Speedup

- Defn

> Speedup is computed by dividing the time taken by the optimal sequrntial program by the time taken by the parallel program.

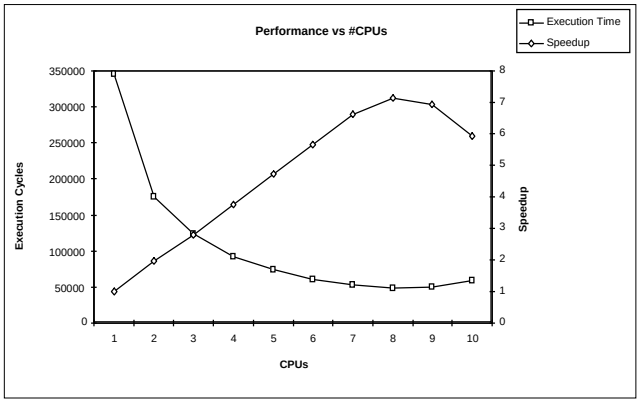
- $\text{Speedup} = \frac{\text{Optimal Sequential Time}}{\text{Parallel Time}}$

Lecture 15

Speedup, inherent sequentialism, maximum achievable speedup, superlinear speedup.

Displaying speedup data

CPU's	1	2	3	4	5	6	7	8	9	10
Execution Time	345782	174683	123492	92345	73241	61045	52341	48341	49873	58234
Speedup	1	1.979	2.800	3.744	4.721	5.664	6.606	7.152	6.933	5.937



How can we measure efficiency?

- A common way to represent parallel program performance is through a speedup graph or table.
- Speedup is a measure of the execution time of the parallel program in comparison to a sequential program that solves the same problem.

Inherent sequentiality

- Some sections of program code are inherently sequential.
- These sections include;
  - barriers
  - conditional critical regions
  - monitors
  - code protected by mutual exclusion in some manner.

Types of speedup

- Linear Speedup: (for k processors)

  $\forall(k: k \in N, Speedup(k) = k)$

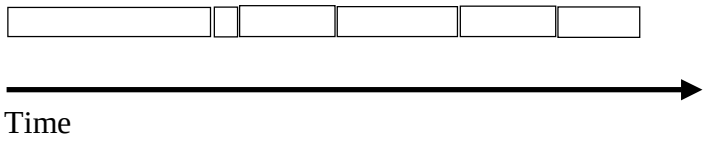
- Super-linear speedup:

  $\exists(k: k \in N, Speedup(k) > k)$,

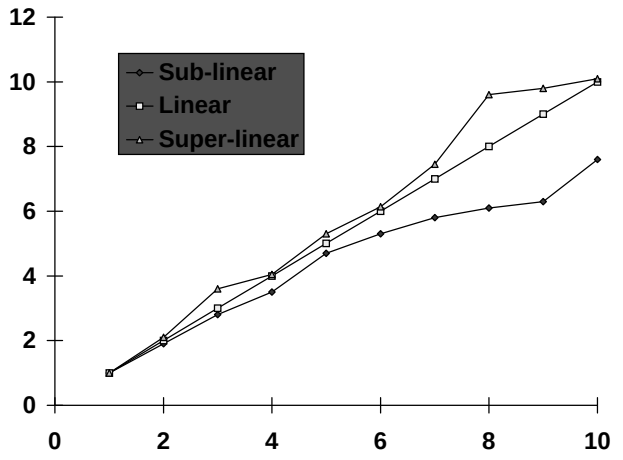
where Speedup(k) is the speedup value calculated for k processors.

Program execution profiles

- Inherently Sequential Code
- Potentially Parallel Code



Types of speedup



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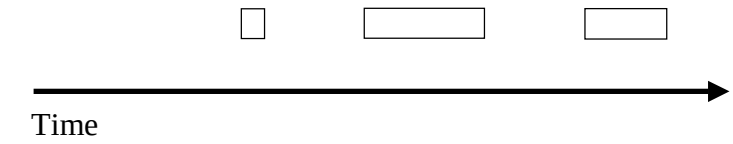

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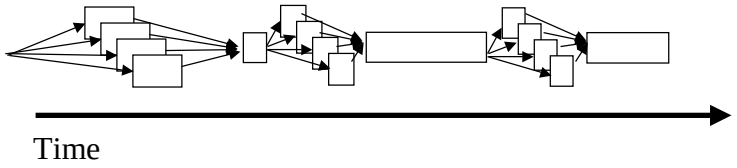

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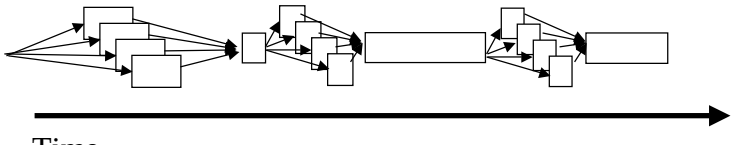

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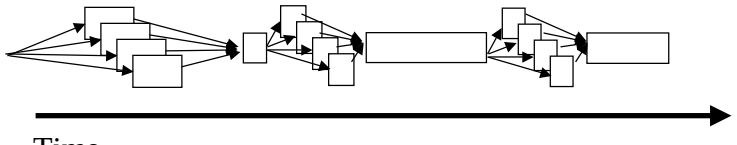

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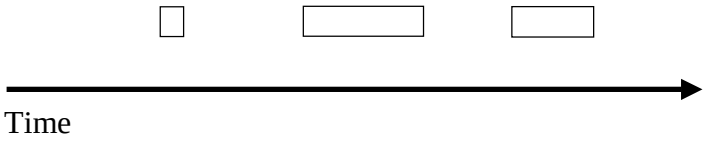

