

Lab 1

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ROLL NO - 1

Implementation of ARM7TDMI-ISA to Block transfer of data items

; this code copy an array from one address from other memory address .

; Implementation of ARM7TDMI-ISA to Block transfer of

;data items

.TEXT

LDR R0, =A

LDR R1, =B

MOV R3, #5

LDR R5,=B;

LOOP:

LDR R2, [R0]

STR R2, [R1]

ADD R0, R0, #4

ADD R1, R1, #4

SUBS R3, R3, #1

BNE LOOP

MOV R3, #5

LOOP1:

LDR R2, [R5]

ADD R5, R5, #4

SUBS R3, R3, #1

BNE LOOP1

SWI 0X011

.DATA

A: .WORD 1, 2, 3, 4, 5

B: .WORD 0

OUTPUT

The screenshot displays the ARMSim interface within a VMware Workstation 17 Player. The main window shows assembly code for an ARMv7-M implementation of an array copy function. The code includes comments in Chinese and assembly instructions for loading, storing, and looping. The CPU registers are visible on the left, and the output window at the bottom shows the execution progress.

```
; this code copy an array from one address from other memory address .
; Implementation of ARMv7-M-ISA to Block transfer of
; data items
;TEXT
00001000: E59F0038 LDR R0, -A
00001004: E59F1038 LDR R1, -B
00001008: E3A03005 MOV R3, #5
0000100C: E59F5030 LDR R5, -B;
00001010: E5020000 LDR R2, [R0]
00001014: E5812000 STR R2, [R1]
00001018: E2800004 ADD R0, R0, #4
0000101C: E2811004 ADD R1, R1, #4
00001020: E2530001 SUBS R3, R3, #1
00001024: 1AFFFFF9 BNE LOOP
00001028: E3A03005 MOV R3, #5
0000102C: E5052000 LDR R2, [R5]
00001030: E2800004 ADD R5, R5, #4
00001034: E2530001 SUBS R3, R3, #1
00001038: 1AFFFFF9 BNE LOOP
0000103C: EF000011 SWI 0x011
; .DATA
0000104C: A: WORD 1, 2, 3, 4, 5
00001060: B: WORD 0
```

Output window:

```
Loading assembly language file /home/kali/git/WPCA-LABS/lab1/1.s
Execution starting ...
Execution ending, Instruction Count:56 Elapsed Time:00:00:00.0950880
Instructions per second:588
```

2. Find sum of N data items in the memory.

.data

A:.WORD 10,20,30,40,50,60,70,80,90,11

```

.text
LDR R0,=A
MOV R1,#10
MOV R3,#0
LOOP: CMP R1,#0
BEQ EXIT
LDR R2,[R0],#4
ADD R3,R3,R2
SUB R1,R1,#1
B LOOP
EXIT: SWI 0x11
.end

```

The screenshot displays the ARMsim interface within a VMware Workstation 17 Player. The main window is titled "ARMsim - The ARM Simulator Dept. of Computer Science". It features a menu bar (File, View, Cache, Debug, Watch, Help) and a toolbar. The interface is divided into several panes:

- General Purpose:** Shows the current state of the processor. The "Unlabeled Decimal" pane displays the following register values:
 - R0: 4100
 - R1: 0
 - R2: 11
 - R3: 461
 - R4: 0
 - R5: 0
 - R6: 0
 - R7: 0
 - R8: 0
 - R9: 0
 - R10(s1): 0
 - R11(fp): 0
 - R12(sp): 0
 - R13(sp): 21504
 - R14(lr): 0
 - R15(pc): 4132
- CPSR Register:** Shows the Current Program Status Register values:
 - Negative(N): 0
 - Zero(Z): 1
 - Carry(C): 1
 - Overflow(O): 0
 - IRQ Disable: 1
 - FIQ Disable: 1
 - Thumb(T): 0
 - CPU Mode: System
- Assembly Code:** The main pane shows the assembly code being executed, with the current instruction highlighted:


```

0000102C: .text
A: WORD 10, 20, 30, 40, 50, 60, 70, 80, 90, 11
00001030: LDR R0,=A
00001034: MOV R1,#10
00001038: MOV R3,#0
0000103C: LOOP: CMP R1,#0
00001040: BEQ EXIT
00001044: LDR R2,[R0],#4
00001048: ADD R3,R3,R2
0000104C: SUB R1,R1,#1
00001050: B LOOP
00001054: EXIT: SWI 0x11
00001058: .end

