Learn-in-depth

Unit3 Lesson2

assignment

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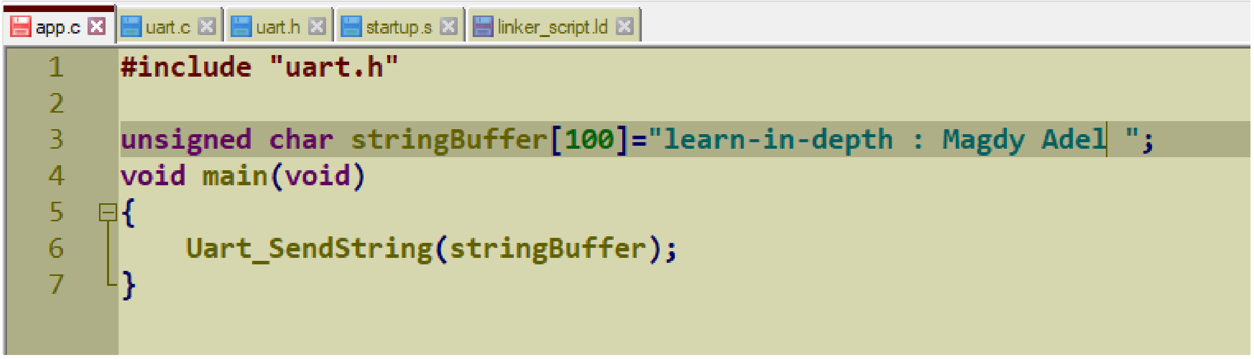
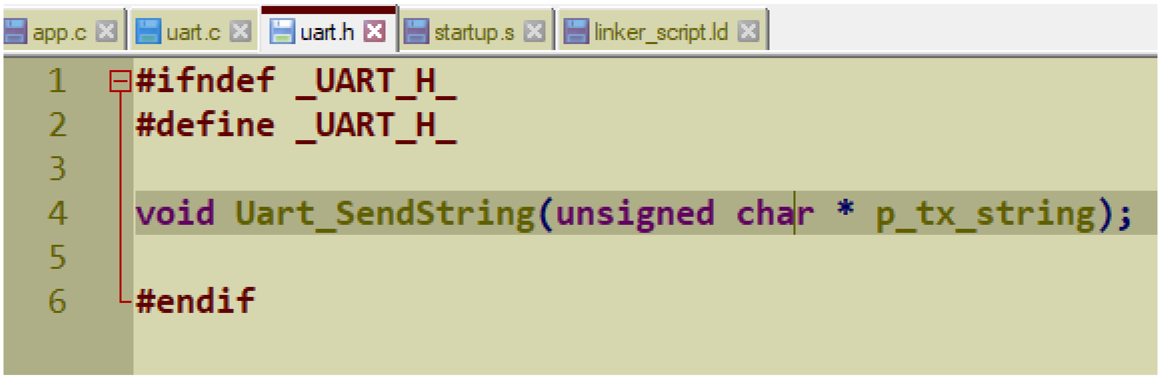
-Screen of source file :

1-app.c



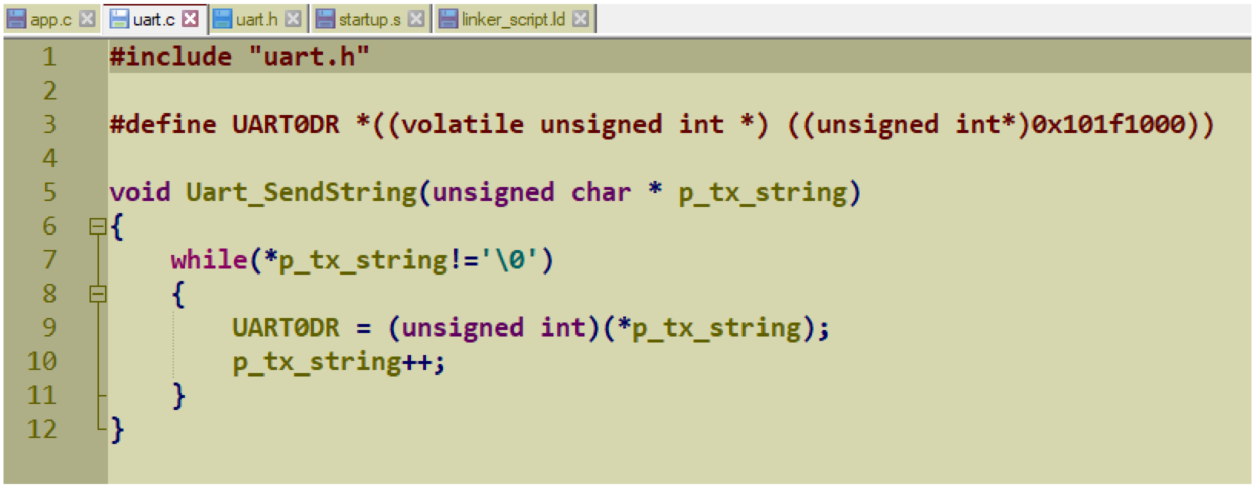
```c
#include "uart.h"

unsigned char stringBuffer[100]="learn-in-depth : Magdy Adel ";
void main(void)
{
    Uart_SendString(stringBuffer);
}
```

