# Title Slide: ERS SC'13

- Name – Nikhil Jain

- Title – Techniques for Improving Observed Network Performance

- Adviser – Prof. Laxmikant Kale

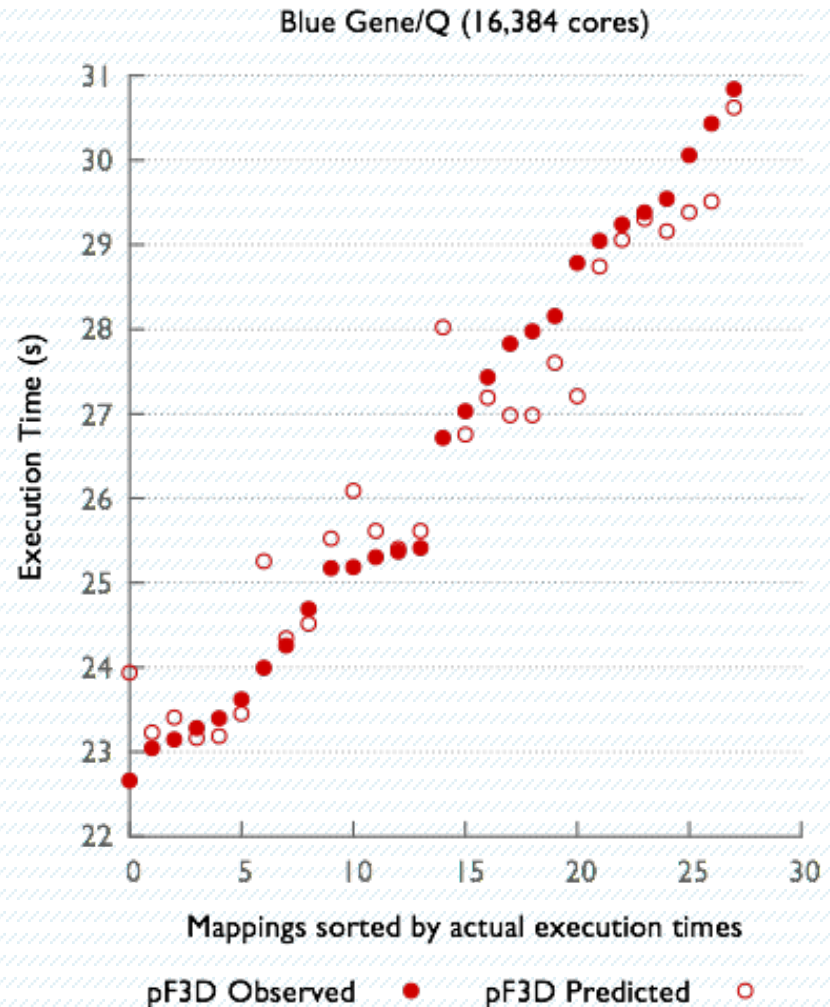- University of Illinois at Urbana-Champaign

Focus: Networks

- Improve performance via task mappings →

- Topology aware collectives.

- Fast and accurate prediction to aid network and application design.

