Special Car Company (SCC)

Introduction:

In this problem, we are going to focus on the car company, “Special Car Company (SCC)”. This company is the main character of this assignment. SCC is the world’s largest car construction parent company. It has many child companies. This problem description will hint towards many directions, and may not be very specific or detailed. Apart from the pointed-out context, you are expected to add many more contents to complete the story.

Suggestions/Rules/Design Expectations:

- Each Action should be modeled by a function/method
- An entity/object should be modeled by a class/attribute
- Apply the design principles that have been discussed in the class and from the design principles try to apply the design patterns
- There is no fixed solution. But there can be some solutions that might be better than others due to having more design principles integrated into them. So try your best to incorporate your knowledge of applying design principles as much as possible.

Context/Problem Entities:

Please look at the following contexts/constraints/story to develop the architecture of your system

1. A car has the following essential elements
    - Engine: The engine can currently be 1300CC, 1700CC, 1800CC, and 2100 CC.
    - Tire: Tires can be of these types - Snow, Spare, Whitewall, Slick
    - Chesis: Chesis can be of these types - Tabular, Backbone, Ladder frame
    - AC: AC can be of these types - high-powered, low powered
    - Color: Available colors, Red, White, Grey, and Black.
    - Total price: Total price in dollars. The price may vary with the demography where it is sold due to the taxes. Consider each entity of the car incurs its cost during developing the design.
    - Body Design: Body design is very specific to a particular group of car

- Automated AI: An AI system that can drive the car automatically. This has mainly the following types, Asia Based Automated Driving AI, and USA Based Automated Driving AI. Each type of AI has been trained to move efficiently on the road of that particular geographical area.
- Seat: A unique feature for each type of car, “Racing car” will always have a single seat, “Private car” will always have five seats, “SUV” will always have 15 seats, and “Military Vehicle” will always have 7 seats.

2. SCC currently makes five groups of cars, “Ferrari”, “Ford”, “Toyota”, “BMW” and “Chevrolet”. Each group of cars' main distinguishing feature is its body design which continuously varies. It means that, for example, any Ferrari car will look different from any Toyota Car. Each group of cars also makes the following variants - “Racing car”, “Private Car”, “SUV” and “Military Vehicle”. The automated AI of the car is dependent on the geography where the car will be running. Each group of cars (E.g., Ferrari, Ford, etc.) has their own shop to sell them. Each group of cars can have one or more shops. Each group of cars also has two types of shops, to sell Asia-centric car models and USA-centric car models.
3. SCC also offers some customizations to the basic design for each car. Clients can customize or decorate their cars as per their wishes. Currently, the following decorating entities are offered,
    - Customized Rain Shield: Thick Rain Shield, Thin Rain Shield, Curved Rain Shield
    - Bumper: Loosen Big Bumper, Tight Small Bumper
    - Gate Controlling system: Remote Based, Mobile App Based
    - Open Roof System: Yes/No type

Clients need to inform the dealers about their requirements. The dealers then add these additional products to the car. Each decorating item incurs some additional cost with the price of the car. The final price of the car is the accumulation of all the entities, basic entities, and decorating entities.

4. SCC also has a notification system. Clients who want to get notified, request a subscription. They can also remove their subscription if they want. There are mainly two types of notifications, Price Change and Car’s basic features change.
5. SCC also has a central online system to do the following commands given by the clients. Remember to think about concurrency issues here. This is a web-based application. So, all the backend programs and logic are designed considering that.
    - Request for car servicing: They can take requests from clients to service their cars. Upon receiving a request, they go to the owner’s home and service their car.
    - Request for car washing: The clients can book a date to request to wash their cars. After getting approval, they can go to the desired place to clean their cars.
    - Request for online delivery: The clients can buy a car online. They can place their delivery order. The payment is given after being received by the client.
6. SCC’s applications are web-based. SCC is now building a mobile application to do all the tasks stated in point 5. You need to design a middleware so that the mobile application can use all the facilities of the web-based system.

Deliverables

- A complete design rationale document that will discuss each design issue/principle/decision that you have taken during implementing the system. Support with a backup class (UML) diagram if needed to state the argument. Discuss, the pros and cons of your solution
- The coding implementation of the problem. You can use any of the language that supports object-oriented principles.