2-uart.h



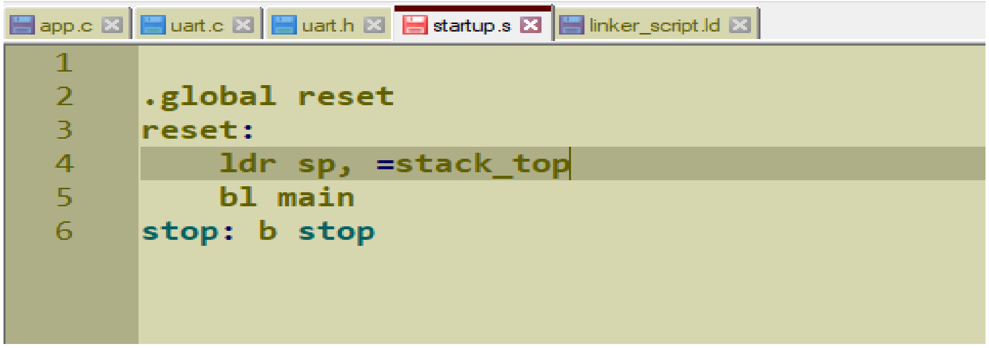
```c
#ifndef _UART_H_
#define _UART_H_

void Uart_SendString(unsigned char * p_tx_string);

#endif
```

