

# **Microprocessor and Computer Architecture Laboratory**

**UE19CS256**

**4th Semester, Academic Year 2020-21**

Date:

Name: Achyut Jagini	SRN:PES2UG19CS013	Section A
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Week#    3    Program Number:    1   

**Write an ALP to add two 64 bit numbers loaded from memory and store the result in memory.**

```
1 - Notepad
File Edit Format View Help
LDR R0, =a
LDR R1, [R0]
LDR R2, [R0, #4]
LDR R0, =b
LDR R3, [R0]
LDR R4, [R0, #4]
ADDS R6, R2, R4
ADC R5, R1, R3
LDR R0, =c
STR R5, [R0]
STR R6, [R0, #4]

.data
a: .word 12213443, 56657887
b: .word 98764532, 45326789
c: .word 0
```

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 : 4168

R1 : 12213443

R2 : 56657887

R3 : 98764532

R4 : 45326789

R5 : 110977975

R6 : 101984676

R7 : 0

R8 : 0

R9 : 0

R10 (s1): 0

R11 (fp): 0

R12 (ip): 0

R13 (sp): 21504

R14 (lr): 0

R15 (pc): 4192

-----

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

1.s

```
00001000:E59F0024 LDR R0, =a
00001004:E5901000 LDR R1, [R0]
00001008:E5902004 LDR R2, [R0, #4]
0000100C:E3A00D41 LDR R0, =b
00001010:E5903000 LDR R3, [R0]
00001014:E5904004 LDR R4, [R0, #4]
00001018:E0926004 ADDS R6, R2, R4
0000101C:E0A15003 ADC R5, R1, R3
00001020:E59F0008 LDR R0, =c
00001024:E5805000 STR R5, [R0]
00001028:E5806004 STR R6, [R0, #4]

.data
00001038: a: .word 12213443, 56657887
00001040: b: .word 98764532, 45326789
00001048: c: .word 0
```

OutputView

Console Stdin/Stdout/Stderr

Loading assembly language file C:\Users\Achyut Jagini\Desktop\week3 dev\1.s

# **Microprocessor and Computer Architecture Laboratory**

**UE19CS256**

**4th Semester, Academic Year 2020-21**

Date:

Name: Achyut Jagini	SRN:Pes2ug19cs013	Section a
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Week# 3

