Capgemini

CALL FORWARDING SYSTEM SIMULATOR

CFSS_DesignDocument-v0.3

[redacted]

Document Control:

Project Revision History

Date	Version	Author	Brief Description of Changes	Approver Signature
09/30/2022	0.1	Prateek, Alok, Abhishek, Rahul, Jinse	Detailed Design of CFSS	
10/11/2022	0.2	Alok, Jinse	Changes in diagrams and changes under database header in 5.5.2	
10/13/2022	0.2	Prateek	Corrected Indentation, Activity Class Diagram	
16/13/2022	0.3	Prateek	Activity Class Diagram Improved	

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1. INTRODUCTION

The Call forwarding System Simulator should be able to make a call from one client to another client and depending on the status of the service selected by the client the respective call forwarding takes place

1.1. Intended Audience

This project is a prototype for everyone who wants to make a call and connect or forward the call depending on the status selected by the client. This document is intended to be read by developers, testers, project managers, and customers. This is a technical document, and the terms should be understood by all of them.

1.2. Acronyms/Abbreviations

CFSS	Call forwarding system simulator
TCP	Transmission Control Protocol

1.3. Project Purpose

Purpose of this project is to provide a call-forwarding system to the client. It aims to make a call from one client to another other and depending on the service selected by the receiver the call forwarding will take place.

1.4. Key Project Objectives

- Establishing a connection between client and client via server
- Giving the option to the client to choose from the types of call forwarding service.
- To forward the call to another client

1.5 Project Scope and Limitation

The scope and limitation of the project are listed,

1.5.1 In Scope

In this project the call forwarding simulator will allow the client to connect to the server and enable the call forwarding services after registering so that when another client calls the call is forwarded depending upon the 3 types of call forwarding services selected. If the client is authenticated from the database in the server and the service is enabled the call gets forwarded, in other cases a normal call is placed and all calls are client requests, and forward calls are logged with timestamps. Admin has the right to add/delete/update the database's entries.

1.5.2 Out of scope

NA

1.6 Functional Overview

In this service, we will have servers and multiple clients. The call forwarding service is provided by the server.

First, the client will request a connection which will be validated, and if the client has enabled call forwarding service, then it establishes connection between the requesting client and the intended forwarding client. In the service we provide three types of call forwarding service unconditional, no reply and busy. Our server will be maintaining a database for call forwarding details. Server will allow the client to register or unregister for a call initially before enabling or disabling the service.
On a call connected from a client, the server shall check for activation of forwarding service using its database and if service is activated, then shall forward accordingly depending on the call forwarding type.

Once unregistered, no forwarding service shall be provided. Clients can unregister with servers if services are no longer required. If the service has been deactivated by the client the call received will be normal else all the incoming calls will be handled as per the forwarding type.

CFSS should work on Linux as well as on Windows.

1.7 Assumptions, Dependencies & Constraints

The connection is established between server and the client.

1.8 Risks

NA

2. DESIGN OVERVIEW

The system consists of three entities, the sender, the receiver and the server.

2.1. Design Objectives

The call forwarding simulator will allow the client to connect to the server and enable the call forwarding services after registering so that when another client calls the call is forwarded depending upon the 3 types of call forwarding services selected.

- Unconditional
- No reply
- Busy

The receiver can enable or disable the service whenever they want.

Recommended Architecture

The recommended system architecture is as follows.

Server-side architecture:

- 1GB RAM
- 500MHz Processor
- 120GB HDD CPU
- Terminal

Client-side hardware interface:

- Desktop or Linux machine
- Terminal

2.2. Architectural Strategies

The architectural strategy used in this project is a client-server strategy. This strategy consists of two entities, the client, and the server. The client requests services from the server and the server provides services to clients. The server continues to listen to the clients' requests until the client wants to discontinue with the service or the connection is not closed.

2.2.1 Design Alternative

The project uses the TCP protocol to establish a connection between the server and client. An alternative to TCP is the UDP protocol. TCP stands for Transmission Control Protocol, a communications standard that enables application programs and computing devices to exchange messages over a network. We have used TCP because TCP is a connection-oriented protocol, it is more reliable as it provides error checking support and guarantees delivery of data to the destination router. .

2.2.2 Reuse of Existing Common Services/Utilities

The system requires the use of existing common services and utilities which are: TCP (Transmission Control Protocol) & other System Calls.

2.2.3 Creation of New Common Services/Utilities

The project does not create or use any new common services or utilities.

2.2.4 User Interface Paradigms

- Command Line Interface (CLI).

2.2.5 System Interface Paradigms

- Operating system – Linux/windows.

2.2.6 Error Detection / Exceptional Handling

- Error detection in all phases of client connection to the server will be provided.

- Four levels of debug log messages will be included like ERROR, INFO, WARNING & DEBUG.
- Appropriate error messages for file handling will also be included.

2.2.7 Memory Management

NA.

2.2.8 Performance

Taking the essential speediness into consideration we will be using TCP designed as TCP is more reliable. The performance of TCP allows the server and client to deliver the best throughput and latency for an individual connection.

2.2.9 Security

We have made use of getpass() function to secure the entered password which hides the entered password

2.2.10 Concurrency and Synchronization

Client and server will be in synchronization in receiving and sending the messages.

