

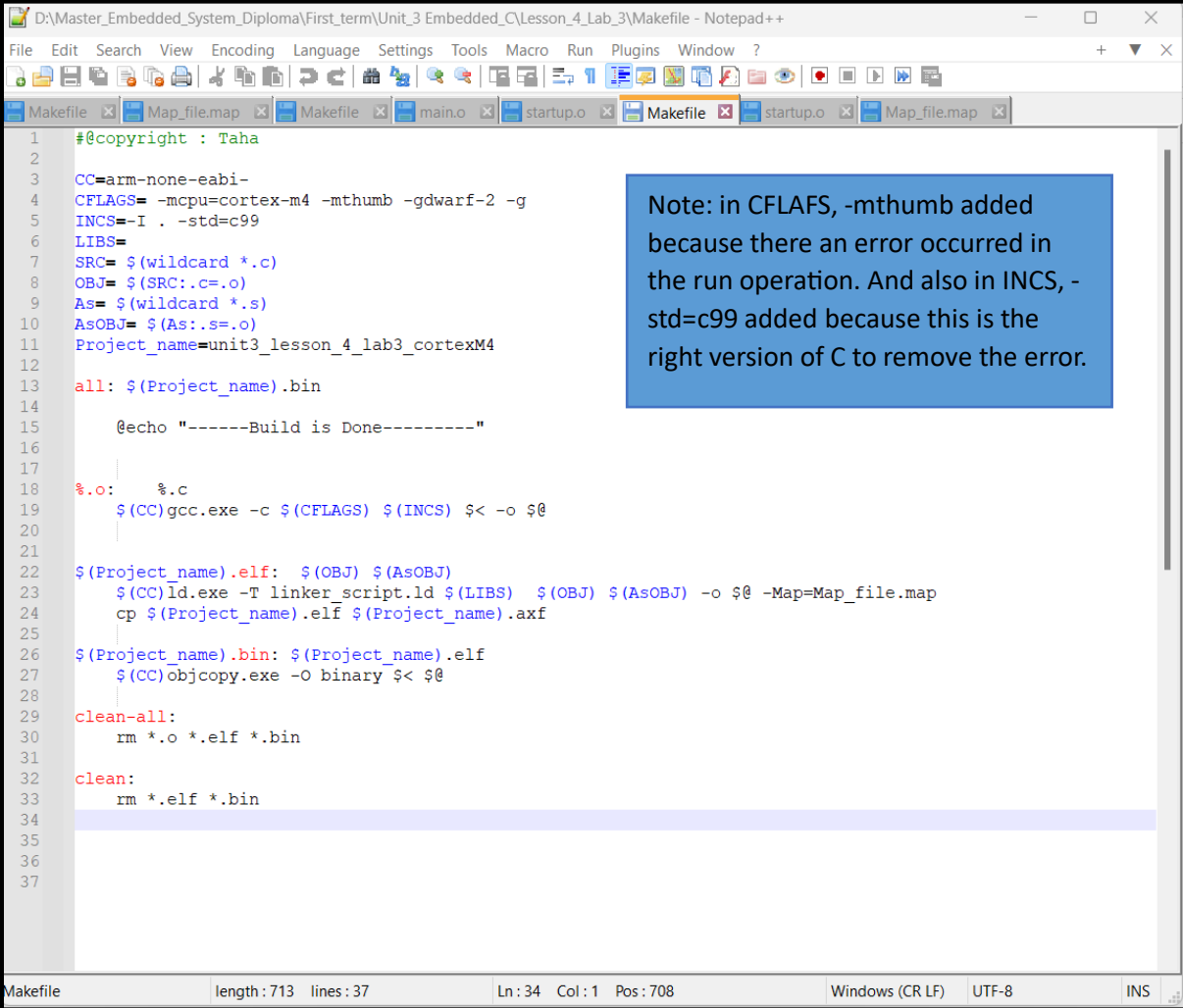
Embedded_C_Lesson_4

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Lab-3 Assignment

1- Makefile of lab-1



```
1  #@copyright : Taha
2
3  CC=arm-none-eabi-
4  CFLAGS= -mcpu=cortex-m4 -mthumb -gdwarf-2 -g
5  INCS=-I . -std=c99
6  LIBS=
7  SRC= $(wildcard *.c)
8  OBJ= $(SRC:.c=.o)
9  AS= $(wildcard *.s)
10 AsOBJ= $(AS:.s=.o)
11 Project_name=unit3_lesson_4_lab3_cortexM4
12
13 all: $(Project_name).bin
14
15     @echo "-----Build is Done-----"
16
17 %.o: %.c
18     $(CC)gcc.exe -c $(CFLAGS) $(INCS) $< -o $@
19
20
21
22 $(Project_name).elf: $(OBJ) $(AsOBJ)
23     $(CC)ld.exe -T linker_script.ld $(LIBS) $(OBJ) $(AsOBJ) -o $@ -Map=Map_file.map
24     cp $(Project_name).elf $(Project_name).axf
25
26 $(Project_name).bin: $(Project_name).elf
27     $(CC)objcopy.exe -O binary $< $@
28
29 clean-all:
30     rm *.o *.elf *.bin
31
32 clean:
33     rm *.elf *.bin
34
35
36
37
```

Note: in CFLAGS, -mthumb added because there an error occurred in the run operation. And also in INCS, -std=c99 added because this is the right version of C to remove the error.

