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Characterization and generation of a general class of resource-constrained project scheduling problems. (English) [Zbl 0870.90070](#)

Manage. Sci. 41, No. 10, 1693-1703 (1995).

Summary: This paper addresses the issue of how to generate problem instances of controlled difficulty. It focuses on precedence- and resource-constrained (project) scheduling problems, but similar ideas may be applied to other network optimization problems. It describes a network construction procedure that takes into account a) constraints on the network topology, b) a resource factor that reflects the density of the coefficient matrix, and c) a resource strength, which measures the availability of resources. The strong impact of the chosen parametric characterization of the problems is shown via an in depth computational study. Instances for the single- and multi-mode resource-constrained project scheduling problem are benchmarked by using the state of the art (branch-and-bound) procedures. The results provided, demonstrate that the classical benchmark instances used by several researchers over decades belong to the subset of the very easy ones. In addition, it is shown that hard instances, being far more smaller in size than presumed in the literature, may not be solved to optimality even within a large amount of computation time.

MSC:

90B35 Deterministic scheduling theory in operations research

90C35 Programming involving graphs or networks

Cited in **5** Reviews
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Keywords:

nonpreemptive case; branch-and-bound; project generator; problem instances of controlled difficulty; precedence- and resource-constrained (project) scheduling; network optimization

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