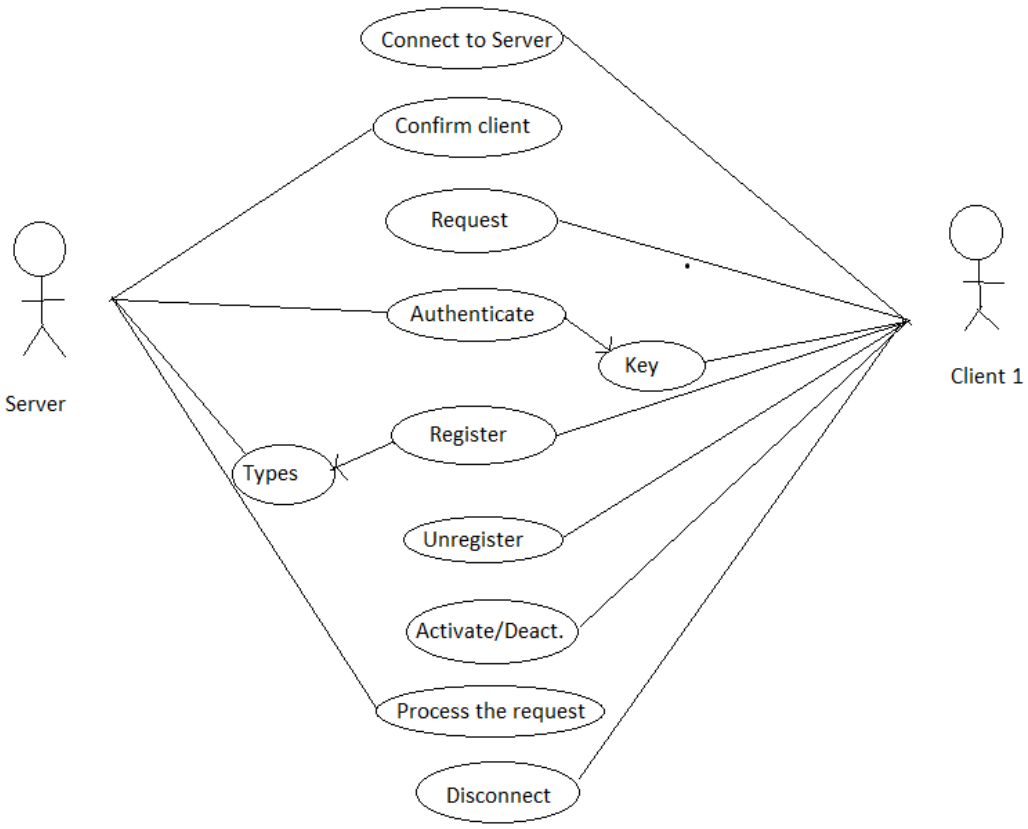
2.2.11 Housekeeping and Maintenance

- Clearing the memory buffers from the system.
- Flushing the contents of the screen when the client starts for better User Experience.

3. SYSTEM ARCHITECTURE

Call forwarding system services employ specialized data structures that are optimized for receiving the message and forwarding it as per our requirement. Because it ensures the successful delivery of data and messages over networks.

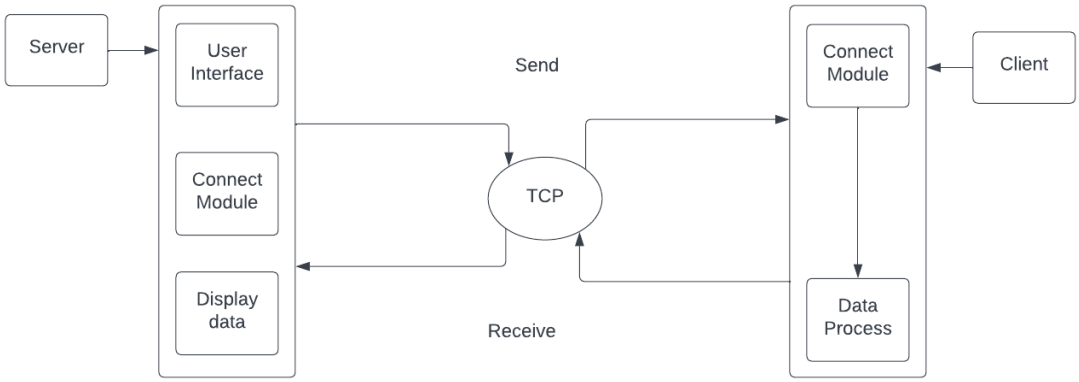
3.1. System Use Case Diagram



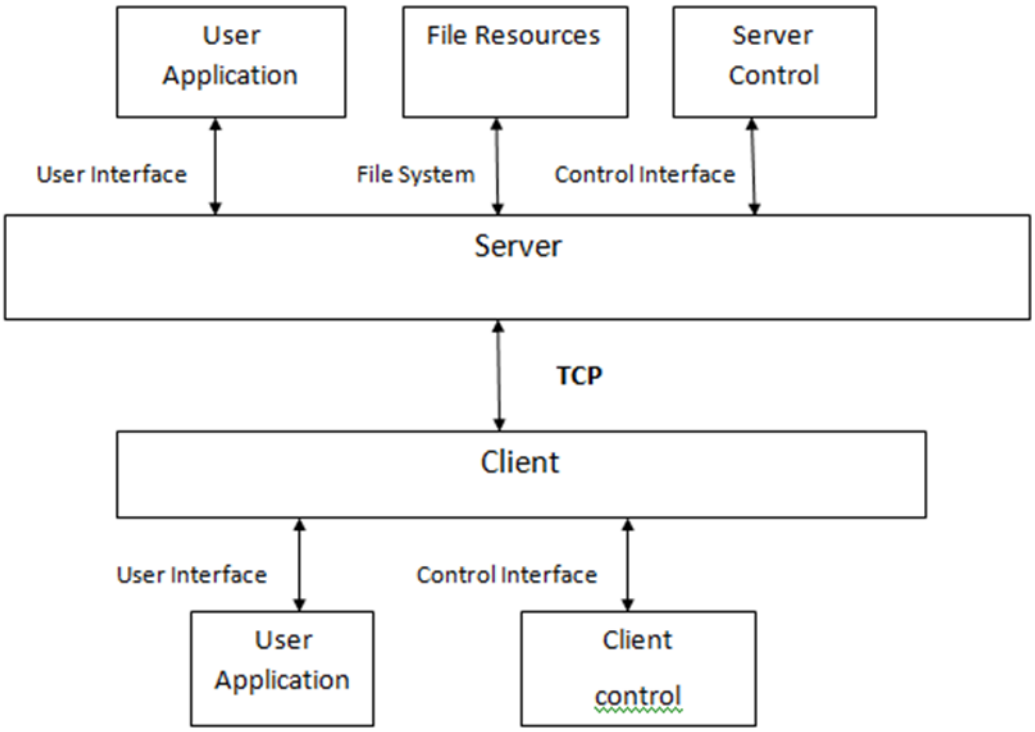
3.2. System Use-Cases

- The request to make a connection to the receiver will be done.
- Once the connection is successful, then displaying “Your call has been forwarded” on successful call forwarding, then the server will check if the receiver has enabled any forwarding service or not.
- If yes, then depending on the type of forwarding service enabled the message will be forwarded. If not then we are directly sending the message to the receiver and storing it in logs with date and time stamps.
- If the client unregisters then disable all the services for the client.

3.3. Subsystem Architecture



3.4. System Interfaces



3.4.1 Internal Interfaces

The internal interfaces comprise interfaces through which the system interacts with the clients through which it provides them services.

3.4.2 External Interfaces

The external interface comprises interfaces through which the users interact with the system.

- Sender's desktop or Linux Machine
- Receiver desktop or Linux machine.

4. DETAILED SYSTEM DESIGN

The Call Forwarding System Simulator (CFSS) contains server and multiple client connections. The connection between the server and clients is established using TCP protocol.

