

AHMED OSAMA AHMED

LAB_1

Readelf for learn-in-depth.elf and check entry point

```
MINGW64/c/Users/sam20/OneDrive/المكتب/MESC/code/Mastering_Embedded_System_Diploma/Unit 3_Embedded_C/Lesson 2/Lab_1
AHMED_OSAMA@MSI MINGW64 ~/OneDrive/المكتب/MESC/code/Mastering_Embedded_System_Diploma/Unit 3_Embedded_C/Lesson 2/Lab_1 (main)
$ arm-none-eabi-readelf.exe -a learn-in-depth.elf
ELF Header:
  Magic:   7f 45 4c 46 01 01 00 00 00 00 00 00 00 00 00 00
  Class:           ELF32
  Data:            2's complement, little endian
  Version:         1 (current)
  OS/ABI:          UNIX - System V
  ABI Version:     0
  Type:            EXEC (Executable file)
  Machine:         ARM
  Version:         0x1
  Entry point address: 0x10000
  Start of program headers: 52 (bytes into file)
  Start of section headers: 33224 (bytes into file)
  Flags:          0x5000002, has entry point, Version5 EABI
  Size of this header: 52 (bytes)
  Size of program headers: 32 (bytes)
  Number of program headers: 1
  Size of section headers: 40 (bytes)
  Number of section headers: 9
  Section header string table index: 6

Section Headers:
[Nr] Name                Type           Addr     Off    Size   ES Flg Lk Inf Al
[ 0]                      NULL          00000000 000000 000000 00  0  0  0  0
[ 1] .startup               PROGBITS      00010000 008000 000010 00  AX  0  0  4
[ 2] .text                 PROGBITS      00010010 008010 0000cc 00  AX  0  0  4
[ 3] .data                 PROGBITS      000100dc 0080dc 000064 00  WA  0  0  4
[ 4] .ARM.attributes       ARM_ATTRIBUTES 00000000 008140 00002e 00  0  0  1
[ 5] .comment              PROGBITS      00000000 00816e 000011 01  MS  0  0  1
[ 6] .shstrtab             STRTAB        00000000 00817f 000049 00  0  0  1
[ 7] .symtab               SYMTAB        00000000 008330 000190 10  8 19  4
[ 8] .strtab               STRTAB        00000000 0084c0 000067 00  0  0  1

Key to Flags:
W (write), A (alloc), X (execute), M (merge), S (strings)
I (info), L (link order), G (group), T (TLS), E (exclude), x (unknown)
O (extra OS processing required) o (OS specific), p (processor specific)

There are no section groups in this file.

Program Headers:
Type           Offset  VirtAddr  PhysAddr  FileSiz MemSiz  Flg Align
LOAD          0x008000 0x00010000 0x00010000 0x00140 0x00140  RWE 0x8000

Section to Segment mapping:
Segment Sections...
00          .startup .text .data

There is no dynamic section in this file.

There are no relocations in this file.

There are no unwind sections in this file.

Symbol table '.symtab' contains 25 entries:
Num:   Value  Size Type  Bind  Vis  Ndx Name
```

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SECTIONS

```
MINGW64/c/Users/sam20/OneDrive/المكتب/MESC/code/Mastering_Embedded_System_Diploma/Unit 3_Embedded_C/Lesson 2/Lab_1
AHMED OSAMA@MSI MINGW64 ~/OneDrive/المكتب/MESC/code/Mastering_Embedded_System_Diploma/Unit 3_Embedded_C/Lesson 2/Lab_1 (main)
$ 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  00008000  2**2
   CONTENTS, ALLOC, LOAD, READONLY, CODE
 1 .text           000000cc  00010010  00010010  00008010  2**2
   CONTENTS, ALLOC, LOAD, READONLY, CODE
 2 .data           00000064  000100dc  000100dc  000080dc  2**2
   CONTENTS, ALLOC, LOAD, DATA
 3 .ARM.attributes 0000002e  00000000  00000000  00008140  2**0
   CONTENTS, READONLY
 4 .comment         00000011  00000000  00000000  0000816e  2**0
   CONTENTS, READONLY

AHMED OSAMA@MSI MINGW64 ~/OneDrive/المكتب/MESC/code/Mastering_Embedded_System_Diploma/Unit 3_Embedded_C/Lesson 2/Lab_1 (main)
$ |
```

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SYMBOL TABLE

```
MINGW64:/c:/Users/sam20/OneDrive/المكتب/MESC/code/Mastering_Embedded_System_Diploma/Unit 3_Embedded_C/Lesson 2/Lab_1
AHMED OSAMA@MSI MINGW64 ~/OneDrive/المكتب/MESC/code/Mastering_Embedded_System_Diploma/Unit 3_Embedded_C/Lesson 2/Lab_1 (main)
$ arm-none-eabi-nm.exe learn-in-depth.elf
00010010 T main
00010000 T reset
00011140 D stack_top
00010008 t stop
000100dc D string_buffer
00010078 T string_buffer2
00010028 T Uart_Send_string
AHMED OSAMA@MSI MINGW64 ~/OneDrive/المكتب/MESC/code/Mastering_Embedded_System_Diploma/Unit 3_Embedded_C/Lesson 2/Lab_1 (main)
$ |
```

