

DISTRIBUTED RESOURCE ALLOCATION**ABSTRACT**

Disclosed methods, systems, and apparatus, include computer programs encoded
5 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. The
method includes: receiving data representing K global constraints and L local constraints
of the KP; transforming the KP into a dual problem using K dual multipliers;
decomposing the dual problem into N sub-problems; performing two or more iterations in
10 solving the dual problem, wherein in one iteration, for each dual multiplier corresponding
to a global constraint corresponding to a pool: determining an updated dual multiplier for
the global constraint corresponding to the pool to be a non-negative threshold; and
computing M decision variables of each of the N users corresponding to the updated dual
multiplier in solving each of the N sub-problems corresponding to the each of the N users.
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FIG. 1