3-uart.c



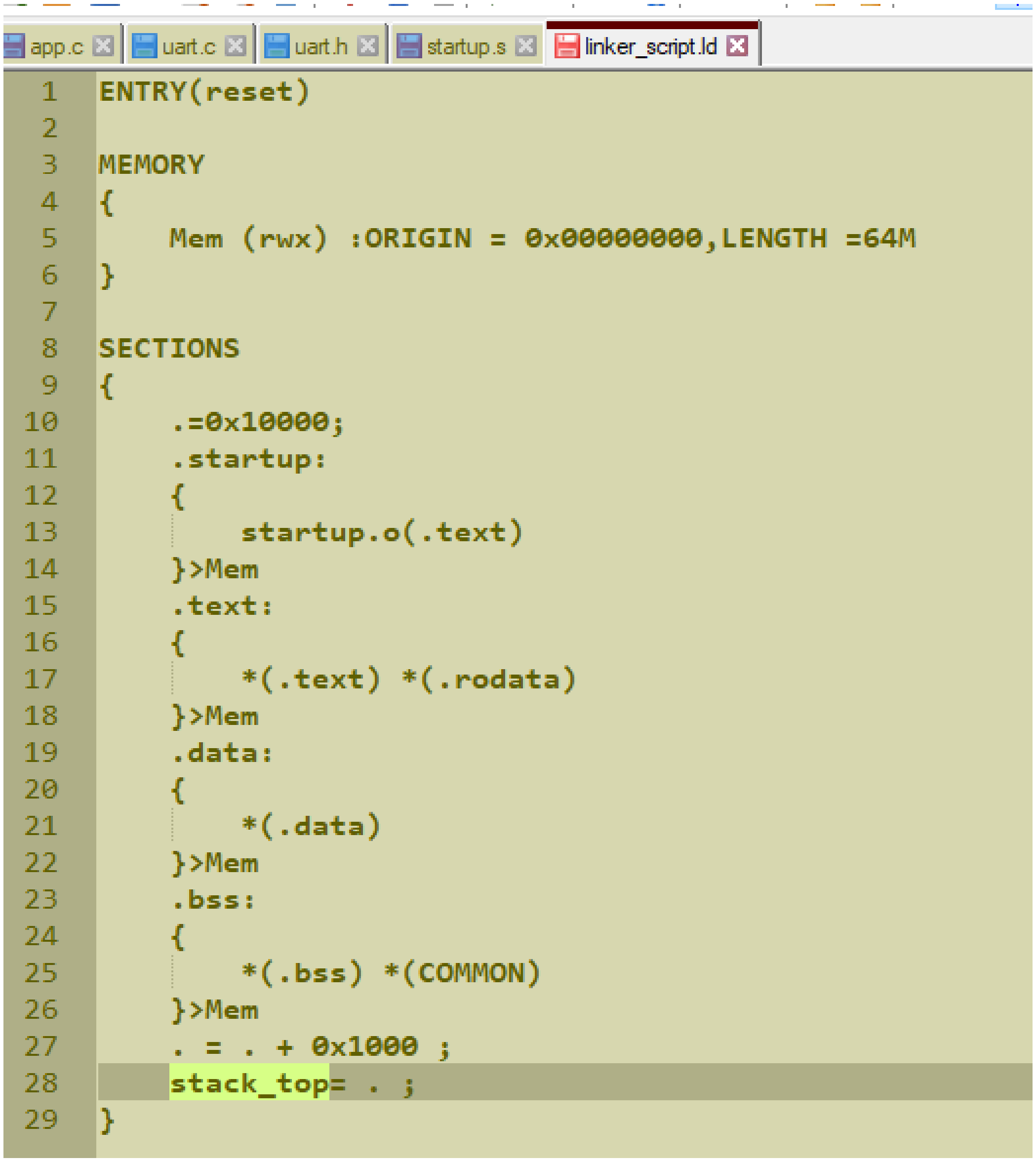
```c
#include "uart.h"

#define UART0DR *((volatile unsigned int *) ((unsigned int*)0x101f1000))

void Uart_SendString(unsigned char * p_tx_string)
{
    while(*p_tx_string!='\0')
    {
        UART0DR = (unsigned int)(*p_tx_string);
        p_tx_string++;
    }
}
```

4-starup.s



```

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

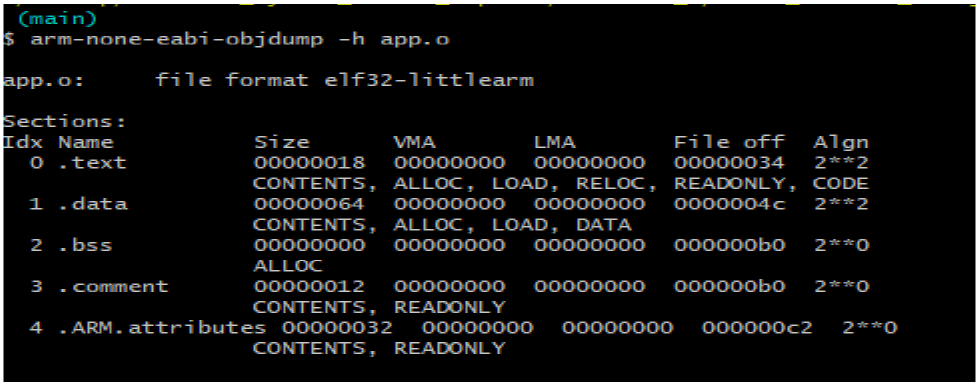
5-linker_script.ld



```
ENTRY(reset)

