CS112 Project Report

Ghulam Ishaq Khan Institute , Swabi , KPK , Pakistan

Course : CS112-Object-Oriented Programming & Design

Faculty : Cyber Security

Section : G

SEMESTER 2 2023/2024

Project : Smart Home Design System

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- Introduction:

  The rapid advancement of technology has paved the way for innovative solutions in various aspects of life, including home management. In this context, the Smart Home Design System project aims to leverage C++ programming to create a sophisticated and interconnected system for managing household tasks efficiently. This system typically involves integrating sensors, actuators, and communication protocols to create an interconnected network of devices. Our project can design an efficient and robust system capable of managing and automating tasks based on user preferences and environmental conditions.

- Synopsis Project:

  The Smart Home Design System project seeks to revolutionize traditional home environments by integrating various aspects of home management into a single, user-friendly interface. By harnessing the power of OOP , the project aims to enhance convenience, efficiency, and security within residential settings, thereby catering to the evolving needs of modern living.

- Objective of The Project:

  The objective of this project is to develop a comprehensive smart home design system using OOP programming to address the growing demand for intelligent home automation solutions. The system aims to seamlessly integrate various aspects of home management, including lighting, temperature control, security, and entertainment, into a unified platform. By doing so, it seeks to enhance the comfort, convenience, and security of residential environments while promoting energy efficiency and adaptability to user preferences and environmental conditions.

- Used OOP Techniques:

1. Abstraction : This technique was used to enhance security by creating an account for the user with secured username and password.

   Justification: Accounts need to be secured so that outsiders don't have any access to it.

2. Inheritance: This technique was used so that some objects such as LED lights could inherit colors from class colors which helps to personalize the color of the light.

   Justification: To have color features for LED lights I had to inherit them . Other way is to create object and create its instance but inheritance is much more better.

3. Polymorphism: This technique was used for objects like computer , LED TV and polymorphism was used well for games that can be played on computer or TV.

Justification: Polymorphism was essential because classes like TV and computer have multiple features and to handle all that classes need to be abstract with multiple classes inheriting virtual functions.

4. Error Handling: This technique has been used specifically for user's inaccurate inputs and attempts to tear down the working of the program.

   Justification: To handle errors we need to use error handling or exception handling. This technique makes the working of the program efficient.

5. File Handling: This technique is used to play various sound effects for different operations.

   Justification: To input sound effects , we have to use files .

6. Encapsulation: This technique was used to hide data from unauthorized access. It has been gently used to avoid access at different places.

   Justification: To hide data from unauthorized access and to have private data members for different classes.

- Implementation:

Our Project starts by letting the user create an account and signin using the username and password he/she entered .This is just a demonstration of how secure it will be with also options such as forgot password .

```
// code snippet//
          cout<<"\nEnter your date of birth(D/M/Y) : ";
                          cin>>Date;
             cout<<"\nEnter your favorite place : ";
                         cin>>Place;
              cout<<"\nEnter your favorite food : ";
                          cin>>Food;
//end//
```

This allows the user to have extra options if he/she forgets her password to login to Smart Home Design System. Different objects of different classes of specific rooms can be accessed from any rooms.
After the user logins to the system , he/she can control any device from any room .
e.g Following is the design of Bedroom .

```
//code snippet//
                    cout<<"\n\t\t\t.Bed Room.";
                       cout<"\n\t\t\t1.LED light";
                       cout<<"\n\t\t\t2.Fan";
                        cout<<"\n\t\t\t3.AC";
                     cout<<"\n\t\t\t4.LED TV";
//end//
```

Key Algorithms and Functionalities:

There aren't any crucial algorithms. However , the quiz application which you can access through your computer and its linking with the printer can be complicated. MyComputer is a class which helps the user to create quizzes and answer them . Printer class helps the user to print them . Printer can access the private members of MyComputer as it's a friend of the computer. A duo that can create , print and handle quizzes.

```
//code snippet//
                          public:
                        friend class Printer;
 //code snippet//
                     cout<<"\n\t\tYour Quizzez";
                for(int i=0 ; i<5-P.Remaining ; i++)
                                  {
            cout<<"\n\t"<<i+1<<"."<<P.T[i].name<<"\t(";
                        if(P.T[i].type=='1')
                           cout<<"MCQ's)";
                                 else
                        cout<<"True/False)";
                                  }
//end//
```

Exception Handling:

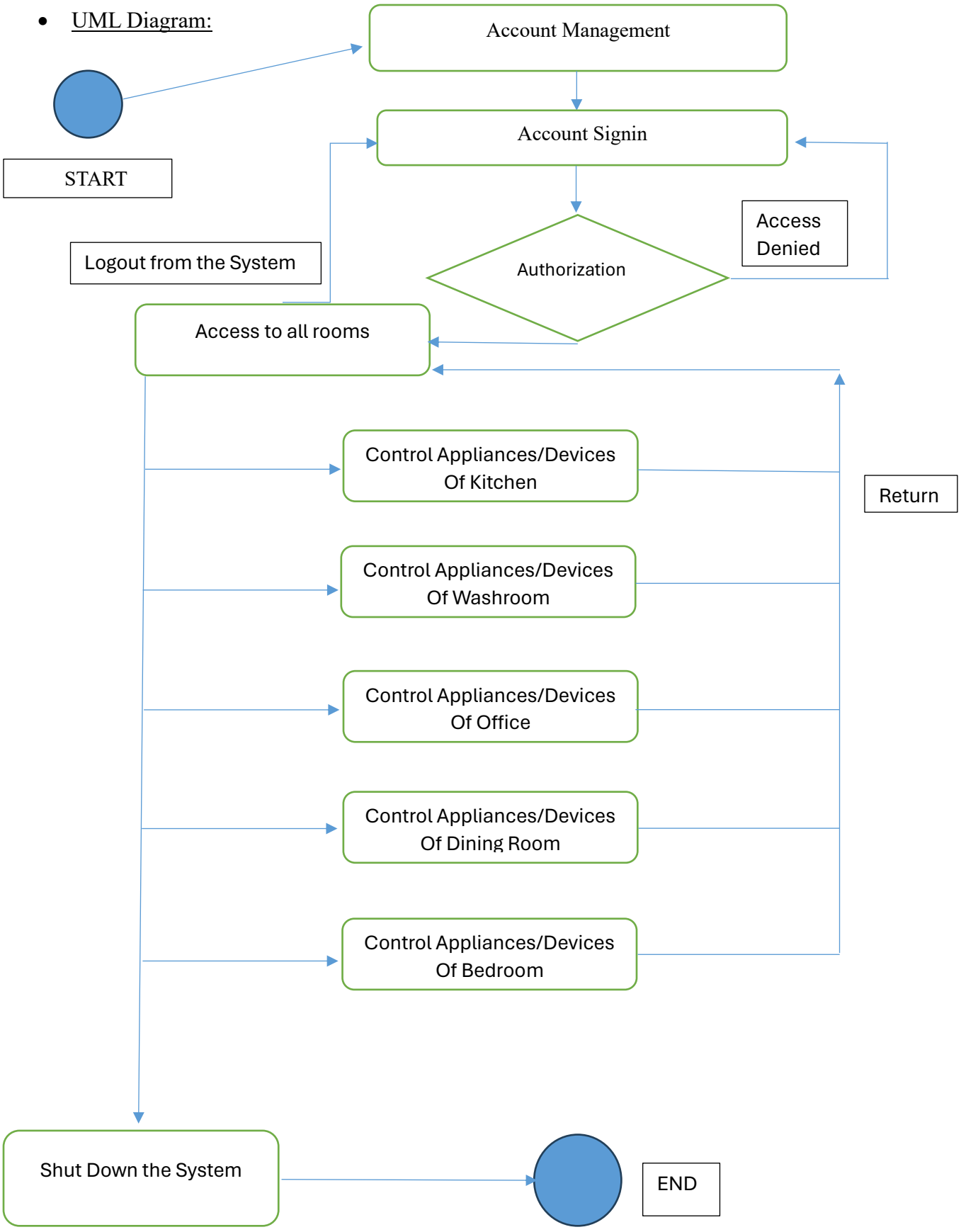
To handle exceptions we have used simple switch case default and if statements .

```
//code snippet//
                  default:
                  cout<<"\n\t\t\tInvalid Command";

//code snippet//

                 else
  cout<<"\n\t\tSorry the device is out of range or switched off";
//end//
```

- Conclusion:

In conclusion , our smart home design system makes the life easier and helps the user to perform tasks without any work or sweat. The design and implementation of the Smart Home System represent a significant step towards creating a more interconnected, efficient, and convenient living environment. By integrating various smart devices and technologies, such as sensors, actuators, and centralized control systems, the Smart Home System offers users unprecedented levels of automation, comfort, and security.

- UML Diagram:


Account Management
START
Account Signin
Access Denied
Logout from the System
Authorization
Access to all rooms
Control Appliances/Devices Of Kitchen
Return
Control Appliances/Devices Of Washroom
Control Appliances/Devices Of Office
Control Appliances/Devices Of Dining Room
Control Appliances/Devices Of Bedroom
Shut Down the System
END