Lab: Dependency Inversion and Interface Segregation Principles

Problems for exercises and homework for the "Java OOP Advanced" course @ SoftUni.

Part I: Dependency Inversion

1. System Resources

You are given a **`GreetingClock.`** It has the following behavior:

- if hour < 12, prints **"Good morning…"**
- if hour < 18, prints **"Good afternoon…"**
- else prints **"Good evening…"**

Refactor the code so that it conforms to the Dependency Inversion principle.

* Optional: Introduce **Strategy Design Pattern**

Solution

Create a new interface **`TimeProvider`** that has a single method **`getHour():int`**

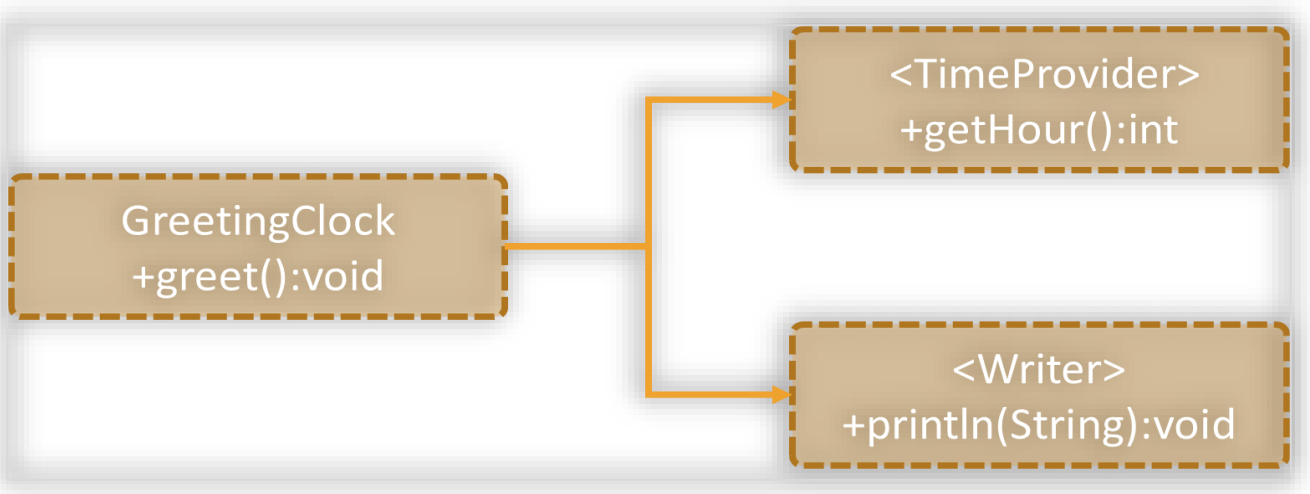
Create an implementation of the interface that can provide the hour (You can use **`LocalTime`** java class)

Inject **`TimeProvider`** through the clock's constructor

Create a new interface **`Writer`** that has a single method **`println(String):void`**

Create an implementation that uses a class that can print to the console

Inject **`Writer`** through the clock's constructor and use it to write to the console



2. Services

You are given some classes:

- **`OnlineStoreOrder`**
- **`SmsNotificationService`**

- **`EmailNotificationService`**

Once the order is **processed** it should **send** the proper **notifications** through the services, if they are active.

Refactor the classes so that they conform the Dependency Inversion principle

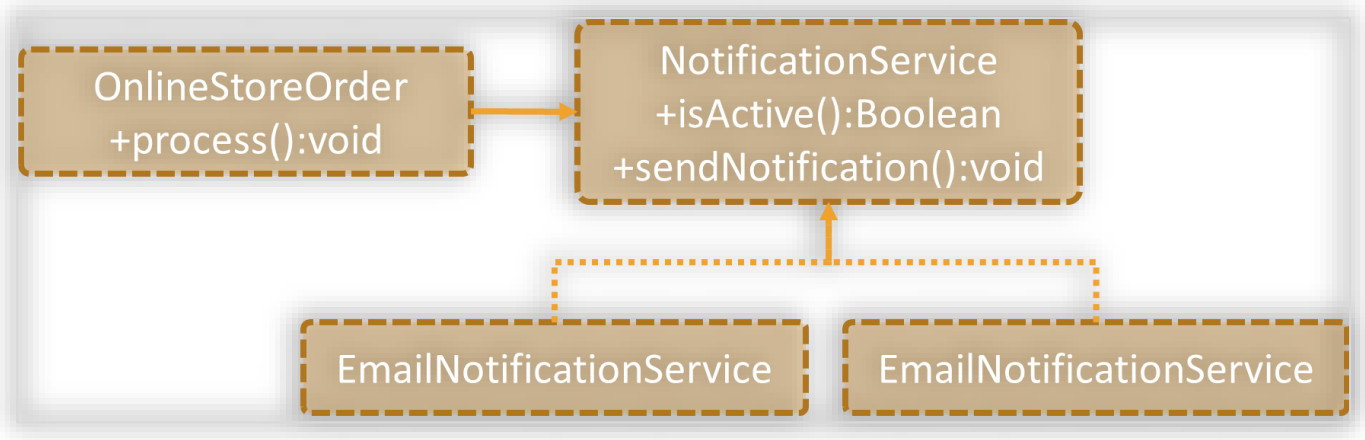
* Optional: Introduce **Composite Design Pattern**

Solution

Introduce a new interface called **`NotificationService`** and make all notification services to implement it

Either inject variable number of parameters in the **`OnlineStoreOrder`** or create a **`CompositeNotificationService`** implementation

`CompositeNotificationService` should implement **`NotificationService`**



3. Employee Info

You are given the classes:

- **`Employee`**
- **`EmployeeInfoProvider`**
- **`EmployeeDatabase`**
- **`ConsoleFormatter`**

