

REPORT

[시스템프로그래밍
Assignment 1-3]



학과	컴퓨터정보공학부
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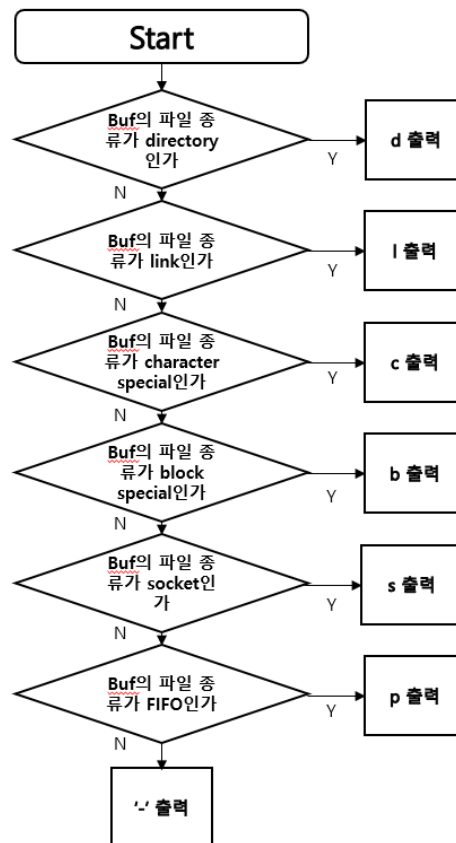
학번	2018202018
이름	유승재
담당 교수	김태석 교수님
제출일	2023.04.12

1. Introduction

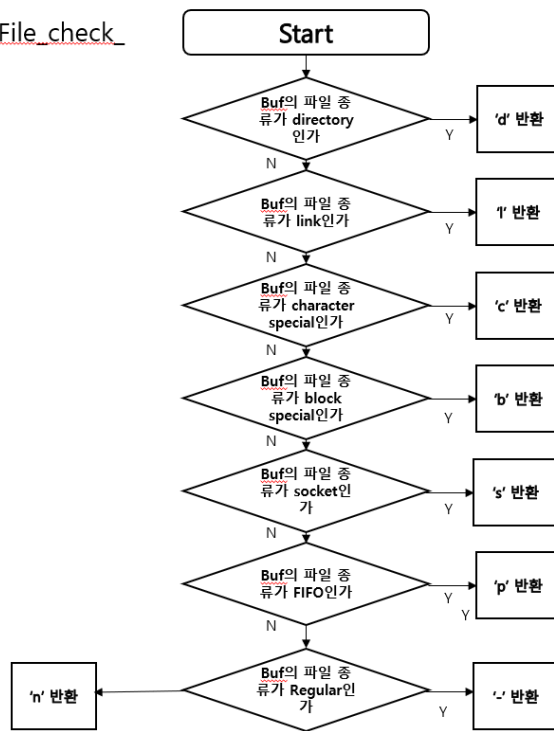
이번 과제는 저번주에 구현한 ls 함수에서 -r, -S, -h 옵션을 추가로 구현하고 와일드 카드를 인자로 주었을 시 실제 ls 와 동일한 방식으로 출력되도록 프로그램을 구현하는 것입니다. 여러 예외들로 인해 발생할 수 있는 문제들을 대처하고 ls 와 동일한 기능을 하는 프로그램을 만드는 것이 이번 과제입니다.

