FACULTY OF COMPUTING
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KING ABDULAZIZ UNIVERSITY

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وتقنية المعلومات
جامعة الملك عبدالعزيز

King Abdulaziz University
Faculty of Computing and Information Technology
Fall 2023 – 1st Term

Course Code: CPCS 203	**Course Name: Programming II**

Online Printing Service

Assignment 1

Assigned Date: 18/09/2022

Delivery Date: 08/10/2022

Instructions

- This program must ONLY be submitted on the Blackboard!
- This project worth 15% of the overall module marks (100%).
- NO assignment will be accepted after 11:59 pm for any reason
- Students can submit their assignment between 11 and 11:59 PM but in this case it will be consider as late submission.
- For discussion schedule, check the captain name, date and time on the BlackBoard.
- ***Further information is provided in the course syllabus.***

Objectives

- Performing procedure on Objects and classes.
- Learn how to use and implement Class and Object concepts.
- Learn to use File I/O (Reading/Writing from/to files).

How to submit your assignment?

- Submit your assignment on the Blackboard ONLY.
- Make sure to add your names / IDs / Section / Your name / Assignment number at the beginning of your program

Files provided with assignment

- Input file samples:
  - **inputPrint.txt**: which contains all print services, delivery options and customer details that needs to be registered into the system.
  - **inputOrders.txt**: contains all the commands to generate invoices. These commands are read from the file and processed by the system.
- Output files:
  - **outputPrintDB.txt**: This output file displays all the registered record for the print services, delivery options and customer (The information in this file is read from **inputPrint.txt)**.
  - **outputInvoices.txt**: This output file contains a log of all the generated invoices with full details. This file also has a report at the end to show total number of orders against each customer in the system.

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Note: Please check the format of each of these files and make sure you follow this format in your assignment solution.

1.1 The Online Printing Service Description

An online printing service is a very convenient facility that offers a cost-effective alternative to anyone who wants business cards, customized posters, brochures, or any other type of print work completed quickly and effectively. Online printing is a great option for anyone who wants to save money. The customer needs only upload the files online, select the print preferences for paper, color, etc., and then the printed papers will be delivered right to the customer's doorsteps. To stay competitive in the market and bring in new customers, the online printing service is giving discounts on print orders.

The system you are required to develop is called the **Online Printing Service, and it** is expected to facilitate online customers to print their pages and assist the operational manager to keep track of all requests for successful execution. Initially, the system will register all the print services, customer, and delivery details from **inputPrint.txt.** Information read from **inputPrint.txt** is written with all the details into a file, called **outputPrintDB.txt**.

After information registration, the system will be ready to generate invoices for any registered print service. Since the data is already stored in the system, the operational manager will capture the minimum data while generating an invoice. For each invoice, the delivery service ID, print service ID, customer ID, order quantity, order date, and first order status are read from the input file **inputOrders.txt**. After processing each order, the details are written to the output file **outputInvoices.txt**. The invoice will include all the details and the total amount will be calculated by applying the discount (if applicable), adding the delivery cost as per the selected shipment company. An additional VAT amount will be added to the total amount.

For a more detailed description of the system and commands, please follow the next three steps, which will explain how to develop the **Online Printing Service**.

Step 1: Registering Print Service, Delivery Service and Customer Details

All print services, delivery services and customer details will be registered into the system before generating invoice. The first line read from ***inputOrders.txt*** contains three integers, which determine the number of registered print services, delivery services and customer. For example, the total number of registered print services is (22), the total number of delivery services is (6), and the total number of customers is (13). In the following, we describe the format of each command.

1.1 Command: AddPrintService

This command is used to add all information of the registered print services. It includes information of print service ID (such as 501), print type (such as Flyer, Brochure, BusinessCard, etc), paper finishing (such as Glossy or Matt), color mode (such as Greyscale or CMYK) and cost per print. Check the following example and table.

Command Example
`AddPrintService 501 Flyer Matt Greyscale 6.0`

Field name	Type	Example
Print Service ID	String	501
Print Type	String	Flyer
Paper Finishing	String	Matt
Color Mode	String	Greyscale
Cost	Double	6.0

1.2 Command: AddDeliveryService

This command will add delivery service details into the system.

