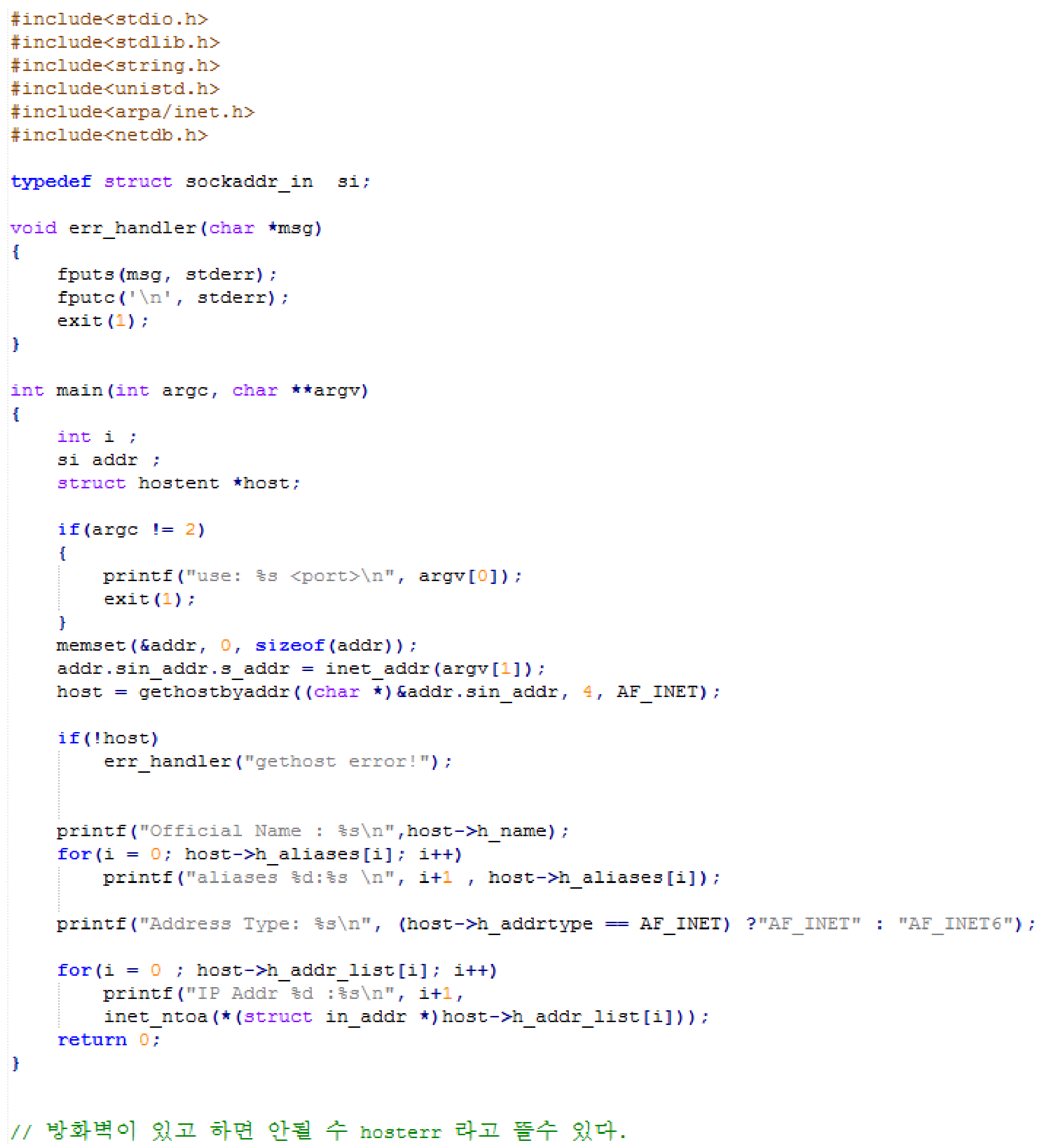
TI DSP, MCU 및 Xilinx Zynq FPGA 프로그래밍 전문가 과정

