

Iowa High Performance Computing Summer School 2011

Summer Computing Project

Summer Project Report Due Date: Friday, August 26, 2011

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Purpose of Summer Computing Project The aim of the summer computing project is to provide the opportunity for the student to apply the high performance computing knowledge gained during the intensive three-day IHPC 2011 course to his or her own graduate or postdoctoral research. The student's current graduate advisor or postdoctoral mentor is expected to provide primary oversight of the student's work on this project. However, one of the IHPC faculty will serve, over the course of the summer, as an advisor specifically for the computational aspects of the project. Therefore, the student's graduate advisor need not be an expert in high performance computing, as the IHPC advisor can provide guidance on computational matters.

Examples of proposed high performance computing projects include:

- The parallelization of an existing serial code
- The debugging of a parallel code currently under development
- The extension of an existing parallel code
- The optimization of an existing parallel code to improve scalability.

Since many excellent potential projects could take longer than the course of the summer, it is *not* necessary the project be complete by the due date of the summer project report. The important aspect is to make significant progress towards the project goal.

After the due date, all project reports will be evaluated by the IHPC 2011 Faculty, the project demonstrating the most significant *relative* computational advance will be awarded the Top IHPC 2011 Project Award, including a certificate and a \$250 prize. Note that the competition will be based not on the absolute performance of the computational implementation, but on the relative advance of the performance of the computational implementation.

Project Report Format The project report should be no more than five pages (not including references). The project report should include the following sections:

1. Abstract: A paragraph describing project undertaken and the computational goals accomplished.
2. Introduction: The introduction, no more than one page, should describe the scientific context of your computational project. Remember that the application may be evaluated by scientists outside of your field of study, so technical details should be kept to a minimum.
3. Computational Implementation: Please describe the computational approach (including the algorithms used, *e.g.* finite difference methods, spectral methods, etc.) used for your research. Next, outline the high performance computational strategy chosen to improve the performance of your research code. This section should embody the bulk of your report. Be sure to describe in detail that status of the

computational implementation at the commencement of the project, and the improvements made over the course of the summer project. Be specific about what you have achieved in comparison to the initial project goals, and what may remain to be completed.

4. Computational Performance: Back up your report with quantitative performance data. For many applications, a strong scaling or weak scaling, both in table and graphical form, is the preferred format for this section. Be sure to describe precisely the test problem that was run to collect this performance data. If a strong or weak scaling seems not to be applicable to your project, consult with your computational advisor to determine an acceptable quantitative measure of the performance of your computational implementation.
5. Conclusion: Briefly summarize the project computational goals, highlighting those that have been successfully achieved and those that remain to be completed.

This report should be turned in, in PDF format, to your assigned IHPC computational advisor by the due date of Friday, August 26, 2011.