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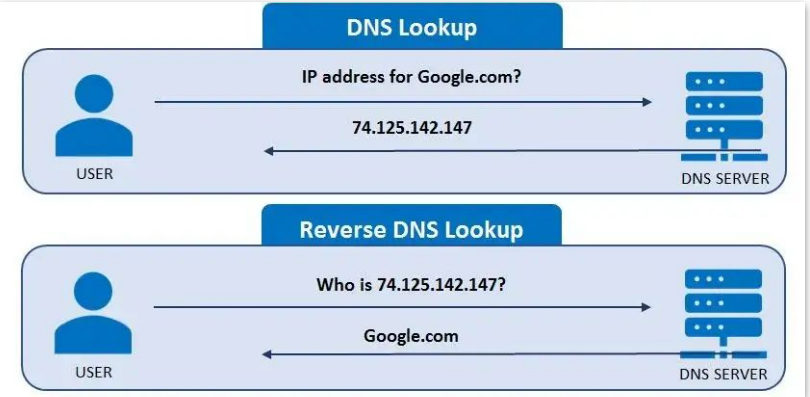
プロジェクトについて

DNSルックアップ&ファイルアップロード
ユーティリティ

概要

★ プロジェクト：DNSルックアップ&ファイルアップロード
(コマンドラインインターフェース)

★ 目的：ネットワークプログラミングスキルの向上



技術

使用技術:C言語でTCPソケットプログラミング

開発環境:Ubuntu 23.10

学習理由 : 学校で学んだコンピュータネットワークの知識を活用して、
実践的なアプリケーションを開発する

学習方法 : GeeksforGeeks.org、 cplusplus.com,
man7.org、 pubs.opengroup.org

技術を適用する

複数の同時接続を処理します
→ I/Oマルチプレックステクニックを使用する[poll()]

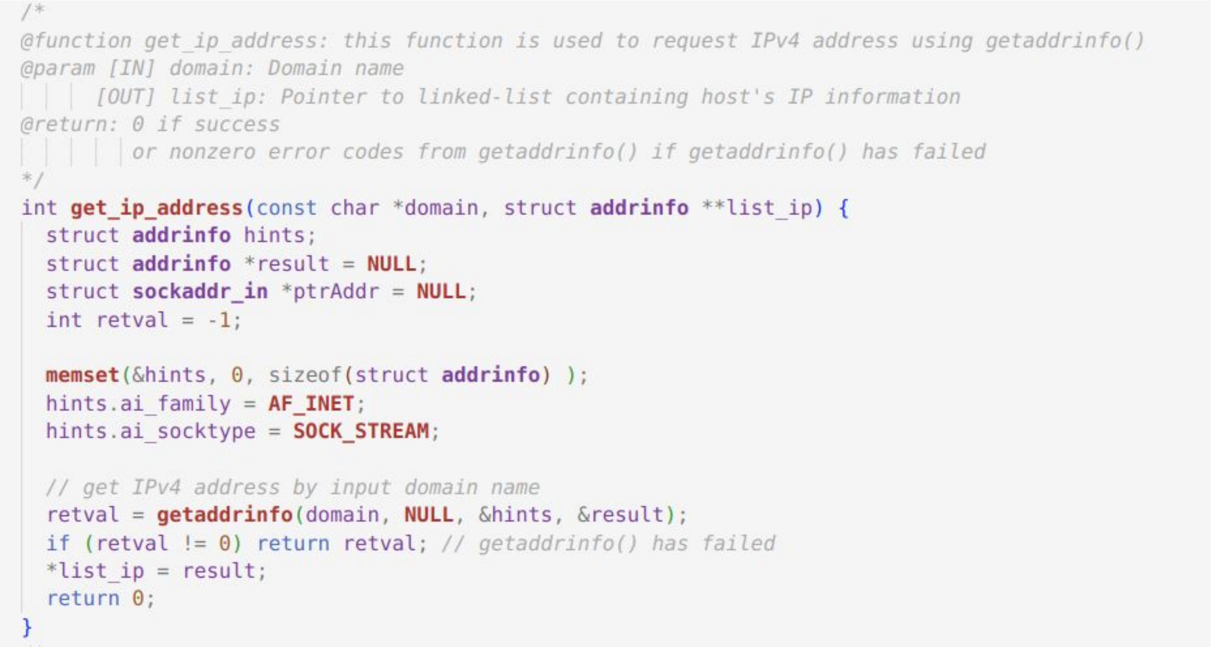
ストリームトランスミッションの取り扱い
→ デリミタを使用します [“\r\n”]

