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!
  - ♦ 2nd 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?