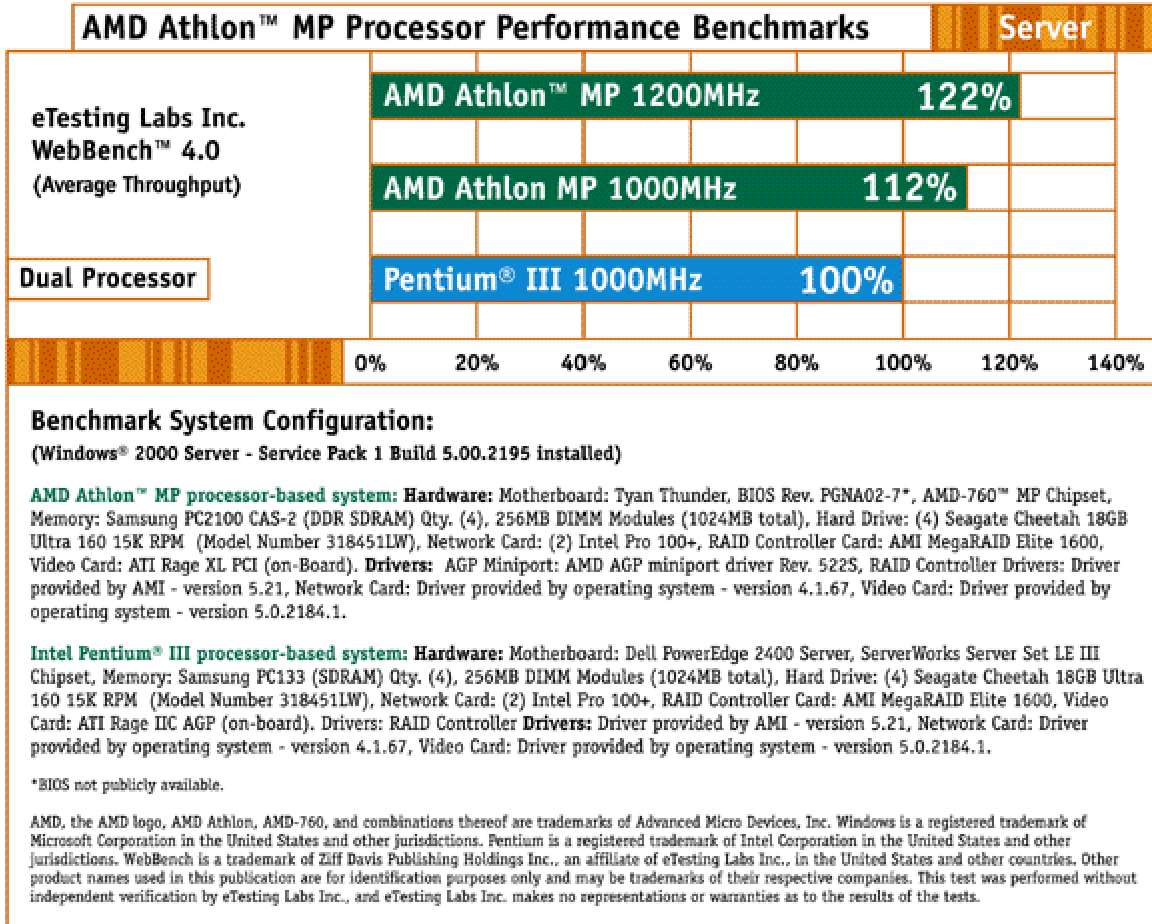# Computing cluster for CDF

Yuri Gotra, November 2001

Choosing the CPU

Athlon processor can do 9 operations per clock cycle (5 for Pentium III), has 128 kB L1 cache (32 kB for P III) and 266 MHz system bus speed (133 MHz for P III). Prices for DDR memory are comparable with SDR (133 MHz) modules. DDR memory operates at the same speed (266 MHz) as the CPU. Given these facts one can foresee significant performance boost for the system based on dual Athlon 1500+ MP (1.33 GHz) compared to the MIT cluster on dual Pentium III (1 GHz) CPU with PC-133 SDR memory. According to the RackSaver specs price per Gflop for Athlon MP (1.4 GHz) system is $330 compared to $662 cluster based on P III (1.26 GHz). Athlon based cluster has the best price/performance ratio compared to commercially available systems built on P III or SPARC CPU's (Dell, IBM, Compaq, HP, Sun).

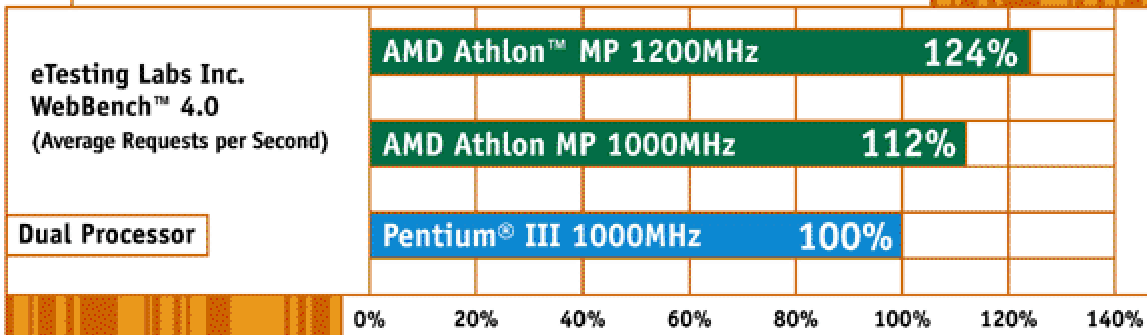## AMD Athlon™ Processor Competitive Comparison

