

# Department of Computer Science & Engineering Microprocessor & Computer Architecture - UE20CS252

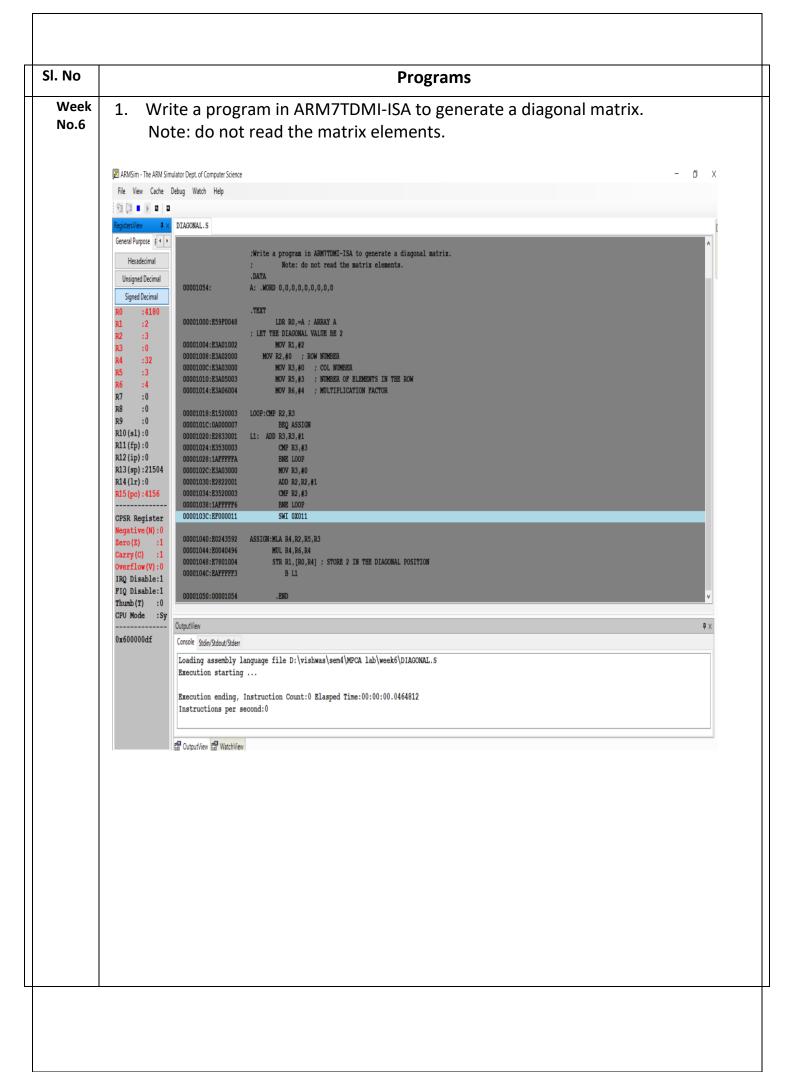
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DATE: 26/03/2022

WEEK 6



2. Write a program in ARM7TDMI-ISA to find the sum of all the positive numbers in the array. Use subroutine SUMPOSITIVE for the same. ARMSim - The ARM Simulator Dept. of Computer Science Ō File View Cache Debug Watch Help F ( ) 6 2 RegistersView  $\Psi \times ADDPOSNUM.S$ General Purpose F + + ;Write a program in ARM7TDMI-ISA to find the sum of all the positive ;numbers in the array. Use subroutine SUMPOSITIVE for the same. Hexadecimal Unsigned Decimal A: .WORD 1,-2,3,4,5,-6,7,8,-9,-10 Signed Decimal 00001070: SUM: .WORD 0 :4208 00001000:E59F0038 LDR RO,=A ; ARRAY MOV R1,#0 ; INDEX VARIABLE MOV R2,#0 ; SUM VARIABLE R3 R4 00001004:E3A01000 :-10 00001008:E3A02000 :4208 LDR R4,=SUM 0000100C:E59F4030 R5 :0 :0 00001010:EB000001 BL LOOP R7 :0 00001014:E5842000 STR R2, [R4] R8 :0 00001018:EF000011 SWI 0X011 R9 :0 R10(sl):0 R11(fp):0 0000101C:E4903004 LOOP: LDR R3,[R0],#4 R12(ip):0 R13(sp):21504 00001020:E1B03003 MOVS R3,R3 R14(lr):4116 00001024:5A000003 BPL POSITIVE L1: ADD R1,R1,#1 00001028:R2811001 R15 (pc):4120 0000102C:E351000A CMP R1.#10 CPSR Register 00001030:1AFFFFF9 BNE LOOP 00001034:E1A0F00E MOV PC, LR Negative(N):0 Zero(Z) Carry(C) 0000103C:EAFFFFF9 B L1 Overflow(V):0 IRQ Disable:1 FIQ Disable:1 Thumb(T) :0 CPU Mode OutputView 0x600000df Console Stdin/Stdout/Stderr Loading assembly language file D:\vishwas\sem4\MPCA lab\week6\ADDPOSNUM.S Execution ending, Instruction Count:0 Elasped Time:00:00:00.0080830 Instructions per second:0 OutputView WatchView

