CPLEX 12.6 (64bit)

LP example

A cargo plane has three compartments for storing cargo: front, center and rear. These compartments have the following limits on both weight and space:

Compartment	Weight capacity (tons)	Space capacity (cubic meters)
Front	10	6800
Center	16	8700
Rear	8	5300

Furthermore, the weight of the cargo in the respective compartments must be the same proportion of that compartment's weight capacity to maintain the balance of the plane.
The following four cargoes are available for shipment on the next flight:

Cargo	Weight (tons)	Volume (cubic meters/ton)	Profit ($/ton)
C1	18	480	310
C2	15	650	380
C3	23	580	350
C4	12	390	285

Any proportion of these cargoes can be accepted. The objective is to determine how much (if any) of each cargo C1, C2, C3 and C4 should be accepted and how to distribute each among the compartments so that the total profit is maximized.

x_{ij} amount of cargo i in comp j

A is the set of cargos
A = {C1, C2, C3, C4}

B is the set of compart.
B = {front, center, rear}

$$\max \sum_{i \in A} \sum_{j \in B} p_i x_{ij}$$

Profit of cargo i

$$\text{s.t.} \sum_{j \in B} x_{ij} \leq a_i \quad \forall i \in A$$

Available weight i

$$\sum_{i \in A} x_{ij} \leq c_j \quad \forall j \in B$$

Capacity of compartment j

$$\sum_{i \in A} v_i x_{ij} \leq V_j \quad \forall j \in B$$

Space capacity of compartment j

$$\frac{1}{c_j} \sum_{i \in A} x_{ij} = y \quad \forall j \in B$$

Volume of cargo i

$$x_{ij} \geq 0, y \geq 0$$