Projects

Project submission:

A word doc outlining what you did, and any relevant source code.

If you worked in a group we only need one submission for each of you, but make sure both the file name and the word doc reflect who worked on the project.

So, you are free to try and develop your own project in specific, but a few ideas/categories.

1. Redo several of the assignment questions (or related numerical methods problems) for GPU computing, aka with an ‘accelerator’, programming in DirectCompute, OpenCL or Cuda or the like. If you have the maths skills a numerical Navier-Stokes (computational fluid dynamics) can make for a really interesting highly parallelisable problem, which can also visualise well.
2. Build a cluster of your own (either with multiple computers or raspberry pis) and show how to administer it and schedule jobs with SLURM or similar.
3. Compare the performance of other HPC languages like Julia and Chapel to Python/C etc. Turns out C/C++ is usually faster, but it’s still illustrative.
4. Parallelise one of the much more advanced algorithms we’ve talked about or that you are aware of
5. There a bunch of interesting HPC libraries that are more focused on specific numerical problems (<https://events.prace-ri.eu/event/176/contributions/38/attachments/154/305/HPC_libraries.pdf> has an overview of several)
6. The HPC equivalent of Docker is “Singularity” and apparently Singularity is compatible with Docker. Both deploy an HPC application in a singularity container and give me a good write up on how it works. Good luck, I have no idea.
7. A real actual problem on Sharcnet – we’d need to make a research case for it, and pitch it through Dr. McConnell to get access so you would need to decide and plan for this early.