

# Department of Computer Science & Engineering Microprocessor & Computer Architecture Lab

### **Lab 5 Problem\_Statements**

### **UE22CS251B**

```
Write an ALP to multiply 2 matrices. (3X3)
CODE
     .DATA
    MATRIXA: .WORD 1, 1, 1, 1, 1, 1, 1, 1, 1
MATRIXB: .WORD 9, 9, 9, 9, 9, 9, 9, 9
MATRIXC: .WORD 0, 0, 0, 0, 0, 0, 0
     .TEXT
    MAIN:
     LDR R1, =MATRIXA
LDR R2, =MATRIXB
LDR R3, =MATRIXC
MOV R4, #3
    OUTER LOOP:
      MOV RØ, R2
    MOV R9, #3
INNER_LOOP:
      MOV R8, #0
      MOV R7, #3
MOV R6, R1
     INNERMOST_LOOP:
      LDR R10, [R6], #4
      LDR R11, [R0], #4
MUL R12, R10, R11
ADD R8, R8, R12
SUBS R7, R7, #1
      BNE INNERMOST_LOOP
      STR R8, [R3], #4
SUBS R9, R9, #1
BNE INNER_LOOP
      ADD R1, R1, #12
SUBS R4, R4, #1
BNE OUTER_LOOP
      MOV R0, #0
      MOV R7, #1
      SWI 0x11
     .END
```

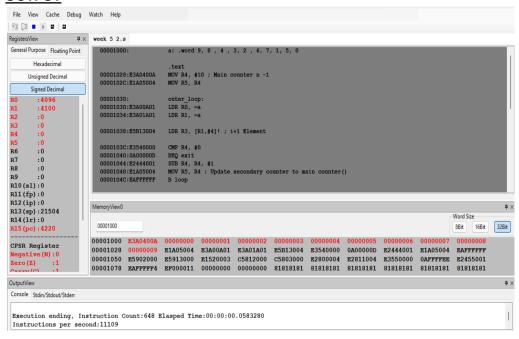


Write an ALP using conditional ARM instructions to sort an array of numbers using Bubble Sort Algorithm.

### **CODE**

```
a: .word 9, 8 , 4 , 3, 2 , 6, 7, 1, 5, 0
MOV R4, #10 ; Main counter n -1 MOV R5, R4
outer loop:
LDR R0, =a
LDR R1, =a
LDR R3, [R1,#4]!; i+1 Element
CMP R4, #0
BEQ exit
SUB R4, R4, #1
MOV R5, R4; Update secondary counter to main counter()
loop:
LDR R2,[R0]; Ith
LDR R3, [R1]; i+1 Element
CMP R2, R3
STRGT R2,[R1]
STRGT R3,[R0]
ADD R0, R0, #4
ADD R1, R1, #4
CMP R5, #0
BEQ outer_loop
SUB R5, R5, #1
B loop
exit:
     SWI 0x11
```

### **OUTPUT**



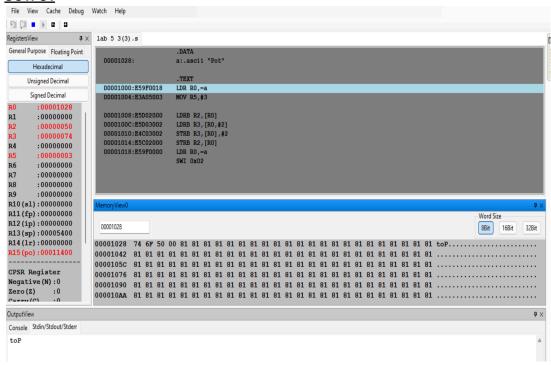
# 3 Assignment: i) Write a program to swap the first and last character of a given string. Example: Input: 'dog' Output: 'god' CODE

```
.DATA
a:.ascii "Pot"

.TEXT
LDR R0,=a
MOV R5,#3

LDRB R2,[R0]
LDRB R3,[R0,#2]
STRB R3,[R0],#2
STRB R2,[R0]
LDR R0,=a
SWI 0x02
```

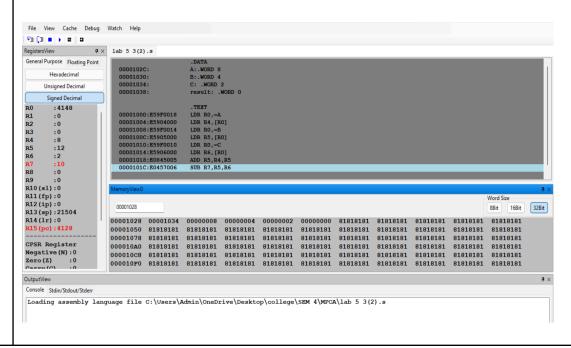
### **OUTPUT**



Given a c Code convert it in its equivalent Arm Code. a)x = (a + b) - c;**CODE** .DATA A:.WORD 8 B:.WORD 4 C: .WORD 2 result: .WORD 0 .TEXT LDR R0,=A LDR R4, [R0] LDR R0,=B LDR R5, [R0] LDR R0,=C LDR R6, [R0] ADD R5, R4, R5

## **OUTPUT**

SUB R7, R5, R6



```
b)
z = (a << 2) | (b & 15);
CODE
  .DATA
  A: .WORD 10
  B: .WORD 5
  Z: .WORD 0
  .TEXT
  LDR R0, =A
  LDR R1, [R0]
  MOV R2, R1, LSL #2
  LDR R0, =B
  LDR R3, [R0]
  AND R3, R3, #15
  ORR R2, R2, R3
  LDR R0, =Z
  STR R2, [R0]
```

### **OUTPUT**

