Department of Computer Science & Engineering
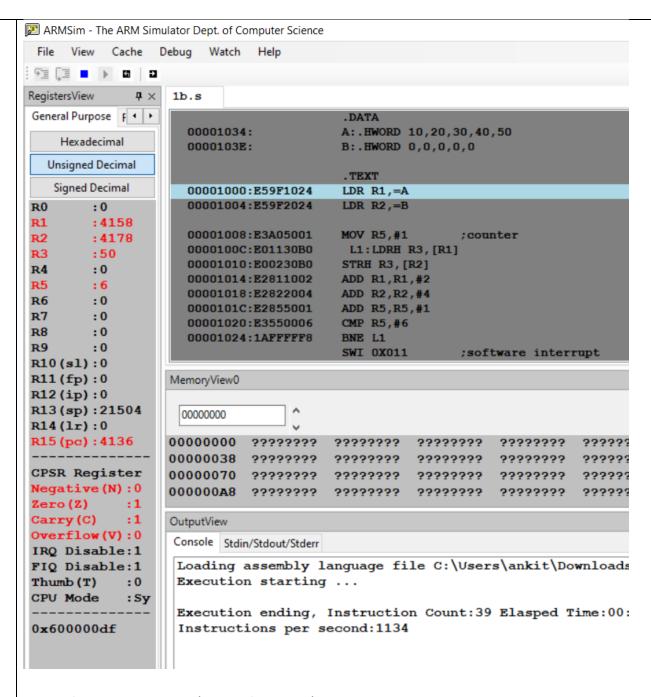## Microprocessor & Computer Architecture
MPCA-Laboratory/Assignment/Hands-on/Project
UE20CS252

NAME: ANKITHA C
SRN : PES1UG20CS626
SECTION: K

Sl. No	Programs

Week No.2	1. Write a program in ARM7TDMI-ISA to copy a block of N data items from Location A to Location B.
	 a.Use Half word(.Hword directive)
	
	 .DATA
	 A:.HWORD 10,20,30,40,50
	 B:.HWORD 0,0,0,0,0
	
	 .TEXT
	 LDR R1,=A
	 LDR R2,=B
	
	 MOV R5,#1 ;counter
	  L1:LDRH R3,[R1]
	 STRH R3,[R2]
	 ADD R1,R1,#2
	 ADD R2,R2,#4
	 ADD R5,R5,#1
	 CMP R5,#6
	 BNE L1
	 SWI 0X011 ;software interrupt

ARMSim - The ARM Simulator Dept. of Computer Science

File   View   Cache   Debug   Watch   Help

RegistersView

General Purpose

Hexadecimal

Unsigned Decimal

Signed Decimal

R0   : 0
R1   : 4158
R2   : 4178
R3   : 50
R4   : 0
R5   : 6
R6   : 0
R7   : 0
R8   : 0
R9   : 0
R10(sl): 0
R11(fp): 0
R12(ip): 0
R13(sp): 21504
R14(lr): 0
R15(pc): 4136

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   : Sy

0x600000df

1b.s

```
                        .DATA
00001034:               A:.HWORD 10,20,30,40,50
0000103E:               B:.HWORD 0,0,0,0,0

                        .TEXT
00001000:E59F1024       LDR R1,=A
00001004:E59F2024       LDR R2,=B

00001008:E3A05001       MOV R5,#1        ;counter
0000100C:E01130B0        L1:LDRH R3,[R1]
00001010:E00230B0       STRH R3,[R2]
00001014:E2811002       ADD R1,R1,#2
00001018:E2822004       ADD R2,R2,#4
0000101C:E2855001       ADD R5,R5,#1
00001020:E3550006       CMP R5,#6
00001024:1AFFFFF8       BNE L1
                        SWI 0X011       ;software interrupt
```

MemoryView0

00000000

00000000   ????????   ????????   ????????   ????????   ??????
00000038   ????????   ????????   ????????   ????????   ??????
00000070   ????????   ????????   ????????   ????????   ??????
000000A8   ????????   ????????   ????????   ????????   ??????

