

LECTURE - 29

Lecture Outline

- Interconnection networks
- IBM's Blue Gene
- I/O and Buses
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- *Scribe for today?*

Interconnection Networks

- Networks at three levels:
 - Massively Parallel Processor (MPP) Network, within about 25m max
 - LAN: within about a few km max
 - WAN: larger
- Latency is higher in WAN
- Cost of redundancy is higher in WAN

Switching versus Routing

- Switching: setup switches between source and destination
- Routing: treat each packet individually
- Switching:
 - Switches separate from processors
 - Switches associated with processors
- Wormhole routing and cut-through routing are other possibilities

MPP Network Topology Design

- Design Criteria
 - Minimum cost, Bisection bandwidth, Link/Node fault tolerance
- Topologies with switches separate from nodes: cross-bar, omega network
- Topologies with switches as part of nodes: ring, 2-D torus, n-D hypercube

IBM's Blue Gene...

Input/Output

- We will mostly talk about storage systems
- I/O performance is important!
- Magnetic disks
 - Platter, head, track, sector, cylinder
- Seek time, rotational delay, transfer time
- Disk controller, controller delay
- Queuing delay

Storage Technologies

- Magnetic disks, and the *access time gap*
- Solid state disks, Expanded storage using DRAMs
- Optical storage (read only)
- Magnetic tapes
 - Same technology as disks
 - Difference in geometry ==> cheaper but slower