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MAP FILE

```
C:\Users\sam20\OneDrive\المكتب\سطح\MESC\code\Mastering_Embedded_System_Diploma\Unit_3_Embedded_C\Lesson_2\Lab_1\output.map - Sublime Text (UNREGISTERED)
File Edit Selection Find View Goto Tools Project Preferences Help

output.map x
2 Memory Configuration
3
4 Name Origin Length Attributes
5 Mem 0x00000000 0x04000000 xrw
6 *default* 0x00000000 0xffffffff
7
8 Linker script and memory map
9
10 0x00010000 . = 0x10000
11
12 .startup 0x00010000 0x10
13 startup.o(.text)
14 .text 0x00010000 0x10 startup.o
15 0x00010000 reset
16
17 .text 0x00010010 0xcc
18 *(.text)
19 .text 0x00010010 0x18 app.o
20 0x00010010 main
21 .text 0x00010028 0x50 uart.o
22 0x00010028 Uart_Send_string
23
24 *(.rodata)
25 .rodata 0x00010078 0x64 app.o
26 0x00010078 string_buffer2
27
28 .glue_7 0x000100dc 0x0
29 .glue_7 0x00000000 0x0 linker stubs
30
31 .glue_7t 0x000100dc 0x0
32 .glue_7t 0x00000000 0x0 linker stubs
33
34 .vfp11_veneer 0x000100dc 0x0
35 .vfp11_veneer 0x00000000 0x0 linker stubs
36
37 .v4_bx 0x000100dc 0x0
38 .v4_bx 0x00000000 0x0 linker stubs
39
40 .iplt 0x000100dc 0x0
41 .iplt 0x00000000 0x0 startup.o
42
43 .rel.dyn 0x000100dc 0x0
44 .rel.iplt 0x00000000 0x0 startup.o
45
46 .data 0x000100dc 0x64
47 *(.data)
48 .data 0x000100dc 0x0 startup.o
49 .data 0x000100dc 0x64 app.o
string_buffer
```

Line 49, Column 1

main 12 Spaces: 4 Plain Text

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```
C:\Users\sam20\OneDrive\المكتب\سطح\MESC\code\Mastering_Embedded_System_Diploma\Unit_3_Embedded_C\Lesson 2\Lab_1\output.map - Sublime Text (UNREGISTERED)
File Edit Selection Find View Goto Tools Project Preferences Help

output.map x
34 .vfp11_veneer 0x00000000 0x0 linker stubs
35
36 .v4_bx 0x000100dc 0x0
37 .v4_bx 0x00000000 0x0 linker stubs
38
39 .iplt 0x000100dc 0x0
40 .iplt 0x00000000 0x0 startup.o
41
42 .rel.dyn 0x000100dc 0x0
43 .rel.iplt 0x00000000 0x0 startup.o
44
45 .data 0x000100dc 0x64
46 *(.data)
47 .data 0x000100dc 0x0 startup.o
48 .data 0x000100dc 0x64 app.o
49 .data 0x000100dc string_buffer
50 .data 0x00010140 0x0 uart.o
51
52 .igot.plt 0x00010140 0x0
53 .igot.plt 0x00000000 0x0 startup.o
54
55 .bss 0x00010140 0x0
56 *(.bss)
57 .bss 0x00010140 0x0 startup.o
58 .bss 0x00010140 0x0 app.o
59 .bss 0x00010140 0x0 uart.o
60 *(COMMON)
61 0x00011140 , = (. + 0x1000)
62 0x00011140 stack_top = .
63 LOAD app.o
64 LOAD startup.o
65 LOAD uart.o
66 OUTPUT(learn-in-depth.elf elf32-littlearm)
67
68 .ARM.attributes
69 0x00000000 0x2e
70 .ARM.attributes
71 0x00000000 0x22 startup.o
72 .ARM.attributes
73 0x00000022 0x32 app.o
74 .ARM.attributes
75 0x00000054 0x32 uart.o
76
77 .comment 0x00000000 0x11
78 .comment 0x00000000 0x11 app.o
79 0x12 (size before relaxing)
80 .comment 0x00000000 0x12 uart.o
81
```

Line 81, Column 1

main 12 Spaces: 4 Plain Text

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QEMU SW

```
MINGW64/c/Users/sam20/OneDrive/المكتب/سطح/MESC/code/Mastering_Embedded_System_Diploma/Unit 3_Embedded_C/Lesson 2/Lab_1
AHMED OSAMA@MSI MINGW64 ~/OneDrive/المكتب/سطح/MESC/code/Mastering_Embedded_System_Diploma/Unit 3_Embedded_C/Lesson 2/Lab_1 (main)
$ qemu-system-arm -M versatilepb -m 128M -nographic -kernel learn-in-depth.bin
learn-in-dept : ahmed osama
```