ファイルを管理し、データの読み取りと書き込み

→ Linuxのsysライブラリー [mkdir, stat]

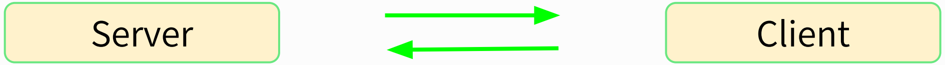
プロジェクトのデモ

Clean code

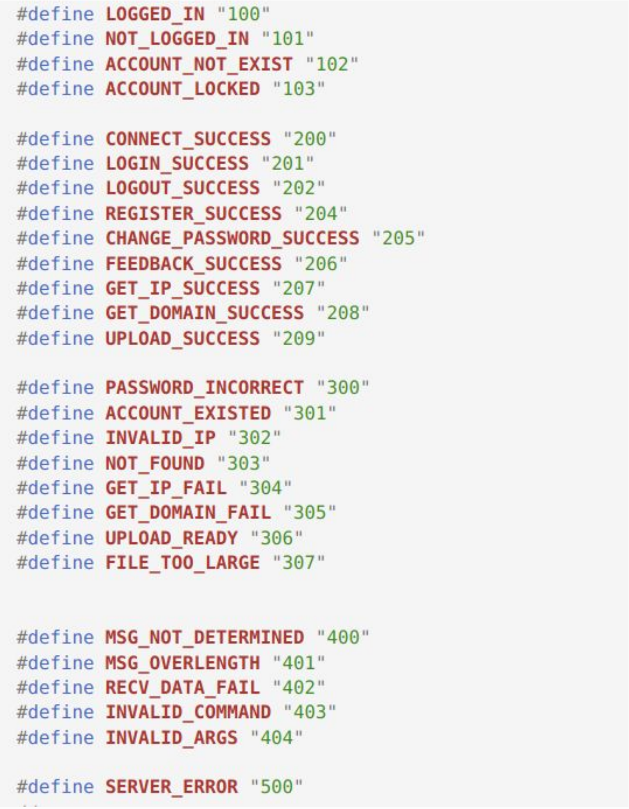


```c
/*
@function get_ip_address: this function is used to request IPv4 address using getaddrinfo()
@param [IN] domain: Domain name
            [OUT] list_ip: Pointer to linked-list containing host's IP information
@return: 0 if success
                  or nonzero error codes from getaddrinfo() if getaddrinfo() has failed
*/
int get_ip_address(const char *domain, struct addrinfo **list_ip) {
  struct addrinfo hints;
  struct addrinfo *result = NULL;
  struct sockaddr_in *ptrAddr = NULL;
  int retval = -1;

  memset(&hints, 0, sizeof(struct addrinfo) );
  hints.ai_family = AF_INET;
  hints.ai_socktype = SOCK_STREAM;

  // get IPv4 address by input domain name
  retval = getaddrinfo(domain, NULL, &hints, &result);
  if (retval != 0) return retval; // getaddrinfo() has failed
  *list_ip = result;
  return 0;
}
```

