Getting the Most Out of Your Graphics Card
Recommendation for project continuation

High performance computing is not new, but the technologies available continue to be reinvented and reevaluated. Starting with the advent of the GPU, and more specifically programming languages that allow the user to access the computing power of multiple GPUs, a new branch on the high-performance tree has been created. It has been shown that programs that meet a set of criteria are ideal for this kind of parallel processing and that the performance gains are phenomenal. However, there is a lot of room for additional research and there are many software programs that meet the criteria but have not been adapted in this way.

That is to say that there are many directions this project could take in the future. Our recommendation is that the project be continued, but the students taking this on need to be aware of the challenges that they will be presented with early on.

1. First of all, the concepts supporting parallel programming are not simple and the course offered by the Colorado State University Computer Science Department should be considered mandatory for project members. (currently CS475)
2. Second, team members should plan on spending a couple of weeks familiarizing themselves with the terminology in whatever code source they plan to use to work with the GPUs (CUDA isn’t the only one out there). (CUDA is the current standard for the project)
3. Third, team members should expect to spend about twice as much time on this project to be successful as they might have to spend on other projects. There is a lot of ramp up knowledge that needs to be covered before development on a completely new program can be started.
4. Finally, while having every team member write the same program is a good exercise for each of them to learn CUDA (or whatever language is being utilized), we recommend that team development be used instead. The potential to learn from one another as well as the additional expertise that comes from explaining code, logic, the language, etc. will be invaluable and may provide a way for the team members to accomplish more with the time they have.

It is our recommendation that this project be carried forward. Changes that allow the team members to work together more and decreases the amount of ramp up time would be wise as they will allow the team to do more in a shorter time frame and hopefully be able to tackle a more advanced application than we were able to.

As an additional note, speaking with Mark Woolston there is a potential collaborative project to use these high performance computing techniques to parallelize and speed up an image processing program currently being used at the ERC. The need they have is for changes in the laser beam to be caught and analyzed in a matter of milliseconds and if certain changes are apparent the laser has to be shut down. According to Mark the current program is not fast enough for their needs.

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