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The Altos System 5000 (left) and the Hewlett-Packard Vectra 486 both incorporate a 486 chip and the EISA bus to form powerful multiuser systems or servers.

HERE COME THE UNIX 486s

We sample two new powerhouses from HP and Altos

The Intel 486 microprocessor has been a hot topic among DOS users for almost a year, but the UNIX community has had little to get excited about until recently, when a few 486s with advanced disk I/O systems started shipping. Once you look closely at the UNIX 486, you'll see why it shouldn't get lost in the PC shuffle: from a price/performance viewpoint, it can compete with workstations, small minicomputers, and network file servers.

These reviews examine two of the first 486s to ship—the Vectra from Hewlett-Packard and the System 5000 from Altos Computer Systems. The UNIXWORLD/Neal Nelson Multiuser Benchmark (see figures) shows these systems to be up to three times faster than 386-based systems. Moreover, both systems outperform the dual-386, 33-MHz Systempro, the self-styled minicomputer killer from Compaq (see the June 1990 UNIXWORLD). The results leave little doubt that you can use a 486 as anything you want. Prices for 486 systems with an Extended Industry Standard Architecture (EISA) bus range from \$7500 for a stripped-down clone to \$30,000 for a fully equipped system.

HP and Altos are at polar extremes in their approach to the 486 market. The Vectra supports off-the-shelf SCO UNIX, but not HP-UX, HP's own System V 3.2 port used on its Motorola-based workstations. At the North Pole is Altos, betting the ice farm on 486 technology: after spending millions on development, it has designated the System 5000 as its flagship system. As a result, Altos has finely tailored SCO UNIX to its system, concentrating heavily on device drivers.

In a UNIX environment, a system needs more than a fast CPU—it needs advanced disk I/O and network throughput.

For Intel systems, this means the EISA bus. Both review units use the EISA bus, a true 32-bit bus that accommodates 8- and 16-bit ISA cards as well as its own 32-bit cards. The bottom line on the EISA standard is it has given vendors a superb alternative to IBM's proprietary MicroChannel Architecture. The MicroChannel is not an open standard architecture, although IBM licenses it to other vendors.

The 486 is an excellent CPU for a workstation. The fastest 486 chip currently shipping is the 25-MHz version. Vendors are now developing a 33-MHz chip, which will make the 486 more competitive with the likes of the SPARCstation from Sun Microsystems and the DECstation 3100 from Digital Equipment Corp. In the meantime, the 486 is a clear alternative for small- to medium-size companies now using Motorola 68030-based systems, Intel 386 systems, and small minicomputers.

One requirement of these reviews was that each system run Open Desktop from The Santa Cruz Operation (SCO). Open Desktop is SCO's UNIX V/386 graphical user interface, plus extensions. It is based on the Motif window manager and runs under X Windows. Altos adds lots of value by integrating device drivers and fine-tuning its hardware to the X environment. HP takes the other approach and heavily markets the Vectra to the DOS and OS/2 community.

Finally, because this is an introduction to the 486 as much as it is a review of two systems, we decided to review the Vectra as a multiuser system, and the System 5000 as both a multiuser system and network file server. Both reviewers liked what they saw.

— Alan Southerton, Product Reviews Editor

ALTOS SYSTEM 5000: IMPRESSIVE ADD-ONS

By Tom Yager

The Altos System 5000 stands separate from the "me, too" pack. It is uniquely suited to a demanding UNIX environment. The system is supremely expandable, capable of accepting up to 64 megabytes of memory and 29 gigabytes of disk, which surpasses most file servers.

Altos provides a full range of user connections, from multipoint serial boards to Ethernet-based terminal server units—all integrated with the hardware and operating system (no chasing after device drivers). The EISA bus may find its first true UNIX home in the System 5000 as well, because Altos obviates the need to use DOS to run the EISA configuration utility after the initial installation.

The review system included a System 5000 tower with 16 megabytes of memory, a High Performance File

be accessed through a side panel. Inside, the motherboard is dotted with surface-mount ICs. The 486 chip itself lies beneath a huge heatsink. A 395-watt power supply serves eight EISA slots, two proprietary memory board sockets, and five half-height drive bays.

