HPC Users Forum

Interconnect Panel
Introductory Slides

April 16, 2008
Where SiCortex is Coming From

- Systems company
- System-on-a-chip silicon
- Open Source software
- Linux/MPI is the standard today
- Linux--/PGAS tomorrow

- 10GE/IB are great for I/O
SiCortex Systems

- 64-bit Linux/MPI
- Low power (3 W/core system power)
  - SC072 Catapult - 72 core, 200 watt
  - SC648 - 648 GF, 2 KW
  - SC1458 - 1.4 TF, 4 KW
  - SC5832 - 5.8 TF, 18 KW
- Tightly coupled Kautz interconnect
  - Better than IB performance
  - Lower than Ethernet prices
SiCortex Fabric

- DMA Engine provides SW interface
- On-chip switch and links
- Copper 2 GB/sec links
- In cabinet Kautz topology
  - Log diameter, 3-way multirail
- SW Implements MPI, sockets, etc.
- 1.4 µsec MPI, 1.5 GB/sec
Communications

- We’re entering an era of high processor count computing
- Parallel programs mean communications
- Communications must be a first class operation
  - Not an I/O add-on
APIs

• Every CS problem solved by adding a layer of abstraction
• Every performance problem solved by removing a layer of abstraction
• How about ONE layer?
  – SCMPI SEND/RECV path 250 instructions
• APIs are fine...
  – but not in the critical path
Languages

- How to do parallel programming
  - Without losing performance
- MPI has been successful
  - So SCMPI with C and Fortran came first
- PGAS programs can be expressive and fast
  - Watch for SC to support UPC and CAF