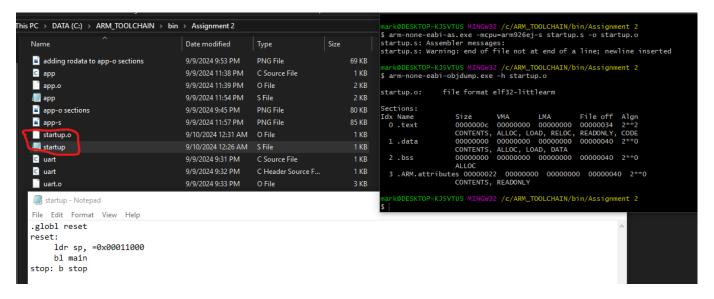
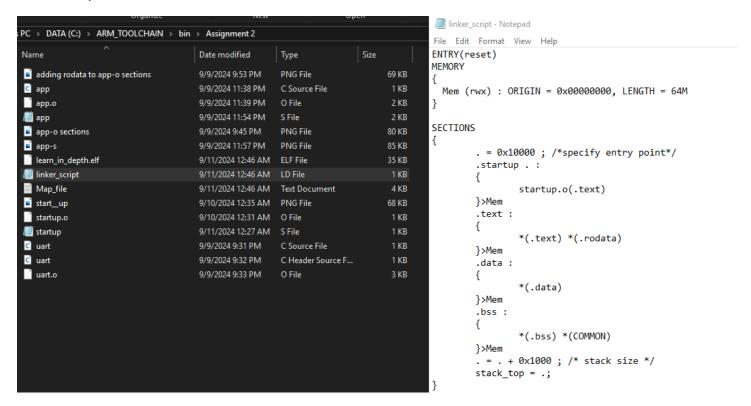
```
App.c
#include "uart.h"
const int x=100;
unsigned char string_buffer[100]="learn in depth 2024: mark";
int main(){
uart_send_string(string_buffer);
  return 0;
}
Uart.c
#include "uart.h"
#define UARTODR *((volatile unsigned int *const)((unsigned int*)0x101f1000))
void uart_send_string(unsigned char *P_tx_string){
while(*P_tx_string != '\0'){
UARTODR =(unsigned char) (*P_tx_string);
P_tx_string++;
}
}
Uart.h
#ifndef_UART_H_
#define _UART_H_
void uart_send_string(unsigned char *P_tx_string);
#endif
```

