PROJECT REPORT

Title: Military Canteen Management System

Submitted By-
Name: Dheeraj Pramod Deore
Registration Number: 25BCE10860
Batch of: 2025

Table of Contents:

Introduction

The **Canteen Stores Department (CSD)** plays an indispensable role in providing essential, quality goods at subsidized rates to **Defence Personnel and their families**, ensuring a defined price advantage for this dedicated community. However, the sheer scale of CSD operations involving high volumes of diverse **inventory, numerous customer transactions, and complex supply chain logistics** often presents significant management challenges. Relying on traditional or semi-manual processes for record-keeping and stock management can lead to system bottlenecks. This project, the **Canteen Management System**, is developed to address these issues. It is designed as a **complete and versatile solution** aimed at automating and streamlining all core operational entries concerning **customers, products, sales, and purchase orders**, enhancing the overall efficiency and transparency of the canteen management.

Problem Statement

The current administrative and operational workflow of the Canteen Stores Department (CSD) is characterized by **fragmented data management**, primarily involving manual or disparate systems for inventory, sales, and customer tracking. This methodology presents significant systemic challenges:

1. **Inventory Inaccuracy:** Lack of a centralized database leads to real-time stock discrepancies, hindering effective purchasing decisions and increasing the risk of stockouts or wastage.
2. **Inefficient Transaction Processing:** Manual data entry for sales and invoice generation is slow and error-prone, reducing customer throughput.
3. **Untimely Reporting:** The inability to execute complex SQL queries and generate immediate, integrated reports prevents timely auditing, reconciliation, and strategic financial planning (e.g., tracking product due amounts).

Therefore, the objective is to design and implement a **Canteen Management System** utilizing Python and MySQL that establishes a **normalized, centralized relational database** to automate core CRUD operations, enforce data integrity, and provide instantaneous, accurate reporting necessary for efficient administrative and logistical control.

Objectives

1. To design a user friendly and systematic system to manage the canteen operations.
2. The operations of deletion and creation of records are streamlined to for the ease of the management.
3. Maintains an updated database of the customers (defence personnel and family).
4. To generate product and customer report for maintenance of records.

System Requirements

Hardware:

- Processor: Intel Core i3 or above
- RAM: 4GB or above
- Hard Disk: 500GB or above
- Monitor: 15" LED

Software:

- Operating System: Windows/Linux/MacOS
- Programming Language: Python
- Database: MySQL

Methodology

The project is divided into two main parts:

1. **Frontend Development:** Using Python to create user interface (UI) for user interaction.

2. **Backend Development:**

- Python programming to handle the logic of the system, such as purchasing, selling, and maintaining the records.
- **Database:** MySQL for storing product details, customer information, and transaction history.

Functional Requirements

1. Customer Management Module (M1)

This module handles the maintenance of the customer database.

- Create Record: Allows the administrator to input new customer details, including ID, Name, Address, and Phone Number (create_record).

- Display Record: Retrieves and displays all customer records from the customer table (display_record).

- Search Record: Enables searching for a specific customer using their unique Customer ID (search_record).

- Modify Record (Update): Provides sub-functionality to update a customer's Name, Address, or Phone Number based on their ID (modify_record).

- Delete Record: Allows permanent removal of a customer record using their ID (delete_record).

2. Product/Inventory Management Module (M2)

This module manages the canteen's stock inventory and procurement data.

- Create Record: Allows input of new product details, including ID, Name, Company, Price, Quantity, Discount, Rate, and Purchase Date (create_rec). This function also updates the product_report table to track payment status.
- Display Record: Retrieves and displays the full list of products available in stock (display_rec).
- Search Record: Enables searching for a product using the Product ID (search_rec).
- Modify Record (Update): Provides sub-functionality to update specific product attributes like Name, Company, Price, Quantity, Discount, or Purchase Date (modify_rec).
- Delete Record: Allows permanent removal of a product record from the inventory (delete_rec).

3. Sales & Billing Management Module (M3)

This module manages sales transactions, inventory reduction, and bill generation.

- Add Customer Purchase (Sales): Records a new sale by linking the Customer ID, Product ID, and Quantity. Critically, it automatically calculates the final Amount and decrements the product's quantity in the product table (add_purchase).
- Modify Purchase Quantity: Allows modification of the quantity of an existing purchase, which then automatically adjusts the total sale amount and updates the product stock quantity (purch_qty).
- Delete Customer Purchase: Removes a recorded sale transaction (del_purchase).

