

Lecture 24: Parallel Systems

- Last Time:
 - I/O
- Today
 - Introduction to parallel processing

Multiprocessors

- Today
 - Example machines
 - Multiprocessor taxonomies
 - SIMD, MIMD
 - UMA, NUMA, CC-NUMA
 - Parallel applications
 - Basic organization
 - Communication and Synchronization

Cluster of Workstations



DOE ASCI White

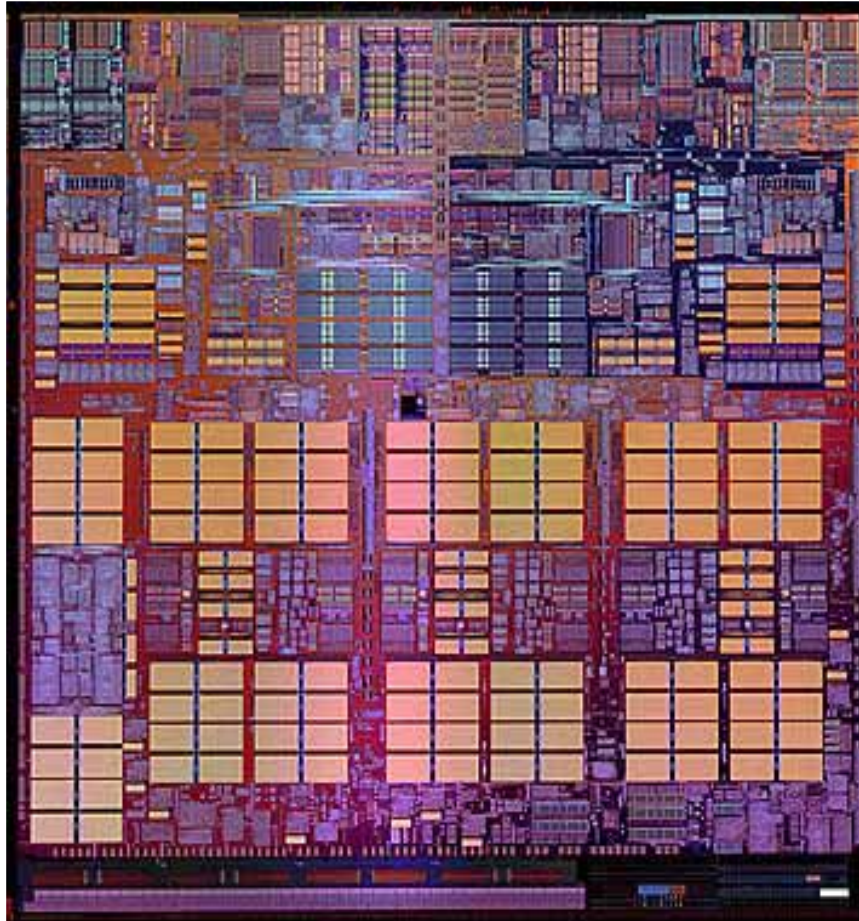


IBM Regatta Machine

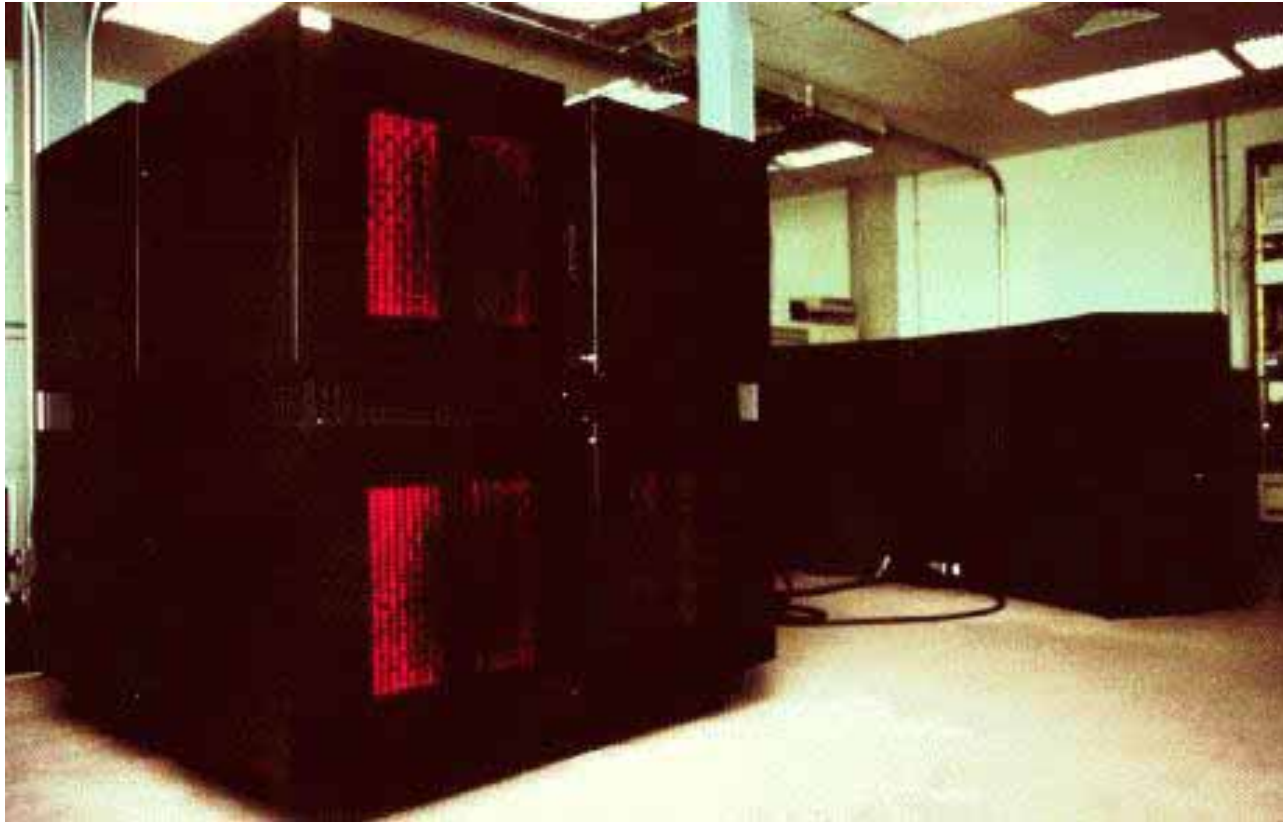


32 processors
32GB DRAM

IBM Power4 Processor

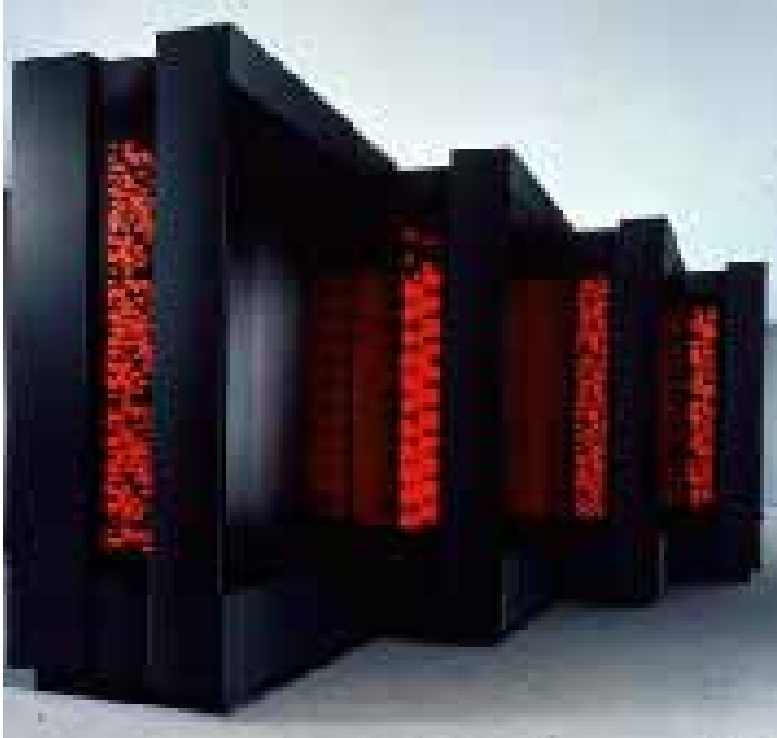


Connection-Machine CM-2



64K processors – simple 4-bit processors
10GB high speed “data vault”
Vintage 1990