2. Flow Chart

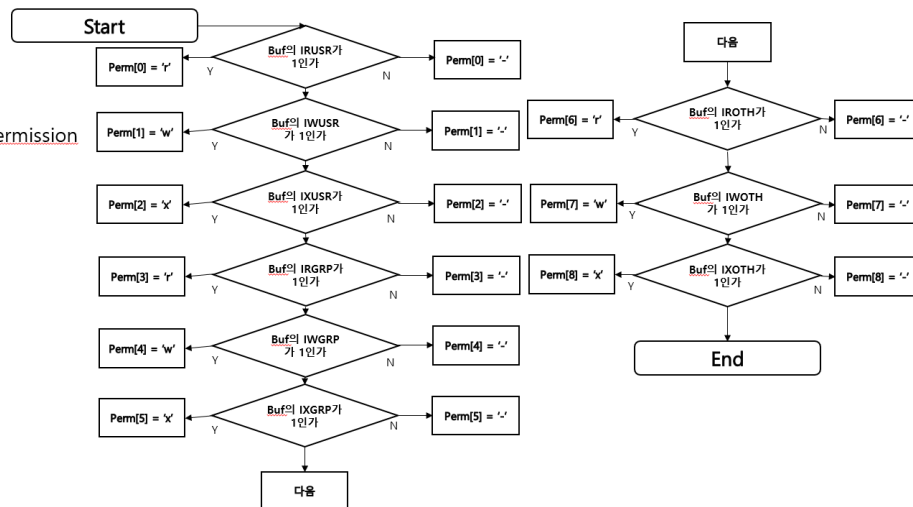
File_check



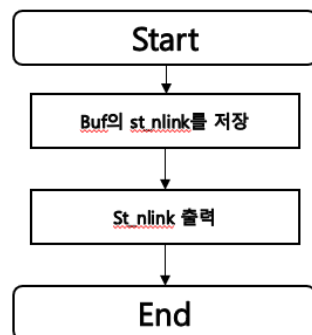
File_check



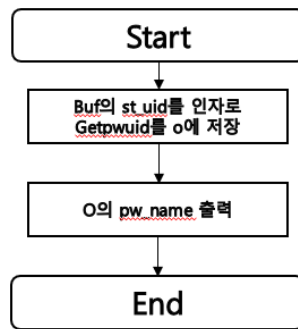
File_permission



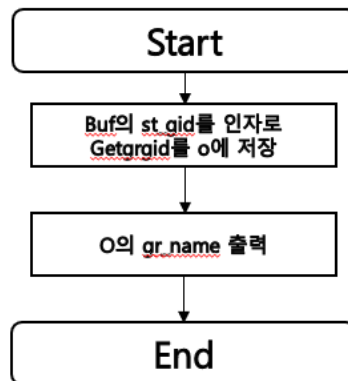
File_link



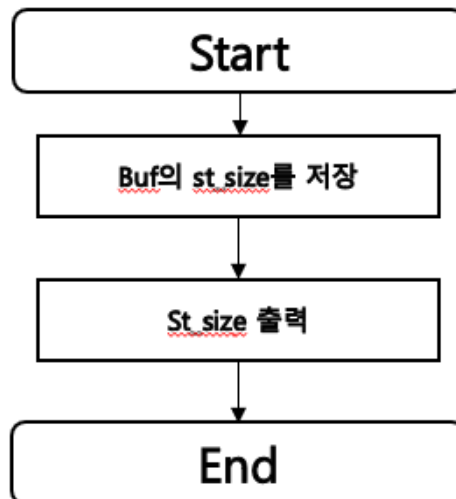
File_owner_name

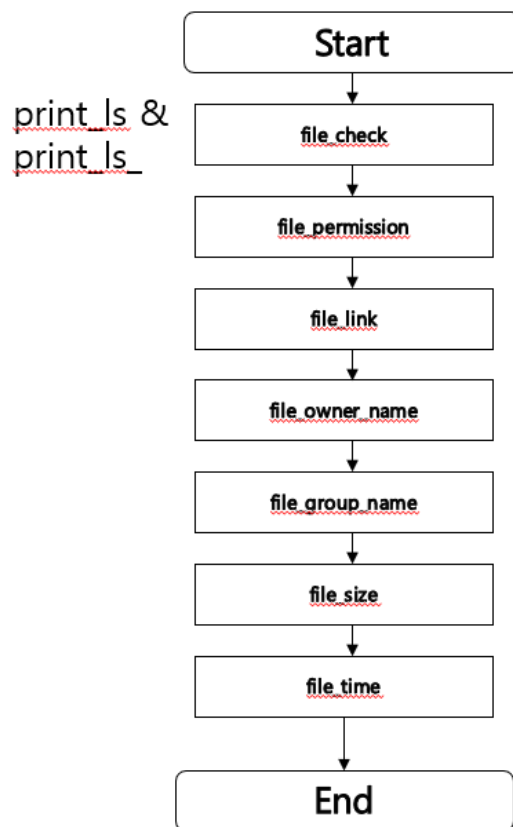
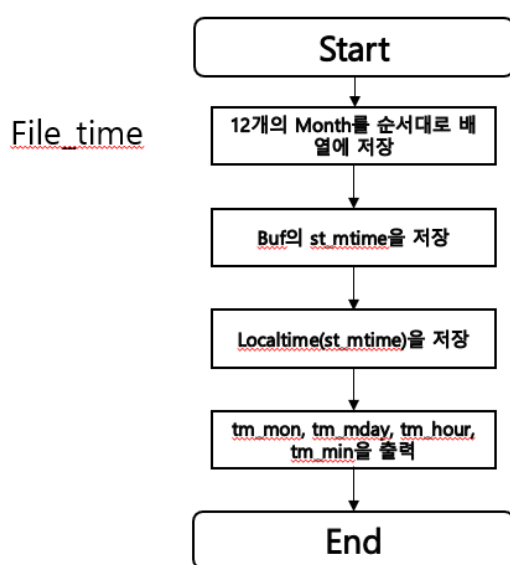


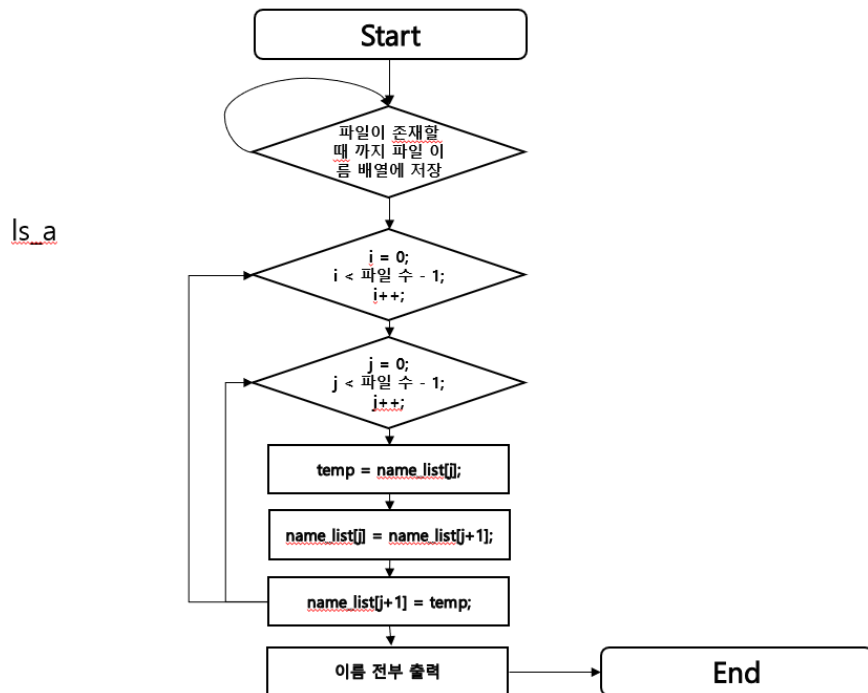
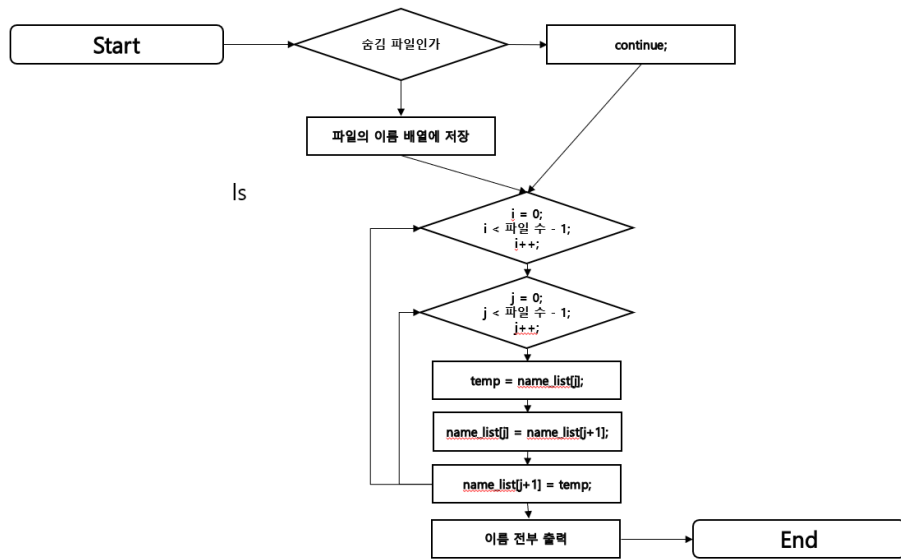
File_group_name

