시스템프로그래밍및실습

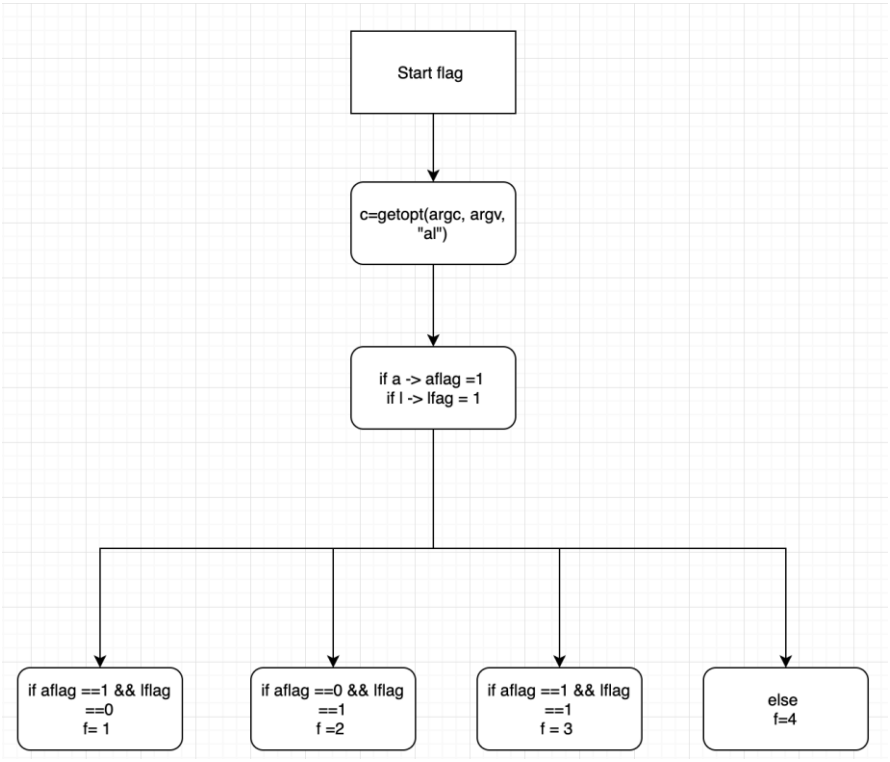
#2-2

이름: 이진수
학번 : 2015722013
학과: 컴퓨터공학과
이준환 교수님

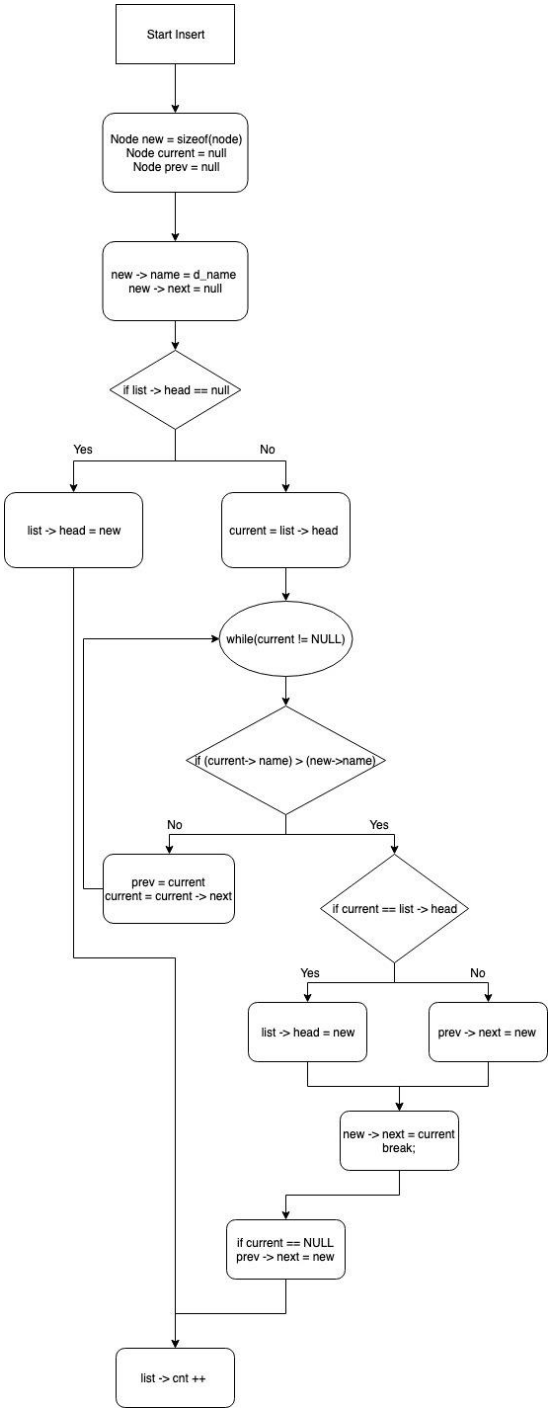
1. Introduction

   이번 과제는 advanced ls 를 구현하는 것이다. 이전 과제는 기본 ls를 구현 했었는데, 이는 현재 디렉토리나 경로를 받은 디렉토리에 있는 파일들을 히든 파일 빼고 출력 하는 것이다. Advanced ls는 기본 ls를 활용하여 option들(-a, -l)을 받아 현 디렉토리나 경로로 받은 디렉토리의 히든 파일 혹은 파일 정보들을 출력해 준다.