Feature	AMD Athlon™	Pentium® III	Pentium® 4
Operations per clock cycle	9	5	6
Integer pipelines	3	2	4
Floating point pipelines	3	1	2
Full x86 decoders	3	1	1
L1 cache size	128KB	32KB	12k µop + 8KB Data Cache
L2 cache size	256KB on-chip	256KB on-chip	256KB on-chip
Total on-chip full-speed cache	384KB	288KB	264KB + 12k µop
Total effective on-chip full-speed cache	384KB (exclusive	256KB (inclusive)	256KB - 12k µop (inclusive)
System bus speed	200 MHz to 266MHz	100MHz or 133MHz	400MHz
3D enhancement instructions	Enhanced 3DNow!™	SSE	SSE2
Single-precision FP SIMD	Yes	Yes	Yes
4 FP operations per clock	Yes	Yes	Yes
Cache/prefetch controls	Yes	Yes	Yes
Streaming controls	Yes	Yes	Yes
DSP/comm extensions	Yes	No	Yes

Benchmarks

AMD Athlon™ MP Processor Performance Benchmarks — Server

eTesting Labs Inc.
WebBench™ 4.0
(Average Throughput)

Dual Processor

Processor	Score
AMD Athlon™ MP 1200MHz	122%
AMD Athlon MP 1000MHz	112%
Pentium® III 1000MHz	100%

0% 20% 40% 60% 80% 100% 120% 140%
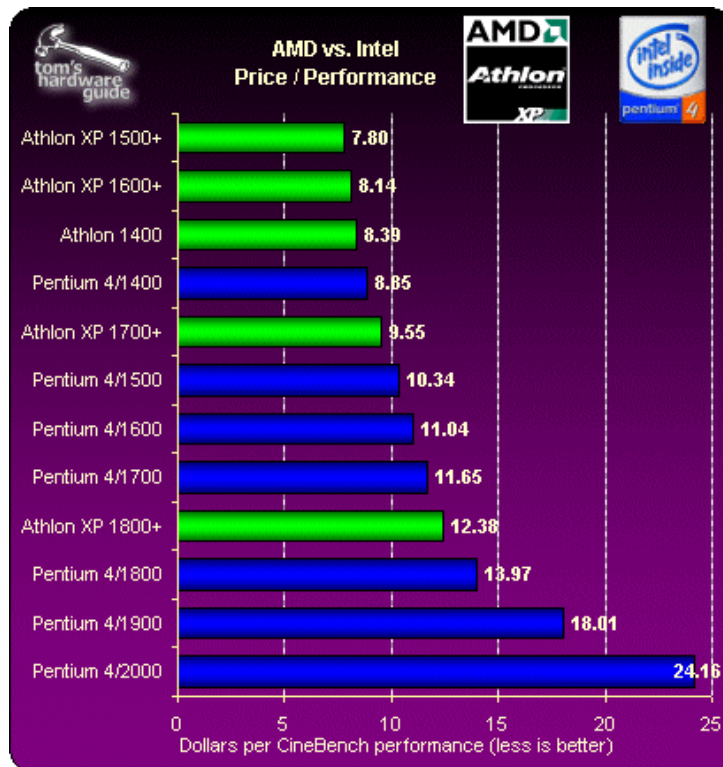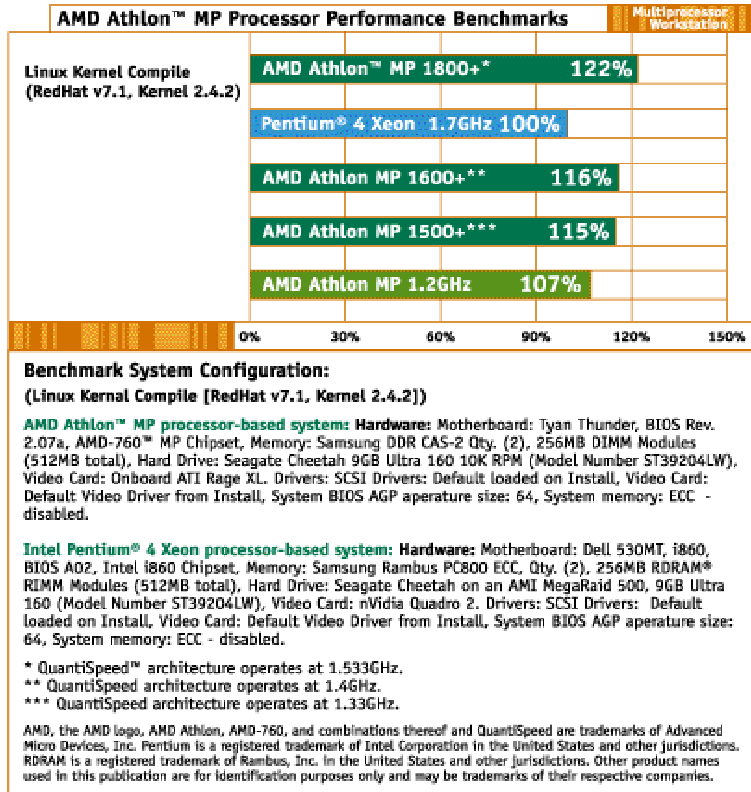
Benchmark System Configuration:

