

DISTRIBUTED RESOURCE ALLOCATION

ABSTRACT

Disclosed herein are methods, systems, and apparatus, including computer programs
5 encoded on computer storage media, for performing allocation of M resources among N
users into K pools by solving a knapsack problem (KP) using a distributed computing system
that includes a number of individual solvers. The method includes: receiving data
representing K global constraints and L local constraints of the KP; decomposing the KP into
 N sub-problems using K dual multipliers, each of the N sub-problems corresponding to a
10 respective one of the N users and subject to the L local constraints w.r.t. the corresponding
user, wherein N is in an order of billions or larger; determining the number of individual
solvers for solving the N sub-problems; distributing the N sub-problems among the number
of individual solvers; and solving the KP by the distributed computing system by performing
two or more iterations.

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FIG. 1