강사 – Innova Lee(이상훈)
gcccompil3r@gmail.com
학생 – GJ (박현우)
uc820@naver.com

2. 네트워크 프로그래밍 – gethostbyaddr

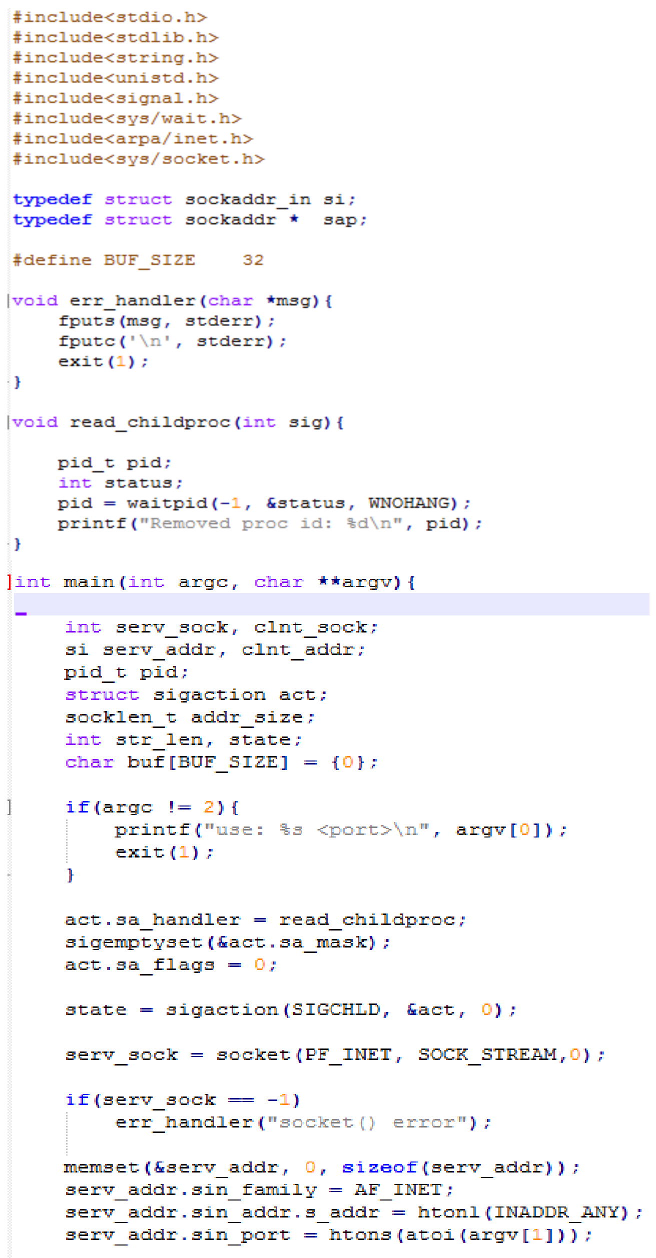


```c
#include<stdio.h>
#include<stdlib.h>
#include<string.h>
#include<unistd.h>
#include<arpa/inet.h>
#include<netdb.h>

typedef struct sockaddr_in  si;

void err_handler(char *msg)
{
    fputs(msg, stderr);
    fputc('\n', stderr);
    exit(1);
}

int main(int argc, char **argv)
{
    int i ;
    si addr ;
    struct hostent *host;

    if(argc != 2)
    {
        printf("use: %s <port>\n", argv[0]);
        exit(1);
    }
    memset(&addr, 0, sizeof(addr));
    addr.sin_addr.s_addr = inet_addr(argv[1]);
    host = gethostbyaddr((char *)&addr.sin_addr, 4, AF_INET);

    if(!host)
        err_handler("gethost error!");


    printf("Official Name : %s\n",host->h_name);
    for(i = 0; host->h_aliases[i]; i++)
        printf("aliases %d:%s \n", i+1 , host->h_aliases[i]);

    printf("Address Type: %s\n", (host->h_addrtype == AF_INET) ?"AF_INET" : "AF_INET6");

    for(i = 0 ; host->h_addr_list[i]; i++)
        printf("IP Addr %d :%s\n", i+1,
        inet_ntoa(*(struct in_addr *)host->h_addr_list[i]));
    return 0;
}


// 방화벽이 있고 하면 안될 수 hosterr 라고 뜰수 있다.
```