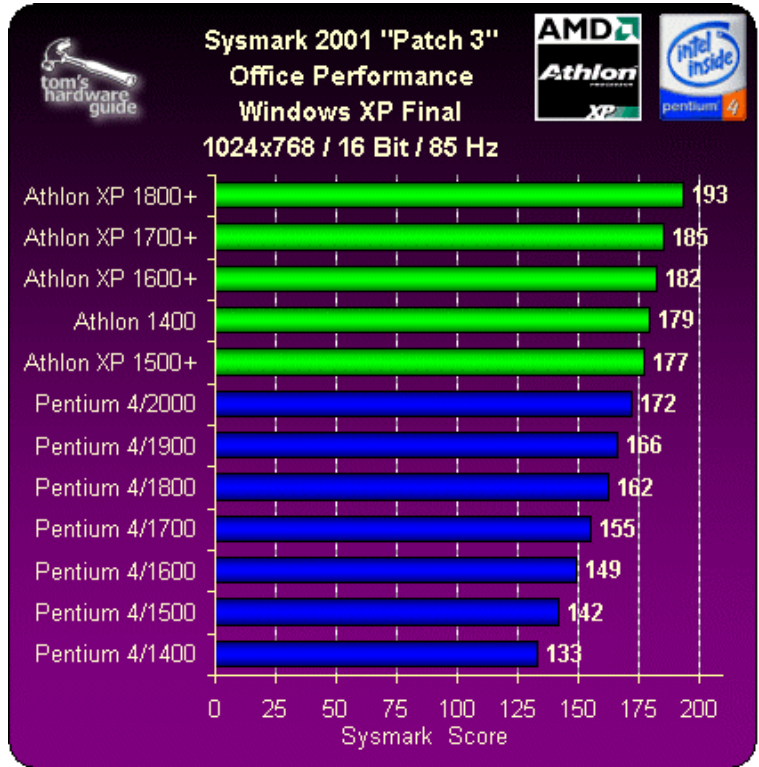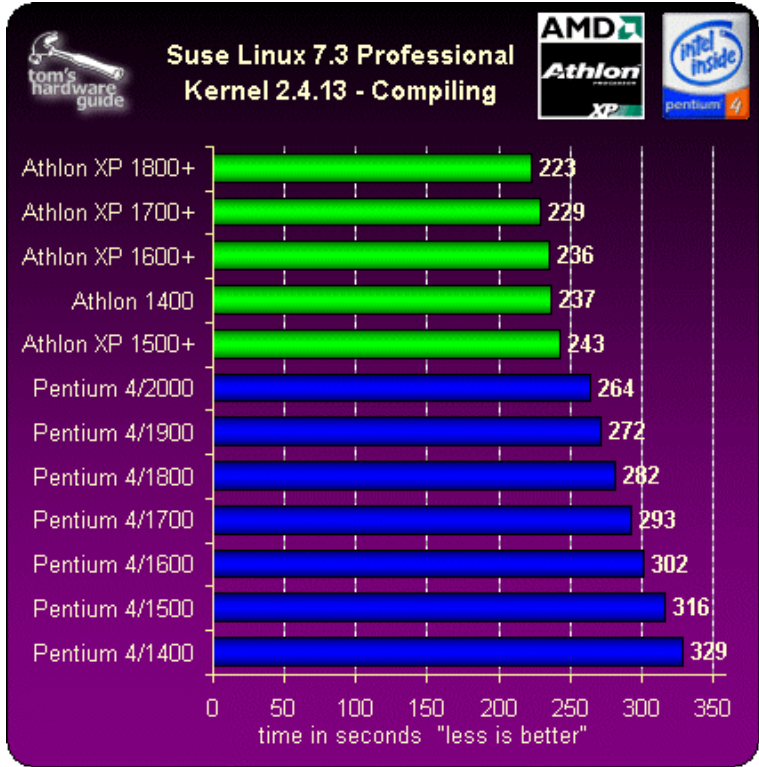(Windows® 2000 Server - Service Pack 1 Build 5.00.2195 installed)

AMD Athlon™ MP processor-based system: Hardware: Motherboard: Tyan Thunder, BIOS Rev. PGNA02-7*, AMD-760™ MP Chipset, Memory: Samsung PC2100 CAS-2 (DDR SDRAM) Qty. (4), 256MB DIMM Modules (1024MB total), Hard Drive: (4) Seagate Cheetah 18GB Ultra 160 15K RPM (Model Number 318451LW), Network Card: (2) Intel Pro 100+, RAID Controller Card: AMI MegaRAID Elite 1600, Video Card: ATI Rage XL PCI (on-Board). **Drivers:** AGP Miniport: AMD AGP miniport driver Rev. 5225, RAID Controller Drivers: Driver provided by AMI - version 5.21, Network Card: Driver provided by operating system - version 4.1.67, Video Card: Driver provided by operating system - version 5.0.2184.1.

Intel Pentium® III processor-based system: Hardware: Motherboard: Dell PowerEdge 2400 Server, ServerWorks Server Set LE III Chipset, Memory: Samsung PC133 (SDRAM) Qty. (4), 256MB DIMM Modules (1024MB total), Hard Drive: (4) Seagate Cheetah 18GB Ultra 160 15K RPM (Model Number 318451LW), Network Card: (2) Intel Pro 100+, RAID Controller Card: AMI MegaRAID Elite 1600, Video Card: ATI Rage IIC AGP (on-board). Drivers: RAID Controller **Drivers:** Driver provided by AMI - version 5.21, Network Card: Driver provided by operating system - version 4.1.67, Video Card: Driver provided by operating system - version 5.0.2184.1.

*BIOS not publicly available.

