Distributes System Seminar Topics

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Topics

- Parallel performance profiling
- Parallel graph algorithms
- Parallel rendering algorithms
- Parallel programming in PGAS languages
- Parallel machine learning
- Experimentation with LLVM, in particular for GPU programming
Parallel performance profiling

- Examine the communication patterns of distributed memory parallel programs
- Try to determine the best network topology for a given communication pattern
- Best can include notions of cost as well as application performance
Parallel graph algorithms

- The single source shortest path algorithm has been recently added to the Graph 500 benchmark
- Run this on the University cluster and try to optimize it
- If have time, look at implementing another parallel graph algorithm and comparing the performance
Parallel rendering algorithms

- One can either implement a parallel rendering/visualization algorithm, for example for scientific visualization, artistic display, computer games etc.
- Or do a survey of open source implementations
- Or try out an open source implementation, such as Ascent (https://github.com/Alpine-DAV/ascent)
Parallel programming in PGAS languages

- Partitioned Global Address Space languages offer the promise of easier distributed memory programming
- The aim is to try programming an algorithm in a PGAS languages such as UPC, UPC++, Chapel, PCJ, Co-array Fortran etc, and write an experience report.
Parallel machine learning

- Try out distributed memory parallel machine learning frameworks such as PaddlePaddle
  https://github.com/PaddlePaddle/Paddle
  Chainer
  https://github.com/chainer/chainer/chainer

- Alternatively, implement a parallel machine learning algorithm
Experimentation with LLVM

- LLVM (https://llvm.org/) is being used to help compile code that will run on multicore CPUs and on GPUs.
- The aim is to learn more about the project and how it integrates with a variety of compilers.
- The project may be of interest for those who use GPUs for graphics or computation.
Other Projects

- See
  
  http://ds.cs.ut.ee/courses/
  distributed-systems-seminar-fall-2018

- Or come and talk to me!