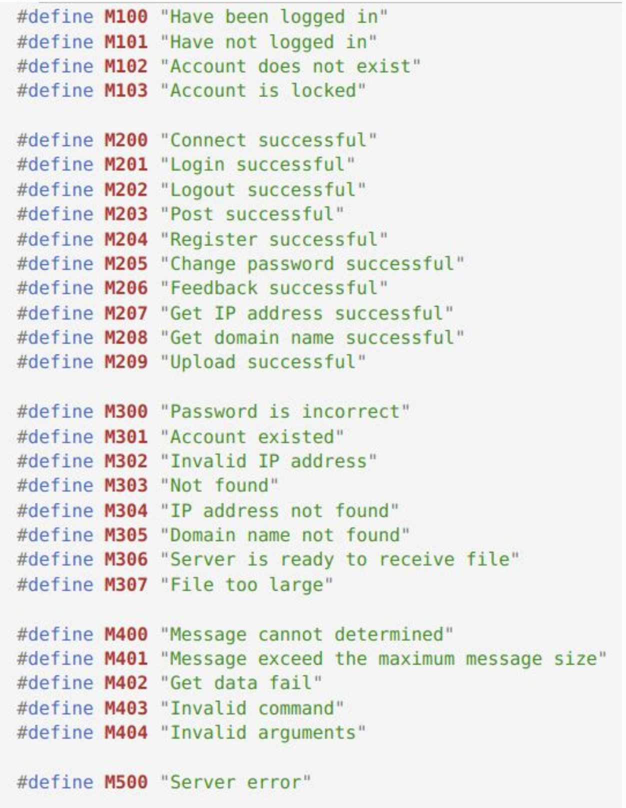
プロジェクトのデモ



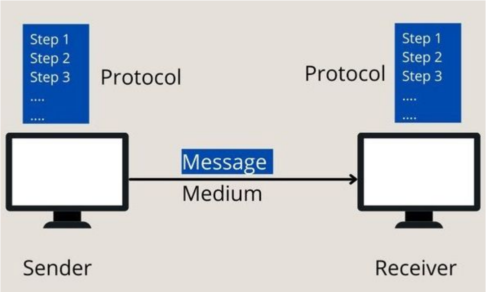
Protocol design



```
#define LOGGED_IN "100"
#define NOT_LOGGED_IN "101"
#define ACCOUNT_NOT_EXIST "102"
#define ACCOUNT_LOCKED "103"

#define CONNECT_SUCCESS "200"
#define LOGIN_SUCCESS "201"
#define LOGOUT_SUCCESS "202"
#define REGISTER_SUCCESS "204"
#define CHANGE_PASSWORD_SUCCESS "205"
#define FEEDBACK_SUCCESS "206"
#define GET_IP_SUCCESS "207"
#define GET_DOMAIN_SUCCESS "208"
#define UPLOAD_SUCCESS "209"

#define PASSWORD_INCORRECT "300"
#define ACCOUNT_EXISTED "301"
#define INVALID_IP "302"
#define NOT_FOUND "303"
#define GET_IP_FAIL "304"
#define GET_DOMAIN_FAIL "305"
#define UPLOAD_READY "306"
#define FILE_TOO_LARGE "307"


#define MSG_NOT_DETERMINED "400"
#define MSG_OVERLENGTH "401"
#define RECV_DATA_FAIL "402"
#define INVALID_COMMAND "403"
#define INVALID_ARGS "404"

#define SERVER_ERROR "500"
```

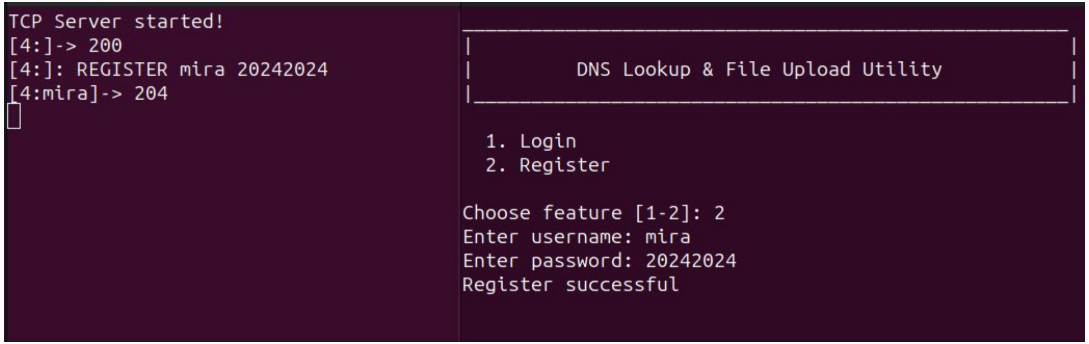


```
#define M100 "Have been logged in"
#define M101 "Have not logged in"
#define M102 "Account does not exist"
#define M103 "Account is locked"

#define M200 "Connect successful"
#define M201 "Login successful"
#define M202 "Logout successful"
#define M203 "Post successful"
#define M204 "Register successful"
#define M205 "Change password successful"
#define M206 "Feedback successful"
#define M207 "Get IP address successful"
#define M208 "Get domain name successful"
#define M209 "Upload successful"

#define M300 "Password is incorrect"
#define M301 "Account existed"
#define M302 "Invalid IP address"
#define M303 "Not found"
#define M304 "IP address not found"
#define M305 "Domain name not found"
#define M306 "Server is ready to receive file"
#define M307 "File too large"

#define M400 "Message cannot determined"
#define M401 "Message exceed the maximum message size"
#define M402 "Get data fail"
#define M403 "Invalid command"
#define M404 "Invalid arguments"

#define M500 "Server error"
```



