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LAB #4

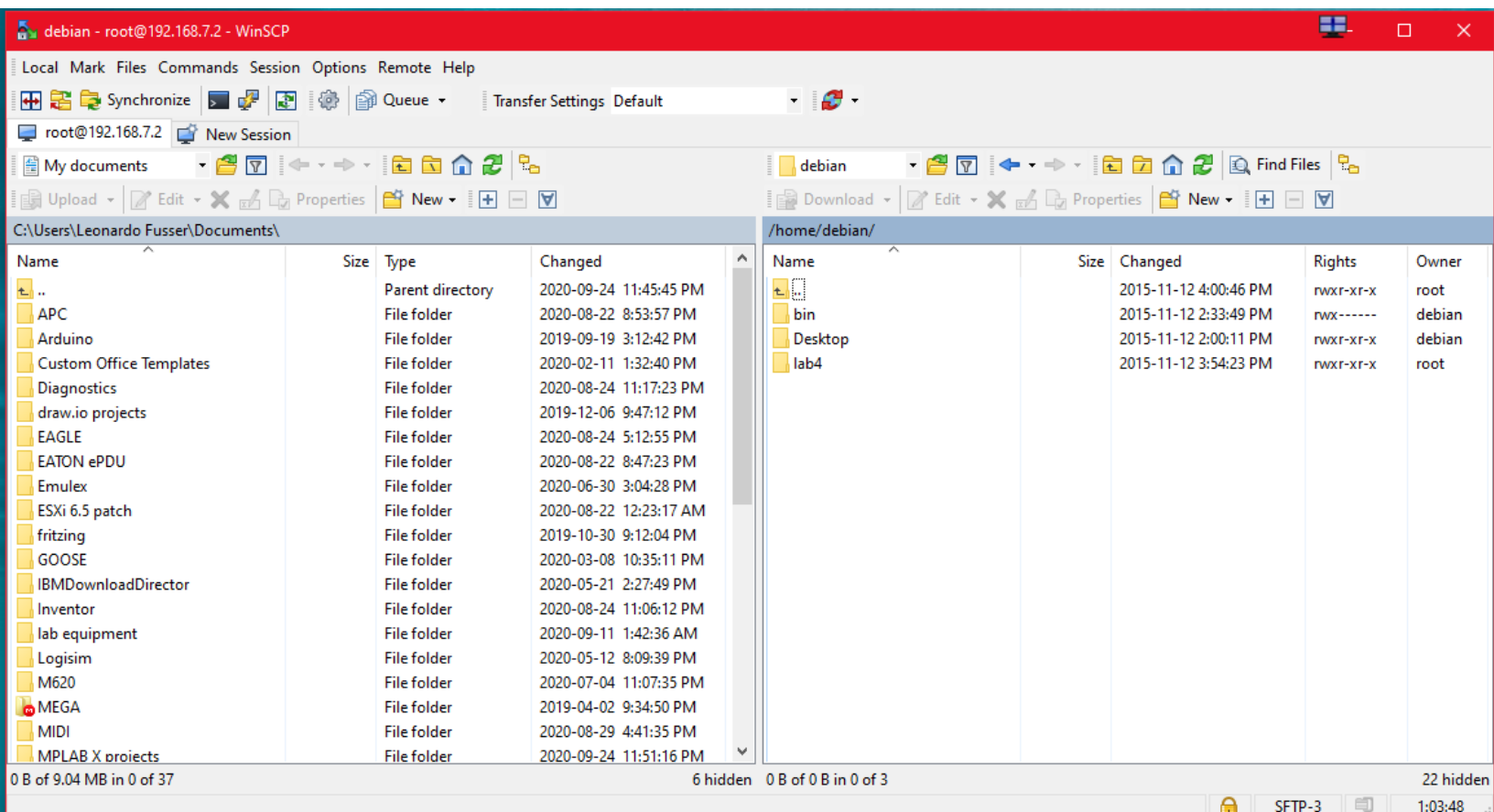
Objectives:

1. Understand better multiple file system
2. Learn and practice compilation and linking in command-line mode.
3. Learn and practice "make" and Makefile.

Procedure:

1. Get the code from the zip file and place it in an appropriate folder on your BBB

You can use psftp over SSH or WinSCP



Using WinSCP to place the code in a folder on the BBB (BBB is the right-side window)

2. Read and understand well what the code does. Is there anything missing?

This code is designed to calculate the average of test grades inputted by the user. The test grades are stored in an array and there are various functions to perform different operations (average, take grades, print grades, etc.). There are various syntax errors and the "print_grades" function is incomplete.