AMD Athlon™ MP Processor Performance Benchmarks — Server

**eTesting Labs Inc.
WebBench™ 4.0**
(Average Requests per Second)

Dual Processor

AMD Athlon™ MP 1200MHz	124%
AMD Athlon MP 1000MHz	112%
Pentium® III 1000MHz	100%

0% 20% 40% 60% 80% 100% 120% 140%

Benchmark System Configuration:

(Windows® 2000 Server - Service Pack 1 Build 5.00.2195 installed)

AMD Athlon™ MP processor-based system: Hardware: Motherboard: Tyan Thunder, BIOS Rev. PGNA02-7*, AMD-760™ MP Chipset, Memory: Samsung PC2100 CAS-2 (DDR SDRAM) Qty. (4), 256MB DIMM Modules (1024MB total), Hard Drive: (4) Seagate Cheetah 18GB Ultra 160 15K RPM (Model Number 318451LW), Network Card: (2) Intel Pro 100+, RAID Controller Card: AMI MegaRAID Elite 1600, Video Card: ATI Rage XL PCI (on-Board). **Drivers:** AGP Miniport: AMD AGP miniport driver Rev. 522S, RAID Controller Drivers: Driver provided by AMI - version 5.21, Network Card: Driver provided by operating system - version 4.1.67, Video Card: Driver provided by operating system - version 5.0.2184.1.

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*BIOS not publicly available.

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AMD Athlon™ MP Processor Performance Benchmarks

Multiprocessor Workstation

Linux Kernel Compile
(RedHat v7.1, Kernel 2.4.2)

Processor	Performance
AMD Athlon™ MP 1800+*	122%
Pentium® 4 Xeon 1.7GHz	100%
AMD Athlon MP 1600+**	116%
AMD Athlon MP 1500+***	115%
AMD Athlon MP 1.2GHz	107%

0%   30%   60%   90%   120%   150%

Benchmark System Configuration:
(Linux Kernal Compile [RedHat v7.1, Kernel 2.4.2])

AMD Athlon™ MP processor-based system: Hardware: Motherboard: Tyan Thunder, BIOS Rev. 2.07a, AMD-760™ MP Chipset, Memory: Samsung DDR CAS-2 Qty. (2), 256MB DIMM Modules (512MB total), Hard Drive: Seagate Cheetah 9GB Ultra 160 10K RPM (Model Number ST39204LW), Video Card: Onboard ATI Rage XL. Drivers: SCSI Drivers: Default loaded on Install, Video Card: Default Video Driver from Install, System BIOS AGP aperature size: 64, System memory: ECC - disabled.

Intel Pentium® 4 Xeon processor-based system: Hardware: Motherboard: Dell 530MT, i860, BIOS A02, Intel i860 Chipset, Memory: Samsung Rambus PC800 ECC, Qty. (2), 256MB RDRAM® RIMM Modules (512MB total), Hard Drive: Seagate Cheetah on an AMI MegaRaid 500, 9GB Ultra 160 (Model Number ST39204LW), Video Card: nVidia Quadro 2. Drivers: SCSI Drivers: Default loaded on Install, Video Card: Default Video Driver from Install, System BIOS AGP aperature size: 64, System memory: ECC - disabled.

* QuantiSpeed™ architecture operates at 1.533GHz.
** QuantiSpeed architecture operates at 1.4GHz.
*** QuantiSpeed architecture operates at 1.33GHz.

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tom's hardware guide

AMD vs. Intel
Price / Performance

AMD Athlon XP / **intel inside pentium 4**

Processor	Dollars per CineBench performance
Athlon XP 1500+	7.80
Athlon XP 1600+	8.14
Athlon 1400	8.39
Pentium 4/1400	8.85
Athlon XP 1700+	9.55
Pentium 4/1500	10.34
Pentium 4/1600	11.04
Pentium 4/1700	11.65
Athlon XP 1800+	12.38
Pentium 4/1800	13.97
Pentium 4/1900	18.01
Pentium 4/2000	24.16

0   5   10   15   20   25
Dollars per CineBench performance (less is better)

Suse Linux 7.3 Professional
Kernel 2.4.13 - Compiling

AMD Athlon XP | **intel inside pentium 4**

CPU	time in seconds
Athlon XP 1800+	223
Athlon XP 1700+	229
Athlon XP 1600+	236
Athlon 1400	237
Athlon XP 1500+	243
Pentium 4/2000	264
Pentium 4/1900	272
Pentium 4/1800	282
Pentium 4/1700	293
Pentium 4/1600	302
Pentium 4/1500	316
Pentium 4/1400	329

time in seconds "less is better"

0   50   100   150   200   250   300   350

Sysmark 2001 "Patch 3"
Office Performance
Windows XP Final
1024x768 / 16 Bit / 85 Hz

AMD Athlon XP | **intel inside pentium 4**

CPU	Sysmark Score
Athlon XP 1800+	193
Athlon XP 1700+	185
Athlon XP 1600+	182
Athlon 1400	179
Athlon XP 1500+	177
Pentium 4/2000	172
Pentium 4/1900	166
Pentium 4/1800	162
Pentium 4/1700	155
Pentium 4/1600	149
Pentium 4/1500	142
Pentium 4/1400	133

Sysmark Score

0   25   50   75   100   125   150   175   200

Possible problems

- MOSIX on Athlon, no known incompatibilities, checked with MOSIX project leader Prof Amnon Barak, from HUJI, Israel. "… *we have no issues with processor types, we touch no code in the area* …"
- Intel Corporation has completed the acquisition of privately held Kuck & Associates, Inc. (KAI). On April 6, 2000, Intel announced that it entered into a definitive agreement to acquire privately held Kuck & Associates, Inc. (KAI) for an undisclosed cash amount. *No known incompatibilities with Athlon, verified with KAI representative.*

Commercial clusters/servers based on Athlon MP processors

Note: Systems with quote over $1800 per node are not shown.

