Gebze Technical University

Computer Engineering

CSE443 - Object Oriented Analysis and Design

Homework 1 - Part 3 Report

Student:
Nevra GÜRSES
161044071

1 INTRODUCTION

1.1 Project Definition

There is a private company specializing in the design and production of exoskeleton armored suits for military personnel, equipped with various custom weapons. There are 3 basic types of suits that are dec (500k TL, 25kg), ora (1500k TL, 30kg) and tor (5000k TL,50kg). These suits can be equipped with the accessories that are Flamethrower (50k TL per item, 2k), AutoRifle (30k TL per item, 1.5kg), RocketLauncher (150k TL per item, 7.5kg), Laser (200k TL per item, 5.5kg). A customer can demand any custom combination of accessories. Our goal is to develop a piece of software in Java able to calculate the total cost and weight of an equipped suit. These software must be flexible and easy to accommodate new accessories and suit types and also designating any combination of accessories should be made dynamically at runtime.

2 METHOD

2.1 Selected Design Pattern and Why That is Selected

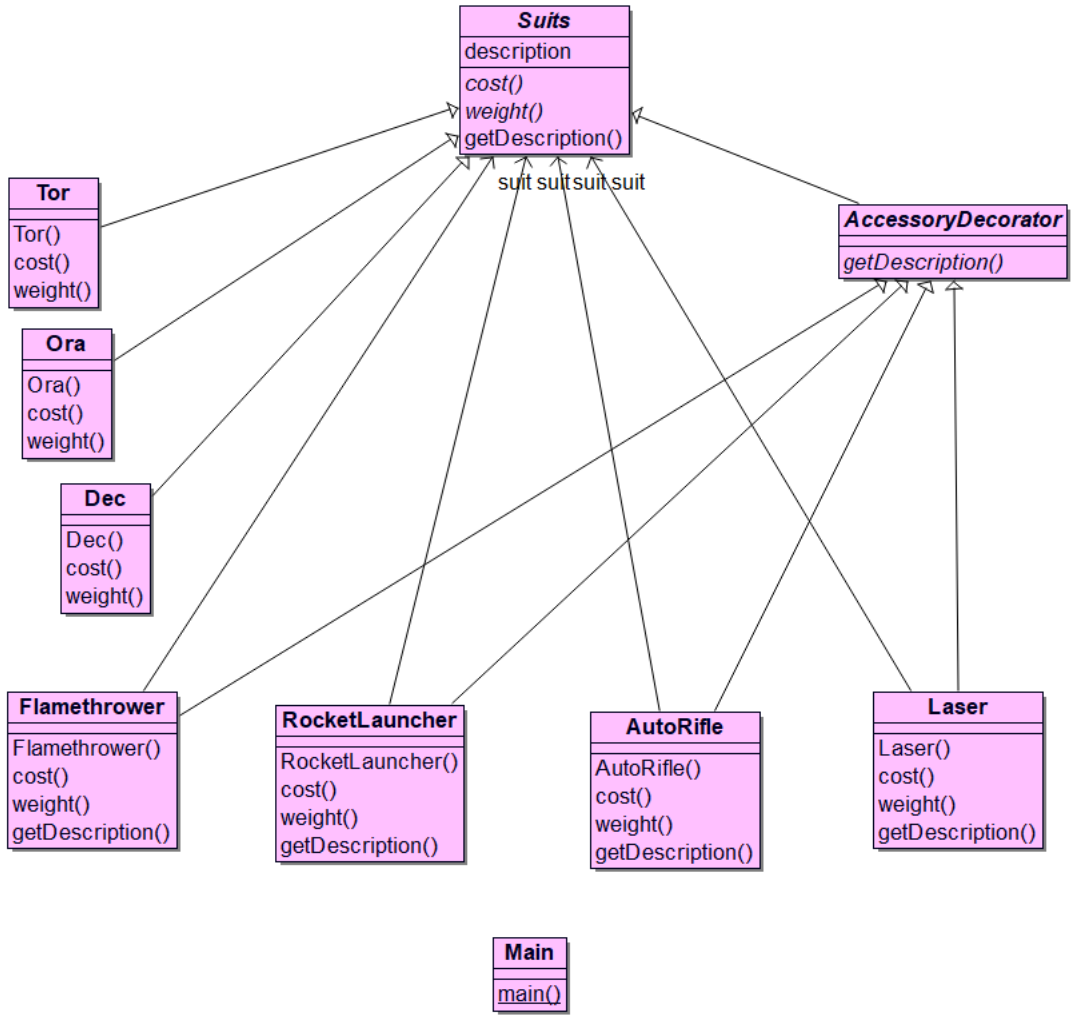
I select Decorator Design Pattern and I apply this pattern for solving given project.

