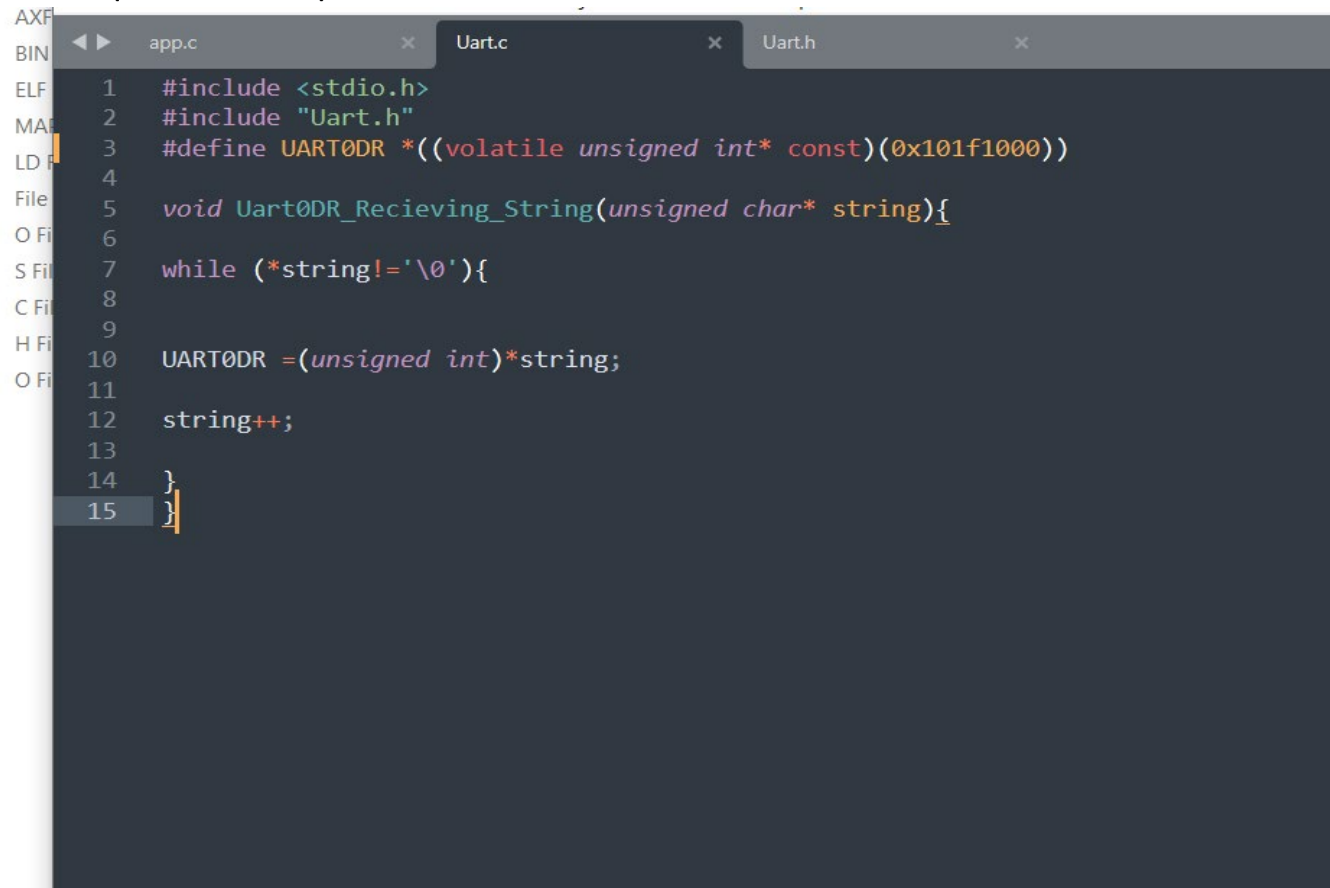
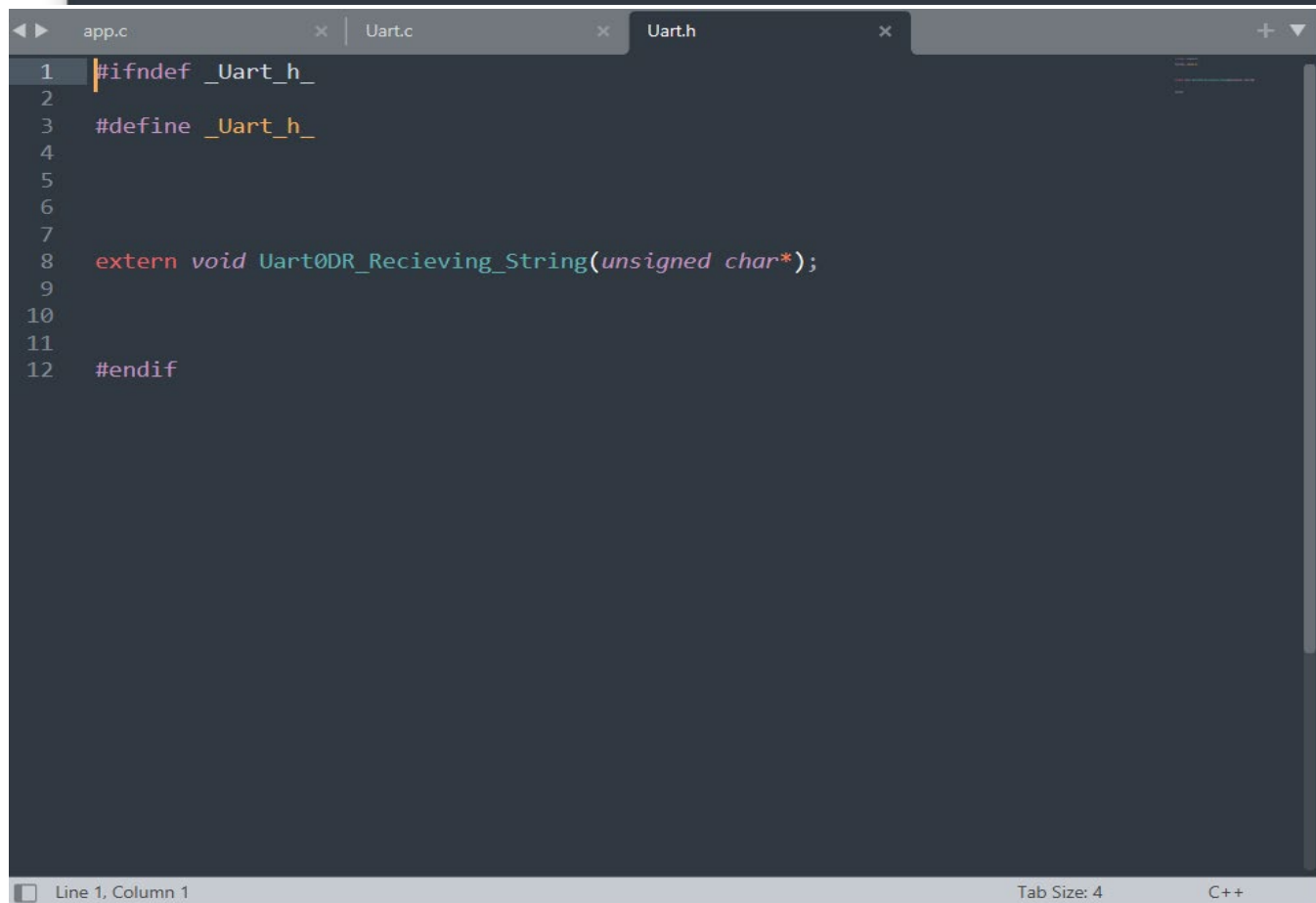


