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Greedy Techniques - Part XI

Complete Course on Algorithms - GATE

Subbarao Lingamgunta • Lesson 44 • May 12, 2023

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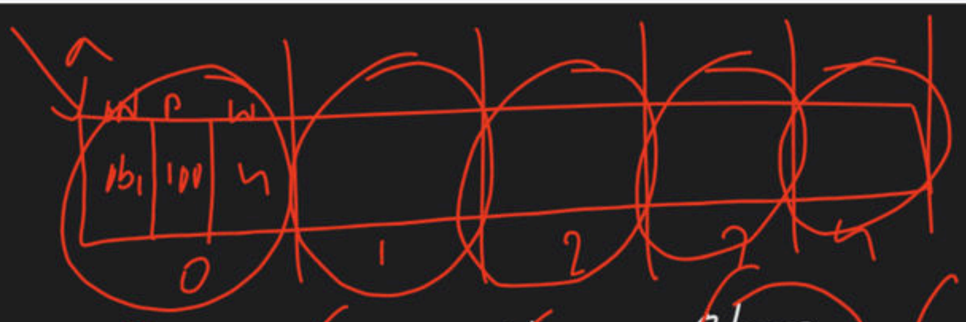
ex

$n = 7 \qquad m = 27$



	w	p	w				
	ob_1	100	4				
	0	1	2	3	4		

objects :	ob_1	ob_2	ob_3	ob_4	ob_5	ob_6	ob_7
profit :	100	75	150	320	140	80	90
weight :	4	2	7	10	6	2	3
① P_i/w_i :	25	37.5	21.4	32	23.3	40	30
② D.O :	5	2	7*	3	6	1	4

$\left(\frac{1}{x_1}\ \frac{1}{x_2}\ \frac{1}{x_3}\ \frac{1}{x_4}\ \frac{1}{x_5}\ \frac{1}{x_6}\ \frac{1}{x_7}\right)$

805

$\Rightarrow n$

$\Rightarrow \log n$

$\Rightarrow n$

③ $i=1$
$27 - 2*1 = 25$
$0 + 80*1 = 80$

$i=2$
$23 - 2*1 = 23$
$80 + 75*1 = 155$

$i=3$
$23 - 10*1 = 13$
$155 + 320*1 = 475$

$i=4$
$13 - 3*1 = 10$
$475 + 90*1 = 565$

$i=5$
$10 - 4*1 = 6$
$565 + 100*1 = 665$

$i=6$
$6 - 6*1 = 0$
$665 + 140 = 805$

$O(n)$

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Job Sequencing with deadlines

