Object Oriented Programming – CS 2M
Spring 2023 – Semester Project

Point of Sale Terminal

Deadline: 10 May 2023 11:59 pm

General Instructions:

- Read the booklet carefully before attempting the project.
- The project is in pairs of two. If you want to do the project individually, you are free to do so. Fill in the attached sheet with the names of the team members.
- DO NOT USE ONLINE COMPILERS.
- The names of file must your complete roll number (22L-XXXX).
- Your code must be properly commented and indented. This carries weightage.
- Any sort of plagiarism, either from the internet or with your peers, will result in a zero in your project.
- PLAGIARISM WILL BE STRICTLY DETECTED through plagiarism checking softwares. Be careful.
- In case of valid doubts or questions, you can email the TA at l216269@lhr.nu.edu.pk

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0. Introduction

We need a software implementation of a Point of Sale terminal at a general store. The users of the system are the cashiers sitting at the sales terminals of the store. The users can use the system to manage sales items in the store, customer details and of course the sales/orders. The system should be capable of presenting some reports related to the sales, items and customers. All data should be stored in files at necessary intervals. The details are presented in the booklet.

1. User Interface

You are not put in the trouble of creating some fancy GUIs at the moment. A simple console based system will suffice as well, at the moment. When the system starts up, the user is presented with the main menu as follows:

1.1. Main Menu

```
1. Manage Items
2. Manage Customers
3. Make New Sale
4. Make Payment
5. Exit

(Press 1 to 5 to select an option)
```

The user (cashier) selects their desired option by pressing one of the numbers from 1 to 5. Upon selecting an option from the main menu, the system presents user with a corresponding sub menu. The details are as follows:

1.2. Items Menu

```
1. Add new Item
2. Update Item details
3. Find Items
4. Remove Existing Item
5. Return to Main Menu

(Press 1 to 5 to select an option)
```

1.3. Customers Menu

```
1. Add new Customer
2. Update Customer details
3. Find Customer
4. Remove Existing Customer
5. Return to Main Menu

(Press 1 to 5 to select an option)
```

2. Details & Functionalities

2.1. Items Menu

When the user (cashier) selects the ***Manage Items*** option from the main menu, they are presented with the ***Items Menu***. The user is allowed to *add new Item, update Item information, search for Items and remove an existing Item.*

2.1.1. Add New Item

When the user selects add new Item option then, system prompts the user to enter the following information of the Item:

```
+ ------------------------------------------------------------ +
   Item_SKU        Description          Price           Quantity
+ ------------------------------------------------------------ +
```

Upon getting all information, the system confirms from the user to save the information. If the user confirms, the system saves the information to file and then shows confirmation message (e.g. Item Information successfully saved) and automatically returns to the Item Menu.

Note: When a new Item is added, the creation date will be the current date to be stored in the table.

2.1.2. Modify Item Details

The system asks user to enter ***Item_SKU***. If found, the system displays the item data. The system then asks the user (cashier) to enter the item details which they want to modify, and to leave blank otherwise. Upon getting all information, the system confirms from the user to save the information. If the user confirms, the system saves the information to file and then shows confirmation message (e.g. Item Information successfully saved) and automatically returns to the Item Menu.

2.1.3. Find Item

The system asks the user to enter any of the item information. If the item is found in the file (the user can leave blank the fields they do not want in the search criteria), they view the information. The screen presented should look something like this:

```
Please specify at least one of the following to find the item. Leave
all fields blank to return to Customers Menu:

Item_SKU:

Description:

Price:

Quantity:

Creation Date:
```

If the item is found, then its details are displayed or an appropriate message is displayed on the screen. Following output is shown to the user:

```
+ ------------------------------------------------------------ +
   Item_SKU        Description          Price          Quantity
+ ------------------------------------------------------------ +
       1        HP Printer              10,000          150
       2        Focus Keyboard          500             200
+ ------------------------------------------------------------ +
```

2.1.4. Remove Item

The system asks user to enter ***Item_SKU***. If found, the system displays the item data, and asks for delete/remove confirmation. After the confirmation the specified ***Item_SKU*** and its corresponding fields are removed from the file.

Note: An item should only be allowed to remove if there is no recorded sale for the item at the moment and appropriate message should be displayed to the user for those items.

2.2. Customers Menu

When the user selects the ***Manage Customers*** option from the main menu, they are presented with the ***Customers Menu***. The user is allowed to *add new customers*, *update their information*, *search for customers*, and *remove an existing customer*.

2.2.1. Add New Customer

When the user selects add new customer option, then system prompts the user to enter the following information of the customer:

```
+ ------------------------------------------------------------ +
        CNIC       Name       Email      Phone      Type
+ ------------------------------------------------------------ +
```

Upon getting all information, the system generates the object of required type, save the information, and then shows confirmation message (e.g. Customer Information successfully saved) and returns to the Customers Menu.

Note: When a new customer is added, their Payable Amount will be zero.

2.2.2. Modify Customer Details

The system asks user to enter ***CNIC***. If it is found, the system asks user to enter the customer details which they want to modify and to leave blank otherwise. Upon getting all information, the system confirms from the user to save the information. If the user confirms, the system saves the information to file and shows confirmation message (e.g. Customer Information successfully saved) and again the Customers Menu.

