

## Abstract

This dissertation presents Vtrace (from the words ‘verify trace’). Vtrace is a tool which takes traces from an abstract model of a Go program and determines whether these traces correspond to real errors in the original program. Vtrace makes use of Uppaal to generate traces through the abstract model, and Toph for Go-to-Uppaal translation. To verify traces, Vtrace automatically builds and runs deterministic tests for each trace and can force Uppaal to exhaustively regenerate new traces until an error is confirmed real.

Vtrace presents the output of any tests to the user in the form of readable log files, allowing the user to see the exact execution of the program which led to the error (complete with concurrent goroutine interleavings).

Vtrace is shown to be capable of finding errors in small Go programs but struggles to deal with programs where shared memory is used across multiple goroutines. Evaluation also shows that performance scales quite poorly, and that this tool is realistically unsuitable for large-scale programs.