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BiqBin: moving boundaries for NP-hard problems by HPC. (English) [Zbl 1440.90061](#)

Dimov, Ivan (ed.) et al., Advances in high performance computing. Results of the international conference on high performance computing, Borovets, Bulgaria, September 2–6, 2019. Cham: Springer. Stud. Comput. Intell. 902, 327-339 (2021).

Summary: In this paper we present a parallel Branch and Bound (B&B) algorithm to solve the Stable Set Problem, which is a well-known combinatorial optimization problem. The algorithm is based on tight semidefinite programming bounds. Numerical results, based on using up to 192 CPU cores, show that this algorithm scales well.

This algorithm is available as a part of the online BiqBin solver, which enables online submissions of problem instances. After submission, it automatically generates computational jobs and runs them using the high-performance computer available at University of Ljubljana. BiqBin demonstrates how to bring HPC closer to specific user community – in our case the mathematical optimization community.

For the entire collection see [[Zbl 1440.65005](#)].

MSC:

- [90C27](#) Combinatorial optimization
- [65K05](#) Numerical mathematical programming methods
- [65Y10](#) Numerical algorithms for specific classes of architectures
- [68Q17](#) Computational difficulty of problems (lower bounds, completeness, difficulty of approximation, etc.)
- [90C57](#) Polyhedral combinatorics, branch-and-bound, branch-and-cut

Keywords:

[high-performance computing](#); [stable set problem](#); [online solver](#); [mathematical optimization](#)

Software:

[BiqBin](#); [BiqCrunch](#); [BiqMac](#); [MKL](#)

Full Text: [DOI](#)

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