High Performance Rust

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Abstract

This dissertation examines the suitabilty of the Rust programming language, to High Performance Computing (HPC). This examination is made through porting three HPC mini apps to Rust from typical HPC languages and comparing the perfomance of the Rust and the original implementation. We also investigate the readability of Rust's higher level programming syntax for HPC programmers through the use of a questionnaire.

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Acknowledgements

This template is a slightly modified version of the one developed by Prof. Charles Duncan for MSc students in the Dept. of Meteorology. His acknowledgement follows:

This template has been produced with help from many former students who have shown different ways of doing things. Please make suggestions for further improvements.

Chapter 1

Introduction

The Rust programming language promises 'High-level ergonomics and low-level control' to help 'you write faster, more reliable software' [1]

1.1 Mini App Selection

Chapter 2

Babel Stream

2.1 Development

2.2 Comparison

Chapter 3

Sparse Matrix Multiplication

3.1 Development

3.2 Comparison

Chapter 4

K-means

4.1 Development

4.2 Comparison

Chapter 5

Rust's usability

Here are some questionnaire results.

Chapter 6

Conclusions

This is the place to put your conclusions about your work. You can split it into different sections if appropriate. You may want to include a section of future work which could be carried out to continue your research.

Appendix A

Stuff which is too detailed

Appendices should contain all the material which is considered too detailed to be included in the main bod but which is, nevertheless, important enough to be included in the thesis.

Appendix B

Stuff which no-one will read

Some people include in their thesis a lot of detail, particularly computer code, which no-one will ever read. You should be careful that anything like this you include should contain some element of uniqueness which justifies its inclusion.

Bibliography

[1] Steve Klabnik and Carol Nichols. The rust programming language.