OutputView

Console   Stdin/Stdout/Stderr

Loading assembly language file C:\Users\ankit\Downloads
Execution starting ...

Execution ending, Instruction Count:39 Elasped Time:00:
Instructions per second:1134

b.Use Byte wise (.Byte directive)
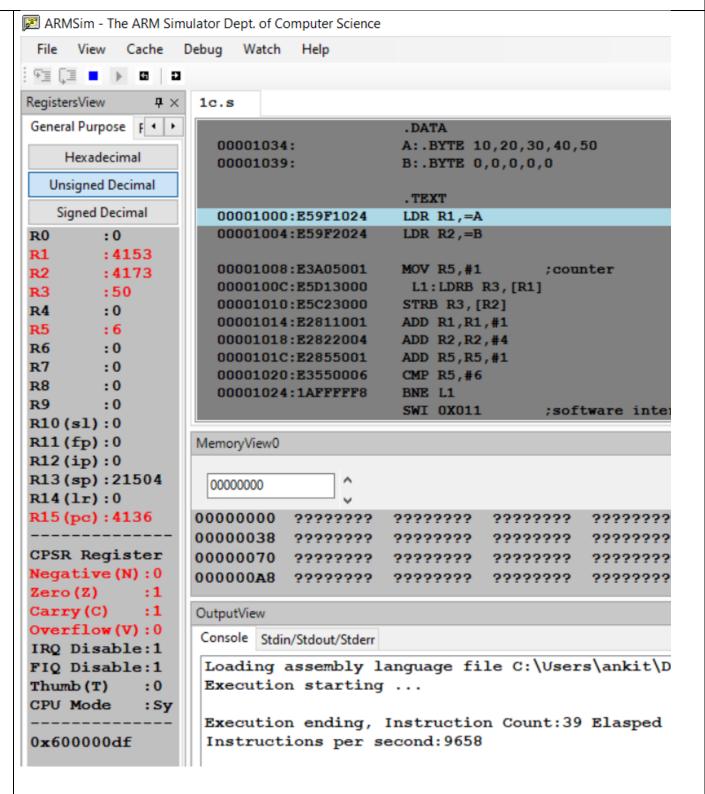
.DATA
A:.BYTE 10,20,30,40,50
B:.BYTE 0,0,0,0,0

.TEXT
LDR R1,=A
LDR R2,=B

MOV R5,#1 ;counter

```
 L1:LDRB R3,[R1]
STRB R3,[R2]
ADD R1,R1,#1
ADD R2,R2,#4
ADD R5,R5,#1
CMP R5,#6
BNE L1
SWI 0X011   ;software interrupt
```

```
 L1:LDRB R3,[R1]
STRB R3,[R2]
ADD R1,R1,#1
ADD R2,R2,#4
```

ARMSim - The ARM Simulator Dept. of Computer Science

File   View   Cache   Debug   Watch   Help

RegistersView   ⊟ ×   1c.s

General Purpose F ◄ ▶

```
                                      .DATA
00001034:                             A:.BYTE 10,20,30,40,50
00001039:                             B:.BYTE 0,0,0,0,0


                                      .TEXT
00001000:E59F1024                     LDR R1,=A
00001004:E59F2024                     LDR R2,=B

00001008:E3A05001                     MOV R5,#1          ;counter
0000100C:E5D13000                      L1:LDRB R3,[R1]
00001010:E5C23000                     STRB R3,[R2]
00001014:E2811001                     ADD R1,R1,#1
00001018:E2822004                     ADD R2,R2,#4
0000101C:E2855001                     ADD R5,R5,#1
00001020:E3550006                     CMP R5,#6
00001024:1AFFFFF8                     BNE L1
                                      SWI 0X011          ;software inter
```

