

SUMMARY OF FEATURES

File Servers



In alphabetical order by company
■ = YES □ = NO

	AcerAltos 7000	Axik NetPower Enterprise Server Series-1	Compaq ProLiant 1000 486DX2/66	Dell PowerEdge SP590	DECpc XL Server 566	Duracorn FilePro 586/66	EPS Super Server Goliath P5-66 SSBKP	GAIN Vector 90ER
List price (tested configuration)	\$14,773	\$24,599	\$16,135	\$17,419	\$14,990	\$8,199	\$11,525	\$19,726
Processor and Memory								
Processor	Intel Pentium/90	Intel DX4/100	Intel 486DX2/66	Intel Pentium/90	Intel Pentium/66	Intel Pentium/66	Intel Pentium/66	Intel Pentium/90
Processor location	ZIF socket on processor card	ZIF socket on motherboard	Standard socket on motherboard	Standard socket on processor card	Socket on processor card	ZIF socket on motherboard	ZIF socket on motherboard	Standard socket on motherboard
Maximum number of CPUs supported	1	1	1	1	1	1	1	2
External RAM cache	256K-1MB	256K-1MB	256K	256K	256K	128K-256K	256K-512K	512K
Installable system RAM	16MB-256MB	1MB-128MB	16MB-128MB	8MB-192MB	8MB-256MB	2MB-128MB	8MB-192MB	16MB-384MB
RAM supports error correction	□	□	□	■	□	□	■	■
Expansion Buses								
Bus architecture (primary, secondary)	EISA, VL-Bus	EISA, VL-Bus	EISA	EISA, PCI	EISA, PCI	ISA, PCI	EISA, PCI	EISA
ISA, EISA, MCA slots	0, 6, 0	0, 6, 0	0, 7, 0	0, 6, 0	0, 5, 0	5, 0, 0	0, 5, 0	0, 8, 0
VL-Bus, PCI, proprietary local-bus slots	2, 0, 0	2, 0, 0	0, 0, 0	0, 2, 0	0, 3, 0	0, 3, 0	0, 3, 0	0, 0, 0
Other proprietary slots	1 CPU	None	None	1 CPU	1 CPU	None	None	1 CPU, 1 RAM
Number of bus-mastering slots	8	6	7	8	8	3	6	6
Disk Subsystem								
Number and capacity of installed hard disks	Four 1GB	Four 1.7GB	Four 1.05GB	Four 1GB	Four 1GB	Four 1GB	Four 1GB	Five 1.75GB
Mirroring implementation	Hardware	Software	Hardware, software	Hardware, software	Hardware	Software	Hardware	Hardware
Disk controller hardware cache	16MB	None	4MB	1.5MB	4MB	None	8MB	16MB
RAID levels supported by disk controller	1, 5	1	1, 4, 5, 10	1, 4, 5, 10	1, 5	1	1, 5	1, 5, 6
Tested configuration supports hot-swapping	■	□	■	■	□	□	□	□*
Drive bays in provided case	12	9	8	8	9	7	16	12
Operating-System Support								
Compatible with DOS, NetWare, and Unix	■	■	■	■	■	■	■	■
Other compatible operating systems	Altos/SCO Unix, Microsoft Windows NT, OS/2, SCO Unix	Microsoft Windows NT, Microsoft Windows NTAS	Microsoft Windows NT, Microsoft Windows NTAS, OS/2, SCO Open Server, SCO Unix, VINES	Coactive Connector, LANtastic, Microsoft Windows NT, Microsoft Windows NTAS, NeXTStep, OS/2, SCO Unix, Solaris, VINES	Microsoft Windows NT, Microsoft Windows NTAS, NeXTStep, OS/2, Pathworks, SCO Unix, UnixWare, VINES	Microsoft Windows NT, OS/2, SCO Unix, Solaris, UnixWare	Microsoft Windows NT, SCO Unix, SCO Xenix GT, VINES	Microsoft Windows NT, Microsoft Windows NTAS, OS/2, SCO Unix Open Desktop and Multiprocessor Extension, SecureWare, Trusted Unix, VINES
Management and Fault Tolerance								
Power supplies (and number of connectors)	One 350W (10)	One 450W (9)	One 300W (8)	One 300W (8)	One 300W (10)	One 250W (7)	Three 250W (20)	Two 250W (15)
Redundant components:								
Disk controller	□	■	□	□	□	■	□	□
Power supply	□	□	□	□	□	□	■	■
Processor	□	□	□	□	□	□	□	□
Local/remote system-management notification	□□	□□	■■	■□	□□	■■	■□	■□
Temperature sensor	□	□	■	■	■	□	□	□
Service and Support								
Warranty	3 years	1 year	3 years	3 years	3 years	1 year	3 years parts, 1 year labor	1 year
On-site service	Included (3 years)	Included (1 year)	Included (3 years)	Included (1 year)	Included (3 years)	Included (1 year)	Included (1 year)	Included (1 year)

