Microprocessor and Computer Architecture Laboratory

UE19CS256

4th Semester, Academic Year 2020-21

Date:

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Week#____6_______ Program Number: ____1__

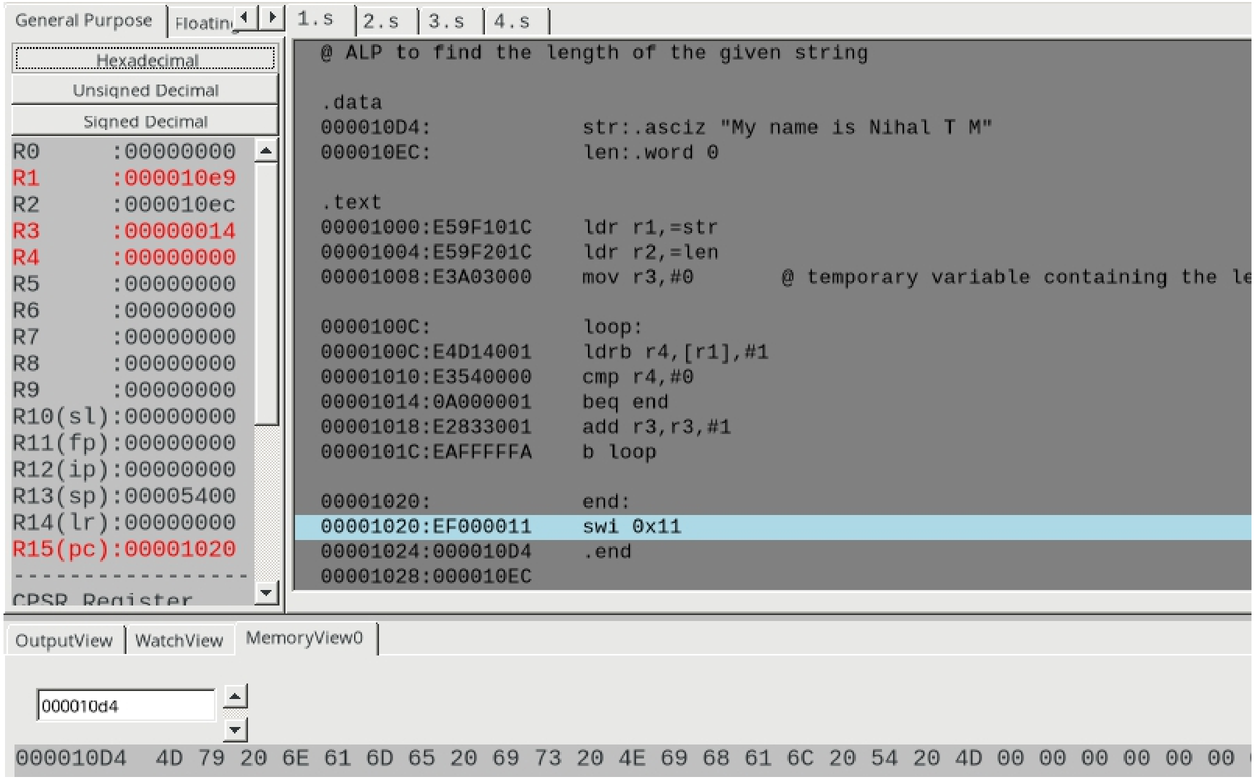
Write an ALP to find the length of a given string

I. ARM Assembly Code (1).

```
@ ALP to find the length of the given string

.data
   str:.asciz "My name is Nihal T M"
   len:.word 0

.text
   ldr r1,=str
   ldr r2,=len
   mov r3,#0     @ temporary variable containing
the length of the string as we traverse
```

```
    loop:
        ldrb r4,[r1],#1
        cmp r4,#0
        beq end
        add r3,r3,#1
        b loop

    end:
        swi 0x11
.end
```

