

# Calcolo Speed Up ed Efficienza

Prodotto Matrice-Vettore

Esempio

# Strategia I - Quanti passi di calcolo?

Dati :  $p=4$  processi,  $n=100 (\geq 4)$   $m=40$

$$r = \left\lceil \frac{n}{p} \right\rceil = \begin{cases} \frac{n}{p} & \text{se } n \% p = 0 \\ \frac{n}{p} + 1 & \text{se } n \% p \neq 0 \end{cases}$$

$$T(1) = 100 \cdot (2 * 40 - 1) t_{calc} = 7900 t_{calc}$$

$$T(p) = 25 \cdot (2 * 40 - 1) t_{calc} = 1975 t_{calc}$$


# Strategia I – Speed up?

$$S(4) = \frac{7900 t_{calc}}{1975 t_{calc}} = 4$$

# Strategia I – Quanti passi di comun.?

Dati :  $p=4$  processi,  $n=100 (\geq 4)$   $m=40$

$$r = \left\lceil \frac{n}{p} \right\rceil = \begin{cases} \frac{n}{p} & \text{se } n \% p = 0 \\ \frac{n}{p} + 1 & \text{se } n \% p \neq 0 \end{cases}$$



Se li vogliamo considerare per rimettere insieme il risultato

$$T(1) = 100 \cdot (2 * 40 - 1) t_{calc} = 7900 t_{calc}$$

$$T(p) = 25 \cdot (2 * 40 - 1) t_{calc} + 25 * \log_2 4 t_{com} = 1975 t_{calc} + 50 t_{com}$$

# Strategia I – Quanti passi di comun.?

Dati :  $p=4$  processi,  $n=100 (\geq 4)$   $m=40$

$$r = \left\lceil \frac{n}{p} \right\rceil = \begin{cases} \frac{n}{p} & \text{se } n \% p = 0 \\ \frac{n}{p} + 1 & \text{se } n \% p \neq 0 \end{cases}$$

$$T(1) = 100 \cdot (2 * 40 - 1)t_{calc} = 7900t_{calc}$$

$$t_{com} = 2t_{calc}$$

$$T(p) = 25 \cdot (2 * 40 - 1)t_{calc} + 25 * \log_2 4 t_{com} = 1975 t_{calc} + 100 t_{calc} = 2075 t_{calc}$$

# Strategia I – Speed up?

$$S(p) = \frac{7900 t_{calc}}{2075 t_{calc}} = 3,8$$

# Strategia II - Quanti passi di calcolo?

Dati :  $q=4$  processi,  $m=40 (\geq 4)$   $n=100$

$$c = \left\lceil \frac{m}{q} \right\rceil = \begin{cases} \frac{m}{q} & \text{se } m \% q = 0 \\ \frac{m}{q} + 1 & \text{se } m \% q \neq 0 \end{cases}$$

$$T(1) = 100 \cdot (2 * 40 - 1)t_{calc} = 7900t_{calc}$$

$$T(4) = 100 \cdot (2 * 10 - 1)t_{calc} + 100 \cdot \log_2 4 \cdot t_{calc} = 2100t_{calc}$$

# Strategia II – Speed up?

$$S(q) = \frac{7900t_{calc}}{2100t_{calc}} = 3,76$$



# Strategia II – Quanti passi di comun.?

Dati :  $q=4$  processi,  $m=40$  ( $\geq 4$ )  $n=100$

$$c = \left\lceil \frac{m}{q} \right\rceil = \begin{cases} \frac{m}{q} & \text{se } m \% q = 0 \\ \frac{m}{q} + 1 & \text{se } m \% q \neq 0 \end{cases}$$

$$T(1) = 100 \cdot (2 \cdot 40 - 1)t_{calc} = 7900t_{calc}$$

$$T(4) = 100 \cdot (2 \cdot 10 - 1)t_{calc} + 100 \cdot \log_2 4 \cdot t_{calc} + 100 \cdot \log_2 4 t_{com} =$$

