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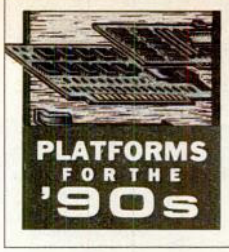
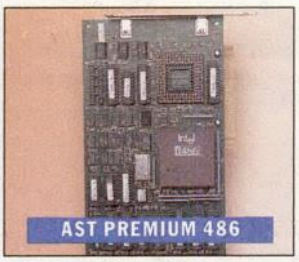
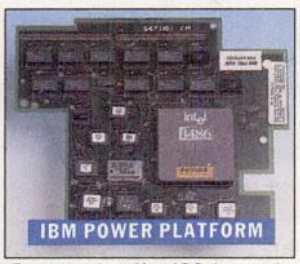
SPECIAL REPORT







Clockwise from top left, the ALR Powercache 4's 486 is on the motherboard; the AST Premium 486/25's CPU and memory are on a plug-in card; the IBM PS/2 Power Platform's 486 is on a daughterboard; the Everex 486is board plugs in the 386 socket.

FIRST LOOK

Design Differences Affect 486 System Horsepower

BY MICHAEL J. MILLER

Recent benchmarks by the *InfoWorld* Test Center of eight soon-to-be-available 486 systems show how design can significantly affect performance.

Although all the machines we tested ran much faster than their 386-based counterparts, we found significantly better performance by some machines, generally those that support the 486's burst-mode memory. This feature lets the 486 fill 16 bytes of its 8K internal cache in five clock cycles rather than the 386's minimum of eight cycles.

The machines that plug 486 cards or daughterboards into a 286 or 386 architecture (the ALR Powerflex, AMI 486 motherboard, Everex Step 486is, and IBM Power Platform) typically do not support burst mode; while the machines de-

See First Look, Page 8

i486 Systems to Garner Lion's Share of Attention at Comdex

Be it in EISA, MCA, or vanilla AT flavors, this week's fall '89 Comdex will crown a new king of the hill — Intel's i486.

For the hot-rodders in the audience — and what PC user doesn't dream of getting behind the keyboard of one of these high-performance beauties and putting it through its paces — we've bundled the latest i486 system announcements on a page of their own (Page 169).

With several systems already announced, the race to bring 486 machines to market continues to pick up speed. For a close look at who's in the race so far and how they compare, see First Look, above.

Compaq Server Invades Mini Turf

Users Concerned With Dealers' Ability to Support Multiuser System

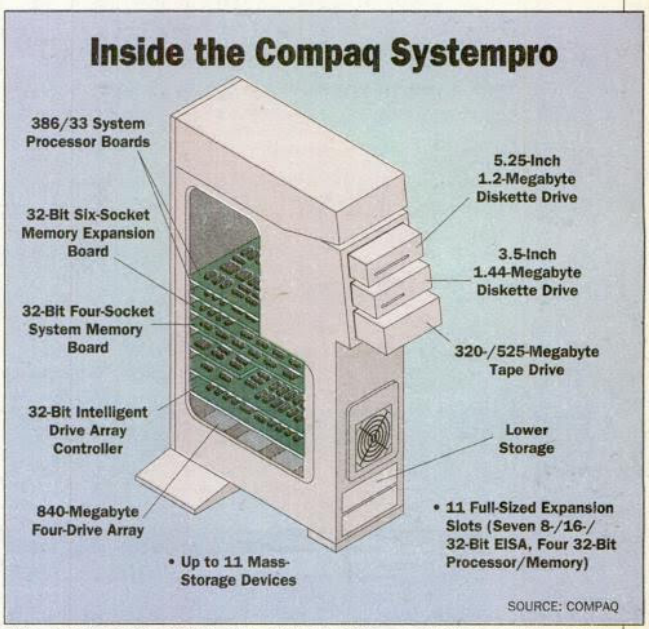
BY EDWARD FOSTER AND PATRICK DRYDEN

HOUSTON — Users reacting to Compaq Computer Corp.'s Systempro introduction here last week were generally impressed with the system's technology, but many questioned whether the company can effectively sell and support such a machine only through dealers.