3. Write a program in ARM7TDMI-ISA to check the parity of given 32 bit number using function subprogram PARITYCHECK. Display appropriate messages as ODD PARITY or EVEN PARITY number. a)for odd parity: ARMSim - The ARM Simulator Dept. of Computer Science ٥ File View Cache Debug Watch Help FI (I • ) 0 | 0 RegistersView # × PARITYCHECK.S General Purpose F + + .DATA
ODD: .ASCIZ "ODD PARITY NUMBER"
EVEN: .ASCIZ "EVEN PARITY NUMBER"
A: .WORD 0X00000007 Unsigned Decimal Signed Decimal .TEXT
LDR R2,=A
LDR R3,[R2]
MOV R6,#0 ; COUNT REGISTER
MOV R4,#0 ; COUNT NUMBER OF 15. :4188 R1 :0
R2 :42
R3 :0
R4 :3
R5 :0
R6 :32
R7 :0
R8 :0
R9 :0
R10(s1):0 :4228 L2: TST R3,#1

BNE L1

LOOP:MOV R3,R3,LSR #1

ADD R6,R6,#1

CMP R6,#32

BNE L2

TST R4,#1

BEQ L3

LDR R0,=ODD

SWI OXO2

B EXIT

L3: LDR R0,=EVEN 00001010:E3130001 00001014:1A00000B 00001018:E1A030A3 0000101C:E2866001 00001020:E3560020 00001024:1AFFFFF9 R12(ip):0 R13(sp):21504 00001034:EF000002 00001038:EA000001 0000103C:E59F0014 R14(lr):0 CPSR Register 00001040:EF000002 00001044:EF000011 EXIT:SWI 0X011 Carry(C) :1 Overflow(V):0 00001048:E2844001 0000104C:EAFFFFF1 IRO Disable:1 FIQ Disable:1 Thumb (T) CPU Mode 0x200000df Console Stdin/Stdout/Stderr ODD PARITY NUMBER OutputView WatchView b)for even parity: ARMSim - The ARM Simulator Dept. of Computer Science О File View Cache Debug Watch Help FI [I • b 0 | D RegistersView 📮 🗴 General Purpose F + + Hexadecimal Unsigned Decimal Signed Decimal ODD: .ASCIZ "ODD PARITY NUMBER"
EVEN: .ASCIZ "EVEN PARITY NUMBER"
A: .WORD 0X000000000 R0 :4206
R1 :0
R2 :4228
R3 :0
R4 :0
R5 :0
R6 :32
R7 :0
R8 :0
R9 :0
R1 (fp):0
R11 (fp):0
R12 (ip):0
R13 (sp):21504
R14 (lr):0
R15 (pc):4164 :4206 .TEXT

LDR R2,=A

LDR R3,[R2]

MOV R6,#0 ; COUNT REGISTER

MOV R4,#0 ; COUNT NUMBER OF 15 00001014:1A00000B 00001018:E1A030A3 0000101C:E2866001 00001020:E3560020 CPSR Register 00001044:EF000011 EXIT:SWI 0X011 IRQ Disable:1 FIQ Disable:1 Thumb(T) :0 CPU Mode :Sy 00001048:E2844001

Console Stdin/Stdout/Stderr

EVEN PARITY NUMBER

☐ OutputView ☐ WatchView

0x600000df

# **Student exercises:**

1. Write a program in ARM7TDMI-ISA to find the sum of all the digits in an 32bit number.

```
.data
```

A: .WORD 2312

B: .WORD 0xCCCCCCD

```
.text
```

mov r0,#0 LDR r1,=A

LDR r2,[r1]

Idr r4,=B

LDR r5,[r4]

