

Frankii Tang fftang@uci.edu

Nate Le nathanl3@uci.edu

EECS 117 Hw1 Part 2

a)

Frankii Tang fftang@uci.edu
Nate Le nathanl3@uci.edu

EECS 117 HW 1 Part 2

p - ^{transpose} ~~matrix~~ (A)
 $n = A.\text{rows}$
parallel for $j = 2$ to n
parallel for $i = 1$ to $j - 1$
exchange a_{ij} with a_{ji}

a) for example, $n = 4$ when $j = 4$,

A_{11}	A_{12}	A_{13}	A_{14}
A_{21}	A_{22}	A_{23}	A_{24}
A_{31}	A_{32}	A_{33}	A_{34}
A_{41}	A_{42}	A_{43}	A_{44}

when $j = 2$,

A_{11}	A_{12}		
A_{21}	A_{22}		

when $j = 3$,

A_{11}	A_{12}		
A_{21}	A_{22}		

A_{11}	A_{21}	A_{31}	
A_{12}	A_{22}	A_{32}	
A_{31}	A_{32}	A_{33}	

b)

(b) $W = ?$, $D = ?$, $T_p = ?$ $\Rightarrow j = n$

W par for $i = 1$ to $j - 1 \Rightarrow n - 1$ operations

par for 2 to $n \Rightarrow n - 1$ operations

$$(n-1)^2 = n^2 - 2n + 1$$

$$W = \Theta(n^2)$$

D : par for $\Rightarrow \Theta(\log n)$

exchange $\Rightarrow \Theta(1)$

$$D = \Theta(\log n) + \Theta(\log n) + \Theta(1)$$

$$D = \Theta(\log n)$$

$$\text{Parallelism: } \frac{W}{D} = \frac{\Theta(n^2)}{\Theta(\log n)} = \Theta\left(\frac{n^2}{\log n}\right)$$

c)

$$W = \Theta(n^2)$$

$$D: \text{par for} \Rightarrow \Theta(\log n)$$

$$\text{exchange} \Rightarrow \Theta(1)$$

$$D = \Theta(\log n) + \Theta(\log n) + \Theta(1)$$

$$D = \Theta(\log n)$$

$$\text{Parallelism: } \frac{W}{D} = \frac{\Theta(n^2)}{\Theta(\log n)} = \Theta\left(\frac{n^2}{\log n}\right)$$

c) par for \rightarrow for

$$W = \Theta(n^2)$$

$$D = \Theta(\log n) + \Theta(n) = \Theta(n)$$

$$\frac{W}{D} = \Theta\left(\frac{n^2}{n}\right) = \Theta(n)$$