```
- Output View:** The bottom pane shows the execution output:


```

Loading assembly language file /home/kali/git/WPCA-LABS/lab1/2.s
Execution starting ...
Execution ending, Instruction Count: 66 Elapsed Time: 00:00:00.1419999
Instructions per second: 464

```



3. Find Factorial

```
.text
MOV R0,#5
MOV R1,#5
LOOP:SUB R0,R0,#1
MUL R2,R1,R0
MOV R1,R2
CMP R0,#1
BEQ EXIT
B LOOP
EXIT:SWI 0x11
.end
```

The screenshot displays the ARMsim ARM simulator interface. The main window shows the assembly code being executed, with the following instructions highlighted in blue:

```
.text
00001000: E3A00005  MOV R0, #5
00001004: E3A00005  MOV R1, #5
00001008: E2400001  LOOP: SUB R0, R0, #1
0000100C: E0A00001  MUL R2, R1, R0
00001010: E1A00002  MOV R1, R2
00001014: E3800001  CMP R0, #1
00001018: 0A000000  BEQ EXIT
0000101C: EAF0FF09  B LOOP
00001020: EF000011  EXIT: SWI 0x11
.end
```

The left sidebar shows the register values and the CPSR register status:

```
R0 : 1
R1 : 120
R2 : 120
R3 : 0
R4 : 0
R5 : 0
R6 : 0
R7 : 0
R8 : 0
R9 : 0
R10 : 0
R11 : 0
R12 : 0
R13 : 22504
R14 : 0
R15 : 4128
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
```

The bottom status bar shows the execution progress:

```
Loading assembly language file /home/kali/git/MPCA-LABS/lab1/3.s
Execution starting ...
Execution ending, Instruction Count: 26 Elapsed Time: 00:00:00.1339390
Instructions per second: 194
```

4. search for an element, sum of n elements in an array using various addressing modes

```
.data
    A: .word 5,10,15,20,25
.text
    MOV R2,#15
    MOV R3,#5
    LDR R0,=A
    MOV R4,#0
LOOP:
    ADD r4, r4,#1
    LDR R1,[R0],#4
    CMP R1,R2
    BEQ Label1
    SUBS R3,R3,#1
    BNE LOOP
    BEQ NF
Label1:
    MOV R7,R4
    SWI 0x011
NF:
    MOV R6,#-1
    SWI 0x011
.end
```

Ubuntu 64-bit - VMware Workstation 17 Player (Non-commercial use only)

Player

ARMsim - The ARM Simulator Dept. of Computer Science

File View Cache Debug Watch Help

General Purpose Floating-Point 4a.s

Unassembled Disassembled Standard Decimal

00001040: .data A: word 5,10,15,20,25

00001000:E3A0200F .text MOV R2,#15

00001004:E3A03005 MOV R3,#5

00001008:E3A00001 LDR R0,=A

0000100C:E3A04000 MOV R4,#0

00001010: LOOP: ADD R4,R4,#1

00001014:E4901004 LDR R1,[R0],#4

00001018:E1510002 CMP R1,R2

0000101C:0A000002 BEQ Label1

00001020:E2533001 SUBS R3,R3,#1

00001024:1AFFFFF9 BNE LOOP

00001028:0A000001 BEQ NF

0000102C: Label1: MOV R7,R4

00001030:EF000011 DWT 0x11

00001034: NF: MOV R5,#-1

00001038:EF000011 SWI 0x11

0000103C:00000000 .end

CPUR 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

0x600000ff

OutputView WatchView

Console | Main/Status/Filter

Loading assembly language file /home/kali/git/WPCA-LABS/lab1/4a.s

Execution starting ...

Execution ending, Instruction Count:22 Elapsed Time:00:00:00.0224460

Instructions per second:980

27°C Mostly sunny

Q Search

ENG IN

18:10 26-02-2023