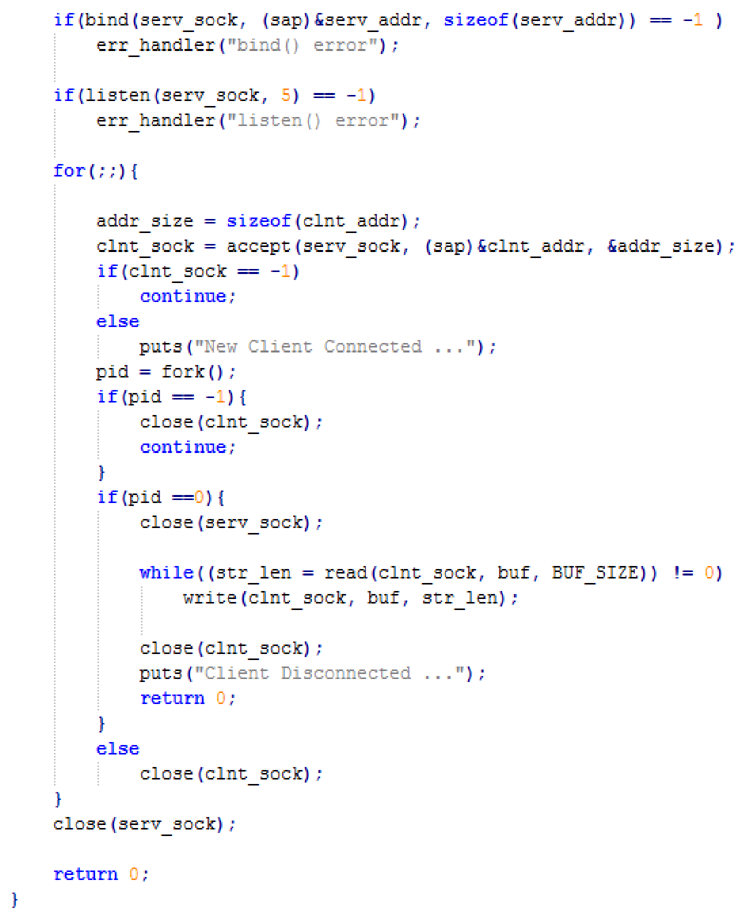
- gethostbyaddr은 gethostbyname과 유사하게 ip주소로 host의 정보를 얻어와서 해당 정보에 관한 것을 출력하는 예제이다.

단) 방화벽이 있다고 하면 host_err 생길 수 있다.

