



Microprocessor & Computer Architecture
MPCA-Laboratory-3
UE20CS252

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Section : K

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:

NOTEPAD FILE:

prgm21.s - Notepad

File Edit Format View Help

;sum of alternate numbers from an array of N numbers using preindexing (without writeback)

;POSITION: ODD

.DATA

A: .WORD 2,4,6,8,10,12

SUM: .WORD 0

.TEXT

MOV R2,#0

LDR R1,=A

LDR R3,=SUM

MOV R5,#4

MOV R4,#1 ;COUNTER

LOOP: LDR R6,[R1,R5] ;PREINDEXING WITHOUT WRITEBACK

ADD R2,R2,R6

ADD R5,R5,#8 ;ODD POSTION

ADD R4,R4,#2

CMP R4,#7

BNE LOOP

STR R2,[R3]

SWI 0X011

OUTPUT SCREENSHOT:

The screenshot displays the ARMSim - The ARM Simulator interface. The main window shows the assembly code for 'prgm21.s'. The code calculates the sum of alternate numbers from an array of 12 numbers (2, 4, 6, 8, 10, 12) using preindexing without writeback. The registers R0 through R15 are shown on the left, with R15 (PC) at 4144. The CPSR register is also visible. The MemoryView4 window shows the memory address 00001054. The OutputView window shows the console output: 'Loading assembly language file C:\Users\Laxmikant\BTEch\4th Sem\Classes\MPCA Lab\week3\prgm21.s'.

```
;sum of alternate numbers from an array of N numbers using preindexing (without writeback)
;POSITION: ODD
.DATA
0000103C:      A: .WORD 2,4,6,8,10,12
00001054:      SUM: .WORD 0

.TEXT
00001000:E3A02000  MOV R2,#0
00001004:E59F1028  LDR R1,=A
00001008:E59F3028  LDR R3,=SUM
0000100C:E3A05004  MOV R5,#4
00001010:E3A04001  MOV R4,#1                ;COUNTER

00001014:E7916005  LOOP:LDR R6,[R1,R5]      ;PREINDEXING WITHOUT WRITEBACK
00001018:E0822006          ADD R2,R2,R6
0000101C:E2855008          ADD R5,R5,#8            ;ODD POSTION
00001020:E2844002          ADD R4,R4,#2
00001024:E3540007          CMP R4,#7
00001028:1AFFFFF9          BNE LOOP
0000102C:E5832000          STR R2,[R3]
                                SWI 0X011
```

b. Use Post-indexing addressing mode:

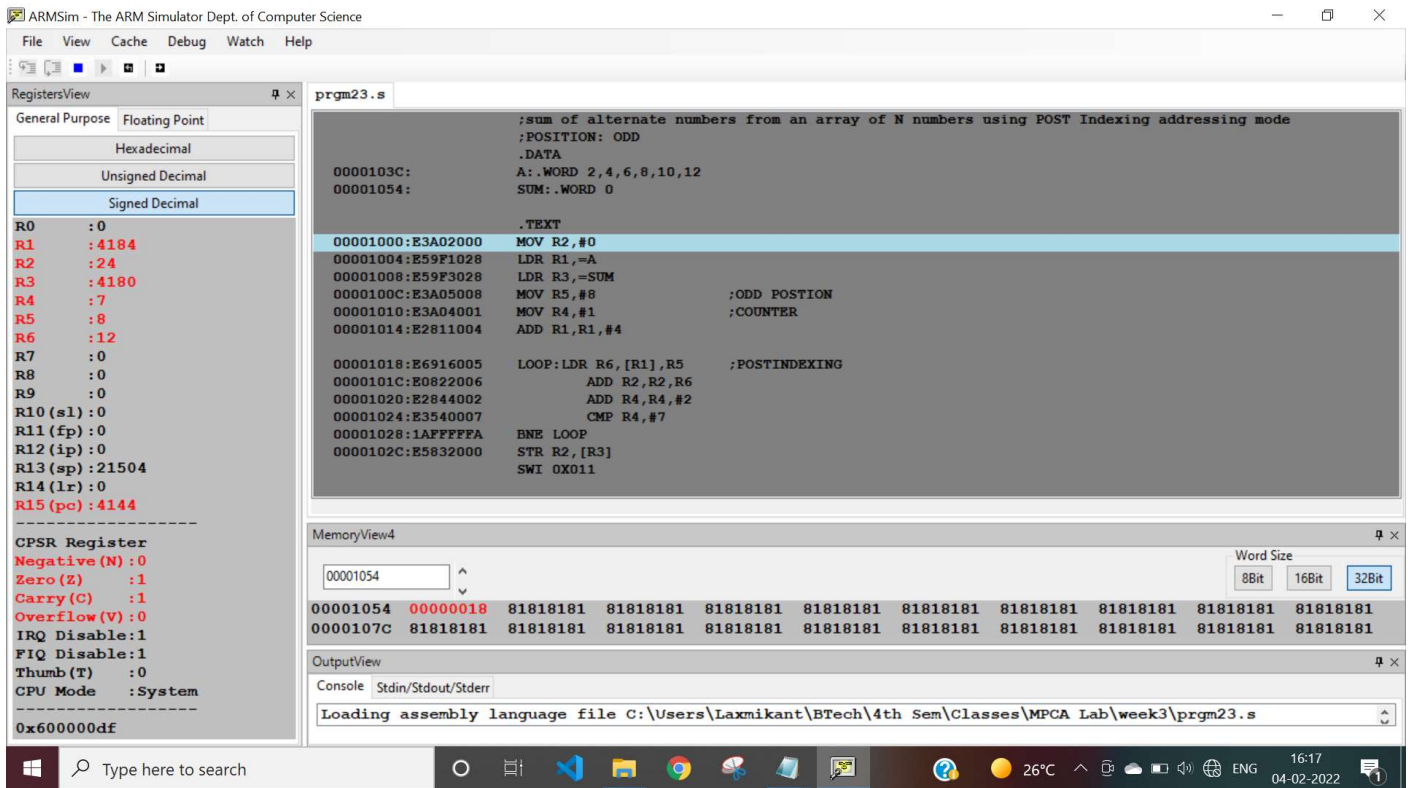
NOTEPAD FILE:

```
prgm23.s - Notepad
File Edit Format View Help
;sum of alternate numbers from an array of N numbers using POST Indexing addressing mode
;POSITION: ODD
.DATA
A: .WORD 2,4,6,8,10,12
SUM: .WORD 0

.TEXT
MOV R2,#0
LDR R1,=A
LDR R3,=SUM
MOV R5,#8                ;ODD POSTION
MOV R4,#1                ;COUNTER
ADD R1,R1,#4

LOOP:LDR R6,[R1],R5      ;POSTINDEXING
      ADD R2,R2,R6
      ADD R4,R4,#2
      CMP R4,#7
BNE LOOP
STR R2,[R3]
SWI 0X011
```