Program Number: 2

**Write an ALP to copy n numbers from Memory  
Location A to Memory Location B**

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UE19CS256

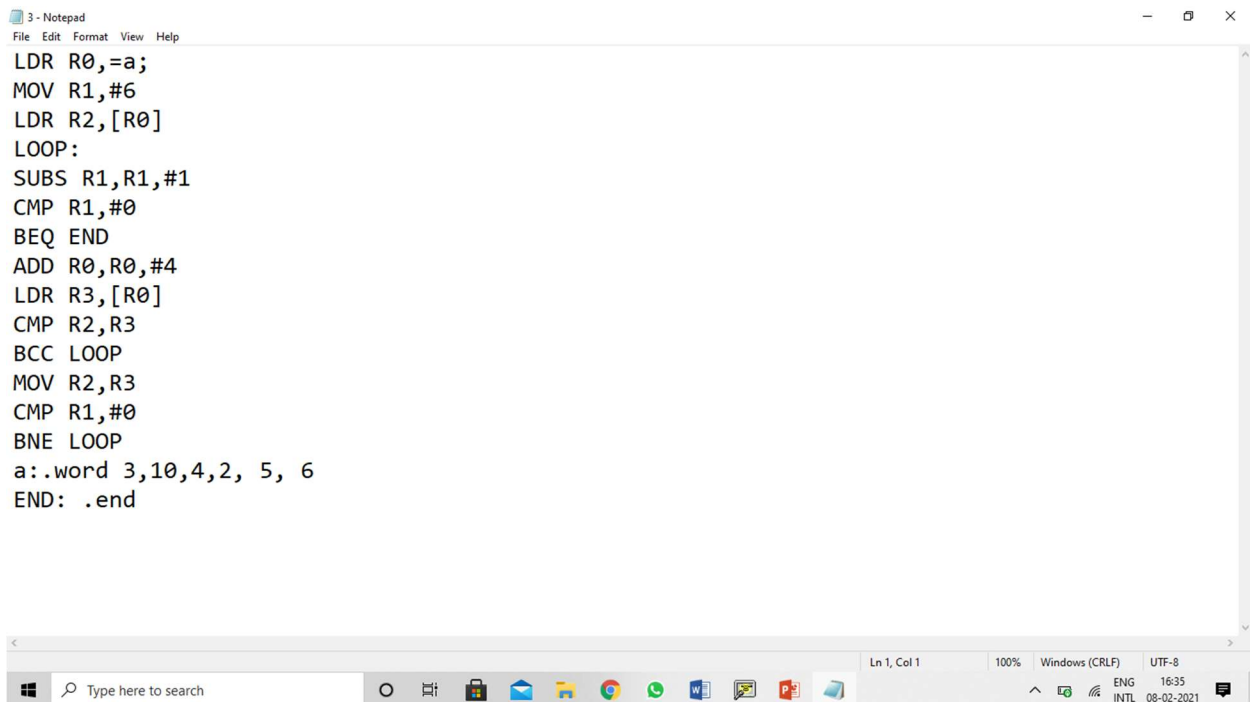
4th Semester, Academic Year 2020-21

Date:

Name:	SRN:	Section

Week# 3 Program Number: 3

**Write an ALP to find smallest number in an array of n 32 bit numbers**



```
3 - Notepad
File Edit Format View Help
LDR R0,=a;
MOV R1,#6
LDR R2,[R0]
LOOP:
SUBS R1,R1,#1
CMP R1,#0
BEQ END
ADD R0,R0,#4
LDR R3,[R0]
CMP R2,R3
BCC LOOP
MOV R2,R3
CMP R1,#0
BNE LOOP
a:.word 3,10,4,2, 5, 6
END: .end
```

Ln 1, Col 1 100% Windows (CRLF) UTF-8 16:35 08-02-2021

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 : 4168  
R1 : 0  
R2 : 2  
R3 : 6  
R4 : 0  
R5 : 0  
R6 : 0  
R7 : 0  
R8 : 0  
R9 : 0  
R10 (s1) : 0  
R11 (fp) : 0  
R12 (ip) : 0  
R13 (sp) : 21504  
R14 (lr) : 0  
R15 (pc) : 70656

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

0x600000df

3.s

```

00001000:E59F0044 LDR R0,=a:
00001004:E3A01006 MOV R1,#6
00001008:E5902000 LDR R2,[R0]
0000100C:
0000100C:E2511001 SUBS R1,R1,#1
00001010:E3510000 CMP R1,#0
00001014:0A00000C BEQ END
00001018:E2800004 ADD R0,R0,#4
0000101C:E5903000 LDR R3,[R0]
00001020:E1520003 CMP R2,R3
00001024:3AFFFFF8 BCC LOOP
00001028:E1A02003 MOV R2,R3
0000102C:E3510000 CMP R1,#0
00001030:1AFFFFF5 BNE LOOP
00001034: a:.word 3,10,4,2, 5, 6
0000104C:00001034 END: .end

```

OutputView

Console Stdin/Stdout/Stderr

Execution starting ...  
PC out of valid memory range, address:00011400  
PC out of valid memory range, address:00011400

Execution ending, Instruction Count:0 Elapsed Time:00:00:00.1002457  
Instructions per second:0

