Week4 HW

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1) Make a file, "f1", and fill it with more than 20 bytes.

$vi f1

I have a dream

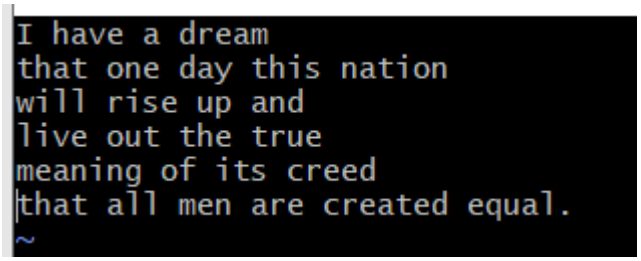
that one day this nation

will rise up and

live out the true

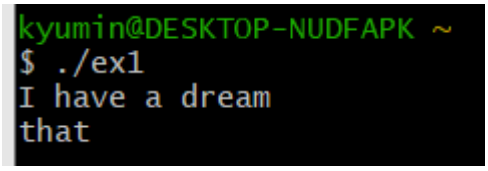
meaning of its creed

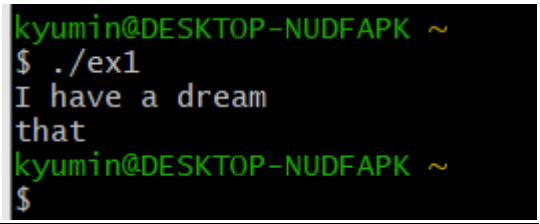
that all men are created equal.

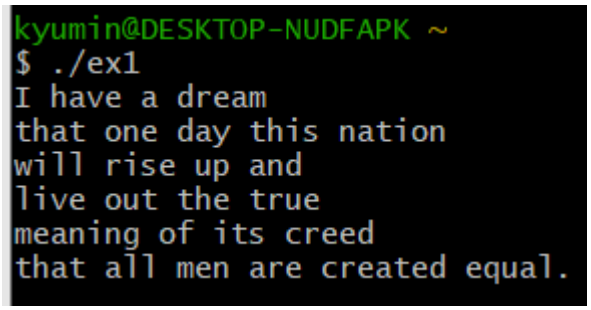


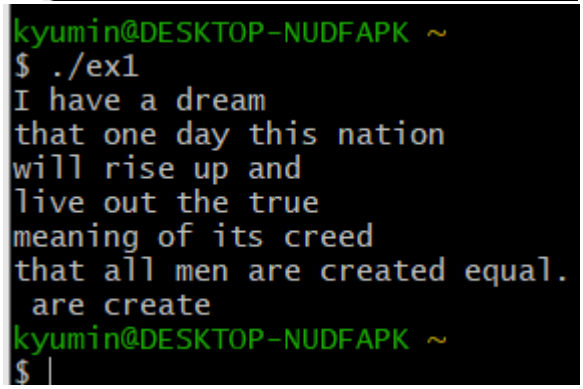
Vi f1으로 코맨드 모드에 진입하여 내용을 입력하였다.

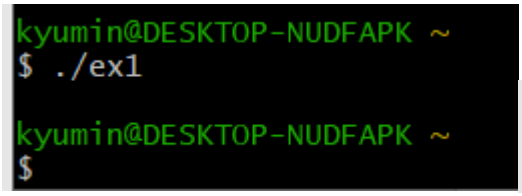
2) Try the code in 6-0), 6-1), 6-2), 6-3), 6-4), 6-5). For 6-3) explain the strange output.