Hexadecimal
Unsigned Decimal
Signed Decimal

R0   : 0
R1   : 4153
R2   : 4173
R3   : 50
R4   : 0
R5   : 6
R6   : 0
R7   : 0
R8   : 0
R9   : 0
R10(sl):0
R11(fp):0
R12(ip):0
R13(sp):21504
R14(lr):0
R15(pc):4136

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   :Sy

0x600000df

MemoryView0

```
00000000          ^
                  v
00000000   ????????   ????????   ????????   ????????
00000038   ????????   ????????   ????????   ????????
00000070   ????????   ????????   ????????   ????????
000000A8   ????????   ????????   ????????   ????????
```

OutputView

Console   Stdin/Stdout/Stderr

Loading assembly language file C:\Users\ankit\D
Execution starting ...

Execution ending, Instruction Count:39 Elasped
Instructions per second:9658

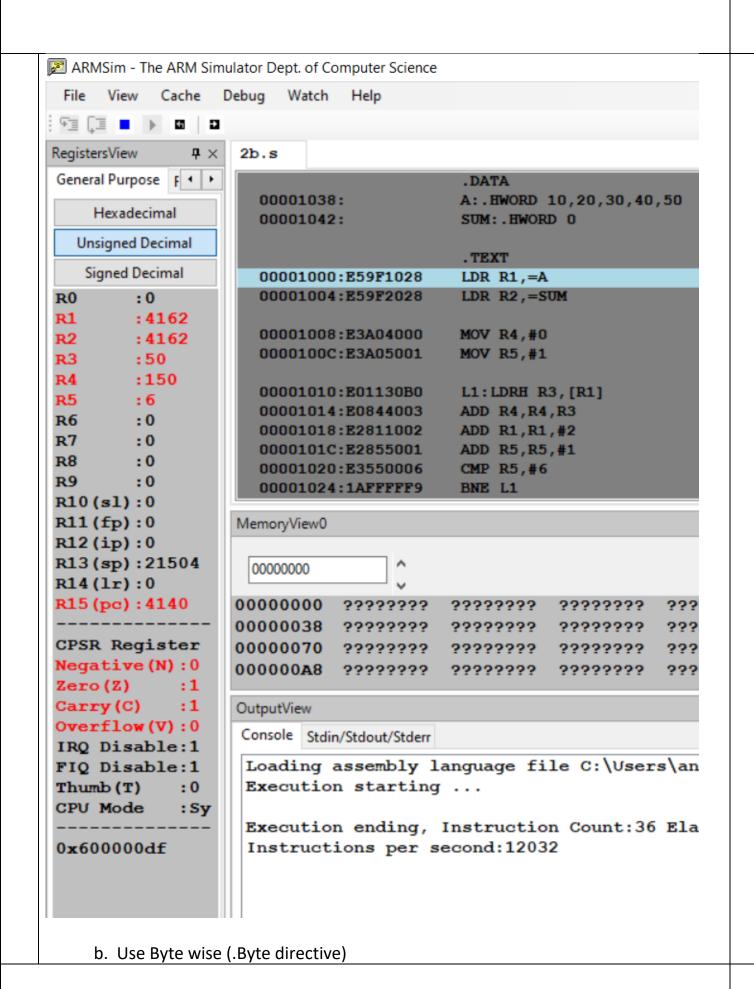2. Write a program in ARM7TDMI-ISA to find the sum of N data items in the memory. Store the result in the memory location.
   a. Use Half word(.Hword directive)

   .DATA
   A:.HWORD 10,20,30,40,50

```
SUM:.HWORD 0

.TEXT
LDR R1,=A
LDR R2,=SUM

MOV R4,#0
MOV R5,#1

L1:LDRH R3,[R1]
ADD R4,R4,R3
ADD R1,R1,#2
ADD R5,R5,#1
CMP R5,#6
BNE L1
STRH R4,[R2]
SWI 0X011
```

```
SUM:.HWORD 0

.TEXT
LDR R1,=A
LDR R2,=SUM
```