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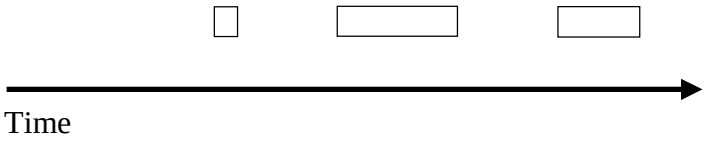

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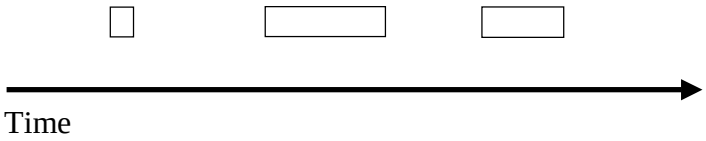

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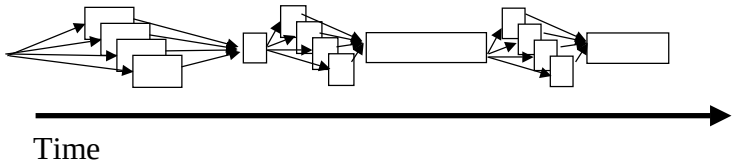

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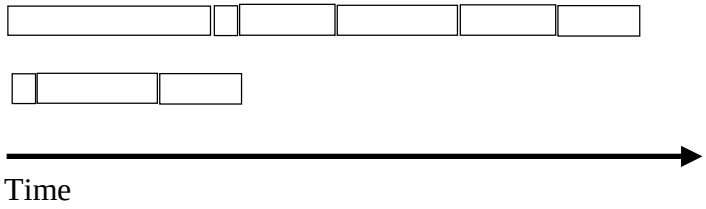

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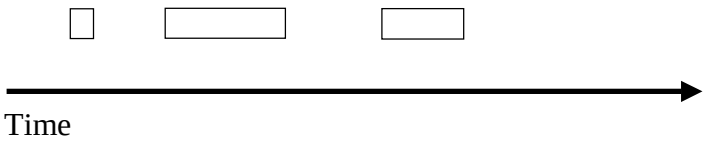

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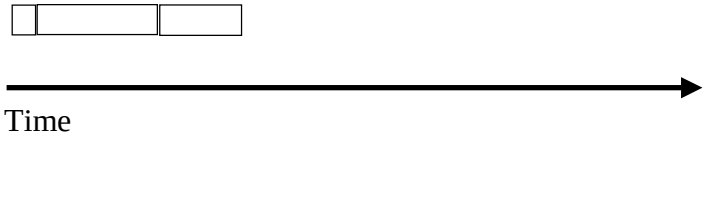

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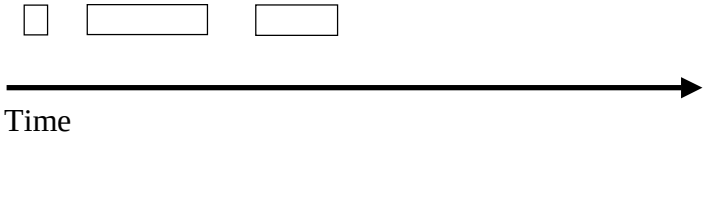

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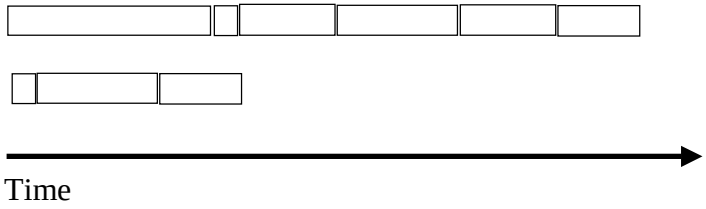

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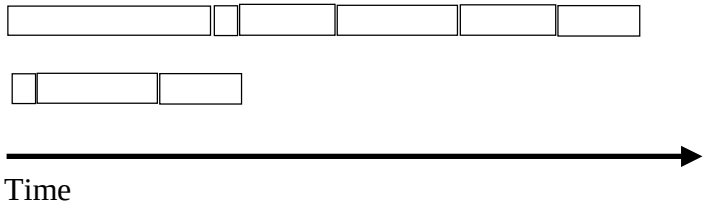
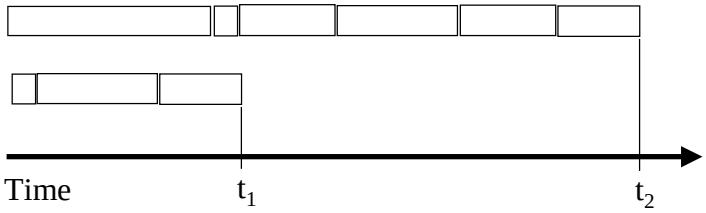
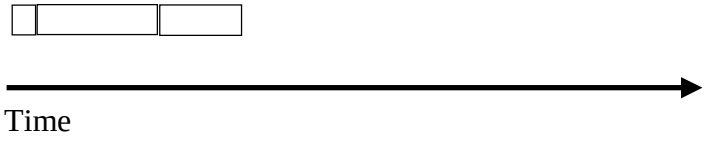


Maximum achievable speedup

- Inherently Sequential Code
- Potentially Parallel Code



$$\text{MaxSpeedup} = t_2 / t_1$$

Program execution profiles

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