The standard-issue System 5000 includes an Altos Base I/O board, providing serial, parallel, floppy disk,

SCSI, and Ethernet support from a single slot. The Ethernet controller sits atop the main I/O board on a short daughtercard. A specialized connector holds a memory controller to help maintain external cache, among other things. In the review system, five EISA slots remain open, mostly thanks to Altos' ingenuity in designing the Base I/O card.

Another slot was well spent on an

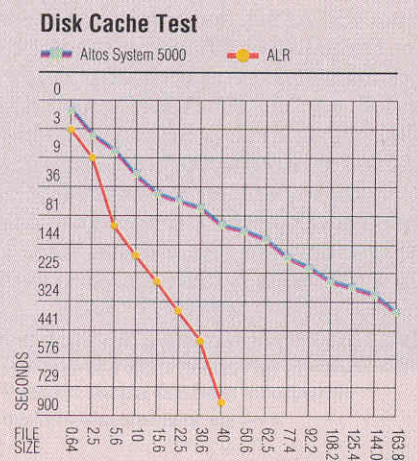
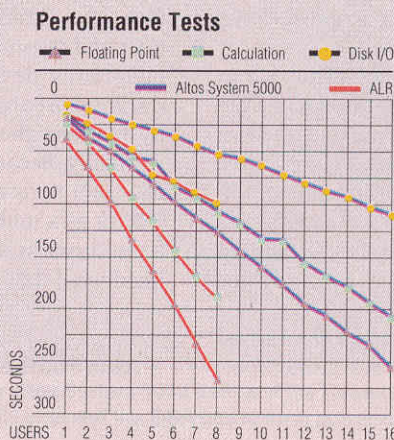
The System 5000 comes in a hefty, attractive case with a hinged door, behind which lie up to three half-height I/O devices.

Processor (HPFP), 525 megabytes of SCSI tape backup, and an internal 200-megabyte SCSI hard disk. Altos also provided a second tower, the System Expansion Unit (SEU/2), which housed three additional 200-megabyte SCSI drives and an 8mm tape backup.

The System 5000 comes in a hefty, attractive case with a hinged door, behind which lie up to three half-height I/O devices. All other components can

Altos 486 is Speedy Performer

The Altos System 5000 performed much faster than the ALR 33/386 reference machine. Floating-point performance was three times faster in the UNIXWORLD/Neal Nelson Multiuser benchmark. Integer calculations occurred at about twice the speed of the ALR; and disk I/O was 50 percent faster. The disk cache test showed no activity out of the ordinary.



The tested configuration for the Altos System 5000 consisted of 32 megabytes of memory, two 440-megabyte hard drives, and a built-in math co-processor. The ALR test system ran at 33 MHz and supported 15 megabytes of system memory, 180-megabyte ESDI hard drive, and

an 80387 math co-processor. A detailed description of the UNIXWORLD/Neal Nelson Multiuser benchmark is available from UNIXWORLD, Product Reviews, 444 Castro Street, Mountain View, CA 94041.

HPFP controller card co-designed by Altos and Interphase. The HPFP uses an on-board 68000 CPU to drive one or two SCSI channels at up to 4 megabytes per second each. The card uses EISA bus mastering to move data directly to main memory, without assistance from the host. Two HPFP boards can be resident in a single machine, bringing the system's total SCSI channels to five. This adds up to 35 devices—5 channels, with 7 devices per channel—creating the need for a place to put them.

Twin Towers

Altos' companion tower, the SEU/2, is nearly identical to the main unit. But look inside and you'll find only a power supply, dual cooling fans, SCSI cabling, and a number of drive slots. Each tower is connected to an HPFP through a 50-pin cable, and a socket on the tower provides pass-through to another SEU/2. Up to eight towers can be attached, each one loaded with a mix of SCSI devices.

Altos has added reworked disk drivers for SCO UNIX, providing for disk striping and mirroring in software. With striping, performance is improved by distributing consecutive disk blocks across physical drives (block 1 is on drive 1, block 2 on drive 2, and so on). It also delivers the benefit of combining multiple drives into a single virtual drive; up to 12 devices can be lumped into 1. Mirroring (duplication of data on a separate drive) on the System 5000 is determined by a software-defined partition, so the system administrator can blend mirrored and nonmirrored file systems in the same disk subsystem, or even the same drive.