The client can: -

1. Register/ Unregister to the server database
2. Login to the server to Enable/ Disable Service
3. Forward call if in the busy, unconditional, or no-reply state

If the Client is registered in the server and service is activated, the call should be forwarded to the designation.

4.1. Key Entities

The key entities associated with the system are:

Server

- The server is a remote entity that stores the file which contains a database of existing users.
- It verifies the IP address of the client making the connection.
- Provides service on client requests.
- It verifies the unique number of the receiver and the type of forwarding service enabled.
- Provides service on the client request.
- Client requests the server to register it to the database, enable/ disable the service, or forward the call to desired destination
- Logs are maintained as per user request.

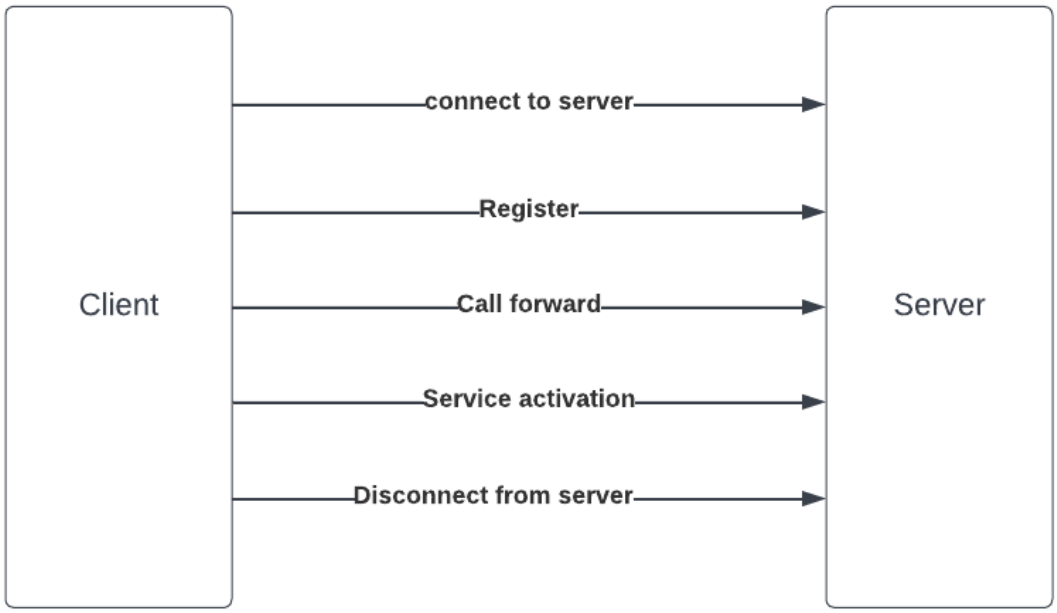
Client

- The client is an entity that is run by the user on their system.
- It requests to connect with the server.
- Client is calling another client and depending on the choice of the call forwarding system the call will be forwarded.
- Client will exit after all the operations.

