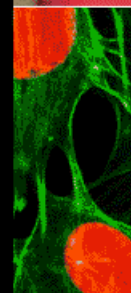
CRAY The Supercomputer Company



Vendor Briefing Panel - Cray

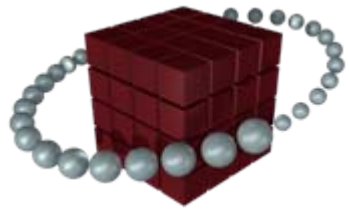
Steve Scott

Chief Technology Officer, Cray Inc.

SOS 10, Maui, March 2006

What is Cray's technology to achieve petaflop systems in 2009?

- Start with best-of-class microprocessor: AMD Opteron™
  - Industry standard x86/64 architecture
  - Integrated memory controller
    - ⇒ *very* low memory latency (~50ns)
  - Open standard, high speed interface (HyperTransport)
  - Dual core today with strong roadmap
- Surround it with Cray communications infrastructure
  - High global bandwidth to tens of thousands of nodes
  - Globally addressable memory
    - ⇒ low overhead, one-sided data access
  - Scalable addressing, translation and synchronization
  - Unlimited concurrency for latency tolerance
  - Support for low latency, low overhead message passing too



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How will Cray achieve petaflop application scalability by 2009?

- Good question, but the wrong question for system vendors
  - Many applications already scale (some never will)
  - Lots of work to do… (some by us, most by others)
- System vendors need to provide:
  - Balanced systems
  - Efficient communication and synchronization mechanisms
  - Robust systems that can scale to petaflops reliably
  - Better programming models
  - Good tools for performance tuning and debugging *at scale*
- And to *expand* the set of applications served:
  - Configurable system bandwidth
  - Heterogeneous processing (one size doesn't fit all)
    - Vectorization, massive multithreading, FPGAs

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What's Cray's view of the future size of the HPC market?

- High end is growing, and is a big market for Cray
- That said, some things we're going in Cascade may find applicability outside of HPC
  - Adaptive processing can provide advantages at the single processor scale

How can HPC customers help us?

- Well… um… buy lots of Cray machines.
- Customers should make their real needs known, and then buy machines based on those criteria.
- This will reward vendors for building *useful* machines.

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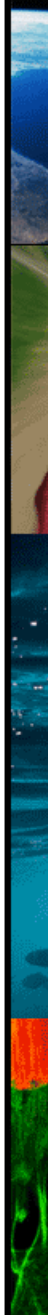
Who will be our closest competitors in 2009?

- The usual suspects…

Where will new competitors come from?

- Various niche solutions may play a role (e.g: Cell, CSX600)
  - May just play in limited application domains
  - Programmability is more important than performance
    - If you can't compile a mainstream HLL to it, it won't be a general purpose solution
  - Key will be creating an effective heterogeneous computing capability



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