CSE212: SOFTWARE DEVELOPMENT METHODOLOGIES

YEDITEPE UNIVERSITY

SPRING 2022

ASSIGNMENT 3 – DUE DATE MAY 1ST, 2022

This semester, you will be implementing a *Fuel Station Management System* as part of your assignment series. In this context, you are a large corporate fuel company that wants to streamline management on its fuel stations.

For the third assignment, you are asked to use **polymorphism** to calculate the net profit of a fuel station.

You should implement the following additional classes and their respective instance variables/methods:

CarWash:
```
basePrice = 10 (final static double)
void displayServiceInfo()
```

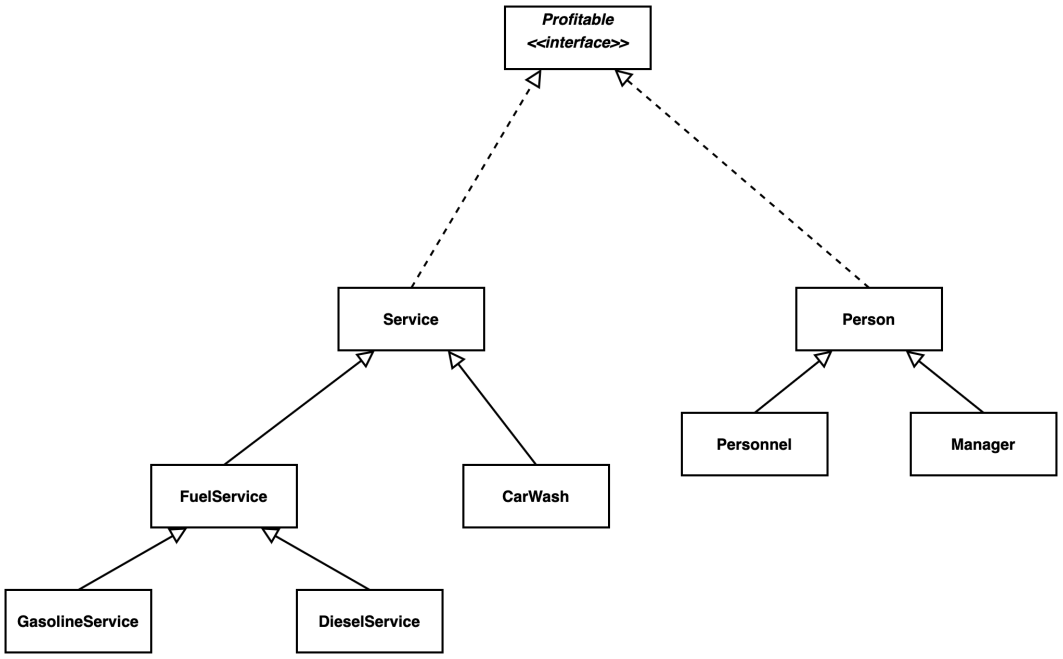
Person:
```
name (String)
surname (String)
salary (double) (base salary should be 100)
void displayInformation()
```

Personnel:
```
jobCount (int)
void incJobCount()
```

Manager:
```
jobYear (int)
```

Profitable (interface):
```
double calculate()
```

You should construct the following class hierarchy by using inheritance and polymorphism.



You should define the appropriate classes as abstract. The classes that should be defined as abstract are the ones whose objects are not created using the **new** keyword.

You should implement the `Profitable` interface in `Service` and `Person` classes. The `calculate()` method coming from the interface should be written in `GasolineService`, `DieselService`, `CarWash`, `Personnel`, and `Manager` classes.

In `GasolineService`, `DieselService`, `CarWash` the `calculate()` method should return the revenue directly. On the other hand, the `calculate()` method should return the "base salary (100) + `jobCount` * 1.5" in `Personnel` class and "base salary (100) + manager extra (200) + `jobYear` * 50" in `Manager` class.

Note that the "calculate" method returns + (positive) values for income generating services (gasoline, diesel, wash) and - (negative) values for expenses (such as personnel and manager salaries).

