

# Microprocessor and Computer Architecture Laboratory

**UE19CS256**

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

Date:22/1/21

Name: Kartik Soni	SRN: PES1UG19CS212	Section D
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Week# 1 Program Number: 1

Title of the Program

**Write an ALP using ARM instruction set to add and subtract two 32 bit numbers .Both numbers are in registers.**

I. ARM Assembly Code

mov r0,#9

mov r1,#4

add r2,r0,r1

sub r3,r0,r1

## II. Final Output Screen Shot

The screenshot displays the ARMSim - The ARM Simulator interface. The title bar reads "ARMSim - The ARM Simulator Dept. of Computer Science". The menu bar includes "File", "View", "Cache", "Debug", "Watch", and "Help".

The **RegistersView** panel on the left shows the state of various registers:

- General Purpose: Floating Point
- Hexadecimal
- Unsigned Decimal
- Signed Decimal
- R0 : 9
- R1 : 4
- R2 : 13
- R3 : 5
- 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

Below the registers, the CPSR Register status is shown:

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

The memory address 0x000000df is displayed at the bottom of the register view.

The main assembly code window shows the following instructions:

```
00001000:E3A00009  MOV r0,#9
00001004:E3A01004  MOV r1,#4
00001008:E0802001  ADD r2,r0,r1
0000100C:E0403001  SUB r3,r0,r1
.end
```

The **OutputView** panel on the right shows the execution log:

- Console Stdin/Stdout/Stderr
- Loading assembly language file C:\Users\Kartik\Desktop\College\MPCA Lab\1.s
- 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:00:00:00.0655707
- Instructions per second:0

At the bottom, there are tabs for "OutputView" and "WatchView".

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Week# \_\_\_\_1\_\_\_\_ Program Number: \_\_\_\_2\_\_\_\_