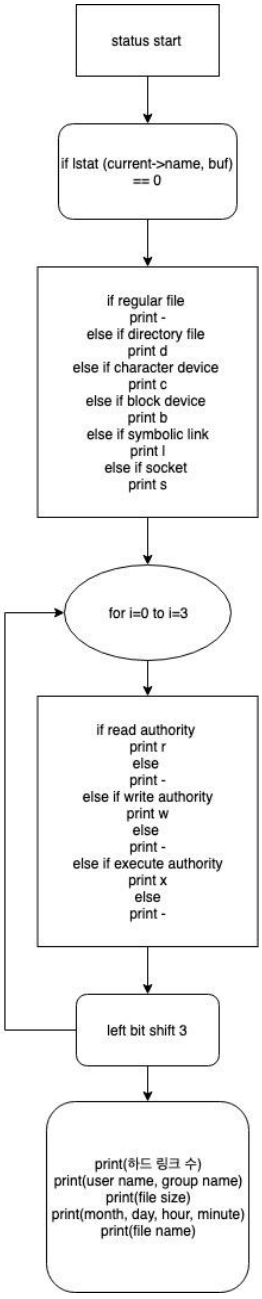
2. Flow Chart



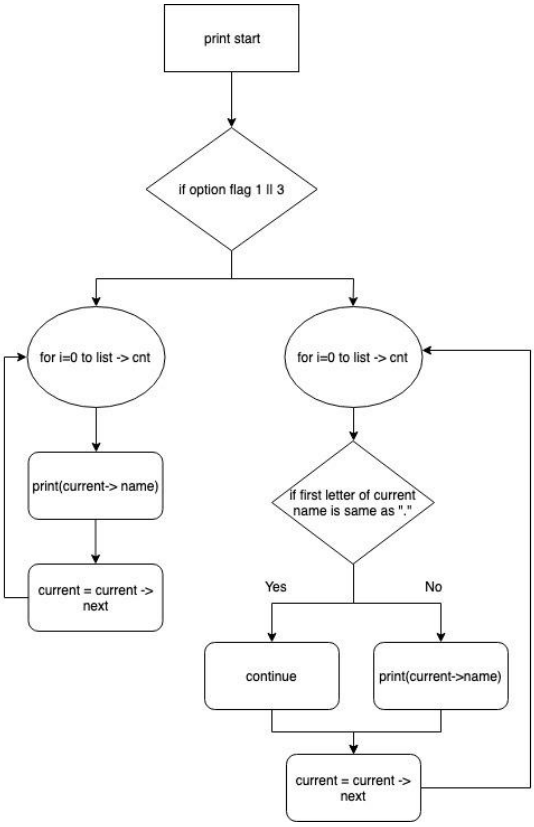
<flag option flow chart>



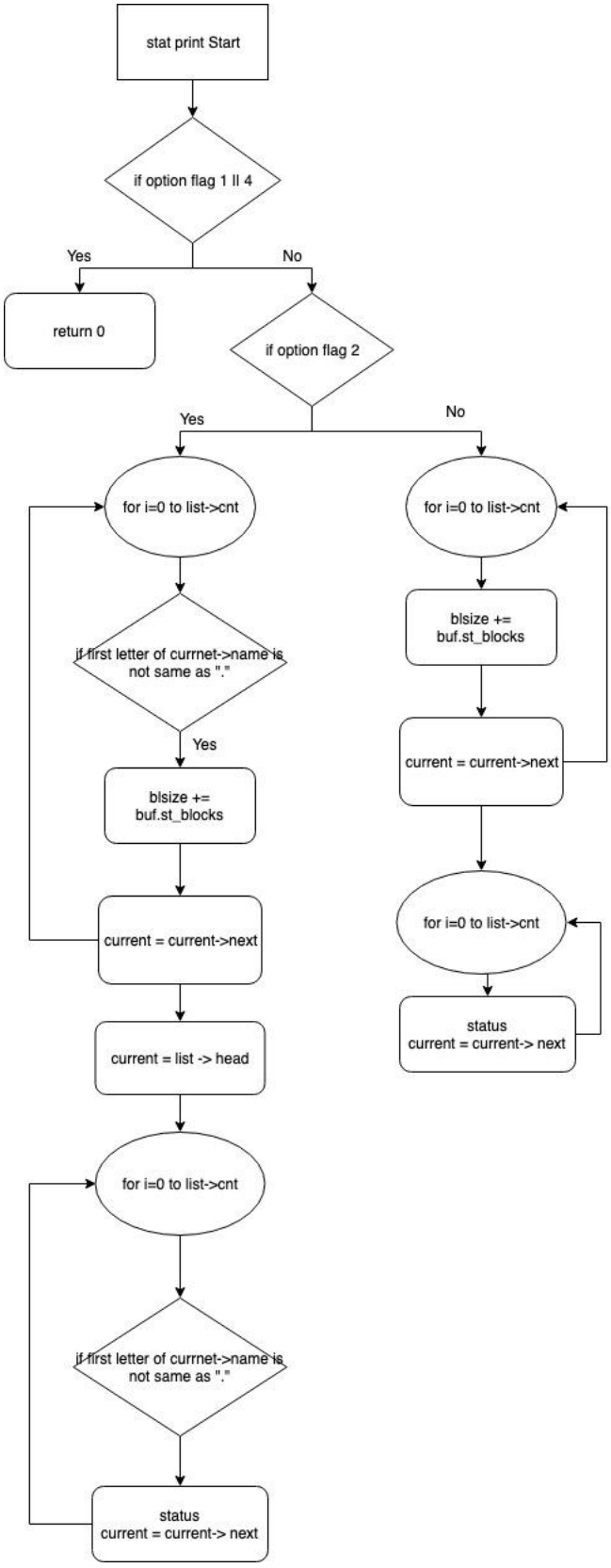
<insert node flow chat>



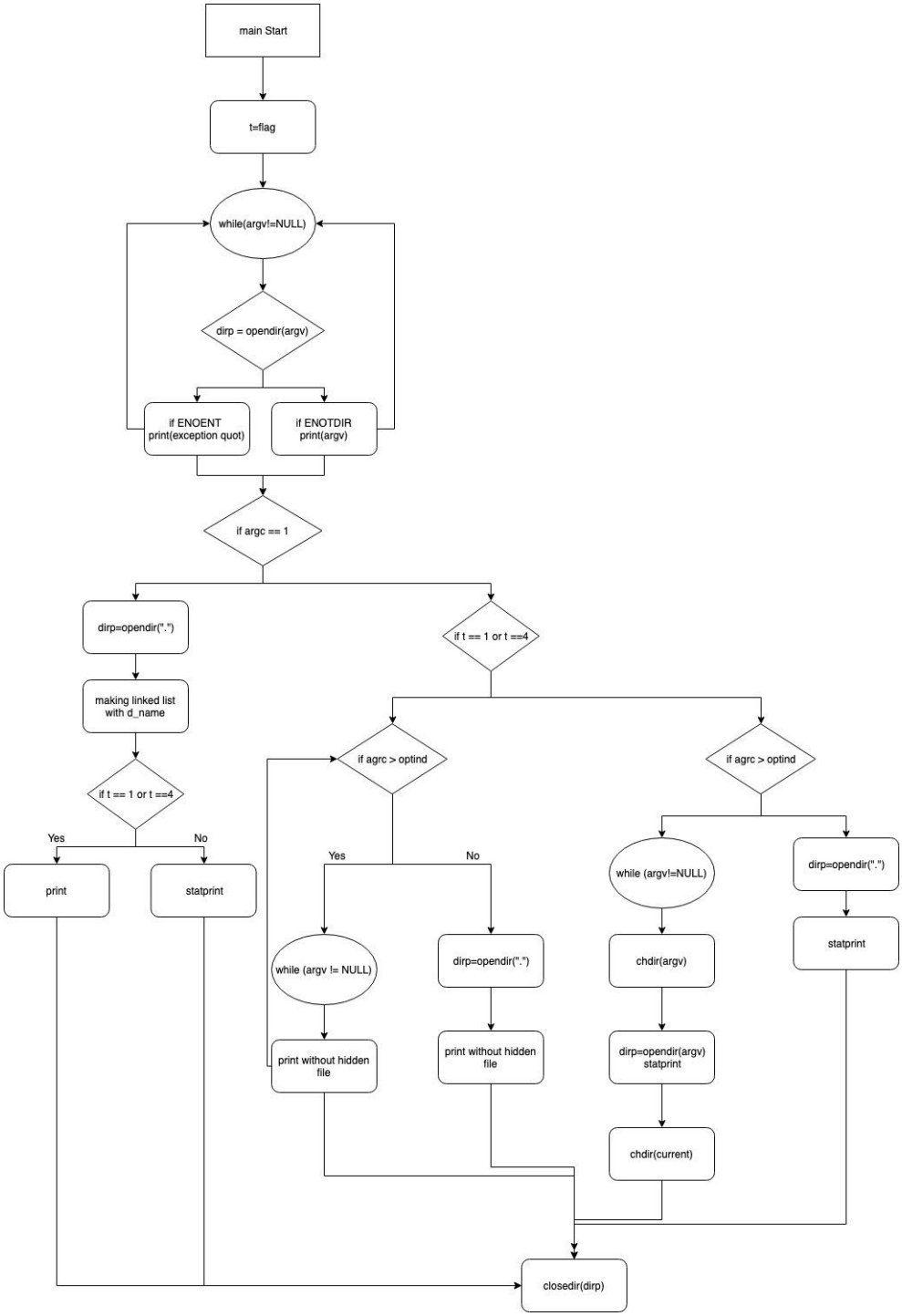
<status flow chart>



<print flow chart>



<stat print flow chart>



<main flow chart>

3. Pseudo code

```
struct Node {
    name
    Node next
}

struct List{
    cnt
    Node head
}

start {
    list->cnt =0
    list->head =null
}

flag {
    c = getopt(agrc, argv, "al")
    if c == a -> aflag=1
         == l -> lflag=1

    if aflag == 1 && lflag == 0
        t=1
    else if aflag ==0 && lflag==1
        t=2
    else if aflag == 1 && lflag==1
        t=3
    else
        t=4
}
insert {
   Node new = sizeof(node)
   Node current = null
   Node prev = null

   new->name = d_name
   new->next = null

   if(list->head == null){
       list -> head == new
   }
   else {
       current = llist -> head
       if(current->name > new->name){
           if(current = list->head)