Compaq is targeting its multiprocessing server directly at the minicomputer market, according to Rod Canion, Compaq's president and CEO. The Systempro, with its capability to run dual 386 or 486 processors, "moves us into a much higher performance market segment that has traditionally been served by minicomputers," Canion said.

Compaq's ambitious plans will have to wait for a while, however, as networking or multiuser operating systems that support the Systempro's multiprocessor and disk-array tech-

See Compaq, Page 5



The Systempro offers 11 32-bit slots, including seven EISA expansion slots and four slots for processor and memory upgrades on the separate memory bus. Compaq rates the system from 8 MIPS with one 386 up to 40 MIPS with two 33-MHz 486 chips.

LAN Manager HPFS Harbinger of OS/2 386

BY STUART J. JOHNSTON

When Microsoft delivers LAN Manager 2.0, an important piece of the 32-bit puzzle will begin to fall into place for OS/2 users: a true 32-bit file system that shows the 80386's awesome power.

However, users will have to wait until OS/2 2.0 ships sometime next year for general availability of the new file system, a Microsoft spokeswoman said.

The High Performance File System for 80386- and 80486-based PCs (HPFS-386) will eventually let users address up to 48 terabytes (1,000 gigabytes) of disk space in 24 2-terabyte volumes. HPFS-386 will be available with LAN Manager 2.0, which Compaq intends to ship in the first quarter of 1990.

Although the initial version of HPFS-386 will only support 48 gigabytes in 24 2-gigabyte volumes, that is a function of 16-bit OS/2 1.2, not the file system, said Steve Kanzler, product marketing manager for LAN Manager.

That problem will be obviated when Microsoft introduces OS/2 2.0, which is the first 32-bit version, Kanzler said. (See "First 80386 OS/2 Versions Will Be Hybrid 16-bit Systems," August 7, Page 8.) The company has announced that developer's kits for 2.0 will ship by the end of this year.

Besides access to gargantuan disk volumes, HPFS-386 prom-

See HPFS, Page 168

What's Hot at This Year's Comdex

While only a marathon runner could see all the products in fall Comdex's 10 exhibition sites, these are some you won't want to miss.

PORTABLES AND LAPTOPS
- *Compaq's notebook-style LTE and LTE/286*
- *Dolch's Dolch-P.A.C. 486 portable*
- *Poqet's 1-pound Poqet PC*
- *Toshiba America's T3100SX*

MCA PRODUCTS
- *NCR's PC486/MC Micro Channel compatible*
- *Video Logic's DVA4000 video board for MCA systems*

SOFTWARE
- *Lotus' Notes and 1-2-3/G for Presentation Manager*
- *Microsoft's Excel and Word for Presentation Manager; Word for Windows*
- *Precision Inc.'s Superbase*

EISA SYSTEMS
- *Compaq's Systempro and 486/25 Deskpro*
- *HP's Vectra 486*
- *Olivetti's CP486 at Intel's booth*

NETWORKING
- *Cogent Technologies' bus-master network cards*
- *Microsoft's LAN Manager, Version 2.0*
- *Saros Corp.'s Fileshare*

First Look

Continued From Page 1

signed with the CPU and memory on the motherboard (the ALR Powercache 4, Olivetti 486/25, and VIPC 486) or on the same plug-in board (the AST Premium 486/25) typically do.

The use of an external data cache does not seem to be as much of a factor as with 386-based systems — no doubt due to the 8K internal cache. However, a well-designed external cache used in conjunction with burst-mode memory can make a significant difference in performance.

Finally, the choice of bus architectures — AT-compatible, MCA, or EISA — doesn't appear to be a major influence in running stand-alone DOS applications. MCA and EISA advocates claim these architectures should perform significantly better in applications that make use of multiple bus-master cards, such as in high-end CAD, running Unix, or as a network server. We had planned to test network and OS/2 performance; however, the proper boards and drivers are not currently available, and today, these advantages remain largely theoretical.