- Generate Invoice: Creates a formal, printable invoice detailing all products, quantities, rates, and the total payable amount for a specific customer on a particular date

System workflow

The system is structured as a hierarchical, menu-driven command-line interface, ensuring a logical workflow for the administrator:

1. Main Menu: The user starts here, choosing between Products Report Generator or Administrator access (main_menu).
2. Administrator Menu: After selection, the user is presented with the three major operational categories: Customers Menu (M1), Products Menu (M2), or Canteen Sales Menu (M3) (admin).
3. Module Sub-Menus: Upon entering any of the three main module menus (M1, M2, or M3), the user is presented with a clear list of the available CRUD operations (Create, Display, Search, Modify, Delete) specific to that module.
4. Data Input/Output: Each operation prompts the user for specific input (e.g., ID, Name, Quantity) and provides clear formatted output (e.g., table display of records or confirmation messages).

Non-Functional Requirements

1.Usability

Simplicity and Intuitiveness: The entire system must be operable through the command-line interface (CLI) with clear, sequential, menu-driven navigation. All data entry prompts must be self-explanatory to minimize administrator training time

2.Reliability (Error Handling)

Data Integrity & Robustness: The system must incorporate comprehensive error handling mechanisms (using Python's try-except blocks) to gracefully manage invalid inputs (e.g., non-numeric data for IDs or quantities) and connectivity issues with the MySQL database. Critical database operations (like sales and deletion) must be immediately confirmed or rejected with informative messages

3. Performance

Query Response Time: Database operations (Create, Read, Update, Delete) involving single-record lookups (e.g., search_rec, invoice generation) must execute and return results to the user within 2 seconds on the local host environment

4. Maintainability

Code Modularity and Clarity: The Python source code must be modular, utilizing distinct functions for each operation (e.g., create_rec, delete_record, prod_menu). This structure ensures that future updates, debugging, or additions of new features (like reporting columns) can be isolated and implemented efficiently.

System Architecture

The Canteen Management System is built on a Three-Tier Architecture. This design was chosen to separate the user interface, the business logic, and the database, making the system easier to maintain and upgrade.

Architecture Components

1. **Presentation Tier (User Interface):**
    - **Component: Command Line Interface (CLI).**
    - **Function: This is the visual layer where the administrator interacts with the system. It handles the menu displays (main_menu, cust_menu) and captures user inputs. It sends this data to the Logic Tier and displays the results (tables, success messages) back to the user.**
2. **Logic Tier (Application Logic):**
    - **Component: Python Functions.**
    - **Function: This is the "brain" of the application. It contains all the functions (e.g., add_purchase, create_rec) that process data. It performs calculations (like total bill amounts), validates user inputs (checking for integers vs. strings), and constructs the SQL commands.**
3. **Data Tier (Storage):**
    - **Component: MySQL Database.**
    - **Function: This layer stores all the persistent data in relational tables (customer, product, purchase). It executes the SQL queries sent by the Python logic to fetch, update, or delete records.**

Design Diagrams

This section visually represents the structure and behavior of the system.

Workflow Diagram

The following diagram illustrates the logical flow of the user interaction, moving from the Main Menu to specific administrative sub-menus.

Flow Description:

- **Start: The user begins at the Main Menu.**
- **Branch: They can choose "Products Report" (Read-only) or "Administrator" (Full Access).**
- **Action: Inside the Admin section, the flow splits into three functional paths: Customer Management, Product Inventory, and Canteen Sales.**
- **End: Each path leads to specific CRUD operations (Create, Read, Update, Delete) before returning to the menu.**

Entity-Relationship (ER) Diagram

This diagram defines the database schema and the relationships between the entities.

Entities & Relationships:

- **Customer: Stores personal details (cust_id is the Primary Key).**
- **Product: Stores inventory details (p_id is the Primary Key).**
- **Purchase: The transaction table. It has a Many-to-One relationship with both Customer and Product (One**

customer can make many purchases; One product can be sold many times).

- Product_Report: Linked to Product, tracking financial status.

Sequence Diagram (Add Purchase)

This diagram details the sequence of events when a new sale is recorded, highlighting the system's internal logic.