ARMSim - The ARM Simulator Dept. of Computer Science

File   View   Cache   Debug   Watch   Help

RegistersView   ⚲ ✕

General Purpose

| Hexadecimal |
| Unsigned Decimal |
| Signed Decimal |

```
R0      :0
R1      :4162
R2      :4162
R3      :50
R4      :150
R5      :6
R6      :0
R7      :0
R8      :0
R9      :0
R10(sl):0
R11(fp):0
R12(ip):0
R13(sp):21504
R14(lr):0
R15(pc):4140
--------------
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    :Sy
--------------
0x600000df
```

2b.s

```
                            .DATA
00001038:                   A:.HWORD 10,20,30,40,50
00001042:                   SUM:.HWORD 0

                            .TEXT
00001000:E59F1028           LDR R1,=A
00001004:E59F2028           LDR R2,=SUM

00001008:E3A04000           MOV R4,#0
0000100C:E3A05001           MOV R5,#1

00001010:E01130B0           L1:LDRH R3,[R1]
00001014:E0844003           ADD R4,R4,R3
00001018:E2811002           ADD R1,R1,#2
0000101C:E2855001           ADD R5,R5,#1
00001020:E3550006           CMP R5,#6
00001024:1AFFFFF9           BNE L1
```

MemoryView0

```
00000000
```

00000000	????????	????????	????????	???
00000038	????????	????????	????????	???
00000070	????????	????????	????????	???
000000A8	????????	????????	????????	???

OutputView

Console   Stdin/Stdout/Stderr

```
Loading assembly language file C:\Users\an
Execution starting ...

Execution ending, Instruction Count:36 Ela
Instructions per second:12032
```

b. Use Byte wise (.Byte directive)

```
.DATA
A:.BYTE 10,20,30,40,50
SUM:.BYTE 0

.TEXT
LDR R1,=A
LDR R2,=SUM

MOV R4,#0
MOV R5,#1

L1:LDRB R3,[R1]
ADD R4,R4,R3
ADD R1,R1,#1
ADD R5,R5,#1
CMP R5,#6
BNE L1
STRB R4,[R2]
SWI 0X011
```

ARMSim - The ARM Simulator Dept. of Computer Science

File   View   Cache   Debug   Watch   Help

RegistersView

General Purpose

| Hexadecimal |
| Unsigned Decimal |
| Signed Decimal |

```
R0        : 0
R1        : 4157
R2        : 4157
R3        : 50
R4        : 150
R5        : 6
R6        : 0
R7        : 0
R8        : 0
R9        : 0
R10(sl) : 0
R11(fp) : 0
R12(ip) : 0
R13(sp) : 21504
R14(lr) : 0
R15(pc) : 4140
--------------
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    : Sy
--------------
0x600000df
```

2c.s

```
                              .DATA
00001038:              A:.BYTE 10,20,30,40,50
0000103D:              SUM:.BYTE 0

                              .TEXT
00001000:E59F1028      LDR R1,=A
00001004:E59F2028      LDR R2,=SUM

00001008:E3A04000      MOV R4,#0
0000100C:E3A05001      MOV R5,#1

00001010:E5D13000      L1:LDRB R3,[R1]
00001014:E0844003      ADD R4,R4,R3
00001018:E2811001      ADD R1,R1,#1
0000101C:E2855001      ADD R5,R5,#1
00001020:E3550006      CMP R5,#6
00001024:1AFFFFF9      BNE L1
```

MemoryView0

`00000000`

```
00000000   ????????   ????????   ????????   ??
00000038   ????????   ????????   ????????   ??
00000070   ????????   ????????   ????????   ??
000000A8   ????????   ????????   ????????   ??
```

OutputView

Console   Stdin/Stdout/Stderr

```
Loading assembly language file C:\Users\a
Execution starting ...

Execution ending, Instruction Count:36 E
Instructions per second:12030
```