- **RackSaver**, San Diego, CA (**www.racksaver.com**). RSC-4432, (32 nodes, 403 Gflops per rack, RedHat 6.2, 7.0, 7.1). Built "Samson" 132 Athlon nodes cluster at the University of Delaware, ranks in the TOP200 of the fastest supercomputers. They offer dual Athlon 1U UltraThin RS-1131 server based on Tyan S2460 EIDE motherboard (hosts 3 HD) for $1499 (with 256 MB ECC registered memory, 20 GB 7200 rpm HD, 4 MB video, FD, w/o CD). 512 MB: +$100, CD: +$69,
- **Linux Networx** (**www.linuxnetworx.com**, 1-801-304-0267) offers Athlon based clusters. This company built a 48-node cluster for D0. Clusterworx management software. ICE box cluster management appliance. Evolocity 2100 cluster (up to 10 nodes), Evolocity 1240s cluster (up to 5 nodes), *Built L3 48-node cluster for D0* (includes 96 Pentium III 1.0 GHz processors, 48G of RAM). Quote for 1 node: $1715. (2U-3PCI, 460W, 1600+, 256MB, Maxtor 100GB, Tiger, LAN). Contact person Rich Furst, 847-236-1983.
- **http://www.harddata.com/index.html** Tiger, 2U, 2+2 bay, 2xPCI, 400W, 512MB, ATI Rage pro 8MB, CD, FD, LAN, w/o HD, OS. : $1366 (incl $85 S&H)
- **www.atipa.com** **Atipa's Daytona R10i 1U** Dual AMD 1500+ MP, **$1342** (incl $20 S&H) with 40 GB HD, CD, 1U case, 3 removable drive bays, FD, 512 MB memory. Dual 3-COM LAN, 64bit/33mhz expansion slot, Tyan **Thunder** S2462NG mainboard, 6 cooling fan & blower with 300W PFC power supply, 1 year warranty. *Built cluster for CMS at FCC (1st floor).* 2U option is available, 2x66MHz PCI, 2x33MHz PCI, 4 HD bays, 300W, same price.
- **http://www.apache.com**

- **www.sunsetsystems.com** $1336 (CD, 1500+ **XP**, 256 MB)

- **www.alliedsystemsdesign.com** Total density W

- **www.advancedclustering.com** Pinnacle, 2U, 512MB, 20 GB, FD, CD, 1 year service, Thunder video, $1784.

- **www.pssclabs.com** Tiger, *Tower!* 300W, 512MB, FD, 100 GB, LAN, SVGA, $1800

Build-it-yourself Athlon MP cluster

Estimated price is about $1100 per node (w/o HD), see component prices below and test setup. Given the budget of $14000 one can assemble a 7 node 1 TB cluster with 2 gateways. One can expect performance of such a cluster to be comparable/superior to MIT's 10 node Pentium III cluster (~$30000, June 2001). Based on MIT's experience this cluster will allow up to 20-25 users.

Brand	Product	Description	Price	Ship	Date/HR	Dealer/Phone

Case

Brand	Product	Description	Price	Ship	Date/HR	Dealer/Phone
AMS	#CK218-400W, 2U 6bay Rackmount (Rack Mount) server, 400watt	2U 6bays Rackmount w/ 400 watts power supply, 5.25Vx1, 3.5Vx1 & 3.5Hx4	$ 260	Start at $15	11/20/2001 8:56:00 PM CT	**KRI Computer** 866-839-1838 909-839-2886 **Buy Online**

Cpu

Brand	Product	Description	Price	Ship	Date/HR	Dealer/Phone
AMD	Athlon MP 1500+ Palomino 1.33GHz 3D NOW! (Socket-A) 266FSB Processor	Price for PHONE ORDER must MENTION PRICE WATCH - Includes 15Day Dealer Warranty - IN STOCK - AMD Channel OEM Partner	$ 159	Starts at $10.95	11/23/2001 1:07:45 AM CT	**Accubyte** 888-222-8298 630-832-9200 **Buy Online**

Motherboard

Brand	Product	Description	Price	Ship	Date/HR	Dealer/Phone
Tyan	IN STOCK* S2460 Tiger MP AMD 760MP Dual Athlon MP mboard ATX	Up to 3GB, 4 DIMMs DDR PC2100 ECC registered, 6 PCI/1 AGP	$ 202	starts at $9	11/18/2001 1:43:03 PM CT	**Einux Systems** 866-883-4689

Combo

Brand	Product	Description	Price	Ship	Date/HR	Dealer/Phone
Tyan	*IN STOCK* S2460 - TigerMP AMD Dual AMD-762 Chipset - 6 PCI - 1 AGP - DMA100 - DDR memory ATX	with CPUs -Dual Athlon MP 1500 with CPU, Fan, Coolermaster EP5-6I11 fan - One year warranty on the kit	$ 579	$12 - $18 UPS Ground Insured!!	11/18/2001 12:31:30 PM CT	**Micro-Pro, Inc.** 888-881-0231 216-661-7218 **Buy Online**

Memory

Brand	Product	Description	Price	Ship	Date/HR	Dealer/Phone
Corsair	PRICE FOR ONLINE ORDERS ONLY - CM64SD512-2100 PC2100 512MB unbuffered DDR	184PIN CAS 2.5 USES 32MX8 DRAMS 266MHZ - Lifetime Warranty	$ 110	$4 Fedex saver	10/26/2001 8:19:00 AM CT	**Newegg.com** 800-390-1119 909-395-9046 **Buy Online**

Video

Brand	Product	Description	Price	Ship	Date/HR	Dealer/Phone
eVGA			$ 36	12+	11/17/2001	

	STOCK, eVGA GeForce2 MX200, 32MB SDR AGP 4x	Exclusive ADM software, 032-A4-NV31-01 One year warranty			11:34:33 AM CT	510-623-3700 .

