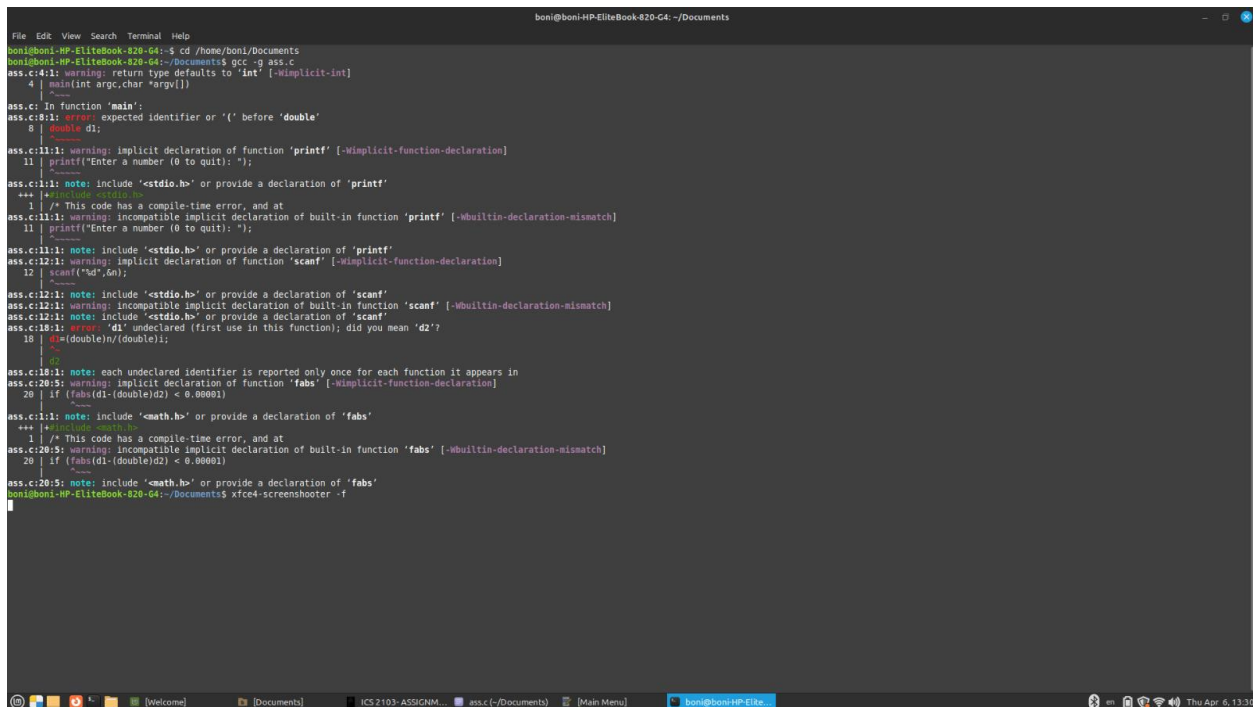


# SCT211-0010/2022

## MAURICE.M.MAINA

1.



```
File Edit View Search Terminal Help
boni@boni-HP-EliteBook-820-G4: ~/Documents
boni@boni-HP-EliteBook-820-G4:~/Documents$ gcc -g ass.c
ass.c:4:1: warning: return type defaults to 'int' [-Wimplicit-int]
  4 | main(int argc, char *argv[])
    | ~~~~~
ass.c: In function 'main':
ass.c:10:11: error: expected identifier or '(' before 'double'
     8 |     double d1;
        |     ^~~~~~
ass.c:11:1: warning: implicit declaration of function 'printf' [-Wimplicit-function-declaration]
    11 | printf("Enter a number (0 to quit): ");
        | ^~~~~
ass.c:11:1: note: include <stdio.h> or provide a declaration of 'printf'
+++
1 | /* This code has a compile-time error, and at
ass.c:11:1: warning: incompatible implicit declaration of built-in function 'printf' [-Wbuiltin-declaration-mismatch]
    11 | printf("Enter a number (0 to quit): ");
        | ^~~~~
ass.c:11:1: note: include <stdio.h> or provide a declaration of 'printf'
ass.c:12:11: warning: implicit declaration of function 'scanf' [-Wimplicit-function-declaration]
    12 | scanf("%d", &d1);
        | ^~~~~
ass.c:12:11: note: include <stdio.h> or provide a declaration of 'scanf'
ass.c:12:11: warning: incompatible implicit declaration of built-in function 'scanf' [-Wbuiltin-declaration-mismatch]
