

Candidate Number: **2392F**  
Project Title: **An Optimising Compiler from Haskell  
to Java Bytecode**  
Examination: Computer Science Tripos – Part II, July 2019  
Word Count: 11941 <sup>1</sup>  
Lines of Code: 8569 <sup>2</sup>  
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.

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<sup>1</sup>Calculated using `texcount -l -sum "$file"`

<sup>2</sup>Calculated using `wc -l "$file"`