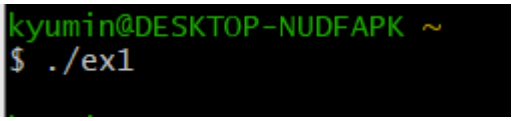








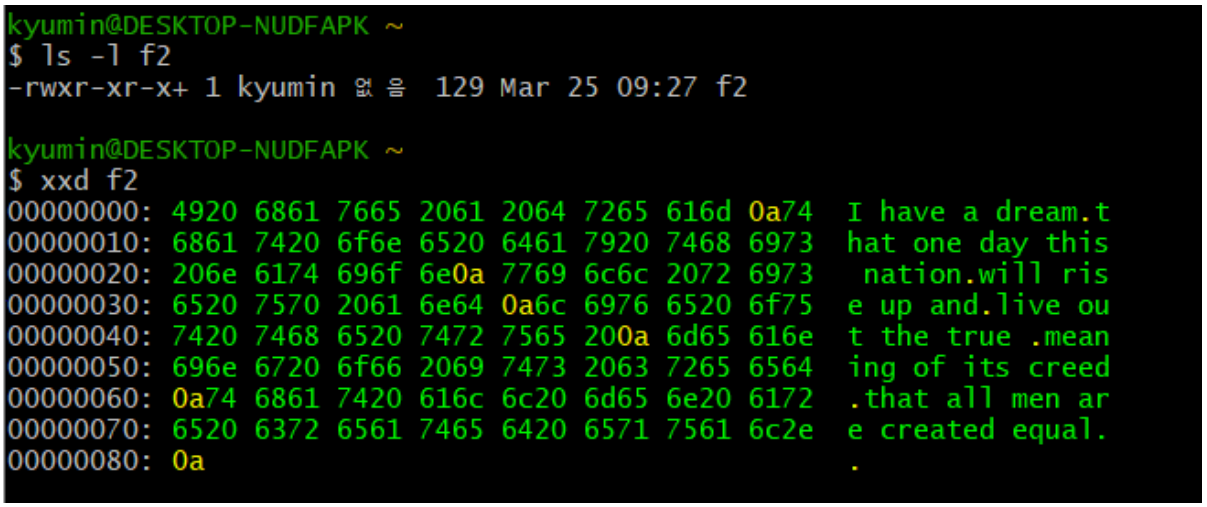




6-3) 코드를 실행하면 마지막에 " are create"라는 문자가 추가로 붙는다. 그 이유는 write(1, buf, 20);에서 y가 아닌 20이라고 작성했기 때문이다.

Buf 배열은 저장되어있는 스트링보다 저장할 스트링의 길이가 짧다면 이전 문자열이 기록에 남는다. 즉 기존에 "t all men are create"라고 저장되어있다가 "d equal.₩0 all ceate"라고 저장이 된다면 buf를 출력할 때 끝에 " are create"가 추가로 출력되는 것이다.

3) Find the byte size of f2 with "ls -l f2". Use xxd to find out the actual data stored in f2.



Ls -l f2명령어를 사용하여 확인한 크기는 129 바이트다. Xxd를 사용하여서도 확인해봤다. 16진수로 하나에 1바이트다. 예를들어 4920 에서는 49와 20 이렇게 2바이트다. 총 개수를 세어보면 129 바이트로 확인된다.

3-1) Write a program that counts the number of bytes in f2. Compare it with the output of "ls -l f2".

```c
#include <fcntl.h>
#include <sys/stat.h>
#include <sys/types.h>
#include <unistd.h>
#include <stdio.h>
#include <string.h>

int main(){
        int x, y,R=0;
        char buf[20];

        x=open("f2", O_RDONLY, 00777);
        for(;;){
                y=R;
                R+=read(x,buf,20);
                if(y==R) break;
        }
        printf("The number of bytes is %d\n",y);
        return 0;
}
```

```
kyumin@DESKTOP-NUDFAPK ~
$ g++ -o ex1 ex1.c
kyumin@DESKTOP-NUDFAPK ~
$ ./ex1
The number of bytes is 129
```

우선 읽은 문자열을 저장할 buf 배열을 만들었다. f2파일을 읽기모드로 열었다. 그리고 x 파일을 읽은 내용을 buf에 저장하고, 읽은 길이를 변수 R에 더해준다. 만약 읽은 글자 수가 200 이하라면 읽은만큼만 y에 더해줄 수 있다. 이렇게 무한 for문을 돌려주는데 위 코드처럼 y=R; / if(y==R) break; 명령어를 사용해줬는데 이는 R의 값에 변화가 없다면 무한 for문을 멈추라는 의미다. Y 값을 출력해보면 f1파일이 몇 바이트인지 알 수 있다.

4) Write a program "hw4.c" that opens f2 and shows each byte of it in hexadecimal number, decimal number, and character. Use printf("%x %d %c₩n", ...) to display a number in various format.

```
int x, y; char buf[20];
x=open("f2", O_RDONLY, 00777);       // open f2 for reading
for(;;){
    y=read(x, buf, 1);  // read next byte
    if (y==0) break;    // we read all, exit the loop
    printf("%x %d %c₩n", buf[0], buf[0], buf[0]); // display
}
```

5) Compile hw4.c with -g option and run gdb to execute each instruction one by one. Use "p" or "x" to check the value of a variable. For m1 mac, use lldb instead of gdb.

```
$ gcc  -g  -o  hw4  hw4.c
$ gdb  hw4
gdb) b  main                                -- stop at main
```

```
gdb) r                                    -- run
    ............
9   x=open("f2", O_RDONLY, 00777);       -- next line to execute
gdb) list                                   -- show code list
gdb) n                                      -- execute current line
11   y=read(x, buf, 1);                 -- line 9 has been executed. next is line 11
gdb) p x                                   -- show x
$1 = 7                                     -- f2 is now file number 7
gdb) n
     ..........
gdb) p y
$2 = 1                                  -- we have read 1 byte
gdb) p buf[0]
$4 = 73 'I'                              -- assume we have 'I' in buf[0]
gdb) x/4xb buf                           -- show 4 bytes at buf in hexadecimal num
0x7fffffffe470: 0x49 0x06 0x40 0x00  -- we have 0x49=73='I' in buf[0]
(for lldb, you need an address to use x command.
      p &buf                             -- print the address of buf
      0x0016fdff496
      x/4xb 0x0016fdff496                -- show 4 bytes at addr 0x0016fdff496
)
gdb) n
............                              -- repeat a few times
gdb) list                                 -- show rest of code
gdb) b 15                                 -- break point at line 15 (after loop)
gdb) c                                    -- continue to that break point
gdb) q                                    -- stop gdb
```

