Frontiers of Extreme Computing 2007
Zettaflops Workshop

Erik P. DeBenedictis
• Schedule Notice

  – 9:00 Tony Hey
  – 9:30 Almadena Chtchelkanova – time switch with ↓
  – 10:00 Bob Lucas – time switch with ↑
  – 11:30 John Gustafson, Clearspeed – new on agenda
  – 12:00 Karu Sankaralingam
  – 1:30 Tom Cwik
  – 2:00 Gian-Luca Bona

NOTE: Can we discuss carpooling to the airport tomorrow!
History
History and Book

• 1994 Petaflops I, Pasadena
• 1999 Petaflops II, Santa Barbara
• 2002 WIMPS, Bodega Bay
• 2005 Zettaflops, Santa Cruz
• 2007 Zettaflops, Santa Cruz

• [Note: there were other activities]
Petaflops/Zettaflops Format

• These are interdisciplinary workshops on computation in the future
  – Technology is best sold for the benefit of its use to society
    • This is an objective of the workshop
  – We assemble people representing the self-organized “technology stack” that benefits society through computation, reinforcing our team
What Can We Accomplish?
(Erik’s Suggestion, need your help)
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(Erik’s Suggestion, need your help)

- We have a unique group
  - Broader: Devices through applications
- There are several post-petaflops activities approaching Congress
- Zettaflops is not a part of any such initiative, but we are funded by DOE, DARPA, and have participation by several other Government agencies, and industry

- Action: Leverage our unique breadth by thinking through the key, broad cross-cutting issue of the day
- See if we can support one or more of the advanced computing initiatives, increasing the likelihood of their getting funded
- The cross-cutting issue: how much value to society will result from different computational technology investments
Objective of Workshop: Fill In Blanks Here

Supercomputer Performance (5 MW)  | Applications | Technology | Mobile Performance (5 W)
---|---|---|---
1 Zettaflops | Full Global Climate Phil Jones | Limits of “beyond CMOS” technologies | 1 Petaflops
100 Exaflops | NASA Computing needs Tom Cwik | Upside due to improved architecture | 100 Teraflops
10 Exaflops | Personalized Medicine Nathan Price | Limit of CMOS with more highly parallel code | 10 Teraflops
1 Exaflops | | Limit of CMOS μP per ITRS with legacy code | 1 Teraflops
100 Petaflops | | | 100 Gigaflops
10 Petaflops | | | 10 Gigaflops
1 Petaflops | | | 1 Gigaflops
100 Teraflops | | | 100 Megaflops

2000 2010 2020 2030 Year →
Delivering Result

• One result: Thomas Sterling as agreed to write a monograph
• Another result: Talks on Website and personal relationships enabling rhetoric in the future
• Action to Result
  – By Thursday lunch, have collected raw material for above
• Working groups: Participants please come to consensus on what you can agree upon
Wednesday Speakers
• **Talk Title:** eResearch in the Cloud: Data-Intensive High Performance Computing
• **Speaker Title:** Corporate Vice President for Technical Computing
• **History:** New to Workshop
• **Upside Potential:** Software and tools increase ability to solve important problems
Almadena Chtchelkanova

• Talk Title: NSF High End Computing Univ. Research Activity Program
• Speaker Title: Program Manager
• History: New to Workshop
• Upside Potential: Research funding for I/O and software is essential to improvements at these stages
Bob Lucas

• Talk Title: **DARPA Exascale Initiative: goals, motivation, range of topics, players, and approach**

• Speaker Title: “Heading up a new Computational Sciences Division”

• History: Participated in 2005 Workshop

• Upside Potential: Discussing a Government effort that could lead to R&D funding
John Gustafson

• Talk Title: *Strategies for solving the heat/power problem*
• Speaker Title: CTO of HPC, Clearspeed
• History: Attended 2005 Workshop
• Upside Potential: SIMD is a machine architecture offering an order of magnitude more FLOPS/watt than conventional designs
• Talk Title: A System Perspective on End of Silicon
• Speaker Title: Faculty, U. Wisconsin
• History: New to Workshop
• Upside Potential: TRIPS is a novel multi-core architecture, which seems dead center on what the technology will support well
• Talk Title: *NASA/JPL Future Computing Needs*
• Speaker Title: [title unknown], JPL
• History: New to Workshop
• Upside Potential: While NASA/JPL is an HPC user, it also has responsibility for space computing that could become another customer for similar technology
Gian Luca Bona

- **Talk Title:** Prospects for Solid State Data Storage: Beyond Flash Memory and the Hard Disk Drive
- **Speaker Title:** Staff, Manager Photonic Networks Science & Technology
- **History:** New to Workshop
- **Upside Potential:** I/O is a basic resource for powering computation
• Should Gian-Luca go to arch group?
• Tony Hey,
• Tom Cwik