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Motivation

- Communication performance greatly impacts execution time
- Existing tools do not identify the factors impacting communication performance
- We aim to use simulations and MPI profiling from real executions to quantify the impact of factors affecting communication performance

Objectives

- Create MPI profiles for UMT2013, AMG2013 and PF3D on Quartz for various node sizes (weak scaling)
- Create different simulation configurations to isolate the impact of different parameters on total execution time

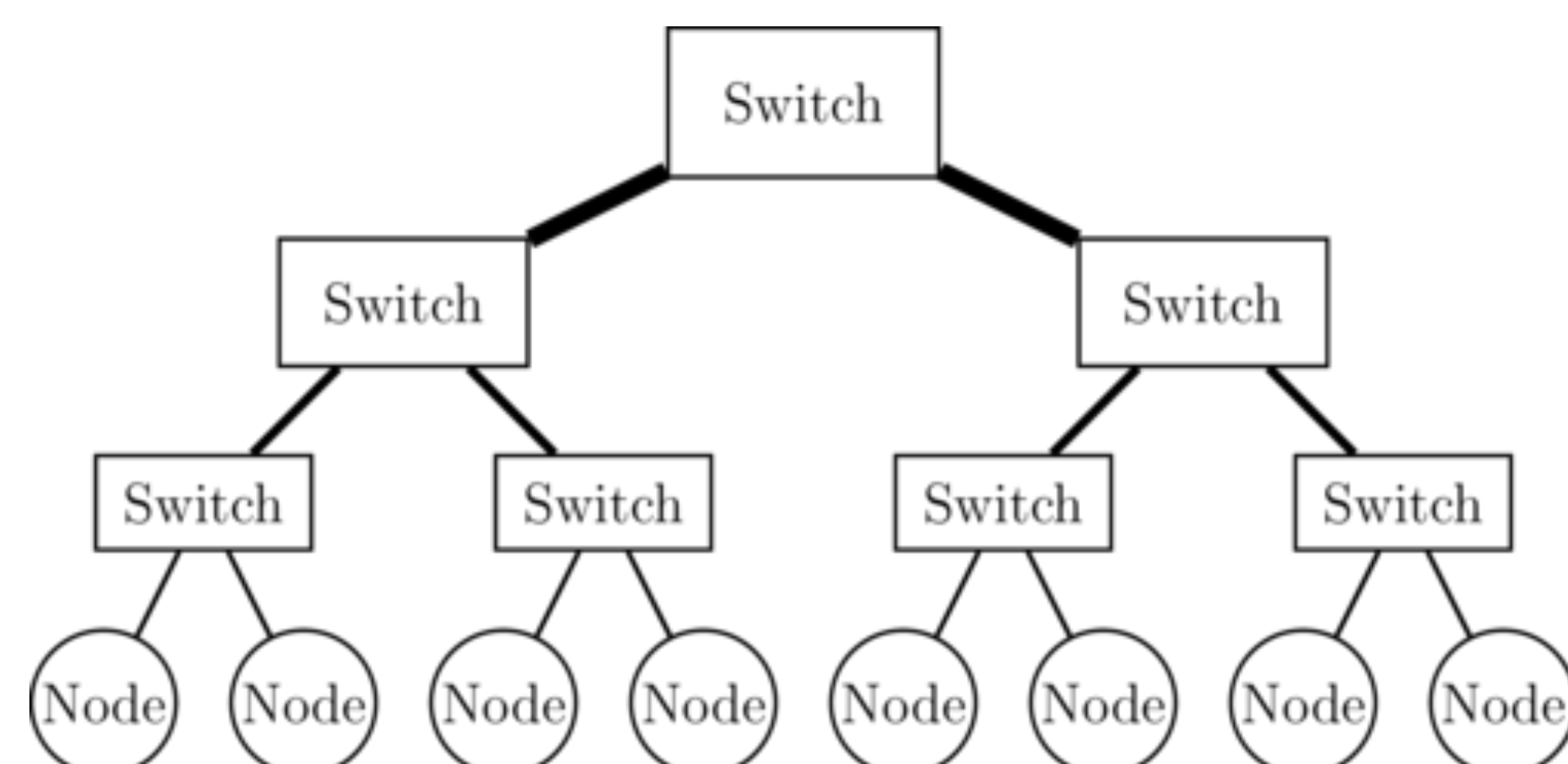
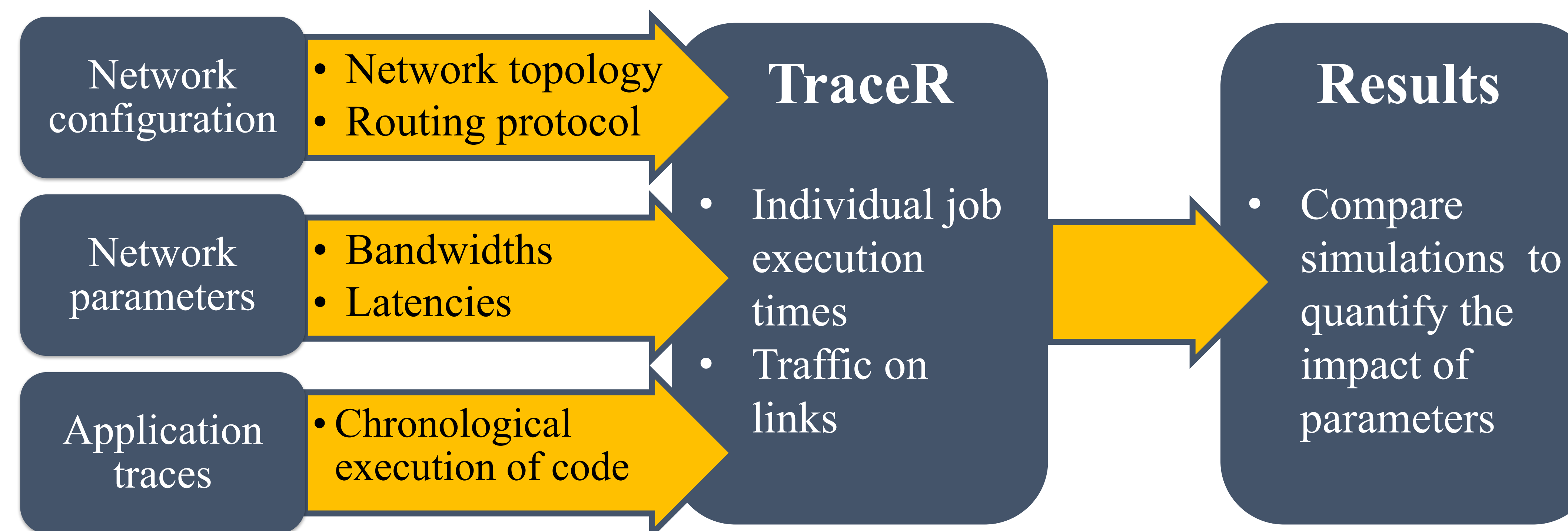


