Object Oriented Programming (CS-217)

Instructor: **Shakeel Zafar**

Agenda: Has-a, Is-a & Polymorphism, Virtual Functions.

Total Marks: 100

Issued Date: April 7th, 2020

Submission Deadline: May 1st, 2020, Wednesday, at 11:59pm

Instructions and guidelines

- Play it safe, you should know that programming assignments are evaluated ELECTRONICALLY to detect plagiarism.**SO, DO NOT COPY! Anyone caught being indulged in the act of plagiarism may be awarded straight away an "F" grade in the course. (Work on this assignment individually)**
- **Comment and indent your code properly.**
- **Read the complete assignment statement carefully before starting the implementation.**
- **You can discuss any problem you face while working on Assignment with TA's in case you need any help.**
- **Submit this assignment's soft copy in a compressed Single Folder whose name should be your complete roll number (e.g. l191000.zip and nothing else).**
- **Your assignment will be declined if you violate any of the submission guidelines.**
- **NO LATE SUBMISSIONS WILL BE ACCEPTED. Submission procedure will be told soon.**

Best of Luck ☺

Problem Statement

The problem statement is pretty simple. We need a software implementation of a Point of Sale terminal at a typical 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. You'll come to know about the details later in this handout.

User Interface

You are not put in the trouble of creating some fancy GUIs at the moment. What you are supposed to do is to develop a simple console-based system. When the system starts the user is presented with the main menu as follows:

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 selects his/her 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:

Items Menu

1- Add new Item
2- Update Item details
3- Find Items
4- Remove Existing Item
5- Back to Main Menu

Press 1 to 5 to select an option:

Customers Menu

1- Add new Customer
2- Update Customer details
3- Find Customer
4- Remove Existing Customer
5- Back to Main Menu

Press 1 to 5 to select an option:

Items Menu

When the user selects the "Manage Items" option from the main menu he/she is presented with the "Items Menu".
The user is allowed to add new Item, update Item information and to search for Items and also remove an existing Item.

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 info the system confirms from the user to save the info and then if the user confirms the system saves the info to file and then shows confirmation message (e.g. Item Information successfully saved) and again the Item Menu.

Note that when a new Item is added the creation date will be the current date to be stored in the table.

Modify Item Details

The system asks user to enter Item_SKU and then if found displays the item data. Then the system asks user to enter the item details which he wants to modify and to leave blank otherwise.

Upon getting all info the system confirms from the user to save the info and then if the user confirms the system saves the info to file and then shows confirmation message (e.g. Item Information successfully saved) and again the Item Menu.

Find Item

The system asks the user to enter any of the item info and then finds the item from the file according to the given information. The user can leave blank the fields he/she does not want in the search criteria.
e.g. the screen presented should look 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
-----------------------------------------------------------------------------------------------------
```

Remove Existing Item

User enters the "Item_SKU" and if a valid item_SKU exist then a confirmation from the user is asked. After confirmation the specified "Item_SKU" is removed from the file.

Note that 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.

Customers Menu

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

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, Address, Phone and Email, Type
Upon getting all info the system generates the object of required type, save the info and then shows confirmation message (e.g. Customer Information successfully saved) and again the Customers Menu.

Note that when a new customer is added his payable amount will be zero.

Modify Customer Details
The system asks user to enter CNIC and then if found displays the customer data. Then the system asks user to enter the customer details which he wants to modify and to leave blank otherwise. Upon getting all info the system confirms from the user to save the info and then if the user confirms the system saves the info to file and then shows confirmation message (e.g. Customer Information successfully saved) and again the Customers Menu.

Find Customer

The system asks the user to enter any of the customer info and then finds the customer from the file according to the given information. The user can leave blank the fields he/she does not want in the search criteria.

e.g. the screen presented should look 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 his details are displayed or an appropriate message is displayed on the screen. Following output is shown to the customer:

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

Remove Existing Customer

User enters the "CNIC" and if a valid CNIC exist then a confirmation from the user is asked. After confirmation the specified "CNIC" is removed from the file.

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

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 Sales ID of the new sale. The cashier is prompted to enter the "CNIC" and system waits for input from the cashier.

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. He is prompted to enter "Item_SKU" and system waits for input from the cashier. As soon as the cashier enters Item_SKU, system displays item "Description" and "Price" if a correct Item_SKU is found and prompts cashier to enter "Quantity".

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.

Enter New Item

When the user types "1", the system responds by prompting user once again for new Item_SKU as before and 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 by typing "2".

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
5k6             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 that the total sales for a single day for a single customer should not exceed the sale limit of the customer.

Note that every new sale created against a customer will increase the customer balance by the sales amount.

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
Amount Paid: 17,550
Remaining Amount: 12,450
Amount to be Paid: 10,000
```

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 that the amount paid is calculated using the sum of all amounts of receipts of given "Sales ID".

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.