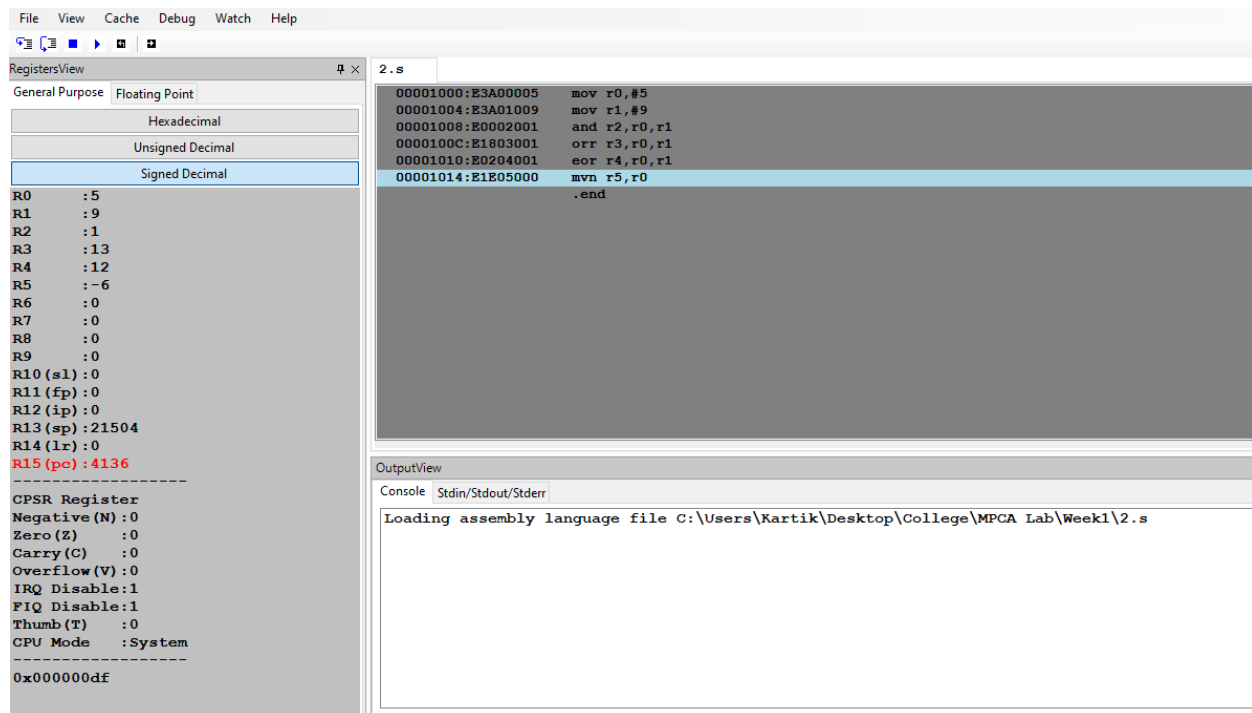
Title of the Program

**Write an ALP to demonstrate logical operations. All operands are in registers.**

## I. ARM Assembly Code

```
mov r0,#5
mov r1,#9
and r2,r1,r0
orr r3,r1,r0
eor r4,r1,r0
mvn r5,r0
```

## II. Final Output Screen Shot



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Week# 1 Program Number: 3

Title of the Program

**Write an ALP to add 5 numbers where values are present in registers.**

I. ARM Assembly Code

```
mov r0,#20
```

```
mov r1,#30
```

```
mov r2,#40
```

```
mov r3,#50
```

```
mov r4,#60
```

```
add r5,r1,r0
```

```
add r6,r2,r5
```

```
add r7,r3,r6
```

add r8,r4,r7

## II. Final Output Screen

The screenshot displays a debugger window with the following components:

- RegistersView:** Shows the state of various registers. General Purpose registers R0 through R15 are listed. R0-R7 are in hexadecimal, while R8-R15 are in decimal. R15 (PC) is highlighted in red at address 70656. The CPSR register is also shown with various flags like Negative (N), Zero (Z), Carry (C), Overflow (V), IRQ Disable, FIQ Disable, Thumb (T), and CPU Mode (System).
- Assembly View:** Displays the assembly code being executed. The code includes instructions like `mov r0, #20`, `mov r1, #30`, `mov r2, #40`, `mov r3, #50`, `mov r4, #60`, `add r5, r1, r0`, `add r6, r2, r5`, `add r7, r3, r6`, `add r8, r4, r7`, and `.end`. The address 00001020:E0848007 is highlighted.
- OutputView:** Shows the execution log. It includes messages like "Loading assembly language file C:\Users\Kartik\Desktop\College\MPCA Lab\Week1\3.s", "Execution starting ...", "PC out of valid memory range, address:00011400", "Execution ending, Instruction Count:0 Elapsed Time:00:00:00.0718071", and "Instructions per second:0".

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Week# \_\_\_\_1\_\_\_\_ Program Number: \_\_\_\_4\_\_\_\_

Title of the Program

**Write an ALP using ARM instruction set to check if a number stored in a register is even or odd. If even, store 00 in R0, else store FF in R0**

I. ARM Assembly Code

```
mov r1,#21
```

```
and r2,r1,#1
```

```
cmp r2,#0
```

```
beq L1
```

```
mov r0,#0xff
```

```
L1: mov r0,#0x00
```

## II. Final Output Screen Shot

RegistersView

General Purpose Floating Point

Hexadecimal

Unsigned Decimal

Signed Decimal

R0 : 00000000  
R1 : 00000014  
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) : 00011400

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

4.s

```
00001000:E3A01014 mov r1,#20
00001004:E2012001 and r2,r1,#1
00001008:E3520000 cmp r2,#0
0000100C:0A000000 beq L1
00001010:E3A000FF mov r0,#0xff
00001014:E3A00000 L1: mov r0,#0x00
```

OutputView

Console Stdin/Stdout/Stderr

Loading assembly language file C:\Users\Kartik\Desktop\College\MPCA Lab\Week1\4.s  
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:00:00:00.1047202  
Instructions per second:0

RegistersView

General Purpose Floating Point

Hexadecimal

Unsigned Decimal

Signed Decimal

R0 : 000000ff  
R1 : 00000015  
R2 : 00000001  
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) : 00001014

CPSR Register

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

0x200000df

4.s

```
00001000:E3A01015 mov r1,#21
00001004:E2012001 and r2,r1,#1
00001008:E3520000 cmp r2,#0
0000100C:0A000000 beq L1
00001010:E3A000FF mov r0,#0xff
00001014:E3A00000 L1: mov r0,#0x00
```

OutputView

Console Stdin/Stdout/Stderr

Loading assembly language file C:\Users\Kartik\Desktop\College\MPCA Lab\Week1\4.s



### **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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