Sequence of Events:

1. User: Enters Customer ID and Product ID.
2. System: Validates that the input is a valid integer.
3. System: Queries the database to Insert the sale record.
4. Database: Updates the purchase table.
5. System: Immediately queries the database to Update the stock.
6. Database: Decrements p_qty in the product table.
7. System: Displays "Record Added" to the user.

Design Decisions & Rationale

During the development of this project, several key technical decisions were made to ensure the system met the requirements for efficiency and reliability.

Choice of Technology

- Why Python? Python was selected for the logic layer because of its simplicity and the powerful mysql.connector library. This allowed for rapid development of the CRUD functions without complex overhead.
- Why MySQL? A Relational Database Management System (RDBMS) was essential because the data (Customers, Products, Sales) is inherently structured and related. MySQL provides the necessary data integrity constraints (Primary and Foreign Keys) that a simple file-based system (like CSV) could not offer.

Architectural Decisions

- Modular Function Design: Instead of writing one giant script, the code is broken down into specific functions for each task (e.g., prod_menu, search_record). This makes the code readable and allows for easier debugging. If the "Search" feature breaks, I only need to fix the search_record function, not the entire program.
- Menu-Driven Interface: A text-based menu system was chosen over a Graphical User Interface (GUI) to prioritize performance and compatibility. It allows the system to run on any computer with Python installed, consuming minimal resources while remaining fast and responsive.

Data Handling Strategy

- Atomic Transactions: For the sales module, I decided to execute the "Record Sale" and "Update Inventory" queries in immediate succession followed by a single commit(). This decision ensures that the inventory count always matches the actual sales records, preventing stock discrepancies.

TESTING:

The system was tested with different use cases, such as purchasing the stock and maintaining its record, sales of the canteen, and updating the database.

Unit Testing: I tested individual functions (like create_rec and add_purchase) separately to ensure they perform their specific task without errors.

Validation Testing: I intentionally entered incorrect data types (e.g., text instead of numbers) to verify that the system's error handling (try-except blocks) works and prevents runtime crashes.

Integration Testing: I specifically tested the "Sales" module to confirm that buying a product automatically reduces the stock count in the "Product" inventory table, ensuring the two modules interact correctly.

