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Tuning parameters of a mixed-integer programming solver for real world problems

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Occasionally one needs to teach a solver to solve similar problems quickly. It can be achieved by tuning parameters of the solver algorithm. This process can also be automatized. We present a tool that tunes configuration parameters of an algorithm. Parameters are tuned to minimize the solving time for a set of problems. SCIP is a mixed-integer programming solver developed at Zuse Institute Berlin. The solver has more than 1500 configuration parameters. Most of the parameters are related to the solution process, others apply to solver's input/output. There are both discrete and continuous parameters. Our tool modifies parameters one by one to find ones having the most impact on the solving time. Then combinations of the best parameter values are evaluated. This approach implies that a great amount of solver runs is needed: 1-2 values of every parameter multiplied by the number of parameters multiplied by the number of test problems. Thus we employ a public cloud to create a temporary computational cluster for faster processing. The paper presents an overview of the system and some real world usage examples.

Primary author: Mr SMIRNOV, Sergey (Institute for Information Transmission Problems of the Russian Academy of Sciences)

Presenter: Mr SMIRNOV, Sergey (Institute for Information Transmission Problems of the Russian Academy of Sciences)

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