

**Department of Computer Science & Engineering**

**Microprocessor & Computer Architecture**

**MPCA-Laboratory/Assignment/Hands-on/Project**

**UE20CS252**

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**SRN : PES2UG20CS390 DATE: 22/02/2022**

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| **Sl. No** | **Programs** |
| **Week No.5** | 1. Write a program in ARM7TDMI-ISA to generate Fibonacci Series and store  them in an array.  Program:  Ldr R0,=A;  Mov R10,#9  Mov R1,#0  Mov R2,#1  Str R1,[R0],#4  Add R3,R2,R1  Loop: Str R3,[R0],#4  Add R3,R2,R1  Mov R1,R2  Mov R2,R3  Sub R10,R10,#1  Cmp R10,#0  Beq Exit  Bne Loop    Exit: Swi 0x11  A: .word  Screenshot:      2. Write a program in ARM7TDMI-ISA to find smallest number in an array of n  32 bit numbers  Program:  .text  ldr r0,=data1  ldr r4,=0x05 ;//length of loop  ldr r1,[r0],#04  sub r4,r4,#01  back:  ldr r2,[r0]  cmp r1,r2  bls less ;// branch on low  mov r1,r2  less:  add r0,r0,#04  sub r4,r4,#01  cmp r4,#00  bne back  str r1,[r3] ;// smallest value stored in memory location  stop: b stop  .data  data1: .word 10,20,7,8,100  Screenshot:  3. Write a program in ARM7TDMI-ISA to multiply 2 matrices of order3.  i.e., implement c[i][j]=c[i][j] + a[i][j] x b[i][j].  a. Use MLA instruction  b. Use MUL instruction  Program:  ; MULTIPLICATION OF 2 MATRICES.  .DATA  A: .WORD 1,2,3,4,5,6,7,8,9  B: .WORD 1,2,3,4,5,6,7,8,9  C: .WORD 0,0,0,0,0,0,0,0,0  .TEXT  LDR R0,=A  LDR R1,=B  LDR R2,=C    MOV R3,#0 ;INNER LOOP COUNT I INDEX  MOV R4,#0 ;OUTER LOOP COUNT J INDEX  MOV R10,#3 ; NUMBER OF ELEMENTS IN A ROW  MOV R8,#0 ;VALUE OF K    LOOP1:MLA R11,R3,R10,R8  MOV R11,R11,LSL #2  LDR R5,[R0,R11]    MLA R12,R8,R10,R4  MOV R12,R12,LSL #2  LDR R6,[R1,R12]    MUL R11,R5,R6 ; REGISTER R11 IS REUSED.  ADD R9,R9,R11    ADD R8,R8,#1 ; INCREMENT K INNERMOST LOOP  CMP R8,#3  BNE LOOP1    MLA R12,R3,R10,R4 ; STORE THE IN C[I][J]  MOV R12,R12,LSL #2  STR R9,[R2,R12]    MOV R8,#0 ; K=0  MOV R9,#0 ; C[I][J]=0  ADD R4,R4,#1  CMP R4,#3  BNE LOOP1  MOV R4,#0  ADD R3,R3,#1  CMP R3,#3  BNE LOOP1  SWI 0X011  .END    Screenshot:  4. Write a program in ARM7TDMI-ISA to transfer a block of 256 words stored  at memory location X to memory location Y using Load Multiple and Store  Multiple instructions. The rate of transfer is 32 bytes.  Programs:  // Program to transfer a block of data from location X to location Y.  .DATA  A: .WORD 23,43  B: .WORD 0,0,0,0,0,0,0  .TEXT  LDR R4, =A //INITIALIZATION OF THE BLOCK ADDRESSES  LDR R5, =B  loop: LDMIA R4!, {R0-R1}  STMIA R5!, {R0-R1}  CMP R11,#16  BNE loop  Screenshot:  **Student exercises:**  1. Write a program in ARM7TDMI-ISA to add 2 matrices of order3.  i.e., Implement c[i][j]= a[i][j] + b[i][j].  Program:  //TO FIND SUM OF N DATA ITEMS IN THE MEMORY.STORE THE RESULY  //USING PRE-INDEXING ADDRESSING WITH WRITE BACK MODE  .DATA  A: .WORD 1,2,3,4  B: .WORD 1,2,3,4  SUM: .WORD 0,0,0,0  .TEXT  MOV R2,#0  LDR R8, =A  LDR R9,=B  LDR R10, =SUM  MOV R11,#1  SUB R8,R8,#4  SUB R9,R9,#4  SUB R10,R10,#4  MOV R12,#1  LOOP: LDR R6,[R8,#4]!  LDR R7,[R9,#4]!  ADD R2,R6,R7  ADD R11,R11,#1  STR R2,[R10,#4]!  CMP R11,#5  BNE LOOP  SWI 0X011  .END  Screenshot:    2. Write a program in ARM7TDMI-ISA to find the ROWSUM of a matrix.    Program:  .DATA  A: .WORD 1,2,3,4,5,6,7,8,9  SUM: .WORD 0,0,0  .TEXT  MOV R2,#0  LDR R8, =A  LDR R10, =SUM  MOV R11,#1  SUB R8,R8,#4  SUB R10,R10,#4  LOOP: LDR R6,[R8,#4]!  ADD R2,R2,R6  ADD R11,R11,#1  CMP R11,#4  BNE LOOP  STR R2,[R10,#4]!  MOV R2,#0  ADD R3,R3,#1  CMP R3,#3  SUB R11,R11,#3  BNE LOOP  SWI 0X011  .END  Screenshot: |