NNSA
Advanced Simulation and Computing (ASCI)
National Academy of Sciences

The Future of Supercomputing

(study jointly funded with DOE Office of Science)

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NNSA and Senate Studies…

[Language p S530 of CR--S, January 15, 2003]

- The NNSA is directed to commission two related studies, the first to be performed in collaboration with the Department's Office of Science and the second focused solely on issues relevant to the stockpile stewardship program. These studies should address issues of alternative computer architectures and the requirements that drive them.

JASONS Study

Identify the distinct requirements of the stockpile stewardship program and its relation to the ASCI acquisition strategy.

This study should clearly describe

- The linkage between the development of software applications and the acquisition of hardware capability and capacity, with consideration of the needs of the stockpile life extension programs and the underlying weapons science programs
- An evaluation of the cost trade-offs between the dates on which specific computing resources are required and reduced future costs for computational power.

JASONS Study (cont'd)

- Clearly there is a relationship between the NAS study and the JASONS study
  - JASONS study will take place during summer of 2003
  - ASCI commissioned two studies in order to enable one to be classified (JASONS) and the other completely open (NAS)
  - To the maximum extent possible we'd like the two studies to remain distinct with the JASONS focusing on ASCI requirements and the NAS focusing on general supercomputing related issues

JASONS Study (cont'd)

- Several NAS panel members have Q-clearances
- We wish to avoid presenting duplicate material. Therefore:
  - We are pursuing the idea of allowing a subset of the NAS panel members to attend JASONS classified meetings as interested observers
    - the JASONS have agreed to this approach
  - Allowing a subset of the JASONS to attend NAS meetings as interested observers

ASCI View

- ASCI strongly endorses “architectural diversity” and the existence of a strong supercomputing vendor community.
- Study must address the entire supercomputing landscape and not just “macho-flops”
  - “idea-to-solution” and productivity
  - All software layers: application development to kernels, programming paradigms, languages, compilers, debuggers, visualization, etc., etc.
  - memory bandwidth (of course!!) but also I/O and file systems, application driven balanced systems
  - scaling (up/down)
  - size and power issues… etc., etc., etc.

ASCI View (cont'd)

- What is the current state of art/practice of supercomputing in the US/World?
- What/who are the requirements drivers?
- What are the supercomputing "gold nuggets" and how may they be exploited?
  - does/should open source software have a role to play?
- What are the shortfalls and how do we address them over the next 3, 5, 10, 20 years?
  - costs? $$

The Jul 2003 NAS Interim Report should focus on DOE/NNSA supercomputing

ASCI View (cont'd)

- What should be the US supercomputing "vision"?
  - how do we make it compelling?
  - what role should/can the government play?
- Other recent supercomputing efforts that should be explored:
  - NSA's Integrated High End Computing (IHEC) study
  - 2002 OSTP Data-calls to federal agencies
  - DARPA's High Productivity Computing Systems (HPCS) program
  - NSTC High-End Computing Revitalization Taskforce (NEW initiative from OSTP)

Summary

- DOE/NNSA appreciates the effort and the interests of the NAS “The Future of Supercomputing” panel members
  - thank you for taking the time from your (very!) busy schedules
  - this study is important to DOE, NNSA, the other federal agencies involved in supercomputing and the nation
  - both DOE and NNSA will make available whatever laboratory/Alliance personnel assets are required to make this a comprehensive study
  - we look forward to our active interactions