

Candidate Number: **2392F**
Project Title: **An Optimising Compiler from Haskell
to Java Bytecode**
Examination: Computer Science Tripos – Part II, May 2019
Word Count: 11972 ¹
Lines of Code: 8569 ²
Project Originator: The dissertation author
Project Supervisor: Dr. Timothy Jones

Original Aims

The aim of the project was to build an optimising compiler from a subset of Haskell to Java Bytecode, exploring compiler and language implementation beyond what was covered in the Tripos. Extensions included supporting typeclasses and class instances, monads, a larger subset of Haskell, and additional optimisations such as strictness analysis.

Work Completed

All stages in a traditional optimising compiler pipeline (except parsing) were implemented, covering a significant subset of Haskell, supporting non-strict evaluation, and applying a few targeted optimisations. This satisfies all of the success criteria for the project. Further, a number of the suggested extensions were implemented that significantly increase the expressivity of the original subset of Haskell: typeclasses, monads, and datatypes. Finally, the effectiveness of optimisations were evaluated and the project was compared to similar compilers on a variety of performance metrics.

Special Difficulties

None.

¹Calculated using `texcount -l -sum "$file"`

²Calculated using `wc -l "$file"`