Embedded C lesson 2 Report

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Uart.c

```
#include "uart.h"
#define UART0DR *((volatile unsigned int*)((unsigned int*)(0x101f1000)))
void uart_send_string(unsigned char* p_tx_string)
{
	while(*p_tx_string != '\0')
	{
		UART0DR = (unsigned int) *p_tx_string ;
		p_tx_string++;
	}

}
```

Uart.h

```
#ifndef _UART_H_
#define _UART_H_
void uart_send_string(unsigned char* p_tx_string);
#endif
```

App.c

```
#include "uart.h"
unsigned char x[100] = "learn_in_depth: <Farha Emad>";
void main(void){

        uart_send_string(x);

}
```

startup.s

```
.global reset
reset:
        ldr sp, = stack_top
        bl main
stop: b stop
```

linker_script.ld

```
ENTRY(reset)
MEMORY
{
	Mem (rwx) : ORIGIN = 0x000000000 , LENGTH = 64M
}
SECTIONS
{
	. = 0x10000;
	.startup . : {
	startup.o(.text)
	}> Mem
	.text :{
	*(.text) *(.rodata)
	}> Mem
	.data : {
	*(.data)
	}> Mem
	.bss : {
	*(.bss) *(.COMMON)
	}> Mem
	. = . + 0x1000;
	stack_top = . ;
}
```

app.o sections

```
WIN 10@DESKTOP-BHGVA79 MINGW32 /d/Embedded/Learn_in_Depth/Unit3_embedded_c/Embed
dedC_lesson2/Lab1
$ arm-none-eabi-objdump.exe -h app.o

app.o:     file format elf32-littlearm

Sections:
Idx Name          Size      VMA       LMA       File off  Algn
  0 .text         0000001c  00000000  00000000  00000034  2**2
                  CONTENTS, ALLOC, LOAD, RELOC, READONLY, CODE
  1 .data         00000064  00000000  00000000  00000050  2**2
                  CONTENTS, ALLOC, LOAD, DATA
  2 .bss          00000000  00000000  00000000  000000b4  2**0
                  ALLOC
  3 .debug_info   00000064  00000000  00000000  000000b4  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  4 .debug_abbrev 0000005a  00000000  00000000  00000118  2**0
                  CONTENTS, READONLY, DEBUGGING
  5 .debug_aranges 00000020  00000000  00000000  00000172  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  6 .debug_line   00000035  00000000  00000000  00000192  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  7 .debug_str    000000c6  00000000  00000000  000001c7  2**0
                  CONTENTS, READONLY, DEBUGGING
  8 .comment      0000007f  00000000  00000000  0000028d  2**0
                  CONTENTS, READONLY
  9 .debug_frame  0000002c  00000000  00000000  0000030c  2**2
                  CONTENTS, RELOC, READONLY, DEBUGGING
 10 .ARM.attributes 00000032  00000000  00000000  00000338  2**0
                  CONTENTS, READONLY
```

app.o symbols

main → .text section

uart_send_string → unresolved

x → .data section

```
WIN 10@DESKTOP-BHGVA79 MINGW32 /d/Embedded/Learn_i
n_Depth/Embedded_Online_Diploma_Assignments/Unit3/
Embedded_C_lesson2/Lab1 (master)
$ arm-none-eabi-nm.exe app.o
00000000 T main
         U uart_send_string
00000000 D x
```

uart.o sections

```
WIN 10@DESKTOP-BHGVA79 MINGW32 /d/Embedded/Learn_in_Depth/Unit3_embedded_c/Embed
dedC_lesson2/Lab1
$ arm-none-eabi-objdump.exe -h uart.o

uart.o:     file format elf32-littlearm

Sections:
Idx Name          Size      VMA       LMA       File off  Algn
  0 .text         00000054  00000000  00000000  00000034  2**2
                  CONTENTS, ALLOC, LOAD, READONLY, CODE
  1 .data         00000000  00000000  00000000  00000088  2**0
                  CONTENTS, ALLOC, LOAD, DATA
  2 .bss          00000000  00000000  00000000  00000088  2**0
                  ALLOC
  3 .debug_info   00000057  00000000  00000000  00000088  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  4 .debug_abbrev 00000051  00000000  00000000  000000df  2**0
                  CONTENTS, READONLY, DEBUGGING
  5 .debug_aranges 00000020  00000000  00000000  00000130  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  6 .debug_line   00000039  00000000  00000000  00000150  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  7 .debug_str    000000d2  00000000  00000000  00000189  2**0
                  CONTENTS, READONLY, DEBUGGING
  8 .comment      0000007f  00000000  00000000  0000025b  2**0
                  CONTENTS, READONLY
  9 .debug_frame  00000030  00000000  00000000  000002dc  2**2
                  CONTENTS, RELOC, READONLY, DEBUGGING
 10 .ARM.attributes 00000032  00000000  00000000  0000030c  2**0
                  CONTENTS, READONLY

WIN 10@DESKTOP-BHGVA79 MINGW32 /d/Embedded/Learn_in_Depth/Unit3_embedded_c/EmbeddedC_lesson2/Lab1
$
```

