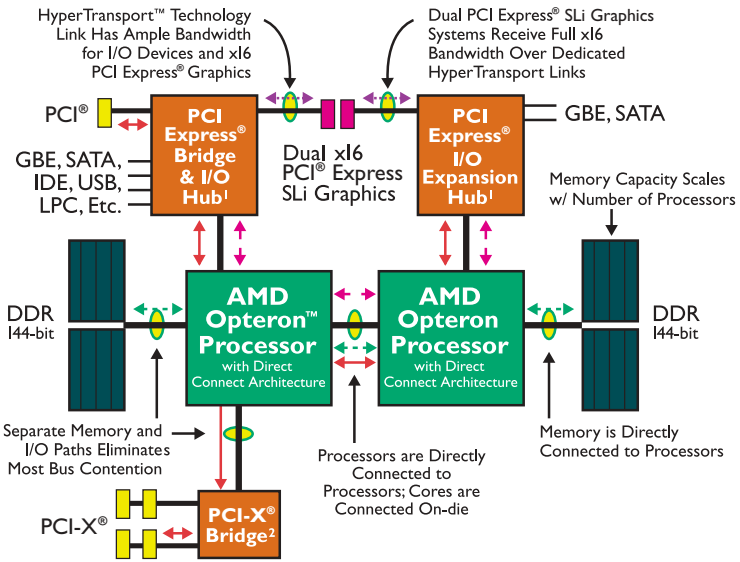
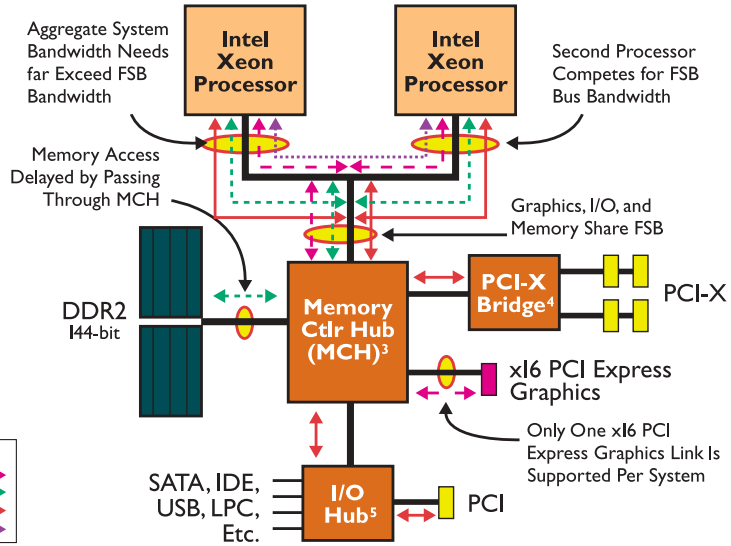
AMD Opteron™ Processor with Direct Connect Architecture
2P Workstation Comparison

AMD Opteron™ Processor-based 2P Workstation



Intel Xeon Processor-based 2P Workstation



AMD Direct Connect Architecture

AMD Opteron™ Processor-based Workstation

AMD64 Architecture
- Enables simultaneous high-performance 32- and 64-bit computing
- Delivers industry-leading performance-per-watt capabilities compared to other x86-based architectures
- AMD PowerNow!™ technology with Optimized Power Management provides power-on-demand computing and can help lower TCO
- AMD's dual-core implementation enables one platform to meet the needs of multi-tasking and multi-threaded environments, providing platform longevity

Integrated DDR Memory Controller
- Dramatically reduces latency for fast memory reads
- Directly connecting memory provides a dedicated path from memory to processor
- Memory bandwidth scales as processors are added
- Helps eliminate need for larger caches

HyperTransport™ Technology
- At up to 8GB/s bandwidth per link, HyperTransport provides sufficient bandwidth for supporting new and existing interconnects including Fibre Channel, Gigabit Ethernet, PCI-X,® PCI-X® 2.0, PCI Express,® Serial-ATA, Serial Attached SCSI and 10G Ethernet

Front Side Bus-Based Architecture

Intel Xeon Processor-based Workstation

EM64T Technology
- Allows simultaneous 32- and 64-bit computing
- Memory addressability limited to 36-bit
- Demand Based Switching

"Northbridge"-style Memory Controller via Front Side Bus
- Passage through memory controller hub delays memory reads
- Processors compete for FSB bandwidth
- Memory and I/O must share FSB bandwidth, further reducing the efficiency of the FSB

