

# **Microprocessor and Computer Architecture (MPCA)**

## **Laboratory**

**UE20CS252 4th Semester,  
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**Week # 2**

**Program Number: 1**

### **Title of the Program**

Write a program in ARM7TDMI-ISA to find the sum of N data items at alternate [ odd or even positions] locations in the memory. Store the result in the memory location.

- a. Use Pre-indexing addressing mode
- b. Use Post- Indexing addressing mode
- c. Use Auto-indexing addressing mode

### **Program Code**

**Preindexing :**

```
.DATA  
A: .WORD 10,20,30,40  
SUM: .WORD 0
```

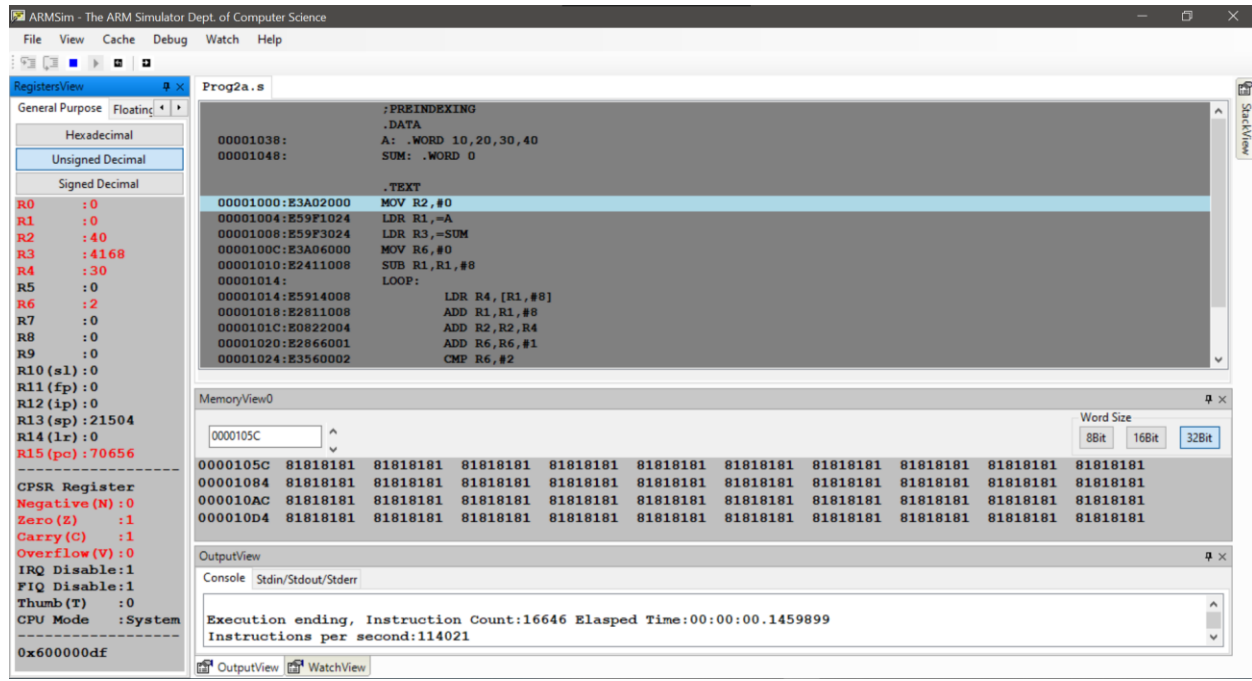
```
.TEXT  
MOV R2,#0  
LDR R1,=A  
LDR R3,=SUM  
MOV R6,#0  
SUB R1,R1,#8  
LOOP:  
    LDR R4,[R1,#8]  
    ADD R1,R1,#8
```

```

        ADD R2,R2,R4
        ADD R6,R6,#1
        CMP R6,#2
BNE LOOP
STR R2,[R3]
.END