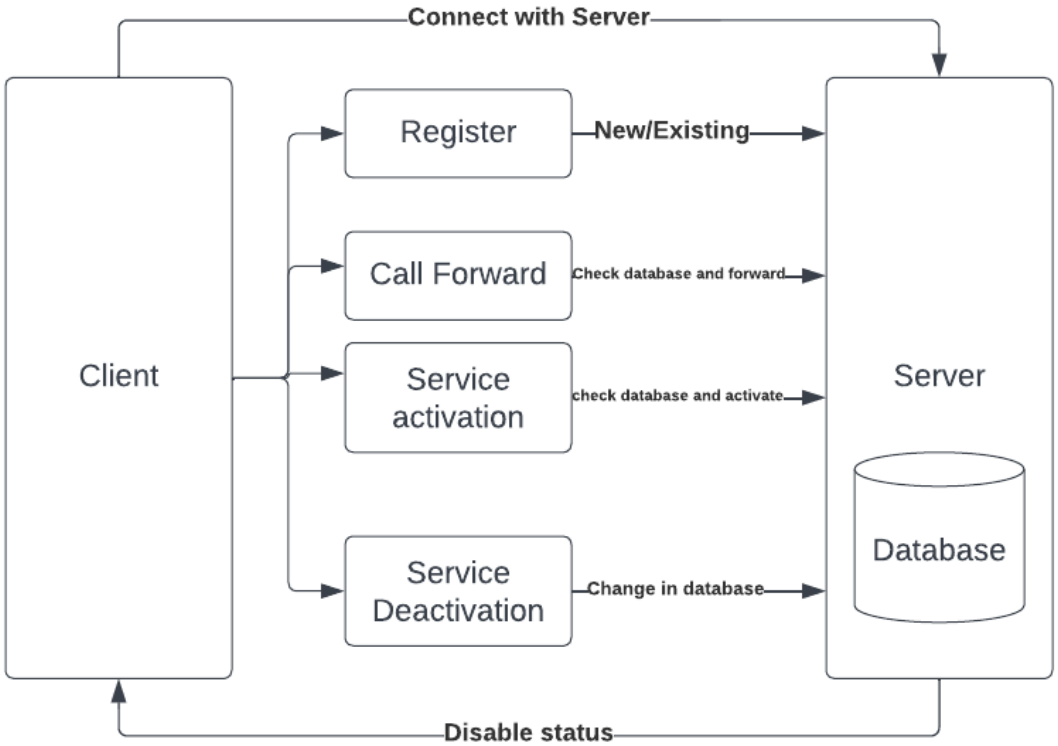
4.2. Detailed-Level Database Design

4.2.1 Level - 0 Diagram

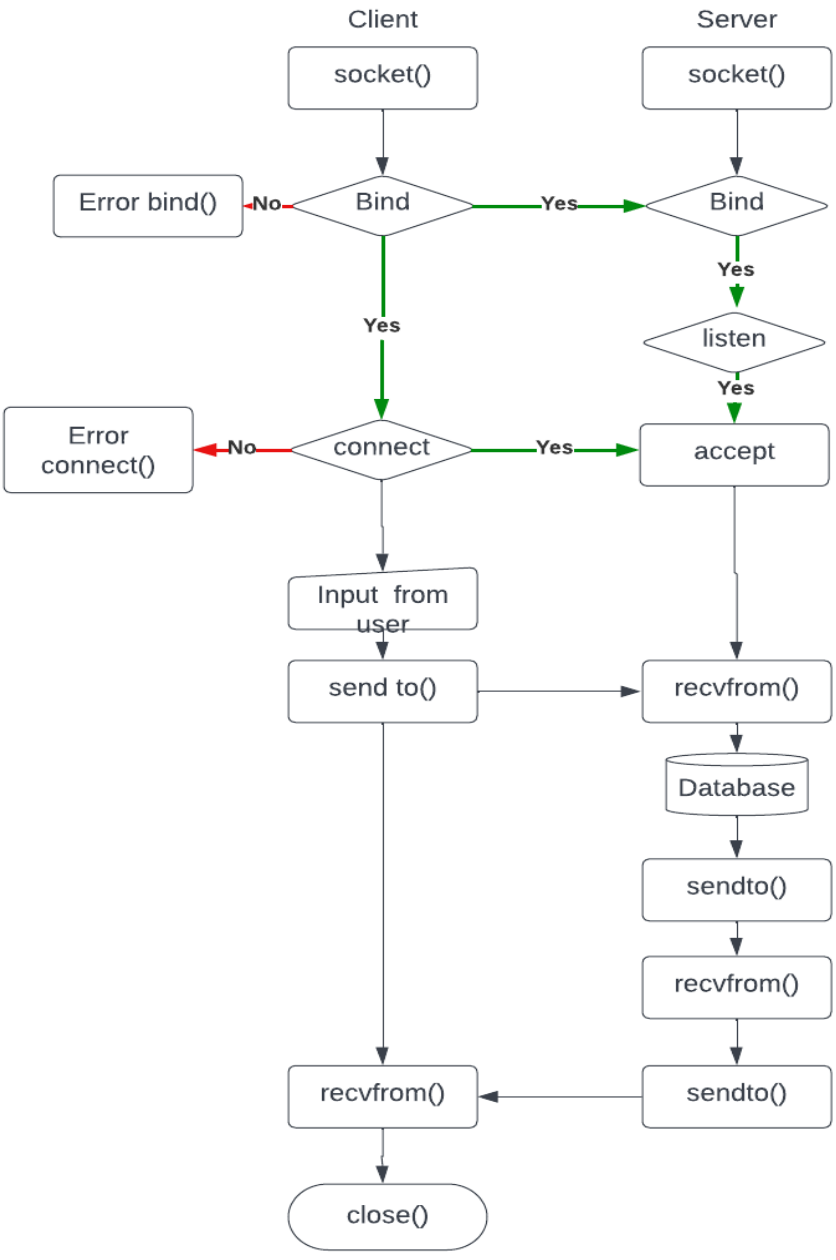
4.2.2 Level - 1 Diagram



4.2.3 Level - 2 Diagram



4.2.4 Data Mapping Information



4.2.5 Data Conversion

NA.

4.2.6 Requirement Specifications

Functional Requirements	Requirement Description	Priority
CFSS_SR_01	Server should maintain a database for the call forwarding details which include user authentication, type, source and destination etc.	Mandatory
CFSS_SR_02	Server shall allow clients to register or unregister for call forwarding service initially before enabling or disabling the service. Clients register/unregister requests shall be authenticated using a database.	Mandatory
CFSS_SR_03	Register/Unregister request shall be encrypted	Optional
CFSS_SR_04	The Server should support 3 types of call forwarding services i.e. unconditional or No reply or as Busy.	Mandatory

CFSS_SR_05	Shall allow authenticated and registered users to activate or deactivate the service as per their requirement	Mandatory
CFSS_SR_06	Activation and Deactivation of Call forwarding request shall require encrypted authentication	Optional
CFSS_SR_07	On a call connected from a client, the server shall check for activation of forwarding service using its database and if service is activated, then shall forward accordingly depending on the call forwarding type.	Mandatory
CFSS_SR_08	Once unregistered, no forwarding service shall be provided	Mandatory
CFSS_SR_09	Admin shall allow add/delete/update of database entries	Mandatory
CFSS_SR_10	Shall log all client requests and forwarded calls with date timestamp.	Mandatory
CFSS_CL_01	Shall register with server to request for call forwarding service	Mandatory
CFSS_CL_02	Registered and Authenticated Client can enable or disable the Call forwarding service anytime.	Mandatory

	No restriction on the number of enable/disable of Call forwarding service	
CFSS_CL_03	Shall unregister with server if services are no longer required	Mandatory
CFSS_CL_04	Shall receive normal calls addressed to the client if service is deactivated else all incoming call to be handled as per call forwarding service type	Mandatory
CFSS_CL_05	Shall unregister with server	Mandatory
CFSS_CL_06	Should include debug log messages with at least 4 levels (FATA, INFO, WARNING, DEBUG)	Mandatory
Non-Functional Requirements		
CFSS_N_01	The application should run (after compilation) on LINUX as well as windows	Desirable

4.3 Disaster and Failure Recovery

NA.

