SE 3313 Software Design and Architecture

Factory Pattern

Lab 5

1 Context

Creating an object often requires complex processes not appropriate to include within a composing object. The object's creation may lead to a significant duplication of code, may require information not accessible to the composing object, may not provide a sufficient level of abstraction, or may otherwise not be part of the composing object's concerns. The factory method design pattern handles these problems by defining a separate method for creating the objects, which subclasses can then override to specify the derived type of product that will be created. The factory method pattern relies on inheritance, as object creation is delegated to subclasses that implement the factory method to create objects. The Factory Method Pattern is also known as a Virtual Constructor.

2 Problem Description

In this lab, you will implement a car ordering system using the Factory Method pattern.

There are 3 car brands (Toyota, Mercedes, and Renault) in this order system, each capable of producing three different body types of cars (sedan, hatchback, SUV) with their own styles and different specs.

The cars will have specifications like model name, weight, acceleration, top speed, and price.

The cars will also have methods to display car specs, delivery time, production time and origin of the car.

Design a menu, get brand and body type choices from the user.

Draw class diagram of this scenario.

3 Measure of Success

You are expected to implement necessary classes for this example using Factory Pattern. You should implement menu and provide proper handling of user input and menu options. You should display car specifications accurately.

4   Example Output

```
Enter brand choice.
mercedes
Enter a body type.
hatchback
Model Name: A-Class
Weight: 1365.0 kg
Acceleration 0-100km: 8.2 sec
Top speed: 225 km/h
Price: 29500.0 euro
Origin Country: Germany
Production Time: 1 month
Delivery Time: 3-4 weeks.
```

Figure 1:

```
Enter brand choice.
renault
Enter a body type.
suv
Model Name: Austral
Weight: 1465.0 kg
Acceleration 0-100km: 9.7 sec
Top speed: 175 km/h
Price: 29000.0 euro
Origin Country: France
Production Time: 1 month
Delivery Time: 2-4 weeks.
```

Figure 2: