Tribhuvan University

IOE, Pulchowk Campus

Department of Electronics and Computer Engineering

OBJECT ORIENTED PROGRAMMING

PROJECT REPORT

on

A PHONE CALL

Submitted By:

Saurav Kumar Mahato

(077BCT079)

Susheel Thapa

(077BCT090)

Submitted To:

Department of Electronics

and

Computer Engineering

Acknowledgement

First of all we would like to thank to our OOP instructor Daya Sagar Baral , Lokh Nath Regmi and Shanti Tamang we helped us to learn OOP in C++. Along with learning they provided us the opportunity to apply the concept of OOP to manage our project and use its feacture like encapsulation, abstraction, inheritance and polymorphism.

Would also like to thank whole team of Deapartment of Electronics and Computer Engineering to provide us the opportunity to expose our skills and express our learning throught projects.

Thanks to all our seniors as well who directly or indirectly help us through the learning process and made our journey easy through different session and workshops.

Finally, thanks to all our friends and classmates who helped in discussing different idea and workflow of the project along with providing good suggestions.

Abstract

The main idea of the project is to demostrate how the calling process works between two clients and how it is handled by server at the backend.

Many of us don't know how things happens at the backend of the communication so this project demostrates that clearly with use of different explanatory diagrams and flowchart.

A practical calling process were observed and the same thing is tried to simulate. GUI reference is taken from iphone mobile and acheived using figma as GUI maker for this project.

After the completion of the project, one can see how the calling process simulation works.

This project also tries to demstrate the audio sending feactures like we have in real life but its mainly like onetime one way communication at a time.

This project best tries to model the real calling process with limited feactues.

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Objectives

Following are the objective of our OOPs project:

1. To learn Object Oriented Programming paradigm.
2. To learn Simple Media Direct Layer(*a library that provide 2D graphics.*)
3. Understanding how does client and server communicate with each other.
4. Enhancing concept over interaction with database via C++ program
5. Understanding how does A Phone Call work in real life
6. Understanding the special feature C++ like
   (a) Function and Operator Overloading
   (b) Virtual Function
   (c) Stream Class
   (d) Exception Handling
   (e) Standard Template library(*STL*)
7. To learn how to collaborate with each other in a project.

Introduction

Our project (A Phone Call) was initiated with the aim to demostrate how the call get established between two client in the real world and what actually is happening behind the scene.

The key objectives of this project is to focus over two client who will be trying to call each other. And middle person(server) will be routing the call to the designated person after, it has successfully decoded the signal that has been passed to it by one of its client. Moreover, we will also focus over the storing data like who have called to whom and when did they have so that we can display a call log on our client side.

It doesn't indent to include all the feature that is found in our call app of our phone but we will to try make the call app as real as possible. Also, we aren't going for the communication over the voice call as it is beyond the scope of this project.

At last,**A Phone Call** focus over how a call get connected between two user when one user calls another user and the hidden detail of what is happening in background. Also, it will include some feature of the Our Calling app to make is a bit realistic.

Application

There are various applications of this kind of project if it gets big. It is summorized in the following paragraph:

As we all know, the field of communication is very huge. Everyone uses mobiles and they do call eachother to share their information in real time which is accomplished by this king of project model in big scale level.

With the use of big netowrking and commmunication protocols, this project can be taken up to further advanced level where real time communication will be possible with all the feactures.

Some of such company in Nepal are NCELL, NTC which has taken the whole market of communication. If imagined future, this project should have same future like this big companies do have now in Nepal.

Literature Survey

Different survey and materials were researched while building this project for various purpose explained below:

1. For GUI interface, differentwe needed a model of dialpad which was finalized to be taken from iphone.
2. SDL2 library in c++ were used to handle graphic purpose for this project.
3. Figma was used to acheive the GUI interface of iphone dialpad and whole calling windows.
4. For netowrking purpose and server, lot of things were researched and finally decided to use concept of files to handle the server task since there are not much material over the internet about networking in SDL2.
5. For audio feacture, linux recording were used as temporary solution with limited 5 seconds recording and sending feacture between two clients(not real time).
6. .wav file was used with SDL2 for audio purpose.
7. Finally, for writing different platform were researched and finally used LATEX.

Existing System

A Phone Call is simple to demonstrate how does the call get establish between any two user who are connected in any network.

The most common example of existing in the real world are network provider like Nepal Telecom , Ncell. What mainly happen is that a person calls another person from his phone by dialing number and call the call gets conneted to the destination after the server (NCELL OR NTC as instance) does its work. The calling service provider acts as the bridge between two clients and allows to share information with each other.