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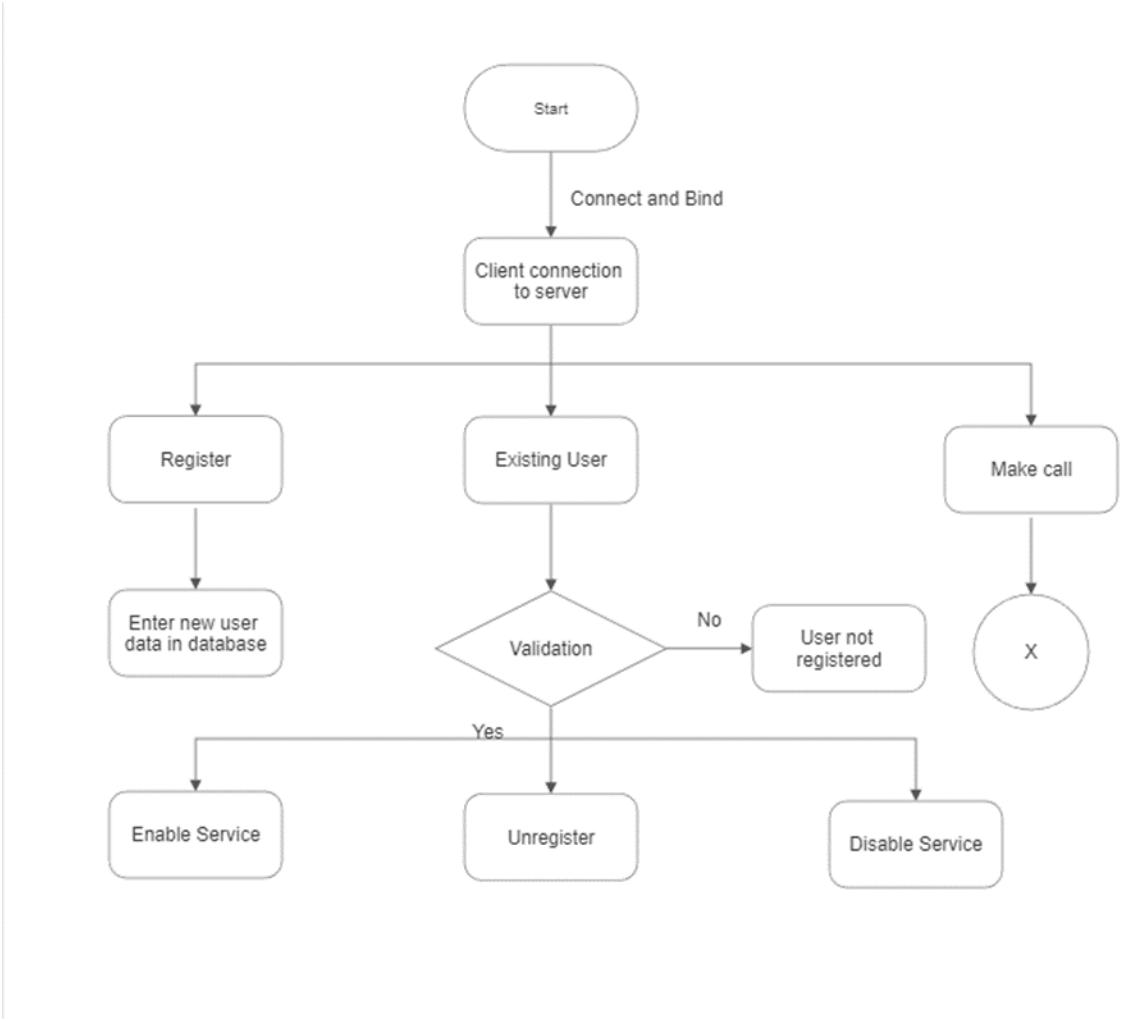
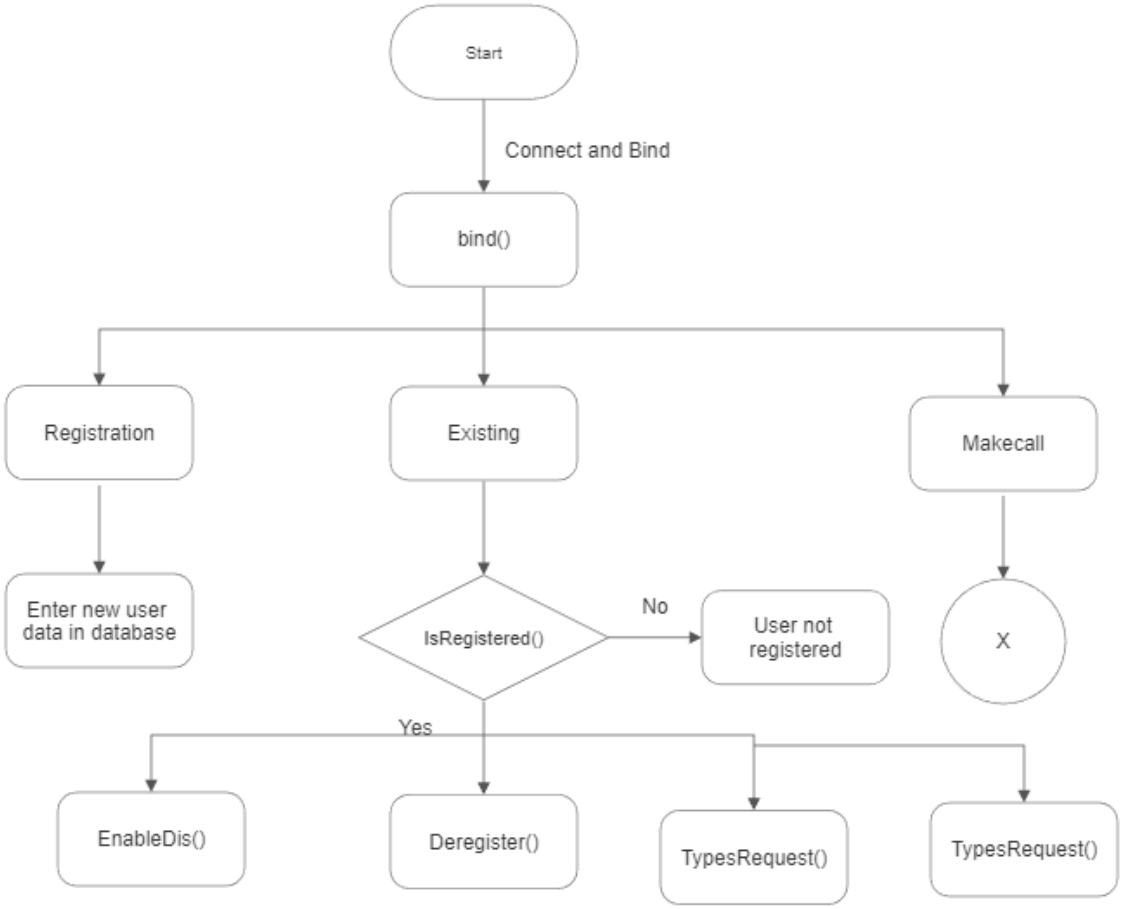
4.4. Business Process workflow