* This system includes a hot-spare hard disk.

The HP NetServer's strong performance makes it easy to recommend. The HP NetServer is still easier to recommend on the basis of its design, also one of the best in this roundup. This combination makes the HP NetServer the system to look for if you need a high-end PCI-based server to manage a busy, growing business.—WPF

IBM Personal Computer Co.

● **IBM PS/2 Server 95 Array 566**

At a time when EISA is the de facto standard for expansion buses in servers and high-speed local buses are quickly becoming ubiquitous, the IBM PS/2 Server

95 Array 566 seems something of an anachronism. But ignoring this machine just because it uses a Micro Channel expansion bus would be a mistake.

The IBM PS/2 Server was the best overall performer on our benchmark tests, and it also features an instant-tear-down design that makes maintenance a snap. At \$16,700, the system is priced very

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PC MAGAZINE
EDITORS' CHOICE

HR Mission Critical	HP NetServer 486/LF	IBM PS/2 Server 95 Array 566	Poly RAID-586EV	Tangent "Just'N Case" Server 100	Wyse Series 6000i Model 665	ZDS Z-Server EX DP66E
\$4,588	\$19,043	\$16,700	\$12,500	\$9,995	\$14,459	\$18,500
Intel Pentium/66	Intel 486DX2/66	Intel Pentium/66	Intel Pentium/66	Intel Pentium/66	Intel Pentium/60	Two Intel Pentium/66s
ZIF socket on motherboard	ZIF socket on processor card	Standard socket on processor card	ZIF socket on motherboard	ZIF socket on motherboard	ZIF socket on motherboard	Standard sockets on processor card
1	1	1	1	1	1	2
256K	256K	256K	256K-512K	256K-512K	256K	256K
1MB-128MB	8MB-136MB	16MB-256MB	8MB-128MB	2MB-192MB	16MB-192MB	4MB-384MB
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
ISA, PCI	EISA, PCI	MCA	EISA, VL-Bus	EISA, PCI	EISA	EISA
5, 0, 0	0, 7, 0	0, 0, 8	0, 6, 0	0, 4, 0	0, 7, 0	0, 8, 0
0, 3, 0	0, 2, 0	0, 0, 0	2, 0, 0	0, 4, 0	0, 0, 0	0, 0, 0
None	1 CPU	1 CPU	None	None	None	1 CPU, 1 RAM
4	7	8	8	8	7	8
Two 1.8GB, two 1.4GB	Four 535MB, two 1GB	Four 1GB	Five 1.2GB, one 80MB	Four 1GB	Four 1GB	Four 1GB
Hardware, software	Hardware, software	Hardware	Hardware	Software	Hardware	Hardware, software
None	None	4MB	4MB	None	16MB	None
1, 5	1, 5, 6	1, 5	1, 3, 5	1	1, 5	1, 5, 6
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	9	9	8	8	6	11
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Microsoft Windows NT, OS/2, SCO Unix, UnixWare, VINES	Microsoft Windows NT, OS/2, VINES	LanServer, Microsoft Windows NT, OS/2, VINES	Microsoft Windows NT, OS/2, SCO Unix	LanServer, Microsoft Windows NT, OS/2, SCO Open Desktop, SCO Unix	Microsoft Windows NT, OS/2, SCO Unix, Solaris, UnixWare, VINES	Microsoft Windows NT, Microsoft Windows NTAS, OS/2, SCO Open Server Enterprise, SCO Open Server Network, SCO Unix, Solaris, VINES
One 300W (5)	One 350W (9)	One 400W (7)	One 300W (8)	Two 300W (14)	One 325W (6)	One 384W (11)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 years	3 years	3 years	2 years parts, 5 years labor	2 years	1 year	3 years
\$39 (1 year)	Included (3 years)	Included (3 years)	\$175 (1 year)	\$495 (1 year)	Included (1 year)	Included (3 years)

competitively with other high-performing servers in this roundup.

