

# Microprocessor and Computer Architecture Laboratory

UE19CS256

4th Semester, Academic Year 2020-21

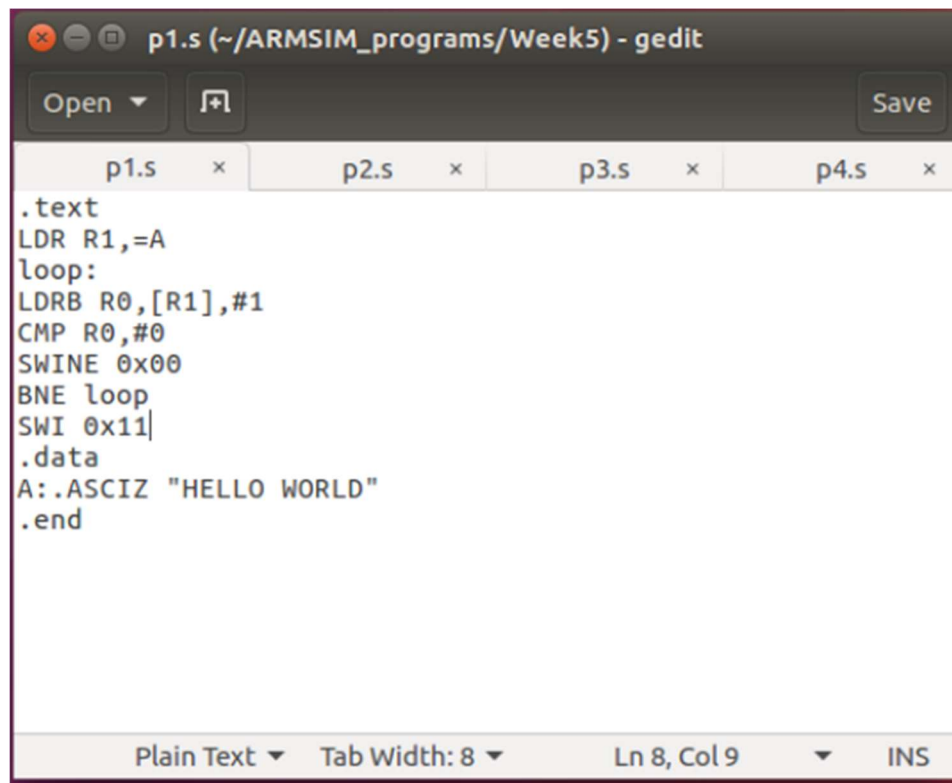
Date: 3/3/2021

Name: B.Pravena	SRN: PES2UG19CS076	Section: B
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Week# 5 Program Number: 1

## Write an ALP to display Hello World

### I. ARM Assembly Code



The screenshot shows a gedit window titled "p1.s (~/ARMSIM\_programs/Week5) - gedit". The window contains the following ARM assembly code:

```
.text
LDR R1,=A
loop:
LDRB R0,[R1],#1
CMP R0,#0
SWINE 0x00
BNE loop
SWI 0x11
.data
A:.ASCIZ "HELLO WORLD"
.end
```

The status bar at the bottom indicates "Plain Text", "Tab Width: 8", "Ln 8, Col 9", and "INS".

## II. Output Screen Shot

The screenshot displays a debugger interface with the following components:

- General Purpose** tab selected, showing register values in **Hexadecimal** format.
- Registers:**
  - R0: 00000000
  - R1: 00001028
  - R2: 00000000
  - 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): 00001014
- CPSR Register:**
  - Negative(N): 0
  - Zero(Z): 1
  - Carry(C): 1
- Assembly Code (p1.s):**

```
.text
00001000:E59F1010    LDR R1,=A
00001004:                loop:
00001004:E4D10001    LDRB R0,[R1],#1
00001008:E3500000    CMP R0,#0
0000100C:1F000000    SWINE 0x00
00001010:1AFFFFFFB    BNE loop
00001014:EF000011    SWI 0x11
.data
0000101C:                A: .ASCIZ "HELLO WORLD"
.end
```
- OutputView** tab selected, showing **Console** output: `HELLO WORLD`