ass.c:12:11: note: include <stdio.h> or provide a declaration of 'scanf'
ass.c:13:11: error: 'd1' undeclared (first use in this function); did you mean 'd2'?
    13 |     d1=(double)n/(double)d1;
        |     ^~
ass.c:18:11: note: each undeclared identifier is reported only once for each function it appears in
ass.c:20:5: warning: implicit declaration of function 'fabs' [-Wimplicit-function-declaration]
    20 | if (fabs(d1-(double)d2) < 0.000001)
        | ^~~~~
ass.c:11:1: note: include <math.h> or provide a declaration of 'fabs'
+++
1 | /* This code has a compile-time error, and at
ass.c:20:5: warning: incompatible implicit declaration of built-in function 'fabs' [-Wbuiltin-declaration-mismatch]
    20 | if (fabs(d1-(double)d2) < 0.000001)
        | ^~~~~
ass.c:20:5: note: include <math.h> or provide a declaration of 'fabs'
boni@boni-HP-EliteBook-820-G4:~/Documents$ xfce4-screenshooter -f
```

The code will crash at line 16 because of the run time error posed when the loop is initialized with  $i = 0$  (division by zero error)

The code has a compile-time error, a missing semicolon at line 7 after the variable count declaration. Also, there is at least one run-time error, a division by zero error that will occur when  $i = 0$ .

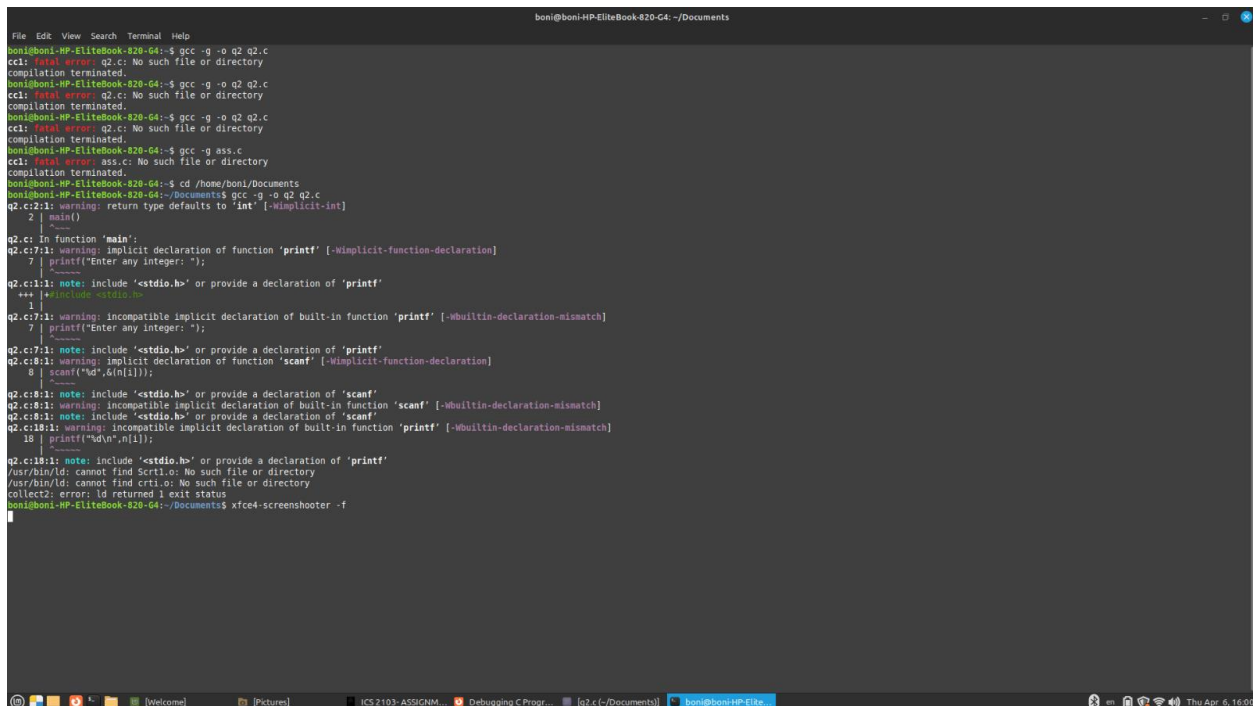
- Differentiating compile time error and run time error:

Compile-time errors are errors that occur during the compilation (translation) of the source code into machine code. They correspond to syntax of code while run-time errors are errors that occur while the program is running.

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## MAURICE.M.MAINA

### 2.



```
boni@boni-HP-EliteBook-820-G4: ~/Documents
File Edit View Search Terminal Help
boni@boni-HP-EliteBook-820-G4:~$ gcc -g -o q2 q2.c
cc1: fatal error: q2.c: No such file or directory
compilation terminated.
boni@boni-HP-EliteBook-820-G4:~$ gcc -g -o q2 q2.c
cc1: fatal error: q2.c: No such file or directory
compilation terminated.
boni@boni-HP-EliteBook-820-G4:~$ gcc -g -o q2 q2.c
cc1: fatal error: q2.c: No such file or directory
compilation terminated.
boni@boni-HP-EliteBook-820-G4:~$ gcc -g -o q2 q2.c
cc1: fatal error: q2.c: No such file or directory
compilation terminated.
boni@boni-HP-EliteBook-820-G4:~$ gcc -g -o ass.c
cc1: fatal error: ass.c: No such file or directory
compilation terminated.
boni@boni-HP-EliteBook-820-G4:~$ cd /home/boni/Documents
boni@boni-HP-EliteBook-820-G4:~/Documents$ gcc -g -o q2 q2.c
q2.c:2:1: warning: return type defaults to 'int' [-Wimplicit-int]
  2 | main()
    | ^~~~~
q2.c: In function 'main':
q2.c:7:1: warning: implicit declaration of function 'printf' [-Wimplicit-function-declaration]
  7 | printf("Enter any integer: ");
    | ^~~~~
q2.c:11:1: note: include 'stdio.h' or provide a declaration of 'printf'
 11 |
+++ |+#include <stdio.h>
    |
q2.c:7:1: warning: incompatible implicit declaration of built-in function 'printf' [-Wbuiltin-declaration-mismatch]
  7 | printf("Enter any integer: ");
    | ^~~~~
q2.c:7:1: note: include 'stdio.h' or provide a declaration of 'printf'
q2.c:8:1: warning: implicit declaration of function 'scanf' [-Wimplicit-function-declaration]
  8 | scanf("%d",&n[i]);
    | ^~~~~
q2.c:8:1: note: include 'stdio.h' or provide a declaration of 'scanf'
q2.c:8:1: warning: incompatible implicit declaration of built-in function 'scanf' [-Wbuiltin-declaration-mismatch]
  8 | scanf("%d",&n[i]);
    | ^~~~~
q2.c:10:1: warning: incompatible implicit declaration of built-in function 'printf' [-Wbuiltin-declaration-mismatch]
 10 | printf("%d\n",n[i]);
    | ^~~~~
q2.c:10:1: note: include 'stdio.h' or provide a declaration of 'printf'
/usr/bin/ld: cannot find crt1.o: No such file or directory
/usr/bin/ld: cannot find crt1.o: No such file or directory
collect2: error: ld returned 1 exit status
boni@boni-HP-EliteBook-820-G4:~/Documents$ xfce4-screenshooter -f
```

The issue with the program is a design flaw. The program is supposed to sort the list from smallest to largest each time a new number is entered. However, it is sorting from largest to smallest.

The problem is with the selection of the index of the smallest number. In the code, the index of the smallest number is being found by comparing each element of the array with the current smallest element. If an element is found that is smaller than the current smallest element, then the index of that element is stored as the index of the smallest element.