2.2.3. Find Customer

The system asks the user to enter any of the customer information and then finds the customer from the file according to the given information. The user can leave blank the fields they do not want in the search criteria. The screen presented should look something like this:

```
Please specify at least one of the following to find the customer.
Leave all fields blank to return to Customers Menu:

CNIC:

Name:

Email:

Phone:

Type:
```

If the customer is found, then their details are displayed or an appropriate message is displayed on the screen. The following output is shown to the customer:

```
+ ------------------------------------------------------------ +
   CNIC              Name        Email       Phone       SalesLimit
+ ------------------------------------------------------------ +
   38603-9907626-1   Javed Ahmed javed@nu.edu.pk   03004433333  650.00
   35203-1523130-7   Omer Khan   omer@nu.edu.pk    03334444433  790.00
+ ------------------------------------------------------------ +
```

2.2.4. Remove Existing Customer

The system asks user to enter ***CNIC***. If found, the system displays the customer data, and asks for delete/remove confirmation. After the confirmation the specified ***CNIC*** and its corresponding fields are removed from the file.

*Note: a **CNIC** that is associated with any sales cannot be removed from the system and appropriate message should be displayed to the user.*

2.3. Make New Sale

When the user selects the ***Make New Sale*** option from the Main Menu, the screen appears with the sale date/time and ***SalesID*** of the new sale. The cashier is prompted to enter the ***CNIC*** and system waits for input from the cashier. Here is an example screen:

```
Sales ID: 1
Sales Date: 05/06/2020
Enter CNIC: 35203-1523130-7
```

The cashier is then asked to add items for this sale. They are prompted to enter ***Item_SKU*** and system waits for input from the cashier. As soon as the cashier enters ***Item_SKU***, system displays item's ***Description*** and ***Price***, if a correct ***Item_SKU*** is found, and prompts cashier to enter ***Quantity***. Here is an example screen:

```
Item_SKU: 123
Description: C++: The Complete Reference
```

```
Price: Rs. 650.00
Quantity: 1
Sub-Total: Rs. 650.00

Press 1 to Enter New Item
Press 2 to End Sale
Press 3 to Remove an existing Item from the current sale
Press 4 to Cancel Sale
(Choose from option 1 – 4)
```

Note: Text in red represents user input and in green represent system generated output.

2.4. Enter New Item

When the user types ***1***, the system responds by prompting user once again for new ***Item_SKU***. Upon entry of each new item, the system displays the ***Total amount payable***. The process of entering new items will continue until all items have been processed, at which point the cashier selects the ***End Sale*** option.

2.5. End Sale

This system operation will involve computing the total for the sale and communicating it to the user by displaying on the console. Following output should be displayed after ending the sale:

```
Sales ID: 1                              CNIC:  35203-1523130-7
Sales Date: 06/05/2020                   Name: Omer Khan
Type: Silver Customer
   + ------------------------------------------------------------ +
        Item_SKU        Description      Quantity        Amount
   + ------------------------------------------------------------ +
        2C58       C++: Complete Reference    1          650.00
        5K62       Bioinformatics Algorithms  1          790.00
   + ------------------------------------------------------------ +
                                       Total Sales:   Rs. 1440.00
```

```
+ ------------------------------------------------------------ +

Press any key to continue . . .
```

The user will be taken to the Main Menu after ending the sale.

Note: The total sales for a single day for a single customer should not exceed the sale limit of the customer.

Note: Every new sale created against a customer will increase the customer balance by the sales amount.

2.6. Make Payment

The system prompts the user to enter the ***Sales ID,*** and if a valid ***Sales ID*** is given then following output is shown:

```
Sale ID: 3
Customer Name: Javed Ahmed
Total Sales Amount: 30,000.00
Amount Paid: 17,550.00
Remaining Amount: 12,450.00
Amount to be Paid: 10,000.00
```

In the above output, the user will enter the amount to be paid for making the payments against the sale. Following action will be taken after a payment is entered:

- A new payment will be recorded
- Customer balance will be decreased for the associated customer

*Note: The amount paid is calculated using the sum of all amounts of receipts of given **Sales ID**.*

3. Design Information and Requirements

- Use file system to store all data.
- Make sure you separate the implementation from the interface completely using N-Tier architecture.
- All data entry points should have proper error checks and error messages.
- All data entry is through command line interface.
- There must be proper commenting throughout your code.
- The code should be well indented and easy to read as your marking depends a lot on this.
- The data is to be preserved in file system using structure given below:

Classes:

Item [members]

(Item_SKU, Description, Price, AvailableQuantity, CreationDate) **Customer** [members]

(CNIC, Name, Address, Phone, Email, Type, AmountPayable, SalesLimit)

SilverCustomers [no new data members]
The sales limit for silver customer is 40,000
GoldCustomers [members]
(Discount)
Maximum discount to GoldCustomers will be 3% and sales limit is 100,000
PlatinumCustomers
(Discount)
Maximum discount to PlatinumCustomers will be 5% and sales limit is 250,000

Sales [members]

(SaleID, **Customer**, **SalesLineItem, Receipt,** date, status)
SalesLineItem [members]
(LineNo, **Sales, Item**, Quantity)
Receipt [members]

(ReceiptNo, ReceiptDate, **Sales**, Amount)

POS* [members]

(Items, Customer, Sales, Receipt)

* = Point of Sales System

You need to think about the relationship among these classes.