Your application should be able to handle the following scenario and requirements:

- You have to create a Menu to display the menu items. Use **enumerations (enum)** to print the menu items. When a user starts your application, it should prompt the following menu:

```
1. Create a new station
```

```
2. Add gasoline to a station inventory
3. Add diesel to a station inventory
4. Display a station inventory
5. Sell gasoline to customer
6. Sell diesel to customer
7. Sell car wash
8. Display sold services so far
9. Add personnel/manager to a station
10. Calculate net profit of a station
0. Exit
```

- When the user selects the 5th, 6th, and 7th option, the system automatically assigns a personnel to sell that service. For example, in the 5th option, when gasoline is sold to a customer, the system picks a random personnel from the personList and increments its job count using the `jobCount()` method.
- When the user selects the 7th option, the program should ask for a station ID to search the `stationArray` and find the `Station` object that has the given ID. When the object is found, then the program should create a `CarWash` object by requesting the information (car plate) from the user. Then, this `CarWash` object should be added to the `serviceArray` of the corresponding `Station` object. If there are no `Stations` in the `stationArray` with the given ID, then the program should print "No station found with the given ID!".
- When the user selects the 9th option, a sub-menu should appear to ask for personnel or manager. Then, the program should ask for a station ID to search the `stationArray` and find the `Station` object that has the given ID. When the object is found, then the program should create a `Personnel/Manager` object by requesting the information from the user. Then, this `Personnel/Manager` object should be added to the `personList` of the corresponding `Station` object. If there are no `Stations` in the `stationArray` with the given ID, then the program should print "No station found with the given ID!".
- When the user selects the 10th option, the program should ask for a station ID to search the `stationArray` and find the `Station` object that has the given ID. The program should call the calculate() method of each object and calculate the overall profit (weather - or +) of the station. Note that you can

use an ArrayList<Profitable> to add all the applicable objects when adding them to their respective arrays.

- When a user selects the 0th option, your application should terminate.

Rules that you must follow

1. You are given a MainClass.java file. Here you can find the main method and the general outline of the menu structure. You can also find the necessary method calls that perform the 7th, 9th, and 10th options of the menu.
    a. *public static void sellCarWash(Station[] stationArray)*
    b. *public static void addPerson(Station[] stationArray)*
    c. *public static void calculateNetProfit(Station[] stationArray)*
2. These methods listed above must be defined in the Station class and should be static such that you can access them from the main method directly. What they do is self explanatory as it can be understood from their name.
3. You are **not allowed** to make any changes to the MainClass.java file.
4. Your class, variable, method, etc. names should be defined as indicated in this PDF file unless stated otherwise.
5. **If your code does not compile you won't get any credit!**
6. Your program output should **match** the example given below. Keep in mind the spaces, empty lines, asking the user input in the same line, etc.
7. Write each class in a separate .java file.