MEMORY
{
    Mem (rwx) :ORIGIN = 0x00000000,LENGTH =64M
}

SECTIONS
{
    .=0x10000;
    .startup:
    {
        startup.o(.text)
    }>Mem
    .text:
    {
        *(.text) *(.rodata)
    }>Mem
    .data:
    {
        *(.data)
    }>Mem
    .bss:
    {
        *(.bss) *(COMMON)
    }>Mem
    . = . + 0x1000 ;
    stack_top= . ;
}
```

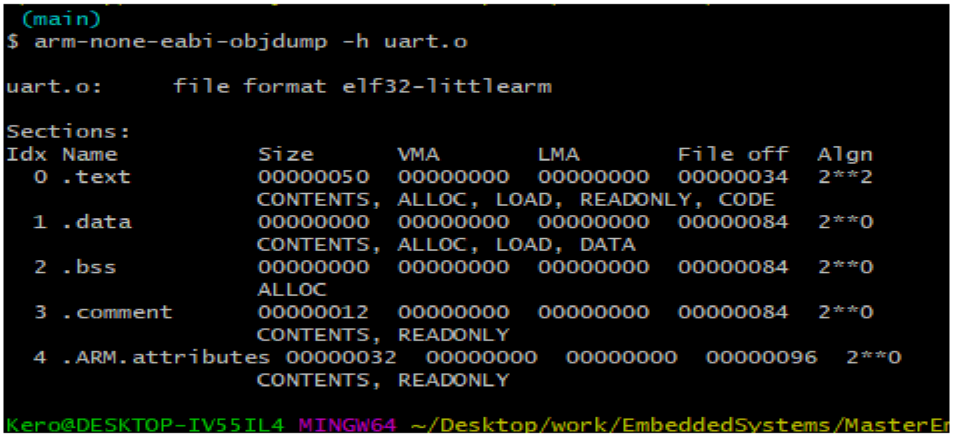
-Object files:

1-app.o



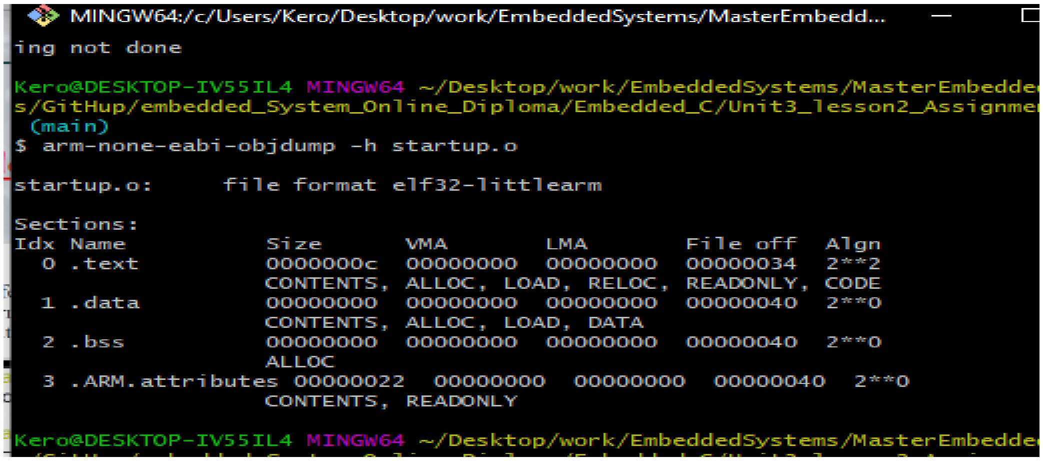
```
 (main)
$ arm-none-eabi-objdump -h app.o

app.o:     file format elf32-littlearm

Sections:
Idx Name          Size      VMA       LMA       File off  Algn
  0 .text         00000018  00000000  00000000  00000034  2**2
                  CONTENTS, ALLOC, LOAD, RELOC, READONLY, CODE
  1 .data         00000064  00000000  00000000  0000004c  2**2
                  CONTENTS, ALLOC, LOAD, DATA
  2 .bss          00000000  00000000  00000000  000000b0  2**0
                  ALLOC
  3 .comment      00000012  00000000  00000000  000000b0  2**0
                  CONTENTS, READONLY
  4 .ARM.attributes 00000032  00000000  00000000  000000c2  2**0
                  CONTENTS, READONLY
```

2-uart.o



```
 (main)
$ arm-none-eabi-objdump -h uart.o

uart.o:     file format elf32-littlearm

Sections:
Idx Name          Size      VMA       LMA       File off  Algn
  0 .text         00000050  00000000  00000000  00000034  2**2
                  CONTENTS, ALLOC, LOAD, READONLY, CODE
  1 .data         00000000  00000000  00000000  00000084  2**0
                  CONTENTS, ALLOC, LOAD, DATA
  2 .bss          00000000  00000000  00000000  00000084  2**0
                  ALLOC
  3 .comment      00000012  00000000  00000000  00000084  2**0
                  CONTENTS, READONLY
  4 .ARM.attributes 00000032  00000000  00000000  00000096  2**0
                  CONTENTS, READONLY