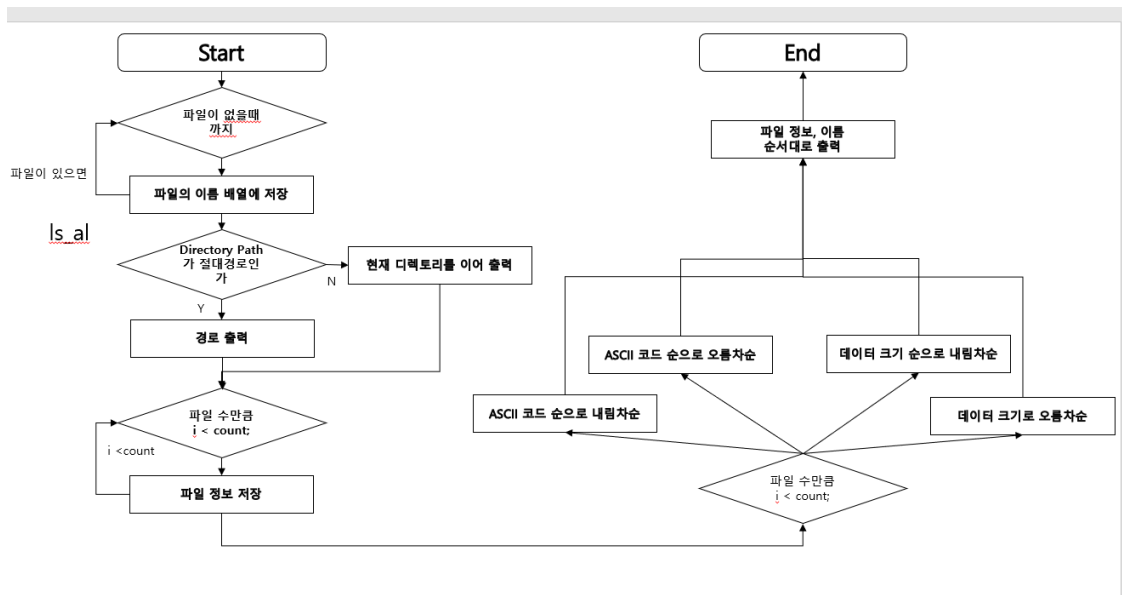
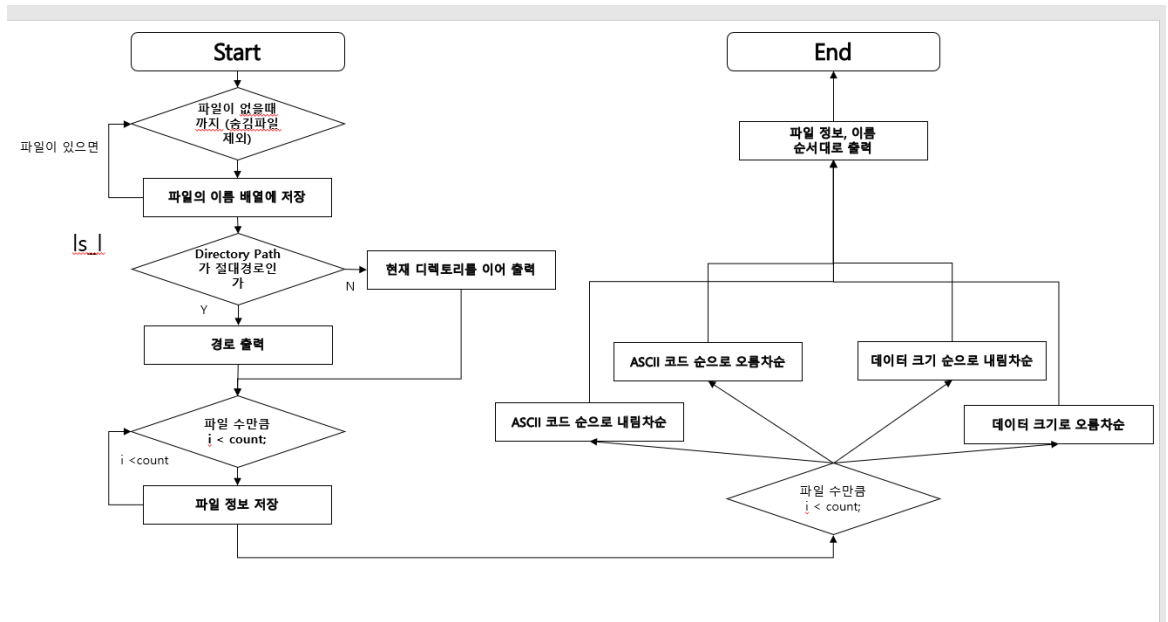