2. 네트워크 프로그래밍 – mpecho_server



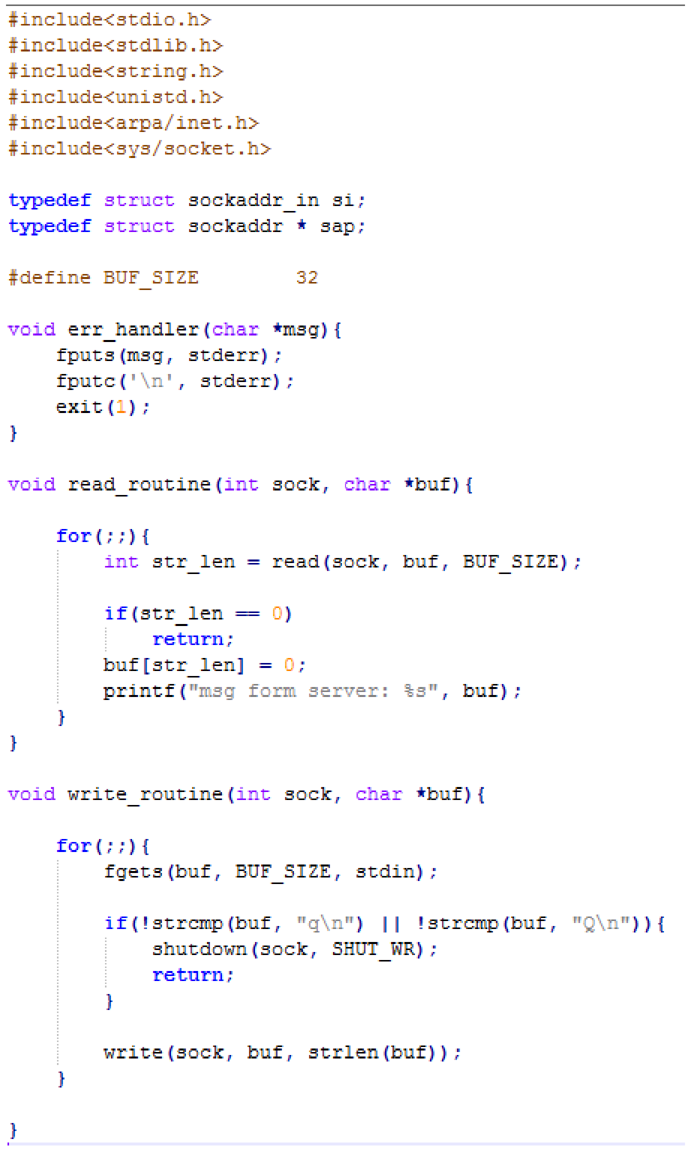
```c
#include<stdio.h>
#include<stdlib.h>
#include<string.h>
#include<unistd.h>
#include<signal.h>
#include<sys/wait.h>
#include<arpa/inet.h>
#include<sys/socket.h>

typedef struct sockaddr_in si;
typedef struct sockaddr *  sap;

#define BUF_SIZE    32

void err_handler(char *msg){
    fputs(msg, stderr);
    fputc('\n', stderr);
    exit(1);
}

void read_childproc(int sig){

    pid_t pid;
    int status;
    pid = waitpid(-1, &status, WNOHANG);
    printf("Removed proc id: %d\n", pid);
}

int main(int argc, char **argv){

    int serv_sock, clnt_sock;
    si serv_addr, clnt_addr;
    pid_t pid;
    struct sigaction act;
    socklen_t addr_size;
    int str_len, state;
    char buf[BUF_SIZE] = {0};

    if(argc != 2){
        printf("use: %s <port>\n", argv[0]);
        exit(1);
    }

    act.sa_handler = read_childproc;
    sigemptyset(&act.sa_mask);
    act.sa_flags = 0;

    state = sigaction(SIGCHLD, &act, 0);

    serv_sock = socket(PF_INET, SOCK_STREAM,0);

    if(serv_sock == -1)
        err_handler("socket() error");

    memset(&serv_addr, 0, sizeof(serv_addr));
    serv_addr.sin_family = AF_INET;
    serv_addr.sin_addr.s_addr = htonl(INADDR_ANY);
    serv_addr.sin_port = htons(atoi(argv[1]));
```



