Remote Phonebook

12.10.2022-17.10.2022

Sprint 2

Group 6

INDEX

Overview

Remote Phonebook for Client :

In this project ,We have to make a setup for a remote phonebook. The process starts by establishing a connection between the client and the server.User is then authenticated by the use of the pre registered user data stored in an appropriate data structure. The server maintains a concurrency control for all its clients with proper security and protection. The client would ask authentication from the server and after authentication they would remain in the public group by default. There would be three types of access categories for the user: anonymous, authenticated and admin authenticated. For an anonymous client, the server should support a virtual user with the name anonymous to add contact to a public group only without any password. All the authenticated users should be allowed to add, view and delete contact from the phone directory for the group they belong to. They should view the content of public groups. Users with authenticated admin access can access any contact in addition to add, remove group to phone directory.

Goals

This project aims at creating and maintaining a remote phonebook for a client having a required set of features. It aims at smooth functioning and connections between the client and server. All clients should be able to access certain functions based on their level of authentication.

Purpose

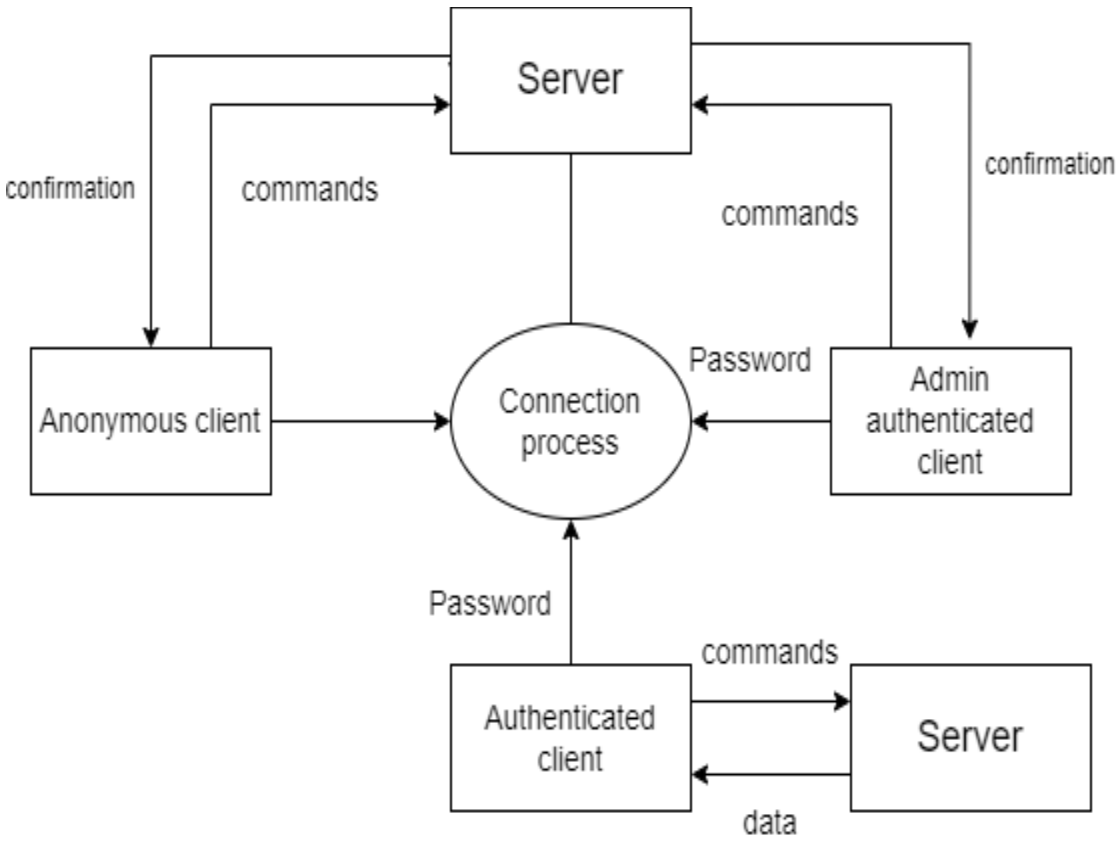
The purpose of this document is to track and record all the information and events occurring throughout the phonebook and keep the details organized so that we can track the progress and functionalities of the clients and the server properly.

