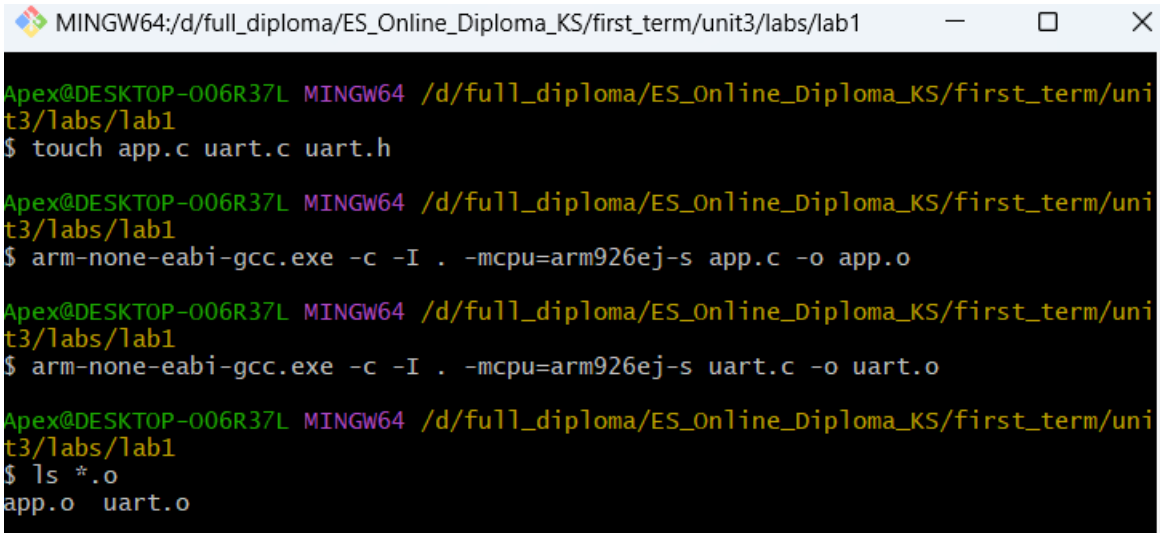
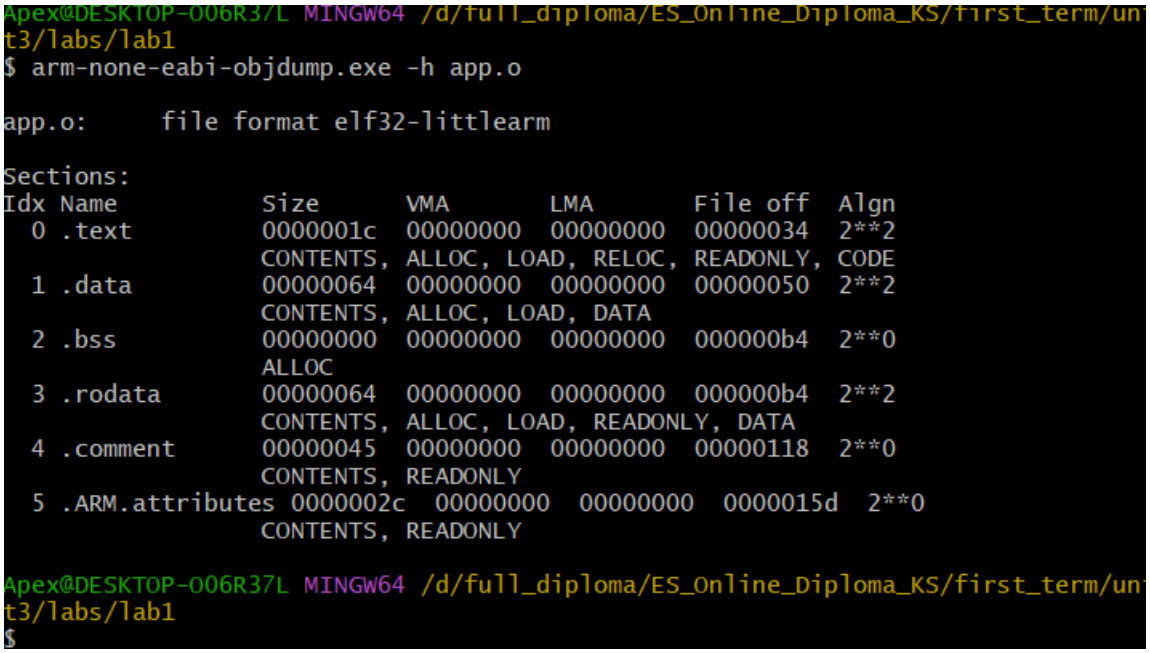
LAB 1