OUTPUT:

```
==============================MAIN MENU============================
1. PRODUCTS REPORT GENERATOR
2. CUSTOMER INVOICE GENERATOR
3. ADMINISTRATOR
4. EXIT
===================================================================
Enter your choice (1-4): 3
=========================ADMINISTRATOR MENU=======================
1. CUSTOMERS MENU
2. PRODUCTS MENU
3. CANTEEN SALE MENU
4. BACK TO MAIN MENU
===================================================================
Enter your choice (1-4): 1

=========================CUSTOMER MENU============================
1. Create record
2. Display record
3. Search record
4. Modify record
5. Delete record
0. Back to administrator menu
===================================================================
Enter your choice (1/2/3/4/5/0): 1

Enter CUSTOMER ID: 100001
Enter CUSTOMER NAME: Rakhi Sharma
Enter CUSTOMER ADDRESS: B/102, ALF Apartments, MD Road
Enter CUSTOMER PHONE NO.: 9910435690
```

```
Do you want to add more records? (y/n): y

Enter CUSTOMER ID: 120034
Enter CUSTOMER NAME: Amar Saini
Enter CUSTOMER ADDRESS: A/12, Defence Colony
Enter CUSTOMER PHONE NO.: 7705704832

Do you want to add more records? (y/n): y

Enter CUSTOMER ID: 123456
Enter CUSTOMER NAME: Kushagra Patel
Enter CUSTOMER ADDRESS: 536, IFFCO Colony
Enter CUSTOMER PHONE NO.: 8800123654

Do you want to add more records? (y/n): y

Enter CUSTOMER ID: 110045
Enter CUSTOMER NAME: Avantika Mishra
Enter CUSTOMER ADDRESS: 1860, Shivaji Nagar
Enter CUSTOMER PHONE NO.: 9872046300

Do you want to add more records? (y/n): y

Enter CUSTOMER ID: 132008
Enter CUSTOMER NAME: Ashok Sinha
Enter CUSTOMER ADDRESS: C/82, Ekta Apartments, Sector 15
Enter CUSTOMER PHONE NO.: 8240963537

Do you want to add more records? (y/n): y

Enter CUSTOMER ID: 145879
Enter CUSTOMER NAME: Ishita Singh
Enter CUSTOMER ADDRESS: 342, Shankar Vihar
Enter CUSTOMER PHONE NO.: 9344552687

Do you want to add more records? (y/n): n

Record(s) added!

===========================CUSTOMER MENU============================
1. CREATE RECORD
2. DISPLAY RECORD
3. SEARCH RECORD
4. MODIFY RECORD
5. DELETE RECORD
0. BACK TO ADMINISTRATOR MENU
=======================================================================
Enter your choice (1/2/3/4/5/0): 2

CUSTOMER ID    CUSTOMER NAME      CUSTOMER ADDRESS              PHONE NO.
100001       Rakhi Sharma          B/102, ALF Apartments, MD Road    9910435690
110045        Avantika Mishra       1860, Shivaji Nagar              9872046300
120034        Amar Saini            A/12, Defence Colony             7705704832
123456        Kushagra Patel       536, IFFCO Colony                 8800123654
132008        Ashok Sinha          C/82, Ekta Apartments, Sector 15  8240963537
145879        Ishita Singh          342, Shankar Vihar               9344552687

=============================CUSTOMER MENU==========================
1. CREATE RECORD
2. DISPLAY RECORD
3. SEARCH RECORD
4. MODIFY RECORD
5. DELETE RECORD
```

```
0. BACK TO ADMINISTRATOR MENU
=========================================================================

Enter your choice (1/2/3/4/5/0): 3

Enter Customer ID to search for the record: 120034


CUSTOMER ID     CUSTOMER NAME        CUSTOMER ADDRESS           PHONE NO.

120034          Amar Saini           A/12, Defence Colony       7705704832


===========================CUSTOMER MENU============================

1. CREATE RECORD

2. DISPLAY RECORD

3. SEARCH RECORD

4. MODIFY RECORD

5. DELETE RECORD

0. BACK TO ADMINISTRATOR MENU
=========================================================================

Enter your choice (1/2/3/4/5/0): 4


===================CUSTOMER RECORD MODIFICATION==================

1. MODIFY CUSTOMER NAME

2. MODIFY CUSTOMER ADDRESS

3. MODIFY CUSTOMER PHONE NO.

0. BACK TO CUSTOMER MENU


Enter the choice to proceed (1/2/3/0): 3


Enter Customer ID for the record to be modified: 123456

Enter the Updated Phone no.: 8970125647


The modified data is:

CUSTOMER ID     CUSTOMER NAME        CUSTOMER ADDRESS          PHONE NO.

123456           Kushagra Patel       536, IFFCO Colony        8970125647
```

```
================CUSTOMER RECORD MODIFICATION=================
1. MODIFY CUSTOMER NAME
2. MODIFY CUSTOMER ADDRESS
3. MODIFY CUSTOMER PHONE NO.
0. BACK TO CUSTOMER MENU

Enter the choice to proceed (1/2/3/0): 0

========================CUSTOMER MENU========================
1. CREATE RECORD
2. DISPLAY RECORD
3. SEARCH RECORD
4. MODIFY RECORD
5. DELETE RECORD
0. BACK TO ADMINISTRATOR MENU
==============================================================
Enter your choice (1/2/3/4/5/0): 5

