

Compare & Exchange :

T_{comp} / T_{comm} - per data

$T_{startup}$ - per operation.

MPI-Send $\Rightarrow T_{startup} + n \cdot T_{comm}$

MPI-Recv $\Rightarrow T_{startup} + n \cdot T_{comm}$.

merge-array $\Rightarrow 2n \cdot T_{comp}$.

for loop $\Rightarrow n \cdot T_{comp}$

$$2T_{startup} + 2nT_{comm} + 3nT_{comp} =$$

Odd - Even

MPI-Scatter $\Rightarrow T_{startup} + \frac{n}{Size} T_{comm}$.

merge-Sort $\Rightarrow \left(\frac{n}{Size}\right)^2 \cdot T_{comp} / \frac{n}{Size} \log \frac{n}{Size}$

because the array has $\frac{n}{Size}$ elems.

(1)

$$MPI_Gather \Rightarrow T_{startup} + \frac{n}{Size} T_{comp}$$

Per loop with size iterations

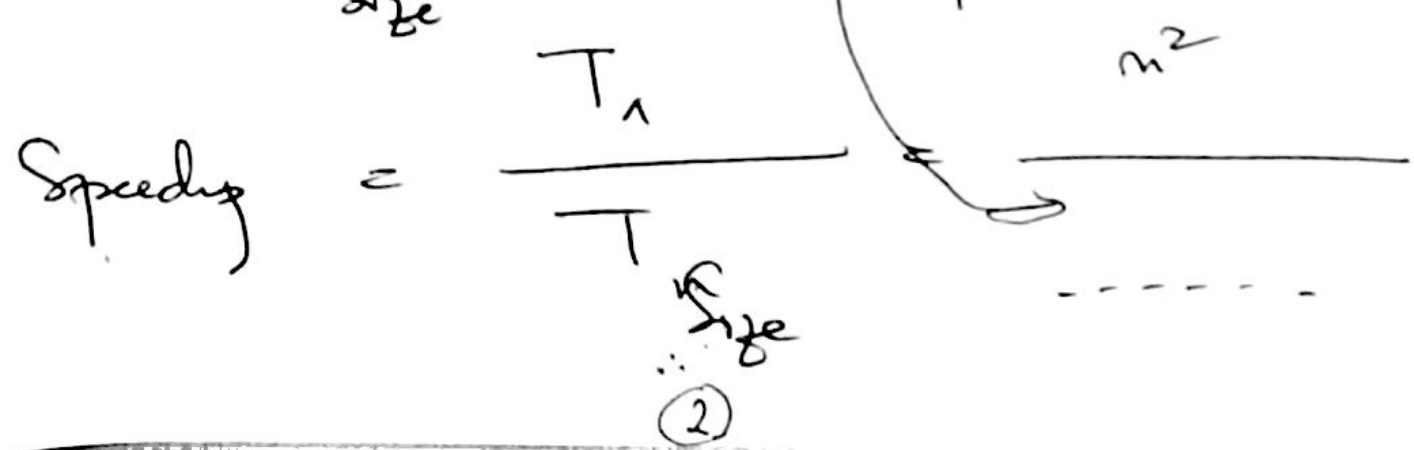
Size x complexity of Compare & Exchange
with $\frac{n}{size}$ elems

$$= Size \left(2T_{startup} + \frac{2n}{Size} T_{comp} + \frac{3n}{Size} T_{comp} \right)$$

$$= \underline{2 Size T_{startup} + 2n T_{comp} + 3n T_{comp}}$$

Total complexity

$$\left(2Size + 2 \right) T_{startup} + \left(\frac{2n}{Size} + 2n \right) T_{comp} + \left(\frac{n^2}{Size^2} + 3n \right) T_{comp}$$



RANKING SORT

$$\text{MPI-Broadcast} \Rightarrow T_{\text{startup}} + n T_{\text{comm}}$$

$$\text{Generate ranking} \quad \frac{n}{\text{Size}} \times n \times T_{\text{comp}} = \frac{n^2}{\text{Size}} T_{\text{comp}}$$

$$\text{MPI-Gather} \Rightarrow T_{\text{startup}} + \frac{n}{\text{Size}} T_{\text{comm}}$$

$$\text{The serial part} \quad n \times 1 \times T_{\text{comp}} = n T_{\text{comp}}$$

$$2 T_{\text{startup}} + \left(n + \frac{n}{\text{Size}} \right) T_{\text{comm}} + \left(\frac{n^2}{\text{Size}} + n \right) T_{\text{comp}}$$

(3)