

- Main.o sections

```

MINGW64:/d/Courses/programming/NOW/EmbeddedSystems/NOW/DIPLOMAS/KSESDiploma/5.Assignments/Unit 3 (Embedded C)/Lecture 4/Assignment 1 (toggle led using tiva c in keil)/source code (master)
$ arm-none-eabi-objdump.exe -h main.o
main.o:      file format elf32-littlearm

Sections:
Idx Name          Size      VMA           LMA           File off  Algn
0 .text            0000000c  00000000  00000000  00000034  2**2
CONTENTS, ALLOC, LOAD, READONLY, CODE
1 .data            00000004  00000000  00000000  000000c0  2**2
CONTENTS, ALLOC, LOAD, DATA
2 .bss             00000000  00000000  00000000  000000c4  2**0
ALLOC
3 .rodata          00000004  00000000  00000000  000000c4  2**2
CONTENTS, ALLOC, LOAD, READONLY, DATA
4 .debug_info      000000a3  00000000  00000000  000000c8  2**0
CONTENTS, RELOC, READONLY, DEBUGGING
5 .debug_abbrev    0000000c  00000000  00000000  0000016b  2**0
CONTENTS, READONLY, DEBUGGING
6 .debug_loc       00000038  00000000  00000000  000001f7  2**0
CONTENTS, READONLY, DEBUGGING
7 .debug_aranges   00000020  00000000  00000000  0000022f  2**0
CONTENTS, RELOC, READONLY, DEBUGGING
8 .debug_line      00000063  00000000  00000000  0000024f  2**0
CONTENTS, RELOC, READONLY, DEBUGGING
9 .debug_str       0000011f  00000000  00000000  000002b2  2**0
CONTENTS, READONLY, DEBUGGING
10 .comment         0000007f  00000000  00000000  000003d1  2**0
CONTENTS, READONLY
11 .debug_frame     0000002c  00000000  00000000  00000450  2**2
CONTENTS, RELOC, READONLY, DEBUGGING
12 .ARM.attributes 00000033  00000000  00000000  0000047c  2**0
CONTENTS, READONLY

```

- Startup.o sections

```

abdul@Administrator MINGW64 /d/Courses/programming/NOW/EmbeddedSystems/NOW/DIPLOMAS/KSESDiploma/5.Assignments/Unit 3 (Embedded C)/Lecture 4/Assignment 1 (toggle led using tiva c in keil)/source code (master)
$ arm-none-eabi-objdump.exe -h startup.o
startup.o:    file format elf32-littlearm

Sections:
Idx Name          Size      VMA           LMA           File off  Algn
0 .text            00000090  00000000  00000000  00000034  2**2
CONTENTS, ALLOC, LOAD, RELOC, READONLY, CODE
1 .data            00000000  00000000  00000000  000000c4  2**0
CONTENTS, ALLOC, LOAD, DATA
2 .bss             00000400  00000000  00000000  000000c4  2**2
ALLOC
3 .vectors         0000001c  00000000  00000000  000000c4  2**2
CONTENTS, ALLOC, LOAD, RELOC, READONLY, DATA
4 .debug_info      00000181  00000000  00000000  000000e0  2**0
CONTENTS, RELOC, READONLY, DEBUGGING
5 .debug_abbrev    000000da  00000000  00000000  00000261  2**0
CONTENTS, READONLY, DEBUGGING
6 .debug_loc       0000007c  00000000  00000000  0000033b  2**0
CONTENTS, READONLY, DEBUGGING
7 .debug_aranges   00000020  00000000  00000000  000003b7  2**0
CONTENTS, RELOC, READONLY, DEBUGGING
8 .debug_line      00000067  00000000  00000000  000003d7  2**0
CONTENTS, RELOC, READONLY, DEBUGGING
9 .debug_str       00000190  00000000  00000000  0000043e  2**0
CONTENTS, READONLY, DEBUGGING
10 .comment         0000007f  00000000  00000000  000005ce  2**0
CONTENTS, READONLY
11 .debug_frame     00000050  00000000  00000000  00000650  2**2
CONTENTS, RELOC, READONLY, DEBUGGING
12 .ARM.attributes 00000033  00000000  00000000  000006a0  2**0
CONTENTS, READONLY