II. Output Screen Shot (One Example of your choice)



```
R0       :00000000
R1       :000010e9
R2       :000010ec
R3       :00000014
R4       :00000000
R5       :00000000
R6       :00000000
R7       :00000000
R8       :00000000
R9       :00000000
R10(sl):00000000
R11(fp):00000000
R12(ip):00000000
R13(sp):00005400
R14(lr):00000000
R15(pc):00001020
-----------------
CPSR Register
```

```
@ ALP to find the length of the given string

.data
000010D4:           str:.asciz "My name is Nihal T M"
000010EC:           len:.word 0

.text
00001000:E59F101C    ldr r1,=str
00001004:E59F201C    ldr r2,=len
00001008:E3A03000    mov r3,#0       @ temporary variable containing the le

0000100C:            loop:
0000100C:E4D14001    ldrb r4,[r1],#1
00001010:E3540000    cmp r4,#0
00001014:0A000001    beq end
00001018:E2833001    add r3,r3,#1
0000101C:EAFFFFFA    b loop

00001020:            end:
00001020:EF000011    swi 0x11
00001024:000010D4    .end
00001028:000010EC
```

```
000010d4

000010D4  4D 79 20 6E 61 6D 65 20 69 73 20 4E 69 68 61 6C 20 54 20 4D 00 00 00 00 00 00
```

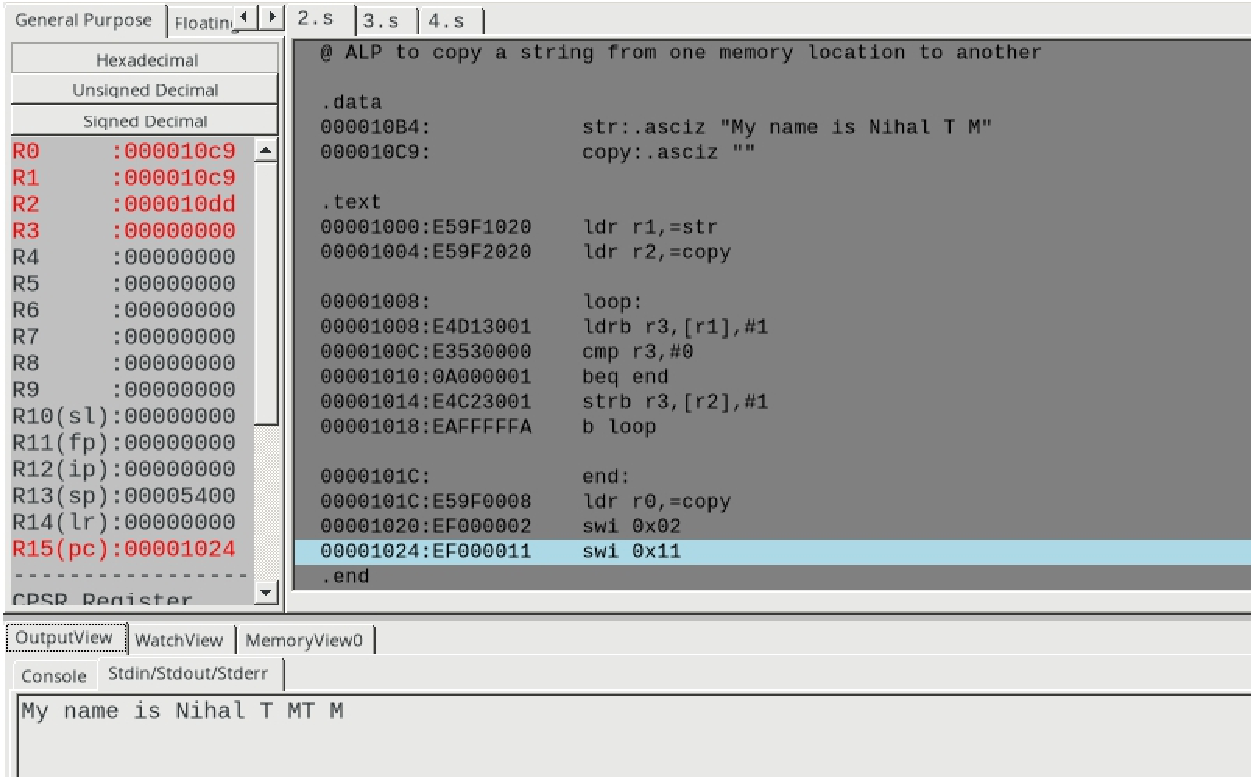
Week#____6______ Program Number: ____2__