プロジェクトのデモ

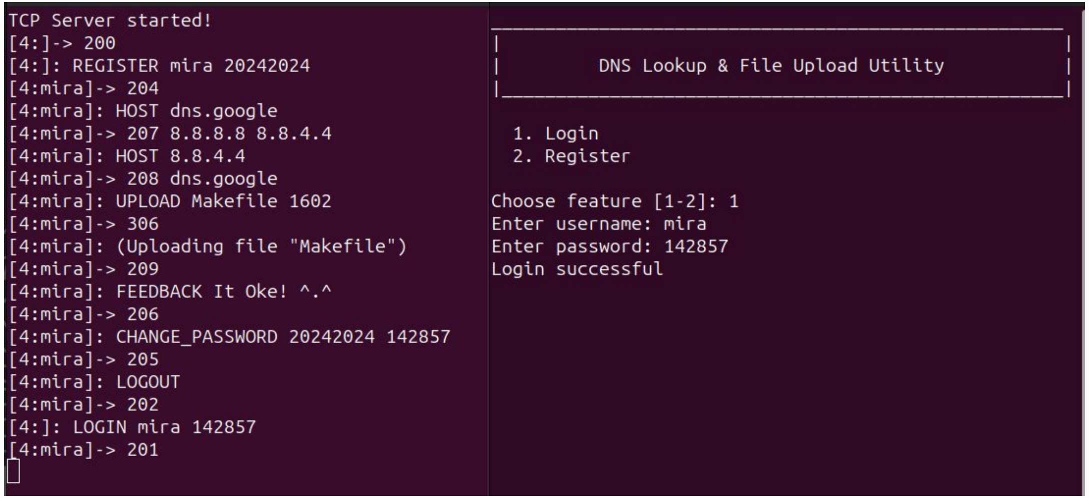
Register



```
TCP Server started!
[4:]-> 200
[4:]: REGISTER mira 20242024
[4:mira]-> 204
```

```
 ______________________________________________________________
|                                                              |
|             DNS Lookup & File Upload Utility                 |
|______________________________________________________________|

  1. Login
  2. Register

Choose feature [1-2]: 2
Enter username: mira
Enter password: 20242024
Register successful
```

Login

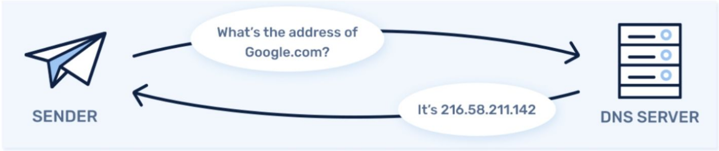


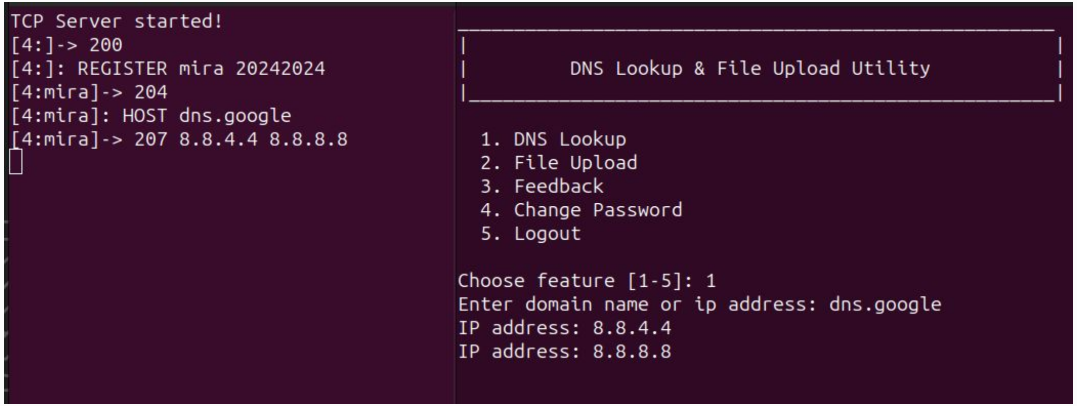
```
TCP Server started!
[4:]-> 200
[4:]: REGISTER mira 20242024
[4:mira]-> 204
[4:mira]: HOST dns.google
[4:mira]-> 207 8.8.8.8 8.8.4.4
[4:mira]: HOST 8.8.4.4
[4:mira]-> 208 dns.google
[4:mira]: UPLOAD Makefile 1602
[4:mira]-> 306
[4:mira]: (Uploading file "Makefile")
[4:mira]-> 209
[4:mira]: FEEDBACK It Oke! ^.^
[4:mira]-> 206
[4:mira]: CHANGE_PASSWORD 20242024 142857
[4:mira]-> 205
[4:mira]: LOGOUT
[4:mira]-> 202
[4:]: LOGIN mira 142857
[4:mira]-> 201
```

```
 ______________________________________________________________
|                                                              |
|             DNS Lookup & File Upload Utility                 |
|______________________________________________________________|

  1. Login
  2. Register

Choose feature [1-2]: 1
Enter username: mira
Enter password: 142857
Login successful
```

