William Schultz

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will62794.github.io

Education

Sep. 2020 - Present **PhD Student**, *Northeastern University*, Boston, MA, *Computer Science*.
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 2022 **Applied Scientist Intern**, *Amazon Web Services*, New York, NY.
Working in the S3 Automated Reasoning Group.

Summer 2021 **Research Intern**, *NASA Langley Research Center*, Cambridge, MA (Remote).
- 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 2015 **Research Assistant**, *Cornell University*, Ithaca, NY.
- 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.
Accepted for publication at FMCAD 2022.

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