



Atılım University
Department of Software Engineering

SE461 Software Design Patterns

Fall, 2021-2022

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Assignment 1

Due Date: November 22, 2021 23.59

Duration: 7 Days

WARNINGS

- Students who either cheat, attempt to cheat or provide a help to other(s) in cheating, get 0 (zero) grade from assignment. Also, based on the regulations, a disciplinary action will be taken.
- For every late hour, 10 points will be cut.
- Assignments sent by e-mail will not be accepted.

Important Note: For each question, your programs do not need to be working fully. But, as for the described parts it has to be complete and ready to run with slight modifications. It can be compiled without any touch to your part when the missing parts are completed.

1. Given the following requirement:

An online computer hardware shop wants to allow its users to build their desired computers. Users of the application can pick several hardware parts and build their computers from scratch and get an estimated price. Computers should be composed of a motherboard, a RAM, a CPU, one or more GPUs, one or more storage units (HDDs, SSDs), a PSU, and multiple peripherals for the interaction with the computer (mouse, keyboard, screen, etc.).

All of these components should have a price. You can assign random sensible prices to each piece of hardware. Make sure that there are at least 3 options for each concrete instance of hardware.

You are free to make assumptions for the details that are not mentioned in the above requirement.

- a) Design a software for the above requirement and draw the UML class diagram for the designed software. **You must use the Builder Pattern.** Otherwise, you cannot get any point from this section. (20 points)
- b) Implement the previously designed software (the **exact** one that you draw the UML for) with either C++ or Java. If you pick the C++ option, make sure your program does not leak memory. If any memory leak is detected, it will cost you some grades. You can use Valgrind software to analyze your program. (30 points)

2. Given the following requirement:

You are trying to build a music streaming application similar to Spotify. Because of the budget limitations, knowing that it is illegal you want to somehow get the music stream from Spotify and re-encode it and stream it as it is your own.

Suppose that Spotify provides an interface for its SpotifyPlayer object which has two methods: String musicDetails(String musicName) and String stream(String musicName). The music coming from the stream method is encoded in a form that you can read it but you cannot use it in your own program because of copyright problems. Let's assume that Spotify is using the Base64 encoding. Your implementation should take care of the encoding and output the result as a regular String stream.

You are free to make assumptions for the details that are not mentioned in the above requirement.

- Your job is to provide an **Adapter** class for such a problem. (20 points)
- Take the following UML diagram as the starting point of your program and expand it by placing the previously designed Adapter class “*SpotifyAdapter*” in it and implement it with C++ or Java. Again be very careful about the memory leaks if you choose C++. It will cost you some points if it is not considered carefully. (30 points)

