Progress presentation

A parallel algorithm for all-pairs shortest paths that minimises data movement

Marcus A. K. September

February 8, 2022

Introduction

What is the project about?

- ▶ Develop a parallel algorithm for solving all-pairs shortest paths (APSP)
- ▶ A 2D grid of processing elements and message passing
- ▶ Multiprocessor simulation
- ▶ Parallelise a matrix multiplication, Minimise data movement with `FoxOtto`

Current state of progress

Timetable

…	…	…
16 – 17	20 Jan – 2 Feb	**Evaluation** $\cdots$
18 – 20	3 Feb – 23 Feb	**Extensions** $\cdots$
21 – $\cdots$	24 Feb – $\cdots$	**Dissertation writing**

Current state

- ▶ Work items left on evaluation:
    - ▶ Generate more input graphs, using random graph library
    - ▶ (Allow independent processing element (PE) execution in timing class)
- ▶ Extensions done:
    - ▶ Finished generalising simulation and FoxOtto
    - ▶ Halfway done with graph compression

Moving forward

Key work items left

- ▶ Finish evaluation
  - ▶ Generate random graphs of various sizes
  - ▶ Allow independent processing element execution in timing wrapper
  - ▶ Do execution time measurements for various problem sizes
- ▶ Finish graph compression optimisation (extension)
- ▶ (Parallelise Floyd-Warshall (extension))
- ▶ Start writing dissertation? Or more extensions?
  - ▶ 24 February in timetable

What has been accomplished?

Main work items

- ▶ Data preparation script and class
- ▶ Multiprocessor simulation
  - ▶ Can pass `Worker` description for `PE(i, j)`
  - ▶ `Manager` and `MemoryController` handles execution of `Workers` and their communication
- ▶ `FoxOtto` min-plus matrix multiplication
- ▶ Main APSP algorithm

Extra

- ▶ Correctness tests
- ▶ Some evaluation done

Questions?