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Master's Thesis

Efficient Tracing of Actor Programs with Minimal Program Interference

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Start date: 01-Oct-2016

Modern debugging tools require a plethora of data to provide developers with insights into the behavior of their programs. However, obtaining this data interferences with a program's execution. For concurrent programs such interference can reduce the probabilities of observing race conditions and other concurrency bugs during debugging. For actor languages, this problem is related to messages, actor creation, and actor state changes.

As part of an FWF-funded research project, we are investigating new debugging tools for actor-based languages. The goal of this master thesis is to investigate techniques to efficiently record the behavior of an actor program, dynamically adapt the recording to minimize the interference with a programs execution, while retaining enough information about the runtime behavior to facilitate debugging.

Specifically, we want to investigate techniques to efficiently and scalable record actor creation, message sends, and promise resolution to facilitate online debugging and post-mortem analysis of a programs behavior. The obtained data should allow for a causality analysis and to reason about the ordering of events. At the same time, the actual recording should have close to zero overhead during execution, and we need to study the impact of the recording has on the probability of observing known race conditions with empirical experiments.

The progress of the project should be discussed at least every two weeks with the advisor. A time schedule and a milestone plan must be set up within the first 3 weeks. It should be continuously refined and monitored to make sure that the thesis will be completed in time.

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