# Strategia II – Quanti passi di comun.?

Dati :  $q=4$  processi,  $m=40$  ( $\geq 4$ )  $n=100$

$$c = \left\lceil \frac{m}{q} \right\rceil = \begin{cases} \frac{m}{q} & \text{se } m \% q = 0 \\ \frac{m}{q} + 1 & \text{se } m \% q \neq 0 \end{cases}$$

$$t_{com} = 2t_{calc}$$

$$T(1) = 100 \cdot (2 \cdot 40 - 1)t_{calc} = 7900t_{calc}$$

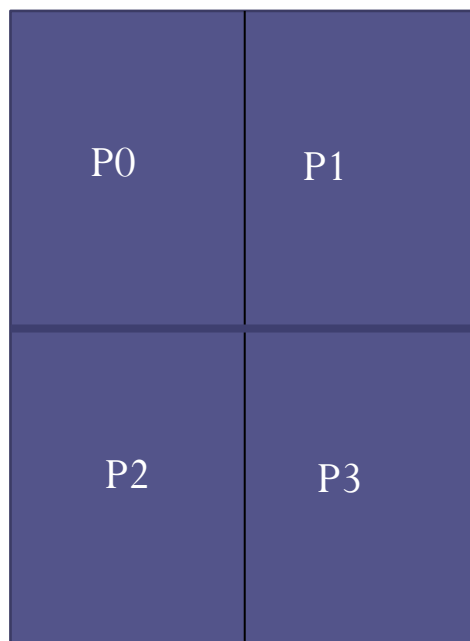
$$T(4) = 100 \cdot (2 \cdot 10 - 1)t_{calc} + 100 \cdot \log_2 4 \cdot t_{calc} + 200 \cdot \log_2 4 t_{calc} = 2500t_{calc}$$

# Strategia II – Speed up?

$$S(q) = \frac{7900t_{calc}}{2500t_{calc}} = 3,16$$

# Strategia III - Quanti passi di calcolo?

Dati :  $p \times q = 2 \times 2$  processi,  $n = 100 (\geq 2)$ ,  $m = 40 (\geq 2)$



# Strategia III - Quanti passi di calcolo?

Dati :  $p \times q = 2 \times 2$  processi,  $n=100 (\geq 2)$ ,  $m=40 (\geq 2)$

$$r = \left\lceil \frac{n}{p} \right\rceil = \begin{cases} \frac{n}{p} & \text{se } n \% p = 0 \\ \frac{n}{p} + 1 & \text{se } n \% p \neq 0 \end{cases} \quad c = \left\lceil \frac{m}{q} \right\rceil = \begin{cases} \frac{m}{q} & \text{se } m \% q = 0 \\ \frac{m}{q} + 1 & \text{se } m \% q \neq 0 \end{cases}$$

$$T(1) = 100 \cdot (2 * 40 - 1)t_{calc} = 7900t_{calc}$$

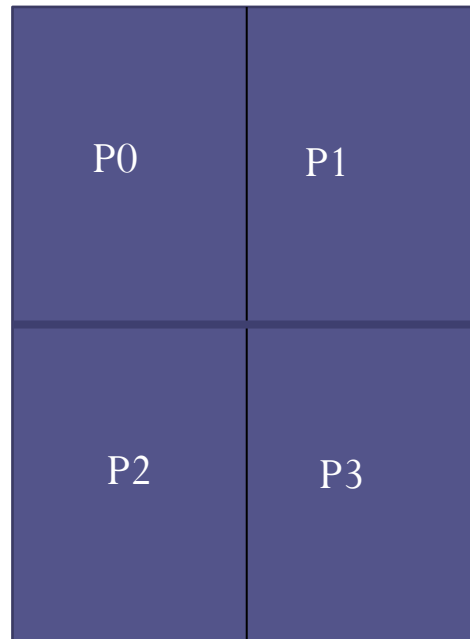
$$T(2 \times 2) = 50 \cdot (2 * 20 - 1)t_{calc} + (50)t_{calc} = 2000 t_{calc}$$

