

# Posudek diplomové práce

Matematicko-fyzikální fakulta Univerzity Karlovy

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**Název práce** Optimization Decision Analysis for Graal  
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**Studijní program** Informatika      **Studijní obor** Softwarové systémy

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## Text posudku:

### SUMMARY

The thesis develops a tool and a methodology for analysing performance issues in modern optimising compilers, specifically the Graal compiler. The idea is to capture the chains of optimizations applied by the compiler in the form of tree and then provide a tool for analysing the differences in the trees. This makes it possible to see how changes in the compiler (or changes across multiple runs) affect the optimizations applied during the compilation and, consequently, the resulting performance.

The main contributions of the thesis are (i) extensions to the Graal compiler to capture optimization decisions in the form of trees (more specifically, inlining tree and optimization tree), (ii) a tool (profdiff) for comparing the captured trees and (iii) three case studies that demonstrate how the framework was used to analyse (and improve) performance of three benchmarks in the Graal test suite.

### EVALUATION

The thesis presents a contribution to a major large-scale research project. The work done as part of the thesis has been adopted by the project maintainers and has been actively used. The thesis solves a significant practical problem that affects the development of optimizing compilers and it offers a practical solution. The text describes the work in a clear way and using well-written English. The thesis clearly makes a significant practical research contribution.

The description of the project in the thesis presents the tool in its final form. There are a number of design decisions made along the way that could deserve a more detailed justification and explanation. For example, the thesis discusses tree preprocessing before comparison or the logic for deciding when a compilation fragment is created - these are presented as they were implemented, but it would be interesting to see whether the author experimented with different alternatives before deciding on the final design.

### QUESTIONS

Perhaps the most notable design decision that is done in the thesis is the design of the two trees (optimization tree and inlining tree). As illustrated by the evaluation, this works well. However, I am still curious if the author considered other formats for the trees, or perhaps

using one merged tree? It seems that the structure of the tree may be a significant factor for readability of the results. (And relatedly, do the sub-trees in the tree generally represent decisions dependent on the parent node? If not, would this result in better diffs?)

**Práci doporučuji k obhajobě.**

**Práci nenavrhuji na zvláštní ocenění.**

*Pokud práci navrhuje na zvláštní ocenění (cena děkana apod.), prosím uveďte zde stručné zdůvodnění (vzniklé publikace, významnost tématu, inovativnost práce apod.).*

**Datum** 27. August 2023

**Podpis**

T. Petiček