Execution time for different mappings of pF3D

60%
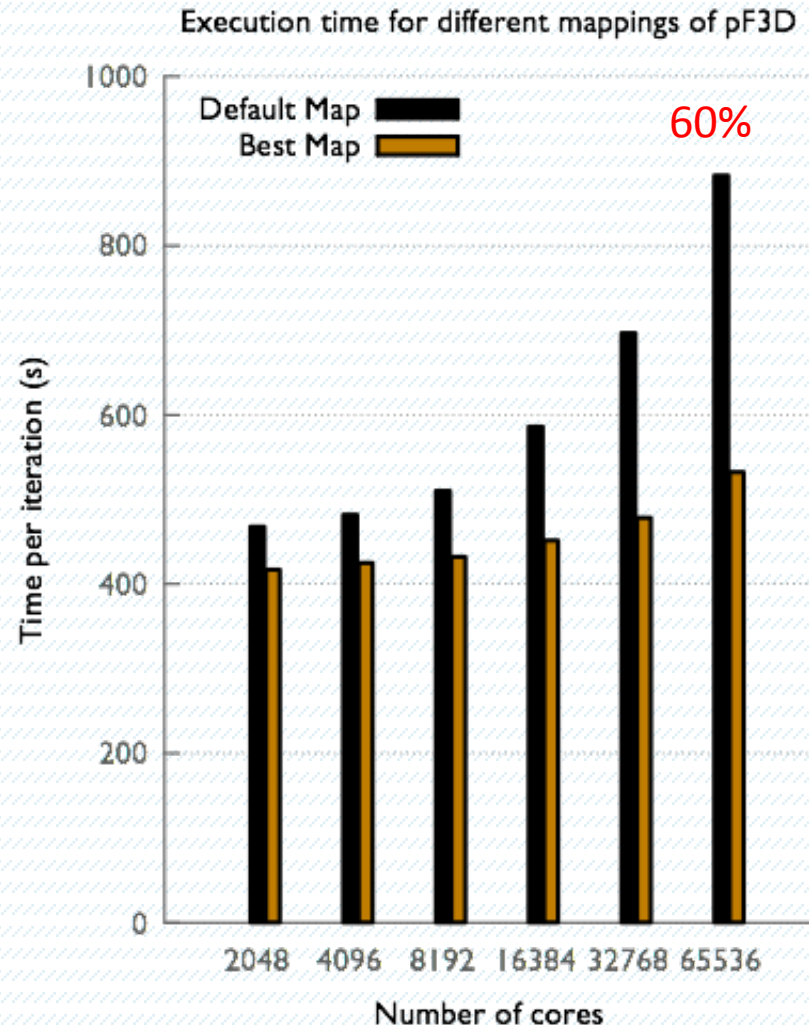
Modeling Performance

- Many components impact communication.

- Machine learning can be used to identify important features.

- Predicting Application Performance using Supervised Learning on Communication Features, SC'13.

Blue Gene/Q (16,384 cores)

Execution Time (s)

Mappings sorted by actual execution times

pF3D Observed   ●   pF3D Predicted   ○

Fast Simulation

- Simulate message-level events instead of packets
- Focus on key-features, ignore the rest

- Different resolutions for different components
- Use heuristics to estimate the state

Comparison for all-to-all over sub-communicators

Mappings on 16,384 cores of BlueGene/Q
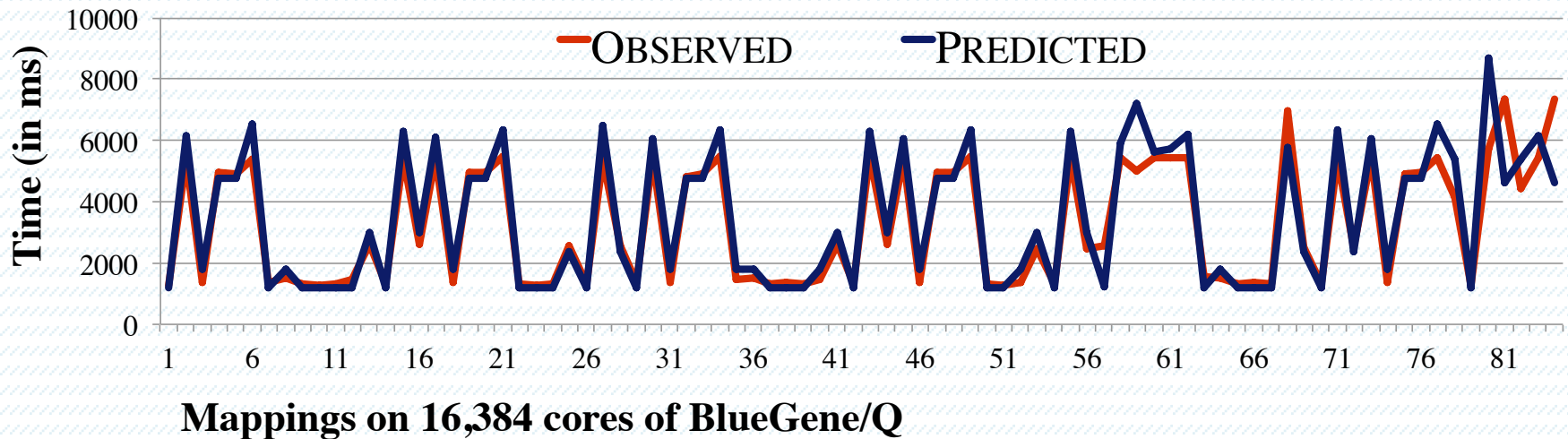
Moving Forward…

- Can we create a feedback loop between machine learning and fast simulation?

- First few minutes of a job run can be utilized to find the best mapping using the power of thousands of cores via fast simulation.

- Use fast and accurate simulation for studying future networks for applications of interest.

- More info at http://charm.cs.illinois.edu/~nikhil/