Kero@DESKTOP-IV55IL4 MINGW64 ~/Desktop/work/EmbeddedSystems/MasterEn
```

3-startup.o

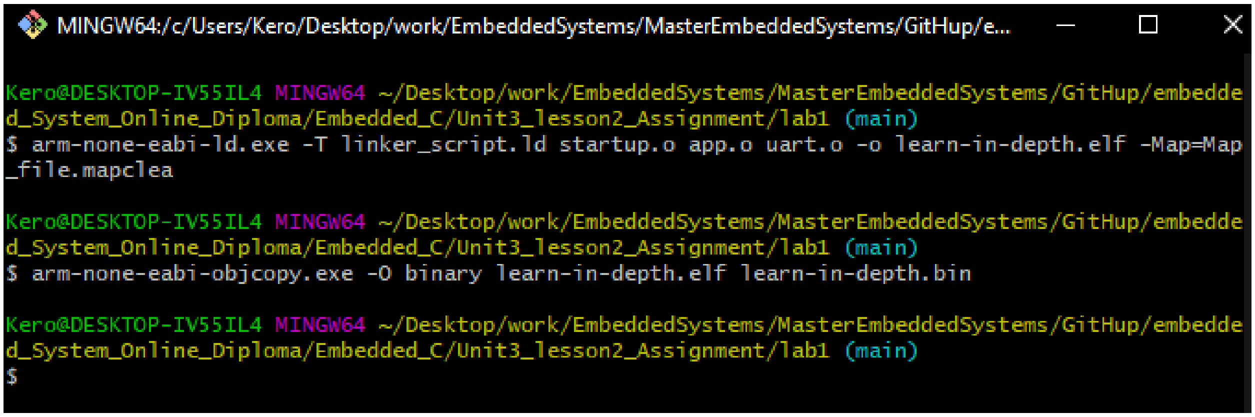


MINGW64:/c/Users/Kero/Desktop/work/EmbeddedSystems/MasterEmbedd...

```
ing not done

Kero@DESKTOP-IV55IL4 MINGW64 ~/Desktop/work/EmbeddedSystems/MasterEmbedde
s/GitHup/embedded_System_Online_Diploma/Embedded_C/Unit3_lesson2_Assignme
 (main)
$ arm-none-eabi-objdump -h startup.o

startup.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, RELOC, READONLY, CODE
  1 .data         00000000  00000000  00000000  00000040  2**0
                  CONTENTS, ALLOC, LOAD, DATA
  2 .bss          00000000  00000000  00000000  00000040  2**0
                  ALLOC
  3 .ARM.attributes 00000022  00000000  00000000  00000040  2**0
                  CONTENTS, READONLY