Command Example
`AddDeliveryService 601 Local SaudiPost 18.0`

Field name	Type	Example
Delivery Service ID	String	601
Delivery Scope	String	Local
Delivery Partner	String	SaudiPost
Delivery Charges	Double	18.0

1.3 Command: AddCustomer

This command will add customer details into the system.

Command Example
`AddCustomer 1278782451 Fawad Qahtani Dammam`

Field name	Type	Example
Customer ID	String	1278782451
First Name	String	Fawad
Last Name	String	Qahtani
Address	String	Dammam

1.4 Command: Quit

The command quit will exit the process of entering the registration information.

Step 2: Generate Invoices

The order details are given in ***InputOrders.txt***. The first line of this file is an integer that determines the number of orders for which invoices should be generated. For example, in the provided file ***InputOrders.txt*** there are 30 orders, therefore, 30 invoices shall be generated for them. In the following, a more detailed description of generating invoices is provided below.

2.1 Command: GenerateInvoice

This command is used to generate invoice against each order. This command contains the basic information of print service, delivery and customer. For each order, it reads the print service ID, delivery service ID, customer ID, number of required prints, order date and first time customer status.

Command Example
`GenerateInvoice 501 601 1021236554 24 2022 9 11 true`

Field name	Type	Example
Print Service ID	String	501
Delivery ID	String	601
Customer ID	String	1021236554
Number of Prints	int	24
Order Date	Date	2022 9 11
Is First Order	Boolean	true

Consider the following notes when generating invoices:

Important Notes

- The system will read the ***Print Service ID*** as a string. You need to search for the print service object associated with the given print service ID.
- The system will read the ***Delivery Service ID*** as a string. You need to search for the delivery service object associated with the given delivery service ID.
- The system will read the ***Customer ID*** as a string. You need to search for the customer object associated with the given customer ID.
- For each invoice, the system should generate a unique sequenced ***invoice number*** starting from 1.
- **You must calculate total invoice amount by applying the following:**

  1. Print Service Discount
     Apply discount on the total of print service as:

Sr #	Condition	Discount
i.	First Time Ordering	Flat SR. 20 off (If order value is less than SR. 20, SR 0 will be charged as
ii.	Order Value < 100	No discount
iii.	Order Value from 100 to <200	10% off
iv.	Order Value from 200 to <300	15% off
v.	Order Value from 300 to <500	20% off
vi.	Order Value >500	30% off

  2. Delivery Service Discount
     After applying Print Service Discount, if the total amount is SR. 250 or above then the delivery will be free.

  3. Value Added Tax (VAT)
     After applying Print Service Discount and Delivery Service Discount, add 15% as VAT to the total amount.

Example to calculate total invoice amount:

Print Service ID: 501

Cost: SAR 6.0

No. of Prints: 24

First Order: Yes

Delivery Charges: SAR 18.0

Item	**Amount**	**Net Price**	**Comments**
Print Cost	SAR 144	SAR 144	6 x 24
Discount	SAR 14.4	SAR 129.6	10% discount (as SAR 144 is in range of 100 to <200)
First Order	SAR 20	SAR 109.6	Flat SR. 20 off for first order applied
Delivery charges	SAR 18	SAR 127.6	Order value after discount (SAR 109.6) is less than SAR 250, so delivery charges applied.
VAT	SAR 19.14	SAR 146.74	15% VAT applied on SAR 127.6
Total Invoice amount (including VAT)		**SAR 146.74**	

- All the invoices will be printed in the ***OutputInvoices.txt*** (check step 3).

1.2 Command: Quit

The command quit will exit the process of entering the order information.

Step 3: Print all the information

3.1 Print the registered print services, delivery services and customer information

As mentioned earlier, the registered print services, delivery services and customer information are read from **inputPrint.txt** and are written to the file **OutputPrintDB.txt.**

3.2 Print all generate invoices and summary report of total orders placed by each customer

The system should print a record of all generated invoices. The system will calculate the total invoice amount for each order as explained in step 2.