Connection Machine CM-5



16K Nodes

Each node = 22MIP Sun Sparc processor

1 Teraflop peak

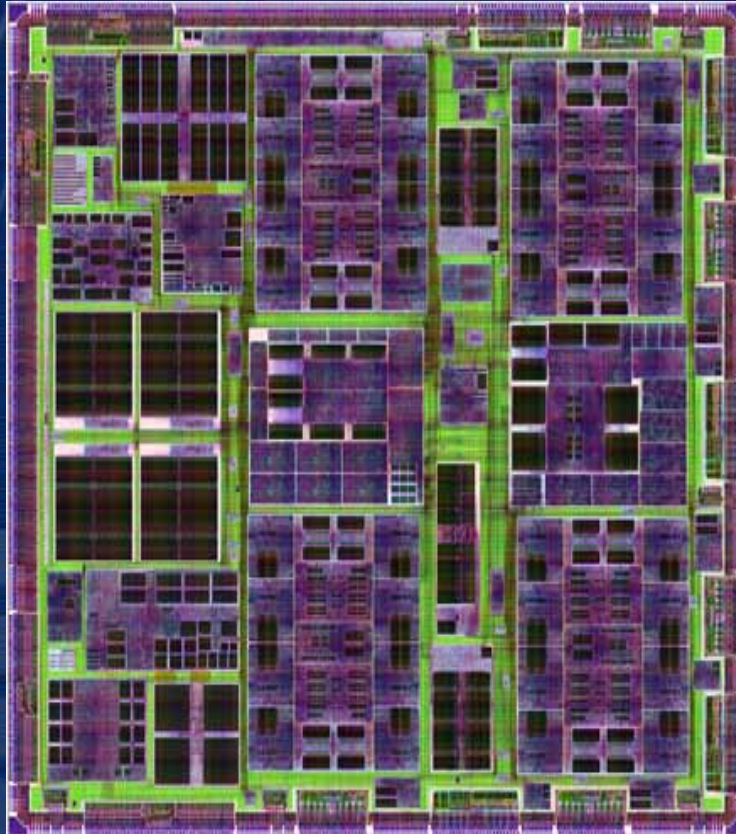
Vintage 1996

Cray Vector Supercomputer – Cray XMP



Vector-multiprocessor
4 vector CPUs, 112 MHz
800 Megaflops peak
Vintage 1982

Network processor



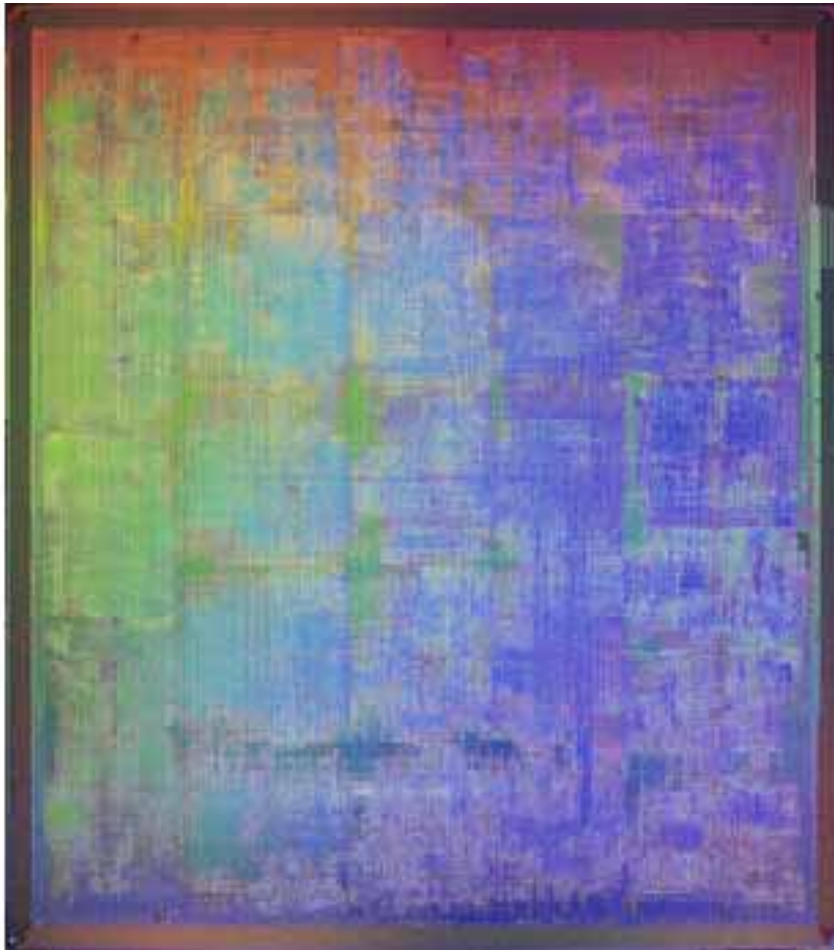
- 32 processors
 - 256 Threads
- 128.1 Gbps Aggregate I/O Bandwidth
 - 64 Gbps HCC
 - 51.2 Gbps SPI 4.2
 - 10.8 Gbps QDR
 - 2.1 Gbps PCI
- Speed Grades: 266, 300, & 333 MHz
- Power: 18.5W, typical
- 175M transistors
- 1036 pin HPBGA
- 0.13u "G" TSMC

Silicon Access Packet Processor

www.siliconaccess.com

May 1, 2002

Graphics processor (GeForce 6800)



- * 6 vertex processors
- * 16 fragment (pixel) processors
- * plus lots of other ALU's

Summary

- Next Time
 - Parallel architecture continued