```

- Tiva\_c.elf sections

```

abdu1@Administrator MINGW64 /d/Courses/programming/NOW/EmbeddedSystems/Now/DIPLO
MAS/KSESDiploma/5.Assignments/Unit 3 (Embedded C)/Lecture 4/Assignment 1 (toggle
led using tiva c in keil)/source code (master)
$ arm-none-eabi-objdump.exe -h tiva_c.elf
tiva_c.elf: file format elf32-littlearm

sections:
Idx Name          Size      VMA       LMA       File off  Algn
0  .text          0000013c  00000000  00000000  00010000  2**2
CONTENTS, ALLOC, LOAD, READONLY, CODE
1  .data          00000004  20000000  0000013c  00020000  2**2
CONTENTS, ALLOC, LOAD, DATA
2  .bss           00000404  20000004  00000140  00020004  2**2
ALLOC
3  .debug_info     00000224  00000000  00000000  00020004  2**0
CONTENTS, READONLY, DEBUGGING
4  .debug_abbrev   00000166  00000000  00000000  00020228  2**0
CONTENTS, READONLY, DEBUGGING
5  .debug_loc      000000b4  00000000  00000000  0002038e  2**0
CONTENTS, READONLY, DEBUGGING
6  .debug_aranges  00000040  00000000  00000000  00020442  2**0
CONTENTS, READONLY, DEBUGGING
7  .debug_line     000000ca  00000000  00000000  00020482  2**0
CONTENTS, READONLY, DEBUGGING
8  .debug_str      000001b3  00000000  00000000  0002054c  2**0
CONTENTS, READONLY, DEBUGGING
9  .comment        0000007e  00000000  00000000  000206ff  2**0
CONTENTS, READONLY
10 .ARM.attributes 00000033  00000000  00000000  0002077d  2**0
CONTENTS, READONLY
11 .debug_frame    0000007c  00000000  00000000  000207b0  2**2
CONTENTS, READONLY, DEBUGGING

```

- Main and Startup symbols

```

abdu1@Administrator MINGW64 /d/Courses/programming/NOW/EmbeddedSystems/Now/DIPLO
MAS/KSESDiploma/5.Assignments/Unit 3 (Embedded C)/Lecture 4/Assignment 1 (toggle
led using tiva c in keil)/source code (master)
$ arm-none-eabi-nm.exe main.o
00000004 C .bss
00000000 D .data
00000000 T main
00000000 R .rodata

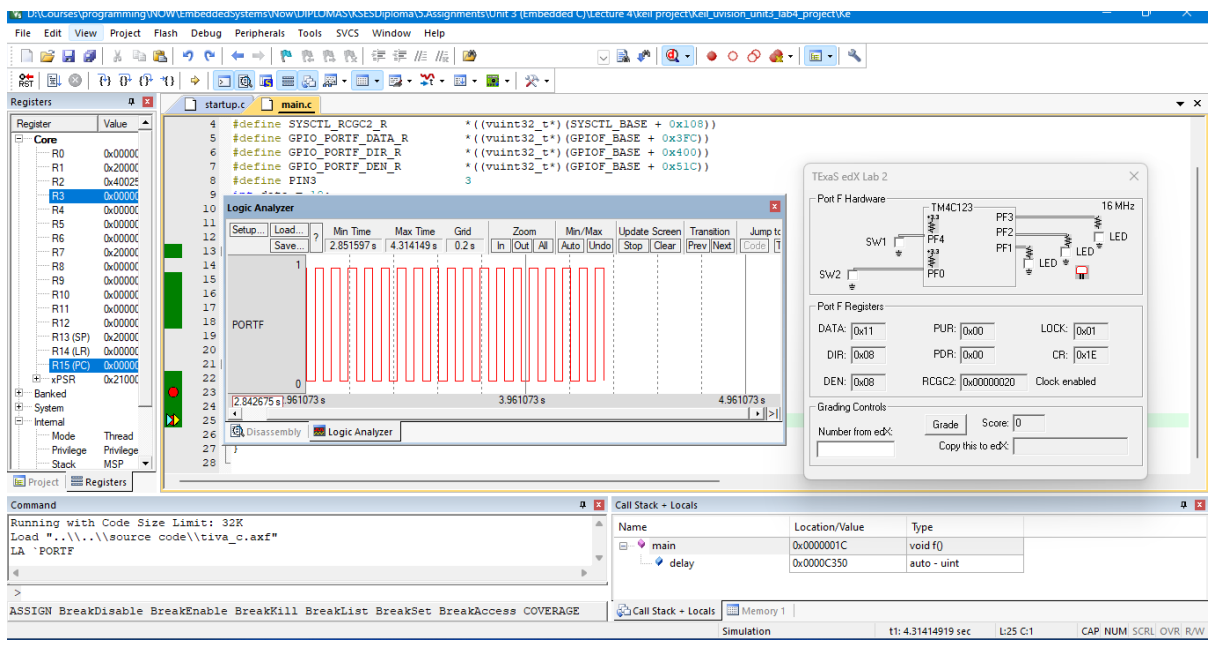
abdu1@Administrator MINGW64 /d/Courses/programming/NOW/EmbeddedSystems/Now/DIPLO
MAS/KSESDiploma/5.Assignments/Unit 3 (Embedded C)/Lecture 4/Assignment 1 (toggle
led using tiva c in keil)/source code (master)
$ arm-none-eabi-nm.exe startup.o
00000084 w Bus_Fault_Handler
00000084 t Default_Handler
U Ebss
U Edata
U Etext
00000000 R gp_fv_vectors
00000084 w Hard_Fault_Handler
U main
00000084 w MM_Fault_Handler
00000084 w NMI_Handler
00000000 t Reset_Handler
U Sbss
U Sdata
00000000 b Stack_Pointer
00000084 w Usage_Fault_Handler

