Subject: Phase 1 - Moss: Automatic Parallelisation using Effects Tracking and Cost Analysis

Phase 1 Project Selection Status Report

Name: Dylan Moss

College: Queens'

CRSID: dm894

Director of Studies: Ramsey Faragher

Please complete 1, 2 and 3 below.

1. Please write 100 words on your current project ideas.

The aim of this project is to create a source-to-source compiler from a custom, sequential Go-like language down to parallelised Go code. This allows users to gain the benefits of parallel programming, while avoiding complexities such as reasoning about interfering side-effects and cost overheads introduced by creating threads. I will develop a type system to track the minimum and maximum value of variables (aided by user annotations) and hence use cost analysis based upon [0] to determine the cost benefit of parallelising functions. I will then schedule functions into concurrent threads based upon this analysis and extend [1] to introduce simple side effects checking to ensure there are no conflicting side effects (assuming pointers are conflicted unless explicitly told otherwise by the user).

[0] https://dl.acm.org/doi/pdf/10.1145/361002.361016
[1] https://www.cl.cam.ac.uk/teaching/2122/OptComp/slides/lecture13.pdf

2. Please list names of potential project supervisors, indicating any interactions you have had with them, for example: not contacted, awaiting reply, in discussion, agreed to supervise.

Alan Mycroft - agreed to supervise

3. Is there any chance that your project will involve any computing resources other than the Computing Service's MCS and software that is already installed there, for example: your own machine, machines in College, special peripherals, imported software packages, special hardware, network access, substantial extra disc space on the MCS.

If so indicate below what, and what it is needed for.

This project will require my own personal laptop, but I do not expect to need another other computing resources.