Enter Customer ID for the record to be deleted: 145879

The updated data is:
CUSTOMER ID    CUSTOMER NAME     CUSTOMER ADDRESS                   PHONE NO.
100001         Rakhi Sharma          B/102, ALF Apartments, MD Road     9910435690
110045         Avantika Mishra       1860, Shivaji Nagar                9872046300
120034         Amar Saini            A/12, Defence Colony               7705704832
123456         Kushagra Patel        536, IFFCO Colony                  8970125647
132008         Ashok Sinha           C/82, Ekta Apartments, Sector 15   8240963537

=======================CUSTOMER MENU=========================
1. CREATE RECORD
2. DISPLAY RECORD
```

```
3. SEARCH RECORD
4. MODIFY RECORD
5. DELETE RECORD
0. BACK TO ADMINISTRATOR MENU
============================================================================
Enter your choice (1/2/3/4/5/0): 0

=======================ADMINISTRATOR MENU=======================
1. CUSTOMERS MENU
2. PRODUCTS MENU
3. CANTEEN SALE MENU
4. BACK TO MAIN MENU
============================================================================
Enter your choice (1-4): 2

==========================PRODUCT MENU==========================
1. CREATE PRODUCT
2. DISPLAY ALL PRODUCTS AVAILABLE
3. SEARCH DESIRED RECORD
4. MODIFY PRODUCT RECORD
5. DELETE PRODUCT RECORD
6. BACK TO ADMINISTRATOR MENU
============================================================================
Enter your choice (1-7): 1

PRODUCT ID: 101
NAME OF PRODUCT: Chocolate
NAME OF PRODUCT COMPANY: Cadbury
PER UNIT PRODUCT PRICE: 45
PRODUCT QUANTITY: 200
PRODUCT DISCOUNT: 100
PRODUCT SELLING RATE: 50
PRODUCT PURCHASE DATE (yyyy-mm-dd): 2024-01-03
Is the outstanding payment made? (Yes/No): Yes

Do you want to enter more data?(y/n): y

PRODUCT ID: 102
NAME OF PRODUCT: Coffee Powder
NAME OF PRODUCT COMPANY: Nescafe
PER UNIT PRODUCT PRICE: 20
PRODUCT QUANTITY: 300
PRODUCT DISCOUNT: 80
PRODUCT SELLING RATE: 30
PRODUCT PURCHASE DATE (yyyy-mm-dd): 2024-04-01
Is the outstanding payment made? (Yes/No): No
Enter the due amount for product purchase: 3000

Do you want to enter more data?(y/n): y

PRODUCT ID: 103
NAME OF PRODUCT: Toothpaste
NAME OF PRODUCT COMPANY: Colgate
PER UNIT PRODUCT PRICE: 86
PRODUCT QUANTITY: 100
PRODUCT DISCOUNT: 0
PRODUCT SELLING RATE: 90
PRODUCT PURCHASE DATE (yyyy-mm-dd): 2024-03-01
Is the outstanding payment made? (Yes/No): Yes

Do you want to enter more data?(y/n): y

PRODUCT ID: 104
NAME OF PRODUCT: Tea Leaves
NAME OF PRODUCT COMPANY: Red Label
PER UNIT PRODUCT PRICE: 70
PRODUCT QUANTITY: 400
PRODUCT DISCOUNT: 100
PRODUCT SELLING RATE: 80
PRODUCT PURCHASE DATE (yyyy-mm-dd): 2024-02-11
Is the outstanding payment made? (Yes/No): Yes

Do you want to enter more data?(y/n): y

PRODUCT ID: 105
NAME OF PRODUCT: Soap
NAME OF PRODUCT COMPANY: Pears
PER UNIT PRODUCT PRICE: 30
PRODUCT QUANTITY: 200
PRODUCT DISCOUNT: 100
PRODUCT SELLING RATE: 25
PRODUCT PURCHASE DATE (yyyy-mm-dd): 2024-04-03
Is the outstanding payment made? (Yes/No): No
Enter the due amount for product purchase: 4000

Do you want to enter more data?(y/n): y

PRODUCT ID: 106
NAME OF PRODUCT: Biscuit
NAME OF PRODUCT COMPANY: Parle G
PER UNIT PRODUCT PRICE: 10
PRODUCT QUANTITY: 500
PRODUCT DISCOUNT: 150
PRODUCT SELLING RATE: 15
PRODUCT PURCHASE DATE (yyyy-mm-dd): 2024-05-10
Is the outstanding payment made? (Yes/No): Yes
```

```
Do you want to enter more data?(y/n): n

Record(s) added!

========================PRODUCT MENU==========================
1. CREATE PRODUCT
2. DISPLAY ALL PRODUCTS AVAILABLE
3. SEARCH DESIRED RECORD
4. MODIFY PRODUCT RECORD
5. DELETE PRODUCT RECORD
6. BACK TO ADMINISTRATOR MENU
================================================================
Enter your choice (1-7): 2
PRODUCT ID     PRODUCT NAME    PRODUCT COMPANY    PRODUCT PRICE(PER
UNIT) QUANTITY       DISCOUNT       RATE          PURCHASE DATE
101           Chocolate      Cadbury         45.0              200           100.0         50.0
2024-01-03
102           Coffee Powder   Nescafe         20.0              300           80.0          30.0
2024-04-01
103           Toothpaste     Colgate         86.0              100           0.0           90.0
2024-03-01
104           Tea Leaves     Red Label       70.0              400           100.0         80.0
2024-02-11
105           Soap          Pears           30.0              200           100.0         25.0
2024-04-03
106           Biscuit       Parle G         10.0              500           150.0         15.0
2024-05-10

=========================PRODUCT MENU=========================
1. CREATE PRODUCT
