



SiCortex

# HPC Users Forum

Interconnect Panel  
Introductory Slides

April 16, 2008

# Where SiCortex is Coming From

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- Systems company
  - System-on-a-chip silicon
  - Open Source software
  - Linux/MPI is the standard today
  - Linux--/PGAS tomorrow
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- 10GE/IB are great for I/O



# SiCortex Systems

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- 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

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- 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  $\mu$ sec MPI, 1.5 GB/sec



# Communications

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- 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

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- 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

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- 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