```

- Tiva\_c symbols

```
abdu1@Administrator MINGW64 /d/Courses/programming/NOW/EmbeddedSystems/Now/DIPLO
MAS/KSESDiploma/5.Assignments/Unit 3 (Embedded C)/Lecture 4/Assignment 1 (toggle
led using tiva c in keil)/source code (master)
$ arm-none-eabi-nm.exe tiva_c.elf
20000404 B .bss
0000012c W Bus_Fault_Handler
20000000 D .data
0000012c T Default_Handler
20000404 B .ebss
20000004 D .edata
0000013c T .etext
00000000 T _g_pfn_vectors
0000012c W Hard_Fault_Handler
0000001c T main
0000012c W MM_Fault_Handler
0000012c W NMI_Handler
000000a8 T Reset_Handler
00000138 T .rodata
20000004 B .sbss
20000000 D .sdata
20000004 b Stack_Pointer
0000012c W Usage_Fault_Handler
```

- keil screenshot off



- keil screenshot on

The screenshot shows the Keil uVision IDE interface. The main window displays the 'main.c' file with the following code:

```
4 #define SYSCTL_RCGC2_R *((vuint32_t*)(SYSCTL_BASE + 0x100))
5 #define GPIO_PORTF_DATA_R *((vuint32_t*)(GPIOF_BASE + 0x3FC))
6 #define GPIO_PORTF_DIR_R *((vuint32_t*)(GPIOF_BASE + 0x400))
7 #define GPIO_PORTF_DEN_R *((vuint32_t*)(GPIOF_BASE + 0x51C))
8 #define PIN3 3
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```

The Logic Analyzer window shows a square wave signal on the PORTF register, with a time scale from 0 to 4.961073 s. The hardware configuration window for 'TExaS edX Lab 2' shows a circuit diagram with a 16 MHz clock, two switches (SW1, SW2), and two LEDs (LED, Green). The Port F Registers section shows the following values:

| Register | Value      |
|----------|------------|
| DATA     | 0x19       |
| DIR      | 0x08       |
| DEN      | 0x08       |
| PUR      | 0x00       |
| PDR      | 0x00       |
| RCGC2    | 0x00000020 |
| LOCK     | 0x01       |
| CR       | 0x1E       |

The bottom status bar indicates 'Simulation' mode with a time of 4.27664794 sec.