Files required to compile:



A screenshot of a code editor with three tabs: app.c, Uart.c, and Uart.h. The Uart.c tab is active, showing the implementation of the Uart0DR_Receiving_String function. The code is as follows:

```
1  #include <stdio.h>
2  #include "Uart.h"
3  #define UART0DR *((volatile unsigned int* const)(0x101f1000))
4
5  void Uart0DR_Receiving_String(unsigned char* string){
6
7  while (*string!='\0'){
8
9
10     UART0DR =(unsigned int)*string;
11
12     string++;
13
14 }
15 }
```



A screenshot of a code editor with three tabs: app.c, Uart.c, and Uart.h. The Uart.h tab is active, showing the header file for the Uart module. The code is as follows:

```
1  #ifndef _Uart_h_
2
3  #define _Uart_h_
4
5
6
7
8  extern void Uart0DR_Receiving_String(unsigned char*);
9
10
11
12  #endif
```

At the bottom of the editor, the status bar shows "Line 1, Column 1", "Tab Size: 4", and "C++".

```
app.c x Uart.c x Uarth x +
1 #include "Uart.h"
2
3 unsigned char string[100]="Learn-In-Depth:<Mahmood Ali>";
4
5 int main(){
6
7   Uart0DR_Recieving_String(string);
8
9   return 0;
10
11 }
```

Line 1, Column 1 Tab Size: 4 C

```
makefile x makefile x Startup.s x
1
2 .global reset
3
4 reset:
5     ldr sp,=_stack_p
6     bl main
7
8 loop:
9     b loop
10
11
```

```

1 ENTRY(reset)
2
3 MEMORY{
4     MEM(RWX):ORIGIN =0x00000000,LENGTH =64M
5
6
7
8
9
10 SECTIONS{
11     . = 0x10000;
12     .reset . :
13     {
14         Startup.o(.text)
15     }>MEM
16     .text :
17     {
18         *(.text)
19         *(.rodata)
20     }>MEM
21
22     .data :
23     {
24         *(.data)
25     }>MEM
26
27     .bss :
28     {
29         *(.bss)
30     }>MEM
31
32     . = . + 0x1000;
33     _stack_p = .;
34
35 }