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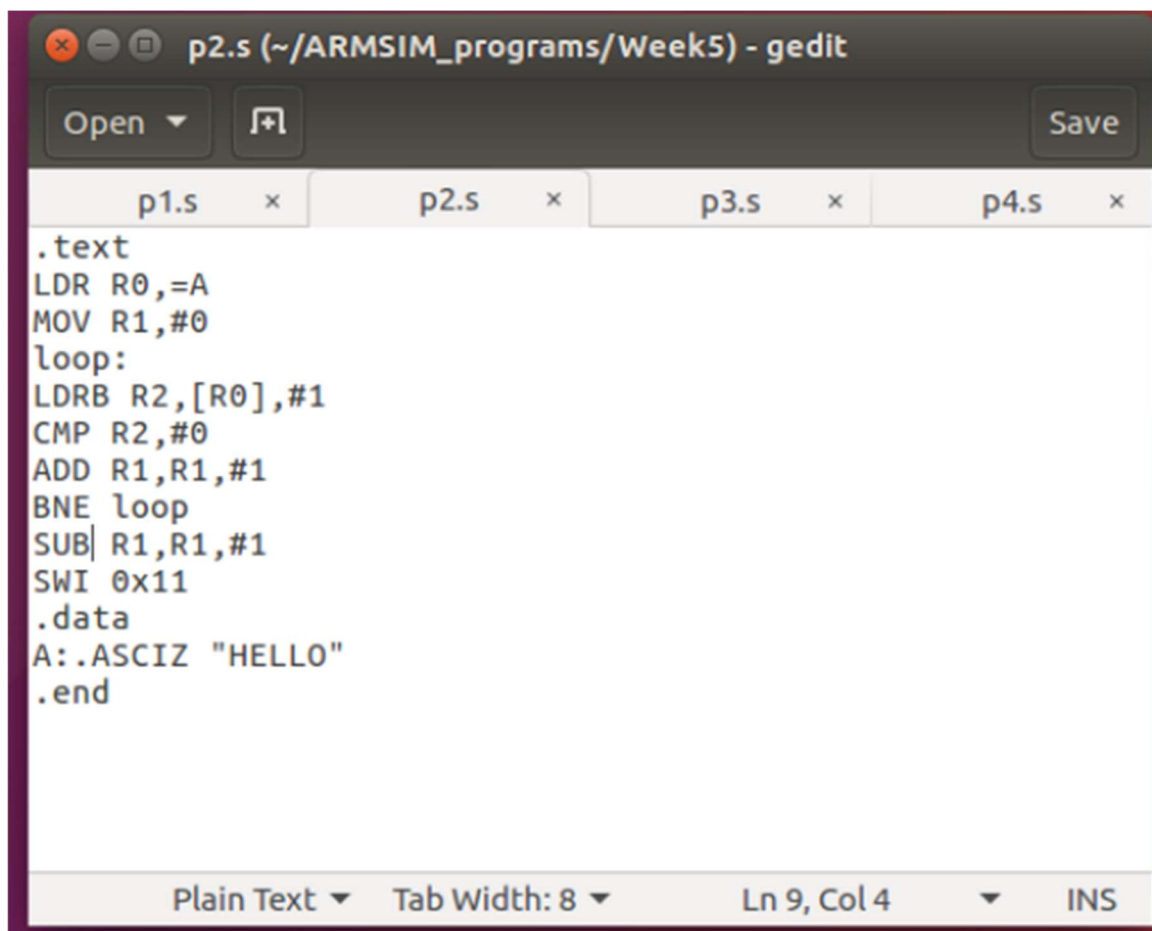
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Week# 5 Program Number: 2

**Write an ALP to find the length of a given string**

I. ARM Assembly Code



The screenshot shows a gedit editor window titled "p2.s (~/ARMSIM\_programs/Week5) - gedit". The window has a menu bar with "Open" and "Save" buttons. Below the menu bar are four tabs labeled "p1.s", "p2.s", "p3.s", and "p4.s", each with a close button. The main text area contains the following ARM assembly code:

```
.text
LDR R0,=A
MOV R1,#0
loop:
LDRB R2,[R0],#1
CMP R2,#0
ADD R1,R1,#1
BNE loop
SUB R1,R1,#1
SWI 0x11
.data
A:.ASCIZ "HELLO"
.end
```

At the bottom of the window, there is a status bar showing "Plain Text", "Tab Width: 8", "Ln 9, Col 4", and "INS".

