CO ASSIGMENT

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1) Write assembly language program for the following
   D = A / B * C

➔ For 3 address

```
DIV   R1, A , B        ;    R1 ←   M[A] / M[B]
MUL   D , R1 , C       ;    M[D] ←   R1 * M[C]
```

➔ For 2 address

```
LOAD   R1 , A          ;    R1 ←    M[A]
DIV    R1 , B          ;    R1 ←    R1 / M[B]
MUL   R1 , C           ;    R1  ←   R1 * M[C]
LOAD   D , R1          ;    M[D]  ←  R1
```

➔ For 1 address

```
LOAD   A               ;    AC  ←   M[A]
DIV   D                ;    AC  ←   AC / M[D]
MUL   C                ;    AC   ←  AC * M[C]
LOAD   D               ;    M[D]  ←   AC
```

➔ For zero address

```
PUSH   D               ;    TOS  ←  D
PUSH   B               ;    TOS ←   B
PUSH   A               ;    TOS  ←  A
DIV                    ;    TOS  ←  ( A / B )
PUSH   C               ;    TOS  ←  C
MUL                    ;    TOS  ←  C * ( A / B )
POP   D                ;    M[D]  ←  TOS
```

2) A program consists of 100 instructions out of which 40 are the read instructions , 30 are computation instructions and remaining 30 are the write instructions. Assume total no of basic steps for each read , write and compute is 4 , 5 and 6 respectively and a processor clock rate is 2 GHz , calculate the time taken by the program to execute

➔ We have ,

T = (N X S)/ R

Given : time taken to read 40 instructions

T1 = (40 X 4)/ 2 X 10^{9}

T1 = 80 X 10^{-9} seconds

Time taken for computation instructions

T2 = (30 X 5) / 2 X 10^9
T2 = 75 X 10^{-9} seconds

Time taken for writing instructons

T3 = (30 X 6) / 2 X 10^9
T3 = 90 X 10^{-9} seconds

Total time taken by the processor to execute all the 100 instructions is
T = T1 + T2 + T3
T = 80 X 10^{-9} + 75 X 10^{-9} + 90 X 10^{-9}
T = 245 X 10^{-9} seconds

3) Assume that there are 5 bits to be used for the representation of the numbers. Perform the following operation and check whether overflow occurs or not

a) 11 – 14

11	0 1 0 1 1
-14	1 0 0 1 0
-3	1 1 1 0 1

Overflow does not occur

b) 8 + 9

8	0 1 0 0 0
+9	0 1 0 0 1
17	0 1 0 0 0 1

Overflow occurs

c) -16 + 8

-16	1 0 0 0 0
8	0 1 0 0 0
-8	1 1 0 0 0

Overflow does not occur

d) 7 + 8

7	0 0 1 1 1
+8	0 1 0 0 0
15	0 1 1 1 1

Overflow does not occur

4) Name the machines which use Big endian and little endian assigments

➔ IBM's 370 mainframes , most RISC based computers , TCP/IP , and Motorola microprocessors use the Big endian approach

Intel processors (CPU’s) and DEC alphas and atleast some programs that run on them are little endian

5) Write the addressing mode for the following instructions :

i. Add R1 , R2 ; register addressing mode

ii. Move #%1011001 , R1 ; immediate addressing mode

iii. SUB A , B ; absolute (direct) addressing mode

iv. ADD 8 (R2) , R1 ; index addressing mode