The Decorator Pattern attaches additional responsibilities to an object dynamically. Decorators provide a flexible alternative to subclassing for extending functionality.This type of design pattern comes under structural pattern as this pattern acts as a wrapper to existing class.This pattern creates a decorator class which wraps the original class and provides additional functionality keeping class methods signature intact.

Our goal of project is to make combination of accessories dynamically at run time and decorator design pattern provides this goal perfectly because objects can be decorated at any time, so we can decorate objects dynamically at runtime with as many decorators as we like. And also this pattern provides flexibility and accommodating new accessories and suit types is very easy. The only things we will do; creating these classes and if that new type is suit, it extends from Suits abstract class that is Component class and if new

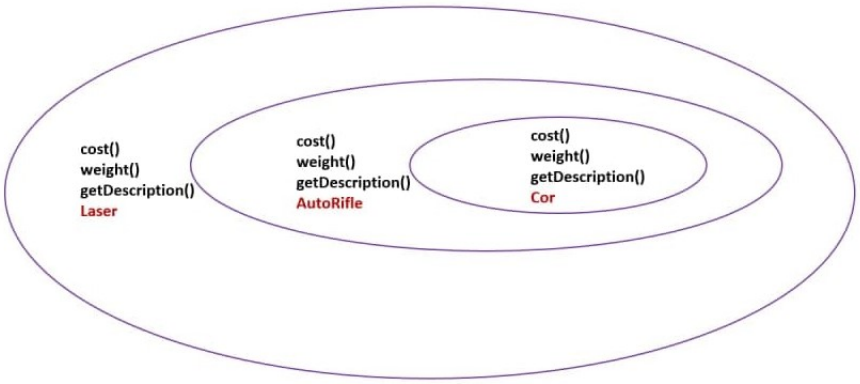
type is accessory, it is a decorator and that class extends abstract decorator class and after we should implement them. This design pattern provides all needs of our project,because of this I select this design pattern.

2.2 Class Diagram and Explanation of Selected Design Pattern with Diagram



- **Suits Abstract Class:** This class is an abstract class. Each suit can be used on its own or wrapped by a decorator.
- **Tor - Ora - Dec Classes:** These classes are concrete suit classes and those extend from Suit abstract class and implements its abstract methods.These classes are the object we're going to dynamically add new behavior to.
- **AccessoryDecorator Abstract Class:** This is a abstract decorator class. This class extends from Suits class and also there is a has-a relationship between Suits class.Decorator has an instance variable that holds reference to a suit and it wraps suit.
- **Flamethrower - RocketLauncher- AutoRifle - Laser Classes:** These classes are concrete decorator classes. These classes keep an instance variable that holds reference to a suit and these classes wrap suit. These classes extends from AccessoryDecorator class and implements its abstract methods.
- **Main Class:** This class testing and working class.

An Example of Wrapping of Decorator in Decorator Design Pattern:



3 Running Results

```
"C:\Program Files\Java\jdk-14.0.2\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2020.2.3\lib\idea_r
 .jar=52484:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2020.2.3\bin" -Dfile.encoding=UTF-8 -classpath
 C:\Part3_Code\out\production\Part3_Code Main
Total cost and weight of an equipped suit that includes: dec, Flamethrower, AutoRifle, Laser, RocketLauncher = 930k TL, 41.5 kg
Total cost and weight of an equipped suit that includes: ora, Flamethrower, Laser = 1750k TL, 37.5 kg
Total cost and weight of an equipped suit that includes: tor, AutoRifle, Laser, RocketLauncher = 5380k TL, 64.5 kg

Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk-14.0.2\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2020.2.3\lib\idea
 .jar=52505:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2020.2.3\bin" -Dfile.encoding=UTF-8 -classpath
 C:\Part3_Code\out\production\Part3_Code Main
Total cost and weight of an equipped suit that includes: dec, Flamethrower, AutoRifle, Laser, RocketLauncher = 930k TL, 41.5 kg
Total cost and weight of an equipped suit that includes: ora, Flamethrower, AutoRifle, Laser, RocketLauncher = 1930k TL, 46.5 kg
Total cost and weight of an equipped suit that includes: tor, Flamethrower, AutoRifle, Laser, RocketLauncher = 5430k TL, 66.5 kg

Process finished with exit code 0
```

```
"C:\Program Files\Java\jdk-14.0.2\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2020.2.3\lib\idea_r
 .jar=52515:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2020.2.3\bin" -Dfile.encoding=UTF-8 -classpath
 C:\Part3_Code\out\production\Part3_Code Main
Total cost and weight of an equipped suit that includes: dec, AutoRifle, Laser = 730k TL, 32.0 kg
Total cost and weight of an equipped suit that includes: ora, Flamethrower, Laser, RocketLauncher = 1900k TL, 45.0 kg
Total cost and weight of an equipped suit that includes: tor, Flamethrower, AutoRifle, Laser, RocketLauncher = 5430k TL, 66.5 kg

Process finished with exit code 0
```