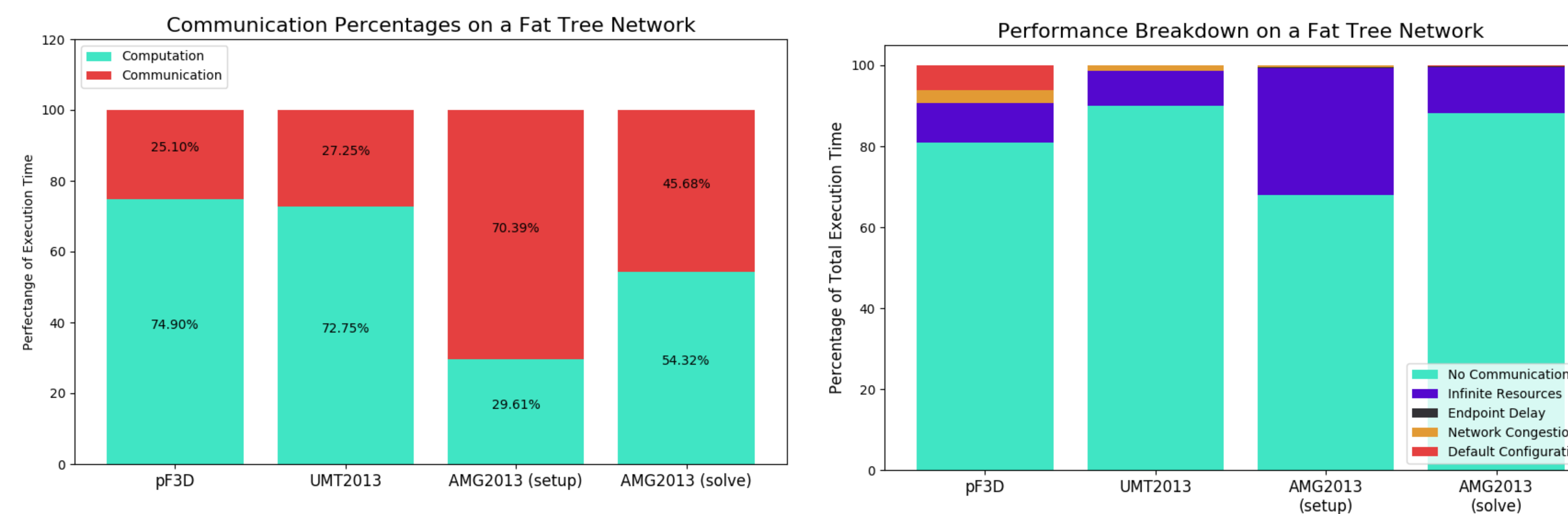
Fig. 1: Fat tree network

(http://jhnet.co.uk/projects/figures/fat_tree/fat_tree.png)

