Greedy Algorithms

A Scheduling Application: Problem Definition

Algorithms: Design and Analysis, Part II

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?

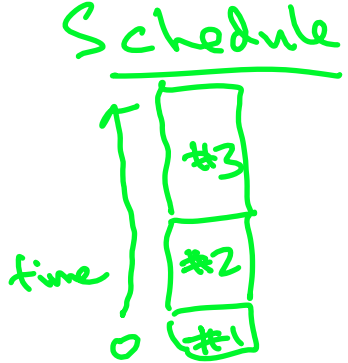
Assume: each job j has a:

- 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, $\ell_1 = 1$, $\ell_2 = 2$, $\ell_3 = 3$.



Question: what is C_1, C_2, C_3?

(A) 1, 2, 3

(B) 3, 5, 6

(C) 1, 3, 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 $w_1 = 3, w_2 = 2, w_1 = 1$, this sum is $3 \cdot 1 + 2 \cdot 3 + 1 \cdot 6 = 15$.