Hard drive

Western Digital	Caviar WD1000BB (OEM Bare Drive)	Price for phone order. Mention PRICE WATCH - EIDE 100GB 7200RPM, 8.9ms seek time, 2MB cache buffer, ATA 100.	$ 195	$13.95 & UP	11/24/2001 1:10:12 PM CT	**Mtzon.Com** 866-595-4233 909-595-4233

Ata controller

Promise Technology Controller Cards	PRICE FOR ONLINE ORDER IN STOCK, PROMISE Ultra 100 UDMA ATA 100 IDE controller w/software (OEM)	2 Chanell IDE Supports UDMA 33, UDMA 66, UDMA 100 w/Cable	$ 15	$12 Fedex 2 Day Air	11/9/2001 4:20:00 PM CT	**Beyond Computer Inc.** 877-467-2224 212-965-1552

Nic 1 Gbit

Ark	GA2000T 10BT, 10/100, 1000Mbs 64BIT PCI LAN Card In Retail BOX	Full Duplex 20/200/2000 NWAY 1000/GIGABIT LAN adapter. OVER COPPER.	$ 75	Starting at $7.00 Ground (Insured)	11/14/2001 2:15:53 PM CT	**I-Market** 888-999-0958 909-869-6621

Nic 10/100

Encore	network card pci card 10/100	MUST MENTION PRICE WATCH - network card pci 10/100	$ 3	9	10/14/2001 8:57:00 PM CT	**Connect Computers** 949-367-2875 .

Nic 10/100

D Link Systems	DLink DFE-570TX 10/100 4 Port Server NIC CARD	D-Link DFE570TX 10/100 4 Port Server NIC	$ 106	14.95 SECOND DAY AIR	11/7/2001 5:10:52 PM CT	**Comp-U-Plus** 800-287-8786

Switch 24 port

3COM	3COM Superstack III 3C16980A Switch 3300 24port	NEW MODEL	$ 794	17.00 and up	6/21/2001 3:22:11 PM CT	**Coast 2 Coast Office Supply, Inc** 800-646-0045 480-661-0045

Switch 48 port

Netgear	fs750na fs750na 48port 10/100 switch	with gigabit module slots new & factory sealed.	$ 767	9.95	11/23/2001 10:31:14 AM CT	**PCNation/Computer Warehouse Club**

						847-400-3400 -- P.O.'s accepted

Console switch

Linksys	SView04 Proconnect Console Keyboard/Video/Mouse Sharing Switch	Retail	$ 98	**Unknown??**	9/27/2001 7:11:58 PM CT	**Multiwave/MWAVE.COM** 800-234-3358 626-912-8485 Buy Online

CD

Creative Labs	52X CDROM DRIVE	.OEM	$ 19	13.99	11/13/2001 1:08:13 PM CT	**Essentiallyyoursdigital.com** 800-801-9555 818-348-7410

Floppy

Samsung	3.5inch 1.44 Floppy Drive 1Yr Warranty	MUST MENTION PRICE WATCH - .floppy	$ 5	INSURED $12.00	10/1/2001 10:55:00 AM CT	**Connect Computers** 949-367-2875 . Buy Online

Test setup

Tyan s2460 Tiger MP, 2xAMD Athlon MP 1600+, 512 MB PC2100 ECC registered, Antec SX-830 300 W, Teac FD-235HF, Mitsumi 48x IDE CD $1148   1148+208=1356

COLFAX INTERNATIONAL est. **1987** 108 South Wolfe Road, Sunnyvale CA

Case

Antec Cases	SX1040B-ATX Full Tower w/400W Part# SX1040B	Antec SX1040B Full Tower w/400W Power Supply, AMD Athlon Approved up to 1.4Ghz,BLACK Color	**$ 129**	$20.75	11/8/2001 11:07:43 PM CT	**PCHertz.com** 888-647-9697 701-282-5555 Buy Online

Combo

Tyan	S2460 TIGER MP DUAL AMD ATX MB ATA100 6PCI 1AGP UP TO 3GB OF MEMORY	MUST MENTION PRICE WATCH - with cpu -(2) DUAL AMD ATHLON MP 1.4GHZ 1600+ CPUS WITH HEATSINKS AND FANS	**$ 584**	12+	11/23/2001 1:02:50 AM CT	**Tufshop.com** 888-919-1101 562-290-0111 -- P.O.'s accepted Buy Online

Memory

Corsair	VS512MBECC266R PC2100 (266MHZ) 512MB ECC REGISTERED (DDR) 184PIN CAS 2.5	- with Lifetime Warranty	**$ 157**	10 Fed Ex	11/28/2001 2:24:45 PM CT	**Spartan Technologies, Inc.** 888-393-0340 Buy Online	IL	CMVS512M

Video

eVGA	Price for online order only IN STOCK, eVGA GeForce2 MX200, 32MB SDR AGP 4x	nVidia Select Builder Exclusive ADM software, 032-A4-NV31-01 One year warranty	**$ 36**	12+	11/17/2001 11:34:33 AM CT	**USSA.COM** 510-623-3700 . Buy Online	CA	100013

Hard drive

Western Digital	100GB EIDE 7200RPM Ultra DMA/100 9ms - OEM	Price for PHONE ORDER must MENTION PRICE WATCH - * 7200RPM *	**$ 193**	$14.95 +	11/28/2001 3:56:32 PM CT	**Accubyte** 888-222-8298 630-832-9200 Buy Online	IL	WD-100-72