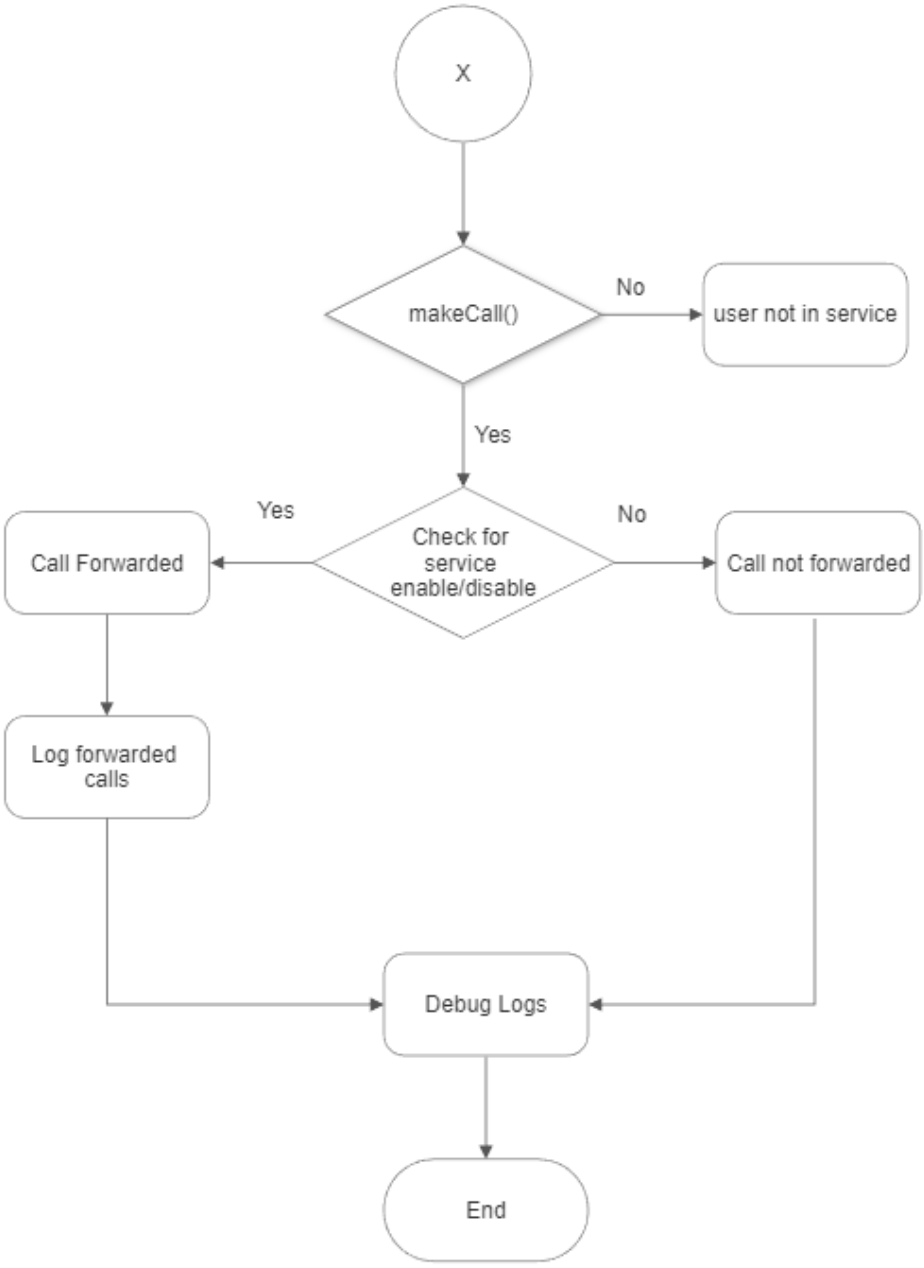


4.5. Business Process Modeling and Management (as applicable)

NA

4.6 Business Logic




X
makeCall()
No
user not in service
Yes
Yes
Check for service enable/disable
No
Call Forwarded
Call not forwarded
Log forwarded calls
Debug Logs
End