Target audience

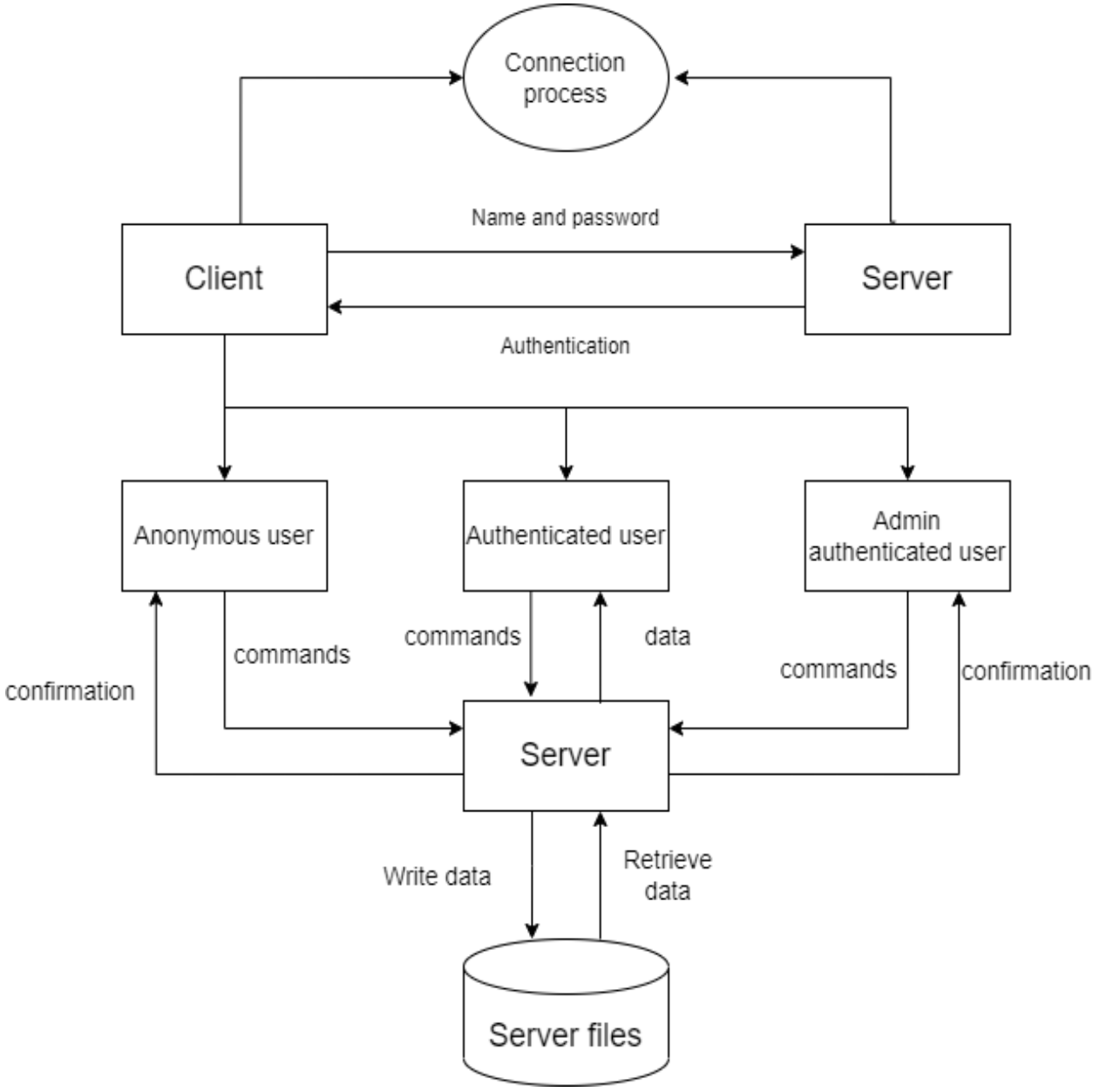
The target audience are the clients whose access rights are tracked and functions are specified. Also, the server who has to authenticate the clients and concurrently manage them.