## II. Output Screen Shot

The screenshot shows the ARM Simulator interface. The main window displays assembly code for a program named 'p2.s'. The code includes a loop that increments register R1 until it reaches 5, then prints 'HELLO'.

```

.text
00001000:E59F0018  LDR R0,=A
00001004:E3A01000  MOV R1,#0
00001008:          loop:
00001008:E4D02001  LDRB R2,[R0],#1
0000100C:E3520000  CMP R2,#0
00001010:E2811001  ADD R1,R1,#1
00001014:1AFFFFFB  BNE loop
00001018:E2411001  SUB R1,R1,#1
0000101C:EF000011  SWI 0x11
.data
00001024:          A: .ASCIZ "HELLO"
.end
  
```

On the left, the register window shows the following values:

- R0: 0000102a
- R1: 00000005
- R2: 00000000
- 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): 0000101c

The CPSR Register shows:

- Negative(N): 0
- Zero(Z): 1
- Carry(C): 1

The OutputView at the bottom shows the memory dump starting at address 00001024, displaying the string 'HELLO' in ASCII.

## III. Output Table for the program

Before Execution	
A	"HELLO"
After Execution	
R1	5

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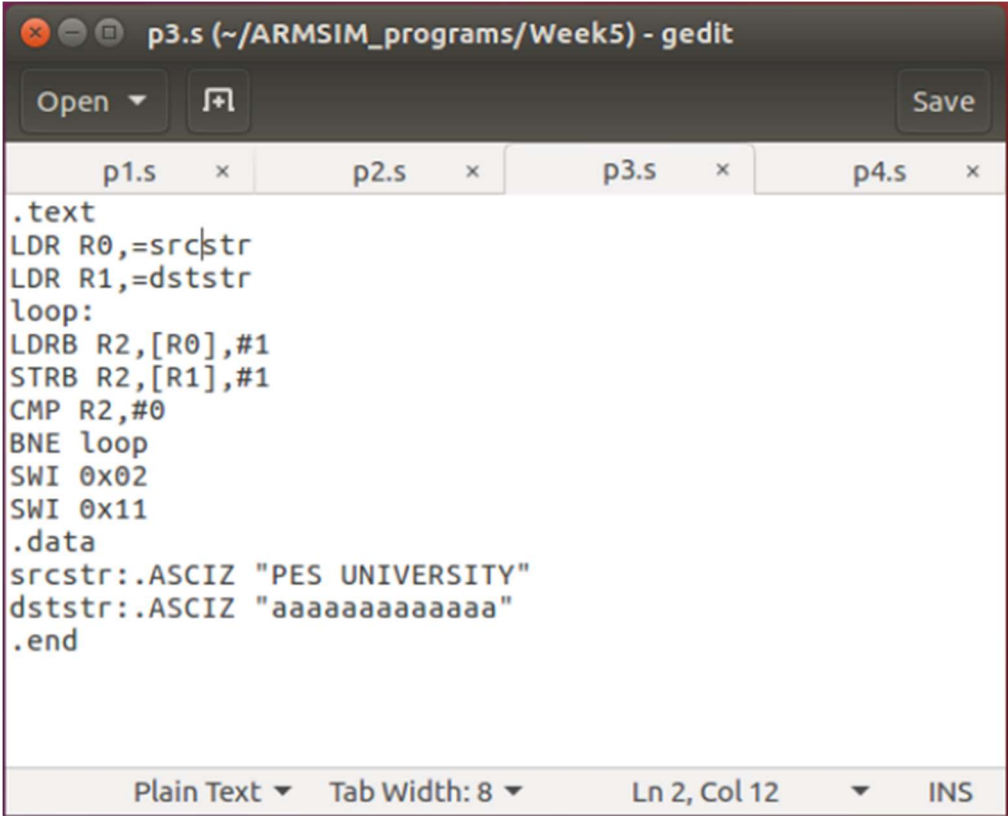
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Week# 5 Program Number: 3