プロジェクトのデモ

Forward DNS:

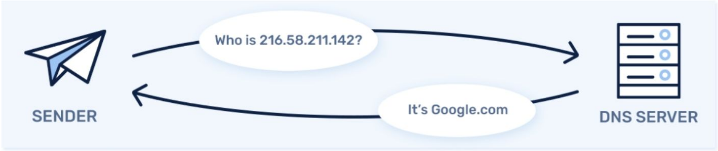


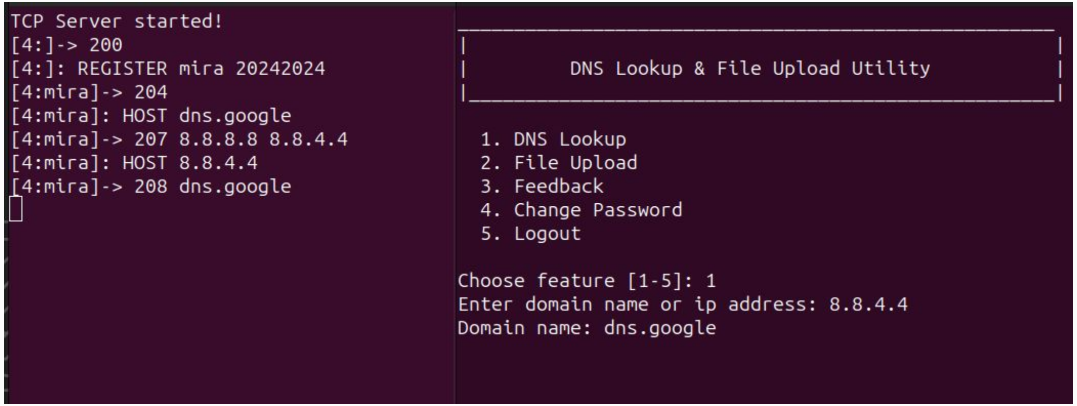


```
TCP Server started!
[4:]-> 200
[4:]: REGISTER mira 20242024
[4:mira]-> 204
[4:mira]: HOST dns.google
[4:mira]-> 207 8.8.4.4 8.8.8.8
```

```
 ______________________________________________________
|                                                      |
|          DNS Lookup & File Upload Utility            |
|______________________________________________________|

  1. DNS Lookup
  2. File Upload
  3. Feedback
  4. Change Password
  5. Logout

Choose feature [1-5]: 1
Enter domain name or ip address: dns.google
IP address: 8.8.4.4
IP address: 8.8.8.8
```

Reverse DNS:





```
TCP Server started!
[4:]-> 200
[4:]: REGISTER mira 20242024
[4:mira]-> 204
[4:mira]: HOST dns.google
[4:mira]-> 207 8.8.8.8 8.8.4.4
[4:mira]: HOST 8.8.4.4
[4:mira]-> 208 dns.google
```

```
 ______________________________________________________
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|          DNS Lookup & File Upload Utility            |
|______________________________________________________|

  1. DNS Lookup
  2. File Upload
  3. Feedback
  4. Change Password
  5. Logout

Choose feature [1-5]: 1
Enter domain name or ip address: 8.8.4.4
Domain name: dns.google
```
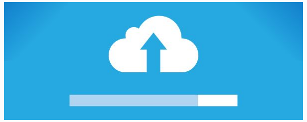
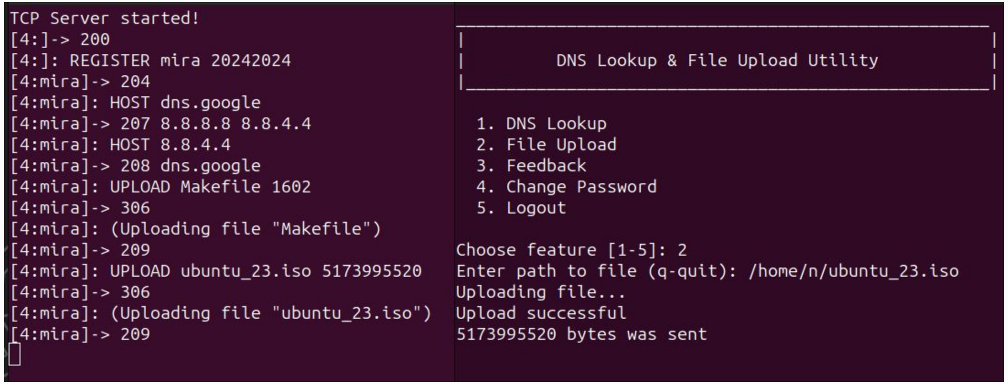

