



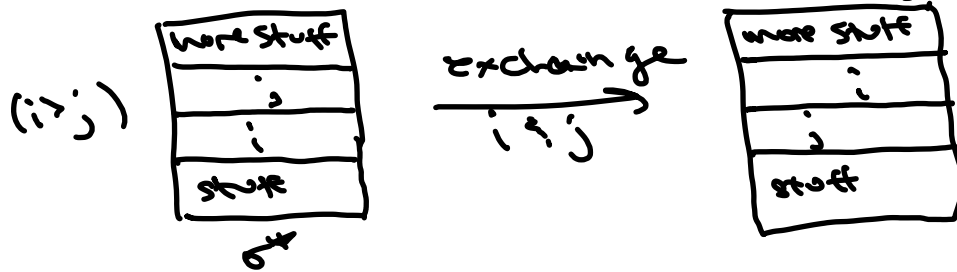
Algorithms: Design  
and Analysis, Part II

# 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: Pink arrows point from 'goes up' in (C) to 'by  $d_j$ ' and from 'goes down' in (C) to 'by  $d_i$ '.

# Cost-Benefit Analysis, Part II

Upside: 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:  $i > j \Rightarrow \frac{w_i}{l_i} < \frac{w_j}{l_j} \Rightarrow w_i l_j < w_j l_i$   
 $\Rightarrow \text{COST} < \text{BENEFIT}$

$\Rightarrow$  Swap improves  $\sigma^*$ , contradicts optimality of  $\sigma^*$

QED!