However, the swapping is being done with the current element and the smallest element. This causes the program to sort the list from largest to smallest instead of smallest to largest.

To fix this, the index of the largest element should be stored, and the swapping should be done with the current element and the largest element.

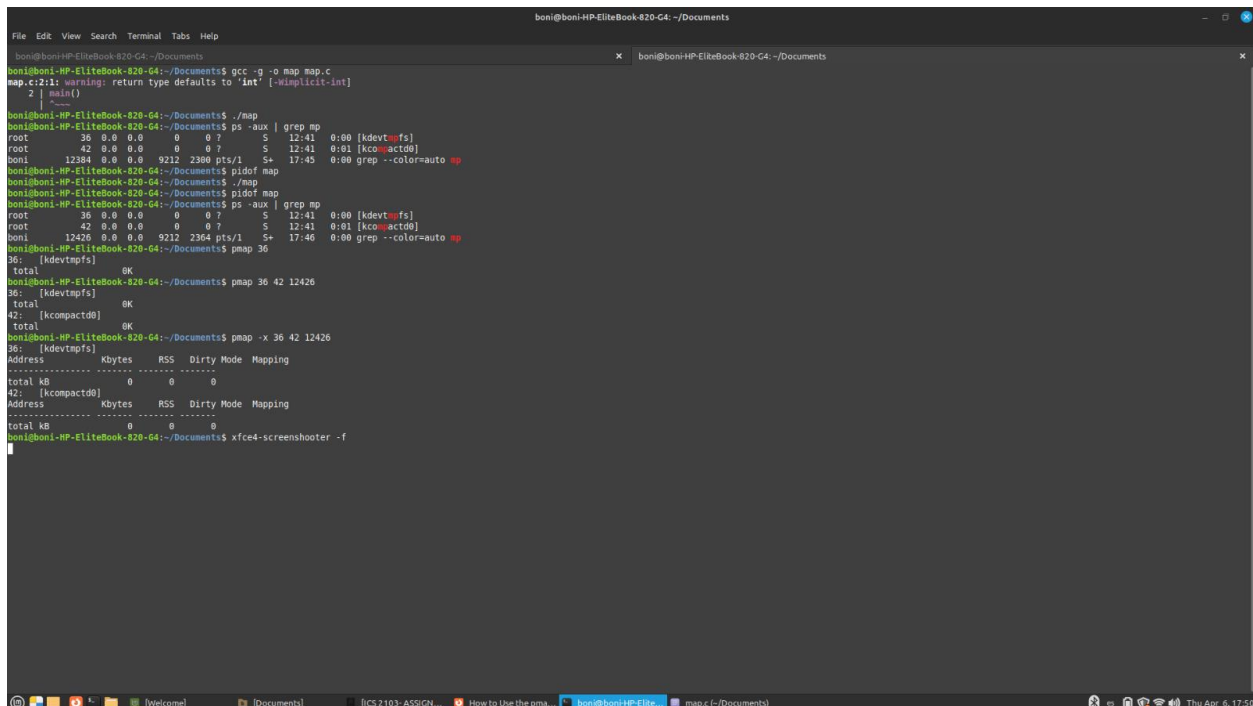
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## MAURICE.M.MAINA

3. During the writing and compiling of a program, what two steps must be taken to make use of a library

- **Include the library header files:** The library header files contain declarations for the functions, classes, or variables that are provided by the library. These declarations allow the compiler to check that the program is using the library correctly. To use a library in a program, the header files for that library must be included in the program code.
- **Link against the library:** Linking is the process of combining object files generated by the compiler into a single executable file. During the linking process, the linker must be able to find the compiled library code and link it into the program. This is usually done by specifying the library name on the command line or in the project settings of the development environment. The linker then combines the compiled code from the program with the compiled code from the library to produce the final executable file that can be run on the target system.

