

RE: Help on solving the linear programming model using solver

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you'd better use AMPL(mathematical modelling language) than excel.

plz visit www.ampl.org

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the best time to plant a tree was twenty years ago.
the second best time, is today – Chinese proverb

"papachunks" wrote:

Can anyone help solve the following program model? I'm really not sure what to do but I do have to use solver.

The N-P hard problem is:

$P_m/r_j / W_j C_j$

A set of $n=25$ jobs and a set of $m=4$ machines and processing times P_{ij} (the processing time of job j on the machine i), $i = 1, \dots, 4, j = 1, \dots, 25$; job weights w_1, \dots, w_{25} . Objective: Schedule the jobs on the 4 machines so that $\sum w_j C_j$ is minimized, where C_j is the completion time of job j .

The basic idea is to introduce an interval-indexed linear program, akin to the time indexed linear program of the previous subsection. Let $G_0 = 1$, and let $G_l = 2^{l-1}$, $l = 1, \dots, L$, where L is large enough that every feasible schedule of interest completes by time 2^{L-1} . (By a slight abuse of notation, we let $(G_0, G_1) = (1, 1)$ indicate the point interval $(1, 1)$). Let:

$X_{ijl} = 1$, if J_j is assigned to M_i to complete in interval (G_{l-1}, G_l)
0, otherwise,

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For $i = 1, \dots, 4$, $j = 1, \dots, 25$ and $l = 1, \dots, L$, let P_{ij} be the processing time of J_j on M_i , for all i, j . We can then write down the following linear programming formulation whose objective function gives a lower bound on the total weighted completion time:

$$\text{Min} \quad \sum_{i,j,l} G_l - 1 X_{ijl}$$

Subject to

- 1) $\sum_{j,l} X_{ijl} = 1 \quad j = 1, \dots, 25$
- 2) $\sum_{j,l} P_{ij} X_{ijl} \leq G_l, \quad i = 1, \dots, 4, \quad l = 1, \dots, L$
- 3) $X_{ijl} = 0$ if $r_{j,i,l} + p_{ij} > G_l, \quad i, j, l$
- 4) $X_{ijl} \geq 0 \quad i, j, l$

Observe that the machine load constraints (2) are sufficient relaxed to accommodate the possibility that a job could start a time zero and yet contribute to the load of interval $(G_l - 1, G_l)$; thus any solution vector x corresponding to an integral, feasible schedule is feasible for this LP. Further observe that if J_j completes in $(G_l - 1, G_l)$ then its contribution to the objective function is $w_j G_l$, a lower bound on its contribution to the actual schedule.