



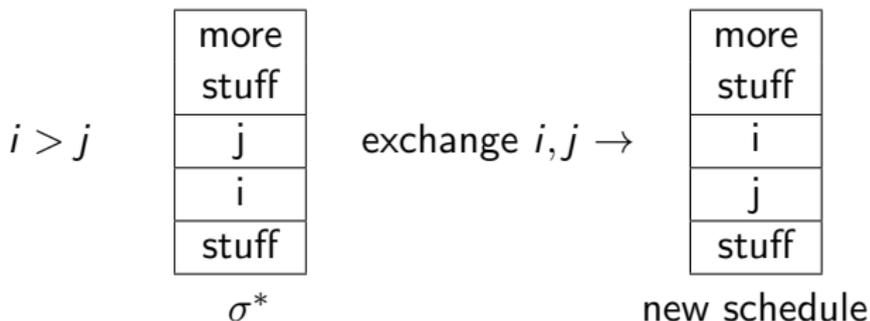
Algorithms: Design  
and Analysis, Part II

# Greedy Algorithms

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A Scheduling Application:  
Correctness Proof Part II

# Cost-Benefit Analysis, Part I



**Question:** What is the effect of this exchange on the completion time of (1) a job  $k$  other than  $i$  or  $j$ , (2) the job  $i$ , (3) the job  $j$ ?

- A) Not enough info/goes up/goes down
  - B) Not enough info/goes down/goes up
  - C) Unaffected/ goes up / goes down**
  - D) Unaffected/goes down/goes up
- Annotations: Arrows from the 'goes up' and 'goes down' parts of option C point to 'by  $l_j$ ' and 'by  $l_i$ ' respectively.

# Cost-Benefit Analysis, Part II

Upshot:

1. Cost of exchange  $w_i/l_j$ . [ $C_i$  goes up by  $l_j$ ]
2. Benefit of exchange is  $w_j/l_i$ . [ $C_j$  goes down by  $l_i$ ]

**Note:**  $i > j \Rightarrow w_i/l_i < w_j/l_j \Rightarrow w_i/l_j < w_j/l_i \Rightarrow \text{COST} < \text{BENEFIT}$   
 $\Rightarrow$  Swap improves  $\sigma^*$ , contradicts optimality of  $\sigma^*$ .

QED!