1. Single CPU
2. Arrival time of each job same
3. Running time of each job is 1-unit
4. No-preemption

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ex $n = 4$

Jobs : J_1 J_2 J_3 J_4

profit : 100 200 150 300

Deadlines : 2 1 2 1

$J_3 \Rightarrow 150$ 1

$J_4 \Rightarrow 300$ 1

$J_1 \Rightarrow 100$ 1

$J_2 \Rightarrow 200$ 1

8

J_3 | J_1 1 2 4 850

J_1 | J_3 1 2 750

3

J_4 | J_3 1 2

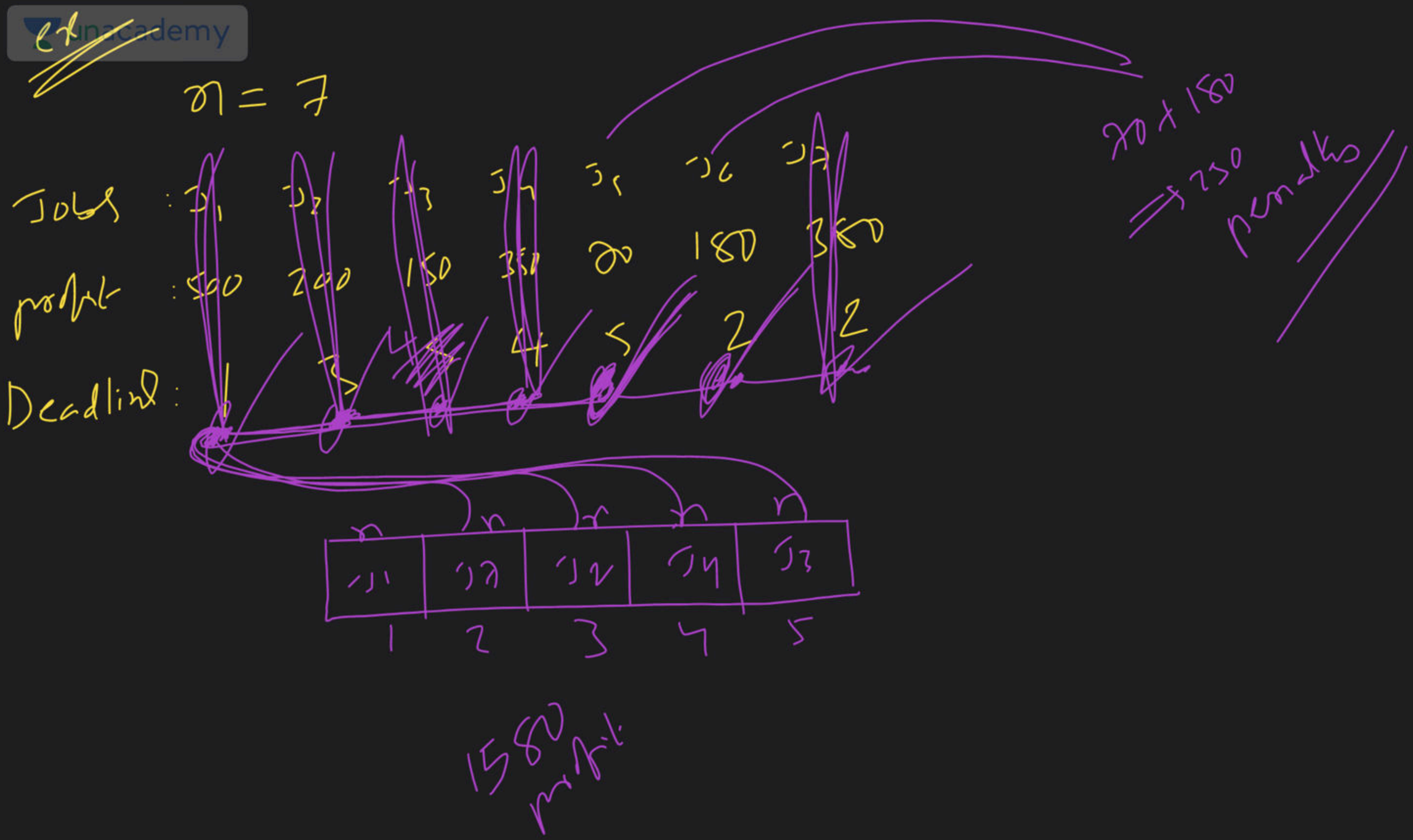
1

J_2 | J_1 1 2 300

J_1 | J_2 1 2

2

J_4 | J_3 1 2 450



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ex

$n = 7$

Jobs :	J_1	J_2	J_3	J_4	J_5	J_6	J_7
profit :	500	200	150	350	70	180	380
Deadline :	1	3	4	4	5	2	2

J_1	J_7	J_2	J_4	J_3
1	2	3	4	5

1580 profit

70 + 180 = 250 penalty

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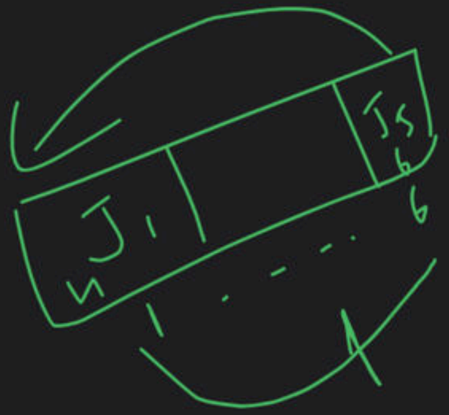
$n = 9$

Jobs	J_1	J_2	J_3	J_4	J_5	J_6	J_7	J_8	J_9
profit	80	100	90	70	50	110	60	120	65
Deadline	5	3	7	4	3	5	1	3	4



① arrange all jobs in D.O profits $\Rightarrow$ $n \log n$

J_8	J_6	J_2	J_3	J_1	J_4	J_9	J_7	J_5
120	110	100	90	80	70	65	60	50
3	5	3	7	5	4	4	1	3

②

J_4	J_9	J_8	J_1	J_6		J_3
1	2	3	4	5	6	7

570

n^2 / n^{BC}

$O(n^2)$ WC

$O(n \log n)$ — BC

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Huffman Coding