**ATPESC 2014 Exam**

**Architectures:**

What will be your approach to achieving good performance on your application on the leading-edge supercomputers that will be operational five years from now?

**Programming models:**

What programming model(s) do you currently use, and among the others you learned about in this course, which one(s) do you think would be useful to you? Why?

**FASTMath:**

1. PETSc has a mode to operate in "Quad Precision". What is "Quad Precision" and under what circumstances might it be useful?

2. When we talk about scaling studies, there are typically two flavors, "strong" scaling and "weak" scaling. What is the difference and which is generally harder to achieve?

3. List a few examples where structured meshes are best used and where unstructured meshes are best. Can you think of any creative uses for meshes as a data abstraction in your area?

**Software Tools:**

1. For your application of interest what are the possible causes performance and scaling bottlenecks? How could these causes be investigated and confirmed?

What steps could be taken to alleviate them?

2. How do the debugging tools presented at ATPESC compare to your ideal?

3. In what ways do their limitations reflect the architecture of the computing platform?

**Visualization:**

1. A large part of data analysis and visualization is using graphical attributes (such as position, color, and scale) to represent different attributes of a data set (scalar or vector values, or topology, for example).   Describe how you might apply these visualization concepts to convey information about the data that you generate, or the software that you develop (debugging information, for example) in your day to day work.

2. Do you have visualization needs that are not currently met using the visualization and analysis tools that were presented at ATPESC, or other tools that you are already using?  Please describe.

**Data-intensive computing and I/O:**

What role(s) does data play in your day-to-day science activities? How do the tools you were introduced to during ATPESC fit into your data management and analysis needs, and where do you see gaps — places where you will need additional functionality?

**Software engineering and community codes:**

Explain at least three ways in which good software practices would be beneficial in your work.

Describe one way you might still employ good software engineering practices while balancing constraints of performance on the largest systems.

In your field of research what features would be needed in a code that could turn into a community code. Provide reasoning and justification for your choices. If you don't think a community code would work in your area provide arguments in support of that opinion.