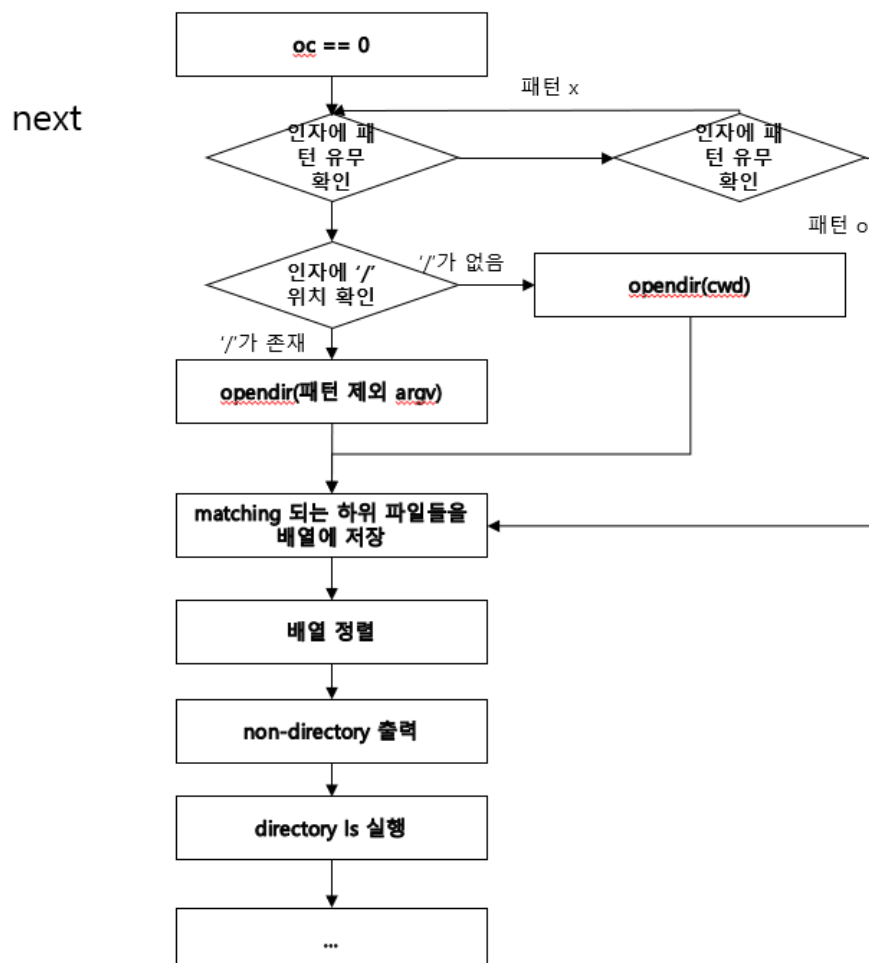
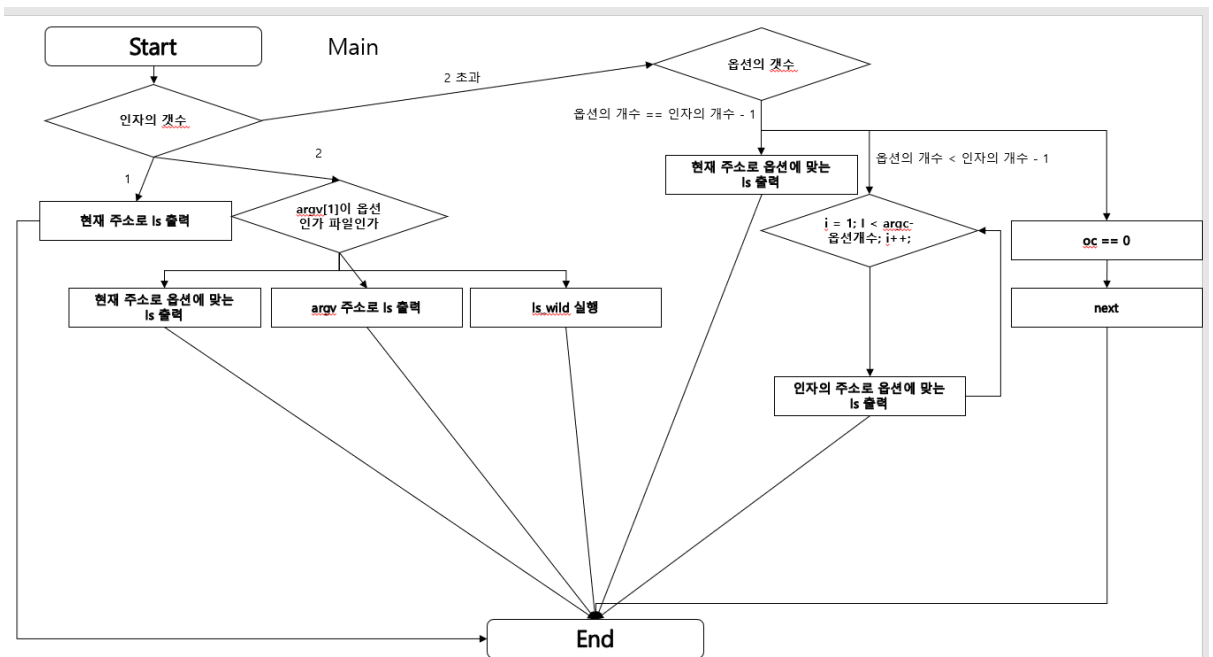
File_size

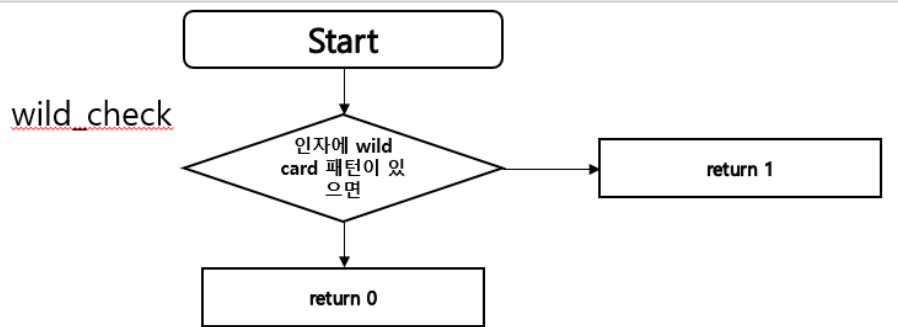












3. Pseudo Code

```
void file_check(struct stat ){  
  
    char 선언;  
  
    if (디렉토리){  
  
        d 출력  
  
    }  
  
    else if (링크){  
  
        l 출력  
  
    }  
  
    else if (character special){  
  
        c 출력  
  
    }  
  
    else if (block special){  
  
        b 출력  
  
    }  
  
}
```

```
else if (socket){  
    s 출력  
}  
  
else if (FIFO){  
    p 출력  
}  
  
else if (regular){  
    - 출력  
}  
}
```

```
Char file_check_(struct stat ){  
  
    if (디렉토리){  
        d 출력  
    }  
  
    else if (링크){  
        l 출력  
    }  
  
    else if (character special){
```

c 출력

}

else if (block special){

b 출력

}

else if (socket){

s 출력

}

else if (FIFO){

p 출력

}

else if (regular){

- 출력

}

Else {

N 출력

}

Char 반환

}

```
Void file_permission(struct stat ){
```

```
Perm[10];
```

Stat 의 st_mode 를 가져와 권한에 맞게 perm 의 자리에 char 배치

Perm 출력

```
}
```

```
Void file_link(struct stat ){
```

Stat 의 st_nlink 를 가져와 link 개수 확인

Link 개수 출력

```
}
```

```
Void file_owner_name(struct stat ) {
```

Stat 의 getpwuid 로 st_uid 를 가져와 struct passwd 형태에 저장

Struct passwd 의 pw_name 출력

```
}
```

```
Void file_group_name(struct stat ){
```

Stat 의 getgrgid 로 st_gid 를 가져와 struct group 형태에 저장

Struct group 의 gr_name 출력

```
}
```

```
Void file_size(struct stat ){
```

Off_t 변수 0 으로 초기화;

변수에 st_size 로 대입;

St_size 출력

}

Void file_time(struct stat){

12 개의 month 를 배열 크기 12 개의 문자열 배열에 1 월부터
12 월까지 저장;

Struct stat 의 st_mtime 을 localtime 함수를 이용해 struct tm 에 저장;

Struct tm 형식의 tm_mon, tm_mday, tm_hour, tm_min 출력

}

Void print_ls(struct stat){

File_check, file_permission, file_link, file_owner_name, file_group_name,

File_size, file_time 한번에 struct stat 을 넣어줘 출력

}

Void print_ls_(struct stat , int){

File_check, file_permission, file_link, file_owner_name, file_group_name,

File_size, file_time 한번에 struct stat 을 넣어줘서 출력, 다만 인자로
hflag 를 받아 출력 방식 변경

}

Void ls(DIR *)

DIR*를 읽어서 맨 앞의 문자가 .이 아닌 파일의 d_name 만 읽어서 저장;

버블 정렬을 이용해 d_name 정리;

D_name 을 정렬한 배열 순서대로 출력;

}

Void ls_a(DIR*){

DIR*을 읽어와 모든 파일들의 d_name 을 배열로 저장;

