

Matrix Multiplication

Matrix multiplication seen as dot products:

$$c \begin{bmatrix} \vdots & \bullet & \vdots \end{bmatrix} = \begin{bmatrix} \text{---} \end{bmatrix}^A \begin{bmatrix} \vdots \end{bmatrix}^B$$

Block matrix multiplication

$$\begin{aligned}
 & \left(\begin{array}{c} \text{Block} \\ \text{C} \\ \left(\frac{n}{2} \times \frac{n}{2} \right) \end{array} \right) = \left(\begin{array}{c} \text{Block row} \\ \text{A} \\ \left(\frac{n}{2} \times n \right) \end{array} \right) \times \left(\begin{array}{c} \text{Block column} \\ \text{B} \\ \left(n \times \frac{n}{2} \right) \end{array} \right) \\
 & = \begin{array}{cc} a & b \\ \hline \end{array} \begin{array}{c} e \\ g \end{array} \\
 & = a \cdot e + b \cdot g
 \end{aligned}$$

wow

$$T(n) = 8 T\left(\frac{n}{2}\right) + \theta(n^2)$$

$$n^{\log_b a}$$

$$a = 8$$
$$b = 2$$

$$\log_b a = \log_2 8 = 3$$

$$\rightarrow \underline{n^3}$$

$$f(n) = \underline{n^2}$$

Case I applies

$$\Rightarrow T(n) = \theta(n^3)$$