プロジェクトのデモ

Upload files

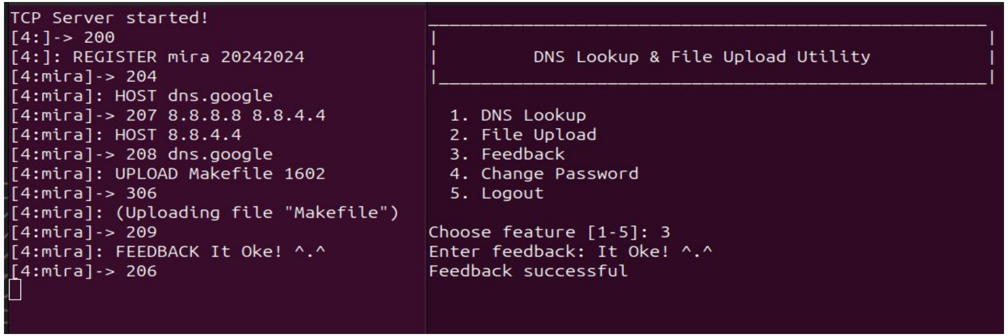




```
TCP Server started!
[4:]-> 200
[4:]: REGISTER mira 20242024
[4:mira]-> 204
[4:mira]: HOST dns.google
[4:mira]-> 207 8.8.8.8 8.8.4.4
[4:mira]: HOST 8.8.4.4
[4:mira]-> 208 dns.google
[4:mira]: UPLOAD Makefile 1602
[4:mira]-> 306
[4:mira]: (Uploading file "Makefile")
[4:mira]-> 209
[4:mira]: UPLOAD ubuntu_23.iso 5173995520
[4:mira]-> 306
[4:mira]: (Uploading file "ubuntu_23.iso")
[4:mira]-> 209
```

```
 _____________________________________________________
|                                                     |
|         DNS Lookup & File Upload Utility            |
|_____________________________________________________|

  1. DNS Lookup
  2. File Upload
  3. Feedback
  4. Change Password
  5. Logout

Choose feature [1-5]: 2
Enter path to file (q-quit): /home/n/ubuntu_23.iso
Uploading file...
Upload successful
5173995520 bytes was sent
```