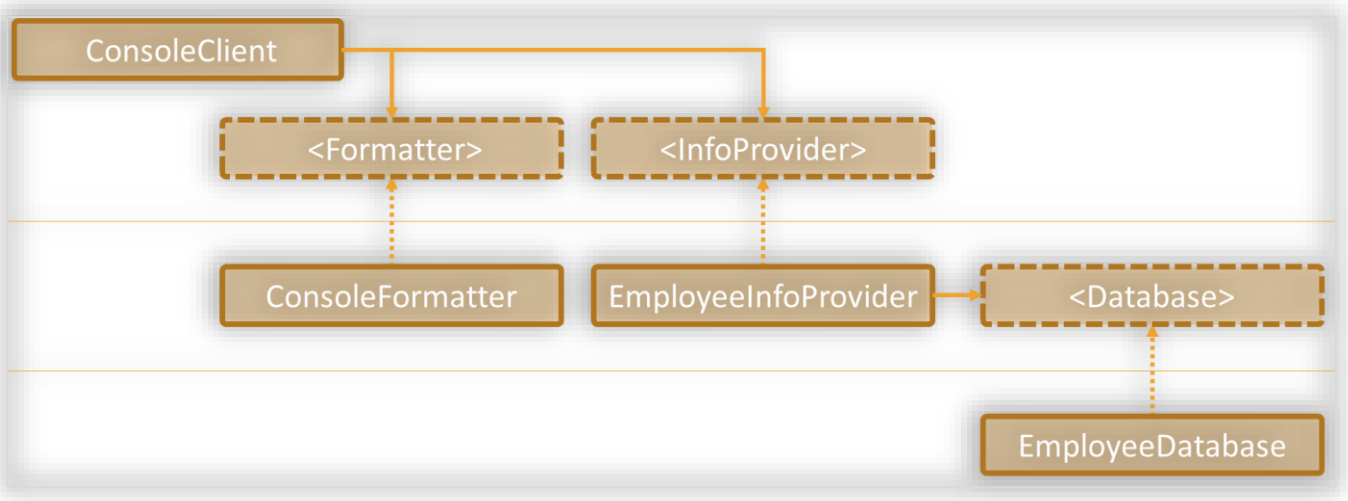
EmployeeInfoProvider **provides a list of employees to be formatted to a** String **by the** ConsoleFormatter**. Then the string is printed to the console.** Refactor the classes and the structure to conform to the **Dependency Inversion** principle.

Hints

Create an abstraction between every layer of the application

Create a **`ConsoleClient`** which will run the application. Define the abstractions by using as a guide the **`ConsoleClient`**'s needs (It needs some kind of Formatter and some kind of **`InfoProvider`**)

`EmployeeInfoProvider` needs a database, so define abstraction by looking at what methods **`EmployeeInfoProvider`** needs



Part II: Interface Segregation

4. Recharge

You are given a library with the following classes

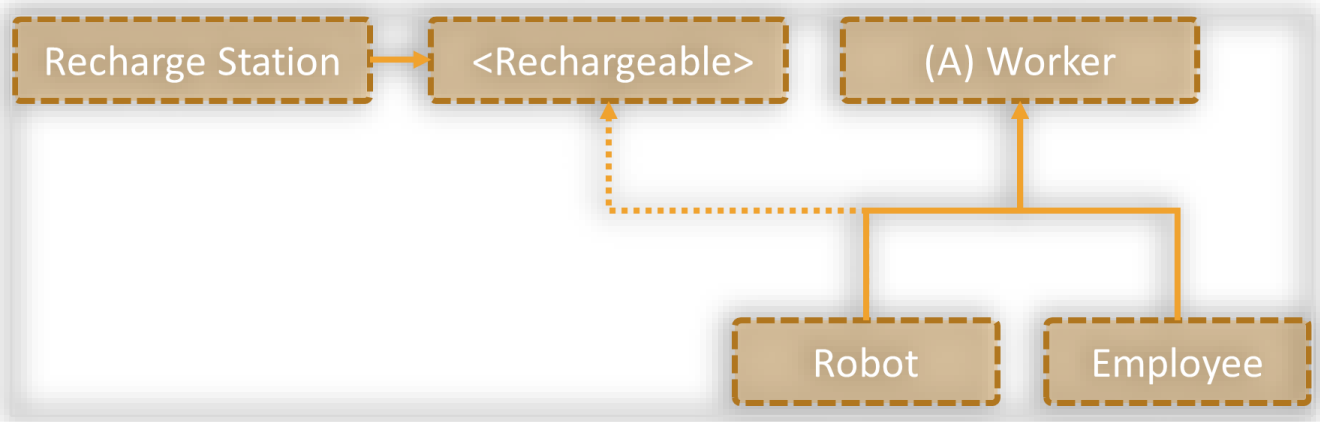
- `Worker implements Sleeper`
- `Employee extends Worker`
- `Robot extends Worker`
- `RechargeStation`

If you inspect the code, you can see that some of the classes have methods that they can't use (throw `UnsupportedOpperationException`) which is clear indication that the code should be refactored.

Refactor the structure so that it conforms to the **Interface Segregation** principle.

Hints

Make the `Robot` to extend `Worker` and at the same time to implement `Rechargeable`



5. Security Door

You are given:

- **`SecurityManager`**
- abstract class **`SecurityCheck`**
- interface **`SecurityUI`**

`SecurityManager` which can interact with a user by validating his key card or by getting his pin code. Both methods are provided by an interface called **`SecurityUI`**. The validation is performed by the appropriate **`SecurityCheck`** class.

Refactor the structure so that it conforms to the **Interface Segregation** principle.

Hints

Split **`SecurityUI`** into smaller role interfaces, one for each **`SecurityCheck`** class.