Each tower can be fitted with its own 2.3-gigabyte 8mm tape drive. Altos includes software that backs up all of the towers onto their resident tape drives simultaneously. There is a ¼-inch phono jack on the back of the system unit connecting to an Altos uninterruptible power supply (UPS). The UPS signals the System 5000 when main power goes out, and the operating system software automatically kills all processes and shuts down on this signal.

In other EISA platforms, it's necessary to boot the system with DOS to access the EISA configuration utility. EISA, like MicroChannel, needs to be told the specifics of which card resides in which slot, and the configuration software knows about a number of EISA and ISA devices.

In other EISA platforms, it's neces-

REVIEW HIGHLIGHTS

Altos System 5000

Altos Computer Systems
2641 Orchard Parkway
San Jose, CA 95134
408-946-6700



Powerful file and compute server, impressive array of Altos-supported add-ons, enhanced version of SCO UNIX, handles up to 200 users through direct serial, multidrop serial and Ethernet connections.



Too noisy for close office use, no multiprocessing capability.

List price: Starts at \$25,000, which includes 8 megabytes of memory, 440-megabyte hard disk, 525-megabyte tape, Ethernet, UNIX. \$40,000 for 16 megabytes of memory, two 440-megabyte disks, High Performance File Processor, 525-megabyte tape, Ethernet, UNIX.

Special Requirements: None.
Support: 10 a.m. to 8 p.m. (EST); toll-free number; dealer and additional factory support available.

Warranty: One year, parts and labor.

sary to boot the system with DOS to access the EISA configuration utility. Altos' EISA configuration utility runs under UNIX, although you have to use a DOS utility when you first install the system. The utility also provides built-in configuration data for Altos peripherals as well as popular third-party devices.

Altos further distinguishes itself by offering a suite of high-performance peripherals for the System 5000. In fact, you could build a departmental network, a multiuser system, or a combination of the two, without straying from Altos-brand hardware.

In addition to the standard TCP/IP and X Window remote user services, the System 5000 can be equipped with

any combination of three serial interface options. Each SIO/2 intelligent I/O card adds eight serial ports to the system. If performance is important, the MDC/2 Multi-Drop Controller tenders greater throughput and expandability. Each connects up to 128 ports through cluster units strung together with dual-twisted pair. Lastly, the Altos TSU (Terminal Server Unit) attaches through the Ethernet and supports up to 10 serial connections. Up to four SIO/2 or MDC/2 boards can be attached to the System 5000, as can any number of TSUs, so the total number of user connections is virtually unlimited.

Test Run

One of the X Window clients that ran over the network without difficulty was FrameMaker, a demo version added to Open Desktop by Altos. It doesn't run well in the standard 640-by-480 pixel frame (it runs off the bottom of the screen), so I redirected its I/O to another UNIX system, a VNS 386 running Interactive's 386/ix, with a 20-inch Mitsubishi monitor driven by a Matrox PG-1281 graphics co-processor.

FrameMaker came up fine. It was here that I really got a feel for the System 5000's performance. Complex graphical and bitmapped images were displayed to screen rapidly. My biggest gripe with FrameMaker 1.3, the requisite pre-loading of screen fonts, moved so quickly that it was done before I had a chance to remember why I didn't like it. Performance was, in a word, crisp.

After working with the System 5000 for a few days, I stopped referring to it as a personal computer. There's nothing "personal" about this system, save the cozy Open Desktop interface. This is a workhorse, a vessel for all the serious work that needs doing while everyone else is playing with their PCs. While the System 5000 is suitable for use as a screamingly fast workstation, its file- and compute-serving talents would be wasted; it would be like driving a Ferrari around in circles in a parking lot. Sure, it could handle it, but you wouldn't be getting what you paid for. □

Tom Yager is a freelance writer who specializes in graphics and networking software, as well as workstation and multiuser platforms.

