

AccessionIndex: TCD-SCSS-T.20121208.034

Accession Date: 8-Dec-2012

Accession By: Dr.Brian Coghlan

Object name: Northstar Dimension

Vintage: c.1984

Synopsis: The first PC teaching tool in the department, with eight 'thin' workstations served by two base units.

**Description:**

NorthStar Computers was established in 1976 in Berkeley, California, by Dr.Charles Grant and Dr.Mark Greenberg.

The system served 'thin' workstation clients (screen and keyboard) from one or more base units. Each workstation connected to a plug-in board in one of 13 expansion slots in a base unit. Each such board contained a 7Mhz Intel 80186 CPU and 128kB of DRAM, running either the Microsoft MS-DOS or Novell NetWare operating systems. Each of these boards had all the features of a standard IBM-compatible PC, and up to twelve such boards could be installed. The boards shared a single central disk via 256kB buffer RAM, but had mutually exclusive access to a floppy disk drive. The expansion slots could also accept standard PC-compatible memory or I/O cards. There were three models, the Dimension 300, 600 and 1200, principally differing in capacity.

While initially successful, sales suffered from the use of hard sector floppy drives which made it difficult to port third-party software onto the machines, and the company closed in 1987.

In c.1984 the Dept.Computer Science purchased a Northstar Dimension from Tim McCarthy of Northstar in Cork (Tim later became Managing Director of Dell). It had eight workstation thin clients around a central server (base unit). It became the first PC teaching tool in the department, housed in the ground floor back room of 202 Pearse Street. In subsequent years this system was superseded by complete labs full of PCs. Later again the rise of laptops and tablets led to the demise of such extensive laboratory facilities.

Unfortunately this system was disposed of in the mid-2000s. If it survives elsewhere the department would very much welcome its donation back into the collection.

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Accession Index	Object with Identification
TCD-SCSS-T.20121208.034	Northstar Dimension. The first PC teaching tool in the department, with eight 'thin' workstations served by two base units, c.1984.

the contents of 90 pounds worth of manuals that the astronauts take with them on every flight. This would require a hard disk or some other kind of mass storage — the 384K of bubble memory in the Compass isn't enough. Another possibility is to establish an on-board troubleshooting capability that would allow the astronauts to isolate problems when something goes wrong during a mission.

There is a certain aptness to NASA's inclusion of microcomputers on space flights. NASA's demand for electronics that delivered more utility per ounce of "payload" was what sparked the trend towards miniaturization in electronic hardware. Lap computers with a lot of processing power are the latest results of such miniaturization. A technical spin-off of the space program has spun back. ●

## Multiuser PC compatible Unveiled by North Star

BY MICHAEL SWAINE  
Senior Editor

One of the latest entries into the IBM PC-compatible arena is a multiuser system from North Star.

One of the original microcomputer firms, North Star Computers of San Leandro, California, is now looking for a hospitable habitat in the IBM market environment. Chuck Grant, North Star's president, is hoping that they've found it with *Dimension*, his company's just-announced Intel 80186-based multiuser system.

"Our challenge was to identify a market need that no other company had addressed," said Grant. Munroe Business Systems recently announced plans to bring out a single-user system based on the Intel 80186 chip (see story on page 00), by Kathy Chin in news

The North Star machine consists of a central processor box or module that can control 2 to 12 PC-compatible work stations. The central module is the key to Grant's hope to stake out new territory. Each work station linked to the central module has the chief features of an IBM PC, including an 8088 microprocessor (running at a faster clock speed than the PC's — 7 MHz versus under 5 MHz), 128K of random access memory, a PC-compatible keyboard and a monochrome monitor with the same resolution as the PC's.

Each work station can be running a different PC-DOS program simultaneously while sharing central disk storage. The individual work stations have no local disk storage, since the main unit includes one or more 15- or 30-megabyte hard-disk drives and a 360K floppy-disk drive. The Intel 80186 microprocessor in the central module is the next step up in the family of chips that includes the 8088.

The central module also includes 256K RAM, used chiefly to speed data transfer

between the work stations and the hard disk.

A system with 2 work stations, an operating system compatible with PC-DOS version 2.0, and a 15-megabyte disk drive will sell for \$7000 when North Star starts shipping the *Dimension* in the first quarter of 1984. Additional work stations will cost \$1500 each.

