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# Congestion-Free Rerouting of Flows on DAGs

**By: Saeed Akhoondian Amiri**
**MaxPlanck Institute for Informatics (MPII)**

## Abstract

In reconfiguration problems we would like to obtain the final settings from the initial settings obeying certain reconfiguration rules. In this talk we study the complexity of the following reconfiguration problem: How to reroute k unsplittable flows of a certain demand in a capacitated network from their current paths to their respective new paths, in a congestion-free manner? This problem finds immediate applications, e.g., in traffic engineering in computer networks. Over the last decades, researchers and practitioners observed that in large networks it is important to separate computational aspects of routing and rerouting algorithms from corresponding hardware. Such observations resulted in the design of various networking paradigms such as Software Defined Networks (SDN). In particular flow rerouting problem finds immediate application in design of fast responsive reliable SDN.

This talk is based on our recent ICALP 2018 paper wherein we discuss the complexity of the problem in digraphs. The problem is generally NP-hard already for k = 2 flows. Deciding whether an unsplittable multi-commodity flow rerouting schedule exists, is NP-hard even on DAGs. Then we present a sketch of a polynomial-time algorithm to solve the route update problem for a constant number of flows on DAGs.

## Biography

Saeed Akhoondian Amiri obtained his M.Sc in 2012 from University of Tehran in algorithm and computation and his Ph.D. in computer science from Technical University Berlin in 2017. Currently he is a PostDoc at the algorithm group of MaxPlanck Institute for Informatics, Saarbrucken, Germany.

He is generally interested in theoretical computer science and more specifically he is working in two major subfields: graph theory and distributed computing. In graph theory he is working on covering and connectivity problems. In covering problems, he works on: Coloring and dominating set problem, Erdos Posa property, etc. and in connectivity problems he works on: disjoint paths problem, flow rerouting problems, graph decompositions, etc. In distributed computing he is interested in better understanding of communication based models and paradigms such as Local and Congest model and software defined networks (SDNs).

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