Feedback



```
TCP Server started!
[4:]-> 200
[4:]: REGISTER mira 20242024
[4:mira]-> 204
[4:mira]: HOST dns.google
[4:mira]-> 207 8.8.8.8 8.8.4.4
[4:mira]: HOST 8.8.4.4
[4:mira]-> 208 dns.google
[4:mira]: UPLOAD Makefile 1602
[4:mira]-> 306
[4:mira]: (Uploading file "Makefile")
[4:mira]-> 209
[4:mira]: FEEDBACK It Oke! ^.^
[4:mira]-> 206
```

```
 _____________________________________________________
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|         DNS Lookup & File Upload Utility            |
|_____________________________________________________|

  1. DNS Lookup
  2. File Upload
  3. Feedback
  4. Change Password
  5. Logout

Choose feature [1-5]: 3
Enter feedback: It Oke! ^.^
Feedback successful
```
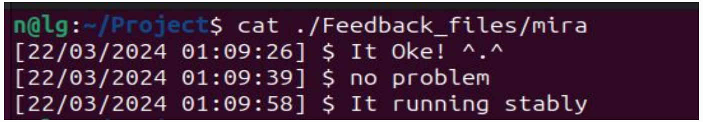
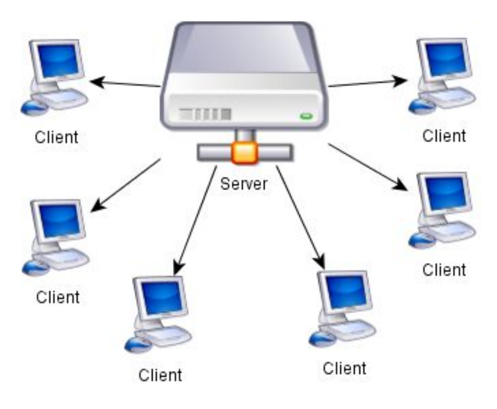
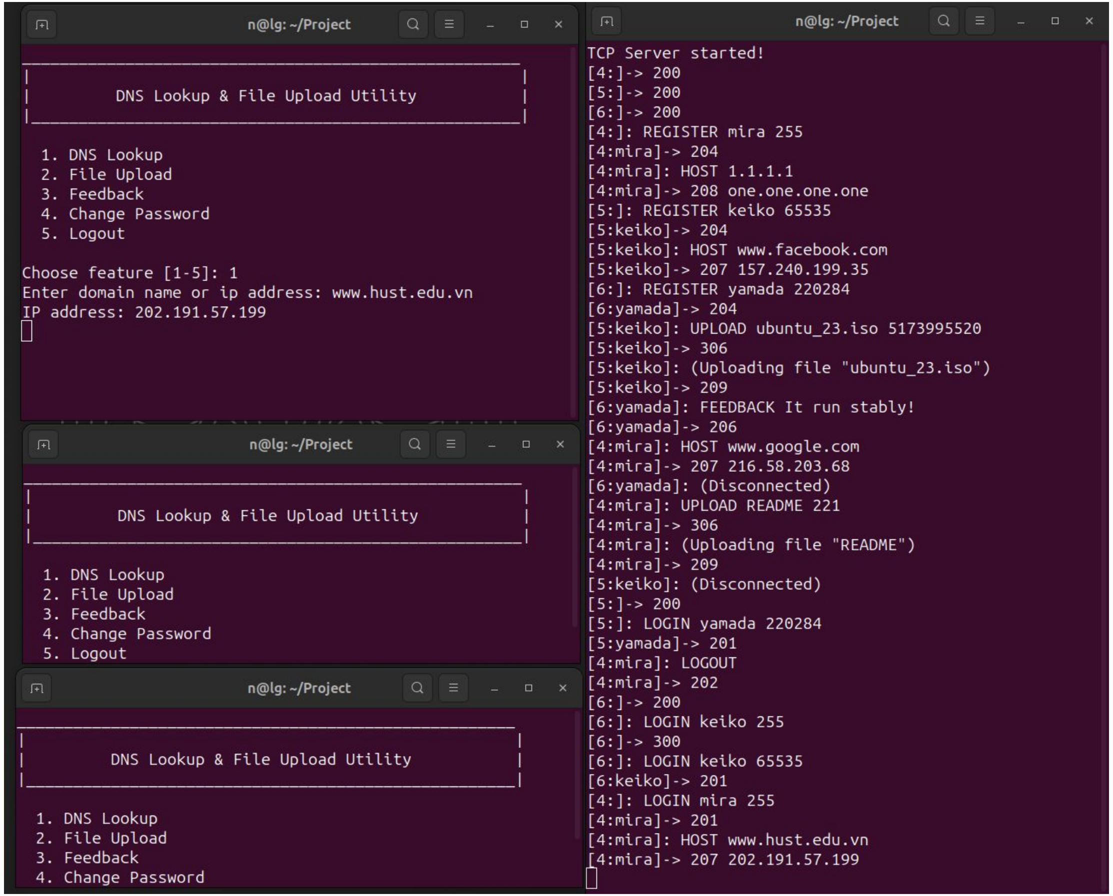



```
n@lg:~/Project$ cat ./Feedback_files/mira
[22/03/2024 01:09:26] $ It Oke! ^.^
[22/03/2024 01:09:39] $ no problem
[22/03/2024 01:09:58] $ It running stably
```

プロジェクトのデモ

Multi Connection





```
 ________________________________________________________
|                                                        |
|          DNS Lookup & File Upload Utility              |
|________________________________________________________|

  1. DNS Lookup
  2. File Upload
  3. Feedback
  4. Change Password
  5. Logout

Choose feature [1-5]: 1
Enter domain name or ip address: www.hust.edu.vn
IP address: 202.191.57.199
```

```
 ________________________________________________________
|                                                        |
|          DNS Lookup & File Upload Utility              |
|________________________________________________________|

  1. DNS Lookup
  2. File Upload
  3. Feedback
  4. Change Password
  5. Logout
```

