundamentals, continually improving teaching methods using modern tools.

Mission 2: To collaborate with industry and offer top-notch facilities in a conductive learning environment.

Mission 3: To foster skilled engineers and ethical innovation in AI and Data Science for global recognition and impactful research.

Mission 4: To tackle the societal challenge of producing capable professionals by instilling employability skills and human values.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO 1: Compete on a global scale for a professional career in Artificial Intelligence and Data Science.

PEO 2: Provide industry-specific solutions for the society with effective communication and ethics.

PEO 3: Hone their professional skills through research and lifelong learning initiatives.

PROGRAM OUTCOMES

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.

PROGRAM SPECIFIC OUTCOMES (PSOs)

- **PSO 1:** Capable of working on data-related methodologies and providing industry-focussed solutions.

- **PSO2:** Capable of analysing and providing a solution to a given real-world problem by designing an effective program.

ABSTRACT

The supermarket billing system is a software application designed to automate the billing process in supermarkets and retail stores. This system enhances efficiency by managing product inventory, calculating purchase totals, applying discounts or offers, generating invoices, and providing detailed sales reports. It aims to reduce manual errors, streamline checkout processes, and improve customer satisfaction. Key features include barcode scanning for quick item retrieval, real-time inventory updates, secure payment gateway integration, and support for various payment methods such as cash, credit/debit cards, and digital wallets. Additionally, the system offers robust administrative functionalities such as stock management, sales analytics, and customer database management. The system is developed using user-friendly interfaces to ensure ease of operation for cashiers and staff. By incorporating advanced technologies and customizable features, the supermarket billing system meets the diverse needs of modern retail operations, thereby contributing to overall business efficiency and customer retention.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

A supermarket billing system is a software application designed to streamline the billing and checkout process in supermarkets, grocery stores, and retail outlets. It automates tasks such as calculating totals, applying discounts, managing inventory, generating invoices, and storing transaction details. Typically, the system integrates various components, including a point-of-sale (POS) interface for cashiers, a database to store product and inventory data, a barcode scanner for quick product identification, and a receipt printer for generating itemized receipts. It supports multiple payment modes such as cash, credit/debit cards, and digital wallets. Key features include product and inventory management, sales reporting, customer loyalty tracking, and tax calculations. By speeding up checkout, reducing manual errors, and offering valuable insights through sales analytics, the system enhances operational efficiency and customer satisfaction.

OBJECTIVE

The primary objective of the supermarket billing system is to automate and streamline the billing and inventory management processes in retail environments. By replacing manual methods, the system aims to enhance operational efficiency, reduce errors, and speed up customer checkout. It provides role-based access for administrators, data entry operators, and billing operators to ensure secure and focused functionality. Administrators can define and manage taxes and commissions, track sales, and generate detailed reports to analyze store performance. The system also facilitates accurate inventory management by maintaining up-to-date product details, including stock levels and expiry dates.

CHAPTER 2
PROJECT METHODOLOGY

2.1 PROPOSED WORK

The proposed work for the Supermarket Billing System focuses on creating an efficient and user-friendly application that automates essential supermarket operations. The system will manage inventory, handle customer purchases, calculate bills, and maintain transaction records. By leveraging Java's object-oriented features, such as encapsulation and inheritance, the program ensures a modular design for ease of maintenance and scalability. It uses data structures like HashMap for fast inventory access and ArrayList for transaction tracking. The system is designed to be extendable, with the potential for integrating graphical interfaces and database support in future enhancements, making it adaptable to larger retail operations.

