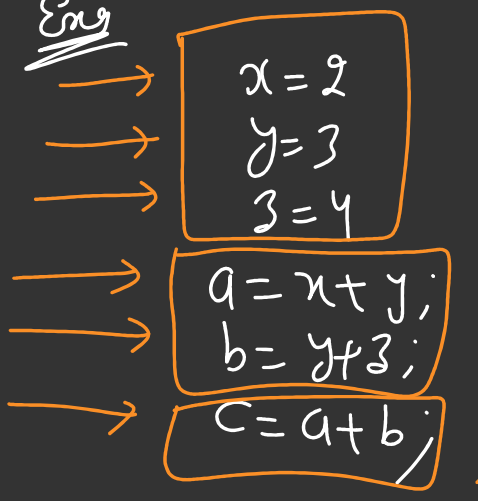
Date 19/01/23

§ Parallel & Distributed Computing §

Amdahl's law

time

Eng



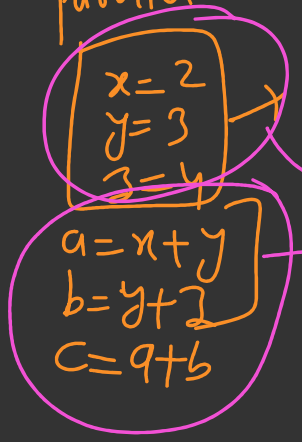
Parallelism time

Speedup = gt is a ratio b/w the time needed for the most efficient Sequential algorithm to perform a Computation and time needed to perform the same Computation on a machine incorporating pipelining or parallelisms.

Ans

Sequential time = 40%

Parallel Execution time = 60%



Speedup

$$S \leq \frac{1}{f + (1-f)/p}$$

time taken by Sequential algorithm

$0 \leq f \leq 1$

p = no. processors.

Sequential = 40%

Parallel = 60%

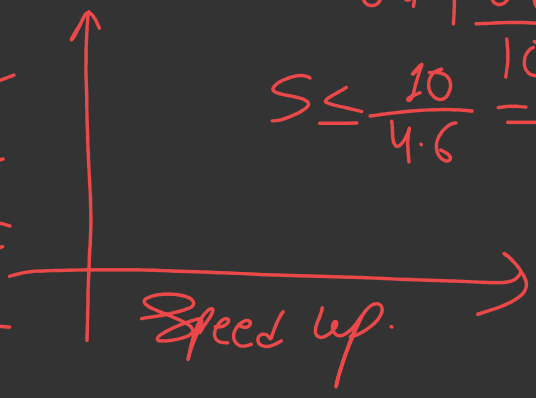
$p = 10$

$$S \leq \frac{1}{f + (1-f)/p}$$

$$S \leq \frac{1}{0.4 + \frac{0.6}{10}}$$

$$S \leq \frac{10}{4.6} = 2.34$$

Seq	Parallel	$p = 10$	S
~~0~~	~~100~~	10	3.5 ✓
20	80		
50	50	10	1.8 ✓
70	30	10	1.3 ✓
90	10	10	1.1 ✓



Data Parallelism:

find all prime numbers less than 30.

2, 3, ~~4~~, 5, ~~6~~, 7, ~~8~~, ~~9~~, ~~10~~, 11, ~~12~~, 13, ~~14~~, ~~15~~, ~~16~~, 17, ~~18~~, 19, ~~20~~,

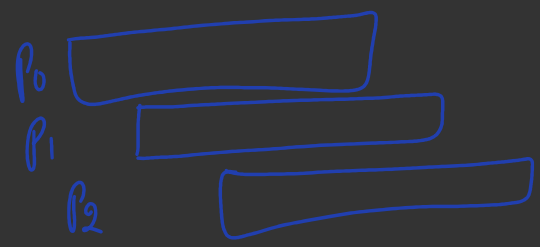
~~21~~, ~~22~~, 23, ~~24~~, ~~25~~, ~~26~~, ~~27~~, ~~28~~, 29, ~~30~~

Processor P_0 → Divide by two

Processor P_1 → Divide by three.

Processor P_2 → Divide by five.

Processor P_3 → Divide by 7



$n = 30$

$\sqrt{n}$

CUET