HP's VECTRA: POWERFUL HOST AND SERVER

By David Flack

The HP Vectra 486 PC shipped in a box that read "Personal Computer" in large letters. Inside, I could detect very little about the Vectra that was personal: the 8½-inch-wide by 24-inch-high tower weighed in at 60 pounds. It had the look and feel of a system that could support up to 64 users. So why call it a Personal Computer?

The Vectra's split personality results from HP's attempt to satisfy all users—including DOS power users, CAD users, and PC LAN users. Perhaps not necessarily last, it wants to please SCO UNIX users, so it touts the Vectra's support for up to 64 serial devices and terminals. To be frank, however, HP has not positioned the Vectra alongside its UNIX workstations.

Our 16-user test configuration consisted of 16 megabytes of system memory, a fast 330-megabyte ESDI hard disk (15.5 millisecond access), terminal multiplexer, two 8-port terminal concentrators, and a 120-megabyte tape backup. The review system also used an optional 20-inch, 1024-by-768 pixel, Super VGA color monitor at \$3695, instead of the standard 14-inch VGA. The price tag for this system configuration came in at just over \$32,000.

Although the review system came with all boards installed, I removed the case and reinstalled the system, memory, and other boards without difficulty. A DOS EISA card installation program enables card and bus configuration under software control, but there is no similar UNIX utility.

I also installed Open Desktop, based on SCO UNIX V/386, Release 3.2.1., only to find that HP currently only supports Release 3.2.0. With assistance from their technical staff, I was able to get Open Desktop to run.

The Vectra is the sum of its three buses. The EISA system bus places

HP firmly in the Gang of Nine, the group of vendors that first posited the EISA standard. An 8-bit utility bus gives you an inexpensive way to support peripherals. And the system memory bus, which has a 32-bit interface into the EISA bus, supports memory expansion up to 64 megabytes. The Vectra has eight EISA slots with one used by the disk controller and one for the video controller on the review unit.

The EISA bus is fine for handling

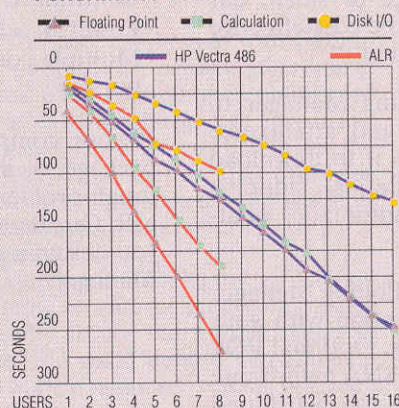
disk controllers and the like, but it is much too slow for moving data in and out of memory. All 32-bit memory address systems, whether 386- or 486-based, have proprietary memory buses. The Vectra's 25-MHz system bus can transfer data in bursts of up to 80 megabytes per second. By comparison, the EISA bus transfer rate is a mere 33 megabytes per second.

An HP-designed custom memory management chip on the system bus supports 1- and 4-megabyte

HP Vectra Makes Decent Showing

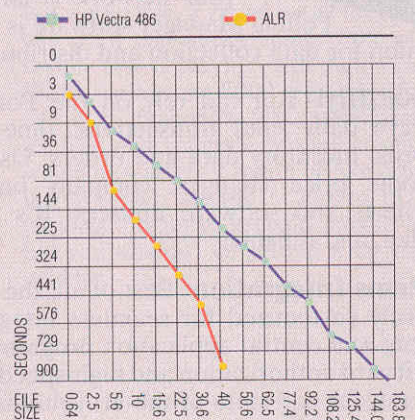
The Hewlett-Packard Vectra 486 easily outperformed the ALR 33/386 reference machine. The Vectra's floating-point performance was three times faster than the ALR in the UNIXWORLD/Neal Nelson Multiuser benchmark. Integer calculation and disk I/O were only 50 percent faster. The disk cache test showed no activity out of the ordinary.