2.2 BLOCK DIAGRAM
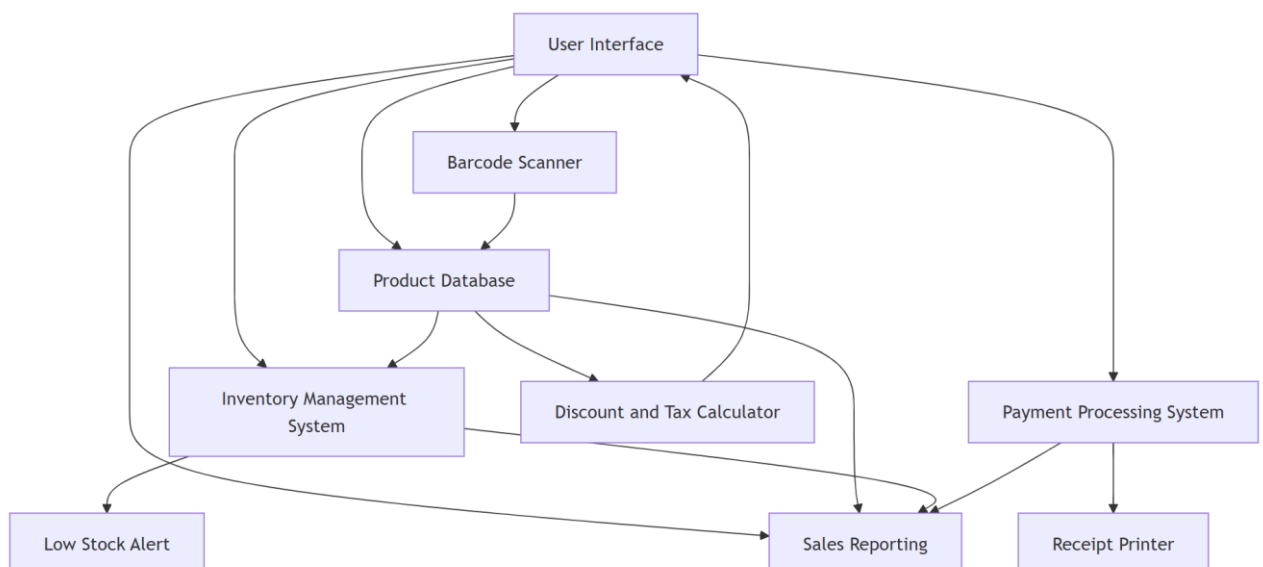
CHAPTER 3

JAVA PROGRAMMING CONCEPTS

The supermarket billing system applies key java programming concepts to ensure functionality and usability:

Object-Oriented Programming (OOP):

Classes and objects represent entities like products, customers, and invoices.

Encapsulation ensures secure access to class attributes using getters and setters.

Collections Framework:

ArrayList or HashMap is used to manage dynamic data such as product lists, inventory, or transactions.

File Handling:

Reading and writing data (e.g., product details and sales history) to files for persistence.

Exception Handling:

Using try-catch blocks to handle errors, such as invalid input or missing inventory,

gracefully.

Input/Output Streams:

Scanner is used for user input, and classes like FileWriter or PrintWriter generate

invoices or receipts.

CHAPTER 4
MODULE DESCRIPTION

4.1 Inventory Management Module

This module handles the initialization, storage, and management of product details, including name, stock, and price. It ensures accurate tracking of inventory levels and updates the stock automatically after transactions. Users can view the inventory for real-time stock information.

4.2 Product Purchase Module

This module facilitates customer purchases by validating stock availability and deducting the purchased quantity from inventory. It calculates the total price for each transaction and ensures smooth handling of multiple product purchases in a session.

4.3 Billing Module

The billing module generates a detailed bill for the customer, listing all purchased products, quantities, and their prices. It calculates the grand total and clears the transaction list after billing, ensuring a fresh start for the next customer.

4.4 Transactions Report Module

This module maintains a record of all transactions made during a session. It provides detailed reports of product purchases, quantities, and total prices, offering insights into sales and operational performance for better management.

4.5 User Interface Module

The user interface module provides a menu-driven console interface, allowing users to navigate through the system.

It accepts user inputs, routes them to the appropriate modules, and displays relevant information or results, ensuring seamless interaction with the system.

CHAPTER 5
CONCLUSION

The supermarket billing system automates billing, inventory management, and reporting efficiently. Role-based access ensures secure and focused functionality for administrators, data entry operators, and bill calculating operators. The system reduces errors, speeds up the checkout process, and enhances operational efficiency. Reports and analytics aid in better decision-making and performance tracking. It is scalable and adaptable for future enhancements like barcode integration or mobile app support. The system meets the core requirements of retail operations, improving both business efficiency and customer satisfaction.

REFERENCES:

1) GitHub – SUPER MARKET BILLING SYSTEM: This project includes functionalities for managing, buying, adding, removing, and selling books, with login and logout security for both users and admins. GitHub Repository

2) Code With C – SUPER MARKET BILLING SYSTEM Java Project: This site provides the full source code and necessary documentation for an online bookstore project in Java

3) Martinez, E. L., Kumar, V., & Lee, J. (2020). AI and machine learning applications in mental health care: Opportunities and limitations. Journal of Psychological Science and Technology, 11(4), 201-215.

