

Physics 244: Term Project Guidelines (4/18/2019)

Purpose: Apply some of what you have learned about parallel scientific computing to a self-directed project that can be accomplished in 5-6 weeks. These can be done individually or in groups of 2-3 maximum.

Timetable:

Tuesday, April 30: term project proposals to be submitted by each student to the TritonEd site under assignment TPP. Each student in a team should submit the same proposal. The proposal is a 1-page abstract which includes goal, team members, technical approach and timetable, and final deliverable (code and presentation). In the case of a team project, describe what each team member will do to achieve the project's goals.

Tuesday, May 21: one page progress report to be submitted to the TritonEd site under assignment TPR stating what work is underway and what the current status/issues are. Each student in a team should submit the same report. The purpose of this report is to keep you on track to meeting your goals as well as a mechanism to tell me about problems you are confronting that may require external help.

Midnight PDT, Wed. June 12. Your term project grade will be based on materials submitted to the TritonEd site under assignment TFP, due by midnight 6/12. **NO LATE SUBMISSIONS WILL BE CONSIDERED.** Materials to be submitted are:

- 1) a written report, in the text editor of your choice, describing the project you undertook and the results you obtained. Your report should include introduction, methodology, results, and conclusions sections. Your report should explicitly reference any code or scripts submitted under item 2) by their filenames. Only one report per team needs to be uploaded to the TritonEd site. Be sure to put the names of all team members on the title page.
- 2) a gzipped archive file containing original source code, scripts, and output files from your project. If you used an external application for your project, you need not submit its source code. However, you need to submit all configuration and input files necessary to run the job. In other words, you need to provide me with enough information to rerun the application in the same way you ran it. Only one archive file per team needs to be uploaded to the TritonEd site.
- 3) for team submissions, each team member must submit a self-evaluation which honestly describes each team member's role and contribution to the project including yourself. I will be reading these to obtain a consistent picture of the contributions of each team member. These must be written independently and submitted by each team member to the TritonEd site.

Some project suggestions.

I am open to all reasonable proposals. You should pick something that is both doable in the space of 5-6 weeks and yet represents an adequate amount of original work. To give you an idea of what I think is both doable and meaningful, I offer the following:

1. Select a scientific application from the many packages installed on SDSC Comet (http://www.sdsc.edu/support/user_guides/comet.html#software/) and conduct a scaling study of one or more of its algorithms and report on the results. This can be either a simulation or machine learning application.
2. Same as 1 but using the parallel application you are using for your research
3. Parallelize a serial application of your choice and demonstrate its correctness and parallel performance. Parallelization can be done with OpenMP, MPI, or CUDA.
4. Use MPI performance tools to analyze the communication patterns of a parallel application of your choice
5. Design and implement a parallel algorithm of your choice, and demonstrate its correctness and speedup relative to a serial code.