Kero@DESKTOP-IV55IL4 MINGW64 ~/Desktop/work/EmbeddedSystems/MasterEmbedde
```

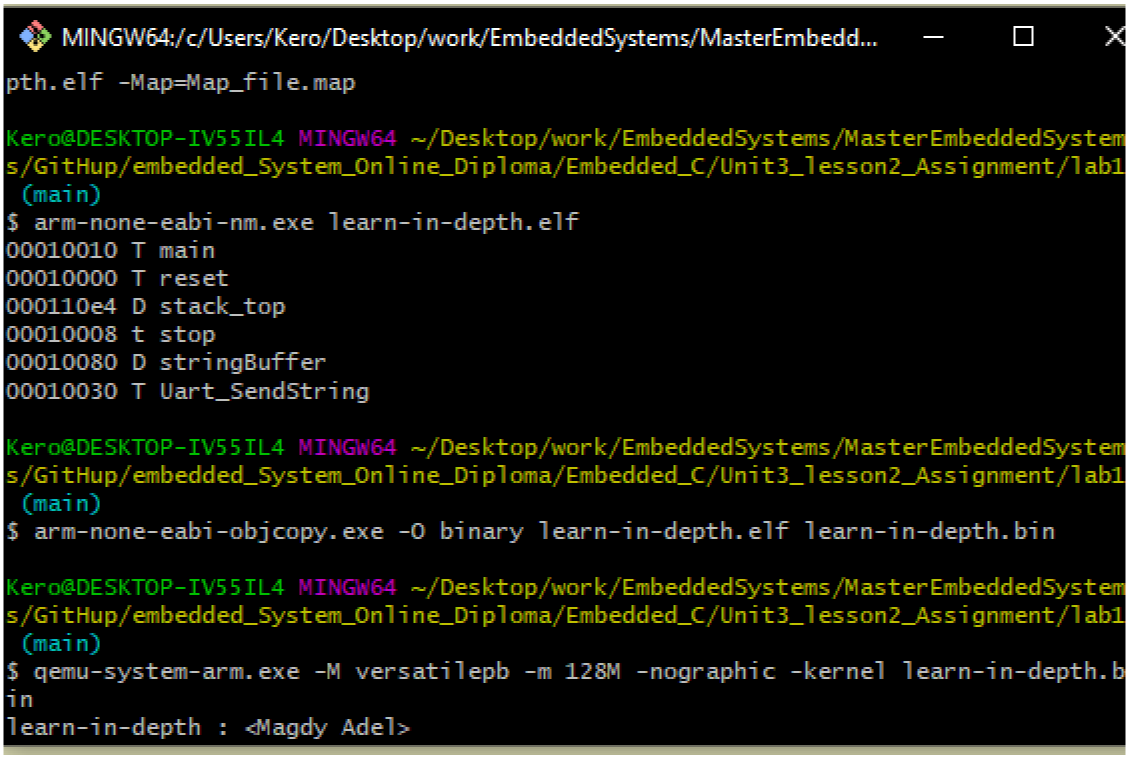
Invoke the linker and pass the linker script:

Generate binary file:


MINGW64:/c/Users/Kero/Desktop/work/EmbeddedSystems/MasterEmbeddedSystems/GitHup/e...

```
Kero@DESKTOP-IV55IL4 MINGW64 ~/Desktop/work/EmbeddedSystems/MasterEmbeddedSystems/GitHup/embedde
d_System_Online_Diploma/Embedded_C/Unit3_lesson2_Assignment/lab1 (main)
$ arm-none-eabi-ld.exe -T linker_script.ld startup.o app.o uart.o -o learn-in-depth.elf -Map=Map
_file.mapclea

Kero@DESKTOP-IV55IL4 MINGW64 ~/Desktop/work/EmbeddedSystems/MasterEmbeddedSystems/GitHup/embedde
d_System_Online_Diploma/Embedded_C/Unit3_lesson2_Assignment/lab1 (main)
$ arm-none-eabi-objcopy.exe -O binary learn-in-depth.elf learn-in-depth.bin

Kero@DESKTOP-IV55IL4 MINGW64 ~/Desktop/work/EmbeddedSystems/MasterEmbeddedSystems/GitHup/embedde
d_System_Online_Diploma/Embedded_C/Unit3_lesson2_Assignment/lab1 (main)
$
```

-Output


MINGW64:/c/Users/Kero/Desktop/work/EmbeddedSystems/MasterEmbedd...

```
pth.elf -Map=Map_file.map

Kero@DESKTOP-IV55IL4 MINGW64 ~/Desktop/work/EmbeddedSystems/MasterEmbeddedSystem
s/GitHup/embedded_System_Online_Diploma/Embedded_C/Unit3_lesson2_Assignment/lab1
 (main)
$ arm-none-eabi-nm.exe learn-in-depth.elf
00010010 T main
00010000 T reset
000110e4 D stack_top
00010008 t stop
00010080 D stringBuffer
00010030 T Uart_SendString

Kero@DESKTOP-IV55IL4 MINGW64 ~/Desktop/work/EmbeddedSystems/MasterEmbeddedSystem
s/GitHup/embedded_System_Online_Diploma/Embedded_C/Unit3_lesson2_Assignment/lab1
 (main)
$ arm-none-eabi-objcopy.exe -O binary learn-in-depth.elf learn-in-depth.bin

Kero@DESKTOP-IV55IL4 MINGW64 ~/Desktop/work/EmbeddedSystems/MasterEmbeddedSystem
s/GitHup/embedded_System_Online_Diploma/Embedded_C/Unit3_lesson2_Assignment/lab1
 (main)
$ qemu-system-arm.exe -M versatilepb -m 128M -nographic -kernel learn-in-depth.b
in
learn-in-depth : <Magdy Adel>
```