Once the system processes the following command from the ***inputOrders.txt,***

Command Example

```
GenerateInvoice 501 601 1021236554 24 2022 9 11 true
```

the following information presented in the table below is written to the file ***outputInvoices.txt:***

Invoice details

```
Invoice No. 1                 Date: 2022-11-9

Print Service Details
     Print Service ID: 501
     Print Type: Flyer
     Paper Finishing: Matt
     Color Mode: Greyscale
     Cost: 6.0
     No. of Prints: 24

Delivery Service Details
     Delivery Service Code: 601
     Delivery Scope: Local
     Delivery Address: SaudiPost

Customer Details
     Customer ID: 1021236554
     Full Name: Ahmed Shamrani

Total Amount: (including VAT): 146.74 SAR
```

After printing all invoices, the system will print a report showing a list of all customers with the number of orders by each customer as shown below:

Number Of Orders per Customer

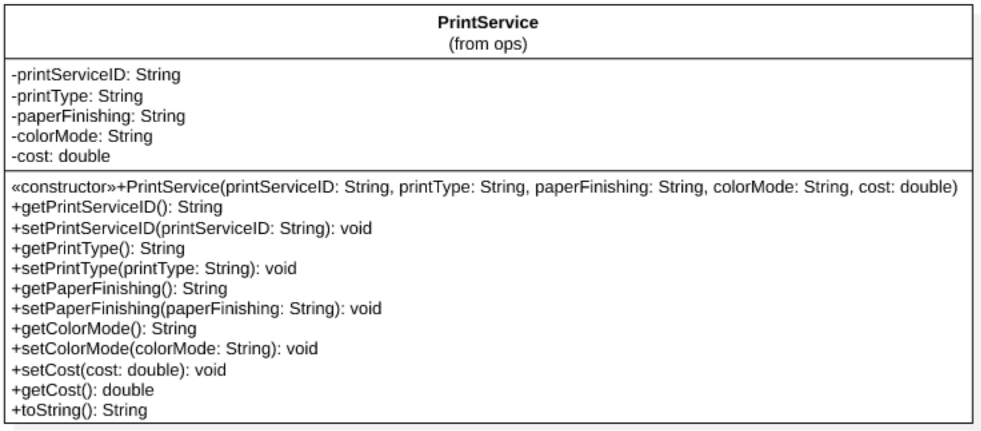
```
--------Total Print Service(s) by customer--------

Customer ID         Customer Name  Total Delivery Orders(s)

1278782451         Fawad Qahtani                         2
1021236554        Ahmed Shamrani                         1
1292114565          Jamal Albara                         1
1125198479          Abdul Rehman                         5
1265883476           Kamal Akmal                         2
1157684670         Nafey Zahrani                         2
1294526474           Abdul Hakim                         2
1025652425            Samar Zaid                         4
1203868672       Rasheed Haitham                         2
1194575453           Abdur Rahim                         2
1328730644      Rizwan AlDawsari                         1
1028758494          Usman Shabir                         3
1227796501          Arshad Zahir                         3
```

1.2 UML Class Diagram for Online Printing Service

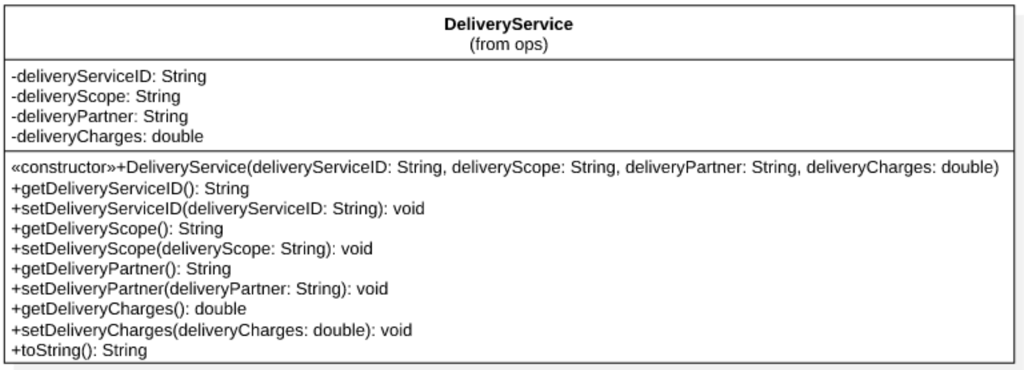
In addition to the main class, you should create four classes as shown in the following UML diagram. Note that you should write appropriate constructor, setter, and getter methods for all classes. (You don't need to follow the same given arguments). Be aware of the visibility (public-private) for each attribute/method.



