Eg: 1 : 3 matrix → A, B, C

A = 10 × 30

B = 30 × 5

C = 5 × 60

When this is written as 1D matrix

= [10, 30, 5, 60]

Length = n, ie there are n-1 matrix

Length = 4, there are 4-1 = 3 matrix

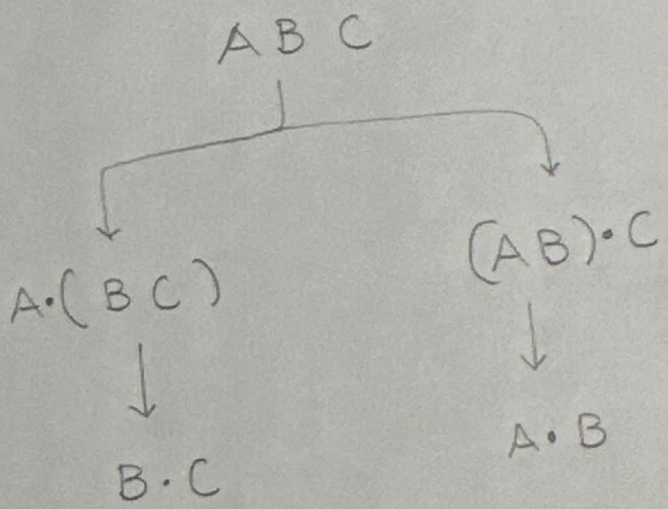
→ 10×30 [(10, 30), 5, 60]

30×5 [10, (30, 5), 60]

5×60 [10, 30, (5, 60)]

Partition

Consider matrix A, B, C



Compute no of operation:

Consider $(AB) \cdot C$

$A = 10 \times 30$

$B = 30 \times 5$

$C = 5 \times 60$

$\Rightarrow A \cdot B = (10 \times 30) \cdot (30 \times 5)$

Total no of operation $= A(m \times n) \cdot B(n \times p)$

$= m \times n \times p$

$= 10 \times 30 \times 5 = 1500$

Size of matrix $= A(m \times n) \cdot B(n \times p)$

$= x[m \times p]$

$= [10 \times 5]$ — Eq (1)

