COS10004: Computer Systems

Lab 8

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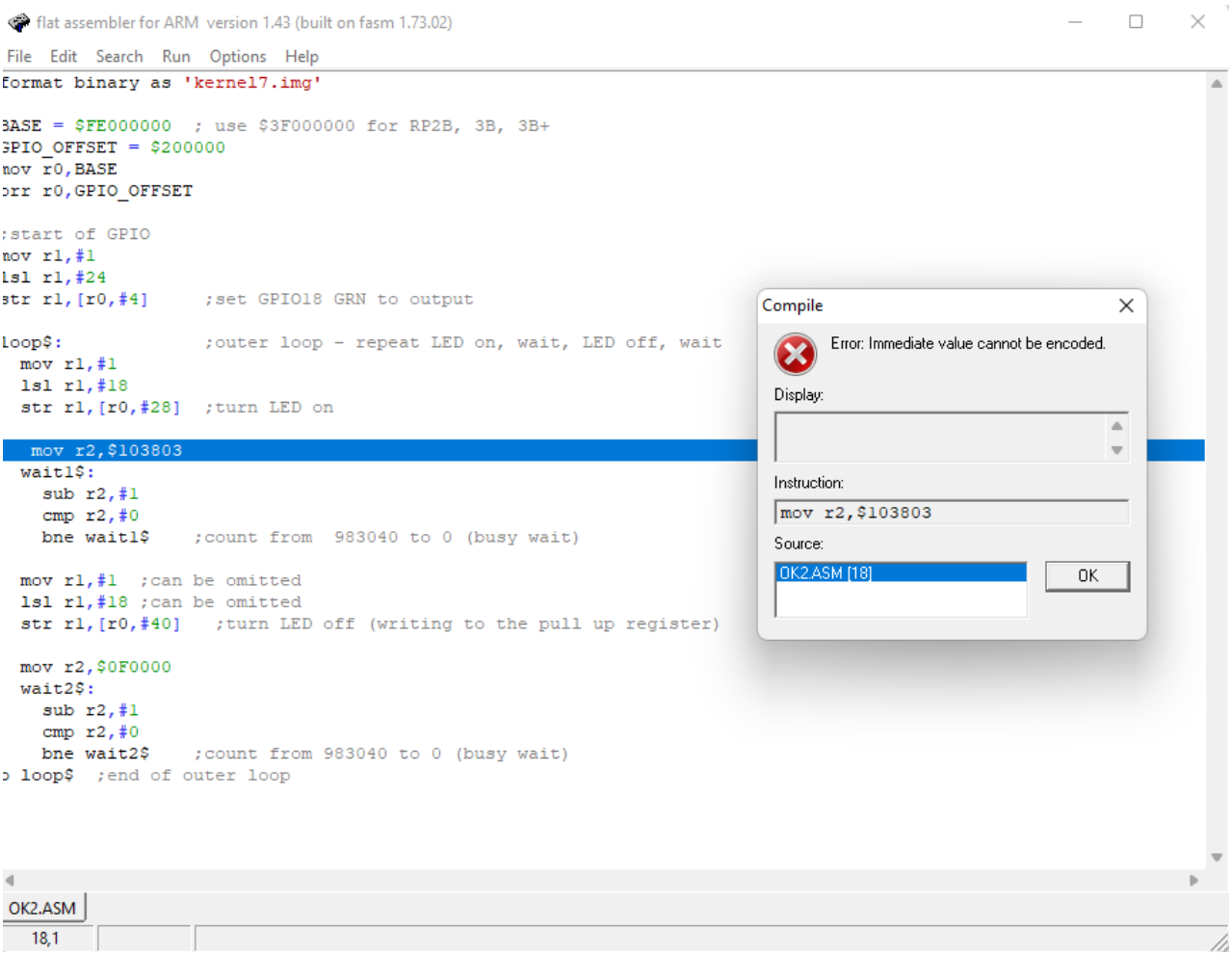
Timers

6. Try compiling and see the error message that comes back.



7. Convert your student number to Hexadecimal and enter it in your submission document.

#103803 = $1957 (1957B)

8.1. Why does MOV only work with numbers with 24 bits set to 0 ? Because only 8 bits contains value that need to move. While 20 bits are used for op-code, 4 other bits left used for a the ROR, both used for barrel shifter.

8.2. How can MOV still be used for numbers that do not satisfy this ? 64bit and 84bit mov instructions that can use more bits to store the number value to move.

8.3. Identify the three bytes (as hex digits) needed to construct your student number and write the code to load the entire number into a register.

Code:

flat assembler for ARM version 1.43 (built on fasm 1.73.02)

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```
format binary as 'kernel7.img'

BASE = $FE000000  ; use $3F000000 for RP2B, 3B, 3B+
GPIO_OFFSET = $200000
mov r0,BASE
orr r0,GPIO_OFFSET

;start of GPIO
mov r1,#1
lsl r1,#24
str r1,[r0,#4]      ;set GPIO18 GRN to output

loop$:              ;outer loop - repeat LED on, wait, LED off, wait
  mov r1,#1
  lsl r1,#18
  str r1,[r0,#28]   ;turn LED on

   mov r2,$195
  wait1$:
    sub r2,#1
    cmp r2,#0
    bne wait1$    ;count from  983040 to 0 (busy wait)

  mov r1,#1  ;can be omitted
  lsl r1,#18 ;can be omitted
  str r1,[r0,#40]   ;turn LED off (writing to the pull up register)

  mov r2,$0F0000
  wait2$:
    sub r2,#1
    cmp r2,#0
    bne wait2$    ;count from 983040 to 0 (busy wait)
b loop$  ;end of outer loop
```

OK2.ASM

18,4 Modified

Some Patterned LED Flashing

```
format binary as 'kernel7.img'

BASE = $FE000000  ; use $3F000000 for RP2B, 3B, 3B+
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    sub r2,#1
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  mov r1,#1  ;can be omitted
  lsl r1,#18 ;can be omitted
  str r1,[r0,#40]   ;turn LED off (writing to the pull up register)

  mov r2,$0F0000
```

```
  wait2$:
    sub r2,#1
    cmp r2,#0
    bne wait2$    ;count from 983040 to 0 (busy wait)
b loop$  ;end of outer loop
```