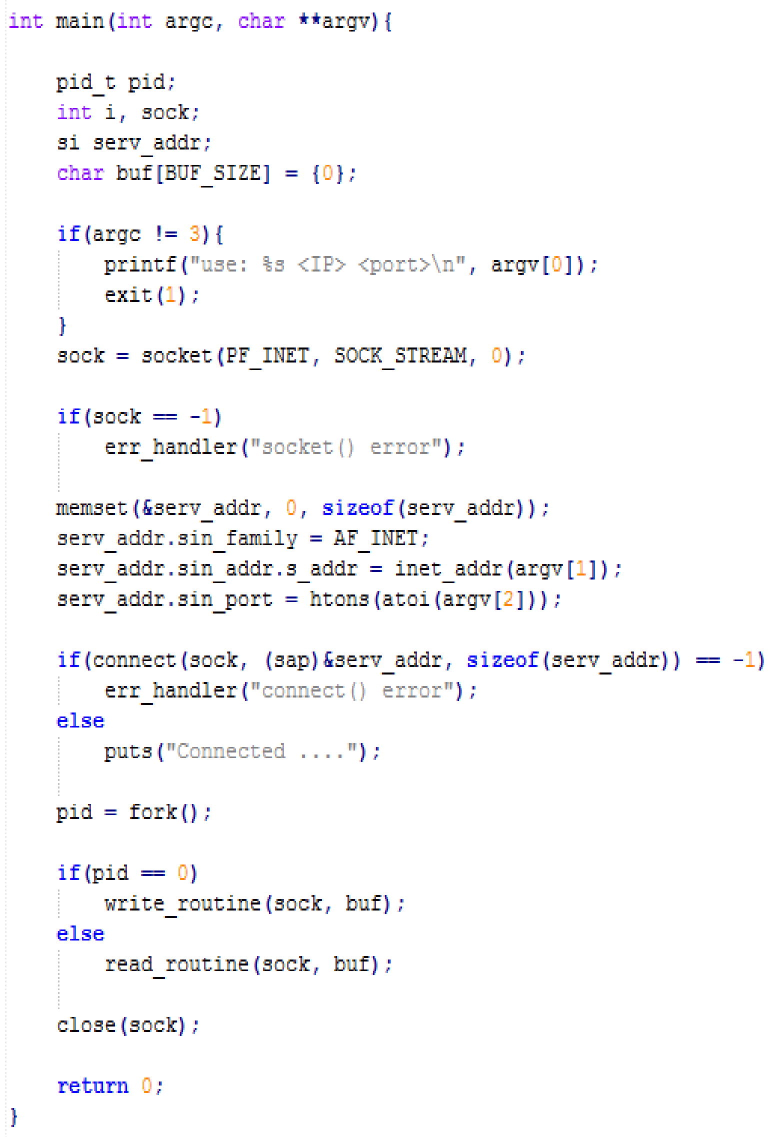
```c
    if(bind(serv_sock, (sap)&serv_addr, sizeof(serv_addr)) == -1 )
        err_handler("bind() error");

    if(listen(serv_sock, 5) == -1)
        err_handler("listen() error");

    for(;;){

        addr_size = sizeof(clnt_addr);
        clnt_sock = accept(serv_sock, (sap)&clnt_addr, &addr_size);
        if(clnt_sock == -1)
            continue;
        else
            puts("New Client Connected ...");
        pid = fork();
        if(pid == -1){
            close(clnt_sock);
            continue;
        }
        if(pid ==0){
            close(serv_sock);

            while((str_len = read(clnt_sock, buf, BUF_SIZE)) != 0)
                write(clnt_sock, buf, str_len);

            close(clnt_sock);
            puts("Client Disconnected ...");
            return 0;
        }
        else
            close(clnt_sock);
    }
    close(serv_sock);

    return 0;
}
```

- client로부터 읽은 값을 바로 client에게 뿌려주는 server

2. 네트워크 프로그래밍 – mpecho_client



```c
#include<stdio.h>
#include<stdlib.h>
#include<string.h>
#include<unistd.h>
#include<arpa/inet.h>
#include<sys/socket.h>

typedef struct sockaddr_in si;
typedef struct sockaddr * sap;

#define BUF_SIZE        32

void err_handler(char *msg){
    fputs(msg, stderr);
    fputc('\n', stderr);
    exit(1);
}

void read_routine(int sock, char *buf){

    for(;;){
        int str_len = read(sock, buf, BUF_SIZE);

        if(str_len == 0)
            return;
        buf[str_len] = 0;
        printf("msg form server: %s", buf);
    }
}

void write_routine(int sock, char *buf){

    for(;;){
        fgets(buf, BUF_SIZE, stdin);

        if(!strcmp(buf, "q\n") || !strcmp(buf, "Q\n")){
            shutdown(sock, SHUT_WR);
            return;
        }

        write(sock, buf, strlen(buf));
    }

}
```



```c
int main(int argc, char **argv){

    pid_t pid;
    int i, sock;
    si serv_addr;
    char buf[BUF_SIZE] = {0};

    if(argc != 3){
        printf("use: %s <IP> <port>\n", argv[0]);
        exit(1);
    }
    sock = socket(PF_INET, SOCK_STREAM, 0);

    if(sock == -1)
        err_handler("socket() error");

    memset(&serv_addr, 0, sizeof(serv_addr));
    serv_addr.sin_family = AF_INET;
    serv_addr.sin_addr.s_addr = inet_addr(argv[1]);
    serv_addr.sin_port = htons(atoi(argv[2]));

    if(connect(sock, (sap)&serv_addr, sizeof(serv_addr)) == -1)
        err_handler("connect() error");
    else
        puts("Connected ....");

    pid = fork();

    if(pid == 0)
        write_routine(sock, buf);
    else
        read_routine(sock, buf);

    close(sock);

    return 0;
}
```

