

Microprocessor and Computer Architecture

UE20CS252

4th Semester, Academic Year 2021-22

Date: 15/03/2022

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Week# 7

Program Number: 1

Title of the Program

1. Display hexadecimal digits [0-9,A-F] on the 8 segment display.

1. ARM Assembly Code(1)

```
vishwa@Acer-Vishwa: /mnt/c/U  ×  +  ∨  
1  ; Program to display 0 to F  and F-0 on the 8 segment display depending  
2  ; on the which black button is pressed  
3  .text  
4  .global _start  
5  begin:  
6      mov r0,#0  
7      mov r2,#0  
8  again:  
9      swi 0x202 ;check whether black button pressed or not  
10     cmp r0,#1  
11     beq loop1  
12     cmp r0,#2  
13     beq loop2  
14     b again  
15  loop1:  
16     mov r5,#16  
17     ldr r1,=zero  
18  back1:  
19     ldrb r0,[r1]  
20     swi 0x200 ;Set 8 segment display to light up  
21     bl delay  
22     add r1,r1,#1  
23     sub r5,r5,#1  
24     cmp r5,#0  
25     bne back1  
26     b again  
27  loop2:  
"display_numbers.s" [dos] 63L, 1130C
```

```

vishwa@Acer-Vishwa: /mnt/c/U  ×  +  ∨
26      b again
27 loop2:
28      mov r5,#16
29      ldr r1,=F
30 back2:
31      ldrb r0,[r1]
32      swi 0x200 ; Set 8 segment display to light up
33      bl delay
34      sub r1,r1,#1
35      sub r5,r5,#1
36      cmp r5,#0
37      bne back2
38      b again
39 delay:
40      mov r4,#64000
41 loop3:
42      sub r4,r4,#1
43      cmp r4,#0
44      bge loop3
45      mov pc,lr
46
47 .data
48 zero: .byte 0b11101101
49 one: .byte 0b01100000
50 two: .byte 0b11001110
51 three: .byte 0b11111010
52 four: .byte 0b01110011

```

```

vishwa@Acer-Vishwa: /mnt/c/U  ×  +  ∨
37      bne back2
38      b again
39 delay:
40      mov r4,#64000
41 loop3:
42      sub r4,r4,#1
43      cmp r4,#0
44      bge loop3
45      mov pc,lr
46
47 .data
48 zero: .byte 0b11101101
49 one: .byte 0b01100000
50 two: .byte 0b11001110
51 three: .byte 0b11111010
52 four: .byte 0b01110011
53 five: .byte 0b10101011
54 six: .byte 0b10101111
55 seven: .byte 0b11100000
56 eight: .byte 0b11111111
57 nine: .byte 0b11101011
58 A: .byte 0b11111011
59 B: .byte 0b00111111
60 C: .byte 0b10011101
61 D: .byte 0b01111110
62 E: .byte 0b10011111
63 F: .byte 0b10010111

```

2. Output Screen Shot (1)

ARMSim - The ARM Simulator Dept. of Computer Science

File View Cache Debug Watch Help

RegistersView

General Purpose Floating Point

Hexadecimal

Unsigned Decimal

Signed Decimal

R0 : 00000000
R1 : 0000109c
R2 : 00000000
R3 : 00000000
R4 : ffffffff
R5 : 00000000
R6 : 00000000
R7 : 00000000
R8 : 00000000
R9 : 00000000
R10(s1): 00000000
R11(fp): 00000000
R12(ip): 00000000
R13(sp): 00005400
R14(lr): 00001034
R15(pc): 00001008

CPSR Register

Negative(N): 1
Zero(Z): 0
Carry(C): 0
Overflow(V): 0
IRQ Disable: 1
FIQ Disable: 1
Thumb(T): 0
CPU Mode : System

0x800000df

PluginUIView

EmbestBoardPlugin

0.0 0.1 0.2 0.3
1.0 1.1 1.2 1.3
2.0 2.1 2.2 2.3
3.0 3.1 3.2 3.3

display_numbers.s

```
; Program to display 0 to F and F-0 on the 8 segment display depending  
; on the which black button is pressed  
.text  
.global _start  
begin:  
00001000: mov r0,#0  
00001004: E3A02000 mov r2,#0  
00001008: again:  
00001008: EF000202 swi 0x202 ;check whether black button pressed or not  
0000100C: E3500001 cmp r0,#1  
00001010: 0A000002 beq loop1  
00001014: E3500002 cmp r0,#2
```

OutputView

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Week# 7

Program Number: 2

Title of the Program

2. Move a string from RIGHT to LEFT on the LCD display panel.

1. ARM Assembly Code(1)

```
vishwa@Acer-Vishwa: /mnt/c/U  ×  +  ∨
1  .text
2  mov r0,#30 ;r0 = x
3  mov r1,#7  ;r1 = y
4  mov r7,#0
5  ldr r8,=num
6  ldr r8,[r8]
7  ldr r2,=str
8  loop:
9      swi 0x204
10     bl sum
11     cmp r0,#0
12     subne r0,r0,#1
13     swieq 0x11
14     b loop
15 sum:
16     cmp r7,r8
17     addne r7,r7,#1
18     bne sum
19     swi 0x206 ;Clear one line in the display on the LCD screen.r0-line no(y)
20     mov r7,#0
21     mov pc,lr
22 .data
23 str: .asciz "HELLO WORLD"
24 num: .word 15000
~
```

2. Output Screen Shot (1)

ARMSim - The ARM Simulator Dept. of Computer Science

File View Cache Debug Watch Help

RegistersView

General Purpose Floating Point

Hexadecimal

Unsigned Decimal

Signed Decimal

R0 : 00000000
R1 : 00000000
R2 : 00000000
R3 : 00000000
R4 : 00000000
R5 : 00000000
R6 : 00000000
R7 : 00000000
R8 : 00000000
R9 : 00000000
R10 (s1) : 00000000
R11 (fp) : 00000000
R12 (ip) : 00000000
R13 (sp) : 00005400
R14 (lr) : 00000000
R15 (pc) : 00001000

CPSR Register

Negative (N) : 0
Zero (Z) : 0
Carry (C) : 0
Overflow (V) : 0
IRQ Disable : 1
FIQ Disable : 1
Thumb (T) : 0
CPU Mode : System

0x000000dF

PluginUI View

EmbestBoardPlugin

0.0 0.1 0.2 0.3
1.0 1.1 1.2 1.3
2.0 2.1 2.2 2.3
3.0 3.1 3.2 3.3

HELLO WORLD

hello_world.s

```
.text
00001000:E3A0001E  mov r0,#30 ;r0 = x
00001004:E3A01007  mov r1,#7  ;r1 = y
00001008:E3A07000  mov r7,#0
0000100C:E59F8034  ldr r8,=num
00001010:E5988000  ldr r8,[r8]
00001014:E59F2030  ldr r2,=str
00001018:               loop:
00001018:EF0000204      swi 0x204
0000101C:EB000003      bl sum
00001020:E3500000      cmp r0,#0
00001024:12400001      subne r0,r0,#1
```

OutputView

Disclaimer:

- The programs and output submitted is duly written, verified and executed by me.
- I have not copied from any of my peers nor from the external resource such as internet.
- If found plagiarized, I will abide with the disciplinary action of the University.

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