4.



```
boni@boni-HP-EliteBook-820-G4: ~/Documents
File Edit View Search Terminal Tabs Help
boni@boni-HP-EliteBook-820-G4: ~/Documents
boni@boni-HP-EliteBook-820-G4:~/Documents$ gcc -g -o map map.c
map.c:12:11: warning: return type defaults to 'int' [-Wimplicit-int]
    2 | main()
      | ~~~~~
boni@boni-HP-EliteBook-820-G4:~/Documents$ ./map
boni@boni-HP-EliteBook-820-G4:~/Documents$ ps -aux | grep mp
root      36  0.0  0.0      0  0  7      5  12:41  0:00 [kdevtmpfs]
root      42  0.0  0.0      0  0  7      5  12:41  0:01 [kcompactd0]
boni    12384  0.0  0.0   9212 2380 pts/1    s+   17:45  0:00 grep --color=auto mp
boni@boni-HP-EliteBook-820-G4:~/Documents$ pidof map
boni@boni-HP-EliteBook-820-G4:~/Documents$ ./map
boni@boni-HP-EliteBook-820-G4:~/Documents$ ps -aux | grep mp
root      36  0.0  0.0      0  0  7      5  12:41  0:00 [kdevtmpfs]
root      42  0.0  0.0      0  0  7      5  12:41  0:01 [kcompactd0]
boni    12426  0.0  0.0   9212 2364 pts/1    s+   17:46  0:00 grep --color=auto mp
boni@boni-HP-EliteBook-820-G4:~/Documents$ pmap 36
36:  [kdevtmpfs]
total      0K
boni@boni-HP-EliteBook-820-G4:~/Documents$ pmap 42
42:  [kcompactd0]
total      0K
boni@boni-HP-EliteBook-820-G4:~/Documents$ pmap -x 36 42 12426
36:  [kdevtmpfs]
Address      Kbytes    RSS   Dirty Mode  Mapping
-----
total kB      0      0      0
42:  [kcompactd0]
Address      Kbytes    RSS   Dirty Mode  Mapping
-----
total kB      0      0      0
boni@boni-HP-EliteBook-820-G4:~/Documents$ xfce4-screenshooter -f
```

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## MAURICE.M.MAINA

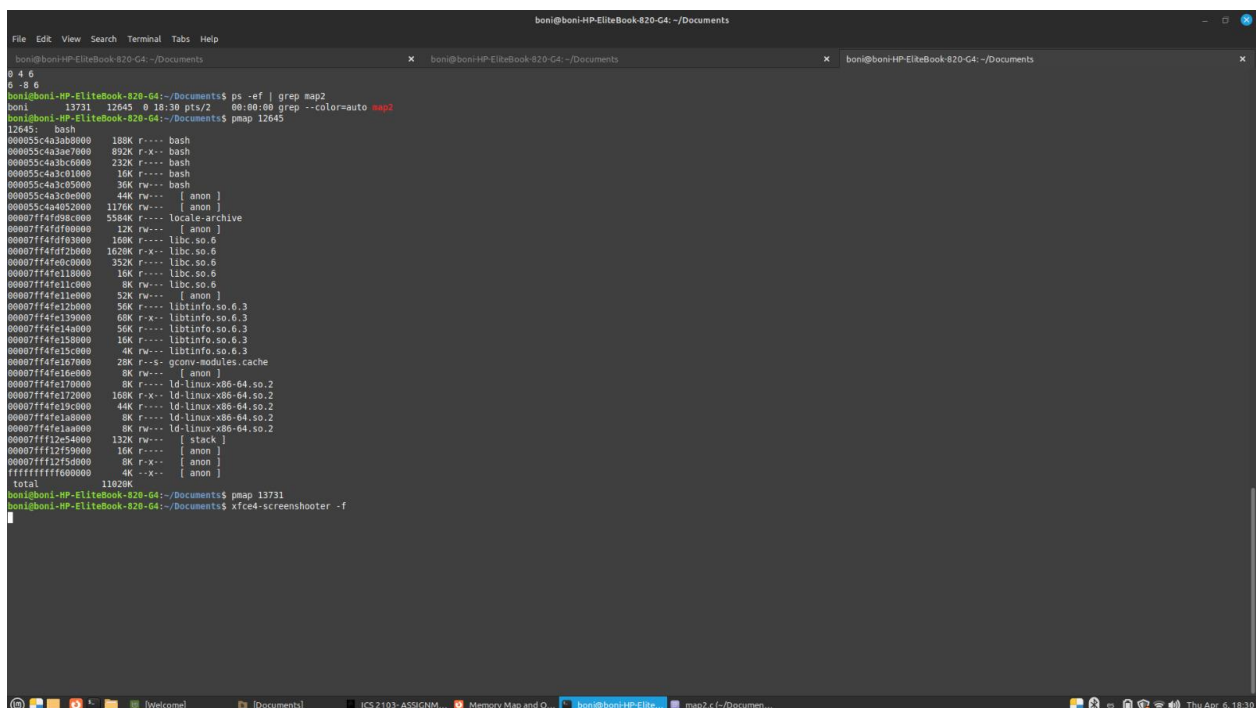
5. What is a system call? For what are system calls used?

