

# ASSIGNMENT 3

## GROUP 42

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### TASK 1

b) Let the maximum size of shared memory allowed in the working machine be  $x$  bytes. Now we are storing matrices  $A(r_1 \times c_1)$ ,  $B(r_2 \times c_2)$  and  $C(r_1 \times c_2)$  in shared memory. Each matrix stores double values.

Let  $r = \max(r_1, r_2)$  and  $c = \max(c_1, c_2)$ .

Let a double data type requires  $y$  bytes in the working machine.

So, total no of bytes to store in shared memory =  $(r_1 \times c_1 + r_2 \times c_2 + r_1 \times c_2) \times y \leq (r \times c + r \times c + r \times c) \times y = 3 \times r \times c \times y$

To ensure proper working of shared memory:

$$3 \times r \times c \times y \leq x$$

$$r \times c \leq x / (3 \times y)$$

This is the required upper limit of  $r \times c$ .

In a system, let there be  $n$  CPU's. We are running  $r_1 \times c_2$  parallel processes. So for achieving performance boost from parallelism,  $r_1 \times c_2$  can be max  $n$ . In our system there are 8 CPU's. So in terms of max performance boost factor is 8, when  $r_1 \times c_2 = 8$ .