4.7. Variables

int portNo

int sfd

int csfd

struct sockaddr_in server_addr

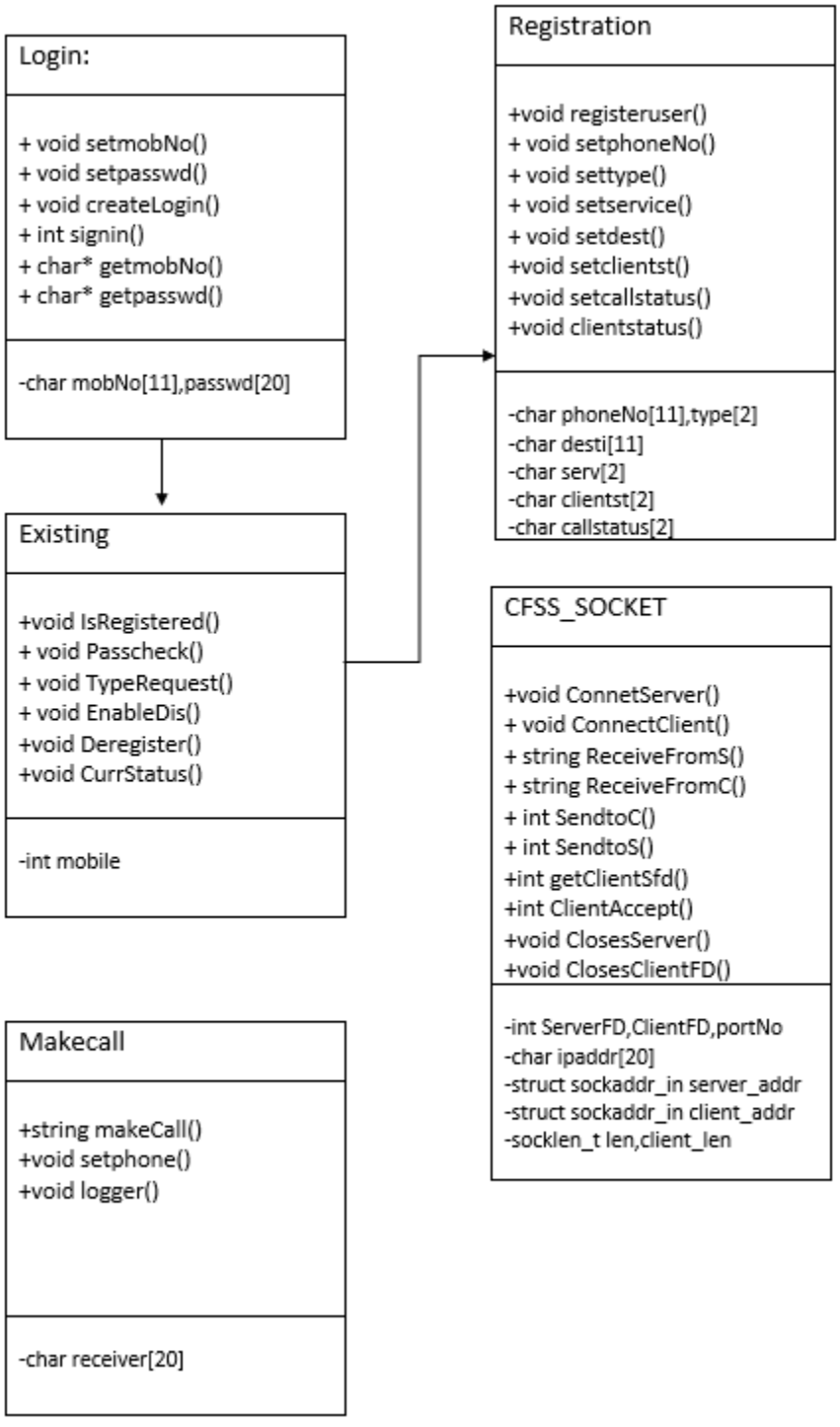
struct sockaddr_in client_addr

int choice

string mobileNo

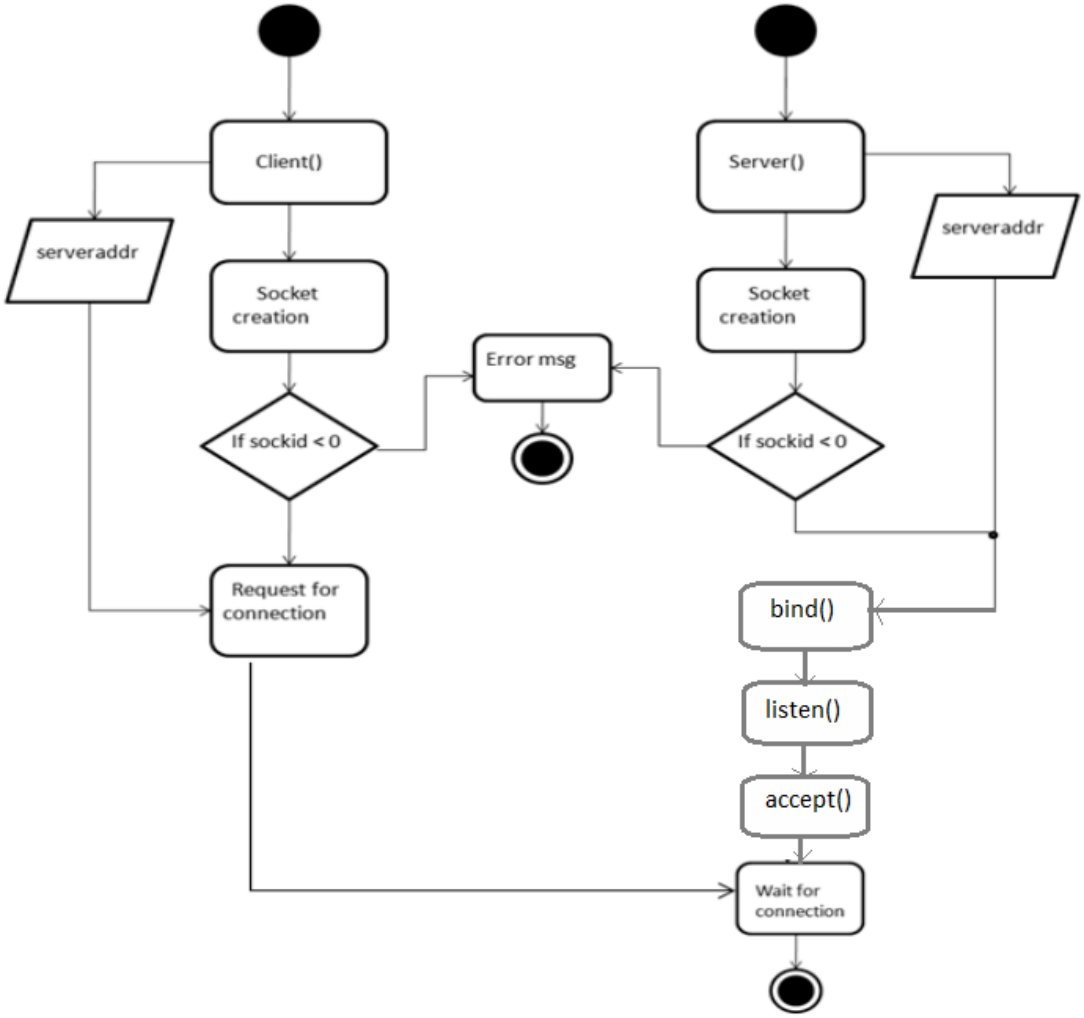
string Filename

4.8. Activity/ Class Diagrams (as applicable)

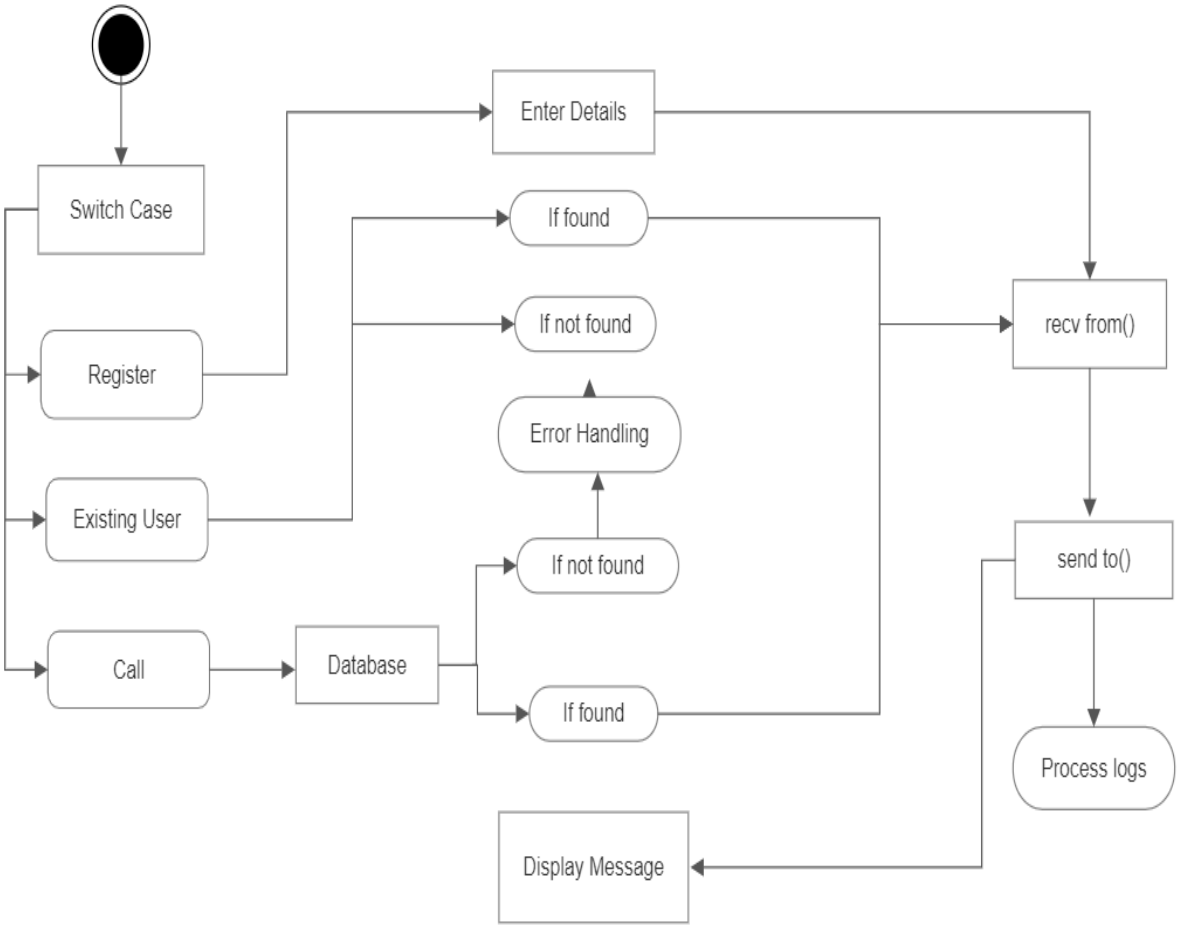


4.8.2 Activity Diagram

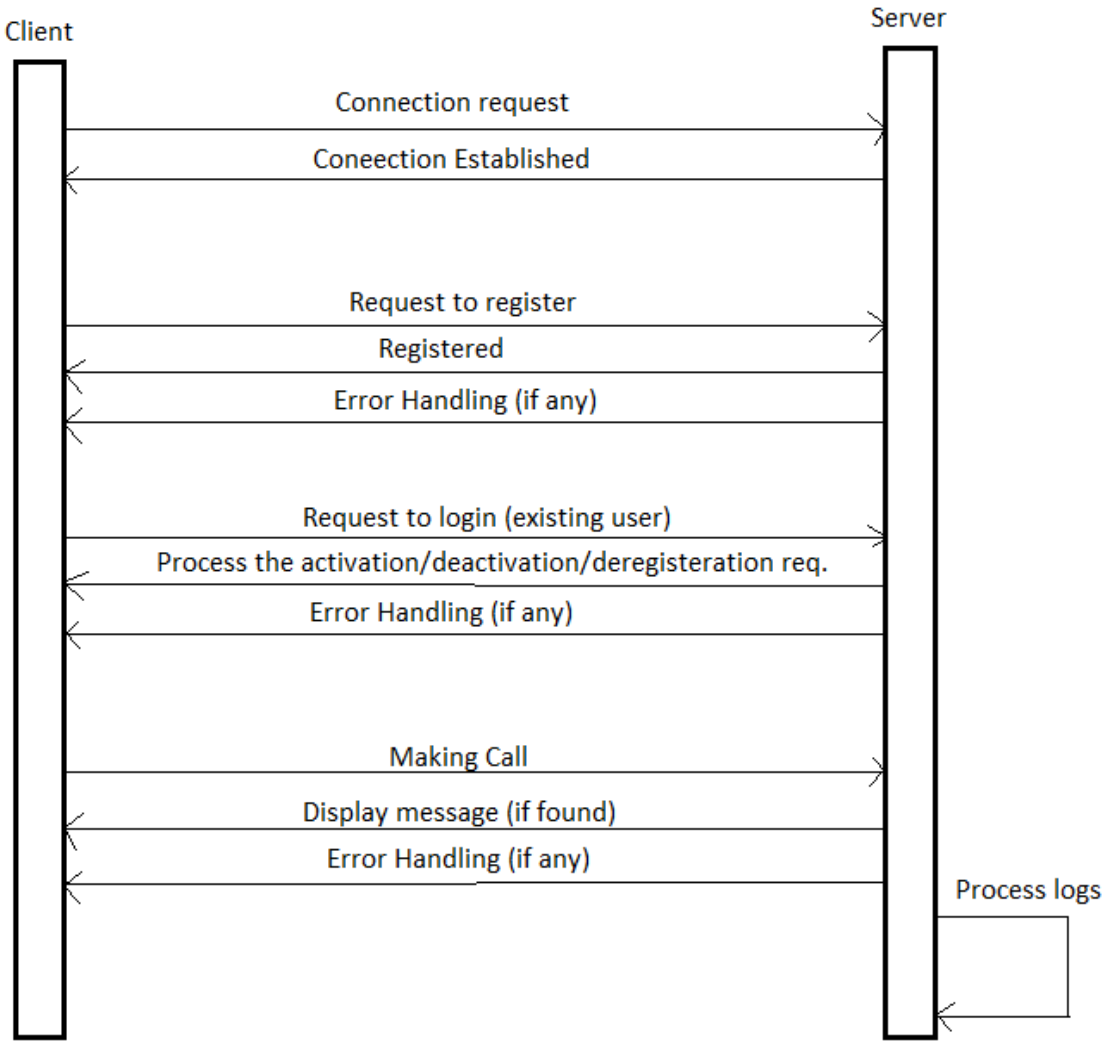
4.8.2.1 Socket creation diagram:



4.8.2.2 Socket end operation diagram:



4.8.3. Sequence diagram:



4.9. Data Migration

Data is migrated between the client and the server.

5. ENVIRONMENT DESCRIPTION

The Environment description allows the client to connect to the server and then the server will check the status of the receiver and do call forwarding accordingly if the service has been enabled by the receiver.

5.1 Time Zone Support

It will support time zones as per Indian standard time (IST) in (GMT +5:30) and UST standard.

5.2 Language Support

C++ language and compilation using g++. The Linux commands helps us to do that task we can specify the commands.

5.3 User Desktop Requirements

User desktop requires a Linux environment or windows environment.

5.4 Server-Side Requirements

On the server side,

- Disk space – Minimum 150GB
- Monitor long-running jobs, to reduce the server load.

5.4.1 Deployment Considerations

Deployment considerations are