3. Compile with gcc and run.
4. Write the print_grades function
5. Compile with gcc and run to make sure everything works correctly.








COM6 - PuTTY

```
root@beaglebone:/home/debian/lab4# gcc -c lab4.c
root@beaglebone:/home/debian/lab4# gcc -o lab4-x lab4.o
root@beaglebone:/home/debian/lab4# ls
lab4.c  lab4.o  lab4-x
root@beaglebone:/home/debian/lab4# ./lab4-x
how many students do you have:3
enter a grade:20
enter a grade:15
enter a grade:12
20
15
12
you have 3 students
the average grade is 15.67
root@beaglebone:/home/debian/lab4#
```



Compiling and executing the code through the executable created (lab4-x) ("print_grades" function complete - shown here)

6. Create a new folder and copy the program in it.

/home/debian/lab4/

Name	Size	Changed	Rights	Owner
 		2015-11-12 2:00:06 PM	rw-r--r--	debian
 lab4.c	1 KB	2015-11-12 3:43:30 PM	rw-r--r--	root
 lab4.o	3 KB	2015-11-12 3:54:01 PM	rw-r--r--	root
 lab4-x	6 KB	2015-11-12 3:54:23 PM	rw-r--r--	root

0 B of 8.96 KB in 0 of 3

 SFTP-3  0:59:05

Program copied into a new folder on the BBB (in /home/Debian/)

7. Brake the file into multiple files.

- file1. Main file
- file2. add average functions
- file3. read_grades print_grades functions

8. Compile now with the intermediary step of object files and linking.



COM6 - PuTTY

```
root@beaglebone:/home/debian/lab4# gcc -c Functions_1.c
root@beaglebone:/home/debian/lab4# gcc -c Functions_2.c
root@beaglebone:/home/debian/lab4# gcc -c lab4_main.c
root@beaglebone:/home/debian/lab4# ls
Functions_1.c  Functions_1.o  Functions_2.h  lab4_main.c
Functions_1.h  Functions_2.c  Functions_2.o  lab4_main.o
root@beaglebone:/home/debian/lab4#
```

Program split into different files and each are compiled afterwards

9. Create a different file name for your executable file. Run and make sure all is good.



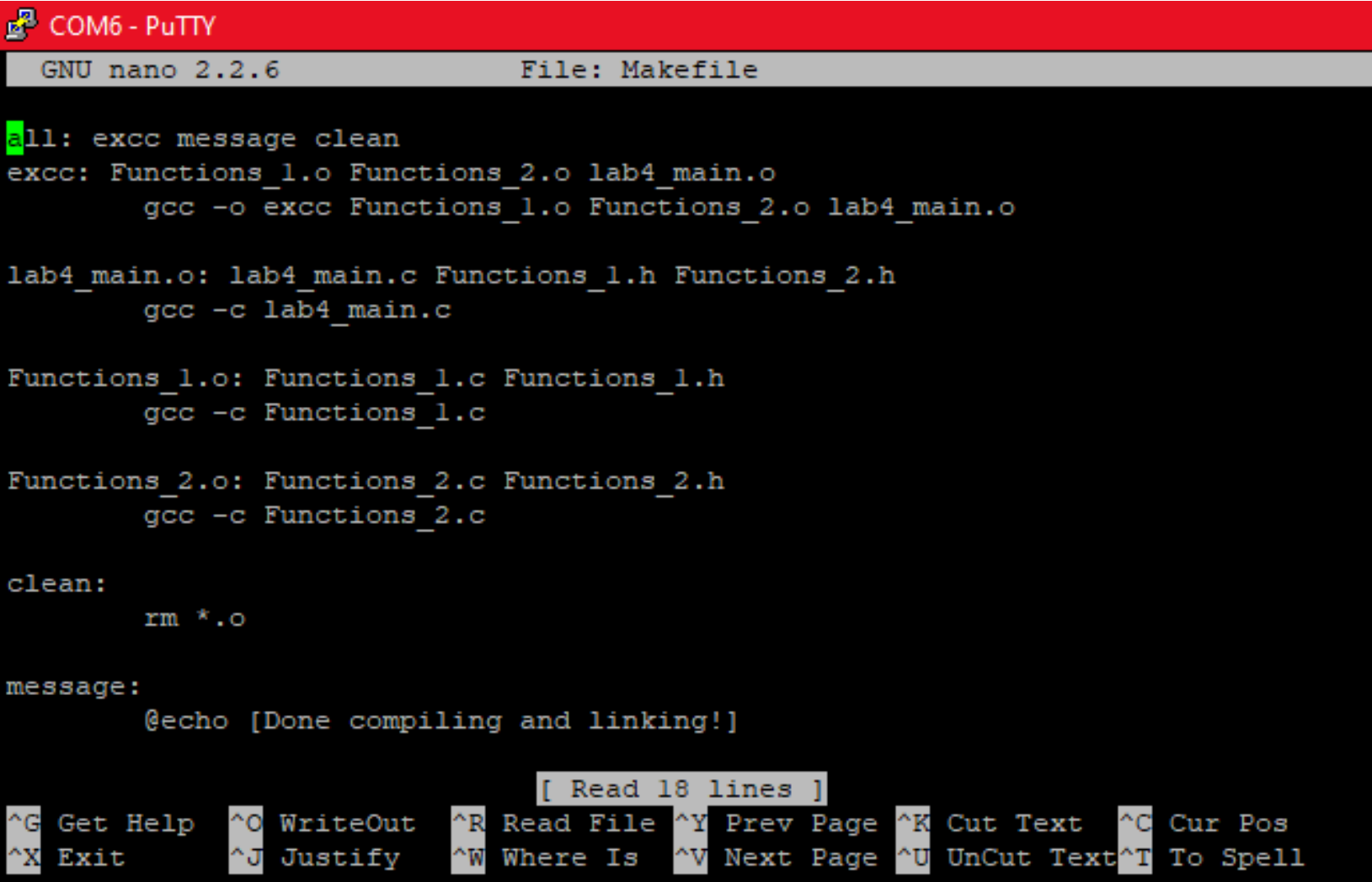
COM6 - PuTTY

```
main.oeaglebone:/home/debian/lab4# gcc -o excc Functions_1.o Functions_2.o lab4_m
root@beaglebone:/home/debian/lab4# ls
excc          Functions_1.h  Functions_2.c  Functions_2.o  lab4_main.o
Functions_1.c  Functions_1.o  Functions_2.h  lab4_main.c
root@beaglebone:/home/debian/lab4# ./excc
How many students do you have?: 3
Enter a grade: 10
Enter a grade: 12
Enter a grade: 11
10
12
11
You have 3 students.
The average grade is 11.00
root@beaglebone:/home/debian/lab4#
```