The *Dimension* "is not just another IBM clone," Grant says, pointing out that

the multiuser system is more cost-effective than single-user systems. But North Star is banking on more than a price advantage to set its product apart from the herd. North Star vice-president of sales and marketing, Dharam Ahuja, thinks the system will appeal to MIS managers in "Fortune 1500" companies who are disturbed by the onslaught of personal computers in corporations. The *Dimension* "presents MIS managers with a means of regaining control over the personal-computer hardware proliferation. An MIS department could make a good case that the purchase, care and system maintenance of the *Dimension* should be its responsibility," asserts Ahuja.

To back up such claims, North Star is also planning to release communications links for the *Dimension* that will allow it to communicate with IBM mainframe computers.

Ahuja says that North Star will be selective about which of its over 1000 dealers it allows to carry the *Dimension*, while pursuing large OEM (original equipment manufacturer) contracts as a means of selling the system to "Fortune 1500" clientele. ●

## Monroe's 'IBM PC' gains speed with its 80186

BY KATHY CHIN  
Reporter

Monroe Business Systems has made a change to the standard IBM PC-compatible recipe followed by other manufacturers. The new ingredient in its Monroe Model 2000 is an Intel 80186 chip. By abandoning the Intel 8086 and Intel 8088 "flavor," the company has come up with the "taste" of a "pure 16-bit system," claims Robert Kane, president of the Morris Plains, New Jersey, firm.

Kane says the Intel 80186 chip gives the Model 2000 an edge over other IBM PC-compatibles. "Our computer runs at 8 MHz; the actual IBM PC runs at 4.7 MHz."

The Monroe Model 2000 can operate most IBM PC software, according to Kane. With the addition of a \$475 Z80 card, which Monroe plans to sell, the system will also run 8-bit CP/M software. The 72-year-old company, known for its desktop calculators and copiers, has created both a floppy-disk and hard-disk version of the Monroe Model 2000. The machine

has half-height 640K disk drives, internal 128K memory expandable to 896K and three RS-232 serial ports, notes Kane. MS-DOS and CP/M-86 operating systems and GW BASIC come bundled with the \$4295 base model. The Monroe 2000 with 10-megabyte hard disk costs \$5600.

The 12-inch amber monitor that comes with the 2000 displays 640 × 400 pixels. The Model 2000's keyboard is detachable; it features a standard typewriter-style layout, numeric keypad and 14 function keys.

The Monroe 2000 will be shipped in January. It's targeted at business professionals. At the same time the firm will introduce a synchronous 300/1200-baud modem, a letter-quality and a dot matrix printer for the system.

Monroe Business Systems has an established national sales force — "over 300 branches from coast to coast" — and does not plan to sell the Monroe 2000 in stores, according to Jerry Birnbaum, vice-president of marketing.

Monroe also manufactures an 8-bit, CP/M-based microcomputer, the 8820, introduced two years ago. ●



## Overheard...

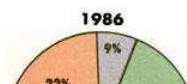
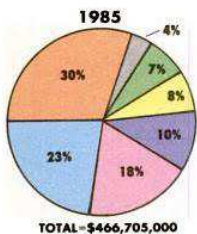
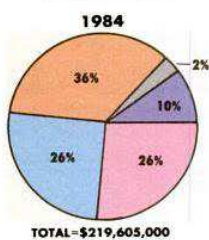
'We are about to get on one of the more dramatic roller coaster rides in terms of price/performance that we have seen in a long time.'

Gordon Campbell,  
CEO of Chips  
and Technologies,  
talking about 386  
developments.

## MARKET UPDATE

### ATs AND COMPATIBLES LEAD IN U.S. XENIX MARKET

Percent Share of Market  
Revenue



## Network Operating System Links Supermicros

### North Star Advanced Netware Joins Multiuser Micros and PCs

By Jiri Weiss

SAN LEANDRO, CA — North Star Computers Inc. is shipping with its **Dimension 300** and 1200 multiuser computers a new operating system that lets users link their Dimensions to each other and to PCs.

The connections are made via Omninet from Corvus Systems of San Jose, California, or Etherlink Plus from 3Com Corp. of Mountain View, California, the company said.

With the new operating system, called North Star Advanced Netware 2.0.0, users can also access data on any unit and use any printer in the network, according to North Star.