Type here to search

16:37  
ENG  
INTL 08-02-2021

# Microprocessor and Computer Architecture Laboratory

UE19CS256

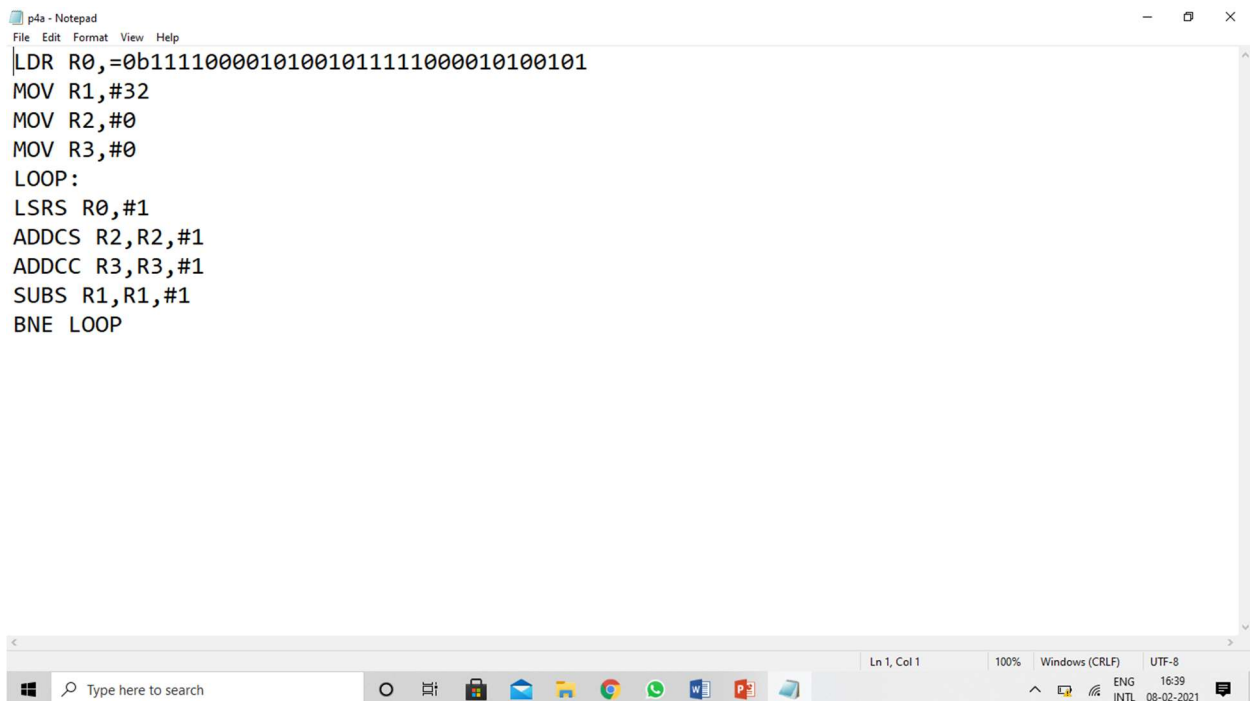
4th Semester, Academic Year 2020-21

Date:

Name: Achyut	SRN:	Section
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Week# 3 Program Number: 4a

**Write an ALP to count the number of 1's and 0's in a given 32 bit number.**



```
p4a - Notepad
File Edit Format View Help
LDR R0,=0b11110000101001011111000010100101
MOV R1,#32
MOV R2,#0
MOV R3,#0
LOOP:
LSRS R0,#1
ADDCS R2,R2,#1
ADDCC R3,R3,#1
SUBS R1,R1,#1
BNE LOOP
```

The screenshot shows a Windows desktop environment with a Notepad window open. The Notepad window has a menu bar with File, Edit, Format, View, and Help. The text area contains assembly code for counting the number of 1s and 0s in a 32-bit number. The code starts with loading a 32-bit constant into register R0, then initializes R1 to 32, R2 to 0, and R3 to 0. A loop labeled LOOP starts with a logical shift right (LSRS) of R0 by 1 bit, increments R2 if the carry flag is set (ADDCS R2,R2,#1), increments R3 if the carry flag is clear (ADDCC R3,R3,#1), decrements R1 (SUBS R1,R1,#1), and branches back to LOOP if not equal (BNE LOOP). The Windows taskbar at the bottom shows the Start button, a search bar, and several application icons including File Explorer, Google Chrome, WhatsApp, Word, and PowerPoint. The system tray on the right shows the date and time as 16:39 on 08-02-2021, along with language and window management icons.

