

CSE-3216: Software Design Patterns

Assignment 01

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**Scenario:**

A vehicle registration happens in Bangladesh, and involves a particular vehicle and its owners. You may assume that there is only one owner per vehicle. Each vehicle maps to a vehicle description that includes its manufacturing date, model, year, and manufacturer. A registration can be renewed multiple times for the same owner and vehicle at the same county OR a different one. It is necessary to keep track of the City in which the renewal was made. The vehicle registration system is to be designed for quick retrieval of information about any vehicle or any vehicle owner (in any City) and the related registration details.

**Classes build:**

* RegistrationInterface : Interface
* VehicleRegistration : Class
* BangladeshVehicleRegistrationCenter : Class
* VehicleRegistryDatabaseBangladesh : Class
* Owner : Class
* Vehicle : Class
* Bus : Class
* Car : Class
* Motorcycle : Class

**Patterns Used and Assumptions Made:**

**Singleton Design Pattern** **:**

VehicleRegistryDatabaseBangladesh class is a database controller where all the Owner and Vehicle registered and renewed data are stored and retrieved. VehicleRegistryDatabaseBangladesh database controller class has only one object thus implementation is done using the singleton design pattern. The methods that is consists of is addVehicleToRegistry(), deleteVehicleFromRegistry(), fetchDataForVerification(), registrationPaymentStatus(), updateDatabaseStatusToRegistred(), alreadyRegistred(), renewRegistration(), notRegistredYet() and renewRegistrationUpdateDatabase().

**Composite Design Pattern :**

As the structure or scenario can be thought recursively as a tree, we have implemented a composite design pattern. Here we have followed the composite design pattern to implement BangladeshVehicleRegistrationCenter.

BangladeshVehicleRegistrationCenter class has a combination of different Car, Bus and Motorcycle classes, where there is only one Owner per Vehicle (Car, Bus and Motorcycle).

Owner class has attributes: name, phoneNumber, dateOfBirth, passport, city, country and payment status.

Vehicle (Car, Bus and Motorcycle) classes have attributes: owner.name, model, horsePower, vehicle name.

In BangladeshVehicleRegistrationCenter (class), one can register or renew vehicles using the VechicleRegistration class object. BangladeshVehicleRegistrationCenter (class) then uses VehicleRegistryDatabaseBangladesh to store and retrieve information related to the different Cars, Buses and Motorcycle classes and their Owners. The BangladeshVehicleRegistrationCenter can retrieve any information of the Owner or the Vehicles (Car, Bus or Motorcycle).

**Decorator Design Pattern :**

We have used the Decorator Design Pattern to build VehicleRegistration with the interface RegistrationInterface, which is used by BangladeshVehicleRegistrationCenter class.

The RegistrationInterface interface has register(), renewRegistration() and registrationInformation() methods which are implemented in VehicleRegistration class.

The VehicleRegistration class registers, renews or shows registrationInformations in BangladeshVehicleRegistrationCenter from the database. VehicleRegistration has attributes like registrationID, registrationDate, registrationExpiryDate, registrationCount, registrationCity, renewRegistrationCity and registrationOwner name.

**Flow of Events:**

**Register Vehicle:** BangladeshVehicleRegistrationCenter has to register a bus (vehicle), thus BangladeshVehicleRegistrationCenter calls Bus object to give information of the bus. The information consists of Owners information too.

The BangladeshVehicleRegistrationCenter then fetchDataForVerification() from the database named VehicleRegistryDatabaseBangladesh and verifies the data. If it is verified then the next process will be done. Or else an exception error will be shown.

The next process is the BangladeshVehicleRegistrationCenter checks the database if the Owner has paid for the registration or not. If the payment is made then a paymentStatusOk() is forwarded. If not, then an exception error of insufficient amount is shown.

The BangladeshVehicleRegistrationCenter then calls VehicleRagistration for the registration of the Bus. If the Bus was not already registered then the registration will be done by updating the database, VehicleRegistryDatabaseBangladesh and from VehicleRegistryDatabaseBangladesh an successful message will be sent. If the bus was already registered then an exception error will be sent showing already registered status.

**Renew Vehicle**: BangladeshVehicleRegistrationCenter has to register a car(vehicle), thus BangladeshVehicleRegistrationCenter calls Car object to give information of the car. The information consists of Owners information too.

The BangladeshVehicleRegistrationCenter then fetchDataForVerification() from the database named VehicleRegistryDatabaseBangladesh and verifies the data. If it is verified then the next process will be done. Or else an exception error will be shown.

The next process is the BangladeshVehicleRegistrationCenter checks the database if the Owner has paid for the registration or not. If the payment is made then a paymentStatusOk() is forwarded. If not, then an exception error of insufficient amount is shown.

The BangladeshVehicleRegistrationCenter then calls VehicleRagistration for the registration of the Bus. If the Car is already a registered vehicle then the registration will be done by updating the database, VehicleRegistryDatabaseBangladesh and from VehicleRegistryDatabaseBangladesh an successful message will be sent. If the Car is not a registered vehicle then an exception error will be sent showing already registered status.

**Other Assumptions:**

* One vehicle (Car, Bus or Motorcycle) can have only one owner.
* One registration done by the Bangladesh Vehicle Registration Center belongs to only one vehicle (Car, Bus or Motorcycle) and its owner.
* If an owner wants to give a vehicles’ (Car, Bus or Motorcycle) ownership to another owner, then the other owners’ name has to be registered by the Bangladesh Vehicle Registration Center.