Sprint Report #1

October 7, 2015

Team Overview

Project

ARM Cluster

Members

- Andrew Hoover
- Samantha Krantz
- Christine Sorensen

Sponser

Dr. Christer Karlsson

Customer

Description

Dr. Christer Karlsson is a computer science professor at South Dakota School of Mines and Technology.

Goal

To produce the fastest and most cost efficient homogenous ARM cluster of single-board computers.

Needs

- 6 - 12 single-board computers (either Raspberry Pi 2B, PcDuino 8, or ODroid 4xU)
- Switch
- Power cord
- Cables

Project Overview

The goal of this project to build a cluster of 6-12 single-board computers that has the most Floating Point Operations as possible per U.S. Dollar per Watt. Three single-board computers were tested; ODroid 4xU, Raspberry Pi 2B, PcDuino 8. The best one will be selected and the cluster will be created under a budget of $1,200. Then, alternative modes of communication besides Ethernet will be investigates using other pins and ports. The computers will be linked in a topology that will be determined during this investigation.

Project Environment

Project Boundaries

Project Context

The project is created on a Linux OS. Github is used to share the materials. The code is written in C++. OpenMP is used to run the code in parallel. A Kill-A-Watt monitor is used to test the power of the running devices.

The following single-board computers are tested:

- ODroid 4xU
- Raspberry Pi 2B
- PcDuino 8

Deliverables

- Mission Statement
- User Stories
- Number Generating Code
- Benchmark Code
- Benchmark Log
- Signed Software Contract
- Updated Design Document

Sprint Report

Work for this sprint included:

- Wrote Mission Statement and Elevator Speech
- Drew up Software Contract
- Wrote user stories
- Obtained ODroid 4xU, Raspberry Pi 2B, and PcDuino 8 single-board computers
- Wrote number generating code
- Wrote benchmark code that ran addition, multiplication, division, and sine floating point operations
- Added OpenMP to run the benchmark code on all cores
- Ran the code each of the single-board computers
- Logged times
- Calculated the GFlops
- Calculated the GFlops/Dollar/Watts
- Determined best computer

Work that is carried over into Sprint 2 is as follows:

- Using the benchmark results to determine which computer to use
- Order more of the computers that proved best from Sprint 1 and maintain the given budget of $1,200
- Find a topology that best fits the cluster

Backlog

- Decide on a computer based on the results of the benchmarking
- Calculate prices on supplies and computers while maintaining below the budget
- Ordering said supplies and computers
- Build the cluster to perform floating-point operations
- Benchmark the cluster
- Experiment with different connections
- Create a new mode of communication