FALL 2019 - Group 5Pis
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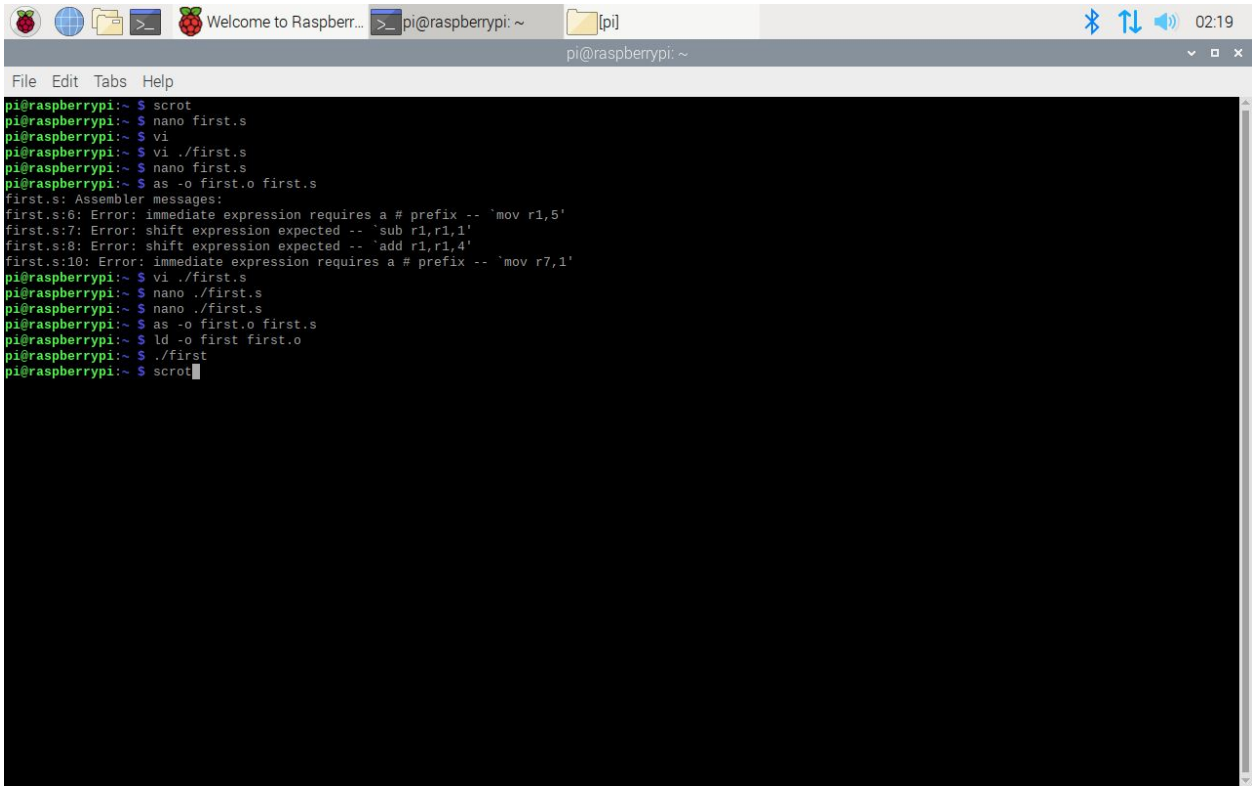
