Suppose you are trying to run many applications on a processor

Java →

Python ↩

skype →

itunes ↩

What order is best?

Each job \( i \in \{1, \ldots, n\} \)

- weight (importance) \( w_i \)
- time \( t_i \) to complete

def: Completion time \( C_j \) of job \( j \) is sum of times required to complete all jobs run before \( j \), plus \( t_j \).

Scheduling Goal:

Minimize \( \sum_{j=1}^{n} w_j C_j \) ⇔ "Objective function"

Q: Why is this a good goal?
A: If important jobs left until end, \( w_j C_j \) → A large

\[ \uparrow \]

large \[ \uparrow \] large
Consider

<table>
<thead>
<tr>
<th>job</th>
<th>time</th>
<th>weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

What is the smallest possible value of $A$?

A) 3
B) 8
C) 13
D) 18

$A = W_1 C_1 + W_2 C_2$

(1,2)

$A = 1 \cdot 3 + 2 \cdot 8 = 19$

(2,1)

$A = 2 \cdot 5 + 1 \cdot 8 = 18$
If choose different objective function -> different algorithm.

Consider

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What is the smallest possible value of $A$?

A) 3  
B) 8  
C) 13  
D) 18

$A = w_1c_1 + w_2c_2$

\[(1, 2)\]

\[\begin{array}{c}
0 \\
2 \\
3
\end{array}\]

\[A = 1 \cdot 3 + 2 \cdot 8 = 19\]

\[(2, 1)\]

\[\begin{array}{c}
5 \\
3
\end{array}\]

\[A = 2 \cdot 5 + 1 \cdot 8 = 18\]