OUTPUT SCREENSHOT:



c. Use Auto-indexing addressing mode:

NOTEPAD FILE:

```
prgm22.s - Notepad
File Edit Format View Help
;sum of alternate numbers from an array of N numbers using AUTOINDEXING (preindexing with writeback)
;POSITION: ODD
.DATA
A: .WORD 2,4,6,8,10,12
SUM: .WORD 0

.TEXT
MOV R2,#0
LDR R1,=A
LDR R3,=SUM
MOV R5,#8 ;ODD POSTION
MOV R4,#1 ;COUNTER
SUB R1,R1,#4

LOOP:LDR R6,[R1,R5]! ;PREINDEXING WITH WRITEBACK
ADD R2,R2,R6
ADD R4,R4,#2
CMP R4,#7
BNE LOOP
STR R2,[R3]
SWI 0X011
```

OUTPUT SCREENSHOT:

ARMSim - The ARM Simulator Dept. of Computer Science

File View Cache Debug Watch Help

RegistersView

General Purpose Run Setting Point

Hexadecimal
Unsigned Decimal
Signed Decimal

R0 : 0
R1 : 4176
R2 : 24
R3 : 4180
R4 : 7
R5 : 8
R6 : 12
R7 : 0
R8 : 0
R9 : 0
R10 (s1) : 0
R11 (fp) : 0
R12 (ip) : 0
R13 (sp) : 21504
R14 (lr) : 0
R15 (pc) : 4144

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

prgm22.s

```
;sum of alternate numbers from an array of N numbers using AUTOINDEXING (preindexing with writeback)
;POSITION: ODD
.DATA
0000103C: A: .WORD 2,4,6,8,10,12
00001054: SUM: .WORD 0

.TEXT
00001000:E3A02000 MOV R2,#0
00001004:E59F1028 LDR R1,=A
00001008:E59F3028 LDR R3,=SUM
0000100C:E3A05008 MOV R5,#8 ;ODD POSTION
00001010:E3A04001 MOV R4,#1 ;COUNTER
00001014:E2411004 SUB R1,R1,#4

00001018:E7B16005 LOOP:LDR R6,[R1,R5]! ;PREINDEXING WITH WRITEBACK
0000101C:E0822006 ADD R2,R2,R6
00001020:E2844002 ADD R4,R4,#2
00001024:E3540007 CMP R4,#7
00001028:1AFFFFFFA BNE LOOP
0000102C:E5832000 STR R2,[R3]
SWI 0X011
```

Memory/View4

00001054

Word Size
8Bit 16Bit 32Bit

00001054	00000018	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181
0000107C	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181	81818181

OutputView

Console Stdin/Stdout/Stderr

Loading assembly language file C:\Users\Laxmikant\BTEch\4th Sem\Classes\MPCA Lab\week3\prgm22.s

16:11 04-02-2022