Depending on how you look at it, the Micro Channel expansion bus can be either an asset or a liability. The MCA-based disk controllers and network interface cards that IBM selected helped the system achieve outstanding results on our benchmark tests; its throughput scores were sec-

ond by a hair to those of the HP NetServer 486/LF, while its CPU utilization scores were substantially better than those of the HP NetServer. When the HP NetServer had just topped 80 percent CPU utilization with a 28-client workload, the IBM PS/2 Server led the pack at only 47 percent CPU utilization. Under the full 60-client workload, when the HP NetServer had peaked

at 97 percent CPU utilization, the IBM PS/2 Server was still humming away at a mere 60 percent CPU utilization.

The downside of Micro Channel is that it doesn't offer the growth path that the more commonly implemented EISA/PCI combination does. Micro Channel is less widely supported than EISA and doesn't provide the additional bandwidth of a high-speed local bus such as PCI. Micro Channel's throughput is adequate for the 10-Mbps Ethernet implementations that predominate today; as 100-Mbps standards reach implementation over the coming years, though, not having PCI support may limit your options.

The IBM PS/2 Server has other unique features besides its expansion bus. No tools are required to tear down the system; thumbscrews let you remove the cover and flip out the power supply, and plastic grips on expansion cards make them effortless to remove. A pair of levers lets you pop out the system's Pentium/66 processor card for easy replacement or upgrades. All eight SIMM banks in the tested machine were filled with error-correcting 8MB SIMMs to enhance fault tolerance.

Of the eight Micro Channel slots on

▶ FACT FILE

IBM PS/2 Server 95 Array 566

List price (tested configuration): \$16,700. Processor/mem-

ory: Intel Pentium/66, 64MB RAM, 256K write-back cache.

Data storage: Four 1GB IBM 0662S12 SCSI-2 hard disks, IBM RAID SCSI controller with 4MB cache, IBM 32G2958 CD-ROM drive.

Network cards: Four IBM Ether-Streamer MC 32 Micro Channel Ethernet.

Power supply: 400-watt. In short:

The IBM PS/2 Server 95 Array 566 was the best overall performer in this roundup, and its design makes maintenance easy. Reliance on IBM's Micro Channel architecture may hinder future upgrade options.



SUITABILITY TO TASK

Expandability/Scalability	GOOD
Security/Fault tolerance	EXCELLENT
Server management	GOOD
Performance	EXCELLENT

IBM Personal Computer Co., Route 100, Somers, NY 10589; 800-772-2227; fax, 800-426-4182.

466 on reader service card

the motherboard (all of which support bus mastering) four were occupied by IBM EtherStreamer MC 32 network interface cards. Two more slots contained the SCSI controller card (with 4MB of on-board cache) and an SVGA graphics adapter, leaving two available for further expansion.

The IBM PS/2 Server's case offers nine half-height drive bays, three of which were empty in the system we looked at. The other six drive bays were occupied by four 1GB SCSI-2 IBM hard disks, a CD-ROM drive, and a 2.88MB floppy disk drive.

The IBM PS/2 Server is a product that stands out in performance as well as design and yet is reasonably priced. Its only weaknesses are the absence of extensive standard server-management tools and, arguably, its reliance on Micro Channel. IBM Personal Computer Co. offers with this system a three-year warranty, which includes on-site service.

If you like the IBM PS/2 Server's features and performance but are concerned about the long-term viability of Micro Channel, take a look at the just-released IBM PC Server. The IBM PC Server is the company's first EISA-based server; it shipped too late for us to test for this story but is reviewed in the First Looks section of this issue.—WPF

Polywell Computers Inc.