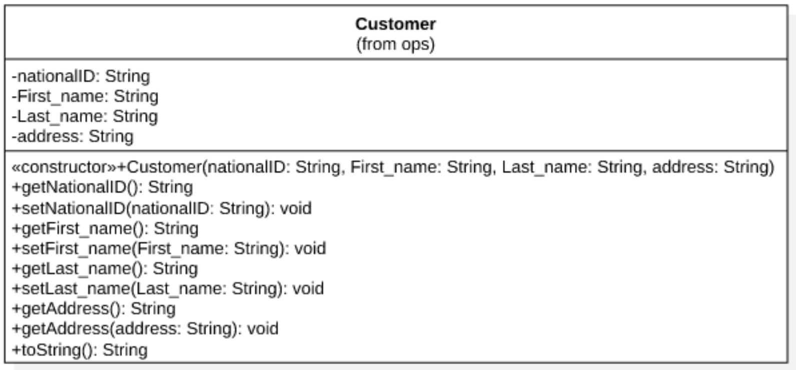
PrintService
(from ops)

-printServiceID: String
-printType: String
-paperFinishing: String
-colorMode: String
-cost: double

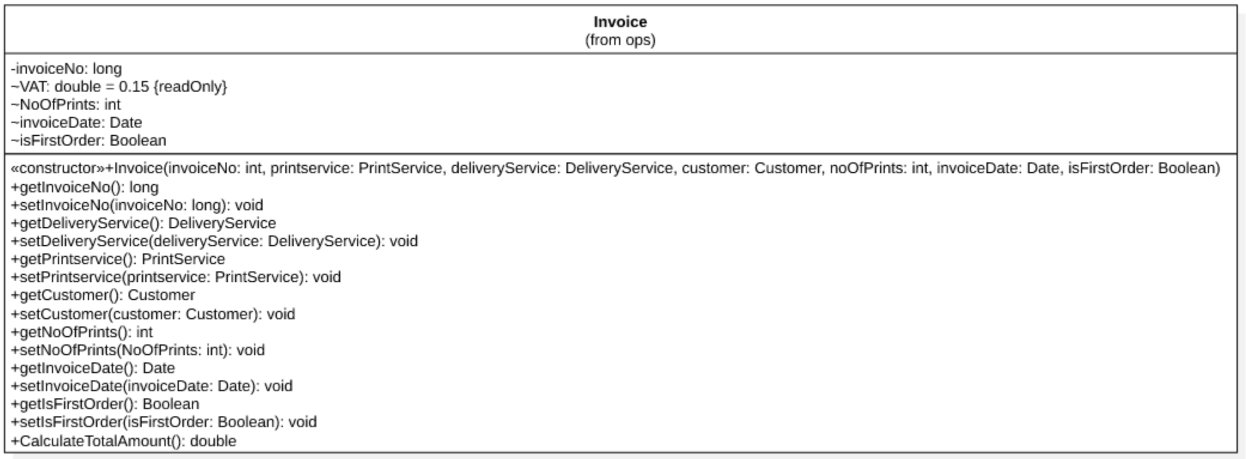
«constructor»+PrintService(printServiceID: String, printType: String, paperFinishing: String, colorMode: String, cost: double)
+getPrintServiceID(): String
+setPrintServiceID(printServiceID: String): void
+getPrintType(): String
+setPrintType(printType: String): void
+getPaperFinishing(): String
+setPaperFinishing(paperFinishing: String): void
+getColorMode(): String
+setColorMode(colorMode: String): void
+setCost(cost: double): void
+getCost(): double
+toString(): String