Write an ALP to copy string from one location to another

I. ARM Assembly Code (1).

```
@ ALP to copy a string from one memory location to another

.data
   str:.asciz "My name is Nihal T M"
   copy:.asciz ""

.text
   ldr r1,=str
   ldr r2,=copy

   loop:
         ldrb r3,[r1],#1
         cmp r3,#0
         beq end
         strb r3,[r2],#1
         b loop

   end:
         ldr r0,=copy
         swi 0x02
         swi 0x11
.end
```

II. Output Screen Shot (One Example of your choice)



```
R0      :000010c9
R1      :000010c9
R2      :000010dd
R3      :00000000
R4      :00000000
R5      :00000000
R6      :00000000
R7      :00000000
R8      :00000000
R9      :00000000
R10(sl):00000000
R11(fp):00000000
R12(ip):00000000
R13(sp):00005400
R14(lr):00000000
R15(pc):00001024
----------------
CPSR Register
```

```
@ ALP to copy a string from one memory location to another

.data
000010B4:           str:.asciz "My name is Nihal T M"
000010C9:           copy:.asciz ""

.text
00001000:E59F1020   ldr r1,=str
00001004:E59F2020   ldr r2,=copy

00001008:           loop:
00001008:E4D13001   ldrb r3,[r1],#1
0000100C:E3530000   cmp r3,#0
00001010:0A000001   beq end
00001014:E4C23001   strb r3,[r2],#1
00001018:EAFFFFFA   b loop

0000101C:           end:
0000101C:E59F0008   ldr r0,=copy
00001020:EF000002   swi 0x02
00001024:EF000011   swi 0x11
.end
```

```
My name is Nihal T MT M
```

Week#____6_______ Program Number: ____3__

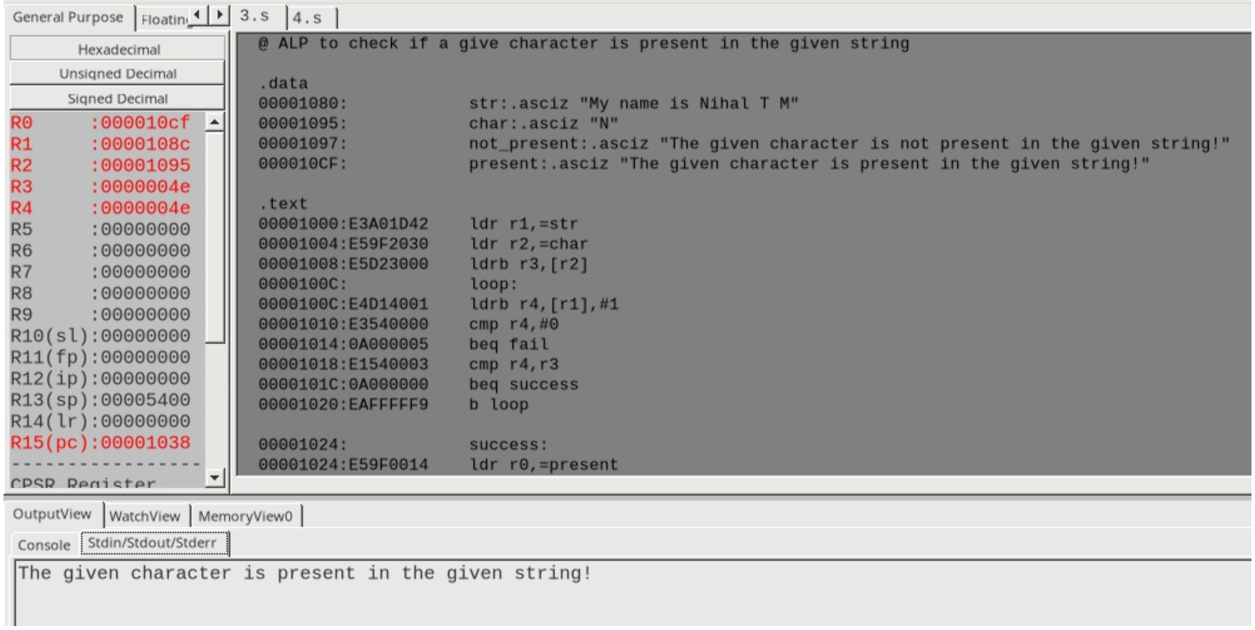
Write an ALP to find whether a given character is present in a string.