6) Write a program that creates a file and writes “how are you doing?” in it. Use open() and write(). Confirm the result with "cat".

```
x = open("f3", O_RDWR | O_CREAT | O_TRUNC, 00777); // create f3
```

```
write(x, "how are you doing?", 18); // write 18 bytes in f3
```

6-1) Repeat Problem 6 but pass a string variable to "write" this time.

```
x = open("f3", O_RDWR | O_CREAT | O_TRUNC, 00777); // create f3
..................
write(x, y, strlen(y)); // y is a string variable that has "how ..." string
```

7) Write a program that makes a copy for file "hw4.c" into another file "cphw4.c". Use open(), read(),and write(). Confirm that they are same with "cat" and "ls -l".

```
x1 = open hw4.c as O_RDONLY
x2 = open cphw4.c as O_RDWR | O_CREAT | O_TRUNC
for(;;){
    y = read max 20 bytes from x1 into buf
    if y is 0, break
    write y bytes of buf into x2
}
```

8) Write a program that makes a copy for file "hw4" (the executable file for "hw4.c) into another file cphw4. Confirm that they are same with "xxd" and "ls -l".

Execute cphw4 to see if it runs ok.

9) Repeat 7). But get the name of the files from the user. Confirm that the result of copy with "cat" and "ls -l".

```
Enter src file name
hw4.c
Enter dest file name
newhw4.c
hw4.c is copied into newhw4.c successfully.
```

10) Write "mycat" that displays the contents of a user-input file in the terminal in characters. Give a text file and a non-text file to mycat and explain the difference.

$./mycat

Enter file name

f1

The content of f1 is :

I have a dream

that one day this nation

will rise up and

live out the true

meaning of its creed

that all men are created equal.

$./mycat

Enter file name

hw4

....

11) Write "myxxd" that displays the contents of a user-input file in the terminal in hexadecimal numbers. Give a text file and a non-text file to myxxd and explain the difference. You need to use printf(“%x “, buf[i]) to display a byte in a hexadecimal number. Also declare the buffer as an array of unsigned char. Compare the result from the result of xxd.

$./myxxd

Enter file name

f1

The content of f1 is :

49 20 68 61 ....

$ xxd f1

....

$./myxxd

Enter file name

hw4

....

$ xxd hw4

....

12) Run following code and display f8 with cat and xxd respectively. Explain the results.

```
int x;
x=open("f8", O_CREAT|O_RDWR|O_TRUNC, 00777);
write(x, "ab", 2);
int y=10;
write(x, &y, 4);
write(x, "cd", 2);
y=235;
write(x, &y, 4);
```

12-1) Run following code and display f8 with cat and xxd respectively. Explain the results.

```
int x;
x=open("f8", O_CREAT|O_RDWR|O_TRUNC, 00777);
write(x, "ab", 2);
int y=10;
write(x, &y, 8);
write(x, "cd", 2);
y=235;
write(x, &y, 8);
```

13) Write a program that divides a given file into three small files of roughly equal size. Use fstat() to find out the size of a file.

```
Enter file name to split
```

f9

f9 is split into f91, f92, and f93.

13-1) Modify your code in Problem 13 so that the user can specify the number of small files.

Enter file name to split

f9

How many smaile files you want to split it into?

5

f9 is split into f91, f92, f93, f94, f95

14) What is wrong with following program?

```
char temp0[20], *temp1[10], *temp2[10];
printf( “enter src file name₩n” );
gets(temp0);
temp1[0]=temp0;
printf( “enter dest file name₩n” );
gets(temp0);
temp2[0]=temp0;
printf( “src file:%s dest file:%s₩n” , temp1[0], temp2[0]);
```

15) What is wrong with following program. Find the problem with GDB and fix it.

```
int x, x1, y;
x=open( “f1” , O_RDONLY, 00777);
x1=open( “f2” , O_WRONLY|O_CREAT|O_TRUNC,00777);
char buf[512];
int cnt=0;
for(;;){
   y=read(x,buf,1);
   if (y==0) break;
   cnt++;
}
write(x1, buf, cnt);
```