"Before, we were a stand-alone star-type cluster system," said Charlie McGrory, manager of North Star's technical service department. "Now we have the capability to interconnect these clusters."

North Star's Advanced Netware is based on Advanced Netware 2.0b by Novell Inc. of Orem, Utah. The new network operating system includes additional features that allow users to automatically back up their data onto tape without having to switch off their system, and to network without having to dedi-

cate a station as a communications server, the company said. Another new feature is that an entire 120-megabyte hard disk can be configured as one volume, McGrory said.

Users in the network can communicate through a shared RS-232 asynchronous communications card, or a modem card plugged into a free slot on the expansion bus in the main processing unit. The system will also support an eight-port card, McGrory said.

North Star's Advanced Netware supports all software operating with its earlier product, North Star Network 1:1:1, and is available with new systems at no extra cost, the company said. The list price of North Star Advanced Netware 2.0.0 is \$1,495, but upgrades for someone running Network 1:1:1 or **Dimension DOS** will be less, the company said. Users desiring an upgrade should contact their dealers, according to the company.

The \$12,900 **Dimension 300** includes an 80186 microprocessor running at 8 MHz, 1 megabyte of central cache RAM, a 360K diskette drive, a 30-megabyte hard disk, and a



Users can link North Star's **Dimension 300** and 1200 multiuser micros using North Star Advanced Netware 2.0.0., an operating system capable of interconnecting star-type cluster systems, the firm says.

60-megabyte tape backup. Hard disk storage is expandable to 150 megabytes, the firm said.

The \$19,900 **Dimension 1200** differs in that it includes a 120-megabyte hard disk that is expandable to 240 megabytes.

Each **Dimension** system has

13 expansion slots that can support up to 12 workstation boards, each with a dedicated 8088-2 processor running at 7 MHz and 512K of RAM. Each workstation, including a monitor and keyboard, costs \$1,795, according to the company.

## Publishing Package In Works for Sun

### 'Frame Maker' Program Currently in Beta Testing

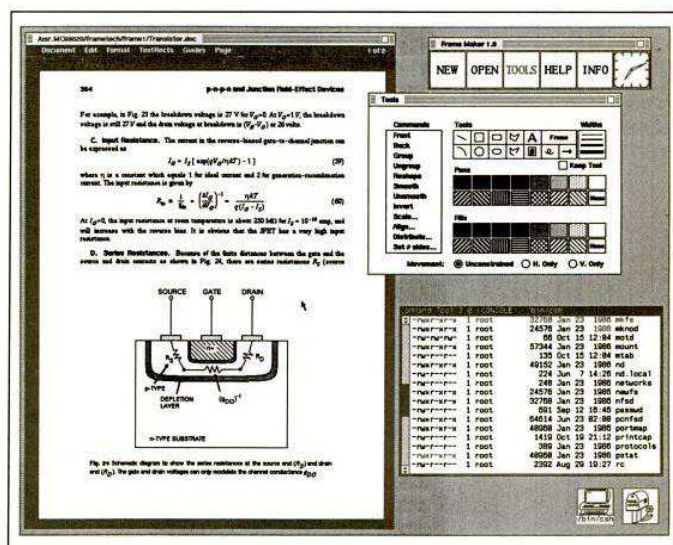
By Jiri Weiss

SAN JOSE, CA — Frame Technology Corp. (FTC) said it will ship in January a \$2,500 "what you see is what you get" publishing package for Sun 2 and Sun 3 workstations made by Sun Microsystems Inc. of Mountain View, California.

The package, called Frame Maker, will run under Sun's Sunview windowing system, so that a user can send and receive messages, run other Sun programs, and cut and paste be-

edit a large variety of document styles with combinations of text and drawings, according to the company.

Frame Maker can import and export both ASCII and Postscript files. Users can customize the fonts, keyboard, fill patterns, pen styles, and tab lead-



Frame Maker, FTC's window-based publishing package, allows Sun workstation users to mix text and drawings, and customize fonts, fill patterns, and pen styles.

Figure 2: Northstar Dimension, description in InfoWorld, 15-Dec-1986, p.31



## ■ CLUSTERED CPU SYSTEMS

■ Since the Alloy Plus4 performs so well and its terminals are attractive, it should be successful in the clustered CPU market.

are possible but not guaranteed. Shielded RS-232C wiring and even fiber optic to RS-232C converters are available to help make connections in buildings with a lot of noisy electrical activity.