**Write an ALP to copy string from one location to another**

## I. ARM Assembly Code



```
p3.s (~/ARMSIM_programs/Week5) - gedit
Open Save
p1.s x p2.s x p3.s x p4.s x
.text
LDR R0,=srcstr
LDR R1,=dststr
loop:
LDRB R2,[R0],#1
STRB R2,[R1],#1
CMP R2,#0
BNE loop
SWI 0x02
SWI 0x11
.data
srcstr:.ASCIZ "PES UNIVERSITY"
dststr:.ASCIZ "aaaaaaaaaaaaa"
.end
Plain Text Tab Width: 8 Ln 2, Col 12 INS
```

## II. Output Screen Shot

The screenshot shows a debugger window with the following components:

- General Purpose Register Window:** Displays registers R0 through R15. R0 is 00001037, R1 is 00001046, R2 is 00000000, and R15 (PC) is 0000101c.
- CPSR Register Window:** Shows Negative(N):0, Zero(Z):1, and Carry(C):1.
- Assembly Code Window:** Displays the following code:
 

```

.text
00001000:E59F0018 LDR R0,=srcstr
00001004:E59F1018 LDR R1,=dststr
00001008:          loop:
00001008:E4D02001 LDRB R2,[R0],#1
0000100C:E4C12001 STRB R2,[R1],#1
00001010:E3520000 CMP R2,#0
00001014:1AFFFFFB BNE loop
00001018:EF000002 SWI 0x02
0000101C:EF000011 SWI 0x11
.data
00001028:          srcstr:.ASCIZ "PES UNIVERSITY"
00001037:          dststr:.ASCIZ "aaaaaaaaaaaaaa"
.end
      
```
- Output Window:** Shows the memory address 00001037 containing the string "PES UNIVERSITY".

## III. Output Table for the program

Before Execution	
srcstr	"PES UNIVERSITY"
dststr	"aaaaaaaaaaaaaa"
After Execution	
dststr	"PES UNIVERSITY"

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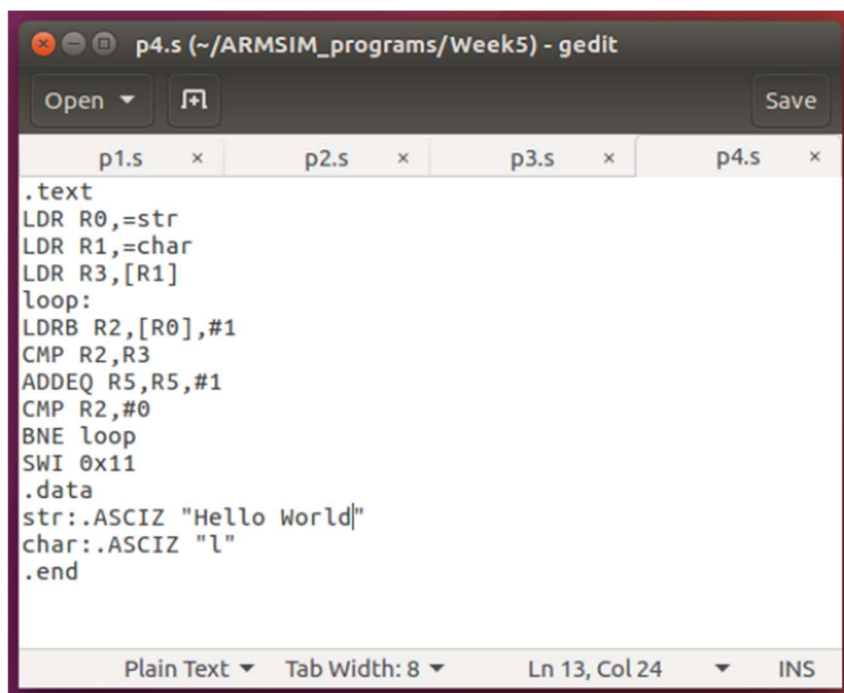
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Week# 5 Program Number: 4