               list -> head == new
           else
               prev -> next = new
           new->next=current
           break
       }
       else{
           prev=current
           current = current->next
       }

       if(current==NULL)
           prev->next = new
   }
   list->cnt++
}

status{
    if(lstat worked correctly){
        if(regular file) print("-")
        else if (directory file) printf("d")
        else if (character device) printf("c")
        else if (block device) printf("b")
        else if (symbolic link) printf("l")
        else if (socket) printf("s")
    }

    tmp = st_mode
    for(i=0 i<list->cnt i++){
        if(read authority)
            printf("r")
        else
            printf("-")
        if(write authority)
            print("w")
        else
            print("-")
        if(execute authority)
            printf("x")
```

```
        else
            printf("-")
        tmp <<= 3
    }
    pwd = user name
    gr = group name
    mktm = last modification time

    printf(st_nlink)
    printf(pwd)
    printf(gr)
    printf(st_size)
    printf(mon, day, hour, minute)
    printf(current->d_name)

}

Print{
    Node current = list->head

    if(f == 2 || f==4)
    {
        for(i=0 i<list->cnt i++){
            if(current->name != "."){
                printf(current->name)
                current=current->next
            }
        }
    }
    else(f==1 || f==3){
        for(i=0 i<list->cnt i++){
            printf(current->name)
            current=current->nextl
        }
    }
}

Statprint{
    Node current = list-> head

    if(t == 1 || t== 4) return 0
    else if (t==2){
        for(i=0 i<list->cnt i++){
            if(current->name != "."){
                blsize +=blsize/2
            }
            current=current->next
        }
        printf(blsize)
        current=current->next;

        for(i=0 i<list->cnt i++){
            if(current->name!=".")
                Stat
            current=current->next;
        }
```