Performance Tests

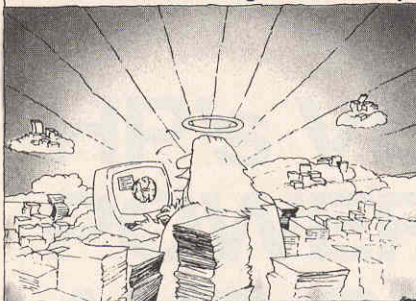


The tested configuration for the HP Vectra consisted of 16 megabytes of memory, 300-megabyte hard disk, and built-in math co-processor. The ALR test system ran at 33 MHz and supported 15 megabytes of system memory, 180-megabyte ESDI hard drive, and an 80387 math

Disk Cache Test



co-processor. A detailed description of the UNIXWORLD/Neal Nelson Multiuser benchmark is available from UNIXWORLD, Product Reviews, 444 Castro Street, Mountain View, CA 94041.



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REVIEW HIGHLIGHTS

HP Vectra 486 PC

Hewlett-Packard
19091 Pruneridge Ave.
Cupertino, CA 95014
800-752-0900



A powerful multiuser host, server, or workstation with industry standard EISA bus. Solid construction, exceptional disk I/O bandwidth, and memory management.



Price/performance may be high compared with 386 systems for less than 10 users, inability to provide more than 1.3 gigabyte disk and reliance on ESDI vs. SCSI may make it unsuitable for some applications.

List price: Up to \$29,000 for a standard system, with 16 megabytes of memory, 330-megabyte ESDI hard disk, terminal multiplexer, two 8-port terminal concentrators, a 120-megabyte tape backup, and a 14-inch VGA color monitor.

Special Requirements: None.

Support: 7 a.m. to 6 p.m. (PST), support is available through HP or dealer. A 24-hour hotline with 4-hour response time is available as an option.

Warranty: One year, parts and labor.

SIMM memory chips. Using these, you can configure anywhere from 2 to 64 megabytes of system memory: the 4-megabyte packages, using 1-megabyte SIMMs, gets you a total of 32 megabytes of memory; the 8-megabyte packages allow you to fully populate the system. Total price is \$32,000. But multiuser systems crave memory, and if you think this is expensive, the same amount of memory on the Compaq Systempro is nearly \$50,000.

The peripheral bus has two slots. It is a proprietary 8-bit, 8-MHz bus intended for local I/O support of floppy

disks, serial and parallel ports, mouse, and so on. It can also be used for ESDI disk controllers, a convenient feature for disk-greedy environments.

Disk Controller and Drives

At the performance heart of any multiuser system or server is the disk controller and drives. HP worked with Adaptec to create an ISA bus disk controller with a 64K cache. The controller's claimed transfer rate is 20 megabits per second. It makes you wonder how fast it would transfer data if the 32-bit capacity of EISA was used.

The ESDI drives are made by HP and are the same as those used in HP's larger minicomputers. HP specifies their mean time before failure at 150,000 hours (that's 17 years!), a worthy consideration for any business that makes heavy use of the disk subsystem.

ESDI was chosen over SCSI because even with its two-drive limit, HP believed that the 1.3-gigabyte capacity for two 670-megabyte drives was sufficient for the Vectra. It also had to retain ESDI register compatibility for DOS applications. With multigigabyte databases and graphics servers becoming the norm, this strategy could be a significant limitation for some applications. An HP SCSI interface controller is in development.

The Vectra's terminal multiplexer kit consists of an ISA interface card developed by Corollary Inc., a remote eight-port terminal concentrator, and a host and terminal cable. The multiplexer's ISA card plugs into the EISA bus slot and outputs to four RJ-45, RS-422 lines that can be up to 1000 feet long. At the end of each of these lines, a terminal concentrator connects up to eight serial devices, again via RJ-45 modular jacks. Two terminal multiplexers can drive 64 serial ports, rated at a sustained 9600 baud, with a maximum baud rate of 19,200 on less than 100 percent of the ports.

The cooling fan for the chassis and the conservatively rated 260-watt power supply (360 watts peak) was as noisy as you might expect, but not objectionable, given the remote positioning that most towers receive.

All things considered, HP's Vectra 486 is a worthy competitor to any low-end mini, and probably at a cost that proprietary chips and system peripherals won't be able to match much longer—if they can even do so now. Add the advantages of multiprocessing for the Vectra architecture, which HP product people say is in development, and the more proprietary minis will become even less competitive. □