

Microprocessor and Computer Architecture (MPCA)
Laboratory
UE20CS252 4th Semester,
Academic Year 2021-22

Date: 28/01/2022

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| Name : SUNDEEP A | SRN: PES1UG20CS445 |
| SEC: H | ROLL NO : 48 |

Week # 1

Program Number: 1

Title of the Program

Write a program in ARM7TDMI-ISA to copy a block of N data items from location A to B(do not use LDM/STM). For half word

Program Code

.DATA

A: .HWORD 10,20,30,40,50,60,70,80,90,100

B: .HWORD 0,0,0,0,0,0,0,0,0,0

.TEXT

LDR R1, =A; initialize the block address

LDR R2, =B

MOV R5,#1;count register

L1:LDRH R3,[R1]

STRH R3,[R2]

ADD R1,R1,#2;address to the next data

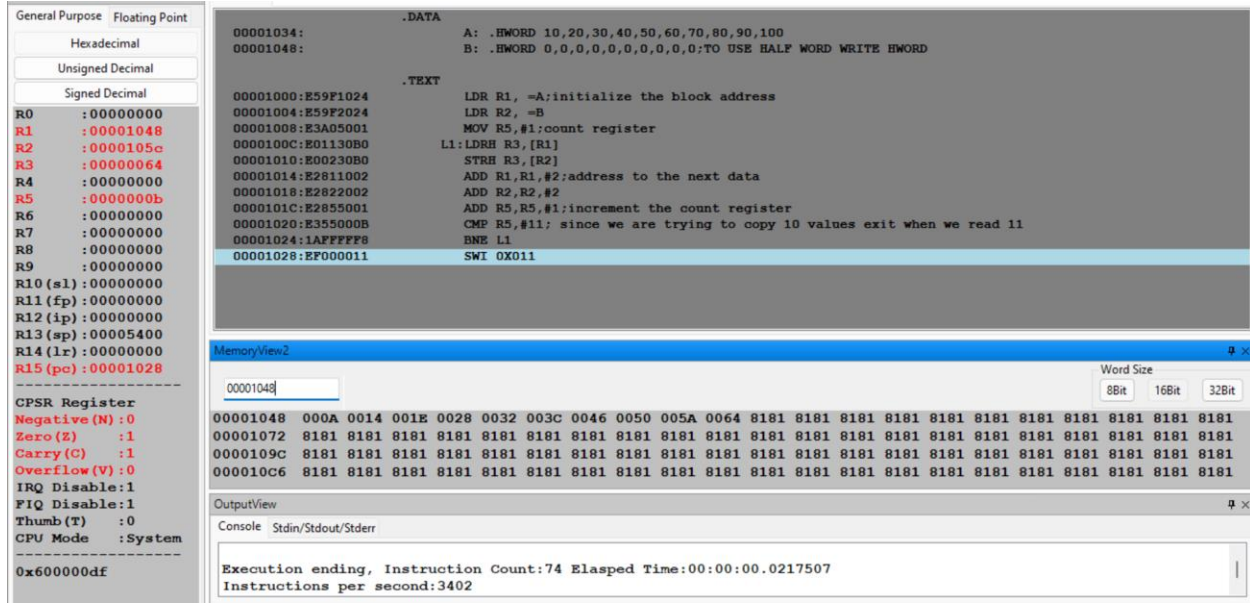
ADD R2,R2,#2

ADD R5,R5,#1;increment the count register

CMP R5,#11; since we are trying to copy 10 values exit when we read 11

BNE L1
SWI 0X011

Screenshot of ArmSimulator of the Program Executed



Program Number: 2

Title of the Program

Write a program in ARM7TDMI-ISA to find the sum of N data items in the memory. State the result in the memory locations

- For full word
- For byte

Program Code

a) Full word

```
.DATA
A: .WORD 0X10, 0X20,0X30,0X40,0X50,0X60,0X70,0X80,0X90,0X100
SUM: .WORD 00

.TEXT
LDR R1, =A
LDR R2, =SUM
MOV R4,#0
```

```

MOV R5,#1
L1: LDR R3,[R1]
ADD R4,R4,R3
ADD R1,R1,#4
ADD R5,R5,#1
CMP R5,#11
BNE L1
STR R4,[R2]
SWI 0X011

```

Screenshot of ArmSimulator of the Program Executed

The screenshot displays the ArmSimulator interface with the following components:

- General Purpose:** Shows registers R0 through R15. R15 (pc) is highlighted at 0000102c.
- CPSR Register:** Shows various flags and modes, including Negative (N), Zero (Z), Carry (C), Overflow (V), IRQ Disable, FIQ Disable, Thumb (T), and CPU Mode (System).
- MemoryView2:** Displays memory addresses and their corresponding values. The address 00001060 is selected, showing a value of 81818181.
- OutputView:** Shows the execution status: "Execution ending, Instruction Count:66 Elapsed Time:00:00:00.0056269 Instructions per second:11729".

Program Code

b) Byte

```

.DATA
A: .BYTE 0X1, 0X2,0X3,0X4,0X5,0X6,0X7,0X8,0X9,0X10
SUM: .BYTE 00

.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,#11
BNE L1
STRB R4,[R2]
SWI 0X011

```

Screenshot of ArmSimulator of the Program Executed

The screenshot displays the ArmSimulator interface with the following components:

- General Purpose Register Window:** Shows registers R0 through R15. R15 (PC) is highlighted in red at address 0000102c. The CPSR Register shows Negative (N): 0, Zero (Z): 1, Carry (C): 1, Overflow (V): 0, IRQ Disable: 1, FIQ Disable: 1, Thumb (T): 0, and CPU Mode: System.
- MemoryView Window:** Displays memory at address 00001042. The word size is set to 32Bit. The memory content is shown in hexadecimal and ASCII.
- OutputView Window:** Shows the execution ending with an instruction count of 66, elapsed time of 00:00:00.0070368, and instructions per second of 9379.

Program Number: 3

Title of the Program

Write a program in ARM7TDMI-ISA to find the sum of N natural numbers. Store the result in the memory location. Using Full Word.

Program Code

.DATA

A: .WORD 15,25,35,45,55,65,75,50,95,105,115,125,135,145

SUM: .WORD 00

.TEXT

LDR R1, =A

LDR R2, =SUM

MOV R4,#0

MOV R5,#1

L1:LDR R3,[R1]

ADD R4,R4,R3

ADD R1,R1,#4

ADD R5,R5,#1

CMP R5,#15

BNE L1

STR R4,[R2]

SWI 011

Screenshot of ArmSimulator of the Program Executed

The screenshot displays the ArmSimulator interface with the following components:

- General Purpose / Floating Point:** Hexadecimal, Unsigned Decimal, Signed Decimal.
- Registers:** R0 to R15 (pc) are shown with their current values. R15 (pc) is 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.
- Program Code:** The code is displayed in the top right pane, showing the .DATA section (A: .WORD 15,25,35,45,55,65,75,50,95,105,115,125,135,145; SUM: .WORD 00) and the .TEXT section (LDR R1, =A; LDR R2, =SUM; MOV R4, #0; MOV R5, #1; L1: LDR R3, [R1]; ADD R4, R4, R3; ADD R1, R1, #4; ADD R5, R5, #1; CMP R5, #15; BNE L1; STR R4, [R2]; SWI 011).
- MemoryView2:** The memory view shows the address 00001070, with a table of memory contents (Address, Data, Comment) for the range 00001070 to 000010E8.
- OutputView:** The output shows the execution ending, instruction count 16718, elapsed time 00:00:00.2659530, and instructions per second 62860.