Using VersatilePB virtual board in QEMU and ARM toolchain

1. Writing source files, getting object files and analyzing them:





2. Writing startup code, getting object file and analyzing it:

```
Apex@DESKTOP-OO6R37L MINGW64 /d/full_diploma/ES_Online_Diploma_KS/first_term/u
t3/labs/lab1
$  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

Apex@DESKTOP-OO6R37L MINGW64 /d/full_diploma/ES_Online_Diploma_KS/first_term/u
t3/labs/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         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
```

3.Writing the linker script, linking all objects, getting the elf file ,analyzing it and get sections of it :

```
Apex@DESKTOP-OO6R37L MINGW64 /d/full_diploma/ES_Online_Diploma_KS/first_term/
t3/labs/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  00001000  2**2
                  CONTENTS, ALLOC, LOAD, READONLY, CODE
  1 .text         000000d8  00010010  00010010  00001010  2**2
                  CONTENTS, ALLOC, LOAD, READONLY, CODE
  2 .data         00000064  000100e8  000100e8  000010e8  2**2
                  CONTENTS, ALLOC, LOAD, DATA
  3 .ARM.attributes 0000002e  00000000  00000000  0000114c  2**0
                  CONTENTS, READONLY
  4 .comment      00000044  00000000  00000000  0000117a  2**0
                  CONTENTS, READONLY

Apex@DESKTOP-OO6R37L MINGW64 /d/full_diploma/ES_Online_Diploma_KS/first_term/
t3/labs/lab1
```

```
Apex@DESKTOP-OO6R37L MINGW64 /d/full_diploma/ES_Online_Diploma_KS/first_term/uni
t3/labs/lab1
$ arm-none-eabi-ld.exe -T linker_script.ld startup.o app.o uart.o -o learn-in-de
pth.elf -Map=Map_file.map
C:\Program Files (x86)\Arm\bin\arm-none-eabi-ld.exe: warning: learn-in-depth.elf
 has a LOAD segment with RWX permissions

Apex@DESKTOP-OO6R37L MINGW64 /d/full_diploma/ES_Online_Diploma_KS/first_term/uni
t3/labs/lab1
$  arm-none-eabi-nm.exe learn-in-depth.elf
00010010 T main
00010000 T reset
0001114c D stack_top
00010008 t stop
000100e8 D string_buffer
00010084 T string_buffer_2
0001002c T uart_send_strig
```

4.Getting the binary file and simulating the application using QEMU:

```
Apex@DESKTOP-OO6R37L MINGW64 /d/full_diploma/ES_Online_Diploma_KS/first_term/uni
t3/labs/lab1
$ arm-none-eabi-objcopy.exe -O binary learn-in-depth.elf learn-in-depth.bin
```

```
Apex@DESKTOP-OO6R37L MINGW64 /d/full_diploma/ES_Online_Diploma_KS/first_term/uni
t3/labs/lab1
$ ../../../../../../c/PROGRAMS/qemu/qemu-system-arm -M versatilepb -m 128M -nogr
aphic -kernel learn-in-depth.bin
learn-in-depth:<tasneem>
```