2013

A Novel Framework for Model Checking UDP Network Interactions

Billy Rathje
brathje@pugetsound.edu

Follow this and additional works at: http://soundideas.pugetsound.edu/summer_research

Recommended Citation
http://soundideas.pugetsound.edu/summer_research/205

This Article is brought to you for free and open access by Sound Ideas. It has been accepted for inclusion in Summer Research by an authorized administrator of Sound Ideas. For more information, please contact soundideas@pugetsound.edu.
A Novel Framework for Model Checking UDP Network Interactions
Billy Rathje; Advisor: Brad Richards
University of Puget Sound, 1500 N Warner, Tacoma WA 98416
brathje@pugetsound.edu

Objective:
- Extend the Java Pathfinder model checking system to verify that the wireless network simulator used in Brad Richards's networking class correctly handles all possible interactions between simulated clients.

Methods
- Developed a novel framework for modeling realistic UDP transmissions (simulated packet loss and out-of-order transmissions). This extends the work of UCSB's Netstub.
- Adopted the protocol developed in Artho and Garoche to wrap sender and receiver client processes as threads.
- Framework utilizes the transformations developed in Stoller and Liu for simplifying distributed program models: 1) replacing remote method invocations with local methods and 2) centralizing processes as threads.

Results
- Developed a library for modeling UDP networks with Java Pathfinder.
- Extended Brad Richards's RF network simulator for model checking.
- Verification of the simulator succeeded (no deadlocks or errors) for 1-4 clients.
- The model of the RF simulator is verified correct.

Summary
- Developed a novel framework for model checking UDP networks.
- Model checked RF networking simulator with Java Pathfinder.
- Verified model of networking simulator.

This work was supported by a University research grant.