- 자식 프로세스에서는 write를 부모 프로세스 에서는 read를 하는 client이다.

2. 네트워크 프로그래밍 – chat_server

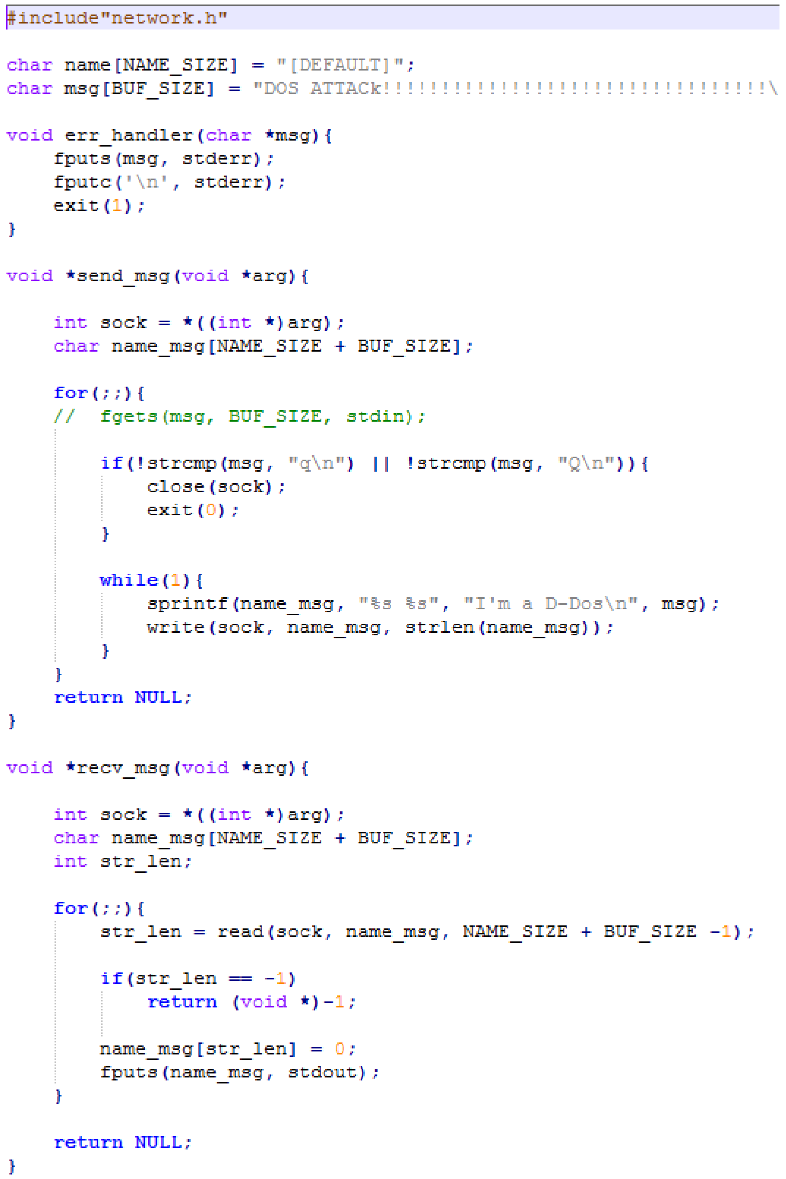
```c
#include<stdio.h>
#include<stdlib.h>
#include<string.h>
#include<unistd.h>
#include<pthread.h>
#include<arpa/inet.h>
#include<sys/socket.h>
#include<sys/epoll.h>
#include<time.h>


#define BUF_SIZE    126
#define MAX_CLNT    256

typedef struct sockaddr_in  si;
typedef struct sockaddr *   sp;

int clnt_cnt = 0;
int clnt_socks[MAX_CLNT];

pthread_mutex_t mtx;

void err_handler(char *msg){
    fputs(msg, stderr);
    fputc('\n',stderr);
    exit(1);
}

void send_msg(char *msg, int len){

    int i;
    pthread_mutex_lock(&mtx);
    for(i =0; i<clnt_cnt; i++)
        write(clnt_socks[i], msg, len);

    pthread_mutex_unlock(&mtx);
}
```

```c
void *clnt_handler(void *arg){
    int clnt_sock = *((int *)arg);
    int str_len = 0, i;
    char msg[BUF_SIZE];
    int rate = 0, count =0;

    while((str_len = read(clnt_sock, msg, sizeof(msg))) !=0){
        send_msg(msg, str_len);
    }

    pthread_mutex_lock(&mtx);

    for(i=0; i<clnt_cnt; i++){
        if(clnt_sock == clnt_socks[i]){
            while(i++ <clnt_cnt -1)
                clnt_socks[i] = clnt_socks[i+1];
            break;
        }
    }

    clnt_cnt--;
    pthread_mutex_unlock(&mtx);
    close(clnt_sock);

}
```