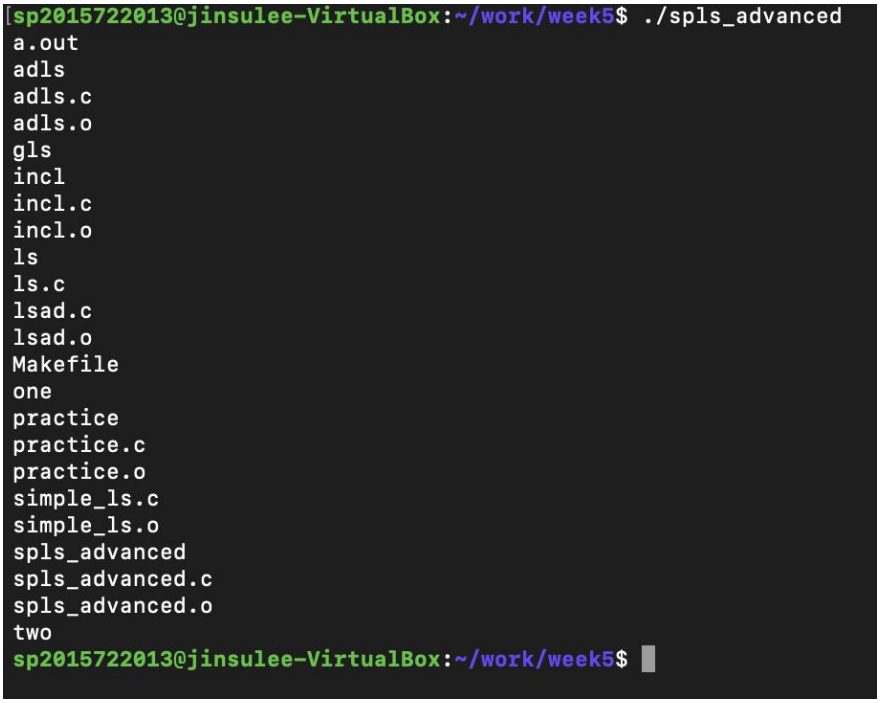
```
    else if(t==3){
        for(i=0 i<list->cnt i++){
            blsize += blsize/2
            current=current->next
        }
        printf(blsize)
        current=current->next

        for(i=0 i<list->cnt i++){
            Stat
            current=current->next
        }
    }
}

main {
    t=flag option

    while(argv != NULL){
        if(argv!="-"){
            if(ENOENT)
                printf("exception quote")
            else if(ENOTDIR)
                printf(argv)
        }
    }

    if (argc==1){
        dirp=opendir(".")
        Start()
        while((dir=readdir(dirp))!=NULL){
            Insert()
        }
        if(t== 1 || t==4)
            Print()
        else
            StatPrint()
    }
    else{
        if(t==1 || t==4){
            if(argc>optind){
                while(argv!=NULL){
                    if(argv!="-"){
                        dirp=opendir(argv)
                        if(dirp!=NULL){
                            Start()
                            while((dir=readdir(dirp))!=NULL){
                                Insert()
                            }
                            Print()
                        }
                    }
                }
            }
            else if(argc==optind){
                dirp==opendir(".")
                dirp==opendir(".")
                Start()
                while((dir=readdir(dirp))!=NULL){
                    Insert()
                }
                Print()
            }
        }
        else if(t==2 || t==3){
            if(argc>optind){
                while(argv!=NULL){
                    if(argv!="-"){
                        dirp=opendir(argv)
                        if(dirp!=NULL){
                            chdir(argv)
                            printf(directory path)
                            Start()
                            while((dir=readdir(dirp))!=NULL){
                                Insert()
                            }
                            Statprint()
                            chdir(current)
                        }
                    }
                }
            }
            else if(argc==optind){
                dirp=opendir(".")
                print(directory path)
                Start()
                while((dir=readdir(dirp))!=NULL){
                    Insert()
                }
                Statprint()

            }
        }
    }
    closedir(dirp)
    return 0
}
```

