Homework 5

Abhijit Chowdhary

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MPI Ring Communication

See the file `int_ring.cpp` for the single element ring and see the file `arr_ring.cpp` for the array of size 2MB ring. Running this on an Intel(R) Core(TM) i7-3770 CPU @ 3.40GHz, I found that on average my latency was around .0035 ms and had bandwidth 10 GB/s on my local computer. You can call the shell script provided to automatically run both codes. For example, call `sh run_all.sh N` to run the files with N processors.

Proposed Schedule

- Week 4/22-4/28:
  - Read papers and understand basic Parareal.
  - Begin writing basic serial version in Matlab for correctness (almost done).
- Week 4/29-5/05:
  - Finish writing Serial version, and port code to C++.
  - Write data structures and helper code for ODE systems and solvers.
  - Perform numerical analysis on convergence, stability, and robustness of methods as internal solvers vary.
- Week 5/06-5/12:
  - Take serial version and write basic OpenMP version.
    - Compare efficiency.
    - Model computational intensity, and think about how to maximize it.
  - Begin seriously writing and wrapping up an MPI version to scale to larger systems.
  - Once this is done, try it on Prince.
- Week 5/13-5/19:
  - Construct plots and figures for both report and presentation.
  - Finalize mathematics behind optimizing parallel efficiency and computational intensity. Confirm with professors about they accuracy.
  - Finish typesetting both.