2. DISPLAY ALL PRODUCTS AVAILABLE
3. SEARCH DESIRED RECORD
4. MODIFY PRODUCT RECORD
```

```
5. DELETE PRODUCT RECORD

6. BACK TO ADMINISTRATOR MENU

==============================================================

Enter your choice (1-7): 3

Enter the product id:103

PRODUCT ID     PRODUCT NAME    PRODUCT COMPANY    PRODUCT PRICE(PER
UNIT) QUANTITY       DISCOUNT       RATE          PURCHASE DATE

103          Toothpaste     Colgate         86.0              100            0.0          90.0
2024-03-01


========================PRODUCT MENU========================

1. CREATE PRODUCT

2. DISPLAY ALL PRODUCTS AVAILABLE

3. SEARCH DESIRED RECORD

4. MODIFY PRODUCT RECORD

5. DELETE PRODUCT RECORD

6. BACK TO ADMINISTRATOR MENU

==============================================================

Enter your choice (1-7):4


=================MODIFY PRODUCT-RECORD MENU=================

1. MODIFY PRODUCT NAME

2. MODIFY PRODUCT COMPANY

3. MODIFY PRODUCT PRICE

4. MODIFY PRODUCT QUANTITY

5. MODIFY PRODUCT DISCOUNT

6. MODIFY PRODUCT SELLING RATE

7. MODIFY PRODUCT PURCHASE DATE

8. BACK TO PRODUCT MENU

==============================================================

Enter your choice (1-8):6


Enter the product id:101
Enter the new product rate:40


The modified data is:

PRODUCT ID      PRODUCT NAME    PRODUCT COMPANY    PRODUCT PRICE(PER
UNIT) QUANTITY        DISCOUNT       RATE          PURCHASE DATE

101          Chocolate      Cadbury         45.0                200             100.0          40.0
2024-01-03


==================MODIFY PRODUCT-RECORD MENU===================

1. MODIFY PRODUCT NAME

2. MODIFY PRODUCT COMPANY

3. MODIFY PRODUCT PRICE

4. MODIFY PRODUCT QUANTITY

5. MODIFY PRODUCT DISCOUNT

6. MODIFY PRODUCT SELLING RATE

7. MODIFY PRODUCT PURCHASE DATE

8. BACK TO PRODUCT MENU

=================================================================

Enter your choice (1-8):8


==========================PRODUCT MENU==========================

1. CREATE PRODUCT

2. DISPLAY ALL PRODUCTS AVAILABLE

3. SEARCH DESIRED RECORD

4. MODIFY PRODUCT RECORD

5. DELETE PRODUCT RECORD

6. BACK TO ADMINISTRATOR MENU

=================================================================

Enter your choice (1-7):5


Enter the product id:103


The modified data is:
```

```
PRODUCT ID     PRODUCT NAME    PRODUCT COMPANY    PRODUCT PRICE(PER
UNIT) QUANTITY        DISCOUNT       RATE          PURCHASE DATE

101          Chocolate      Cadbury         45.0               200            100.0         40.0
2024-01-03

102          Coffee Powder   Nescafe          20.0               300             80.0          30.0
2024-04-01

104          Tea Leaves      Red Label        70.0               400             100.0         80.0
2024-02-11

105          Soap          Pears           30.0               200            100.0         25.0
2024-04-03

106          Biscuit        Parle G          10.0               500            150.0         15.0
2024-05-10


========================PRODUCT MENU========================

1. CREATE PRODUCT

2. DISPLAY ALL PRODUCTS AVAILABLE

3. SEARCH DESIRED RECORD

4. MODIFY PRODUCT RECORD

5. DELETE PRODUCT RECORD

6. BACK TO ADMINISTRATOR MENU

============================================================

Enter your choice (1-7):6


======================ADMINISTRATOR MENU=====================

1. CUSTOMERS MENU

2. PRODUCTS MENU

3. CANTEEN SALE MENU

4. BACK TO MAIN MENU

============================================================

Enter your choice (1-4): 4


========================MAIN MENU============================

1. PRODUCTS REPORT GENERATOR

2. CUSTOMER INVOICE GENERATOR
```

```
3. ADMINISTRATOR
4. EXIT
==============================================================================
Enter your choice (1-4):1
PRODUCT ID      PURCHASE DATE      PAYMENT STATUS     DUE AMOUNT
101          2024-01-03       Yes            0.0
102          2024-04-01       No             3000.0
103          2024-03-01       Yes            0.0
104          2024-02-11       Yes            0.0
105          2024-04-03       No             4000.0
106          2024-05-10       Yes            0.0

=================================MAIN MENU=================================
1. PRODUCTS REPORT GENERATOR
2. CUSTOMER INVOICE GENERATOR
3. ADMINISTRATOR
4. EXIT
==============================================================================
Enter your choice (1-4):3

===========================ADMINISTRATOR MENU===========================
1. CUSTOMERS MENU
2. PRODUCTS MENU
3. CANTEEN SALE MENU
4. BACK TO MAIN MENU