4. Result

```
[sp2015722013@jinsulee-VirtualBox:~/work/week5$ ./spls_advanced -al
directory path : /home/sp2015722013/work/week5
total : 212
drwxrwxr-x      4       sp2015722013    sp2015722013    4096    Apr  12  20:21  .
drwxrwxr-x      7       sp2015722013    sp2015722013    4096    Apr  2  12:27   ..
-rwxrwxr-x      1       sp2015722013    sp2015722013    8888    Apr  2  12:39   a.out
-rwxrwxr-x      1       sp2015722013    sp2015722013    13760   Apr  8  0:28    adls
-rw-rw-r--      1       sp2015722013    sp2015722013    7054    Apr  12  20:19  adls.c
-rw-rw-r--      1       sp2015722013    sp2015722013    9456    Apr  12  20:21  adls.o
-rwxrwxr-x      1       sp2015722013    sp2015722013    15696   Apr  5  18:25   gls
-rwxrwxr-x      1       sp2015722013    sp2015722013    8792    Apr  2  21:13   incl
-rw-rw-r--      1       sp2015722013    sp2015722013    576     Apr  8  1:25    incl.c
-rw-rw-r--      1       sp2015722013    sp2015722013    2096    Apr  2  21:13   incl.o
-rwxrwxr-x      1       sp2015722013    sp2015722013    13848   Apr  12  20:20  ls
-rw-rw-r--      1       sp2015722013    sp2015722013    3312    Apr  4  23:35   ls.c
-rw-rw-r--      1       sp2015722013    sp2015722013    6855    Apr  11  20:11  lsad.c
-rw-rw-r--      1       sp2015722013    sp2015722013    9360    Apr  11  20:7   lsad.o
-rw-rw-r--      1       sp2015722013    sp2015722013    69      Apr  12  20:21  Makefile
drwxrwxr-x      2       sp2015722013    sp2015722013    4096    Apr  6  18:5    one
-rwxrwxr-x      1       sp2015722013    sp2015722013    8888    Apr  2  12:45   practice
-rw-rw-r--      1       sp2015722013    sp2015722013    601     Apr  5  14:51   practice.c
-rw-rw-r--      1       sp2015722013    sp2015722013    3608    Apr  2  12:44   practice.o
-rw-rw-r--      1       sp2015722013    sp2015722013    1428    Apr  11  10:33  simple_ls.c
-rw-rw-r--      1       sp2015722013    sp2015722013    2944    Apr  4  14:11   simple_ls.o
-rwxrwxr-x      1       sp2015722013    sp2015722013    13848   Apr  12  20:21  spls_advanced
-rw-rw-r--      1       sp2015722013    sp2015722013    10370   Apr  11  11:16  spls_advanced.c
-rw-rw-r--      1       sp2015722013    sp2015722013    10640   Apr  11  10:41  spls_advanced.o
drwxrwxr-x      2       sp2015722013    sp2015722013    4096    Apr  11  11:58  two
sp2015722013@jinsulee-VirtualBox:~/work/week5$

[sp2015722013@jinsulee-VirtualBox:~/work/week5$ ./spls_advanced laksj
Cannot access laksj : No such file or directory
sp2015722013@jinsulee-VirtualBox:~/work/week5$

[sp2015722013@jinsulee-VirtualBox:~/work/week5$ ./spls_advanced -l
directory path : /home/sp2015722013/work/week5
total : 204
-rwxrwxr-x      1       sp2015722013    sp2015722013    8888    Apr  2  12:39   a.out
-rwxrwxr-x      1       sp2015722013    sp2015722013    13760   Apr  8  0:28    adls
-rw-rw-r--      1       sp2015722013    sp2015722013    7054    Apr  12  20:19  adls.c
-rw-rw-r--      1       sp2015722013    sp2015722013    9456    Apr  12  20:21  adls.o
-rwxrwxr-x      1       sp2015722013    sp2015722013    15696   Apr  5  18:25   gls
-rwxrwxr-x      1       sp2015722013    sp2015722013    8792    Apr  2  21:13   incl
-rw-rw-r--      1       sp2015722013    sp2015722013    576     Apr  8  1:25    incl.c
-rw-rw-r--      1       sp2015722013    sp2015722013    2096    Apr  2  21:13   incl.o
-rwxrwxr-x      1       sp2015722013    sp2015722013    13848   Apr  12  20:20  ls
-rw-rw-r--      1       sp2015722013    sp2015722013    3312    Apr  4  23:35   ls.c
-rw-rw-r--      1       sp2015722013    sp2015722013    6855    Apr  11  20:11  lsad.c
-rw-rw-r--      1       sp2015722013    sp2015722013    9360    Apr  11  20:7   lsad.o
-rw-rw-r--      1       sp2015722013    sp2015722013    69      Apr  12  20:21  Makefile
drwxrwxr-x      2       sp2015722013    sp2015722013    4096    Apr  6  18:5    one
-rwxrwxr-x      1       sp2015722013    sp2015722013    8888    Apr  2  12:45   practice
-rw-rw-r--      1       sp2015722013    sp2015722013    601     Apr  5  14:51   practice.c
-rw-rw-r--      1       sp2015722013    sp2015722013    3608    Apr  2  12:44   practice.o