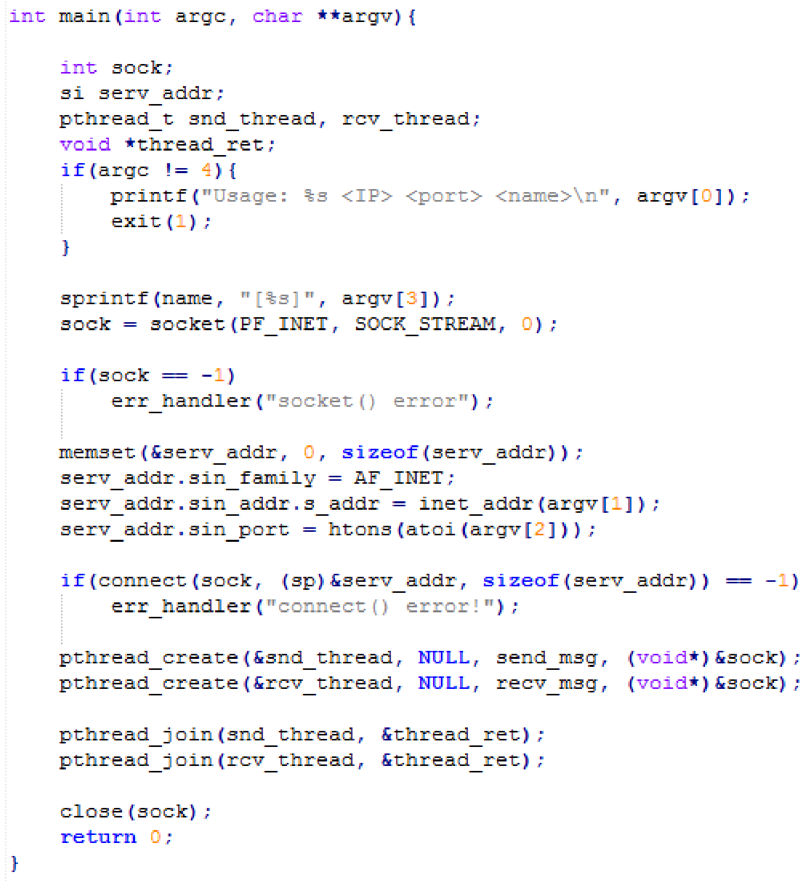
```c
int main(int argc, char **argv){

    int serv_sock, clnt_sock;
    si serv_addr, clnt_addr;
    socklen_t addr_size;
    pthread_t t_id;

    if(argc != 2){
        printf("Usage: %s <port>\n", argv[0]);
        exit(1);
    }
    pthread_mutex_init(&mtx, NULL);

    serv_sock = socket(PF_INET, SOCK_STREAM, 0);

    if(serv_sock == -1)
        err_handler("socket() error");

    memset(&serv_addr, 0, sizeof(serv_addr));
    serv_addr.sin_family = AF_INET;
    serv_addr.sin_addr.s_addr = htonl(INADDR_ANY);
    serv_addr.sin_port = htons(atoi(argv[1]));

    if(bind(serv_sock , (sp)&serv_addr, sizeof(serv_addr)) == -1)
        err_handler("bind() error");
    if(listen(serv_sock, 10) == -1)
        err_handler("listen() error");

    for(;;){
        addr_size = sizeof(clnt_addr);
        clnt_sock = accept(serv_sock, (sp)&clnt_addr, &addr_size);

        pthread_mutex_lock(&mtx);
        clnt_socks[clnt_cnt++] = clnt_sock;
        pthread_mutex_unlock(&mtx);

        pthread_create(&t_id, NULL, clnt_handler, (void *)&clnt_sock);
        pthread_detach(t_id);
        printf("Connected Client IP: %s\n", inet_ntoa(clnt_addr.sin_addr));
    }

    close(serv_sock);

    return 0;
}
```