```

Compiling and building process:

```

MINGW32:/c/Users/Sence79/Desktop/lab1 - Copy

Sence79@DESKTOP-JJFQ8S2 MINGW32 ~/Desktop/lab1 - Copy
$ make
arm-none-eabi-gcc -mcpu=arm926ej-s -g -c -I. Uart.c -o Uart.o
arm-none-eabi-gcc -mcpu=arm926ej-s -g -c -I. app.c -o app.o
arm-none-eabi-as -mcpu=arm926ej-s -g Startup.s -o Startup.o
arm-none-eabi-ld -T LinkerScript.ld Uart.o app.o Startup.o -o Learn-In-Depth.elf -Map=Learn-In-Depth.map
arm-none-eabi-objcopy Learn-In-Depth.elf -O binary Learn-In-Depth.bin
cp Learn-In-Depth.bin Learn-In-Depth.axf

Sence79@DESKTOP-JJFQ8S2 MINGW32 ~/Desktop/lab1 - Copy
$ make sim
qemu-system-arm -M versatilepb -m 128M -nographic -kernel Learn-In-Depth.bin
Learn-In-Depth:<Mahmood Ali>

```

Analyzing some .o files:

```
MINGW32/c/Users/Sence79/Desktop/lab1 - Copy

Sence79@DESKTOP-JJFQ8S2 MINGW32 ~/Desktop/lab1 - Copy
$ make nm
make: *** No rule to make target `nm'. Stop.

Sence79@DESKTOP-JJFQ8S2 MINGW32 ~/Desktop/lab1 - Copy
$ make nm
arm-none-eabi-nm app.o
00000000 T main
00000000 D string
        U Uart0DR_Recieving_String

Sence79@DESKTOP-JJFQ8S2 MINGW32 ~/Desktop/lab1 - Copy
$ make nm
arm-none-eabi-nm Learn-In-Depth.elf
000110e4 D _stack_p
00010008 t loop
00010060 T main
00010000 T reset
00010080 D string
00010010 T Uart0DR_Recieving_String
```

```
MINGW32/c/Users/Sence79/Desktop/lab1 - Copy

Sence79@DESKTOP-JJFQ8S2 MINGW32 ~/Desktop/lab1 - Copy
$ ls
app.c          Learn-In-Depth.bin  LinkerScript.ld  Startup.s  Uart.o
app.o          Learn-In-Depth.elf  makefile         Uart.c
Learn-In-Depth.axf  Learn-In-Depth.map  Startup.o        Uart.h

Sence79@DESKTOP-JJFQ8S2 MINGW32 ~/Desktop/lab1 - Copy
$ make O-analyze
make: *** No rule to make target `O-analyze'. Stop.

Sence79@DESKTOP-JJFQ8S2 MINGW32 ~/Desktop/lab1 - Copy
$ make O_analyze
arm-none-eabi-objdump -h app.o

app.o:      file format elf32-littlearm

Sections:
Idx Name          Size      VMA       LMA       File off  Algn
  0 .text          00000020  00000000  00000000  00000034  2**2
    CONTENTS, ALLOC, LOAD, RELOC, READONLY, CODE
  1 .data          00000064  00000000  00000000  00000054  2**2
    CONTENTS, ALLOC, LOAD, DATA
  2 .bss           00000000  00000000  00000000  000000b8  2**0
    ALLOC
  3 .debug_info     00000076  00000000  00000000  000000b8  2**0
    CONTENTS, RELOC, READONLY, DEBUGGING
  4 .debug_abbrev   00000065  00000000  00000000  0000012e  2**0
    CONTENTS, READONLY, DEBUGGING
  5 .debug_loc      0000002c  00000000  00000000  00000193  2**0
    CONTENTS, READONLY, DEBUGGING
  6 .debug_aranges  00000020  00000000  00000000  000001bf  2**0
    CONTENTS, RELOC, READONLY, DEBUGGING
  7 .debug_line     00000036  00000000  00000000  000001df  2**0
    CONTENTS, RELOC, READONLY, DEBUGGING
  8 .debug_str      0000005a  00000000  00000000  00000215  2**0
    CONTENTS, READONLY, DEBUGGING
  9 .comment        00000012  00000000  00000000  0000026f  2**0
    CONTENTS, READONLY
10 .ARM.attributes 00000032  00000000  00000000  00000281  2**0
    CONTENTS, READONLY
11 .debug_frame    0000002c  00000000  00000000  000002b4  2**2
    CONTENTS, RELOC, READONLY, DEBUGGING
```