-rw-rw-r--      1       sp2015722013    sp2015722013    1428    Apr  11  10:33  simple_ls.c
-rw-rw-r--      1       sp2015722013    sp2015722013    2944    Apr  4  14:11   simple_ls.o
-rwxrwxr-x      1       sp2015722013    sp2015722013    13848   Apr  12  20:21  spls_advanced
-rw-rw-r--      1       sp2015722013    sp2015722013    10370   Apr  11  11:16  spls_advanced.c
-rw-rw-r--      1       sp2015722013    sp2015722013    10640   Apr  11  10:41  spls_advanced.o
drwxrwxr-x      2       sp2015722013    sp2015722013    4096    Apr  11  11:58  two
sp2015722013@jinsulee-VirtualBox:~/work/week5$

[sp2015722013@jinsulee-VirtualBox:~/work/week5$ ./spls_advanced -a
.
..
a.out
adls
adls.c
adls.o
gls
incl
incl.c
incl.o
ls
ls.c
lsad.c
lsad.o
Makefile
one
practice
practice.c
practice.o
simple_ls.c
simple_ls.o
spls_advanced
spls_advanced.c
spls_advanced.o
two
sp2015722013@jinsulee-VirtualBox:~/work/week5$
```

```
sp2015722013@jinsulee-VirtualBox:~/work/week5$ ./spls_advanced -al
directory path : /home/sp2015722013/work/week5
total : 212
drwxrwxr-x      4       sp2015722013    sp2015722013    4096    Apr  12  20:21  .
drwxrwxr-x      7       sp2015722013    sp2015722013    4096    Apr  2  12:27   ..
-rwxrwxr-x      1       sp2015722013    sp2015722013    8888    Apr  2  12:39   a.out
-rwxrwxr-x      1       sp2015722013    sp2015722013    13760   Apr  8  0:28    adls
-rw-rw-r--      1       sp2015722013    sp2015722013    7054    Apr  12  20:19  adls.c
-rw-rw-r--      1       sp2015722013    sp2015722013    9456    Apr  12  20:21  adls.o
-rwxrwxr-x      1       sp2015722013    sp2015722013    15696   Apr  5  18:25   gls
-rwxrwxr-x      1       sp2015722013    sp2015722013    8792    Apr  2  21:13   incl
-rw-rw-r--      1       sp2015722013    sp2015722013    576     Apr  8  1:25    incl.c
-rw-rw-r--      1       sp2015722013    sp2015722013    2096    Apr  2  21:13   incl.o
-rwxrwxr-x      1       sp2015722013    sp2015722013    13848   Apr  12  20:20  ls
-rw-rw-r--      1       sp2015722013    sp2015722013    3312    Apr  4  23:35   ls.c
-rw-rw-r--      1       sp2015722013    sp2015722013    6855    Apr  11  20:11  lsad.c
-rw-rw-r--      1       sp2015722013    sp2015722013    9360    Apr  11  20:7   lsad.o
-rw-rw-r--      1       sp2015722013    sp2015722013    69      Apr  12  20:21  Makefile
drwxrwxr-x      2       sp2015722013    sp2015722013    4096    Apr  6  18:5    one
-rwxrwxr-x      1       sp2015722013    sp2015722013    8888    Apr  2  12:45   practice
-rw-rw-r--      1       sp2015722013    sp2015722013    601     Apr  5  14:51   practice.c
-rw-rw-r--      1       sp2015722013    sp2015722013    3608    Apr  2  12:44   practice.o
-rw-rw-r--      1       sp2015722013    sp2015722013    1428    Apr  11  10:33  simple_ls.c
-rw-rw-r--      1       sp2015722013    sp2015722013    2944    Apr  4  14:11   simple_ls.o
-rwxrwxr-x      1       sp2015722013    sp2015722013    13848   Apr  12  20:21  spls_advanced
-rw-rw-r--      1       sp2015722013    sp2015722013    10370   Apr  11  11:16  spls_advanced.c
-rw-rw-r--      1       sp2015722013    sp2015722013    10640   Apr  11  10:41  spls_advanced.o
drwxrwxr-x      2       sp2015722013    sp2015722013    4096    Apr  11  11:58  two
sp2015722013@jinsulee-VirtualBox:~/work/week5$
```

```
sp2015722013@jinsulee-VirtualBox:~/work/week5$ ./spls_advanced -la ~/ /etc
Cannot access /home/sp2015722013/ : No such file or directory
Cannot access /etc : No such file or directory
directory path : /home/sp2015722013
total : 184
drwxr-xr-x      21      sp2015722013    sp2015722013    4096    Apr  12  20:21  .
drwxr-xr-x      4       root    root    4096    Mar  12  12:33  ..
-rw-------      1       sp2015722013    sp2015722013    19337   Apr  12  17:28  .bash_history
-rw-r--r--      1       sp2015722013    sp2015722013    220     Sep  1  8:27    .bash_logout
-rw-r--r--      1       sp2015722013    sp2015722013    3771    Sep  1  8:27    .bashrc
drwx------      13      sp2015722013    sp2015722013    4096    Mar  26  12:33  .cache
