

## **Combinatorial Scientific Computing and Petascale Simulations (CSCAPES) Institute: Recent Progress**

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Combinatorial scientific computing is concerned with the development and use of discrete algorithms in computational science and engineering. Graph and hypergraph algorithms are among the fundamental tools of CSC, and play a crucial enabling role in extreme-scale applications that require parallelization, solution of differential equations, mesh generation, optimization, etc. The key research areas of CSCAPES Institute include parallelization and load balancing toolkits, Automatic Differentiation libraries, and algorithmic research and software development for prototypical combinatorial problems such as matching and coloring. Software libraries such as Zoltan, ADIC, OpenAD, ColPack, MatchBox etc., are being developed and deployed as a result of this effort. We describe recent progress on several fronts: new algorithms, software functionalities, applications supported, educational activities, and outreach efforts.