- thread를 만들어 각 client별 read, write로 각각 돌아가게 함.
- pthread_detach로 thread를 cpu에 할당한다.

2. 네트워크 프로그래밍 – chat_client



```c
#include"network.h"

char name[NAME_SIZE] = "[DEFAULT]";
char msg[BUF_SIZE] = "DOS ATTACk!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!\

void err_handler(char *msg){
    fputs(msg, stderr);
    fputc('\n', stderr);
    exit(1);
}

void *send_msg(void *arg){

    int sock = *((int *)arg);
    char name_msg[NAME_SIZE + BUF_SIZE];

    for(;;){
    //  fgets(msg, BUF_SIZE, stdin);

        if(!strcmp(msg, "q\n") || !strcmp(msg, "Q\n")){
            close(sock);
            exit(0);
        }

        while(1){
            sprintf(name_msg, "%s %s", "I'm a D-Dos\n", msg);
            write(sock, name_msg, strlen(name_msg));
        }
    }
    return NULL;
}

void *recv_msg(void *arg){

    int sock = *((int *)arg);
    char name_msg[NAME_SIZE + BUF_SIZE];
    int str_len;

    for(;;){
        str_len = read(sock, name_msg, NAME_SIZE + BUF_SIZE -1);

        if(str_len == -1)
            return (void *)-1;

        name_msg[str_len] = 0;
        fputs(name_msg, stdout);
    }

    return NULL;
}
```



```c
int main(int argc, char **argv){

    int sock;
    si serv_addr;
    pthread_t snd_thread, rcv_thread;
    void *thread_ret;
    if(argc != 4){
        printf("Usage: %s <IP> <port> <name>\n", argv[0]);
        exit(1);
    }

    sprintf(name, "[%s]", argv[3]);
    sock = socket(PF_INET, SOCK_STREAM, 0);

    if(sock == -1)
        err_handler("socket() error");

    memset(&serv_addr, 0, sizeof(serv_addr));
    serv_addr.sin_family = AF_INET;
    serv_addr.sin_addr.s_addr = inet_addr(argv[1]);
    serv_addr.sin_port = htons(atoi(argv[2]));

    if(connect(sock, (sp)&serv_addr, sizeof(serv_addr)) == -1)
        err_handler("connect() error!");

    pthread_create(&snd_thread, NULL, send_msg, (void*)&sock);
    pthread_create(&rcv_thread, NULL, recv_msg, (void*)&sock);

    pthread_join(snd_thread, &thread_ret);
    pthread_join(rcv_thread, &thread_ret);

    close(sock);
    return 0;
}
```

- thread 2개로 read와 write를 구별해서 사용하는 client이다.