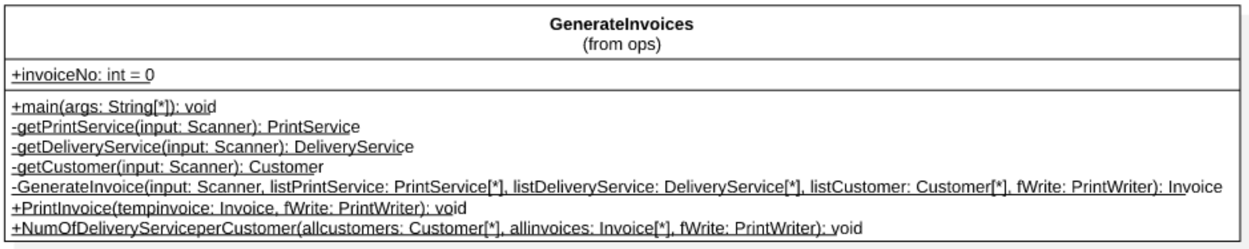
```
DeliveryService
(from ops)
-deliveryServiceID: String
-deliveryScope: String
-deliveryPartner: String
-deliveryCharges: double
«constructor»+DeliveryService(deliveryServiceID: String, deliveryScope: String, deliveryPartner: String, deliveryCharges: double)
+getDeliveryServiceID(): String
+setDeliveryServiceID(deliveryServiceID: String): void
+getDeliveryScope(): String
+setDeliveryScope(deliveryScope: String): void
+getDeliveryPartner(): String
+setDeliveryPartner(deliveryPartner: String): void
+getDeliveryCharges(): double
+setDeliveryCharges(deliveryCharges: double): void
+toString(): String
```



```
Customer
(from ops)
-nationalID: String
-First_name: String
-Last_name: String
-address: String
«constructor»+Customer(nationalID: String, First_name: String, Last_name: String, address: String)
+getNationalID(): String
+setNationalID(nationalID: String): void
+getFirst_name(): String
+setFirst_name(First_name: String): void
+getLast_name(): String
+setLast_name(Last_name: String): void
+getAddress(): String
+getAddress(address: String): void
+toString(): String
```



```
Invoice
(from ops)
-invoiceNo: long
~VAT: double = 0.15 {readOnly}
~NoOfPrints: int
~invoiceDate: Date
~isFirstOrder: Boolean
«constructor»+Invoice(invoiceNo: int, printservice: PrintService, deliveryService: DeliveryService, customer: Customer, noOfPrints: int, invoiceDate: Date, isFirstOrder: Boolean)
+getInvoiceNo(): long
+setInvoiceNo(invoiceNo: long): void
+getDeliveryService(): DeliveryService
+setDeliveryService(deliveryService: DeliveryService): void
+getPrintservice(): PrintService
+setPrintservice(printservice: PrintService): void
+getCustomer(): Customer
+setCustomer(customer: Customer): void
+getNoOfPrints(): int
+setNoOfPrints(NoOfPrints: int): void
+getInvoiceDate(): Date
+setInvoiceDate(invoiceDate: Date): void
+getIsFirstOrder(): Boolean
+setIsFirstOrder(isFirstOrder: Boolean): void
+CalculateTotalAmount(): double
```



```
GenerateInvoices
(from ops)
+invoiceNo: int = 0
+main(args: String[*]): void
-getPrintService(input: Scanner): PrintService
-getDeliveryService(input: Scanner): DeliveryService
-getCustomer(input: Scanner): Customer
-GenerateInvoice(input: Scanner, listPrintService: PrintService[*], listDeliveryService: DeliveryService[*], listCustomer: Customer[*], fWrite: PrintWriter): Invoice
+PrintInvoice(tempinvoice: Invoice, fWrite: PrintWriter): void
+NumOfDeliveryServiceperCustomer(allcustomers: Customer[*], allinvoices: Invoice[*], fWrite: PrintWriter): void
```

Important Notes:

- Use of class & object, arrays of Object, and passing object to method
- Use of Files, Reading/Writing from/on files
- Your program output must be exactly same as given sample output files.
- Your display should be in a readable form.
- Organize your code in separated methods.
- Document your code with comments.
- Use meaningful variables.
- Use dash lines between each method.
- **Delayed submission will not be accepted and there will not be any extension of the project.**

Deliverables:

- You should submit one zip file containing all java codes: CA2089765P1_EasyRent.java where CA is your section, 2089765 your ID and P1 is program 1.
- **NOTE: your name, ID, and section number should be included as comments in all files!**

Input and Output Format

Your program must generate output in a similar format to the sample run provided.

Sample input: See sample input file.

Sample output: See sample output files.

Good Luck!