drwx------      3       sp2015722013    sp2015722013    4096    Mar  12  13:10  .compiz
drwx------      16      sp2015722013    sp2015722013    4096    Apr  7  12:46   .config
-rw-r--r--      1       sp2015722013    sp2015722013    25      Mar  12  12:36  .dmrc
drwx------      2       sp2015722013    sp2015722013    4096    Mar  12  12:36  .gconf
drwx------      3       sp2015722013    sp2015722013    4096    Apr  12  17:27  .gnupg
-rw-------      1       sp2015722013    sp2015722013    18500   Apr  12  17:27  .ICEauthority
drwx------      3       sp2015722013    sp2015722013    4096    Mar  12  12:36  .local
drwx------      5       sp2015722013    sp2015722013    4096    Mar  26  12:32  .mozilla
drwxrwxr-x      2       sp2015722013    sp2015722013    4096    Apr  9  12:55   .nano
-rw-r--r--      1       sp2015722013    sp2015722013    655     May  16  21:49  .profile
-rw-r--r--      1       sp2015722013    sp2015722013    0       Mar  21  16:11  .sudo_as_admin_successful
drwxr-xr-x      2       sp2015722013    sp2015722013    4096    Mar  28  0:31   .vim
-rw-------      1       sp2015722013    sp2015722013    13652   Apr  12  20:21  .viminfo
-rw-------      1       sp2015722013    sp2015722013    128     Apr  12  17:27  .Xauthority
-rw-------      1       sp2015722013    sp2015722013    82      Apr  12  17:27  .xsession-errors
-rw-------      1       sp2015722013    sp2015722013    1144    Apr  12  2:7    .xsession-errors.old
drwxr-xr-x      2       sp2015722013    sp2015722013    4096    Mar  12  12:36  Desktop
drwxr-xr-x      6       sp2015722013    sp2015722013    4096    Mar  22  23:6   Documents
drwxr-xr-x      2       sp2015722013    sp2015722013    4096    Mar  12  12:36  Downloads
-rw-r--r--      1       sp2015722013    sp2015722013    8980    Apr  20  17:47  examples.desktop
drwxr-xr-x      2       sp2015722013    sp2015722013    4096    Mar  12  12:36  Music
drwxr-xr-x      2       sp2015722013    sp2015722013    4096    Mar  12  12:36  Pictures
drwxrwxr-x      2       sp2015722013    sp2015722013    4096    Mar  12  12:58  prac
drwxr-xr-x      2       sp2015722013    sp2015722013    4096    Mar  12  12:36  Public
drwxr-xr-x      2       sp2015722013    sp2015722013    4096    Mar  12  12:36  Templates
drwxr-xr-x      2       sp2015722013    sp2015722013    4096    Mar  12  12:36  Videos
drwxrwxr-x      7       sp2015722013    sp2015722013    4096    Apr  2  12:27   work
directory path : /etc
total : 1192
drwxr-xr-x      130     root    root    12288   Apr  10  23:45  .
drwxr-xr-x      24      root    root    4096    Apr  4  13:42   ..
-rw-r--r--      1       root    root    12288   Mar  21  16:12  .group.swp
-rw-------      1       root    root    0       Jul  31  9:31   .pwd.lock
drwxr-xr-x      3       root    root    4096    Jul  31  9:40   acpi
-rw-r--r--      1       root    root    3028    Jul  31  9:31   adduser.conf
drwxr-xr-x      2       root    root    4096    Mar  26  14:55  alternatives
-rw-r--r--      1       root    root    401     Dec  29  8:15   anacrontab
-rw-r--r--      1       root    root    112     Jan  10  23:36  apg.conf
drwxr-xr-x      6       root    root    4096    Jul  31  9:35   apm
drwxr-xr-x      3       root    root    4096    Mar  19  12:9   apparmor
drwxr-xr-x      8       root    root    4096    Mar  29  20:23  apparmor.d
drwxr-xr-x      5       root    root    4096    Jul  31  9:40   apport
-rw-r--r--      1       root    root    389     Apr  18  23:19  appstream.conf
drwxr-xr-x      7       root    root    4096    Mar  26  14:56  apt
drwxr-xr-x      3       root    root    4096    Jul  31  9:38   aptdaemon
sp2015722013@jinsulee-VirtualBox:~/work/week5$ ./spls_advanced Makefile ls.c
Makefile
ls.c
sp2015722013@jinsulee-VirtualBox:~/work/week5$
```



5. Conclusion

이번 과제를 진행 할 때 option flag를 어떻게 처리 할지에 대해 많은 생각을 하였다. 지금은 두가지 flag라 4가지 경우의 수 밖에 없어서 단순 경우 처리를 해주었는데 나중에 여러가지의 option flag가 나오면 다른 방법을 찾아봐야할 것 같다. 이전 과제는 2중 배열 동적 할당으로 ls를 구현했지만 한계를 느껴 linked list로 새로 구현을 하였다. 아직까지는 구현의 난이도가 엄청 높지 않아 함수를 깔끔하게 구현을 하지 않아도 헷갈리지 않게 짤 수 있었지만 앞으로를 위해서 함수로 깔끔하게 짜는 법을 더 익혀야 할 것 같다.
이번 과제를 통해서 shell의 command가 어떻게 구현되었는지 몸소 느꼈다.