Makefile length: 713 lines: 37 Ln: 34 Col: 1 Pos: 708 Windows (CR LF) UTF-8 INS

2- Linker_script.ld

```

1  /* linker_script CortexM3
2  Taha Mohamed
3  */
4
5  MEMORY
6  {
7  flash(RX) : ORIGIN = 0x00000000, LENGTH = 512M
8  sram(RWX) : ORIGIN = 0x20000000, LENGTH = 512M
9  }
10
11  SECTIONS
12  {
13      .text : {
14          *(.vectors*)
15          *(.text*)
16          *(.rodata*)
17          _E_text = . ;
18      }> flash
19      .data : {
20          _S_DATA = . ;
21          *(.data)
22          _E_DATA = . ;
23      }> sram AT> flash
24      .bss : {
25          _S_bss = . ;
26          *(.bss*)
27          . = ALIGN(4);
28          _E_bss = . ;
29      }> sram
30  }

```

3- Run/Debug

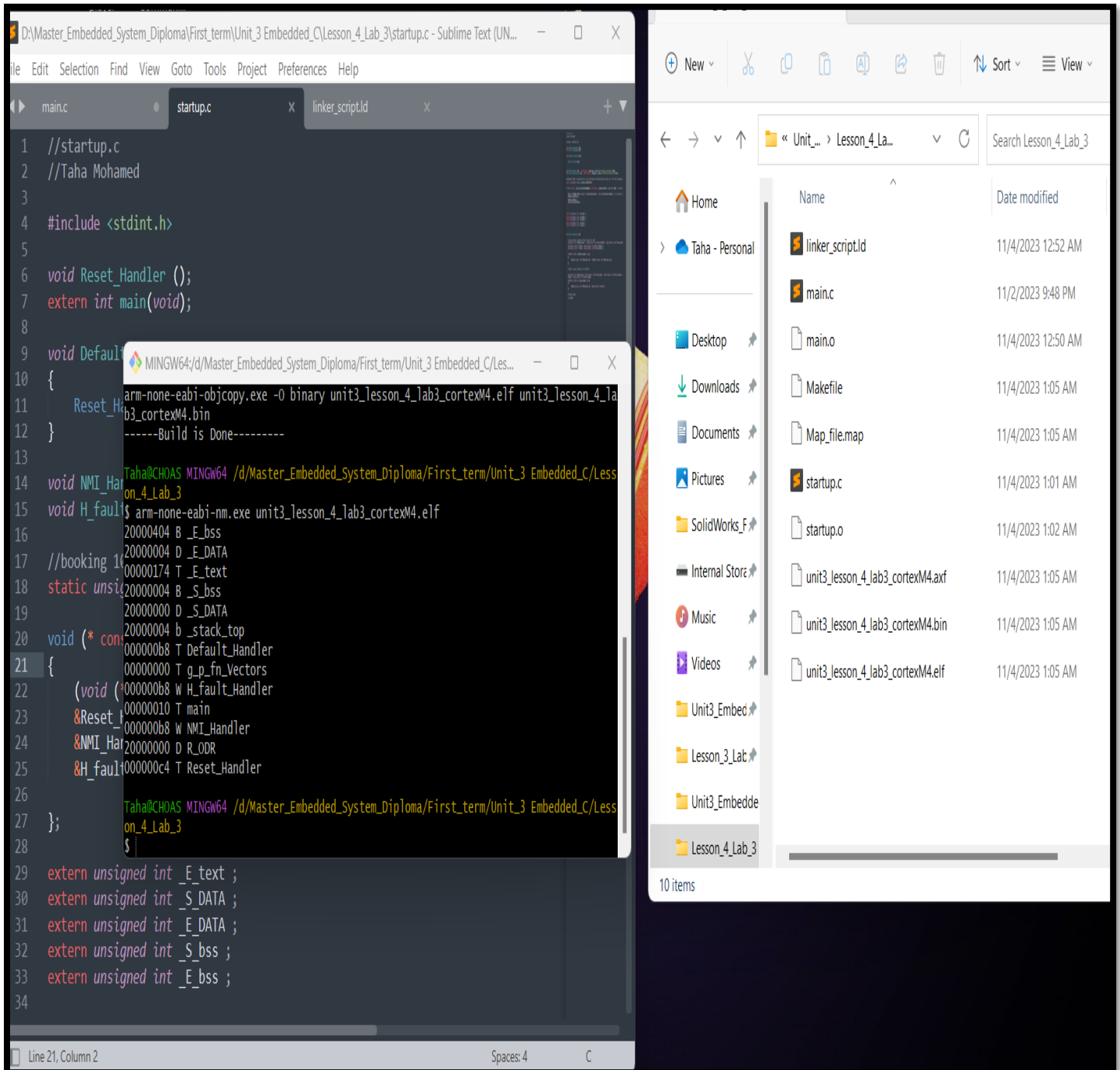
The screenshot shows the Keil uVision IDE with the main.c file open. The main function is being debugged, and the registers window shows the current state of the processor. The command window shows the execution of the program. The hardware window shows the connection to the target device.

```

1  // Learn-in-depth
2  // Eng. Taha Mohamed
3
4
5  #define SYSCFG_RCGC2_R (*(volatile unsigned long*)0x400FE108)
6  #define GPIO_PORTF_DIR_R (*(volatile unsigned long*)0x40025400)
7  #define GPIO_PORTF_DEN_R (*(volatile unsigned long*)0x4002551C)
8  #define GPIO_PORTF_DATA_R (*(volatile unsigned long*)0x400253FC)
9
10
11 int main()
12 {
13     volatile unsigned long delay_count;
14     SYSCFG_RCGC2_R = 0x20;
15     // delay to make GPIO is up and running
16
17     for(delay_count = 0; delay_count < 200; delay_count ++);
18     GPIO_PORTF_DIR_R |= 1<<3; //Dir is output for pin 3 port F
19     GPIO_PORTF_DEN_R |= 1<<3;
20     while(1)
21     {
22         GPIO_PORTF_DATA_R |= 1<<3;
23         for(delay_count = 0; delay_count < 200000; delay_count ++);
24         GPIO_PORTF_DATA_R &= ~(1<<3);
25         for(delay_count = 0; delay_count < 200000; delay_count ++);