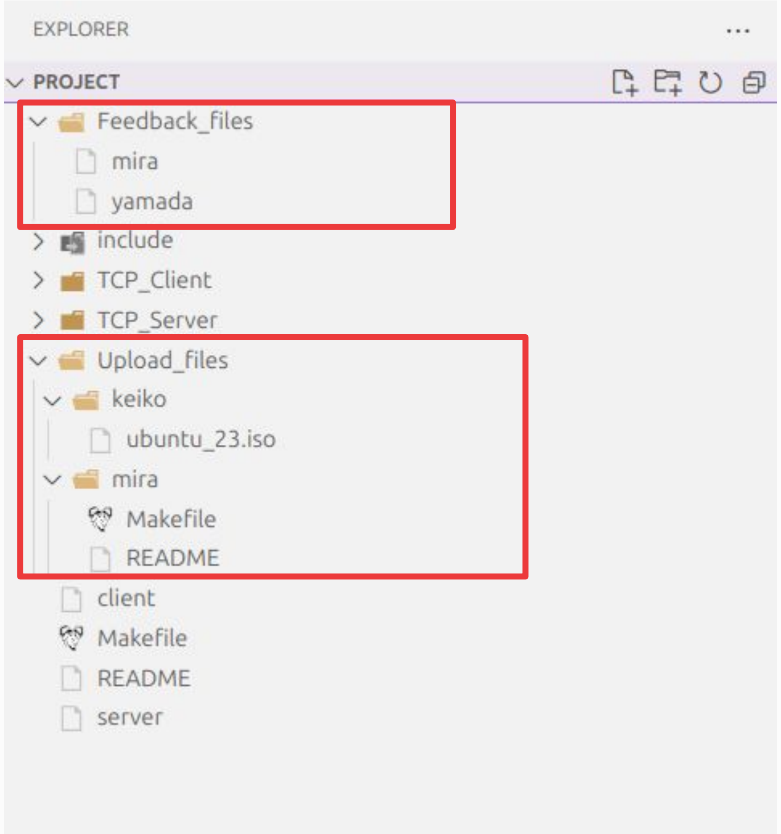
```
 ________________________________________________________
|                                                        |
|          DNS Lookup & File Upload Utility              |
|________________________________________________________|

  1. DNS Lookup
  2. File Upload
  3. Feedback
  4. Change Password
```

```
TCP Server started!
[4:]-> 200
[5:]-> 200
[6:]-> 200
[4:]: REGISTER mira 255
[4:mira]-> 204
[4:mira]: HOST 1.1.1.1
[4:mira]-> 208 one.one.one.one
[5:]: REGISTER keiko 65535
[5:keiko]-> 204
[5:keiko]: HOST www.facebook.com
[5:keiko]-> 207 157.240.199.35
[6:]: REGISTER yamada 220284
[6:yamada]-> 204
[5:keiko]: UPLOAD ubuntu_23.iso 5173995520
[5:keiko]-> 306
[5:keiko]: (Uploading file "ubuntu_23.iso")
[5:keiko]-> 209
[6:yamada]: FEEDBACK It run stably!
[6:yamada]-> 206
[4:mira]: HOST www.google.com
[4:mira]-> 207 216.58.203.68
[6:yamada]: (Disconnected)
[4:mira]: UPLOAD README 221
[4:mira]-> 306
[4:mira]: (Uploading file "README")
[4:mira]-> 209
[5:keiko]: (Disconnected)
[5:]-> 200
[5:]: LOGIN yamada 220284
[5:yamada]-> 201
[4:mira]: LOGOUT
[4:mira]-> 202
[6:]-> 200
[6:]: LOGIN keiko 255
[6:]-> 300
[6:]: LOGIN keiko 65535
[6:keiko]-> 201
[4:]: LOGIN mira 255
[4:mira]-> 201
[4:mira]: HOST www.hust.edu.vn
[4:mira]-> 207 202.191.57.199
```

プロジェクトのデモ

Feedback files

Upload files



EXPLORER

```
PROJECT
  Feedback_files
    mira
    yamada
  include
  TCP_Client
  TCP_Server
  Upload_files
    keiko
      ubuntu_23.iso
    mira
      Makefile
      README
  client
  Makefile
  README
  server
```

今後の展望

★ 今後の技術使用

libpq.h

→アプリケーションを PostgreSQL データベースに接続する

★ 学びたい技術

GTK+、Qt

→ アプリケーションのインターフェースを構築する

ご清聴ありがとうございました