



Algorithms: Design  
and Analysis, Part II

# Greedy Algorithms

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A Scheduling Application:  
Problem Definition

# A Scheduling Problem

## Setup:

- One shared resource (e.g., a processor).
- Many “jobs” to do (e.g., processes).

**Question:** In what order should we sequence the jobs?

**Assume:** Each job has a:

- weight  $w_j$  (“priority”)
- length  $l_j$

# Completion Times

**Definition:** The completion time  $C_j$  of job  $j$  = Sum of job lengths up to and including  $j$ .

**Example:** 3 jobs,  $l_1 = 1, l_2 = 2, l_3 = 3$ .

Schedule:

#1	#2	#3
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0 →

(time)

**Question:** What is  $C_1, C_2, C_3$ ?

A) 1, 2, 3

C) 1, 3, 6

B) 3, 5, 6

D) 1, 4, 6

# The Objective Function

**Goal:** Minimize the weighted sum of completion times:

$$\min \sum_{j=1}^n w_j C_j.$$

**Back to example:** If  $w_1 = 3$ ,  $w_2 = 2$ ,  $w_3 = 1$ , this sum is  $3 \cdot 1 + 2 \cdot 3 + 1 \cdot 6 = 15$ .