● Poly RAID-586EV

In many ways, the Poly RAID-586EV file server from Polywell Computers is more like a high-end desktop system than a server. The major differentiator that classifies this Pentium/66-based system as a file server, as opposed to a high-end workstation, is its four hot-swappable hard disks. Priced at \$12,500, the Poly costs about two-thirds as much as some of the leaders in this roundup, but it can't match their performance, features, or management amenities.

The Poly maintained throughput that was respectable but still merely average. The Poly's throughput steadily increased until the workload reached approximately 16 users. At that point, its throughput leveled off and remained nearly constant, but it did not decrease under extremely heavy client loads as did the throughput of some of the other systems here.

The Poly's CPU utilization results were not so strong. At the 12-workstation level, the system had already exceeded 80 percent CPU utilization; with 32 users, CPU utilization reached 100 percent, meaning that all of the Poly's processor resources were consumed. By comparison, the Compaq ProLiant 1000 486DX2/66 reached only 60 percent CPU utilization at a 60-client load.

Our test configuration was equipped with five 1.2GB Seagate hard disks (including one hot spare) and an additional 80MB hard disk, which contained the server's DOS partition. The five Seagate hard disks were encased in removable caddies made of hard plastic and metal to facilitate hot-swapping. The casing for each disk plugged into another casing installed permanently in the system and attached to the SCSI cables. Two more drive bays were occupied by the CD-ROM drive and floppy disk drive, leaving just one bay free.

The hard disks used for the server's NetWare partition were driven by a Mylex EISA-based SCSI controller with 4MB of hardware cache. The system also

contained an Adaptec ISA-based SCSI controller for the lone 80MB disk. The Poly employs an EISA/VL-Bus design; with the two SCSI controllers, four ZNYX network interface cards, and a graphics adapter installed, only one EISA expansion slot remained open.

The Poly supports up to 128MB of system memory (which does not support error correction) and was equipped with the maximum 512K of processor cache.

Polywell provides detailed documentation with the Poly, which would be a welcome addition if the documentation actually covered any material relevant to file servers. The manual, with its chapters on how to use a mouse and keyboard, seems to be aimed at novice desktop users and is probably below the level of even the greenest network administrators.

The Poly is an average system with an average design. It is covered by an unusually long five-year warranty on labor and a two-year warranty on parts. On-site service costs an extra \$175 for the first year.

Compared with other machines in this roundup that were engineered from the ground up to be file servers, the Poly is unexceptional.—WPF

Tangent Computer Inc.

● Tangent "Just'N Case" Server 100

Tangent Computer likes to tout the fault-tolerant features of the Tangent "Just'N Case" Server 100. The server provides not just hot-swappable hard disks run by redundant duplexed disk controllers, but twin hot-swappable power supplies as well. At \$9,995, the Tangent "Just'N Case" has a below-average price compared with that of the other units in this roundup. Its performance on our benchmark tests was slightly above average.

The hot-swappable components are the system's most salient feature. Other components, however, are more standard: The Tangent "Just'N Case" is powered by a 66-MHz Pentium processor outfitted with 256K of external cache (expandable to 512K). Four EISA slots and four PCI slots, including one shared EISA/PCI slot, are provided; all eight of the slots support bus mastering.

▶ FACT FILE

Poly RAID-586EV

List price (tested configuration):
\$12,500.

Processor/memory: Intel Pentium/66, 64MB RAM, 512K write-back cache. **Data storage:** Five 1.2GB Seagate ST-11200N hard disks and one 80MB Conner CP30080E hard disk, Adaptec AHA-1520 controller, Mylex DAC960 EISA controller with 4MB cache, NEC CDR-500 CD-ROM drive.

Network cards: Four ZNYX EtherAction EISA.

Power supply: 300-watt. **In short:** More like a desktop PC turned on its side than a file server from the ground up, the Poly RAID-586EV was an average performer.

Polywell Computers Inc., 1461 San Mateo Ave., South San Francisco, CA 94080; 800-999-1278, 415-583-7222; fax, 415-583-1974.

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SUITABILITY TO TASK

Expandability/Scalability	GOOD
Security/Fault tolerance	FAIR
Server management	POOR
Performance	FAIR