

CENG 1004 Spring 2021 Final Exam

PART 1 - CODE

Automobile manufacturer Sonda requires an application which calculates the price of its models in its inventory. The company has two car models one of which is Sivic and the other is Sity and their base prices are 50000 TL and 40000 TL, respectively. If requested the following optionals can be added to the cars. Each optional has a cost as listed below. If an optional is selected its cost is added to the Car's price and multiple optionals may be selected.

Optional	Cost
Airbag	3000 TL
Music System	1000 TL
Automatic Breaking System (ABS)	5000 TL
Sunroof	2000 TL

In addition Sonda has also motorbike models: Racer and Scooter and their base prices are 60000 TL and 20000 TL respectively. Motorbikes have also the following optionals that may be selected additionally.

Optional	Cost
Automatic Breaking System (ABS)	5000 TL
Seat Heating	2000 TL

Create the required classes and implement the necessary functionalities

- to add vehicles configured with different optionals to the inventory and
- to print the contents of the inventory of the company.

An example output that shows the content of the inventory is shown below. After adding the following vehicles with the stated optionals into inventory, when you print the contents of the inventory, it should produce following output:

*Sivic with ABS, Music System, Air Bag optional having a total price of 59000 TL
Sivic with ABS, Sunroof having a total price of 57000 TL
Sity with Music System, Sunroof having a total price of 43000 TL
Racer with ABS, Seat Heating having a total price of 67000 TL
Scooter with Seat Heating having a total price of 22000 TL
TOTAL : 5 Vehicles including 3 Cars and 2 Motorbikes having a total price of 248000 TL*

In your design you should consider the followings:

- In addition to existing vehicle types which are car and motorbike, in the future new vehicle types such as motor yacht, truck can introduced into your application.

- Inventory class should not be affected when new vehicle types are defined, but still be able to print its content
- Force all the vehicles to have a cost function which returns their price
- All vehicles can be configured with zero or more optionals
- Define a checked exception and throw that exception when a vehicle is configured with an invalid optional that is a motorbike can not have a sunroof.
- Also provide a test class which produces the example output given above

PART 2 - Documentation

Give answers to the following questions in your documentation.

- Provide the class diagram of your implementation.
- What are the differences between an abstract class and a concrete class? Which class(es) can be defined as abstract classes which of them should be concrete in your code?
- What is Encapsulation? Have you applied encapsulation in your implementation? Explain where and how you applied.
- What are the advantages of Inheritance in Object Oriented Programming? Have you used inheritance in your implementation? Which super class(es) have you used and what did you benefit from these super classes.
- Explain the usage of final keyword in java. Can you use final keyword in any part of your implementation? Explain why or why not?
- Have you benefited from polymorphism in your implementation. If yes, copy the code segment where you use polymorphism to your report and give the name of the polymorphic variable.

Grading Policy

Code

- Defining Classes, Attributes & Methods : **40 Points** (Objective - 3)
- Printing the order output : **20 Points** (Objective - 1)

Documentation

- 10 Points** (Objective - 4)
- 5 Points** (Objective - 4)

- C. **5 Points** (Objective - 4)
- D. **5 Points** (Objective - 3)
- E. **5 Points** (Objective - 4)
- F. **10 Points** (Objective - 4)

Submission

Zip your source folder as yourid.rar. Also save your documentation as yourid.pdf. If your id is “12345678” you will submit the following files:

- ✓ 12345678.rar : archive file containing your source code
- ✓ 12345678.pdf: documentation file containing explanations request in the Documentation Section

Submit your file through DYS system. You should be able to upload files in the homework announcement page.

Important Note: All work should be your own work.

Students will get **ZERO (0)** if they use others' work in their homework or if they share their work with others .

Students will get **ZERO (0)** if their code cannot compile or generates error during runtime.