I. ARM Assembly Code (1).

```
@ ALP to check if a give character is present in the given string

.data
    str:.asciz "My name is Nihal T M"
    char:.asciz "N"
    not_present:.asciz "The given character is not present in the given string!"
    present:.asciz "The given character is present in the given string!"

.text
    ldr r1,=str
    ldr r2,=char
    ldrb r3,[r2]
    loop:
        ldrb r4,[r1],#1
        cmp r4,#0
        beq fail
        cmp r4,r3
        beq success
        b loop

    success:
        ldr r0,=present
        swi 0x02
        b end

    fail:
        ldr r0,=not_present
        swi 0x02

    end:
        swi 0x11
.end
```

II. Output Screen Shot -2 (One Example of your choice)

(i) when character is present in the string:

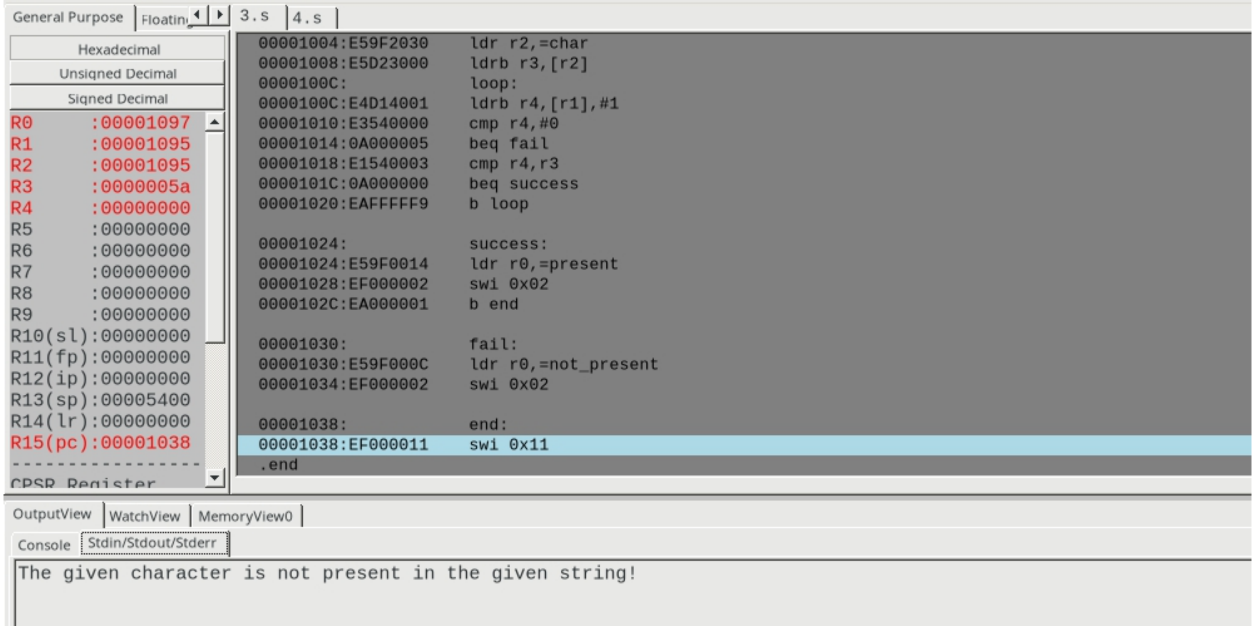


```
R0      :000010cf
R1      :0000108c
R2      :00001095
R3      :0000004e
R4      :0000004e
R5      :00000000
R6      :00000000
R7      :00000000
R8      :00000000
R9      :00000000
R10(sl):00000000
R11(fp):00000000
R12(ip):00000000
R13(sp):00005400
R14(lr):00000000
R15(pc):00001038
-----------------
CPSR Register
```

```
@ ALP to check if a give character is present in the given string

.data
00001080:               str:.asciz "My name is Nihal T M"
00001095:               char:.asciz "N"
00001097:               not_present:.asciz "The given character is not present in the given string!"
000010CF:               present:.asciz "The given character is present in the given string!"

.text
00001000:E3A01D42       ldr r1,=str
00001004:E59F2030       ldr r2,=char
00001008:E5D23000       ldrb r3,[r2]
0000100C:               loop:
0000100C:E4D14001       ldrb r4,[r1],#1
00001010:E3540000       cmp r4,#0
00001014:0A000005       beq fail
00001018:E1540003       cmp r4,r3
0000101C:0A000000       beq success
00001020:EAFFFFF9       b loop

00001024:               success:
00001024:E59F0014       ldr r0,=present
```

```
The given character is present in the given string!
```

