Igniting Exascale

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Panelists

- Pete Beckman
- Franck Cappello
- Al Geist
- Satoshi Matsuoka
- Thomas Sterling
Is there a Fear of Exascale?

- There is concern about
  - Faults
  - Scaling
  - Performance (latency)
  - Complex processing model (e.g., heterogeneous elements)
  - Cost (power, memory)
  - Impact on algorithms
  - Narrowness of application domain
  - Data handling for Exabyte data sets

- In addition, does Exascale imply a discontinuity in programming, algorithms, debugging, etc.?
How can We Overcome the Fear?

• Which fears are mistaken?
  ♦ After all, many were convinced that petascale systems would be impossible without new programming models?

• Conversely, which problems apply at a smaller scale?
  ♦ Thus can be addressed now and provide near-term benefits?

• Which problems are (nearly) unique to Exascale?

• How do we build/test/improve algorithms, software, and applications?
  ♦ Do we need to build a much more sophisticated simulation environment?
How Can We Build Real Excitement?

• How do we provide evidence that Exascale systems will work well with applications?
• How do we demonstrate that Exascale systems can enable new application areas (after all, Exascale systems may be greatly different in architecture - will that be a virtue)?
• In all of the above, how do we move past qualitative statements to quantitative predictions?
How Much is Science Worth?

- Lakeside Technology Center
- 1.1 million ft$^2$
- Over 100MW!
  - 2$^{nd}$ largest customer of ComEd (O’Hare is first)

How much is science that could transform our world worth?
Small (resource) Science vs.
Large (resource) Science

• We have not made a compelling case that Exascale computing should be a priority
  ♦ Why not data-centric computing? Sensors? Privacy? Health?

• How to compare the different kinds of contributions?