==============================================================================
Enter your choice (1-4):3

==========================CANTEEN SALES MENU==========================
1. ADD CANTEEN SALE
2. MODIFY SALE QUANTITY
3. DELETE CANTEEN SALE
```

```
0. BACK TO ADMIN MENU
===============================================================
Enter your choice (1/2/3/0): 1

Enter CUSTOMER ID: 100001
Enter PRODUCT ID: 102
Enter QUANTITY SOLD: 5
Do you want to add more records? (y/n): y

Enter CUSTOMER ID: 123456
Enter PRODUCT ID: 105
Enter QUANTITY SOLD: 2
Do you want to add more records? (y/n): n

Record(s) added!

======================CANTEEN SALES MENU======================
1. ADD CANTEEN SALE
2. MODIFY SALE QUANTITY
3. DELETE CANTEEN SALE
0. BACK TO ADMIN MENU
===============================================================
Enter your choice (1/2/3/0): 2

Enter CUSTOMER ID: 100001
Enter PRODUCT ID: 102
Enter UPDATED QUANTITY: 3
Enter DATE OF SALE (yyyy-mm-dd): 2024-11-05

The updated data is:
CUSTOMER ID     CUSTOMER NAME        PRODUCT ID     PRODUCT NAME
PRODUCT COMPANY      RATE      QUANTITY   AMOUNT     DATE
```

```
100001        Rakhi Sharma         102          Coffee Powder       Nescafe            30.0      3
90.0      2024-11-05

123456        Kushagra Patel       105          Soap             Pears            25.0      2
50.0       2024-11-05

120034        Amar Saini          104          Tea Leaves         Red Label          80.0      1
80.0       2024-09-15

132008        Ashok Sinha         104          Tea Leaves         Red Label          80.0      1
80.0       2024-10-25

132008        Ashok Sinha         105          Soap             Pears            25.0      4
100.0      2024-10-25

132008        Ashok Sinha         106          Biscuit           Parle G           15.0      10
150.0      2024-10-25


=====================CANTEEN SALES MENU=====================

1. ADD CANTEEN SALE

2. MODIFY SALE QUANTITY

3. DELETE CANTEEN SALE

0. BACK TO ADMIN MENU
===========================================================

Enter your choice (1/2/3/0): 3


Enter CUSTOMER ID: 123456

Enter PRODUCT ID: 105

Enter DATE OF SALE (yyyy-mm-dd): 2024-11-05


The updated data is:

CUSTOMER ID   CUSTOMER NAME       PRODUCT ID    PRODUCT NAME
PRODUCT COMPANY      RATE      QUANTITY   AMOUNT     DATE

100001       Rakhi Sharma        102         Coffee Powder       Nescafe            30.0      3
150.0      2024-11-05

120034       Amar Saini         104         Tea Leaves         Red Label          80.0      1
80.0       2024-11-05

132008       Ashok Sinha        104         Tea Leaves         Red Label          80.0      1
80.0       2024-10-25

132008       Ashok Sinha        105         Soap             Pears            25.0      4
100.0      2024-10-25
```

```
132008      Ashok Sinha      106      Biscuit       Parle G       15.0    10
150.0    2024-10-25


======================CANTEEN SALES MENU======================
1. ADD CANTEEN SALE
2. MODIFY SALE QUANTITY
3. DELETE CANTEEN SALE
0. BACK TO ADMIN MENU
===============================================================
Enter your choice (1/2/3/0): 0


======================ADMINISTRATOR MENU======================
1. CUSTOMERS MENU
2. PRODUCTS MENU
3. CANTEEN SALE MENU
4. BACK TO MAIN MENU
===============================================================
Enter your choice (1-4):4


===========================MAIN MENU===========================
1. PRODUCTS REPORT GENERATOR
2. CUSTOMER INVOICE GENERATOR
3. ADMINISTRATOR
4. EXIT
===============================================================
Enter your choice (1-4):2


Enter CUSTOMER ID: 132008
Enter DATE OF SALE (yyyy-mm-dd): 2024-10-25


                    INVOICE
Customer ID : 132008                  Date : 2024-10-25
Customer Name : Ashok Sinha
Customer Phone No. : 8240963537

PRODUCTID  PRODUCTNAME  PRODUCTCOMPANY  RATE  QUANTITY AMOUNT
104           Tea Leaves          Red Label              80.0      1           80.0
105           Soap                Pears                  25.0      4          100.0
106           Biscuit             Parle G                15.0      10         150.0
                                                                   TOTAL     330.0

Total GST: 5%
Amount after GST: Rs. 346.5

Payable Amount: Rs. 346.5

Want to generate another invoice? (y/n): n

==========================MAIN MENU==========================
1. PRODUCTS REPORT GENERATOR
2. CUSTOMER INVOICE GENERATOR
3. ADMINISTRATOR
4. EXIT
==============================================================
Enter your choice (1-4):4

Program Exited!
```

