Thesis Title

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Contents

Abstract

Abstract goes here

Keywords:

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Introduction

1.1 Introduction

The proliferation of streaming data sources such as optical sensors, health tracking sensors, and social networks has increased greatly in the previous 10 years, and with it the the desire to has the desire to understand and analyse this streaming data. The increase in computing power has similarly allowed computing simulations to become increasingly useful as a method of predicting and understanding various processes occurring, whether they be physical, social or purely theoretical.

This thesis seeks to address the problem of having multiple, potentially interrelated, heterogenous computational tasks that are long running or streaming tasks. The problem is broken up into 5 parts:

- Load balancing heterogenous long-running jobs between heterogenous computing hardware
- Providing an api for jobs to describe their dependencies on other jobs
- Providing an inter-job communication api
- Providing an intra-job communication api
- Providing buffering for input and outut for jobs

The system is built using Extempore, a high performance lisp environment. The benefits of being built in Extempore include:

- Providing a direct access to system devices via its C interoperability
- Extempore Just-In-Time (JIT) compiles all code via the LLVM compiler to x86 bitcode, providing high performance program execuition
- Dynamic code redefinition, allowing extempore processes to be retargeted with new functionality as is required
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1.2 Related Work

The focus on performant computing has always been on harnessing multiple processing units into to solve a single task. Technologies have been developed to bulk process data (e.g. Hadoop, spark, storm), to bulk generate and analyse data ((e.eg. MPI)) and to managae the complexity of distributed operations (e.g. SLURM, Zookeeper).

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Literature Review

2.1 Load Balancing

2.2 Communication Systems

2.3 Buffers

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Appendices

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Appendix

Todo list