맨 앞이 .인 파일들 (숨김 파일들)은 두번째 문자부터 읽어서 버블 정렬로 배열 정리;

D_name 을 정렬한 배열 순서대로 출력;

}

Void ls_l(DIR* , Char* 파일 이름(상대경로)){

이름의 맨 앞이 .인 파일을 제외한 파일들의 d_name 들을 배열에 저장;

For (파일 수만큼){

 D_name 배열에 절대 경로 붙여줌;

 절대경로로 이루어진 파일 lstat 으로 정보 가져옴;

 Blocksize 더해줌;

}

If (l 이외의 플래그가 없을 때)

이름을 기준으로 오름차순 정렬;

Else if (Sflag 만)

Stat size 를 기준으로 내림차순 정렬

Else if (rflag 만)

이름을 기준으로 내림차순 정렬

Else if (S 와 r 플래그 둘다)

Stat size 를 기준으로 오름차순 정렬

Blocksize 출력;

For (파일 수만큼){

Print_ls_ 출력

파일 이름 출력

If (symbolic link 일 경우)

➔ 원본 파일 출력

}

Void ls_al(DIR* , char* 파일 이름(상대경로)){

모든 파일의 d_name 배열에 저장;

버블 정렬을 이용해 숨김 파일들은 두번째 문자부터 비교하는
식으로 d_name 배열 정렬;

For (파일 수만큼){

```

    D_name 배열에 절대 경로 붙여줌;

    절대경로로 이루어진 파일 lstat 으로 정보 가져옴;

    Blocksize 더해줌;

}

If (l 이외의 플래그가 없을 때)

    이름을 기준으로 오름차순 정렬;

Else if (Sflag 만)

    Stat size 를 기준으로 내림차순 정렬

Else if (rflag 만)

    이름을 기준으로 내림차순 정렬

Else if (S 와 r 플래그 둘다)

    Stat size 를 기준으로 오름차순 정렬

Blocksize 출력;

For (파일 수만큼){

    Print_ls_ 출력

    파일 이름 출력

    If (symbolic link 일 경우)

        ➔ 원본 파일 출력

}

```



```

Int main(인자 수, 인자 이름){

    Getopt 를 이용하여 옵션 : alhSr 에 플래그 설정;

    If (인자의 개수가 1 일 경우 = 추가 인자가 없을 경우){

        ls (파일) 실행;

    }

    Else if (현재 디렉토리의 옵션 추가 or 옵션이 없는 다른 디렉토리){

        If (옵션 추가일 경우){

            현재의 주소에서 옵션에 맞는 함수 출력;

        }

        Else if (argv[1]이 wildcard 일 경우){

            Ls_wild 함수 출력;

        }

        Else if (다른 디렉토리일 경우){

            인자의 경로로 ls (인자) 출력;

        }

    }

    Else if ( 옵션과 디렉토리가 전부 들어올 경우 ) {

        인자의 맨 앞의 글자가 '-'인 것으로 판단해 옵션의 개수 카운트;

        For (인자 전체 개수 - (1 + 옵션의 개수) 번){

```

인자들을 버블 정렬을 통해 정렬;

}

If (옵션이 없는 경우){

for (argc-1)

if (인자가 wildcard 패턴을 포함하는 경우)

if (절대 경로인 경우)

인자의 와일드카드 이전까지의 경로를 붙임;

Fnmatch 를 통해 match 되는 것만 fill 배열에 저장

Else if (상대 경로인 경우)

Cwd 를 파일에 붙임

Fnmatch 를 통해 match 되는 것만 fill 배열에 저장

Else if (인자가 wildcard 패턴이 없는 경우)

Opendir(인자);

If (NULL 일 경우)

없는 파일인지 확인;

없을 경우 continue;

Nondirectory 파일일 경우 fill 배열에 인자 그대로 저장;

Else (NULL 이 아닐 경우)

Fill 배열에 인자 그대로 저장;

```

    Fill 배열 전체 정렬;

    Fill 배열 중 non-directory 파일 출력;

    Fill 배열 중 directory 파일 ls 로 출력
}

For (인자 전체 개수 - (1 + 옵션의 개수) 번){

    If (없는 파일일 경우){

        오류 메시지 출력;

    }

}

For (인자 전체 개수 - (1 + 옵션의 개수) 번){

    If (디렉토리가 아닌 다른 파일일 경우) {

        옵션에 따라 non-directory 파일들을 인자로 함수 실행;

    }

}

Else (디렉토리 파일들만){

    For (인자 전체 개수 - (옵션 개수 + 1) 만큼){

        If (디렉토리 파일일 경우만){

            옵션에 맞는 ls 함수 출력;

        }

    }

}

```

}

4. 결과화면

Spls_final -lh

```
kw2018202018@ubuntu:~/ls_a$ ./spls_final -lh
Directory Path : /home/kw2018202018/ls_a
total : 3444
-rw-rw-r-- 1 kw2018202018 kw2018202018 24K Apr 6 20:16 2018202018_advanced_ls.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 50K Apr 12 19:53 2018202018_final_ls.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 23K Apr 5 19:9 2018202018_spls_advanced.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 12 17:11 A.AA
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 a.aa
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:37 a.out
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 3 18:38 a.sdf
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 aa.a
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 aaa
-rwxrwxr-x 1 kw2018202018 kw2018202018 22K Apr 6 20:16 advanced_ls
lrwxrwxrwx 1 kw2018202018 kw2018202018 3 Apr 5 14:33 alink -> aaa
lrwxrwxrwx 1 kw2018202018 kw2018202018 6 Apr 2 2:23 asdf -> test.c
dwxrwxr-x 2 kw2018202018 kw2018202018 4.1K Apr 3 12:47 aub
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 12 17:3 B.aa
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 3 15:0 fdf
-rw-rw-r-- 1 kw2018202018 kw2018202018 193 Apr 12 16:38 Makefile
-rwxrwxr-x 1 kw2018202018 kw2018202018 43K Apr 10 14:47 nam
-rw-rw-r-- 1 kw2018202018 kw2018202018 69K Apr 10 14:47 nam.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 6.7K Apr 7 20:34 re.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 22K Apr 5 22:58 spls_advanced
-rwxrwxr-x 1 kw2018202018 kw2018202018 39K Apr 12 19:53 spls_final
-rwxrwxr-x 1 kw2018202018 kw2018202018 39K Apr 12 19:51 test
-rw-rw-r-- 1 kw2018202018 kw2018202018 50K Apr 12 19:51 test.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 18K Apr 3 14:47 test2
-rw-rw-r-- 1 kw2018202018 kw2018202018 27K Apr 3 14:47 test2.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 22K Apr 3 13:36 test22
-rwxrwxr-x 1 kw2018202018 kw2018202018 17K Apr 10 17:59 test3
-rw-rw-r-- 1 kw2018202018 kw2018202018 17K Apr 10 18:22 test3.c
-rwxrwxrwx 1 kw2018202018 kw2018202018 1M Apr 5 20:57 Web1_2_E_2018202018.pdf
-rw-rw-r-- 1 kw2018202018 kw2018202018 1M Apr 5 23:3 Web1_2_E_2018202018.tar.gz
```