A system call is a request made by a program or process to the operating system (OS) kernel to perform a specific task or service on behalf of the requesting process. It is a way for a program to access services provided by the underlying operating system, such as file operations, network communication, and memory management.

System calls are used to allow user programs to interact with the kernel and access system resources such as hardware devices, file systems, and network sockets. By making system calls, programs can request the kernel to perform operations on their behalf, such as opening and closing files, allocating memory, reading and writing data to files, and creating new processes.

System calls provide a standardized interface between user programs and the underlying operating system, which allows programs to be written independently of the specific hardware and software platform on which they are running.

6



```
boni@boni-HP-EliteBook-820-G4: ~/Documents
0 4 6
0 -8 6
boni@boni-HP-EliteBook-820-G4:~/Documents$ ps -ef | grep map2
boni 13731 12645 0 18:30 pts/2 00:00:00 grep --color=auto map2
boni@boni-HP-EliteBook-820-G4:~/Documents$ pmap 12645
12645: bash
000055c4a3ab0000 180K r---- bash
000055c4a3ae7000 892K r-x-- bash
000055c4a3bc0000 232K r---- bash
000055c4a3c01000 10K r---- bash
000055c4a3c05000 36K rw--- bash
000055c4a3c0e000 44K rw--- [ anon ]
000055c4a402000 1170K rw--- [ anon ]
00007ff4fd98c000 5584K r---- locale-archive
00007ff4fdff0000 12K rw--- [ anon ]
00007ff4fdff3000 160K r--- libc.so.6
00007ff4fdff2b000 1620K r-x-- libc.so.6
00007ff4fe0c0000 352K r--- libc.so.6
00007ff4fe118000 18K r--- libc.so.6
00007ff4fe11c000 8K rw--- libc.so.6
00007ff4fe11e000 52K rw--- [ anon ]
00007ff4fe12b000 52K r--- libtinfo.so.6.3
00007ff4fe139000 60K r-x-- libtinfo.so.6.3
00007ff4fe14a000 56K r--- libtinfo.so.6.3
00007ff4fe158000 18K r--- libtinfo.so.6.3
00007ff4fe15c000 4K rw--- libtinfo.so.6.3
00007ff4fe167000 28K r-s- gconv-modules.cache
00007ff4fe16e000 8K rw--- [ anon ]
00007ff4fe178000 8K r--- ld-linux-x86-64.so.2
00007ff4fe172000 160K r-x-- ld-linux-x86-64.so.2
00007ff4fe19c000 44K r--- ld-linux-x86-64.so.2
00007ff4fe1a8000 8K r--- ld-linux-x86-64.so.2
00007ff4fe1aa000 8K rw--- ld-linux-x86-64.so.2
00007ff4fe12e54000 132K rw--- [ stack ]
00007ff4fe1259000 18K r--- [ anon ]
00007ff4fe1259000 8K r-x-- [ anon ]
ffffffffff600000 4K --x-- [ anon ]
total 11020K
boni@boni-HP-EliteBook-820-G4:~/Documents$ pmap 13731
boni@boni-HP-EliteBook-820-G4:~/Documents$ xfce4-screenshooter -f
```