Working Session 2: Algorithmic Research and Development Needs

3) Consider algorithmic features needed to exploit extreme systems.
   a) What is the most important algorithmic development for
      i) Scalable solvers?
      ii) Portable solvers?
      iii) Fault tolerant, resilient solvers?
      iv) Robust and efficient solvers?
   b) What additional algorithmic developments are desired, and what are absolutely required? In particular, the near-term future systems are likely to be heterogeneous. What are the challenges for writing solvers for heterogeneous systems?

4) The new architectures will likely enable new and different kinds of scientific simulations.
   a) What are some unavoidable requirements for solvers for scientific applications, and what are the necessary capabilities we need to develop?
   b) What are the opportunities brought on by the new architectures? What features in solvers will be needed to fully support these new opportunities?

5) Code developers will need some help to deal with extreme-scale architectures.
   a) Describe needed tools, programming environment, etc., and their uses (no need to "name" them). What are their drivers (e.g., extreme parallelism, data movement minimization, fault tolerance, etc.)?
   b) Does the tool exist? How urgently is it needed (0-3 yrs, 3-5 yrs, 5-10 yrs)?