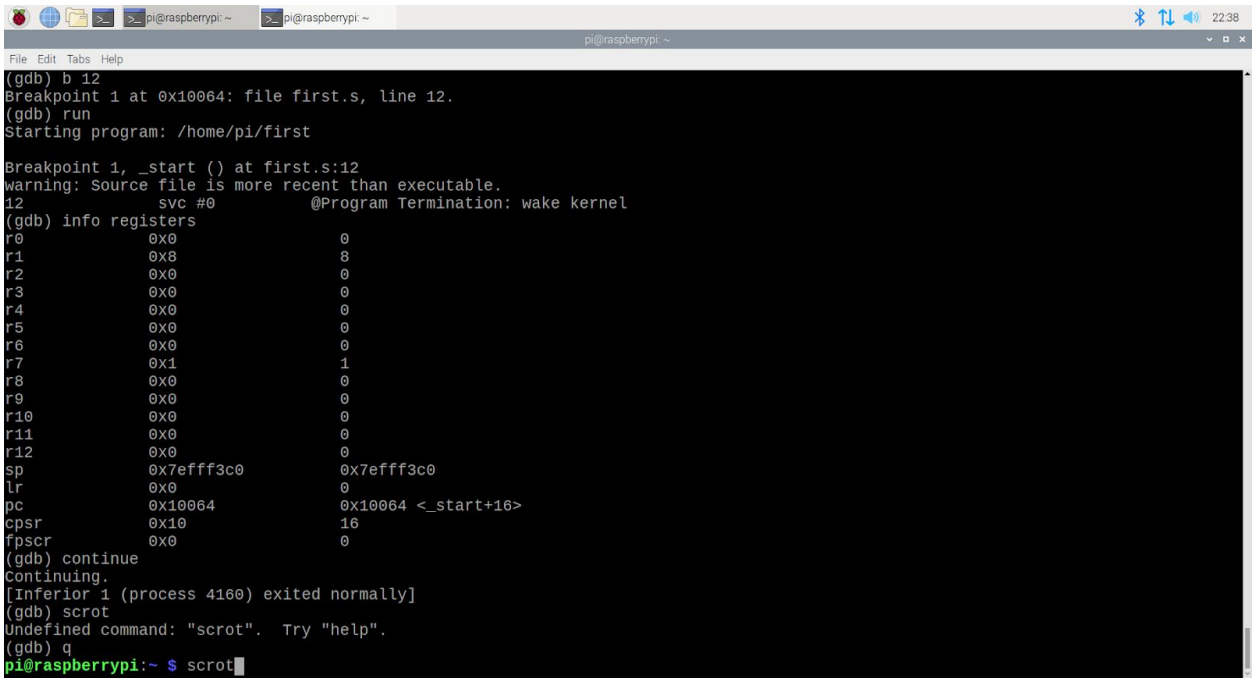
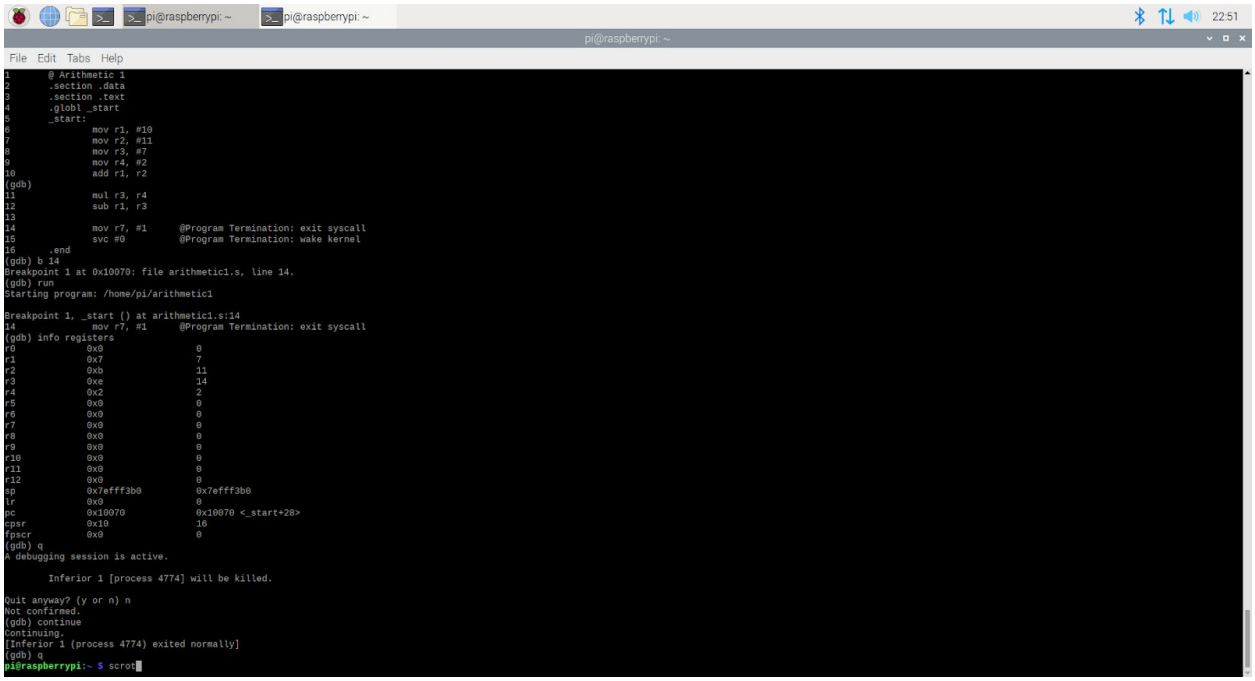
ARM Assembly Report

