Matrix chain multiplication: A and B can be multiplied when number of row in B= number of column in A

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \end{bmatrix}_{2\times 3}$$

$$A \times B = \begin{bmatrix} a_{11} & b_{11} + a_{12} & b_{21} + a_{13} & b_{31} \\ a_{21} & b_{12} + a_{12} & b_{21} + a_{13} & b_{31} \end{bmatrix}$$

$$A_{11} & b_{12} + a_{12} & b_{22} + a_{13} & b_{32} \\ a_{21} & b_{11} + a_{22} & b_{21} + a_{23} & b_{31} \end{bmatrix}$$

$$a_{11} & b_{12} + a_{12} & b_{22} + a_{13} & b_{32} \\ a_{21} & b_{11} + a_{22} & b_{21} + a_{23} & b_{31} \end{bmatrix}$$

$$a_{21} & b_{12} + a_{22} & b_{22} + a_{23} & b_{32} \\ 2 \times 2$$

$$N_{0} & \text{of multiplications} = 12 \text{ (By observation)}.$$

$$= a_{11} & a_{12} & a_{23} & b_{32} \\ a_{21} & b_{12} & a_{23} & b_{32} \\ a_{21} & b_{22} & a_{23} & b_{32} \end{bmatrix}.$$

$$(by \text{ for multiplications}).$$

 $A_1 = 2 \times 3$ $A_2 = 3 \times 4$ $A_3 = 4 \times 2$. Minimum multiplication to find A1A2A3.

$$A_1 = 2 \times 3$$
 $A_2 = 3 \times 4$ $A_3 = 4 \times 2$.

.... All indication to find AIA2A3.

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Minimum multiplication to find AIA2A3.

(A1.A2) . A3

A1 (A2. A3).

Dimensions 2×3 3×4 Cost- 2*3*4=24Resulting Dimension 2×4 4×2 Cost = $2\times4\times2=16$ Total our operations = 24+16=40.

AAZ A3 2×4 4×2

1 0 24 36 2 0 24

A₁ · (A₂ · A₃) Dimensions 2×3 3×4 4×2 Cost $3 \times 4 \times 2 = 24$ Dimension 2×3 3×2 Cost = $2 \times 3 \times 2 = 12$ Total Cost = 24112 = 36.

 $\begin{array}{c}
(A_1A_2)A_3 \\
(C_1)3 = C_1 + C_2 + C_3 + C_3 + C_4 \\
2 + 4 + 2 \\
2 + 2 + 0 + 16 = 40
\end{array}$

A1 (A2 A3)

 $A_1 = 2 \times 3 \qquad A_2 = 3 \times 4 \qquad A_3 = 4 \times 2.$ Niningum multipliation to find AIA2A3. C[1/2] = C[1/1] + C[2/2] + same cost $A_1 A_2 = 0 + 0 + 2 \times 3 \times 4 = 24$

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$$A_{1} A_{2} = 0 + 0 + 2 \times 3 \times 4 = 24$$

$$A_{1} A_{2} = c[2,3]_{2} c[2,2] + c[3,3] + 3 \times 4 \times 2$$

$$A_{1} A_{2} = 0 + 0 + 24 = 24$$

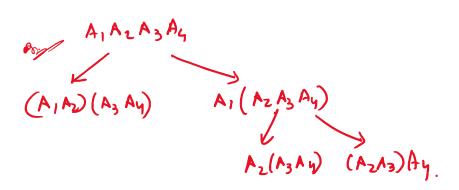
$$A_{1} = \lambda \times 3$$

$$A_{1} = \lambda \times 3$$

$$A_{1} = \lambda \times 3$$

$$A_{2} = \lambda \times 3$$

$$A_{2} = \lambda \times 3$$



 $A_{1}(A_{2}A_{3})$ C[1,3] = C[1,1] + C[2,3] $A_{2}A_{3}A_{2}$ = 0 + 24 + 12 = 36