Hacettepe University

Computer Enginnering

BBM 104:

INTRODUCTION TO PROGRAMMING LABORATORY II SPRING 2023

Assignment 2

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20.04.2023

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PROBLEM

WHAT IS THE PROBLEM?

People are getting lazier day by day than before, and people are always trying to do more with less effort. Everything in our world is now more technological and smarter, technological device does everything for us, and our house should too. People try to make their life easier.

WHAT IS THE SOLUTION?

As technology advances, people are seeking ways to simplify their lives, and a solution to this problem is the creation of a smart home system. With this system, some devices such as cameras, plugs, and lamps can be controlled remotely for added convenience. Object-Oriented Programming (OOP) was utilized in the design and implementation of this system. In this approach, each smart device in the home can be represented by a class, each class contains the necessary methods, and this system can be made using OOP without making the code complicated.

FACED PROBLEMS AND THE SOLUTIONS

In this program, faced a lot of problems due to the lack of knowledge of Java and OOP. In the end it was all researched and resolved. Some of these problems are:

It was difficult to create a sketch with the right class hierarchy. Class hierarchy changed while writing program.

While the program was being written, many errors were encountered, as the errors were not handled in the beginning. To the solution, the input was analyzed piece by piece.

BENEFITS OF THIS SYSTEM

This project includes some smart home accessories such as Smart Lamp, Smart Color Lamp, Smart Camera and Smart Plug. These devices can provide us with many benefits and make our lives easier. It can do our work for us and thus save us time. Some benefits of this program:

Control: Smart devices can be controlled remotely, which provides convenience.

Personalization: Your home can be customized and be colored to your preferences by using smart lamp.

Energy savings: Energy can be saved by smart devices.

Cost savings: Smart devices can reduce energy consumption and cost of bills.

Security: Smart plugs can be controlled remotely, which enhances security and can prevent potential fire hazards.

OBJECT-ORIENTED PROGRAMMING (OOP)

BENEFITS OF OOP

Object-oriented programming (OOP) is a programming paradigm that provides benefits such as reusability, modularity, encapsulation, abstraction, and inheritance. It simplifies complex systems and allows for more efficient code maintenance. Overall, OOP provides a robust framework for building software systems that are scalable, maintainable, and efficient. OOP has some rules to obey. They are called as four pillars of OOP:

Inheritance, Polymorphism, Abstraction, Encapsulation

FOUR PILLARS OF OOP

Encapsulation: Some variable and methods are hidden within an object to reduce errors and make programs more secure.

Abstraction: To prevents programmers from making mistakes, and shows only functionality to the user.

Inheritance: Inheritance is a method which one object access acquires all the variables and methods of a parent object. It reduces redundancy and make programs more efficient.

Polymorphism: Polymorphism in Java is a concept by which we can perform a single action in different ways. It is ability of a class to provide different implementations of a method.

Together, these four concepts form the pillars of OOP. By effectively applying these principles, programmers can write code that is easier to understand and modify.

UML DIAGRAM

UML (Unified Modeling Language) is a way of drawing template that show how computer programs work. These template can help programmers understand what a program should do and how to build it.

Command Manager class is the most important class in the program, all inputs are detected in this class, and then necessary methods are called from there, words are given as parameter to the method. All smart devices are created in this class.

SmartLamp, SmartCamera, SmartPlug, and SmartColorLamp that is child of SmartLamp class, are devices and all of them are child of Device class. Variables and methods that should be in all devices are defined in Device class. Other variables and methods were defined in subclasses.

Timer class was created to do time operations.

FileInput and FileOutput classes were created to read inputs and write outputs.

UML Diagram of the program.

RESOURCES AND APPENDIX

Since this program is a more complex program than the codes written before, there were problems due to lack of knowledge. Thanks to artificial intelligence and some websites like StackOverFlow, GeeksforGeeks and so on, these problems have been overcome. While no code was used directly, it was rewritten for the program after the logic of the codes was understood.