The assembly program was decently simple. In order to write the first program given to us, we had to open the nano text editor. We typed it and wrote the file out. We assembled it into an objective file and linked it to an executable using as -o ./first.o ./first.s and ld -g -o ./first ./first.o, respectively. We used the GDB GNU to debug the program and then set a breakpoint and ran the program. It didn't print anything because there wasn't anything to print. We found the info of the registers and checked that the register contained the correct value. Next, we did the arithmetic file. We assigned 10 to r1, 11 to r2, 7 to r3, and 2 to r4. We had to do the parentheses first, and have the value being updated come before the value being added/subtracted/multiplied to. For example, A + B would be add r1, r2. The value of r2 goes into r1, but r2 still stays the same. We completed the code, assembled it, linked it, debugged it, and ran it the same way as we did with the program first.

Screenshots below


Welcome to Raspberr...
pi@raspberrypi: ~
[pi]
02:19
pi@raspberrypi: ~
File Edit Tabs Help
pi@raspberrypi:~ $ scrot
pi@raspberrypi:~ $ nano first.s
pi@raspberrypi:~ $ vi
pi@raspberrypi:~ $ vi ./first.s
pi@raspberrypi:~ $ nano first.s
pi@raspberrypi:~ $ as -o first.o first.s
first.s: Assembler messages:
first.s:6: Error: immediate expression requires a # prefix -- `mov r1,5'
first.s:7: Error: shift expression expected -- `sub r1,r1,1'
first.s:8: Error: shift expression expected -- `add r1,r1,4'
first.s:10: Error: immediate expression requires a # prefix -- `mov r7,1'
pi@raspberrypi:~ $ vi ./first.s
pi@raspberrypi:~ $ nano ./first.s
pi@raspberrypi:~ $ nano ./first.s
pi@raspberrypi:~ $ as -o first.o first.s
pi@raspberrypi:~ $ ld -o first first.o
pi@raspberrypi:~ $ ./first
pi@raspberrypi:~ $ scrot


pi@raspberrypi: ~
pi@raspberrypi: ~
22:38
pi@raspberrypi: ~
File Edit Tabs Help
(gdb) b 12
Breakpoint 1 at 0x10064: file first.s, line 12.
(gdb) run
Starting program: /home/pi/first
Breakpoint 1, _start () at first.s:12
warning: Source file is more recent than executable.
12 svc #0 @Program Termination: wake kernel
(gdb) info registers
r0 0x0 0
r1 0x8 8
r2 0x0 0
r3 0x0 0
r4 0x0 0
r5 0x0 0
r6 0x0 0
r7 0x1 1
r8 0x0 0
r9 0x0 0
r10 0x0 0
r11 0x0 0
r12 0x0 0
sp 0x7efff3c0 0x7efff3c0
lr 0x0 0
pc 0x10064 0x10064 <_start+16>
cpsr 0x10 16
fpscr 0x0 0
(gdb) continue
Continuing.
[Inferior 1 (process 4160) exited normally]
(gdb) scrot
Undefined command: "scrot". Try "help".
(gdb) q
pi@raspberrypi:~ $ scrot


pi@raspberrypi: ~
pi@raspberrypi: ~
22:51
pi@raspberrypi: ~
File Edit Tabs Help
1 @ Arithmetic 1
2 .section .data
3 .section .text
4 .globl _start
5 _start:
6 mov r1, #10
7 mov r2, #11
8 mov r3, #7
9 mov r4, #2
10 add r1, r2
(gdb)
11 mul r3, r4
12 sub r1, r3
13
14 mov r7, #1 @Program Termination: exit syscall
15 svc #0 @Program Termination: wake kernel
16 .end
(gdb) b 14
Breakpoint 1 at 0x10070: file arithmetic1.s, line 14.
(gdb) run
Starting program: /home/pi/arithmetic1
Breakpoint 1, _start () at arithmetic1.s:14
14 mov r7, #1 @Program Termination: exit syscall
(gdb) info registers
r0 0x0 0
r1 0x7 7
r2 0xb 11
r3 0xe 14
r4 0x2 2
r5 0x0 0
r6 0x0 0
r7 0x0 0
r8 0x0 0
r9 0x0 0
r10 0x0 0
r11 0x0 0
r12 0x0 0
sp 0x7efff3b0 0x7efff3b0
lr 0x0 0
pc 0x10070 0x10070 <_start+28>
cpsr 0x10 16
fpscr 0x0 0
(gdb) q
A debugging session is active.
Inferior 1 [process 4774] will be killed.
Quit anyway? (y or n) n
Not confirmed.
(gdb) continue
Continuing.
[Inferior 1 (process 4774) exited normally]
(gdb) q
pi@raspberrypi:~ $ scrot