Design Overview

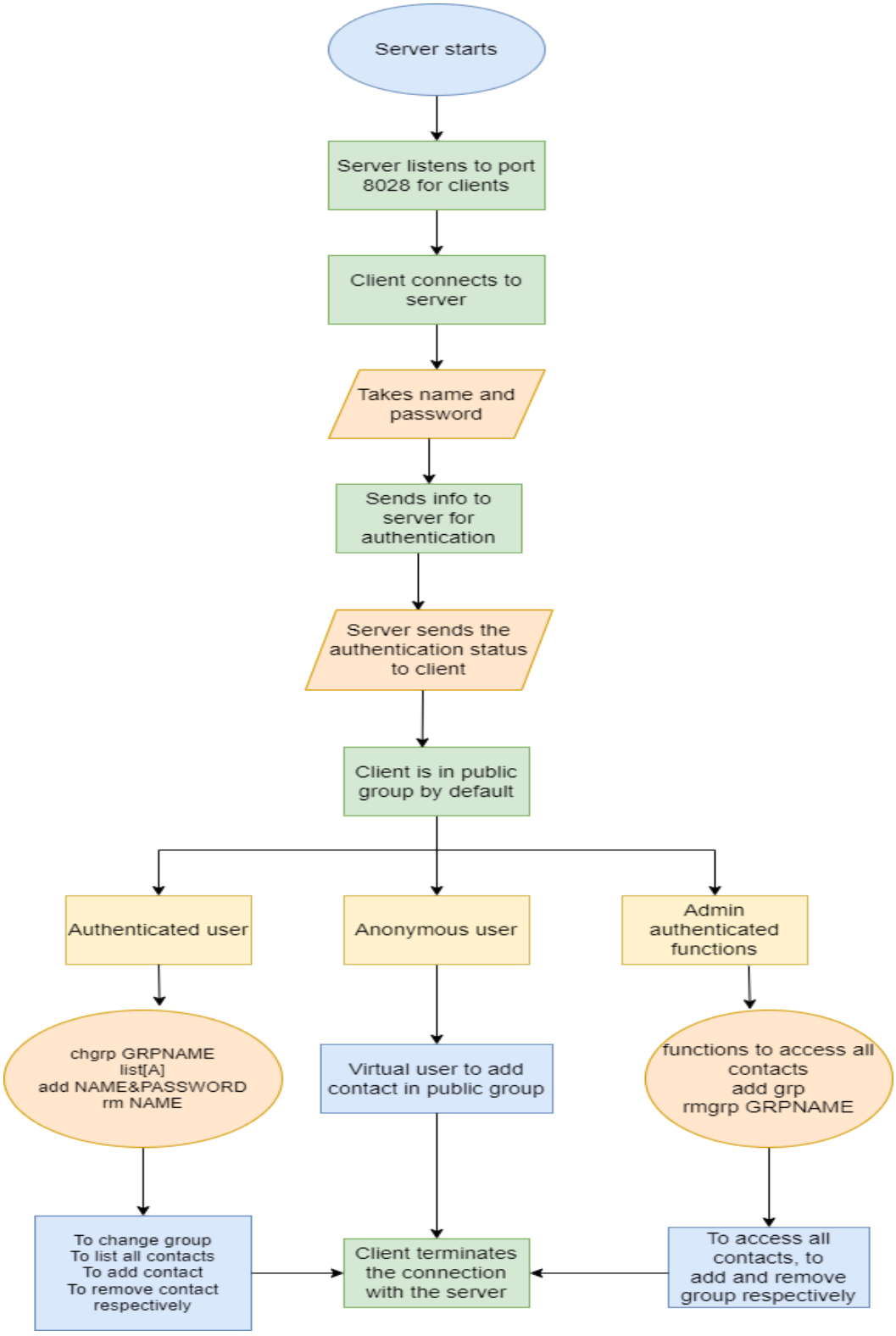
Data Flow Diagram Level 0:



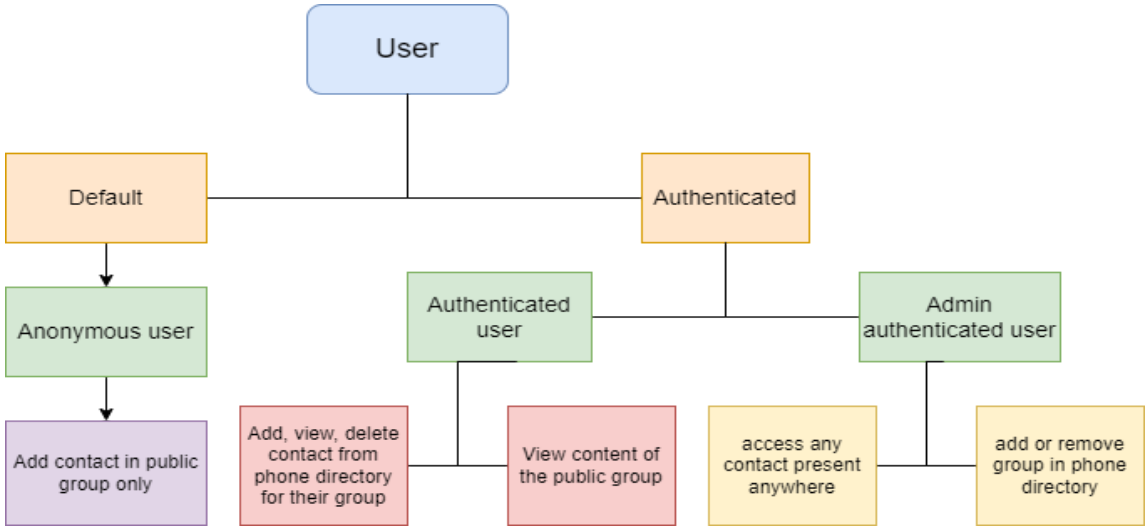
Data Flow Diagram Level 1:



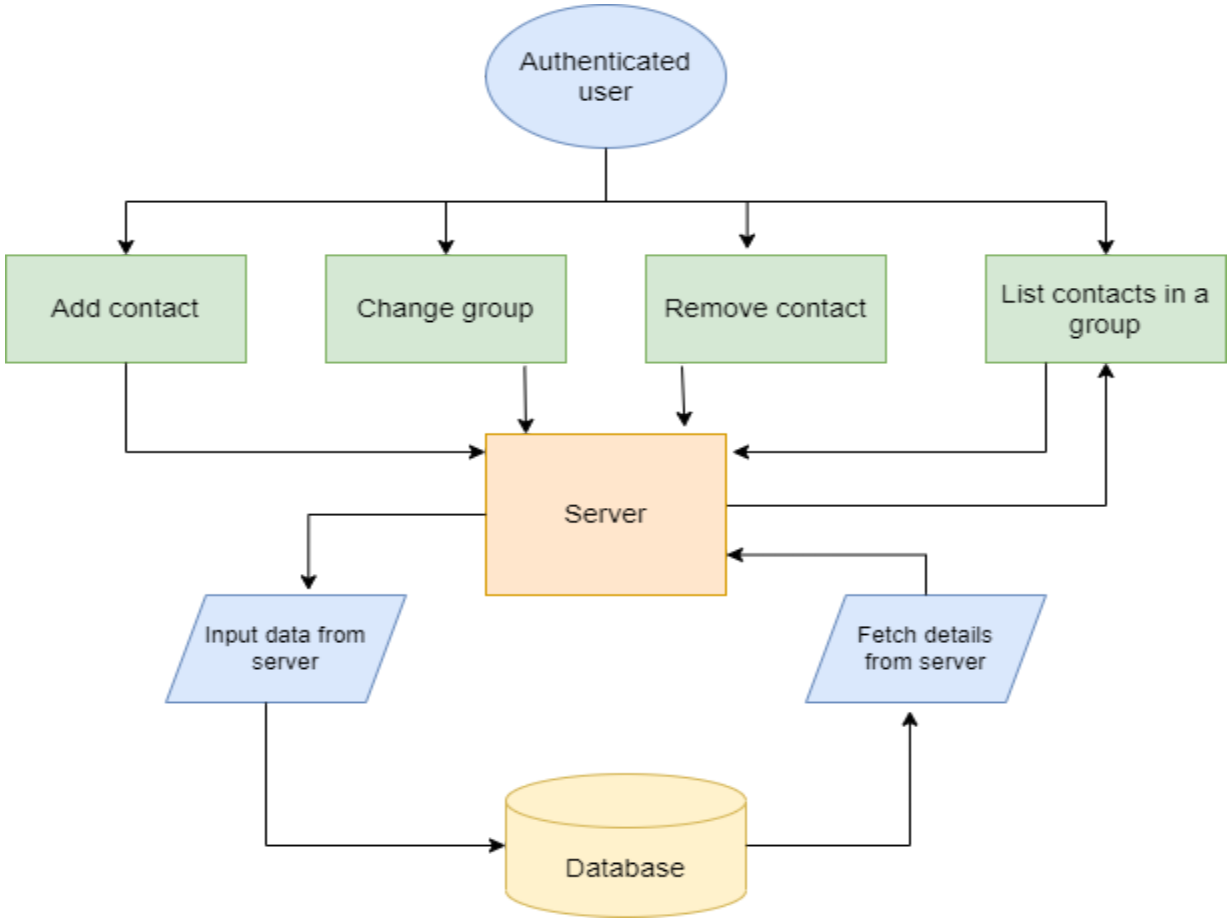
Flowchart for Remote phonebook:



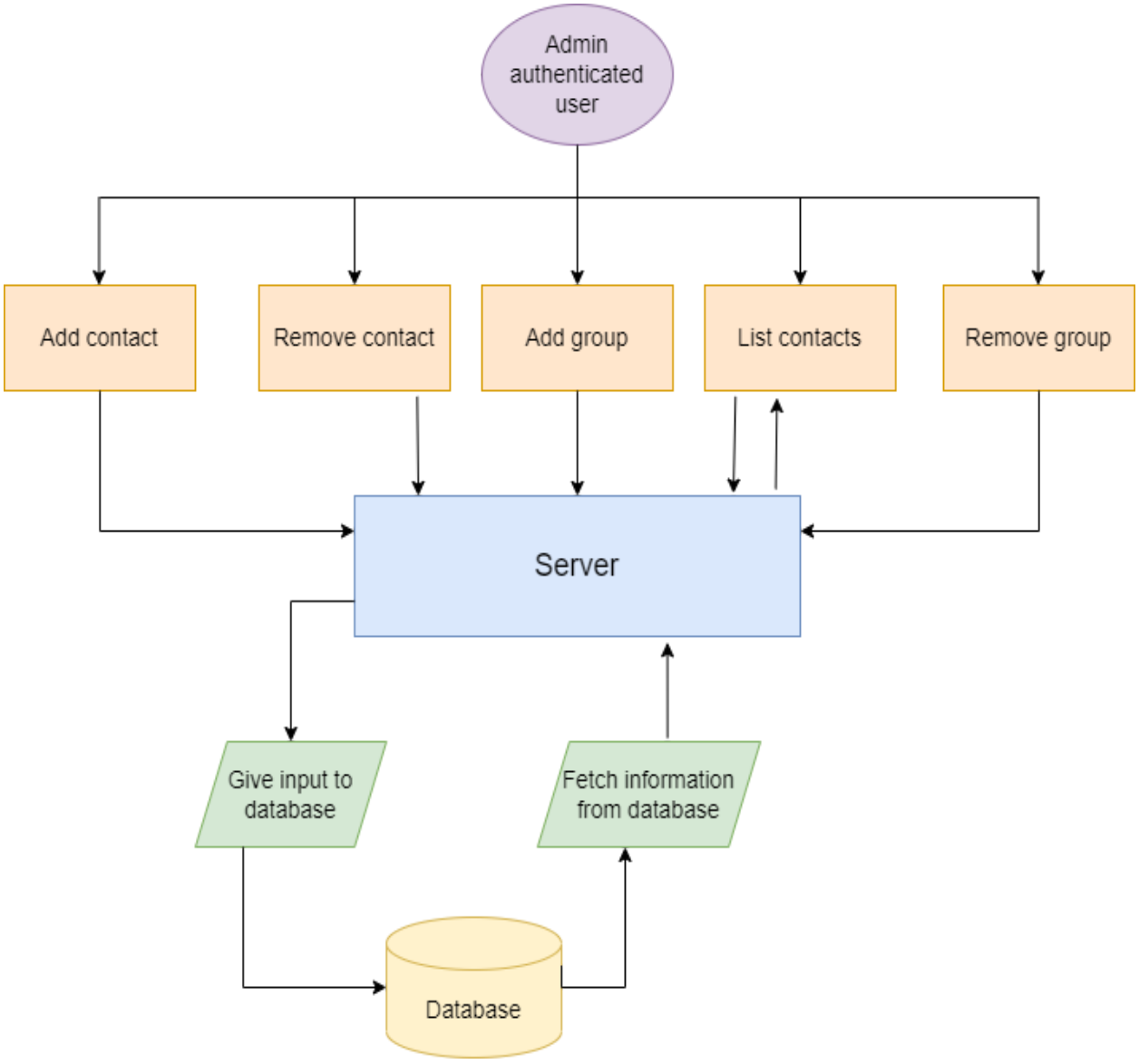
Flowchart for user:



Flowchart for functions of authenticated user:



Flowchart for functions for admin authenticated user:



System Architecture

Functions:

SERVER FUNCTIONS:

User Authentication:

The server should authenticate the user from a poll of registered user data kept with appropriate data structure.

Server side Firewall Protection:

The server should listen to port 8028 for client connection and make the client side computer access the server port.

Service starting at boot:

The server must configure to start the service automatically at boot.

Server side concurrency:

The server should support the concurrent client connection.

CLIENT FUNCTIONS:

Client side program starting:

The user should start the client program to connect the Server whenever he wants.

Client side connection request:

Client should request a connection to the server on port 8028.

Client side authentication:

Client program should start with an authentication

Client side user environment:

On successful authentication the user should be placed in a public group for phone book access.

Client side environment customization:

Users can use chgrp GRPNAME to change his Working group on phone book.

Client side browsing contact:

list[A] to list out all contacts in a group

Client side contact Add:

User adds contact using this function.

Client side contact deletion:

User can remove any contact from working group

Client side Group Add and Remove:

Admin authenticated user use this to add and remove groups.

Client side quit:

The user uses the subcommand bye to terminate the connection.