This is what all the phone or sim company does and charges money. So, eventually in context of Nepal, the best example of existing system for this project can be NCELL and NTC.

Methodology

Tool we will be using

1. ***Visual Studio Code*** as our code editor.
2. ***g++*** as our compiler to compile our project file.
3. ***SDL2*** to create GUI interface on Client side.
4. ***Git*** as our local version control system and ***Github*** as our centralized version control system.
5. **LaTeX** as our Document Preparation system for proposal and project report.
6. ***Linux*** as our working Operating System

Approach to Project

1. Since our project is based over networking and database so we need to do two things at first i.e Building up client and server and Interaction with database.
2. After we have setup client/server and Interaction with database we will be working into the GUI part of the project(mostly client side) as we will be using terminal console to display the mesage from the sever.
3. Then we will integrated our GUI with the client and try to setup the connection with the server.
4. After we become successful over one client then we will go for setup three client.
5. Then before heading to the phone call we wil first try messging feature between client i.e we will try to message client 2 form client 1 and vice versa.
6. Once it is successful we wiil implement that for the call.
7. After successful implementaation of calling feature. We will integrated all those with the database so that we can display the call logs to the client.

Implementation

Simulating the phone call was the goals of this project. It was acheived by taking reference from different sites and youtube platform about how communication works and people connect and share their information.

The potential risks could arise if server fails to do its proper task cause all make backend stuff depends upon server and all other are just the simple things. From number confirming, checking to connecting call all is determined and processed by server.

Nearly one month is the time we were given to do our task, and that time were divided into different part like for idea building, coding , testing , debugging and finally concluding.

In this time we have made a prototype of how calling works with same GUI as mobile do have.