uart.o symbols

uart_send_string → .text section

```
WIN 10@DESKTOP-BHGVA79 MINGW32 /d/Embedded/Learn_i
n_Depth/Embedded_Online_Diploma_Assignments/Unit3/
Embedded_C_lesson2/Lab1 (master)
$ arm-none-eabi-nm.exe uart.o
00000000 T uart_send_string
```

startup.o sections

```
WIN 10@DESKTOP-BHGVA79 MINGW32 /d/Embedded/Learn_in_Depth/Unit3_embedded_c/EmbeddedC_lesson2/Lab1
$ 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         00000010  00000000  00000000  00000034  2**2
                  CONTENTS, ALLOC, LOAD, RELOC, READONLY, CODE
  1 .data         00000000  00000000  00000000  00000044  2**0
                  CONTENTS, ALLOC, LOAD, DATA
  2 .bss          00000000  00000000  00000000  00000044  2**0
                  ALLOC
  3 .debug_line   0000003a  00000000  00000000  00000044  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  4 .debug_info   00000026  00000000  00000000  0000007e  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  5 .debug_abbrev 00000014  00000000  00000000  000000a4  2**0
                  CONTENTS, READONLY, DEBUGGING
  6 .debug_aranges 00000020  00000000  00000000  000000b8  2**3
                  CONTENTS, RELOC, READONLY, DEBUGGING
  7 .debug_str    0000005c  00000000  00000000  000000d8  2**0
                  CONTENTS, READONLY, DEBUGGING
  8 .ARM.attributes 00000022  00000000  00000000  00000134  2**0
                  CONTENTS, READONLY
```

startup.o symbols

main → unresolved

reset → . text section

stack_top → unresolved

stop → .text section

```
WIN 10@DESKTOP-BHGVA79 MINGW32 /d/Embedded/Learn_i
n_Depth/Embedded_Online_Diploma_Assignments/Unit3/
Embedded_C_lesson2/Lab1 (master)
$ arm-none-eabi-nm.exe startup.o
         U main
00000000 T reset
         U stack_top
00000008 t stop
```

Executable file (learn_in_depth.elf) sections

```
WIN 10@DESKTOP-BHGVA79 MINGW32 /d/Embedded/Learn_in_Depth/Unit3_embedded_c/EmbeddedC_lesson2/Lab1
$ arm-none-eabi-objdump.exe -h learn_in_depth.elf

learn_in_depth.elf:     file format elf32-littlearm

Sections:
Idx Name          Size      VMA       LMA       File off  Algn
  0 .startup      00000010  00010000  00010000  00010000  2**2
                  CONTENTS, ALLOC, LOAD, READONLY, CODE
  1 .text         00000070  00010010  00010010  00010010  2**2
                  CONTENTS, ALLOC, LOAD, READONLY, CODE
  2 .data         00000064  00010080  00010080  00010080  2**2
                  CONTENTS, ALLOC, LOAD, DATA
  3 .ARM.attributes 0000002e  00000000  00000000  000100e4  2**0
                  CONTENTS, READONLY
  4 .comment      0000007e  00000000  00000000  00010112  2**0
                  CONTENTS, READONLY
  5 .debug_line   000000a8  00000000  00000000  00010190  2**0
                  CONTENTS, READONLY, DEBUGGING
  6 .debug_info   000000e1  00000000  00000000  00010238  2**0
                  CONTENTS, READONLY, DEBUGGING
  7 .debug_abbrev 000000bf  00000000  00000000  00010319  2**0
                  CONTENTS, READONLY, DEBUGGING
  8 .debug_aranges 00000060  00000000  00000000  000103d8  2**3
                  CONTENTS, READONLY, DEBUGGING
  9 .debug_str    00000103  00000000  00000000  00010438  2**0
                  CONTENTS, READONLY, DEBUGGING
 10 .debug_frame  0000005c  00000000  00000000  0001053c  2**2
                  CONTENTS, READONLY, DEBUGGING
```

Executable file (learn_in_depth.elf) symbols

main → .text section

reset → .text section

stack_top → .data section

stop → .text section

uart_send_string → .text section

x → .data section

```
n_Depth/Embedded_Online_Diploma_Assignments/Unit3/
Embedded_C_lesson2/Lab1 (master)
$ arm-none-eabi-nm.exe learn_in_depth.elf
00010010 T main
00010000 T reset
000110e4 D stack_top
00010008 t stop
0001002c T uart_send_string
00010080 D x
```

Qemu emulator output