NIC

D Link Systems	DLink DFE-570TX 10/100 4 Port Server NIC CARD	D-Link DFE570TX 10/100 4 Port Server NIC	**$ 106**	14.95 SECOND DAY AIR	11/7/2001 5:10:52 PM CT	**Comp-U-Plus** 800-287-8786 Buy Online

CD

Creative Labs	52X CDROM DRIVE	.OEM	**$ 19**	13.99	11/13/2001 1:08:13 PM CT	**Essentiallyyoursdigital.com** 800-801-9555 818-348-7410

Floppy

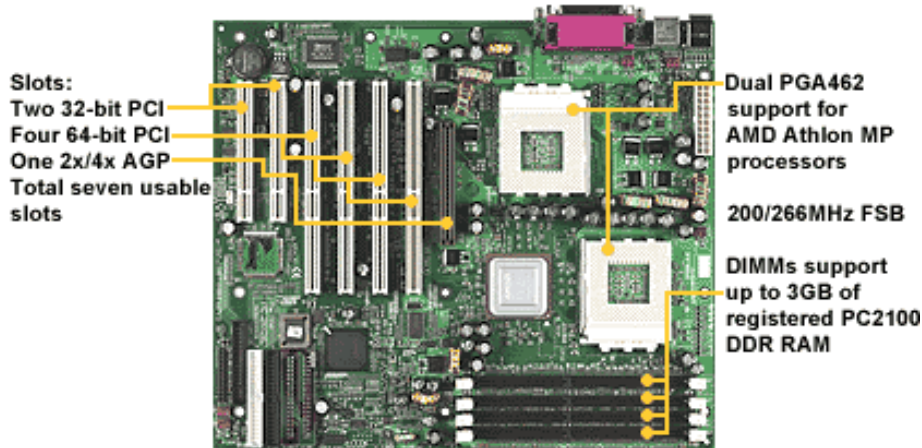|					
Samsung	3.5inch 1.44 Floppy Drive 1Yr Warranty	MUST MENTION PRICE WATCH - .floppy	**$ 5**	INSURED $12.00	10/1/2001 10:55:00 AM CT	**Connect Computers** 949-367-2875

TOTAL $1340

Tiger MP (S2460) Motherboard

Benefits and Applications

Based on our flagship Thunder K7, the world's first dual-processor platform for the AMD Athlon MP processor, our new Tiger MP brings similar processing performance to the masses! This cost-effective, high-quality dual-processor system board supports up to two AMD Athlon MP processors, and provides leading-edge performance for your demanding applications. The Tiger MP is designed around the AMD-760 MP chipset and provides powerful integrated features including a 266MHz system bus, support for up to 3GB of DDR memory, 32-bit and 64-bit PCI slots, 4x AGP slot, dual-channel ATA-100 IDE and much more.

Slots:
Two 32-bit PCI
Four 64-bit PCI
One 2x/4x AGP
Total seven usable slots

Dual PGA462 support for AMD Athlon MP processors

200/266MHz FSB

DIMMs support up to 3GB of registered PC2100 DDR RAM

Processor

Dual PGA462 ZIF sockets Supports two AMD Athlon MP processors Two onboard VRMs System bus support for 200MHz or 266MHz

BIOS

Phoenix BIOS 2Mbit Flash ROM User settings for hardware monitoring (optional) Auto-configuration of IDE hard drive types Multiple boot options DMI 2.0 compliant

Chipset

AMD-760 MP chipset AMD-762 North bridge & AMD-766 South bridge Winbond W83627HF Super I/O ASIC

System Memory

Four 2.5v 184-pin DDR DIMM sockets Supports up to 3GB of Registered PC2100 DDR memory Supports ECC (72-bit) memory modules

Form Factor

ATX footprint (12" x 10.3", 304.8 x 261.62mm) 20-pin power connector (300+W, +5V must be 30A+) Stacked parallel (one) and serial (two) ports Stacked USB (two) ports Stacked keyboard and mouse ports

Hardware Monitoring

Winbond W83782D hardware monitoring ASIC 3-pin fan monitoring headers 3-pin Wake On LAN header (optional)

Expansion Slots

One AGP slot supports 2x/4x modes Four 64-bit and two 32-bit 33MHz (5-volt) PCI slots (v2.2 compliant) Total of seven usable slots

Integrated PCI IDE

Dual-channel master mode Supports up to four enhanced IDE devices Support for DMA100/66/33 IDE and ATAPI compliant devices

Integrated I/O

One floppy connector supports up to two drives Two 9-pin 16550-based serial ports One 25-pin SPP/ECP/EPP parallel port Four USB ports (two via optional cable for rear panel mounting) PS/2 keyboard and mouse ports
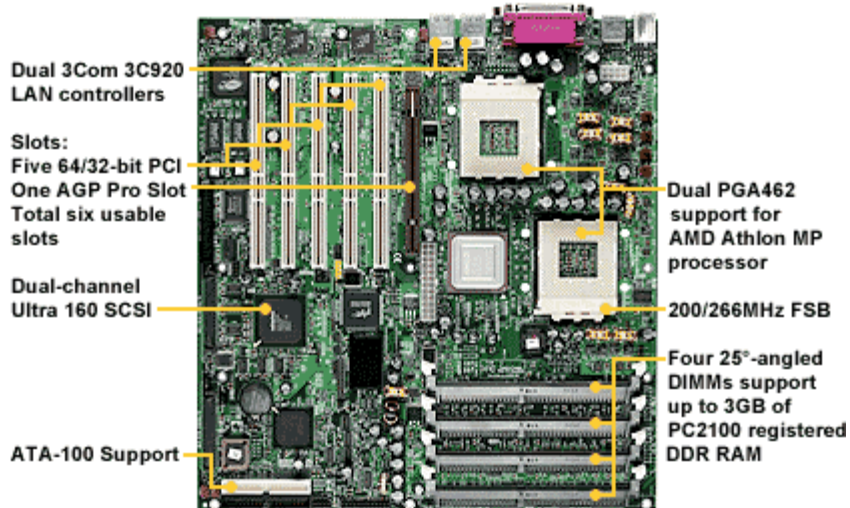
Note