Tools Report

Gcov report:

```
└─$ gcov ../bin/client-clientmain.gcda
File '../src/clientmain.c'
Lines executed:72.00% of 25
Creating 'clientmain.c.gcov'

Lines executed:72.00% of 25
```

```
        -:    0:Source:../src/clientmain.c
        -:    0:Graph:../bin/client-clientmain.gcno
        -:    0:Data:../bin/client-clientmain.gcda
        -:    0:Runs:4
        -:    1://program to define the server main function
        -:    2:#include <stdio.h>
        -:    3:#include <signal.h>
        -:    4:#include <string.h>
        -:    5:#include <stdlib.h>
        -:    6:#include "client.h"
        -:    7:int sockid ;
    #####:    8:void signalHandler(int signal)
        -:    9:{
    #####:   10:        if(signal==SIGINT)
        -:   11:        {
    #####:   12:                send(sockid,"bye",3,0);
    #####:   13:                exit(0);
        -:   14:        }
    #####:   15:}
        -:   16:
        -:   17://main function to execute client
        -:   18:
        4:   19:int main ()
        -:   20:{
        4:   21:        signal(SIGINT,signalHandler);                   //signal to cut the client from server
        4:   22:        char recvdata[200]="",credentials[200]="",commands[200]="";
        4:   23:        Client();                                       //creating a client
        4:   24:        sockid=ToGetSockfd();                           //calling the getsockfd of client
        4:   25:        ToGetCredentials(credentials);                  //calling the getcredentials functions of client
        4:   26:        ToServerConnect() ;                             //calling the serverconnect function to connect to the server
        4:   27:        ToSendData(credentials);                        //sending the credentials to server
        4:   28:        CToRecvData(recvdata);                          //receiving the message from the server using recvData function
        4:   29:        char type[200]="";
        4:   30:        strcpy(type,recvdata);
        4:   31:        ToDisplayRecvData(recvdata);                    //calling the funtion to display the data
        -:   32:        while(1)
        -:   33:        {
       33:   34:                strcpy(commands,"");
       33:   35:                ToGetUserCommands(type,commands) ;  //calling the function to get the usercommands
      33*:   36:                if(strcmp(commands,"")!=0)
        -:   37:                {
       33:   38:                   ToSendData(commands);                //sending the user commands to the server
       29:   39:                   CToRecvData(recvdata);               //receiving the data from the server
       29:   40:                   ToDisplayRecvData(recvdata);         //displaying the received data from the server
        -:   41:                }
        -:   42:                else
        -:   43:                {
    #####:   44:                        printf("Subcommand can't be empty");
    #####:   45:                        continue;
        -:   46:                }
        -:   47:        }
        -:   48:        return EXIT_SUCCESS;
        -:   49:}
        -:   50:
```

Gprof report:

```
└─$ gprof -b ../bin/client gmon.out
Flat profile:

Each sample counts as 0.01 seconds.
 no time accumulated

  %   cumulative   self              self     total
 time   seconds   seconds    calls  Ts/call  Ts/call  name
  0.00      0.00     0.00        7     0.00     0.00  ToSendData
  0.00      0.00     0.00        6     0.00     0.00  CToRecvData
  0.00      0.00     0.00        6     0.00     0.00  ToDisplayRecvData
  0.00      0.00     0.00        6     0.00     0.00  ToGetUserCommands
  0.00      0.00     0.00        1     0.00     0.00  Client
  0.00      0.00     0.00        1     0.00     0.00  ToCloseClientConnections
  0.00      0.00     0.00        1     0.00     0.00  ToGetCredentials
  0.00      0.00     0.00        1     0.00     0.00  ToGetSockfd
  0.00      0.00     0.00        1     0.00     0.00  ToServerConnect
```

```
                     Call graph


granularity: each sample hit covers 2 byte(s) no time propagated

index % time    self  children    called     name
                0.00    0.00       7/7           main [15]
[1]     0.0     0.00    0.00       7         ToSendData [1]
                0.00    0.00       1/1           ToCloseClientConnections [6]
-----------------------------------------------
                0.00    0.00       6/6           main [15]
[2]     0.0     0.00    0.00       6         CToRecvData [2]
-----------------------------------------------
                0.00    0.00       6/6           main [15]
[3]     0.0     0.00    0.00       6         ToDisplayRecvData [3]
-----------------------------------------------
                0.00    0.00       6/6           main [15]
[4]     0.0     0.00    0.00       6         ToGetUserCommands [4]
-----------------------------------------------
                0.00    0.00       1/1           main [15]
[5]     0.0     0.00    0.00       1         Client [5]
-----------------------------------------------
                0.00    0.00       1/1           ToSendData [1]
[6]     0.0     0.00    0.00       1         ToCloseClientConnections [6]
-----------------------------------------------
                0.00    0.00       1/1           main [15]
[7]     0.0     0.00    0.00       1         ToGetCredentials [7]
-----------------------------------------------
                0.00    0.00       1/1           main [15]
[8]     0.0     0.00    0.00       1         ToGetSockfd [8]
-----------------------------------------------
                0.00    0.00       1/1           main [15]
[9]     0.0     0.00    0.00       1         ToServerConnect [9]
-----------------------------------------------


Index by function name

   [2] CToRecvData             [3] ToDisplayRecvData       [4] ToGetUserCommands
   [5] Client                  [7] ToGetCredentials        [1] ToSendData
   [6] ToCloseClientConnections [8] ToGetSockfd            [9] ToServerConnect
```

