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Dynamic Visualization of Compiler Graphs

Master thesis for Ingomar Wesp
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Graal [1] is an effort to create a new just-in-time compiler for Java that is itself written in Java. It is based on a port of the HotSpot client compiler from C++ to Java.

Graal uses a graph as its internal representation of the source code (Graal IR). This Graal IR models both control-flow and data-flow dependencies between nodes. The compiler optimizations are applied on this Graal IR and happen in a phase like manner.

Truffle is a novel modeling language for implementing managed languages in Java. The language implementer writes an abstract syntax tree (AST) interpreter, which is integrated into the Truffle framework. Truffle uses Graal to compile the ASTs to highly optimized machine code.

This project aims at implementing an JavaScript-based visualization tool allows a clear inspection of the Graal IR and can link IR elements between different compilation stages.

The scope of this thesis is as follows:

- The tool has to run within a browser and should be implemented in JavaScript, using state-of-the-art visualization libraries.
- The architecture should support an easy integration with other visualization tools.
- The mutation of the Graal IR between compiler phases should be traceable.
- Applying object-oriented design techniques when developing the visualization tool.

Optional goals are:

- Traceability across two different intermediate representations (e.g. Truffle AST to Graal IR and vice versa)

The work's progress should be discussed with the supervisor at least every 2 weeks. Please note the guidelines of the Institute for System Software when preparing the written thesis.

Supervisor: Dipl.-Ing. Matthias Grimmer, Gilles Duboscq M.A.

[1] http://openjdk.java.net/projects/graal/