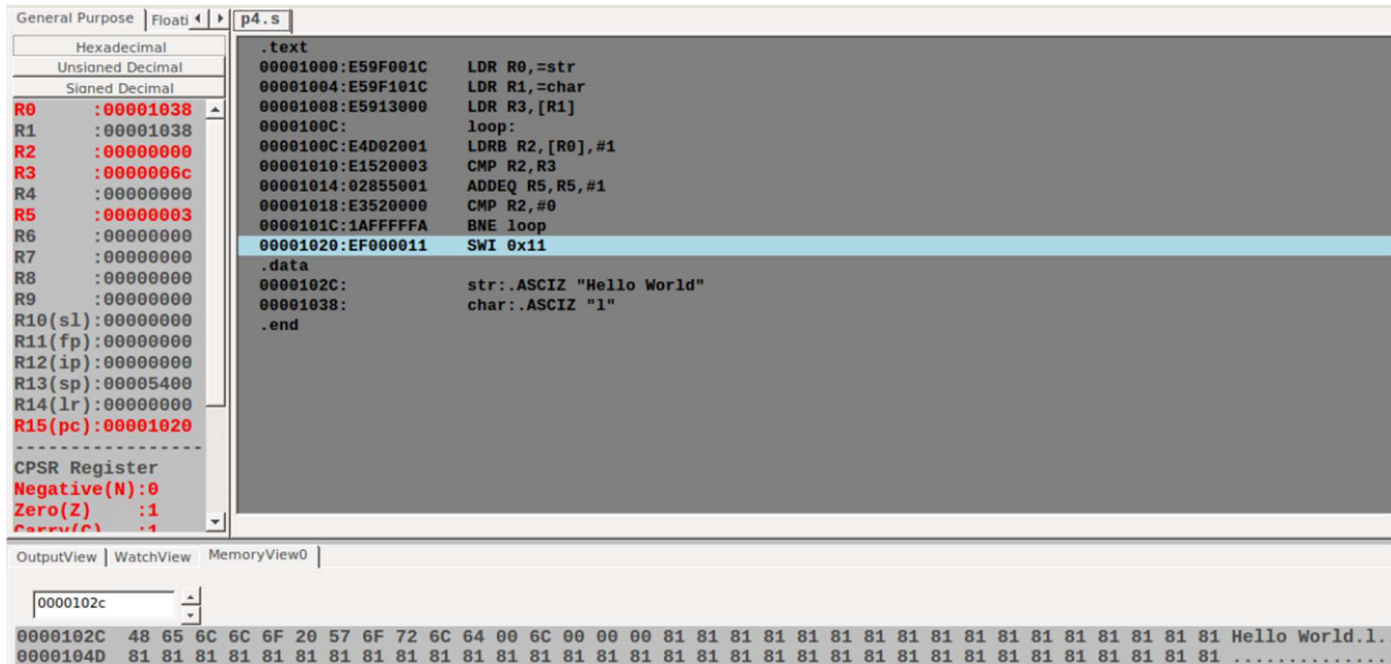
**Write an ALP to find whether a given character is present in a string. If present, find how many times the given character is present in a string.**

## I. ARM Assembly Code



```
p4.s (~/ARMSIM_programs/Week5) - gedit
Open Save
p1.s x p2.s x p3.s x p4.s x
.text
LDR R0,=str
LDR R1,=char
LDR R3,[R1]
loop:
LDRB R2,[R0],#1
CMP R2,R3
ADDEQ R5,R5,#1
CMP R2,#0
BNE loop
SWI 0x11
.data
str:.ASCIZ "Hello World"
char:.ASCIZ "l"
.end
Plain Text Tab Width: 8 Ln 13, Col 24 INS
```

## II. Output Screen Shot



### III. Output Table for the program

Before Execution	
str	"HELLO WORLD"
char	"l"
After Execution	
R5	3