DTrace and Runtime Verification

November 2014

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group	PMA
type	60 ECTS
recommended background	program analysis, parsing, compilation
study program	computer science

Short description

The task is to use DTrace for obtaining information for checking the run-time behavior of concurrent programs.

Background

DTrace is a popular dynamic tracing facility implemented in modern operating systems such as Solaris, FreeBSD, Linux and Apple's MacOS. It allows to instrument the running system to obtain valuable data for debugging and performance measurement, right down into the kernel.

In previous work, we presented an algorithm for verifying Linear Time Logic (LTL) temporal formulae with value bindings on program traces with a special application to the behaviour of concurrent, programs. We implemented it in Java and provided tools using Aspect-Oriented Programming techniques to instrument existing Java programs.

Problem setting

The goal of the project is to extract DTrace data and feed it either online or offline into the verification algorithm. Either adaptations to the existing Java program could be made, or a simple reimplementation of the algorithm in another language.

The task will involve:

- learn how to extract threading-related data from DTrace (that is, write DTrace scripts and test programs, for example in C using pthreads)

- how to pass this data in an efficient way to another program for post-processing, and

- understand and optimize the existing algorithm and data-structures for the task at hand

Keywords: run-time verification, dtrace, temporal logic, monitoring.

References

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