18-645: How to Write Fast Code

Project 4:- Final Phase

As you are coming to the end of the semester, this document states the requirements for the project. Specifically, there are **3 different submissions**: a written report, a video presentation and the code that you have implemented.

Updated Design Document. A report that summarizes your final design is required. There is an upper limit of 10 double-column page using either the IEEE Conference template `https://www.ieee.org/conferences/publishing/templates.html`. The final design document should contain the following:

1. *Updated Design.* The previous report summarized your initial designs of individual kernels in your application. As you implement your kernels, changes may have been made for better performance. For example, you might have increased the size of the kernel, or changed the layout of the data between different kernels. You might have also fused some of your previous kernels into a single kernel.

   The updated report should report the final design that was implemented. It should also provide some sort of explanation as to why the design is high performant.

2. *Parallelization.* Using the identified independent operations, you should also parallelized your implementation. Describe how your implementation was parallelized and provide an explanation as to why that particular parallelization scheme was chosen.

3. *Performance Plots.* You should have implemented a high performance implementation of your algorithm. You should include a performance plot that shows the following features across a number of data sizes (when appropriate):

   - *Baseline Comparison.* The performance of the baseline comparison code should be included.
   - *Your implementation.* The performance of your implementation should be included on the same plot.

4. *Future Directions.* A section on possible future directions to get better performance is expected. Give an idea of what else would you have tried to get better performance if the semester was much longer.

Implementation. Provide a zipped file containing the following

1. Implementation of your code.

2. Readme file on how to run the code. For example, if it is running on particular ECE machines, let us know which machine it runs on.

Video Presentation. A 8-10 minute video is required as part of the final submission. All team members must present their work in the video. The content of the video is to be a highlight video that showcases the part of your project that you are most proud of.
Bonus points of up to 10% of the project grade will be given for a well-produced/interesting video.

Submission. The implementation and the report (in pdf format) are to be submitted as 2 separete files via Canvas by the end of the due date. **Submissions through Canvas must be submitted individually**. Link to upload video will be provided separately. Only 1 video is required per team.