Spls_final -ls

```

kw2018202018@ubuntu:~/ls_a$ ./spls_final -ls
Directory Path : /home/kw2018202018/ls_a
total : 3444
-rwxrw-rw- 1 kw2018202018 kw2018202018 1532531 Apr 5 20:57 Web1_2_E_2018202018.pdf
-rw-rw-r-- 1 kw2018202018 kw2018202018 1457252 Apr 5 23:3 Web1_2_E_2018202018.tar.gz
-rw-rw-r-- 1 kw2018202018 kw2018202018 69527 Apr 10 14:47 nam.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 50517 Apr 12 19:53 2018202018_final_ls.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 50517 Apr 12 19:51 test.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 43104 Apr 10 14:47 nam
-rwxrwxr-x 1 kw2018202018 kw2018202018 39016 Apr 12 19:53 spls_final
-rwxrwxr-x 1 kw2018202018 kw2018202018 39000 Apr 12 19:51 test
-rw-rw-r-- 1 kw2018202018 kw2018202018 27912 Apr 3 14:47 test2.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 24125 Apr 6 20:16 2018202018_advanced_ls.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 23768 Apr 5 19:9 2018202018_spls_advanced.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 22368 Apr 6 20:16 advanced_ls
-rwxrwxr-x 1 kw2018202018 kw2018202018 22368 Apr 5 22:58 spls_advanced
-rwxrwxr-x 1 kw2018202018 kw2018202018 22200 Apr 3 13:36 test22
-rwxrwxr-x 1 kw2018202018 kw2018202018 18160 Apr 3 14:47 test2
-rw-rw-r-- 1 kw2018202018 kw2018202018 17576 Apr 10 18:22 test3.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 17480 Apr 10 17:59 test3
-rw-rw-r-- 1 kw2018202018 kw2018202018 6683 Apr 7 20:34 re.c
drwxrwxr-x 2 kw2018202018 kw2018202018 4096 Apr 3 12:47 aub
-rw-rw-r-- 1 kw2018202018 kw2018202018 193 Apr 12 16:38 Makefile
lrwxrwxrwx 1 kw2018202018 kw2018202018 6 Apr 2 2:23 asdf -> test.c
lrwxrwxrwx 1 kw2018202018 kw2018202018 3 Apr 5 14:33 alink -> aaa
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 12 17:11 A.AA
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 a.aa
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:37 a.out
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 3 18:38 a.sdf
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 aa.a
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 aaa
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 12 17:3 B.aa
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 3 15:0 fdf

```

Spls_final -lr

```

kw2018202018@ubuntu:~/ls_a$ ./spls_final -lr
Directory Path : /home/kw2018202018/ls_a
total : 3444
-rw-rw-r-- 1 kw2018202018 kw2018202018 1457252 Apr 5 23:3 Web1_2_E_2018202018.tar.gz
-rwxrw-rw- 1 kw2018202018 kw2018202018 1532531 Apr 5 20:57 Web1_2_E_2018202018.pdf
-rw-rw-r-- 1 kw2018202018 kw2018202018 17576 Apr 10 18:22 test3.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 17480 Apr 10 17:59 test3
-rwxrwxr-x 1 kw2018202018 kw2018202018 22200 Apr 3 13:36 test22
-rw-rw-r-- 1 kw2018202018 kw2018202018 27912 Apr 3 14:47 test2.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 18160 Apr 3 14:47 test2
-rw-rw-r-- 1 kw2018202018 kw2018202018 50517 Apr 12 19:51 test.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 39000 Apr 12 19:51 test
-rwxrwxr-x 1 kw2018202018 kw2018202018 39016 Apr 12 19:53 spls_final
-rwxrwxr-x 1 kw2018202018 kw2018202018 22368 Apr 5 22:58 spls_advanced
-rw-rw-r-- 1 kw2018202018 kw2018202018 6683 Apr 7 20:34 re.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 69527 Apr 10 14:47 nam.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 43104 Apr 10 14:47 nam
-rw-rw-r-- 1 kw2018202018 kw2018202018 193 Apr 12 16:38 Makefile
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 3 15:0 fdf
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 12 17:3 B.aa
drwxrwxr-x 2 kw2018202018 kw2018202018 4096 Apr 3 12:47 aub
lrwxrwxrwx 1 kw2018202018 kw2018202018 6 Apr 2 2:23 asdf -> test.c
lrwxrwxrwx 1 kw2018202018 kw2018202018 3 Apr 5 14:33 alink -> aaa
-rwxrwxr-x 1 kw2018202018 kw2018202018 22368 Apr 6 20:16 advanced_ls
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 aaa
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 aa.a
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 3 18:38 a.sdf
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:37 a.out
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 12 17:11 A.AA
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 a.aa
-rw-rw-r-- 1 kw2018202018 kw2018202018 23768 Apr 5 19:9 2018202018_spls_advanced.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 50517 Apr 12 19:53 2018202018_final_ls.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 24125 Apr 6 20:16 2018202018_advanced_ls.c

```

Spls_final -larS


```

kw2018202018@ubuntu:~/ls_a$ ./spls_final -larS
Directory Path : /home/kw2018202018/ls_a
total : 3456
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 3 15:0 fdf
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 12 17:3 B.aa
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 aaa
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 aa.a
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 3 18:38 a.sdf
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:37 a.out
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 12 17:11 A.AA
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 a.aa
lrwxrwxrwx 1 kw2018202018 kw2018202018 3 Apr 5 14:33 alink -> aaa
lrwxrwxrwx 1 kw2018202018 kw2018202018 6 Apr 2 2:23 asdf -> test.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 193 Apr 12 16:38 Makefile
drwxrwxr-x 2 kw2018202018 kw2018202018 4096 Apr 3 15:0 .vscode
drwxrwxr-x 2 kw2018202018 kw2018202018 4096 Apr 3 12:47 aub
drwxr-xr-x 25 kw2018202018 kw2018202018 4096 Apr 12 16:37 ..
drwxrwxr-x 4 kw2018202018 kw2018202018 4096 Apr 12 19:53 .
-rw-rw-r-- 1 kw2018202018 kw2018202018 6683 Apr 7 20:34 re.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 17480 Apr 10 17:59 test3
-rw-rw-r-- 1 kw2018202018 kw2018202018 17576 Apr 10 18:22 test3.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 18160 Apr 3 14:47 test2
-rwxrwxr-x 1 kw2018202018 kw2018202018 22200 Apr 3 13:36 test22
-rwxrwxr-x 1 kw2018202018 kw2018202018 22368 Apr 5 22:58 spls_advanced
-rwxrwxr-x 1 kw2018202018 kw2018202018 22368 Apr 6 20:16 advanced_ls
-rw-rw-r-- 1 kw2018202018 kw2018202018 23768 Apr 5 19:9 2018202018_spls_advanced.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 24125 Apr 6 20:16 2018202018_advanced_ls.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 27912 Apr 3 14:47 test2.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 39000 Apr 12 19:51 test
-rwxrwxr-x 1 kw2018202018 kw2018202018 39016 Apr 12 19:53 spls_final
-rwxrwxr-x 1 kw2018202018 kw2018202018 43104 Apr 10 14:47 nam
-rw-rw-r-- 1 kw2018202018 kw2018202018 50517 Apr 12 19:51 test.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 50517 Apr 12 19:53 2018202018_final_ls.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 69527 Apr 10 14:47 nam.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 1457252 Apr 5 23:3 Web1_2_E_2018202018.tar.gz
-rwxrwxrwx 1 kw2018202018 kw2018202018 1532531 Apr 5 20:57 Web1_2_E_2018202018.pdf

