On the Use of Lagrangian Optimization For Designing Distributed Self-Stabilizing Protocols

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Résumé

Large scale distributed systems typically comprise hundreds to millions of entities that have only a partial view of resources. How to fairly and efficiently share such resources between entities in a distributed way has thus become a critical question. A possible answer resorts to Lagrangian optimization and distributed gradient descent. Under certain conditions, the resource sharing problem can be formulated as a global optimization problem, which can be solved by a distributed self-stabilizing demand and response algorithm. In the last decade, this technique has been applied to design network protocols (variants of TCP, multi-path network protocols, wireless network protocols) and even distributed algorithms for smart grids. In this talk,I will present the basics of this technique as well as the key underlying assumptions and its limitations.

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