Role and Participation of national and international funding agencies

Paul Messina, Fred Johnson,

Bertrandt Braunschweig, Catherine Riviere,
Herve Mouren, Fabrizio Gagliardi,

Abani Patra, Kostas Glinos

Background and Overview

- *Existing Funding*
  - DOE ($250M/year in s/w and algorithms for HPC)--
  - OASCR $50M/year (SCIDAC fraction) computer science and applied mathematics both independently and embedded in application teams
  - $60M in base programs
  - NNSA ~$100M
  - (30% Univ, 70% Lab)
  - NSF $50M (diffuse across many programs), OCI, CISE coordinate-- HECURA, PetaApps, CDI, SDCI, STCI, CISE/CCF)
  - DARPA ???

Background …

- *Existing Funding*
  - $25M ANR (National Agency for Research) -- in a mix of application and
  - GENCI -- substantial investment in PRACE … detailed agreements being worked out
  - EC (DEISA, PRACE investments, …) ~ $45+M/yr
  - DEISA/PRACE $15M
  - Embedded Systems $15M
  - Terascale Computing $15M

Background …

- Challenges With Petascale

- Existing Collaboration

Background …

- *Joint Education and Training*
  - Extensive mobility among EU partners
  - Programs open to others -- developed countries pay their way
  - Partnership is common but problematic -- time synchronization …
  - Flexibility in NSF funding scenario using supplements
  - NSF has Office of International Science and Engineering -- area specific expertise both at NSF and locally available
  - O(100) students and junior fellowships; CSGF

Background …

- *Joint Education and Training*
  - New programs in Germany and France HPC Masters -- 50 students/year in each, Teratec, Juelich …
  - HPC related PhD positions in France,
  - ANR -- joint program possible but each country funds its own personnel; ANR target 7-8% international

Environment to develop Exascale xxx

- *Weaknesses*
  - Design of research program for the “uncharted territory” of the High Risk-High Return research needed now
  - Industry does not perceive significant immediate ROI compared to other users of HPC; Applications that are not at the table
  - Decay of some past efforts
  - HPC needs need careful quantification -- e.g. DOE workshop series for some areas of Science
  - Application software vendors need to be involved… ongoing efforts
  - Funding for “new technology adoption” is not flexible enough for quick response needed
  - Availability of critical mass of technical personnel and resources

Environment to develop Exascale xxx

- *Strengths*
  - Science case for benefits from extreme scale computing in the grand challenges of society -- power, life sciences is clear
  - HPC ROI over the last decades is significant -- recent National Academy study -- Reduction in product development cycle --
  - Availability of critical mass of technical personnel and resources at US national laboratories

Environment to develop Exascale xxx

- Evolutionary Strawmen
  - Heavyweight with commodity -- embedded systems; Cell phones etc; …
  - Lightweight with custom
- Aggressive Strawman
  - “Clean Sheet”

Collaboration Scenarios

1. Almost no collaboration --Joint workshops only
   - *Not adequate*
2. Loosely Coupled Collaboration -- Benchmarks defined
   - May be beneficial but inadequate in many cases
3. Collaboration with standardization
   - *Can be very beneficial in most areas*
4. Tightly Coupled Collaboration
   - *Beneficial in some cases*

Collaborations

1. Open Source Model
   - *Orthogonal -- mechanism rather than style*
   - *Weakness in long term support and maintenance*
- NITRD Model?
- International Clearing house of what is funded?
- High Risk can be ameliorated by spreading it out -- Lloyds model?