# Strategia III – Speed up?

$$S(2x2) = \frac{7900 t_{calc}}{2000 t_{calc}} = 3,95$$

# Strategia III - Quanti passi di comun.?

Dati :  $p \times q = 2 \times 2$  processi,  $n=100 (\geq 2)$ ,  $m=40 (\geq 2)$



$\log_2 q$  passi di com  
albero sulle righe della griglia

# Strategia III – Quanti passi di comun.?

Dati :  $p \times q = 2 \times 2$  processi,  $n=100 (\geq 2)$ ,  $m=40 (\geq 2)$

$$r = \left\lceil \frac{n}{p} \right\rceil = \begin{cases} \frac{n}{p} & \text{se } n \% p = 0 \\ \frac{n}{p} + 1 & \text{se } n \% p \neq 0 \end{cases} \quad c = \left\lceil \frac{m}{q} \right\rceil = \begin{cases} \frac{m}{q} & \text{se } m \% q = 0 \\ \frac{m}{q} + 1 & \text{se } m \% q \neq 0 \end{cases}$$

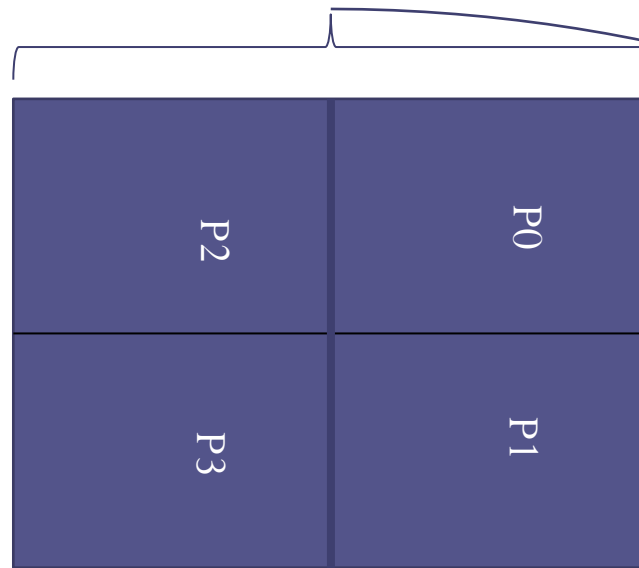
$$T(1) = 100 \cdot (2 * 40 - 1)t_{calc} = 7900t_{calc}$$

$$T(2 \times 2) = 50 \cdot (2 * 20 - 1)t_{calc} + (50)t_{calc} + (50)t_{com} + (50)t_{com} =$$



# Strategia III - Quanti passi di comun.?

Dati :  $p \times q = 2 \times 2$  processi,  $n = 100 (\geq 2)$ ,  $m = 40 (\geq 2)$



$\log_2 p$  passi di comun.  
albero sulle colonne della  
griglia

# Strategia III – Quanti passi di comun.?

Dati :  $p \times q = 2 \times 2$  processi,  $n=100 (\geq 2)$ ,  $m=40 (\geq 2)$

$$r = \left\lceil \frac{n}{p} \right\rceil = \begin{cases} \frac{n}{p} & \text{se } n \% p = 0 \\ \frac{n}{p} + 1 & \text{se } n \% p \neq 0 \end{cases} \quad c = \left\lceil \frac{m}{q} \right\rceil = \begin{cases} \frac{m}{q} & \text{se } m \% q = 0 \\ \frac{m}{q} + 1 & \text{se } m \% q \neq 0 \end{cases}$$

$$t_{com} = 2t_{calc}$$

$$T(1) = 100 \cdot (2 * 40 - 1)t_{calc} = 7900t_{calc}$$

$$T(2 \times 2) = 50 \cdot (2 * 20 - 1)t_{calc} + (50)t_{calc} + (100)t_{calc} + (100)t_{calc} = 2200 t_{calc}$$

# Strategia III – Speed up?

$$S(2x2) = \frac{7900 t_{calc}}{2200 t_{calc}} = 3,59$$