
Education

- Sep. 2020 - **PhD Student**, *Northeastern University*, Boston, MA, *Computer Science*.
Present Working in the formal methods group, advised by Prof. Stavros Tripakis. Focused on automated verification techniques for distributed protocols. GPA: 4.0/4.0
- 2012 – 2016 **Bachelor of Arts**, *Cornell University*, Ithaca, NY, *Computer Science & Mathematics*.
GPA: 3.16/4.0

Experience

- Summer **Applied Scientist Intern**, *Amazon Web Services*, New York, NY.
2022 Working in the S3 Automated Reasoning Group.
- Summer **Research Intern**, *NASA Langley Research Center*, Cambridge, MA (Remote).
2021
 - Developed a tool for parametric verification of a real-time, distributed merging protocol for autonomous aircrafts as an intern in the Safety Critical Avionics Systems Branch.
- 2016 - 2020 **Senior Software Engineer**, *MongoDB*, New York, NY.
 - Worked on design, maintenance, and verification of MongoDB's distributed database replication system, which is based on the Raft consensus protocol.
 - Designed and formally specified a novel dynamic reconfiguration protocol in TLA+ and led its implementation in the MongoDB replication system.
 - Implemented a new *speculative majority* read consistency level that allows for committed reads without the need to maintain historical snapshots.
 - Extended the Jepsen testing library to verify read-committed guarantees in MongoDB replica sets.
- Summer **Research Assistant**, *Cornell University*, Ithaca, NY.
2015
 - Profiled and analyzed memory usage of the Freeze Frame File System, an adaptation to the Hadoop Distributed File System that allows for real-time distributed snapshots.

Publications

- 2022 **Plain and Simple Inductive Invariant Inference for Distributed Protocols**
📄 in TLA+, *arXiv preprint arXiv:2109.11987*, William Schultz, Ian Dardik, and Stavros Tripakis.
Under submission.
- 2022 **Formal Verification of a Distributed Dynamic Reconfiguration Protocol**,
📄 *CPP 2022*, William Schultz, Ian Dardik, and Stavros Tripakis.
- 2021 **Design and Analysis of a Logless Dynamic Reconfiguration Protocol**,
📄 *OPODIS 2021*, William Schultz, Siyuan Zhou, Ian Dardik, and Stavros Tripakis.
- 2019 **Tunable Consistency in MongoDB**, *VLDB 2019*, William Schultz, Tess Avitabile,
📄 and Alyson Cabral.

Talks

- 2019 **A Bug's Life: Fixing a MongoDB Replication Protocol Bug with TLA+**,
📺 *Talk at TLA+ Conference 2019*, William Schultz and Siyuan Zhou.
- 2018 **An Animation Module for TLA+**, *Talk at TLA+ Community Event 2018*, Oxford,
📺 UK.

Skills

Programming C/C++, Java, Python, Git, GDB

Verification TLA+, TLAPS, Z3