The Tiger MP S2460 accepts a standard ATX-style **power supply** . However, the P/S must be able to supply a minimum of 30A on the 5-volt line. Many 300+ watt power supplies on the market today are capable of this output.

Thunder K7 (S2462) Motherboard

Benefits and Applications

Tyan's Thunder K7 is the world's first dual-processor platform for the AMD Athlon MP processor. This high-quality, feature-rich systemboard provides cutting-edge performance for today's most demanding workstation and server applications, and includes powerful connectivity and management features. In addition to its dual-processor design, the Thunder K7 features AMD's new 760MP chipset, DDR memory support, 64-bit PCI slots, AGP Pro slot (as well as integrated VGA), dual LAN controllers, dual-channel Ultra160 SCSI, on-board server management and more.

Dual 3Com 3C920 LAN controllers

Slots:
Five 64/32-bit PCI
One AGP Pro Slot
Total six usable slots

Dual-channel Ultra 160 SCSI

ATA-100 Support

Dual PGA462 support for AMD Athlon MP processor

200/266MHz FSB

Four 25°-angled DIMMs support up to 3GB of PC2100 registered DDR RAM

Thunder K7 Models

Standard Model	QLogic SM	Adaptec SCSI	UPC Number
S2462NG	No	No	6 35872 006012
S2462UNG	No	Yes	6 35872 005817
S2462UNGM	Yes	Yes	6 35872 005565

Processor

Dual PGA462 ZIF sockets
Supports two AMD Athlon MP processors
Two onboard VRMs
System bus support for 200MHz and 266MHz

BIOS

Phoenix BIOS 4Mb Flash ROM
Supports APM v1.2 and ACPI v1.0
User settings for hardware monitoring
Auto-configuration of IDE hard drive types
Multiple boot options
DMI 2.0 compliant

Chipset

AMD-760 MP chipset
AMD-762 North bridge & AMD-766 South bridge
Winbond W83627HF Super I/O ASIC

System Memory

Four 2.5v 184-pin Registered DDR DIMM sockets
25° angled sockets enable rackmount installation
Supports up to 3GB of PC2100 Registered DDR RAM
Supports ECC (72-bit) memory modules

Form Factor

Extended ATX footprint (13" x 12")
One 24-pin and one 8-pin power connectors

Stacked keyboard and mouse ports
Stacked USB (two) ports
Stacked parallel (one), serial (one) and VGA (one) ports; side-by-side LAN (two) ports
Recommended **Power Supply & Chassis**

Hardware Monitoring

Winbond W83782D hardware monitoring ASIC
3-pin fan monitoring headers
CPU temperature and voltage monitoring

Expansion Slots

One AGP Pro 50 slot
Five 64/32-bit 33MHz (5-volt) PCI slots
Total of six usable slots

Integrated PCI IDE

Dual-channel master mode
Up to four enhanced IDE devices
Support for DMA100/66/33 IDE and ATAPI compliant devices

Integrated I/O

One floppy connector supports up to two drives
One 9-pin 16550-based serial port
One 25-pin SPP/ECP/EPP parallel port
Four USB ports (two ports via optional cable)
PS/2 keyboard and mouse ports

Server Management (optional)

Supports the Intelligent Platform Management Interface (IPMI)
Q-Logic Zircon BMC
Support for IPMI, SDR, SEL, FRU
I^2C and IPMB

Integrated LAN

Two 3Com 3C920 LAN controllers
10/100Mbps data transfer rate per controller

Integrated Graphics

ATI RAGE XL graphics accelerator
4MB frame buffer (SDRAM)
Standard 15-pin analog VGA port

Packing List

- Thunder K7 motherboard / User's manual
- 34-pin floppy cable
- ATA100/66 IDE cable
- Driver CD
- Com port cable

Regulatory

FCC DoC (Declaration of Conformity)
European Community CE (Declaration of Conformity)

Options for data storage

- DATAMAX 1200, **www.dynamicnetworkfactory.com**. $9900. with 12x$160GB IDE, actually sees 130 GB, 1 disk extra due to RAID, 11x130GB~1.4TB (RAID5, SCSI 64bit controller). ($7070/1TB). Max speed 100MB/s. external, no drivers needed, **dual host.**
- 3ware Escalade 3w-7850, 8 drives, internal, $640 w/o HD, max can see 130GB. 130x7=910GB $300x8+$640=$3040. ($3340/1TB) **www.3ware.com**.
- Promise SuperTrack SX6000. 6 IDE drives, internal, $600 w/6 removable drive enclosures w/o HD 6

Brand	Product	Description	Price	Ship	Date/HR	Dealer/Phone	ST	Part#
Maxtor	4g160j8 160gb eide 5400rpm udma 133	3.5lp new & factory sealed.	**$ 292**	4.95	11/23/2001 10:31:14 AM CT	**PCNation/Computer Warehouse Club** 800-969-5255 Buy Online	IL	4G160J8

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