Splint report:

```
Splint 3.1.2 --- 21 Feb 2021

< Location unknown >: Field name reused:
  Code cannot be parsed.  For help on parse errors, see splint -help
  parseerrors. (Use -syntax to inhibit warning)
< Location unknown >: Previous use of
< Location unknown >: Previous use of
server.c: (in function ToAcceptConnections)
server.c:138:16: Unrecognized identifier: SIGCHLD
  Identifier used in code has not been declared. (Use -unrecog to inhibit
  warning)
server.c: (in function AuthenticatedUserFunctionalities)
server.c:151:10: Parameter 1 (comm) to function strcpy is declared unique but
   is aliased externally by parameter 2 (tok) through alias comm
  A unique or only parameter is aliased by some other parameter or visible
  global. (Use -aliasunique to inhibit warning)
< Location unknown >: Field name reused:
< Location unknown >: Previous use of
clientmain.c:19:5: Function main defined more than once
  A function or variable is redefined. One of the declarations should use
  extern. (Use -redef to inhibit warning)
   servermain.c:15:1: Previous definition of main
< Location unknown >: Previous use of
client.c:18:5: Variable sockfd redefined
   server.c:11:5: Previous definition of sockfd
client.c:19:20: Variable servaddr redefined
   server.c:12:20: Previous definition of servaddr
client.c:20:16: Variable slen redefined
   server.c:14:8: Previous definition of slen
client.c:20:21: Variable mlen redefined
   server.c:14:18: Previous definition of mlen
client.c:20:26: Variable connectfd redefined
   server.c:15:5: Previous definition of connectfd
< Location unknown >: Previous use of

Finished checking --- 10 code warnings
```

Valgrind report:

```
└─$ valgrind -s ./../bin/client
==48232== Memcheck, a memory error detector
==48232== Copyright (C) 2002-2022, and GNU GPL'd, by Julian Seward et al.
==48232== Using Valgrind-3.19.0 and LibVEX; rerun with -h for copyright info
==48232== Command: ./../bin/client
==48232==
Enter the Username :admin
Enter the password :1
admin

Enter the subcommand :ADD arpita,8998576897
Provide three inputs name,phonenumber,filename

Enter the subcommand :ADD arpita,8998576897,public group
contact added to the given group

Enter the subcommand :rm arpita,public group
contact removed from the given group

Enter the subcommand :addgrp services
Group added

Enter the subcommand :rmgrp services
Group removed

Enter the subcommand :list a,public group
Matching contacts:
ad1,de1


Enter the subcommand :bye
==48232==
==48232== HEAP SUMMARY:
==48232==     in use at exit: 0 bytes in 0 blocks
==48232==   total heap usage: 2 allocs, 2 frees, 2,048 bytes allocated
==48232==
==48232== All heap blocks were freed -- no leaks are possible
==48232==
==48232== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
```

```
└─$ valgrind -s ./../bin/client
==53578== Memcheck, a memory error detector
==53578== Copyright (C) 2002-2022, and GNU GPL'd, by Julian Seward et al.
==53578== Using Valgrind-3.19.0 and LibVEX; rerun with -h for copyright info
==53578== Command: ./../bin/client
==53578==
Enter the Username :sai nath
Enter the password :group6
authenticated user

Enter the subcommand :list a
Matching contacts:
ad1,de1


Enter the subcommand :chgrp production
Group changed

Enter the subcommand :ADD jist,89989899998
Contact added

Enter the subcommand :rm jist
Contact removed

Enter the subcommand :bye
==53578==
==53578== HEAP SUMMARY:
==53578==     in use at exit: 0 bytes in 0 blocks
==53578==   total heap usage: 2 allocs, 2 frees, 2,048 bytes allocated
==53578==
==53578== All heap blocks were freed -- no leaks are possible
==53578==
==53578== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
```

Testing Report

Unit testing report:

```
./../bin/test


     CUnit - A unit testing framework for C - Version 2.1-3
     http://cunit.sourceforge.net/


Suite: suite for removing contact frrom a file...
  Test: Test for removecontact() in sunny cases  ...passed
  Test: Test for removecontact() in rainy cases  ...passed
Suite: suite for changing group...
  Test: Test for ToChgrp() in sunny cases  ...passed
  Test: Test for ToChgrp() in rainy cases  ...passed

Run Summary:    Type  Total    Ran Passed Failed Inactive
              suites      2      2    n/a      0        0
               tests      4      4      4      0        0
             asserts     20     20     20      0      n/a

Elapsed time =    0.001 seconds
```

Integration testing report:

Case 1:Anonymous user

```
└─$ make client
../bin/client
Enter the Username :
Enter the password :
anonymous user

Enter the subcommand :ADD
ADD command should have two fields

Enter the subcommand :ADD 1
ADD command should have two fields

Enter the subcommand :list
Anonymous user should provide only ADD subcommand

Enter the subcommand :ADD sai,9009989098
Contact added

Enter the subcommand :addgrp
Anonymous user should provide only ADD subcommand

Enter the subcommand :chgrp
Anonymous user should provide only ADD subcommand

Enter the subcommand :ADD Ayeshkanta,8909089988
Contact added

Enter the subcommand :bye

┌──(kali㉿kali)-[~/Desktop/run_final/make]
```

