JOB-SEQUENCE WITH DEADLINE PROBLEM

Swarup Kr Ghosh

How the problem describe?

JOBS	J1	J2	J3	J4	J5
PROFITS	20	15	10	5	1
DEADLINE	2	2	1	3	3

Number of jobs (n) = 5
Max waiting time (d) = 3

You can consider a problem in shopping mall, Customers are waiting to shop something. The mall can make profit from the customers according to their demands. But the customers can wait for shopping with a fixed time. How the mall can manage to get maximum profit.

Assumption: A machine M process with 1 unit of job for an instance (unit time).

Object: Maximize the profit
Constraints: Deadline

JOBS	J1	J2	J3	J4	J5
PROFITS	20	15	10	5	1
DEADLINE	2	2	1	3	3

Number of jobs (n) = 5
Max waiting time (d) = 3

J2	J1	J4
0	1	2
9am	10am	11am

JOB CONDITION	SLOT	SOLUTION	PROFIT
-	-	PHI	0
J1	[1,2]	{J1}	20
J2	[0,1]	{J2,J1}	20+15=35
J3	X	{J2,J1}	35
J4	[2,3]	{J2,J1, J4}	35+5 = 40
J5	X	{J2,J1, J4}	40

PROBLEM-2

JOBS	J1	J2	J3	J4	J5	J6	J7
PROFITS	35	30	25	20	15	12	5
DEADLINE	3	4	4	2	3	1	2

Number of jobs (n) = 7

Max waiting time (d) = 4

J4		J3		J1		J2		
0		1		2		3		4

JOB CONDITION	SLOT	SOLUTION	PROFIT
-	-	\PHI	0
J1	[2,3]	{J1}	35
J2	[3,4]	{J2,J1}	35+30=65
J3	[1,2]	{J3, J2,J1}	65+25=90
J4	[0,1]	{J4,J3,J2,J1}	90+20 = 110
J5	X	{J4,J3,J2,J1}	110
J6	X	{J4,J3,J2,J1}	110
J7	X	{J4,J3,J2,J1}	110

Algorithm:

Procedure: JBWD

   Sort all the jobs based on profit Pi in descending order

as P1 > P2 > P3 ……………………………….>=Pn
d←maximum deadline of job in J
Consider array A[] with size d
for i=1 to n do
    find the largest job x
    for j=i to d
        if ((A[j] = 0) and (x deadline<= d1))
        A[x] = J[i];
        break;
        end if
    end for
end for
end procedure
Time Complexity Analysis O(nd)← average and O(n^2) ← worse