Method



Performance Breakdown



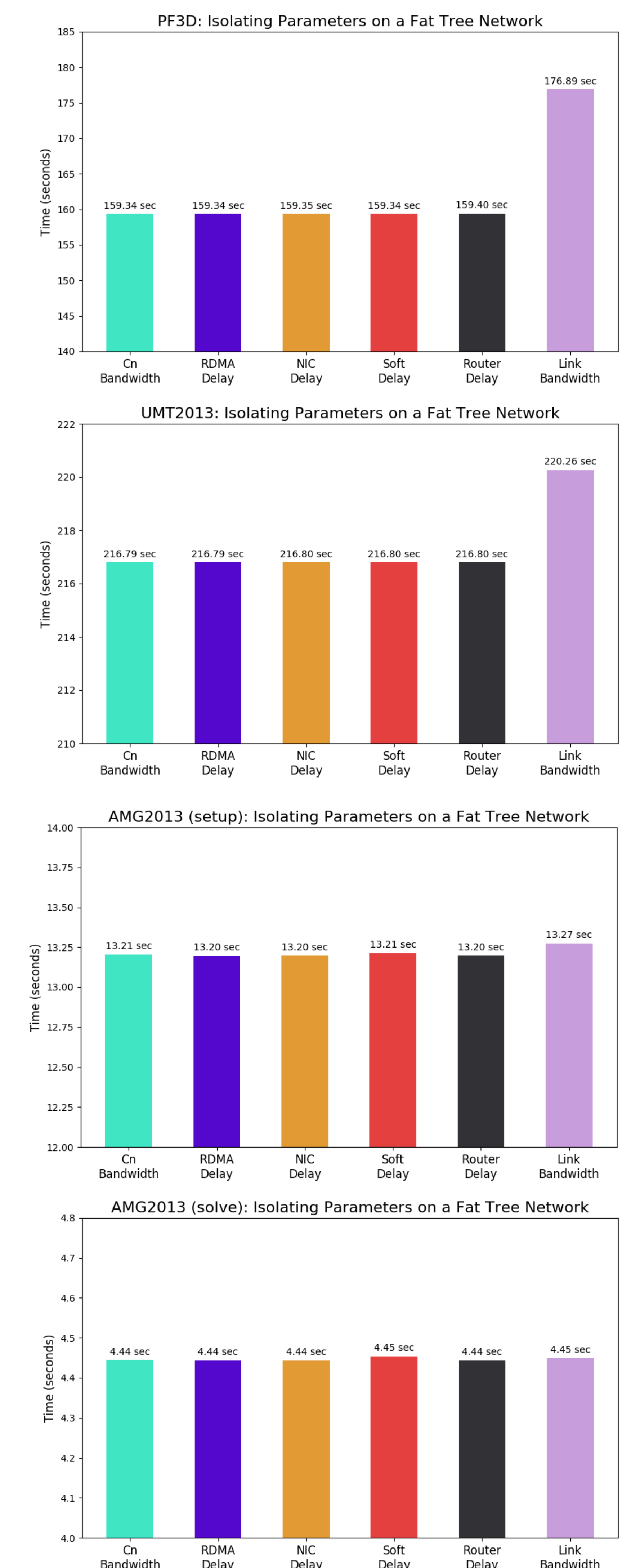
Discussion

- Noticeable jumps from no communication to infinite resources to original configuration
- Link bandwidth has the biggest impact on total execution time

Future Work

- Randomly inject artificial delays into the network to simulate bottlenecks created by running multiple applications

Results



[1] L. Howell, B. Gunney, A. Bhatele, "Characterization of Proxy Application Performance on Advanced Architectures: UMT2013, MCB, AMG2013," Lawrence Livermore National Laboratory (LLNL), Livermore, CA, Tech. Rep., 2015.
 [2] B. Acun, N. Jain, A. Bhatele, M. Mubarak, C. D. Carothers, L. V. Kale, "Preliminary evaluation of a parallel trace replay tool for HPC network simulations", *Proc. Workshop Parallel Distrib. Agent-Based Simul.*, 2015.
 [3] N. Jain, A. Bhatele, S. T. White, T. Gambin, and L. V. Kale, "Evaluating HPC networks via simulation of parallel workloads," in *Proceedings of the ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis*, ser. SC '16. IEEE Computer Society, Nov. 2016, LLNL-CONF-690662.