Now substitution x for $A \cdot B$

$x \cdot C = [10 \times 5] \cdot [5 \times 60]$

Total no of operation $= 10 \times 5 \times 60 = 3000$

Size of matrix $= 10 \times 60$

$\Rightarrow$ So Total operation for $(AB) \cdot C = 1500 + 3000$

$= \boxed{4500}$

Eg 2: A B C D → 4 matrix

[10, 20, 30, 40, 50] = arr

n = 5, so n-1 matrix = 4

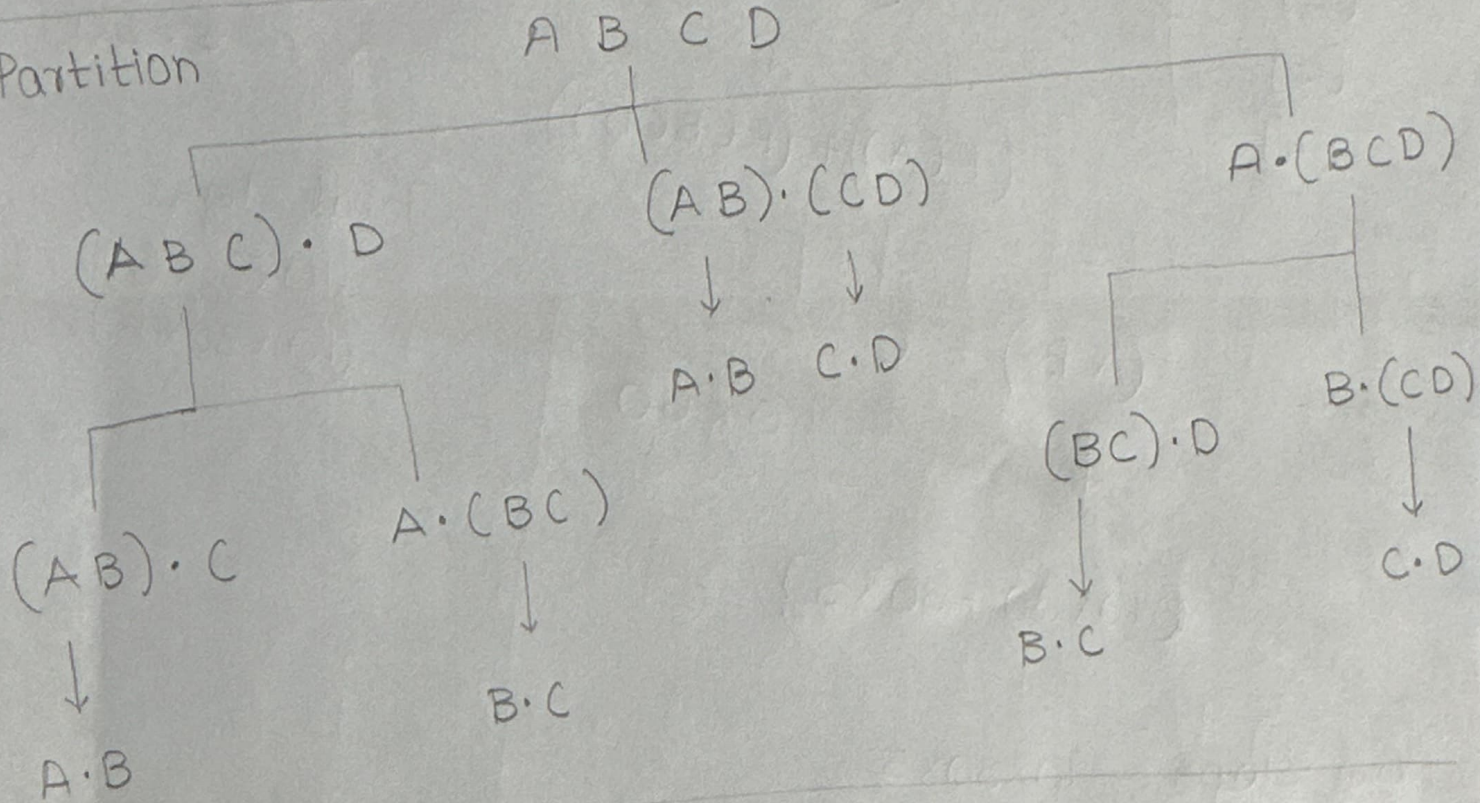
A = 10 X 20 [10 20 30 40 50]

B = 20 X 30 [10 20 30 40 50]

C = 30 X 40 [10 20 30 40 50]

d = 40 X 50 [10 20 30 40 50]

Partition



Compute no of operation

(A B · C) · D

A = 10 X 20

B = 20 X 30

* $A \cdot B = (10 \times 20) \cdot (20 \times 30)$

- Total no of operation $= 10 \times 20 \times 30 = 6000$
- Size of matrix $= 10 \times 30 \longrightarrow x_1$

* Now substitute $x_1 \rightarrow A \cdot B$

$= x_1 \cdot C = (10 \times 30) \cdot (30 \times 40)$

- Total no of operation $= 10 \times 30 \times 40 = 12000$
- Size of matrix $= 10 \times 40 \longrightarrow x_2$

* Now substitute $x_2 \rightarrow (A \cdot B) \cdot C$

$x_2 \cdot D = (10 \times 40) \cdot (40 \times 50)$

- Total no of operation $= 10 \times 40 \times 50 = 20000$
- Size of matrix $= 10 \times 50 \longrightarrow x_3$

$(ABC) \cdot D$

Total no of scalar operation

$= (A \cdot B) = 6000$

$= (A \cdot B) \cdot C = 12000$

$= (A \cdot B \cdot C) \cdot D = 20000$

38,000 operations

Calculating No of Steps in code

A B C D

⇒ [10 20 30 40 50]

i j

Consider K represent the partition point

Lets assume K = 3

x_3

↑

[10 20 30 40 50] = (ABC) · D

i k j

⇒ Total no of operation was : 10 x 40 x 50

this can be written as : arr[i-1] x arr[k] * arr[j]