Application Walkthrough

```
1. Create a new station
2. Add gasoline to a station inventory
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4. Display a station inventory
5. Sell gasoline to customer
6. Sell diesel to customer
7. Sell car wash
8. Display sold services so far
9. Add personnel/manager to a station
10. Calculate net profit of a station
0. Exit
1
Please enter the name of the Station: java
Please enter the Station ID: 1
```

```
1. Create a new station
2. Add gasoline to a station inventory
3. Add diesel to a station inventory
4. Display a station inventory
5. Sell gasoline to customer
6. Sell diesel to customer
7. Sell car wash
8. Display sold services so far
9. Add personnel/manager to a station
10. Calculate net profit of a station
0. Exit
9
1. Add a personnel
2. Add a manager
1

Please enter the ID of the Station you want to add a person: 1

Please enter a name: a
Please enter a surname: a

1. Create a new station
2. Add gasoline to a station inventory
3. Add diesel to a station inventory
4. Display a station inventory
5. Sell gasoline to customer
6. Sell diesel to customer
7. Sell car wash
8. Display sold services so far
9. Add personnel/manager to a station
10. Calculate net profit of a station
0. Exit
9
1. Add a personnel
2. Add a manager
1

Please enter the ID of the Station you want to add a person: 1

Please enter a name: b
Please enter a surname: b

1. Create a new station
2. Add gasoline to a station inventory
3. Add diesel to a station inventory
4. Display a station inventory
```

```
5. Sell gasoline to customer
6. Sell diesel to customer
7. Sell car wash
8. Display sold services so far
9. Add personnel/manager to a station
10. Calculate net profit of a station
0. Exit
9
1. Add a personnel
2. Add a manager
2

Please enter the ID of the Station you want to add a person: 1

Please enter a name: c
Please enter a surname: c
Please enter how many years the manager is working: 3

1. Create a new station
2. Add gasoline to a station inventory
3. Add diesel to a station inventory
4. Display a station inventory
5. Sell gasoline to customer
6. Sell diesel to customer
7. Sell car wash
8. Display sold services so far
9. Add personnel/manager to a station
10. Calculate net profit of a station
0. Exit
2
Please enter the ID of the Station you want to search: 1

Please enter the origin of gasoline: a
Please enter the price per liter: 1.4
Please enter the total shipment volume in liter: 1000

The total gasoline liters in Station #1 is 1000.0
The average gasoline price in Station #1 is 1.4

1. Create a new station
2. Add gasoline to a station inventory
3. Add diesel to a station inventory
4. Display a station inventory
5. Sell gasoline to customer
6. Sell diesel to customer
7. Sell car wash
```

```
8. Display sold services so far
9. Add personnel/manager to a station
10. Calculate net profit of a station
0. Exit
3
Please enter the ID of the Station you want to search: 1

Please enter the origin of Diesel: b
Please enter the price per liter: 2.1
Please enter the total shipment volume in liter: 500

The total diesel liters in Station #1 is 500.0
The average diesel price in Station #1 is 2.1

1. Create a new station
2. Add gasoline to a station inventory
3. Add diesel to a station inventory
4. Display a station inventory
5. Sell gasoline to customer
6. Sell diesel to customer
7. Sell car wash
8. Display sold services so far
9. Add personnel/manager to a station
10. Calculate net profit of a station
0. Exit
4
Please enter the ID of the Station you want to display: 1

Displaying the inventory of Station #1

Gasoline...
The origin is: a
Price per liter is: 1.4
Total liters of this gasoline is: 1000.0

The total gasoline liters in Station #1 is 1000.0
The average gasoline price in Station #1 is 1.4

Diesel...
The origin is: b
Price per liter is: 2.1
Total liters of this Diesel is: 500.0

The total diesel liters in Station #1 is 500.0
The average diesel price in Station #1 is 2.1
```

```
1. Create a new station
2. Add gasoline to a station inventory
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4. Display a station inventory
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7. Sell car wash
8. Display sold services so far
9. Add personnel/manager to a station
10. Calculate net profit of a station
0. Exit
5
Please enter the ID of the Station you want to sell Gasoline: 1

Please enter the car plate: 34 rr 55
Please enter the gasoline liter: 50
Please enter if you have a coupon (y/n): n
Personnel that helped during this service:
Name: a
Surname: a

1. Create a new station
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4. Display a station inventory
5. Sell gasoline to customer
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7. Sell car wash
8. Display sold services so far
9. Add personnel/manager to a station
10. Calculate net profit of a station
0. Exit
6
Please enter the ID of the Station you want to sell Diesel: 1

Please enter the car plate: 34 tt 78
Please enter the diesel liter: 70
Please enter if you want discounted anti-freeze (y/n): n
Personnel that helped during this service:
Name: a
Surname: a

1. Create a new station
2. Add gasoline to a station inventory
3. Add diesel to a station inventory
4. Display a station inventory
```

```
5. Sell gasoline to customer
6. Sell diesel to customer
7. Sell car wash
8. Display sold services so far
9. Add personnel/manager to a station
10. Calculate net profit of a station
0. Exit
7
Please enter the ID of the Station you want to sell car wash: 1

Please enter the car plate: 34 ee 21
Personnel that helped during this service:
Name: a
Surname: a

1. Create a new station
2. Add gasoline to a station inventory
3. Add diesel to a station inventory
4. Display a station inventory
5. Sell gasoline to customer
6. Sell diesel to customer
7. Sell car wash
8. Display sold services so far
9. Add personnel/manager to a station
10. Calculate net profit of a station
0. Exit
8
Please enter the ID of the Station you want to display: 1

Displaying the sold services of Station #1

Gasoline Service...
Bought 50.0 liters.
Car Plate is 34 rr 55.
The revenue from this service is 70.0.

Diesel Service...
Bought 70.0 liters.
Car Plate is 34 tt 78.
The revenue from this service is 147.0.

Car Wash Service...
Car Plate is 34 ee 21.
The revenue from this service is 10.0.

1. Create a new station
```

```
2. Add gasoline to a station inventory
3. Add diesel to a station inventory
4. Display a station inventory
5. Sell gasoline to customer
6. Sell diesel to customer
7. Sell car wash
8. Display sold services so far
9. Add personnel/manager to a station
10. Calculate net profit of a station
0. Exit
10
Please enter the ID of the Station you want to calculate profit: 1

Personnel: -104.5
Personnel: -100.0
Manager: -450.0
GasolineService: 70.0
DieselService: 147.0
CarWash: 10.0
Net profit of station is: -427.5

1. Create a new station
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5. Sell gasoline to customer
6. Sell diesel to customer
7. Sell car wash
8. Display sold services so far
9. Add personnel/manager to a station
10. Calculate net profit of a station
0. Exit
0
```

Submit your assignments in a zip file, which has your student number as name, through the YULEARN (https://yulearn.yeditepe.edu.tr) latest by the end of Sunday, May 1st, 2022.