(ii) when the given character is not present int he given string: (searching for Z)



```
R0      :00001097
R1      :00001095
R2      :00001095
R3      :0000005a
R4      :00000000
R5      :00000000
R6      :00000000
R7      :00000000
R8      :00000000
R9      :00000000
R10(sl):00000000
R11(fp):00000000
R12(ip):00000000
R13(sp):00005400
R14(lr):00000000
R15(pc):00001038
-----------------
CPSR Register
```

```
00001004:E59F2030       ldr r2,=char
00001008:E5D23000       ldrb r3,[r2]
0000100C:               loop:
0000100C:E4D14001       ldrb r4,[r1],#1
00001010:E3540000       cmp r4,#0
00001014:0A000005       beq fail
00001018:E1540003       cmp r4,r3
0000101C:0A000000       beq success
00001020:EAFFFFF9       b loop

00001024:               success:
00001024:E59F0014       ldr r0,=present
00001028:EF000002       swi 0x02
0000102C:EA000001       b end

00001030:               fail:
00001030:E59F000C       ldr r0,=not_present
00001034:EF000002       swi 0x02

00001038:               end:
00001038:EF000011       swi 0x11
.end
```

```
The given character is not present in the given string!
```

Week#____6_______   Program Number: ____4_

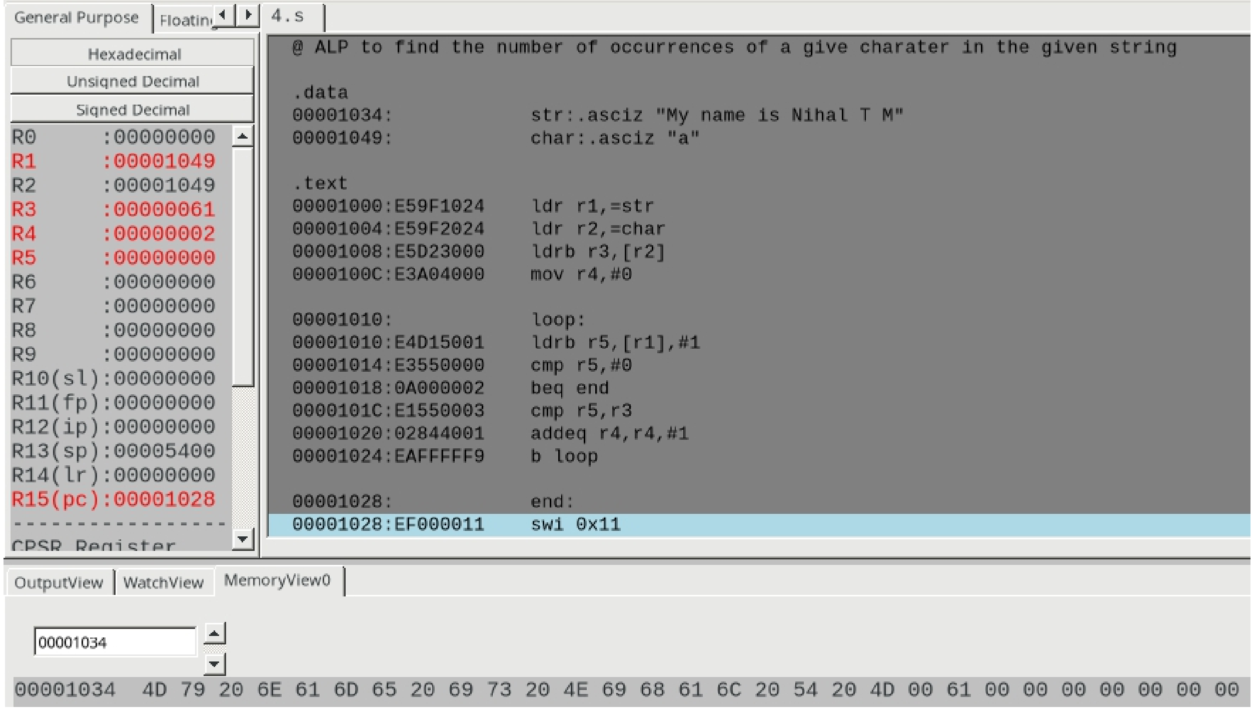
Write an ALP to find how many times a given character is present in a string

I. ARM Assembly Code (1).

```
@ ALP to find the number of occurrences of a give charater in the given string

.data
    str:.asciz "My name is Nihal T M"
    char:.asciz "a"

.text
    ldr r1,=str
    ldr r2,=char
    ldrb r3,[r2]
    mov r4,#0

