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Reading Material

Example:

Consider the four matrices M1, M2, M3 and M4 having the dimensions as shown in Figure-4.

M1: (10,20)	M3: (50,1)
M2: (20,50)	M4: (1,100)

FIGURE 4: MATRIX SIZES

Now the desired result is product of the four matrices - M1 x M2 x M3 x M4. The simplest way of doing this would be to apply the normal matrix multiplication procedure recursively in the order

M1 x (M2 x (M3 x M4))

Figure-5 shows the number of operations that are involved in performing this multiplication in the above order.

Operation	Multiplications	Total
M3 X M4	50 X 100	5000
M2 X (M3 X M4)	20 X 50 X 100	100000
(M1 X M2 X (M3 X M4))	10 X 20 X 100	20000
		125000

FIGURE 5: NORMAL MATRIX MULTIPLICATION

Here we see that the number of multiplication operations = 125000

Now we know that matrix multiplication is Associative. So, A x B x C = (AxB) x C = A x (BxC)

This means that the same multiplication of the four matrices can also be performed in a different order to get the same result. Figure-6 shows an optimized solution to the same problem.

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