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 : 0  
R1 : 0  
R2 : 30  
R3 : 3  
R4 : 3  
R5 : 0  
R6 : 0  
R7 : 3  
R8 : 0  
R9 : 0  
R10 (s1) : 0  
R11 (fp) : 0  
R12 (ip) : 0  
R13 (sp) : 21504  
R14 (lr) : 0  
R15 (pc) : 70656

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

0x600000df

S.S

```
00001000:E59F0044 LDR R0,=A
00001004:E3A0201E MOV R2,#30
00001008:E3A03005 MOV R3,#5
0000100C:E3A04000 MOV R4,#0
00001010: LOOP:
00001010:E5901000 LDR R1,[R0]
00001014:E2844001 ADD R4,R4,#1
00001018:E1510002 CMP R1,R2
0000101C:0A000004 BEQ B
00001020:E2800004 ADD R0,R0,#4
00001024:E2533001 SUBS R3,R3,#1
00001028:1AFFFFFFF8 BNE LOOP
0000102C:E3B06000 MOV R6,#-1
00001030:EA000005 B END
00001034:E1A07004 B:MOV R7,R4
00001038: A: .WORD 10,20,30,40,50
0000104C:00001038 END: .end
```

OutputView

Console Stdin/Stdout/Stderr

Execution starting ...  
PC out of valid memory range, address:00011400  
PC out of valid memory range, address:00011400

Execution ending, Instruction Count:0 Elapsed Time:00:00:00.1002436  
Instructions per second:0

OutputView WatchView

Type here to search

ENG 16:50  
INTL 08-02-2021

# Microprocessor and Computer Architecture Laboratory

UE19CS256

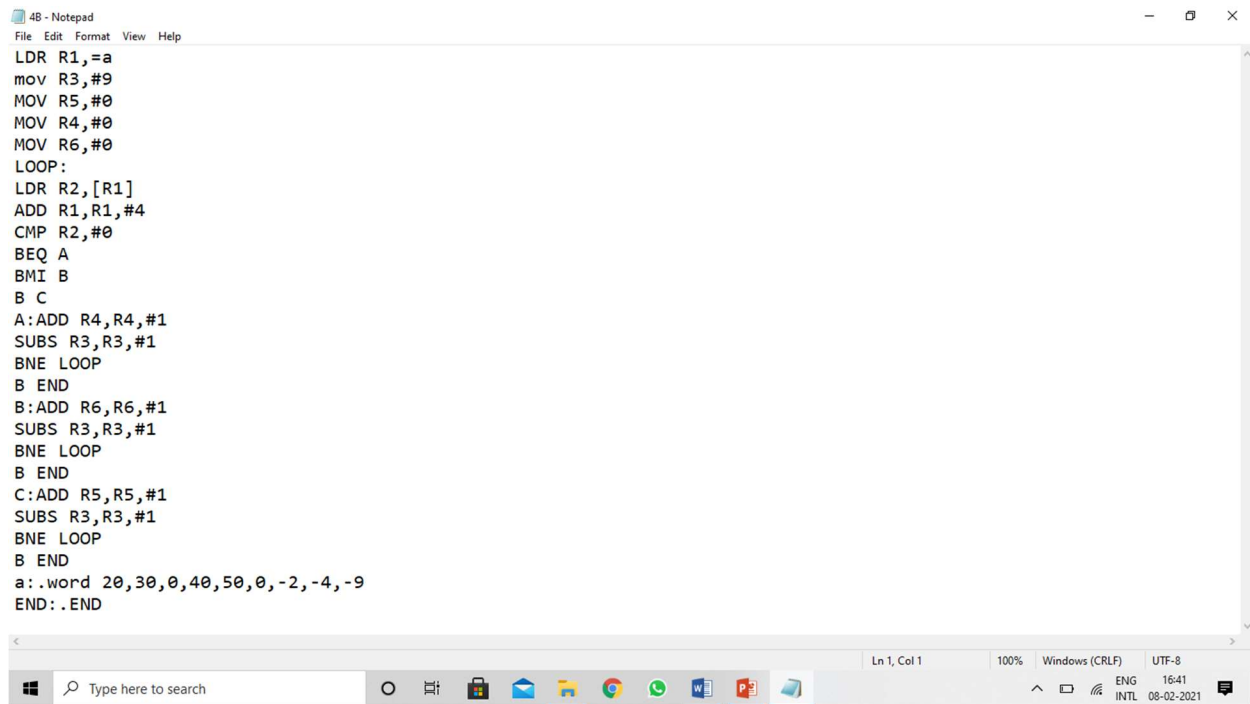
4th Semester, Academic Year 2020-21

Date:

Name: Achyut	SRN:	Section
--------------	------	---------

Week# 3 Program Number: 4b

**Write an ALP to find the number of zeroes, positive and negative numbers in a given array**



```
4B - Notepad
File Edit Format View Help
LDR R1,=a
mov R3,#9
MOV R5,#0
MOV R4,#0
MOV R6,#0
LOOP:
LDR R2,[R1]
ADD R1,R1,#4
CMP R2,#0
BEQ A
BMI B
B C
A:ADD R4,R4,#1
SUBS R3,R3,#1
BNE LOOP
B END
B:ADD R6,R6,#1
SUBS R3,R3,#1
BNE LOOP
B END
C:ADD R5,R5,#1
SUBS R3,R3,#1
BNE LOOP
B END
a: .word 20,30,0,40,50,0,-2,-4,-9
END: .END
```

Ln 1, Col 1 100% Windows (CRLF) UTF-8 ENG 16:41 INTL 08-02-2021



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 : 0

R1 : 0

R2 : -9

R3 : 0

R4 : 2

R5 : 4

R6 : 3

R7 : 0

R8 : 0

R9 : 0

R10 (s1) : 0

R11 (fp) : 0

R12 (ip) : 0

R13 (sp) : 21504

R14 (lr) : 0

R15 (pc) : 70656

-----

CPSR Register

Negative (N) : 0

Zero (Z) : 1

Carry (C) : 1

Overflow (V) : 0

IRQ Disable : 1

FIQ Disable : 1

Thumb (T) : 0

CPU Mode : System

-----

0x600000df

4B.S

```
00001000:E59F1078 LDR R1,=a
00001004:E3A03009 mov R3,#9
00001008:E3A05000 MOV R5,#0
0000100C:E3A04000 MOV R4,#0
00001010:E3A06000 MOV R6,#0
00001014: LOOP:
00001014:E5912000 LDR R2,[R1]
00001018:E2811004 ADD R1,R1,#4
0000101C:E3520000 CMP R2,#0
00001020:0A000001 BEQ A
00001024:4A000004 BMI B
00001028:EAD00007 B C
0000102C:E2844001 A:ADD R4,R4,#1
00001030:E2533001 SUBS R3,R3,#1
00001034:1AFFFFF6 BNE LOOP
00001038:EAD00010 B END
0000103C:E2866001 B:ADD R6,R6,#1
00001040:E2533001 SUBS R3,R3,#1
00001044:1AFFFFF2 BNE LOOP
00001048:EAD0000C B END
0000104C:E2855001 C:ADD R5,R5,#1
00001050:E2533001 SUBS R3,R3,#1
00001054:1AFFFFF2 BNE LOOP
00001058:EAD00008 B END
0000105C: a: word 20,30,0,40,50,0,-2,-4,-9
00001080:0000105C END: .END
```

OutputView

Console Stdin/Stdout/Stderr

Execution starting ...