# 11:

CMP r2,#10

BLT L4

MOV r3,r2

BL2

## L2:

CMP r3,#10

BLT L3

SUB r3,r3,#10

BL2

## L3:

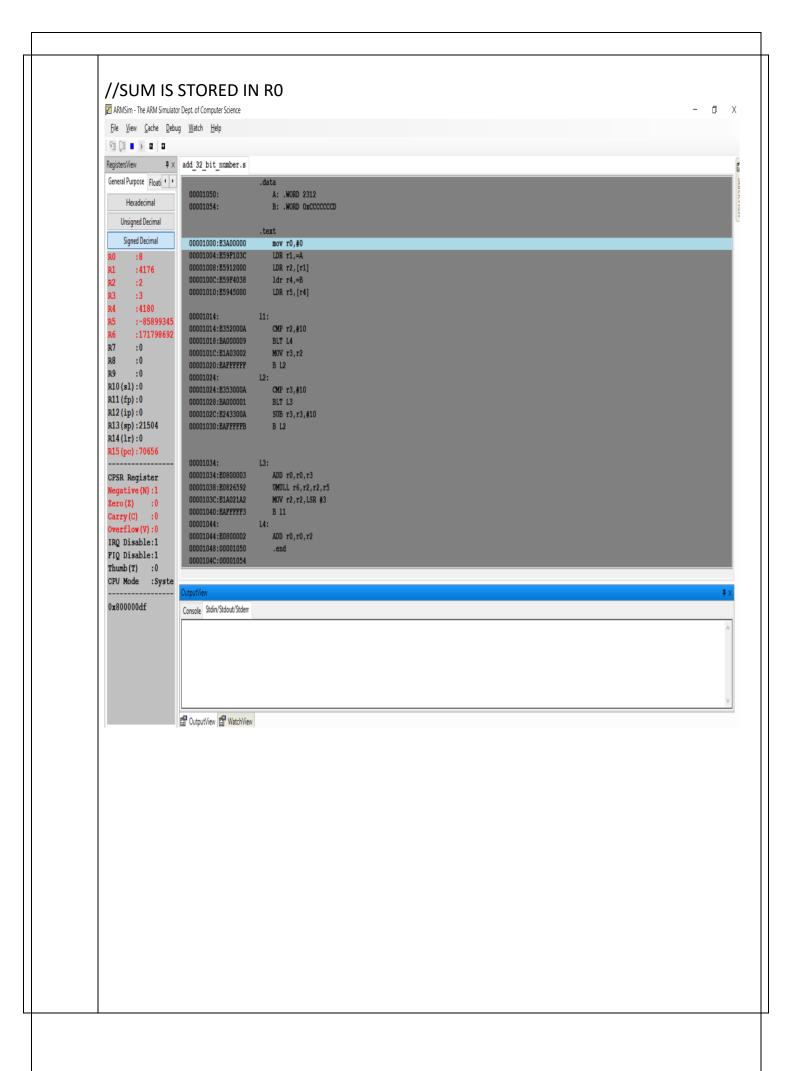
ADD r0,r0,r3 UMULL r6,r2,r2,r5 MOV r2,r2,LSR #3 B I1

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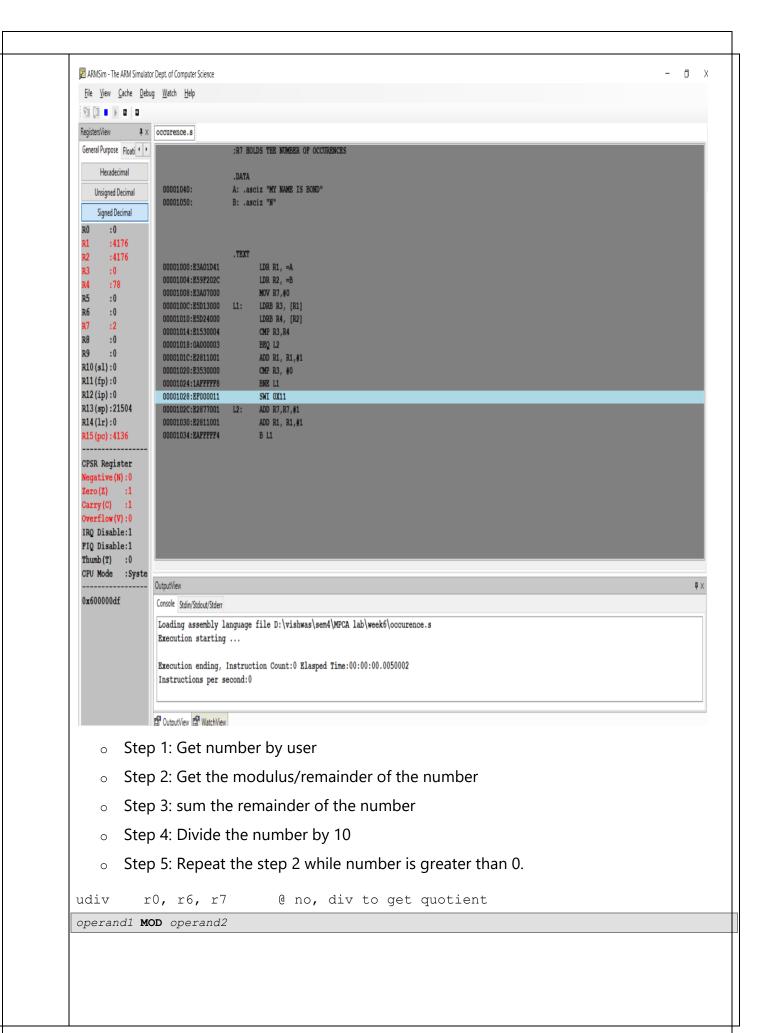
L4:

ADD r0,r0,r2

.end



2. Write a program in ARM7TDMI-ISA to find the number of occurrences of a given character in a string. Example: Given string: My name is Bond. Character: 'n'. Expected Output: Display 2 in a register. ;R7 HOLDS THE NUMBER OF OCCURENCES .DATA A: .asciz "MY NAME IS BOND" B: .asciz "N" .TEXT LDR R1, =A LDR R2, =B MOV R7,#0 L1: LDRB R3, [R1] LDRB R4, [R2] CMP R3,R4 BEQ L2 ADD R1, R1,#1 CMP R3, #0 BNE L1 **SWI 0X11** L2: ADD R7,R7,#1 ADD R1, R1,#1 B L1



	MPCA-Laboratory/Assignment/Hands-on/Project