4) O'Connor, D. S., & Kim, Y. J. (2023). Integrating online therapy platforms into traditional mental health care: A case study. Journal of Behavioral Health Services, **5)** Zhang, X., & Wu, L. (2019). Mental health care in the digital age: The role of mobile apps and online support communities. Journal of Digital Mental Health,5(2), 102-116.

```java
import javax.swing.*;

import java.awt.*;

import java.awt.event.ActionEvent;

import java.awt.event.ActionListener;

import java.util.HashMap;


class Product {
    String name;
    int stock;
    double price;


    Product(String name, int stock, double price) {
        this.name = name;
        this.stock = stock;
        this.price = price;
    }
}


public class SupermarketBillingSystemGUI extends JFrame {
    private HashMap<String, Product> inventory = new HashMap<>();
    private JTextArea inventoryArea;
    private JTextField productField, quantityField;
    private JTextArea receiptArea;


    public SupermarketBillingSystemGUI() {
        setTitle("Supermarket Billing System");
        setSize(600, 500);
```

```java
        setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        setLocationRelativeTo(null);

        initializeInventory();
        createUI();
    }

    private void createUI() {
        // Layout
        setLayout(new BorderLayout());

        // Top Panel for Title
        JLabel titleLabel = new JLabel("Supermarket Billing System",
JLabel.CENTER);
        titleLabel.setFont(new Font("Arial", Font.BOLD, 20));
        add(titleLabel, BorderLayout.NORTH);

        // Center Panel for Inventory Display
        inventoryArea = new JTextArea(10, 40);
        inventoryArea.setEditable(false);
        JScrollPane inventoryScroll = new JScrollPane(inventoryArea);
        add(inventoryScroll, BorderLayout.CENTER);

        // Bottom Panel for Purchase Controls
        JPanel bottomPanel = new JPanel();
        bottomPanel.setLayout(new GridLayout(3, 2, 5, 5));

        bottomPanel.add(new JLabel("Product Name:"));
        productField = new JTextField();
```

```java
        bottomPanel.add(productField);

        bottomPanel.add(new JLabel("Quantity:"));
        quantityField = new JTextField();
        bottomPanel.add(quantityField);

        JButton purchaseButton = new JButton("Purchase");
        JButton viewButton = new JButton("View Inventory");
        bottomPanel.add(viewButton);
        bottomPanel.add(purchaseButton);

        add(bottomPanel, BorderLayout.SOUTH);

        // Right Panel for Receipt
        JPanel rightPanel = new JPanel();
        rightPanel.setLayout(new BorderLayout());
        JLabel receiptLabel = new JLabel("Receipt", JLabel.CENTER);
        receiptArea = new JTextArea(10, 20);
        receiptArea.setEditable(false);
        JScrollPane receiptScroll = new JScrollPane(receiptArea);

        rightPanel.add(receiptLabel, BorderLayout.NORTH);
        rightPanel.add(receiptScroll, BorderLayout.CENTER);
        add(rightPanel, BorderLayout.EAST);

        // Event Listeners
        viewButton.addActionListener(e -> displayInventory());
        purchaseButton.addActionListener(e -> purchaseProduct());
    }
```

```java
private void initializeInventory() {
    inventory.put("Apple", new Product("Apple", 50, 0.5));
    inventory.put("Banana", new Product("Banana", 100, 0.2));
    inventory.put("Milk", new Product("Milk", 30, 1.2));
    inventory.put("Bread", new Product("Bread", 20, 1.5));
}

private void displayInventory() {
    inventoryArea.setText("");
    inventoryArea.append("Product Name\tStock\tPrice\n");
    for (Product product : inventory.values()) {
        inventoryArea.append(String.format("%s\t%d\t$%.2f\n",        product.name,
product.stock, product.price));
    }
}

private void purchaseProduct() {
    String productName = productField.getText().trim();
    String quantityText = quantityField.getText().trim();

    if (productName.isEmpty() || quantityText.isEmpty()) {
        JOptionPane.showMessageDialog(this, "Please enter both product name and
quantity.", "Error", JOptionPane.ERROR_MESSAGE);
        return;
    }

    if (!inventory.containsKey(productName)) {
        JOptionPane.showMessageDialog(this, "Product not found in inventory!",
```

```java
            "Error", JOptionPane.ERROR_MESSAGE);
            return;
        }

        Product product = inventory.get(productName);
        int quantity;

        try {
            quantity = Integer.parseInt(quantityText);
        } catch (NumberFormatException e) {
            JOptionPane.showMessageDialog(this, "Invalid quantity. Please enter a
number.", "Error", JOptionPane.ERROR_MESSAGE);
            return;
        }

        if (quantity > product.stock) {
            JOptionPane.showMessageDialog(this, "Not enough stock available!",
"Error", JOptionPane.ERROR_MESSAGE);
            return;
        }

        double totalPrice = quantity * product.price;
        product.stock -= quantity;

        // Update Receipt
        receiptArea.append(String.format("Purchased: %d x %s @ $%.2f each =
$%.2f\n", quantity, productName, product.price, totalPrice));

        // Clear input fields
```

```java
            productField.setText("");
            quantityField.setText("");
        }


    public static void main(String[] args) {
        SwingUtilities.invokeLater(() -> {
            SupermarketBillingSystemGUI gui = new SupermarketBillingSystemGUI();
            gui.setVisible(true);
        });
    }
}
```

APPENDIX B - SCREENSHOTS

Supermarket Billing System

Available Products

- Apple - $1.20 - Stock: 49
- Banana - $0.80 - Stock: 100
- Carrot - $0.50 - Stock: 80

Purchase Products

Product:

Apple
Banana
Carrot

Purchase

Transaction successful! You purchased 1 Apple(s).

Supermarket Billing System

Available Products

- Apple - $1.20 - Stock: 50
- Banana - $0.80 - Stock: 100
- Carrot - $0.50 - Stock: 80

Purchase Products

Product:

Apple

Quantity:

Purchase

Quantity:

9

Purchase

Transaction successful! You purchased 9 Carrot(s).