Project Specification for CS 4576 High-Performance Scientific Computing

February 20, 2012

The project described here is worth 105 points in total. Your cumulative score on the project will be scaled to be 40% of the final grade for students in CSCI 4576 and 50% of your grade for students in CSCI 5576.

You should assume that your audience does not know more about HPSC than it has learned in the course so far. Be sure that each of your presentations is accessible to all.

There will be no labs scheduled in weeks 10 and 15 to free time for work on projects and paper presentations. Labs in weeks 12, 13, and 14 will be exercises that can be completed during the lab period and that won't require lab reports.

You should use at least an 11 point font for all printed work. Line spacing of one and a half to two is required. Any written part should submitted via the Desire2Learn web site.

Project work should be divided up so that a partner in CSCI 5576 does about 25% more work than one in CSCI 4576.

Project Matchmaking (5 points): in class on Wednesday February 15

You are strongly encouraged to work with a partner on the project. To aid in finding partners, we will have an informal sharing of project ideas. Please prepare a description of your project idea that you can present to the class in not more than 90 seconds. There will be time to mingle and find partners if you wish after the presentations. Note that less work per person is assigned for project teams (2 or 3 people). If you want to use 1-2 PowerPoint slides, upload them to the class web site before class. Sample topics are provided on the D2L site, but feel free to invent your own. You are welcome to choose a topic that will help you in your research or in another course. In the latter case, you'll need to explain how the work you do in this course and that one are distinct and worthy of double credit.

Project Proposal (10 points): up to about 3 pages, not including references: due February 27

The purpose of the project proposal is to ensure that your project is neither too big nor too small and that we have a good variety of projects. You should explain the problem you will

study and the methodologies you will use. That is, what analysis will you do, what data will you collect, and what will you build? (Note that not all topics will require all three of those features, but you must demonstrate that you will think about something in an organized way.)

Paper Presentation (20 points): in class and lab during week 9

The paper presentation is required ONLY of students enrolled in CSCI 5576. The paper presentation is individual work. All CSCI 5576 students must present their own papers even if they are working with partners on the rest of the project. Research papers provide a great way to explore a topic in depth. The purpose of the presentation is for you to study a paper and then share what you have learned with the class. Educate us! The presentation must address the following points. It will also be evaluated on style and accessibility.

- Problem that the paper addresses
- How the problem is solved
- Major lessons learned
- Followup (weaknesses, changes since the paper was written, extensions, etc.)
- Presentation length up to 10 minutes, followed by up to 2 minutes of questions and discussion

Some papers of potential interest will be posted on D2L, but feel free also to find your own. Your presentation should not exceed 10 minutes.

Annotated Bibliography (20 points): due March 23

Prepare an annotated bibliography of sources that you will use in developing your project. One set of instructions is provided here http://www.library.cornell.edu/olinuris/ref/research/skill28.htm. Evaluating the authority of the author(s) is of particular important when you cite websites as websites are typically self-published and not reviewed. In contrast, a published journal article is generally subject to a rigorous review process.

Please also include a note explaining how each source will be useful to you as you develop the project.

You are welcome to use the internet to begin your search, but you need also to come up with sources that are not simply websites. For example, Wikipedia counts as a website while a paper published in a journal but available on line does not. Don't forget about books and other printed material.

A person working alone on a project must include at least four sources in the bibliography, at least three of which are not websites. Two people working together must include at least six sources, at least four of which are not websites. Three people working together must include at least eight sources, at least five of which are not websites.

Project Checkpoint (10 points): due in class Monday, April 9

Turn in a page or two that explain(s) what you have done so far on the project and your plan of attack for what remains. Thomas will be looking for evidence of actual progress!

Final Presentation (20 points): to be given in class and lab in week 16

The final presentation gives you the opportunity to share your work with the rest of the class. The presentation will be evaluated in terms of clarity and organization and how well you address the following questions:

- What was the problem you studied?
- What did you learn about its solution?
- What were the details of your approach? For example, if you studied parallel implementations of an algorithm, you might address questions like these:
  - How does the algorithm fit the selected architecture(s)?
  - What is an appropriate performance model?
  - How well do the selected programming models express the algorithm? Here, you need to address what data you collected, what analysis you did, and what you built, if anything.
- What did you learn in this class that helped you most in your project?

The presentation should be about 8 minutes for a singleton and 12 for partners and 15 for triples. Partners should split the talking roughly equally.

Final Report (20 points): due Wednesday May 9

The final paper, due at our final exam time, should be a well-written formal research report. This document must present the polished, final product of your research accurately and well, integrate and answer any comments and questions that were raised during the in-class presentation, and adhere to a word count limit of 2500 words for singletons and 4000 words for partners and 6000 words for triples, not including figure captions, footnotes, embedded text formatting commands, and references. (Linux fans can compute this number using, for example, detex and wc.) The word-count limit should give you some serious incentive to use figures to tell as much of the story as possible. Scientific American articles, for instance, are designed so a knowledgeable person can get their gist simply by looking at the figures and reading their captions. Code listings that are part of the story should be included as appendices and not figured into the word count.