Startup.s

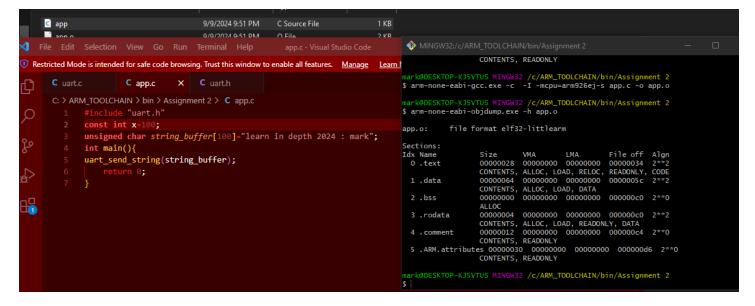


## Linker script



Sections of object files

App.o



## Uart.o

```
nark@DESKTOP-KJ5VTUS MINGW32 /c/ARM_TOOLCHAIN/bin/Assignment 2
$ arm-none-eabi-objdump.exe -h Uart.o
           file format elf32-littlearm
Uart.o:
Sections:
                                              File off Algn
Idx Name
                 Size
                           VMA
                                     LMA
                 00000050 00000000 00000000
                                              00000034 2**2
 0 .text
                 CONTENTS, ALLOC, LOAD, RELOC, READONLY, CODE
                 00000000 00000000 00000000 00000084
                                                        2**0
 1 .data
                 CONTENTS, ALLOC, LOAD, DATA
                 00000000 00000000 00000000 00000084 2**0
 2 .bss
                 ALLOC
 3 .debug_info
                 0000005c 00000000 00000000 00000084 2**0
                 CONTENTS, RELOC, READONLY, DEBUGGING
 4 .debug_abbrev 00000051 00000000 00000000 000000e0 2**0
                 CONTENTS, READONLY, DEBUGGING
 5 .debug_loc
                 0000002c 00000000 00000000 00000131 2**0
                 CONTENTS, READONLY, DEBUGGING
 6 .debug_aranges 00000020 00000000 00000000
                                               0000015d 2**0
                 CONTENTS, RELOC, READONLY, DEBUGGING
                 0000003d 00000000 00000000 0000017d 2**0
 7 .debug_line
                 CONTENTS, RELOC, READONLY, DEBUGGING
                 00000060 00000000 00000000 000001ba 2**0
 8 .debug_str
                 CONTENTS, READONLY, DEBUGGING
                 00000012 00000000 00000000 0000021a 2**0
 9 .comment
                 CONTENTS, READONLY
10 .ARM.attributes 00000030 00000000 00000000 0000022c 2**0
                 CONTENTS, READONLY
                 00000028 00000000 00000000 0000025c 2**2
11 .debug_frame
                 CONTENTS, RELOC, READONLY, DEBUGGING
 ark@DESKTOP-KJ5VTUS MINGW32 /c/ARM_TOOLCHAIN/bin/Assignment 2
```

Startup.o

```
mark@DESKTOP-KJ5VTUS MINGW32 /c/ARM_TOOLCHAIN/bin/Assignment 2
$ 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
mark@DESKTOP-KJ5VTUS MINGW32 /c/ARM_TOOLCHAIN/bin/Assignment 2

$ arm-none-eabi-objdump.exe -h startup.o
startup.o:
                    file format elf32-littlearm
Sections:
                        Size VMA LMA
0000000c 00000000 00000000
Idx Name
                                                                  File off
                                                                               Algn
  0 .text
                                                                 00000034 2**2
                        CONTENTS, ALLOC, LOAD, RELOC, READONLY, CODE 00000000 00000000 00000000 00000040 2**0
  1 .data
                        CONTENTS, ALLOC, LOAD, DATA
00000000 00000000 000000000
                                                                 00000040 2**0
  2 .bss
  ALLOC
3 .ARM.attributes 00000022 00000000 00000000 00000040 2**0
                        CONTENTS, READONLY
  ark@DESKTOP-KJ5VTUS MINGW32 /c/ARM_TOOLCHAIN/bin/Assignment 2
```