```

Spls_final 'test[1-4]'

```

kw2018202018@ubuntu:~/ls_a$ ls
2018202018_advanced_ls.c  aaa  A.AA  a.out  aub  Makefile  re.c  test  test2.c  test.c
2018202018_final_ls.c    a.aa advanced_ls asdf  B.aa  nam      spls_advanced test2 test3 Web1_2_E_2018202018.pdf
2018202018_spls_advanced.c aa.a alink  a.sdf fdf  nam.c    spls_final  test22 test3.c Web1_2_E_2018202018.tar.gz
kw2018202018@ubuntu:~/ls_a$ ./spls_final 'test[1-4]'
test2
test3
kw2018202018@ubuntu:~/ls_a$

```

Spls_final 't??t?'

```

kw2018202018@ubuntu:~/ls_a$ ./spls_final 't??t?'
test2
test3
kw2018202018@ubuntu:~/ls_a$

```

Spls_final ~ '*'

```
kw2018202018@ubuntu:~/ls_a$ ./spls_final ~ '*'
/home/kw2018202018/ls_a/2018202018_advanced_ls.c
/home/kw2018202018/ls_a/2018202018_final_ls.c
/home/kw2018202018/ls_a/2018202018_spls_advanced.c
/home/kw2018202018/ls_a/A.AA
/home/kw2018202018/ls_a/a.aa
/home/kw2018202018/ls_a/a.out
/home/kw2018202018/ls_a/a.sdf
/home/kw2018202018/ls_a/aa.a
/home/kw2018202018/ls_a/aaa
/home/kw2018202018/ls_a/advanced_ls
/home/kw2018202018/ls_a/alink
/home/kw2018202018/ls_a/asdf
/home/kw2018202018/ls_a/B.aa
/home/kw2018202018/ls_a/fdf
/home/kw2018202018/ls_a/Makefile
/home/kw2018202018/ls_a/nam
/home/kw2018202018/ls_a/nam.c
/home/kw2018202018/ls_a/re.c
/home/kw2018202018/ls_a/spls_advanced
/home/kw2018202018/ls_a/spls_final
/home/kw2018202018/ls_a/test
/home/kw2018202018/ls_a/test.c
/home/kw2018202018/ls_a/test2
/home/kw2018202018/ls_a/test2.c
/home/kw2018202018/ls_a/test22
/home/kw2018202018/ls_a/test3
/home/kw2018202018/ls_a/test3.c
/home/kw2018202018/ls_a/Web1_2_E_2018202018.pdf
/home/kw2018202018/ls_a/Web1_2_E_2018202018.tar.gz
/home/kw2018202018 :
assignment1
assignment2
Desktop
Documents
Downloads
examples.desktop
```

```

lab.c
ls_a
Makefile
Maketest
Music
Pictures
Public
simple_ls
simple_ls.c
splab_commands
Templates
test
test.c
testopt
Videos
work
work2
/home/kw2018202018/ls_a/aub :
aaa

```

Spls_final -al

```

kw2018202018@ubuntu:~/ls_a$ ./spls_final -al
Directory Path : /home/kw2018202018/ls_a
total : 3456
drwxrwxr-x 4 kw2018202018 kw2018202018 4096 Apr 12 19:53 .
drwxr-xr-x 25 kw2018202018 kw2018202018 4096 Apr 12 16:37 ..
-rw-rw-r-- 1 kw2018202018 kw2018202018 24125 Apr 6 20:16 2018202018_advanced_ls.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 50517 Apr 12 19:53 2018202018_final_ls.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 23768 Apr 5 19:9 2018202018_spls_advanced.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 12 17:11 A.AA
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 a.aa
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:37 a.out
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 3 18:38 a.sdf
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 aa.a
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 aaa
-rw-rw-r-- 1 kw2018202018 kw2018202018 22368 Apr 6 20:16 advanced_ls
lrwxrwxrwx 1 kw2018202018 kw2018202018 3 Apr 5 14:33 alink -> aaa
lrwxrwxrwx 1 kw2018202018 kw2018202018 6 Apr 2 2:23 asdf -> test.c
drwxrwxr-x 2 kw2018202018 kw2018202018 4096 Apr 3 12:47 aub
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 12 17:3 B.aa
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 3 15:0 fdf
-rw-rw-r-- 1 kw2018202018 kw2018202018 193 Apr 12 16:38 Makefile
-rwxrwxr-x 1 kw2018202018 kw2018202018 43104 Apr 10 14:47 nam
-rw-rw-r-- 1 kw2018202018 kw2018202018 69527 Apr 10 14:47 nam.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 6683 Apr 7 20:34 re.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 22368 Apr 5 22:58 spls_advanced
-rwxrwxr-x 1 kw2018202018 kw2018202018 39016 Apr 12 19:53 spls_final
-rwxrwxr-x 1 kw2018202018 kw2018202018 39000 Apr 12 19:51 test
-rw-rw-r-- 1 kw2018202018 kw2018202018 50517 Apr 12 19:51 test.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 18160 Apr 3 14:47 test2
-rw-rw-r-- 1 kw2018202018 kw2018202018 27912 Apr 3 14:47 test2.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 22200 Apr 3 13:36 test22
-rwxrwxr-x 1 kw2018202018 kw2018202018 17480 Apr 10 17:59 test3
-rw-rw-r-- 1 kw2018202018 kw2018202018 17576 Apr 10 18:22 test3.c
drwxrwxr-x 2 kw2018202018 kw2018202018 4096 Apr 3 15:0 .vscode
-rwxrwxr-w 1 kw2018202018 kw2018202018 1532531 Apr 5 20:57 Web1_2_E_2018202018.pdf
-rw-rw-r-- 1 kw2018202018 kw2018202018 1457252 Apr 5 23:3 Web1_2_E_2018202018.tar.gz
kw2018202018@ubuntu:~/ls_a$