- 500Mhz Processor
- 120GB HDD CPU
- 4GB RAM

5.4.2 Application Server Disk Space

Minimum 150GB.

5.4.3 Database Server Disk Space

NA.

5.4.4 Integration Requirements

The pwd linux command displays the current working directory on the server for the logged-in user.

5.4.5 Jobs

NA.

5.4.6 Network

NA

5.4.7 Others

NA.

5.5 Configuration

Call forwarding system simulator works in a client-server model. The server provides the call forwarding system for the client, using system calls and TCP protocol for the transfer of data. Call forwarding system simulators shall work in all standard Operating systems. The client can enable the call forwarding servo

5.5.1 Operating System

- Operating system – Unix.
- RAM - 8GB.
- Processor - i3/i5/i7.

5.5.2 Database

Fat file system is used.

5.5.3 Network

The following are the network details regarding the project:

- The client and server communicate over a TCP/IP protocol.
- The IP address used can be either IPv4 or IPv6.

5.5.4 Desktop

A Unix-like environment is required.

6. REFERENCES

https://courses.cs.vt.edu/cs2604/fall02/binio.html To read and write binary files

System Requirements Specification Document

https://www.geeksforgeeks.org/vector-in-cpp-stl Vector in STL

7. APPENDIX

NA.

Change Log

QMS Template Version Control (Maintained by QA)			
Date	**Version**	**Author**	**Description**