

Mohanad Mohamed Abdelmonem Eissa

Lab 1

Compiling Program

```
MINGW64/d/ks_diploma/Assignments/Unit 3/Lecture 3/Lab 1
Mohanad@LAPTOP-D8IODKRS MINGW64 /d/ks_diploma/Assignments/Unit 3/Lecture 3/Lab 1
$ arm-none-eabi-gcc.exe -c -I . -g -mcpu=arm926ej-s app.c -o app.o
Mohanad@LAPTOP-D8IODKRS MINGW64 /d/ks_diploma/Assignments/Unit 3/Lecture 3/Lab 1
$ arm-none-eabi-gcc.exe -c -I . -g -mcpu=arm926ej-s uart.c -o uart.o
Mohanad@LAPTOP-D8IODKRS MINGW64 /d/ks_diploma/Assignments/Unit 3/Lecture 3/Lab 1
$ arm-none-eabi-as.exe -mcpu=arm926ej-s startup.s -o startup.o
startup.s: Assembler messages:
startup.s: Warning: end of file not at end of a line; newline inserted
Mohanad@LAPTOP-D8IODKRS MINGW64 /d/ks_diploma/Assignments/Unit 3/Lecture 3/Lab 1
$ arm-none-eabi-ld.exe -T linker_script.ld app.o uart.o startup.o -o learn-in-depth.elf
-Map=Map_file.map
Mohanad@LAPTOP-D8IODKRS MINGW64 /d/ks_diploma/Assignments/Unit 3/Lecture 3/Lab 1
$ arm-none-eabi-objcopy -O binary learn-in-depth.elf learn-in-depth.bin
Mohanad@LAPTOP-D8IODKRS MINGW64 /d/ks_diploma/Assignments/Unit 3/Lecture 3/Lab 1
$
```

Debug Sections

```
MINGW64/d/ks_diploma/Assignments/Unit 3/Lecture 3/Lab 1
Mohanad@LAPTOP-D8IODKRS MINGW64 /d/ks_diploma/Assignments/Unit 3/Lecture 3/Lab 1
$ arm-none-eabi-objdump -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          00000068  00010010  00010010  00008010  2**2
CONTENTS, ALLOC, LOAD, READONLY, CODE
  2 .rodata        0000012c  00010078  00010078  00008078  2**2
CONTENTS, ALLOC, LOAD, READONLY, DATA
  3 .data          00000064  000101a4  000101a4  000081a4  2**2
CONTENTS, ALLOC, LOAD, DATA
  4 .ARM.attributes 0000002e  00000000  00000000  00008208  2**0
CONTENTS, READONLY
  5 .comment       00000011  00000000  00000000  00008236  2**0
CONTENTS, READONLY
  6 .debug_info    0000010d  00000000  00000000  00008247  2**0
CONTENTS, READONLY, DEBUGGING
  7 .debug_abbrev  000000b2  00000000  00000000  00008354  2**0
CONTENTS, READONLY, DEBUGGING
  8 .debug_loc     00000058  00000000  00000000  00008406  2**0
CONTENTS, READONLY, DEBUGGING
  9 .debug_aranges 00000040  00000000  00000000  0000845e  2**0
CONTENTS, READONLY, DEBUGGING
10 .debug_line    00000072  00000000  00000000  0000849e  2**0
CONTENTS, READONLY, DEBUGGING
11 .debug_str     000000be  00000000  00000000  00008510  2**0
CONTENTS, READONLY, DEBUGGING
12 .debug_frame   00000054  00000000  00000000  000085d0  2**2
CONTENTS, READONLY, DEBUGGING

Mohanad@LAPTOP-D8IODKRS MINGW64 /d/ks_diploma/Assignments/Unit 3/Lecture 3/Lab 1
```

Using gdb

Port no = 1234

```
Mohanad@LAPTOP-D8IODKRS MINGW64 /d/ks_diploma/Assignments/Unit 3/Lecture 3/Lab 1
$ qemu-system-arm -M versatilepb -m 128m -nographic -s -S -kernel learn-in-depth.bin
```



```
MINGW64:/d/ks_diploma/Assignments/Unit 3/Lecture 3/Lab 1
Mohanad@LAPTOP-D8IODKRS MINGW64 /d/ks_diploma/Assignments/Unit 3/Lecture 3/Lab 1
$ arm-none-eabi-gdb.exe learn-in-depth.elf
GNU gdb (GDB) 7.5.1
Copyright (C) 2012 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <http://gnu.org/licenses/gpl.html>
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law. Type "show copying"
and "show warranty" for details.
This GDB was configured as "--host=i686-pc-mingw32 --target=arm-none-eabi".
For bug reporting instructions, please see:
<http://www.gnu.org/software/gdb/bugs/>...
Reading symbols from D:\ks_diploma\Assignments\Unit 3\Lecture 3\Lab 1\learn-in-
depth.elf...done.
(gdb) target remote localhost:1234
Remote debugging using localhost:1234
0x00000000 in ?? ()
(gdb)
```

Qemu & gdb

```
(gdb) s
6          while(*P_tx_string != '\0')          // loop until find NULL
in string
(gdb) s
8          UARTODR = (unsigned int)(*P_tx_string);
(gdb) s
9          P_tx_string++;
(gdb) s
6          while(*P_tx_string != '\0')          // loop until find NULL
in string
(gdb) s
8          UARTODR = (unsigned int)(*P_tx_string);
(gdb) s
9          P_tx_string++;
```

```
Mohanad@LAPTOP-D8IODKRS MINGW64 /d/ks_diploma/Assignments/Unit 3/Lecture 3/Lab 1
$ qemu-system-arm -M versatilepb -m 128m -nographic -s -S -kernel learn-in-depth.bin
learn-i
```

Using Makefile to compile

```
MINGW64:/d/ks_diploma/Assignments/Unit 3/Lecture 3/Lab 1
Map_file.map
arm-none-eabi-objcopy -O binary learn-in-depth.elf learn-in-depth.bin
=====Build is done=====

Mohanad@LAPTOP-D8IODKRS MINGW64 /d/ks_diploma/Assignments/Unit 3/Lecture 3/Lab 1
$ make clean_all
rm *.o *.elf *.bin

Mohanad@LAPTOP-D8IODKRS MINGW64 /d/ks_diploma/Assignments/Unit 3/Lecture 3/Lab 1
$ make
arm-none-eabi-gcc.exe -c -I . -g -mcpu=arm926ej-s app.c -o app.o
arm-none-eabi-gcc.exe -c -I . -g -mcpu=arm926ej-s uart.c -o uart.o
arm-none-eabi-as.exe -g -mcpu=arm926ej-s startup.s -o startup.o
startup.s: Assembler messages:
startup.s: Warning: end of file not at end of a line; newline inserted
arm-none-eabi-ld.exe -T linker_script.ld app.o uart.o startup.o -o learn-in-depth.elf -Map
=Map_file.map
arm-none-eabi-objcopy -O binary learn-in-depth.elf learn-in-depth.bin
=====Build is done=====

Mohanad@LAPTOP-D8IODKRS MINGW64 /d/ks_diploma/Assignments/Unit 3/Lecture 3/Lab 1
$ |
```