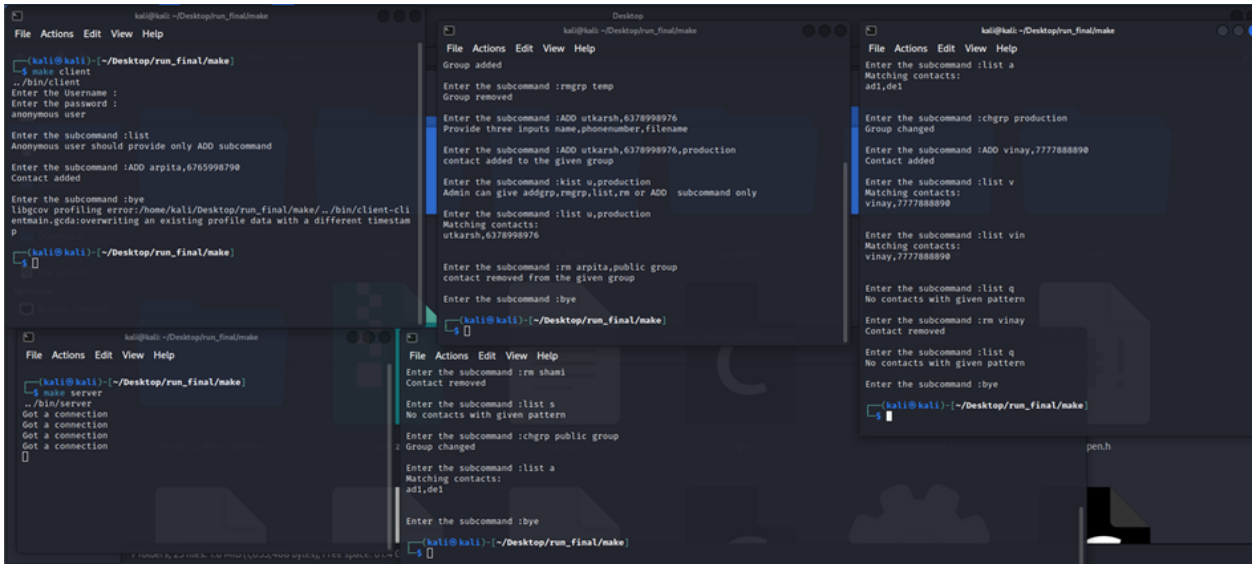
Case 2:Authenticated user

```
└─$ make client
../bin/client
Enter the Username :sai nath
Enter the password :group6
authenticated user

Enter the subcommand :addgrp
Authenticated users can only use ADD,rm,list,chgrp and bye/Bye subcommand
s
Enter the subcommand :ADD virat,1234
Authenticated user can't add the data to the public group
Enter the subcommand :list a
Matching contacts:
ad1,de1

Enter the subcommand :chgrp production
Group changed

Enter the subcommand :ADD vinay,7777888890
Contact added

Enter the subcommand :list v
Matching contacts:
vinay,7777888890
Enter the subcommand :list vin
Matching contacts:
vinay,7777888890
Enter the subcommand :list q
No contacts with given pattern

Enter the subcommand :rm vinay
Contact removed

Enter the subcommand :list q
No contacts with given pattern

Enter the subcommand :bye
```

Case 3:Admin authenticated user

```
└─$ make client
../bin/client
Enter the Username :admin
Enter the password :1
admin

Enter the subcommand :chgrp production
Admin can give addgrp,rmgrp,list,rm or ADD  subcommand only

Enter the subcommand :addgrp hr
Group added

Enter the subcommand :addgrp temp
Group added

Enter the subcommand :rmgrp temp
Group removed

Enter the subcommand :ADD utkarsh,6378998976
Provide three inputs name,phonenumber,filename

Enter the subcommand :ADD utkarsh,6378998976,production
contact added to the given group

Enter the subcommand :kist u,production
Admin can give addgrp,rmgrp,list,rm or ADD  subcommand only

Enter the subcommand :list u,production
Matching contacts:
utkarsh,6378998976

Enter the subcommand :rm arpita,public group
contact removed from the given group

Enter the subcommand :bye
```

Case 4: Handling multiple clients



Requirement Traceability matrix(RTM):

REQUIREMENT	DESIGN MAPPING	CODE MAPPING	IT MAPPING	UT MAPPING
RPBC_01	a	Client-server connection		
RPBC_02	b	User authentication		
RPBC_03	c	Server side protection		
RPBC_04	d	Anonymous user access	IT_01	
RPBC_05	e	Authenticated user access	IT_02	
RPBC_06	f	Authenticated admin access	IT_03	
RPBC_07	g	Server side concurrency	IT_04	
RPBC_08	h	Client side program starting		

RPBC_09	i	Client side connection request		
RPBC_10	j	Client side authentication		
RPBC_11	k	Client side user environment		
RPBC_12	l	Change group		UT_03 UT_04
RPBC_13	m	Contact list display		
RPBC_14	n	Add contact		
RPBC_15	o	Contact deletion		UT_01 UT_02
RPBC_16	p	Group add and remove		
RPBC_17	q	Client side quit		