```

## Screenshot of ArmSimulator of the Program Executed



## Program Code

### Postindexing:

```

.DATA
A: .WORD 10,20,30,40
SUM: .WORD 0

```

```

.TEXT
MOV R2,#0
LDR R1,=A
LDR R3,=SUM
MOV R6,#0
LOOP:
    LDR R4,[R1],#8

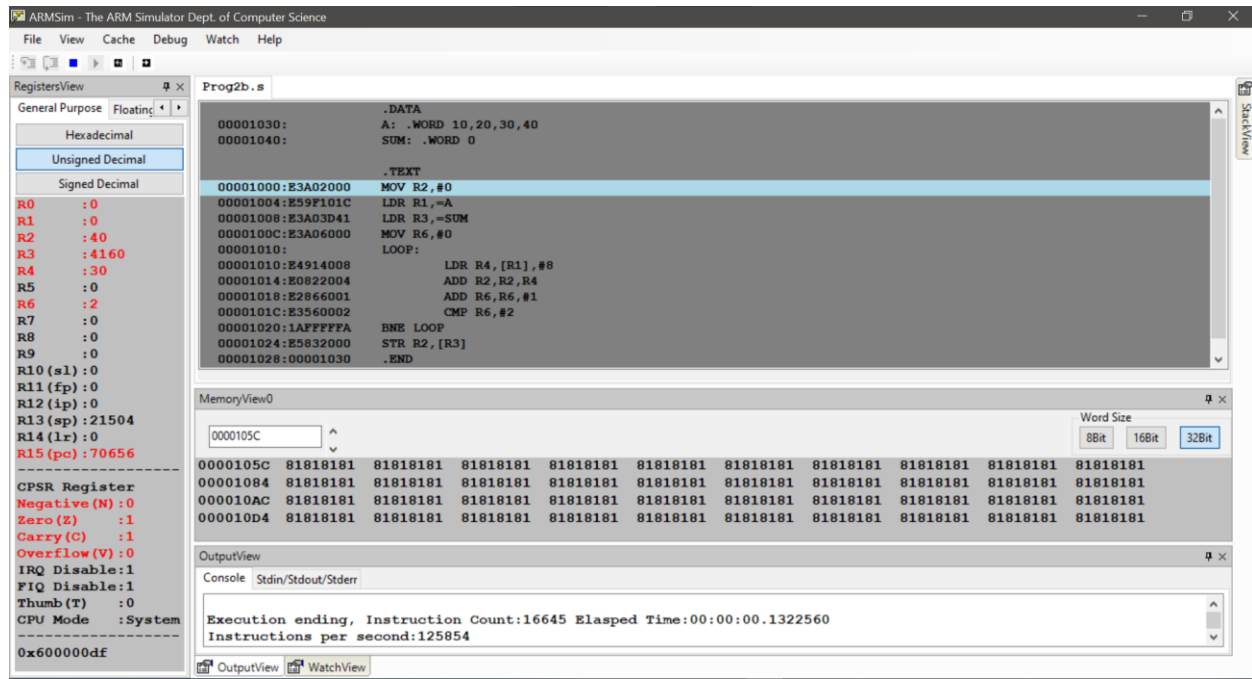
```

```

        ADD R2,R2,R4
        ADD R6,R6,#1
        CMP R6,#2
BNE LOOP
STR R2,[R3]
.END

```

## Screenshot of ArmSimulator of the Program Executed



## Program Code

### Autoindexing :

```

.DATA
A: .WORD 10,20,30,40
SUM: .WORD 0

```

```

.TEXT
MOV R2,#0
LDR R1,=A
LDR R3,=SUM
MOV R6,#0
SUB R1,R1,#8
LOOP:
    LDR R4,[R1,#8]!

```

```

ADD R2,R2,R4
ADD R6,R6,#1
CMP R6,#2
BNE LOOP
STR R2,[R3]
.END

```

## Screenshot of ArmSimulator of the Program Executed

ARMSim - The ARM Simulator Dept. of Computer Science

File View Cache Debug Watch Help

RegistersView

General Purpose Floating

Hexadecimal  
Unsigned Decimal  
Signed Decimal

R0 : 0  
R1 : 0  
R2 : 40  
R3 : 4164  
R4 : 30  
R5 : 0  
R6 : 2  
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

Prog2c.s

```

.DATA
00001034: A: .WORD 10,20,30,40
00001044: SUM: .WORD 0

.TEXT
00001000:E3A02000 MOV R2,#0
00001004:E59F1020 LDR R1,=A
00001008:E59F3020 LDR R3,=SUM
0000100C:E3A06000 MOV R6,#0
00001010:E2411008 SUB R1,R1,#8
00001014: LOOP:
00001014:E5B14008 LDR R4,[R1,#8]!
00001018:E0822004 ADD R2,R2,R4
0000101C:E2866001 ADD R6,R6,#1
00001020:E3560002 CMP R6,#2
00001024:1AFFFFFFA BNE LOOP
00001028:E5832000 STR R2,[R3]

```

MemoryView0

Word Size  
8Bit 16Bit 32Bit

0000105C

0000105C	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181
00001084	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181
000010AC	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181
000010D4	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181

OutputView

Console Stdin/Stdout/Stderr

Execution ending, Instruction Count:16645 Elapsed Time:00:00:00.1277086  
Instructions per second:130335

OutputView WatchView