Challenges faced

1. Preventing data leaks.
2. Limiting access depending on varied user roles.
3. Invoice generation disruptions.
4. Handling errors using the try-except methodology.
5. Preventing duplicate data entry.
6. Efficient indexing to maintain performance.
7. Making it efficient.
8. Taking care of intricate technicalities when combining the menus altogether.
9. Maintaining the consistency of data.

Learning and key takeaways

1. Learning to create tables for inventory, users, transactions and biling.
2. Understanding of important MySQL concepts like primary key, foreign keys and relationships.
3. Learning to connect Python to SQL which forms the core of our programme.
4. Improved and refined skills in writing clean, modular and reusable codes.
5. Integration skills become enhanced.

Future Enhancement

- **Enhanced Reporting:** Implement reports for **Low Stock Alerts** (displaying products below a set quantity threshold) and **Profit/Loss Analysis** (calculating revenue vs. cost).
- **Security Implementation:** Add a proper **User Authentication** and role-based access control system (Admin vs. Clerk) to directly address the system's **Security** NFR.
- **Performance Optimization:** Integrate support for **Barcode Scanning** into the sales module to drastically speed up transaction processing and improve input accuracy.

Conclusion

The **Canteen Management System** successfully fulfilled its objectives by delivering a robust, automated operational tool for the CSD, built on **Python** and a **MySQL** database. This project's strength lies in its adherence to the **Three-Tier Architecture**, which cleanly separates the Presentation (CLI), Logic, and Data layers. This design choice ensures the system is inherently **maintainable** and scalable for future enhancements.

The system now offers comprehensive **CRUD functionality** across the three major operational modules: Customer, Product, and Sales. A key achievement was implementing the complex, synchronized database logic within the **Sales Module**, which ensures that transactions are instantly logged while **concurrently adjusting the product inventory** in real-time. This eliminates the manual errors and stock discrepancies that were the core problems addressed by the system.

Ultimately, the Canteen Management System provides the administration with the necessary tools from accurate inventory tracking and automated transaction processing to detailed **invoice generation** to operate with greater efficiency and transparency, ensuring the continued effective service to Defence Personnel and their families. This serves as a strong platform demonstrating practical application of relational database principles and modular programming.

Bibliography

1. Python Programming: An Introduction to Computer Science" by John Zelle
2. MySQL Documentation: https://dev.mysql.com/doc/
3. scribd.com
4. Slideshare.com