Required resource contains picutures, audio file (.wav) , different tones etc

Block Diagram

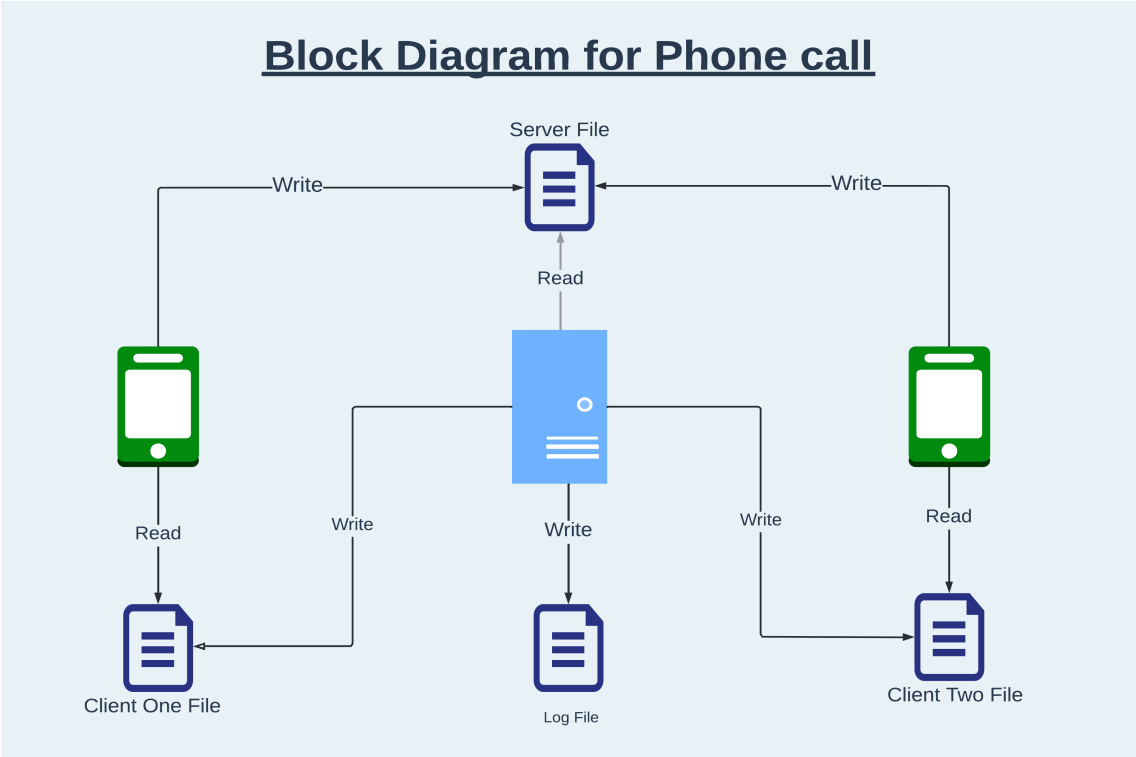

Fig: Block Diagram of For Phone call

Results

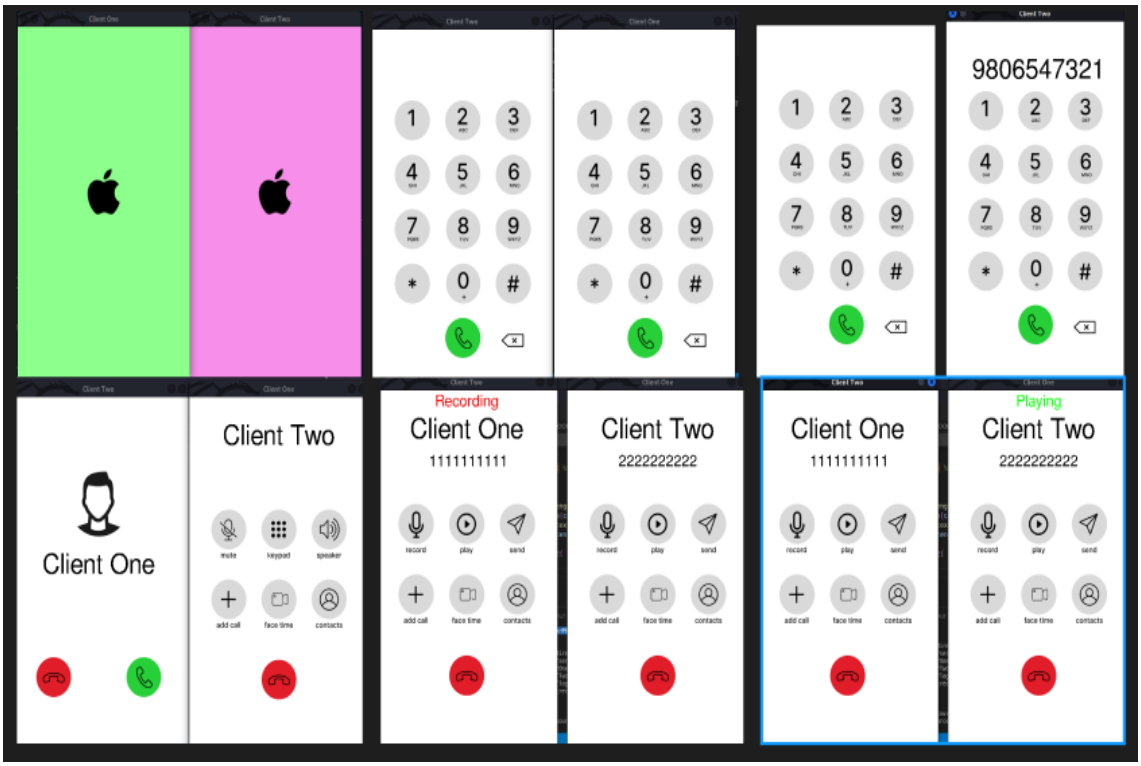

Fig: Above figure shows the result of the phone call simulation.

Problem Faced and Solutions

With every project comes coding, debugging and main fixing bugs. During this project as well, we had to go through a lot of problems. Using networing in SDL2 was getting hard as there are no much resources for SDL2 unlike SFML.

Audio processing was begin difficult to execute so instead linux system command is used to record audio in .wav file which is futher processed by server and finally played from called person.

Dialpad number verifying whether the number is correct or not for call to take place was a little difficult part along with rendering different texture to be displayed in different window.

This project contains a lot of winodows and texture rendering which was sometime gettting confused and time consuming to debug even simple errors.

Though facing all this problems, the project was completed with effort.

Limitation and Future Enhancement

Limitations:

- It doesn't fully model the real phone call simulation but has most of it with limited feactures to demostrate everything in good manner.
- Recording audio part was done using linux system commands so this project will only work in linux os.
- As a server, different file concept was just. Eg: server writing the message in clients txt which is processed by continuing loop of client and respective task being done in client window.

Future Enhancement:

- Use of more advanced library can give this project a better server networking and LAN netowrking which could make the simulation more realistic in small space frame like wireless and bluetooth facility.
- Sending audio using networking and wireless media would be more better.
- Making this project to run in mobile as an application would be great and practial matching.

Conclusion and Recommendations

A Phone call is the simulation of real world communication which perfectly demonstrate how call gets establish between two user who are connected in network.

We are able to complete the project with alot of helping hand and resources that are mention in References.

Moreover, you can take this project to next level based on those things written under Limitation and Future Enhancement. For that, you need to have core concept of C++, networking with C++,SDL2 ,etc.

References

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