    loop:
            ldrb r5,[r1],#1
            cmp r5,#0
            beq end
            cmp r5,r3
            addeq r4,r4,#1
            b loop

    end:
            swi 0x11
.end
```

II. Output Screen Shot (One Example of your choice)

(i) The number of occurrences of the character a in given string is stored in the r4 register



```
R0       :00000000
R1       :00001049
R2       :00001049
R3       :00000061
R4       :00000002
R5       :00000000
R6       :00000000
R7       :00000000
R8       :00000000
R9       :00000000
R10(sl):00000000
R11(fp):00000000
R12(ip):00000000
R13(sp):00005400
R14(lr):00000000
R15(pc):00001028
-----------------
CPSR Register
```

```
@ ALP to find the number of occurrences of a give charater in the given string

.data
00001034:              str:.asciz "My name is Nihal T M"
00001049:              char:.asciz "a"

.text
00001000:E59F1024    ldr r1,=str
00001004:E59F2024    ldr r2,=char
00001008:E5D23000    ldrb r3,[r2]
0000100C:E3A04000    mov r4,#0

00001010:              loop:
00001010:E4D15001    ldrb r5,[r1],#1
00001014:E3550000    cmp r5,#0
00001018:0A000002    beq end
0000101C:E1550003    cmp r5,r3
00001020:02844001    addeq r4,r4,#1
00001024:EAFFFFF9    b loop

00001028:              end:
00001028:EF000011    swi 0x11
```

```
00001034
```

```
00001034  4D 79 20 6E 61 6D 65 20 69 73 20 4E 69 68 61 6C 20 54 20 4D 00 61 00 00 00 00 00 00 00
```

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.

Signature:
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