Executable created ("excc") and program is run

10. Make your Makefile including:

- a. An all target
- b. A clean target
- c. A message target



```
COM6 - PuTTY
GNU nano 2.2.6      File: Makefile

all: excc message clean
excc: Functions_1.o Functions_2.o lab4_main.o
    gcc -o excc Functions_1.o Functions_2.o lab4_main.o

lab4_main.o: lab4_main.c Functions_1.h Functions_2.h
    gcc -c lab4_main.c

Functions_1.o: Functions_1.c Functions_1.h
    gcc -c Functions_1.c

Functions_2.o: Functions_2.c Functions_2.h
    gcc -c Functions_2.c

clean:
    rm *.o

message:
    @echo [Done compiling and linking!]
```

[Read 18 lines]

^G Get Help	^O WriteOut	^R Read File	^Y Prev Page	^K Cut Text	^C Cur Pos
^X Exit	^J Justify	^W Where Is	^V Next Page	^U UnCut Text	^T To Spell

Makefile created with all targets, clean and message

11. Test the functionality of your make file.

```
COM6 - PuTTY
root@beaglebone:/home/debian/lab4# make
make: Warning: File `Functions_1.c' has modification time 1.5e+08 s in the future
gcc -c Functions_1.c
gcc -c Functions_2.c
gcc -c lab4_main.c
gcc -o excc Functions_1.o Functions_2.o lab4_main.o
[Done compiling and linking!]
rm *.o
make: warning: Clock skew detected. Your build may be incomplete.
root@beaglebone:/home/debian/lab4#
root@beaglebone:/home/debian/lab4#
root@beaglebone:/home/debian/lab4#
root@beaglebone:/home/debian/lab4#
root@beaglebone:/home/debian/lab4# ls
excc      Functions_1.h  Functions_2.h  Makefile
Functions_1.c  Functions_2.c  lab4_main.c
root@beaglebone:/home/debian/lab4#
root@beaglebone:/home/debian/lab4#
root@beaglebone:/home/debian/lab4#
root@beaglebone:/home/debian/lab4#
root@beaglebone:/home/debian/lab4# ./excc
How many students do you have?: 3
Enter a grade: 6
Enter a grade: 5
Enter a grade: 4
6
5
4
You have 3 students!
The average grade is 5.00
root@beaglebone:/home/debian/lab4#
```

Makefile tested (by calling command "make"), all ".o" files are removed and program is run (using "excc" executable created earlier)

12. Demo

Approved by Manijeh Khataie on the 30th of September, 2020