Multiple Hub I/O Buses
- With one MCH per system, PCI Express® interface integration onto MCH limits expansion options
- I/O Hub[5] interface bus can be overloaded by the aggregate demands of its many I/O devices

[1] AMD-8132™ HyperTransport PCI-X® Tunnel
[2] NVIDIA nForce Professional 2200 and 2050

[3] Intel E7525 Chipset Memory Controller Hub (MCH)
[4] Intel 6700PXH 64-bit PCI®/PCI-X® Controller Hub
[5] Intel 8280IER I/O Controller Hub (ICH5)

Workstation System Comparison	AMD Opteron™	Intel Xeon[1]	Intel Xeon[2]	Intel Pentium® 4[3]	Apple G5[4]
Modular, glueless scalability	Yes	Requires Northbridge	Requires Northbridge	Requires Northbridge	Requires Northbridge
SMP Capabilities	Up to 8-way	Up to 2-way	Up to 2-way	1-way	Up to 2-way
Direct Connect Architecture	Yes	No	No	No	No
Dual-Core technology	Yes	No	No	No	No
High Performance 32-bit and 64-bit computing	AMD64	EM64T	EM64T	EM64T	Yes
HyperTransport™ technology	Yes	No	No	No	Yes
Integrated DDR memory controller	Yes	No	No	No	No
Front Side Bus frequency	1.4 – 2.6GHz†	533MHz	800MHz	800MHz	900MHz – 1.25GHz
Front Side Bus bandwidth	11.2 – 20.8GB/s†	4.3GB/s	6.4GB/s	6.4GB/s	7.2 – 10GB/s
Maximum Inter-processor bandwidth	8.0GB/s	4.3GB/s	6.4GB/s	N/A	7.2 – 10GB/s
Memory support	DDR200/266/333/400	DDR266	DDR333/DDR2-400	DDR2-400/533	DDR333/400
Memory Bandwidth IP System	6.4GB/s	4.3GB/s	6.4GB/s	8.5GB/s	6.4GB/s
Memory Bandwidth 2P System	12.8GB/s†††	4.3GB/s	6.4GB/s	N/A	6.4GB/s
Memory Bandwidth 4P System	25.6GB/s††††	N/A	N/A	N/A	N/A
Maximum Graphics Support	x16 PCIe® (x16 SLi)	8X AGP	x16 PCIe® (x8 SLi)	x16 PCIe® (x8 SLi)	8X AGP
L1 cache size (max.)	64KB (Data) + 64KB (Instruction) per core	8KB (Data) + 12k mop (Instruction)	16KB (Data) + 12k mop (Instruction)	16KB (Data) + 12k mop (Instruction)	32KB (Data) + 64KB (Instruction)
L2 cache size (max.)	1MB per core	512KB	2MB	2MB	512KB
L3 cache size (max.)	N/A	2MB	N/A	N/A	N/A
Maximum I/O bandwidth IP System	8.0GB/s††	3.2GB/s	4.3GB/s	2GB/s	4.3GB/s
Maximum I/O bandwidth 2P System	24.0GB/s†††	3.2GB/s	4.3GB/s	N/A	4.3GB/s
Maximum I/O bandwidth 4P System	32.0GB/s††††	N/A	N/A	N/A	N/A
SIMD Instruction Set Support	SSE, SSE2, SSE3	SSE, SSE2	SSE, SSE2, SSE3	SSE, SSE2, SSE3	AltiVec

Dedicated Bandwidth
Shared Bandwidth

†The front side bus (interface to memory) of the AMD Opteron™ processor runs at the speed of the processor
††AMD IP System – AMD Opteron 100 Series with NVIDIA nForce Professional 2200 chipset
†††AMD 2P System – AMD Opteron 200 Series with 1 HyperTransport Inter-processor Bus and 3 HyperTransport I/O Buses with DDR400 memory
††††AMD 4P System – AMD Opteron 800 Series with 4 HyperTransport Inter-processor Buses and 4 HyperTransport I/O Buses with DDR400 memory

[1] With Intel E7505 chipset (http://developer.intel.com/products/chipsets/e7505/index.htm)
[2] With Intel E7525 chipset (http://developer.intel.com/products/chipsets/e7525/index.htm)
[3] With Intel 925X chipset (http://developer.intel.com/products/chipsets/925x/index.htm)
[4] G5 processor in Apple Power Mac G5 workstation

Access 2P workstation comparison information online at:
http://www.amd.com/workstationcomparison

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