The benchmark results (see table) show significant differences in memory-intensive applications, including Lotus 1-2-3, Release 2.2 (which uses expanded memory); 1-2-3, Release 3.0 and Autocad 10 (both of which use extended memory); and Word Perfect 5.0. These differences typically point to the basic design of the machine, including the processor setup, memory, and any external data cache. The benchmarks also show significant differences in performance in disk-intensive database applications, although most of these differences can be credited to the various hard disks and disk controllers.

Let's take a look at the specific machines.

ALR: The Powercache 4 was the clear leader in our tests of memory-intensive applications, turning in the fastest times on both versions of 1-2-3 and on Autocad 10. It is a full-size MCA machine (an EISA version has been announced) with the 486 built on the motherboard, and 128K of "write-back" cache and 8 megabytes of RAM standard. The cache is designed so that if it does not contain the information the CPU was looking for (a "cache miss"), it can fetch the information during the next CPU cycle.

The ALR Powerflex is an entirely different matter. This is a small-footprint machine with an ISA bus that comes with an 80286 processor on the motherboard. Optional boards that plug into a special slot let you upgrade the machine to a 386SX or a 486. With the 486 upgrade installed, the Powerflex was generally the slowest of the machines tested; it does not support burst mode and lacks an external cache. However, it is the only system in the group that can be upgraded from a 286.

AMI. American Megatrends Inc. (AMI) produces a motherboard designed for OEMs, rather than a complete system, so the Test Center fitted it into a system with an existing hard disk, controller, and video board. AMI's design involves a daughterboard with 486 and some support chips that plug into the 386 socket on a 386/25 motherboard, with eight AT-style slots. The AMI has 64K of cache, but does not support burst mode. The AMI motherboard produced the most varied test results: It matched the ALR on 1-2-3, Release 2.2 (which uses expanded memory), but was significantly slower running Release 3 and Autocad 10.

AST. The AST Research Premium 486/25 uses the Cupid architecture from AST's Premium line of 386SX and 386DX machines. This architecture has a passive backplane with ISA slots, and the processor and memory contained on a plug-in card. You can upgrade from existing machines yet still get burst-mode support. Even without an external memory cache, the AST performed impressively on the memory-intensive applications. AST is expected to show an EISA machine at Comdex.

EVEREX. The Everex Step 486is is designed with a daughterboard that plugs into the 386 socket on Everex's Step 386/25, which has AT-compatible slots. The 486 version continues to use the 64K of external cache on the motherboard; however, it does not support the 486's burst mode. This may explain why its benchmark times are unremarkable.

IBM. The IBM Power Platform has a daughterboard that replaces the 386/25-based daughterboard in the PS/2 Model 70-A21, the only PS/2 model in which the processor is not built into the motherboard. This machine does not have an external cache; nor does it support burst mode, which may explain its relatively slow performance. (See review, Page 141.)

OLIVETTI. The Olivetti 486/25 is the only EISA machine in this comparison, and it has several unusual features. It comes standard with a bus-master hard disk controller; it uses a proprietary video board that features a frame buffer in addition to standard VGA; and it has a socket for the Intel i860 (as a math coprocessor) in addition to the more standard Weitek 4167 coprocessors. However, most of these features were optimized for Unix and OS/2 performance and don't show up in our MS-DOS tests. With burst-mode support but no external cache, the Olivetti proved to be a good but not spectacular performer.

V.I.P.C. This company uses the Micronics 486 motherboard, and arrived fully stocked — including a $50,000 23-carat gold-plated case (that obviously won't be on the shipping units) and a DPT disk controller with 4½ megabytes of hardware disk cache. This controller, available for many systems, probably explains the machine's blazing performance at disk-intensive database applications, and contributes to the speed at running our Word Perfect test suite. On our other memory-intensive applications, the V.I.P.C. performed very well, but it did not lead the group.

Of course, many other companies have announced 486s and will be showing them at Comdex. Some of these involve new caching schemes (such as Arche Technology's Rival 486, which claims tighter coupling of the main memory and the cache); others claim performance advantages of a 486-specific chip set (Opti Inc.); while others are variations on the EISA design and push the advantages of multiprocessing (Compaq and HP's EISA machines). However, none of these machines was currently available for testing.