```

Spls_final -ls


```

kw2018202018@ubuntu:~/ls_a$ ./spls final -ls
Directory Path : /home/kw2018202018/ls_a
total : 3444
-rwxrwxrwx- 1 kw2018202018 kw2018202018 1532531 Apr 5 20:57 Web1_2_E_2018202018.pdf
-rw-rw-r-- 1 kw2018202018 kw2018202018 1457252 Apr 5 23:3 Web1_2_E_2018202018.tar.gz
-rw-rw-r-- 1 kw2018202018 kw2018202018 69527 Apr 10 14:47 nam.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 50517 Apr 12 19:53 2018202018_final_ls.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 50517 Apr 12 19:51 test.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 43104 Apr 10 14:47 nam
-rwxrwxr-x 1 kw2018202018 kw2018202018 39016 Apr 12 19:53 spls_final
-rwxrwxr-x 1 kw2018202018 kw2018202018 39000 Apr 12 19:51 test
-rw-rw-r-- 1 kw2018202018 kw2018202018 27912 Apr 3 14:47 test2.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 24125 Apr 6 20:16 2018202018_advanced_ls.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 23768 Apr 5 19:9 2018202018_spls_advanced.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 22368 Apr 6 20:16 advanced_ls
-rwxrwxr-x 1 kw2018202018 kw2018202018 22368 Apr 5 22:58 spls_advanced
-rwxrwxr-x 1 kw2018202018 kw2018202018 22200 Apr 3 13:36 test22
-rwxrwxr-x 1 kw2018202018 kw2018202018 18160 Apr 3 14:47 test2
-rw-rw-r-- 1 kw2018202018 kw2018202018 17576 Apr 10 18:22 test3.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 17480 Apr 10 17:59 test3
-rw-rw-r-- 1 kw2018202018 kw2018202018 6683 Apr 7 20:34 re.c
drwxrwxr-x 2 kw2018202018 kw2018202018 4096 Apr 3 12:47 aub
-rw-rw-r-- 1 kw2018202018 kw2018202018 193 Apr 12 16:38 Makefile
lrwxrwxrwx 1 kw2018202018 kw2018202018 6 Apr 2 2:23 asdf -> test.c
lrwxrwxrwx 1 kw2018202018 kw2018202018 3 Apr 5 14:33 alink -> aaa
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 12 17:11 A.AA
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 a.aa
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:37 a.out
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 3 18:38 a.sdf
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 aa.a
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 aaa
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 12 17:3 B.aa
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 3 15:0 fdf

```

Spls_final -Shal

```

kw2018202018@ubuntu:~/ls_a$ ./spls final -Shal
Directory Path : /home/kw2018202018/ls_a
total : 3456
-rwxrwxrwx- 1 kw2018202018 kw2018202018 1M Apr 5 20:57 Web1_2_E_2018202018.pdf
-rw-rw-r-- 1 kw2018202018 kw2018202018 1M Apr 5 23:3 Web1_2_E_2018202018.tar.gz
-rw-rw-r-- 1 kw2018202018 kw2018202018 69K Apr 10 14:47 nam.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 50K Apr 12 19:53 2018202018_final_ls.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 50K Apr 12 19:51 test.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 43K Apr 10 14:47 nam
-rwxrwxr-x 1 kw2018202018 kw2018202018 39K Apr 12 19:53 spls_final
-rwxrwxr-x 1 kw2018202018 kw2018202018 39K Apr 12 19:51 test
-rw-rw-r-- 1 kw2018202018 kw2018202018 27K Apr 3 14:47 test2.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 24K Apr 6 20:16 2018202018_advanced_ls.c
-rw-rw-r-- 1 kw2018202018 kw2018202018 23K Apr 5 19:9 2018202018_spls_advanced.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 22K Apr 6 20:16 advanced_ls
-rwxrwxr-x 1 kw2018202018 kw2018202018 22K Apr 5 22:58 spls_advanced
-rwxrwxr-x 1 kw2018202018 kw2018202018 22K Apr 3 13:36 test22
-rwxrwxr-x 1 kw2018202018 kw2018202018 18K Apr 3 14:47 test2
-rw-rw-r-- 1 kw2018202018 kw2018202018 17K Apr 10 18:22 test3.c
-rwxrwxr-x 1 kw2018202018 kw2018202018 17K Apr 10 17:59 test3
-rw-rw-r-- 1 kw2018202018 kw2018202018 6.7K Apr 7 20:34 re.c
drwxrwxr-x 4 kw2018202018 kw2018202018 4.1K Apr 12 19:53 .
drwxr-xr-x 25 kw2018202018 kw2018202018 4.1K Apr 12 16:37 ..
drwxrwxr-x 2 kw2018202018 kw2018202018 4.1K Apr 3 12:47 aub
drwxrwxr-x 2 kw2018202018 kw2018202018 4.1K Apr 3 15:0 .vscode
-rw-rw-r-- 1 kw2018202018 kw2018202018 193 Apr 12 16:38 Makefile
lrwxrwxrwx 1 kw2018202018 kw2018202018 6 Apr 2 2:23 asdf -> test.c
lrwxrwxrwx 1 kw2018202018 kw2018202018 3 Apr 5 14:33 alink -> aaa
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 12 17:11 A.AA
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 a.aa
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:37 a.out
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 3 18:38 a.sdf
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 aa.a
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 5 13:39 aaa
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 12 17:3 B.aa
-rw-rw-r-- 1 kw2018202018 kw2018202018 0 Apr 3 15:0 fdf

```

5. 고찰

이번 과제는 새로운 옵션을 추가로 구현하는 것과 와일드카드 패턴을 파악하여 출력해주는 두 개의 기능을 구현하는 것이었습니다. 새로운 옵션을 추가로 구현해주는 과정은 어렵지 않았으나 초반에 과제를 수행함에 있어 와일드카드의 이해가 완벽하지 않아 구현에 어려움을 겪었습니다. 이번 과제를 통해서 와일드카드의 이해와 C 언어 코딩 방식을 조금 더 이해할 수 있었습니다. 또한 이번 과제가 저번 코드에 덧붙여서 코딩을 하는 방식으로 진행했는데 새로운 기능을 기존의 코드에 덧붙이는 과정에서 코드를 최적화하지 못하여 굉장히 무거운 코드로 구현된 결과가 아쉬웠습니다.

6. Reference