PC out of valid memory range, address:00011400

PC out of valid memory range, address:00011400

Execution ending, Instruction Count:0 Elapsed Time:00:00:00.1002433

Instructions per second:0

OutputView WatchView

Type here to search

ENG 16:40 08-02-2021

# Microprocessor and Computer Architecture Laboratory

UE19CS256

4th Semester, Academic Year 2020-21

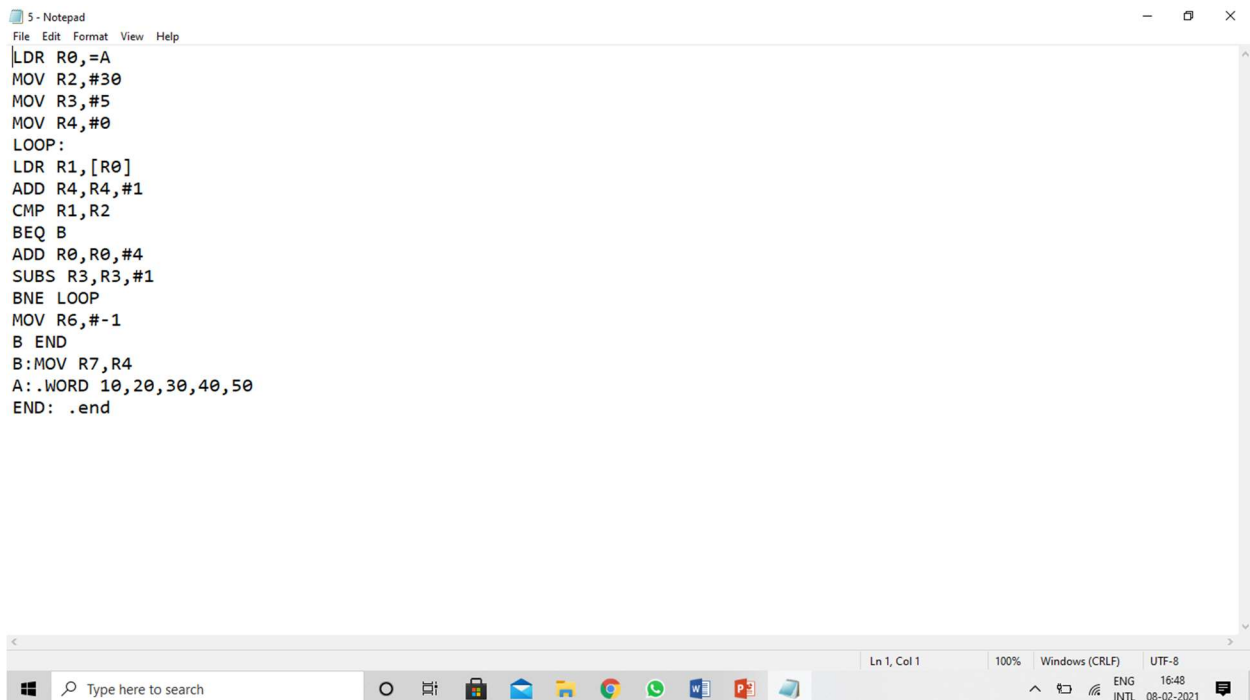
Date:

Name: Achyut	SRN:	Section
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Week# \_\_\_\_3\_\_\_\_

Program Number: \_\_\_\_5\_\_

**Write an ALP to check whether a given number is present in array using Linear Search (Without SWI 0x02), if found move +1 to R6 and key position to R7 else move -1 to R6 (if number not found)**



```
5 - Notepad
File Edit Format View Help
LDR R0,=A
MOV R2,#30
MOV R3,#5
MOV R4,#0
LOOP:
LDR R1,[R0]
ADD R4,R4,#1
CMP R1,R2
BEQ B
ADD R0,R0,#4
SUBS R3,R3,#1
BNE LOOP
MOV R6,#-1
B END
B:MOV R7,R4
A: .WORD 10,20,30,40,50
END: .end
```

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 : 0

R1 : 0

R2 : 30

R3 : 3

R4 : 3

R5 : 0

R6 : 0

R7 : 3

R8 : 0

R9 : 0

R10 (s1) : 0

R11 (fp) : 0

R12 (ip) : 0

R13 (sp) : 21504

R14 (lr) : 0

R15 (pc) : 70656

-----

CPSR Register

Negative (N) : 0

Zero (Z) : 1

Carry (C) : 1

Overflow (V) : 0

IRQ Disable : 1

FIQ Disable : 1

Thumb (T) : 0

CPU Mode : System

-----

0x600000df

5.S

```
00001000:E59F0044 LDR R0,=A
00001004:E3A0201E MOV R2,#30
00001008:E3A03005 MOV R3,#5
0000100C:E3A04000 MOV R4,#0
00001010:
00001010:E5901000 LDR R1,[R0]
00001014:E2844001 ADD R4,R4,#1
00001018:E1510002 CMP R1,R2
0000101C:0A000004 BEQ B
00001020:E2800004 ADD R0,R0,#4
00001024:E2533001 SUBS R3,R3,#1
00001028:1AFFFFF8 BNE LOOP
0000102C:E3E06000 MOV R6,#-1
00001030:EAD00005 B END
00001034:E1A07004 B:MOV R7,R4
00001038:
A: .WORD 10,20,30,40,50
0000104C:00001038 END: .end
```

OutputView

Console Stdin/Stdout/Stderr

Execution starting ...

PC out of valid memory range, address:00011400

PC out of valid memory range, address:00011400

Execution ending, Instruction Count:0 Elapsed Time:00:00:00.1002436

Instructions per second:0

OutputView WatchView

Type here to search

ENG 16:50 08-02-2021