One final comment: If you think these machines are fast, there's more to come. AST Research recently brought in a prototype of a 486 running at 33 MHz, the next speed Intel is expected to start shipping next year. In preliminary benchmarks, this machine was nearly 30 percent faster than the current 25-MHz model. And so it goes. □

— Dan Sommer and Lauren Black, Tracey Capen, Andre Kvitka, Greg Smith, and Eugene Wong of the Test Center staff contributed to this article.

PRODUCT SPOTLIGHT

New at Comdex is Norton Backup, a speedy, customizable backup program from Peter Norton Software Inc. of Santa Monica, California. The utility uses proprietary dual direct-memory-access channels for faster backup and features an interface designed to be easy for novices to use. Norton claims it offers greater reliability because error-correction code is maintained physically separate on the disk from the stored data. It is due to ship in January for a $149 introductory price.

APPLICATIONS TESTS — INFO WORLD

486 Computers

(in hours:minutes:seconds)

Vendor	Bus	Processor/design	Burst mode	External cache	Memory-intensive	Disk-intensive	Autocad Release 10	Dbase III Plus 1.1	Dbase IV 1.0	Lotus 1-2-3 Release 2.2	Lotus 1-2-3 Release 3	Paradox 386	Word Perfect 5.0	InfoWorld[5] Benchmark CPU Speed
ALR Powercache 4[1]	MCA	486/motherboard	Yes	128K	0:11:35	0:36:31	0:02:03	0:18:43	0:09:17	0:03:53	0:04:38	0:08:31	0:01:01	16.4
ALR Powerflex[2]	ISA	486/card in slot	No	No	0:17:18	1:07:59	0:04:42	0:29:07	0:18:28	0:04:44	0:06:17	0:20:24	0:01:35	13.7
AMI 486 motherboard[3]	ISA	486/in 386 socket[4]	No	64K	0:19:02	0:32:12	0:04:32	0:15:52	0:07:05	0:03:53	0:09:34	0:09:15	0:01:03	16.9
AST Premium 486[2]	ISA	486/passive backplane	Yes	No	0:12:14	0:34:47	0:02:28	0:16:54	0:07:40	0:03:57	0:04:46	0:10:13	0:01:03	16.8
Everex Step 486is[2]	ISA	486/in 386 socket[4]	No	64K	0:14:06	0:48:45	0:03:18	0:25:58	0:10:57	0:04:26	0:05:18	0:11:50	0:01:04	16.9
IBM PS/2 Power Platform 486[1]	MCA	486/card in slot	No	No	0:14:09	0:51:42	0:02:53	0:26:47	0:10:52	0:04:29	0:05:27	0:14:03	0:01:20	15.1
Olivetti 486[2]	EISA	486/motherboard	Yes	No	0:13:03	0:40:28	0:02:26	0:19:33	0:09:01	0:04:38	0:04:53	0:11:54	0:01:06	16.1
V.I.P.C. 486[2]	ISA	486/motherboard	No	64K	0:12:16	0:26:03	0:02:45	0:12:49	0:07:27	0:04:01	0:04:49	0:05:47	0:00:41	16.8
IBM PS/2 Model 70-A21	MCA	386-25/motherboard	NA	64K	0:23:45	0:57:39	0:04:07	0:30:33	0:12:38	0:08:00	0:09:54	0:14:28	0:01:44	6.8
IBM PC AT #339	ISA	286-8/motherboard	NA	No	1:44:53	2:08:00	0:19:42	1:05:49	0:37:58	0:34:44	0:45:18	0:24:21	0:05:09	1.4

[1]IBM Power Platform 486 and ALR Powercache 4 are shipping systems. [2]ALR Powerflex, AST, Everex, Olivetti, and V.I.P.C. systems are 486 prototypes. [3]AMI is a 486 motherboard prototype.
[4]AMI, Everex use daughterboards that plug into the 386 socket. [5]Index where 6-MHz IMB PC AT is 1.0