## Learn\_in\_depth.elf

Name ^	Date modified	Туре	Size	\$ arm-none-eabi-nm.exe learn_in_depth.elf 0001000c T main 00010000 T reset
adding rodata to app-o sections	9/9/2024 9:53 PM	PNG File	69 KB	000110ec D stack_top
☐ app	9/9/2024 11:38 PM	C Source File	1 KB	00010008 t stop 00010088 D string_buffer
app.o	9/9/2024 11:39 PM	O File	2 KB	00010088 D String_burrer 00010034 T uart_send_string
<u> </u>	9/9/2024 11:54 PM	S File	2 KB	00010084 T x
app-o sections	9/9/2024 9:45 PM	PNG File	80 KB	mark@DESKTOP-KJ5VTUS MINGW32 /c/ARM_TOOLCHAIN/bin/Assignmer
app-s	9/9/2024 11:57 PM	PNG File	85 KB	<pre>\$ arm-none-eabi-objdump.exe -h learn_in_depth.elf</pre>
learn_in_depth.elf	9/11/2024 12:46 AM	ELF File	35 KB	learn_in_depth.elf: file format elf32-littlearm
inker - Id	9/11/2024 12:47 AM	PNG File	62 KB	
linker_script	9/11/2024 12:46 AM		1 KB	Sections:  Idx Name Size VMA LMA File off Al
Map_file	9/11/2024 12:46 AM		4 KB	0 .startup 0000000c 00010000 00010000 00008000 2*
<b>=</b> '-				CONTENTS, ALLOC, LOAD, READONLY, CODE 1 .text 0000007c 0001000c 0001000c 0000800c 2*
start_up	9/10/2024 12:35 AM	PNG File	68 KB	CONTENTS, ALLOC, LOAD, READONLY, CODE
startup.o	9/10/2024 12:31 AM		1 KB	2 .data 00000064 00010088 00010088 00008088 2*
startup	9/11/2024 12:27 AM	S File	1 KB	CONTENTS, ALLOC, LOAD, DATA 3 .ARM.attributes 0000002e 00000000 00000000 000080ec
c uart	9/9/2024 9:31 PM	C Source File	1 KB	CONTENTS, READONLY
C uart	9/9/2024 9:32 PM	C Header Source F	1 KB	4 .comment 00000011 00000000 00000000 0000811a 2*
uart.o	9/9/2024 9:33 PM	O File	3 KB	CONTENTS, READONLY 5 .debug_info 0000005c 00000000 00000000 0000812b 2*
_				CONTENTS, READONLY, DEBUGGING
				6 .debug_abbrev 00000051 00000000 00000000 00008187 2*
				CONTENTS, READONLY, DEBUGGING
				7 .debug_loc 0000002c 00000000 00000000 000081d8 2* CONTENTS, READONLY, DEBUGGING
				8 .debug_aranges 00000020 00000000 00000000 00008204 2
				CONTENTS, READONLY, DEBUGGING
				9 .debug_line 0000003d 00000000 00000000 00008224 2*
				CONTENTS, READONLY, DEBUGGING
				10 .debug_str
				CONTENTS, READONLY, DEBUGGING
				11 .debug_frame 00000028 00000000 00000000 000082c4 2* CONTENTS, READONLY, DEBUGGING
				CONTENTS, READONET, DEBUGGING
.1 KB				mark@DESKTOP-KJ5VTUS MINGW32 /c/ARM_TOOLCHAIN/bin/Assignment

Symbol table

```
MINGW32:/c/ARM_TOOLCHAIN/bin/Assignment 2

mark@DESKTOP-KJ5VTUS MINGW32 /c/ARM_TOOLCHAIN/bin/Assignment 2

$ arm-none-eabi-nm.exe learn_in_depth.elf
0001000c T main
00010000 T reset
000110ec D stack_top
00010008 t stop
00010088 D string_buffer
00010034 T uart_send_string
00010084 T x

mark@DESKTOP-KJ5VTUS MINGW32 /c/ARM_TOOLCHAIN/bin/Assignment 2

$ | |
```

## Output

hppa-firmware iconv.dll kvmvapic.bin learn_in_depth.bin libatk-1.0-0.dll libbaz2-1.dll libcairo-2.dll	11/18/2013 2:40 AM 4/30/2018 4:48 PM 9/11/2024 12:57 AM 2/20/2018 6:15 AM 11/27/2013 12:42 2/20/2018 6:32 AM 2/20/2018 6:32 AM	Disc Image File Application extens BIN File BIN File Application extens Application extens Application extens Application extens	1 KB 110 KB 65 KB 857 KB 27 KB	♠ MINGW32/c/Program Files (x86)/qemu  mark@DESKTOP-KJ5VTUS MINGW32 /c/Program Files (x86)/qemu  \$ ./qemu-system-arm -M versatilepb -m 128M -nographic -kernel learn_in_depth.bin dsound: Could not initialize DirectSoundCapture dsound: Reason: No sound driver is available for use, or the given GUID is not a valid D ound device ID learn in depth 2024 : mark    Program Files (x86)/qemu   Program Files (x86)/qemu   State
ibcairo-gobject-2.dll	2/20/2018 6:32 AM 3/15/2018 5:31 PM	Application extens Application extens	27 KB 497 KB	
⊚ libeay32.dll	12/7/2017 7:35 PM	Application extens	1,785 KB	