```

4- Text file showing symbols of each object



5- Startup.c

```

1 //startup.c
2 //Taha Mohamed
3
4 #include <stdint.h>
5
6 void Reset_Handler();
7 extern int main(void);
8
9 void Default_Handler()
10 {
11     Reset_Handler();
12 }
13
14 void NMI_Handler () __attribute__((weak, alias ("Default_Handler")));
15 void H_fault_Handler () __attribute__((weak, alias ("Default_Handler")));
16
17 //booking 1024 B located by .bss through uninitialized array of int 256 element
18 static unsigned long _stack_top[256];
19
20 void (* const g_p_fn_Vectors[])()__attribute__((section(".vectors"))) = //arra
21 {
22     (void (*)()) ((unsigned long)_stack_top + sizeof(_stack_top)), // casting i
23     &Reset_Handler,
24     &NMI_Handler,
25     &H_fault_Handler,
26 };
27
28
29 extern unsigned int _E_text ;
30 extern unsigned int _S_DATA ;
31 extern unsigned int _E_DATA ;
32 extern unsigned int _S_bss ;
33 extern unsigned int _E_bss ;
34

```

6- Map_file

```

1
2
3 Memory Configuration
4
5 Name      Origin      Length      Attributes
6 flash     0x00000000    0x20000000    xr
7 sram      0x20000000    0x20000000    xrw
8 *default* 0x00000000    0xffffffff
9
10 Linker script and memory map
11
12 .text      0x00000000    0x194
13 *(.vectors*)
14 .vectors   0x00000000    0x10 startup.o
15          0x00000000    g_p_fn_Vectors
16
17 *(.text*)
18 .text      0x00000010    0xc8 main.o
19          0x00000010    main
20 .text      0x000000d8    0xbc startup.o
21          0x000000d8    H_fault_Handler
22          0x000000d8    Default_Handler
23          0x000000d8    NMI_Handler
24          0x000000e4    Reset_Handler
25
26 *(.rodata*)
27          0x00000194    _E_text = .
28
29 .glue_7    0x00000194    0x0
30 .glue_7    0x00000000    0x0 linker stubs
31
32 .glue_7t   0x00000194    0x0
33 .glue_7t   0x00000000    0x0 linker stubs
34
35 .vfp11_veneer 0x00000194    0x0
36 .vfp11_veneer 0x00000000    0x0 linker stubs
37
38 .v4_bx     0x00000194    0x0
39 .v4_bx     0x00000000    0x0 linker stubs
40
41 .iplt      0x00000194    0x0
42 .iplt      0x00000000    0x0 main.o
43

```