Installing *NTNX* requires a good working knowledge of DOS. You have to create several different types of batch files from the keyboard and understand such things as hidden DOS and copy-protected files.

Installing the software involves several steps. You have to run a program called *Prepdisk* to prepare every disk that will be a shared disk drive. It is best to run this program on a freshly formatted disk, so you might have to back up the server's disk if you already have files on it. You can use the program under certain conditions on a disk that is already formatted, but a backup is probably still a good idea. You must create a *CONFIG.SYS* file for the server with the statement *DEVICE=NX.SYS* as its first line, and you must write a new batch file or modify an existing one for each workstation's processor.

The *NTNX* configuration program lets you specify and adjust many system parameters. Setting the system configuration is a detailed job, and you'd be wise to create a written record of the original setup and later modifications. Several of the options, such as the size of the server lock file buffers, require an understanding of the file access process and some estimations of the workload. If the estimations turn out to be wrong in a few months, you might not remember why you did what you did without notes.

The Plus4 system moves data quickly. The system cache is effective, and all our

benchmark test programs ran quickly on the Plus4. Each card is polled through the network bus to determine if it has data to transmit, so in effect a deterministic protocol is used to share the network resources. As might be expected, the system experienced little degradation under heavy network load.

Combining good hardware engineering with several software options, the Plus4 offers fast service and flexibility to a large or a small work group. It's a good alternative for any level of work group activity that can be performed with MS-DOS-compatible software.

You can easily expand the system and adjust its resources to optimize the system's performance, which is excellent. Since the Alloy Plus4 performs so well and its terminals are attractive, it should be successful in the clustered CPU market.

### NORTHSTAR COMPUTERS INC.

## NorthStar Dimension 300

NorthStar Computers, maker of the Dimension 300 clustered CPU system, was in the personal computer business years before IBM introduced the PC. The NorthStar Horizon was one of the most successful pre-IBM PC systems, but after a few early tries, the company chose not to compete head-to-head with IBM. NorthStar continued to work in OEM and industrial sales, and it used some of the technical expertise gained in the industry to develop a work group computing network with a unique approach.

NorthStar's design for a clustered CPU system puts literally everything needed to support a work group, except the keyboards and CRTs, into one box. The company makes several machines of this type, including the NorthStar Dimension 50, designed to provide small work groups of four stations with 80286-based workstations and server support; the NorthStar Dimension 300, with more expansion capacity and which we reviewed; and the Dimension 600, which, in addition to supporting the clustered CPU cards, can also be a server to a standard media-sharing local area network. The applications the workstations are running and how heavily

the workstations work the server limit the number of stations the Dimension can support. To produce a multiserver LAN, the system can also use LAN cards to link to other servers running under Novell's *NetWare*.

We evaluated the Dimension 300 system with 8088-equivalent workstation cards. The heart of the Dimension 300 multiuser system is a cabinet a little bigger than an AT that holds the combined CPU and video cards and a separate 80186 CPU running Novell's *NetWare*. The CPU cards share the internal hard and floppy disk drives and I/O ports.

The workstations consist simply of standard PC keyboards and PC monitors that are "remoted" from their CPUs by very long keyboard and video cables, with provisions to enhance the signals electrically so that they can pass over the longer wires. This combination produces a small, noiseless workstation with a familiar keyboard and display. You don't need any special software configuration or training to use familiar PC programs on the Dimension 300 system.

The hardware part of the Dimension



## FACT FILE

### NorthStar Dimension 300

NorthStar Computers Inc.  
14680 Catalina St.  
P.O. Box 500  
San Leandro, CA 94577-0558  
(415) 357-8500

**List Prices:** \$12,900, including Dimension 300 central module, 30-Mbyte hard disk drive, 60-Mbyte tape backup unit, 360K floppy disk drive, 1-Mbyte server board with NorthStar's version of Novell's *Advanced NetWare* operating system and two serial ports and one shared parallel port; Workstation-88, including monochrome monitor, keyboard, chassis, Workstation-88 card with 512K RAM, NEC V20 CPU, cabling, video card, and serial port, \$1,795.

**In Short:** In this fast, easy-to-use clustered CPU system, the workstations consist simply of standard PC keyboards and monitors. This setup produces a small, noiseless workstation with a familiar keyboard and display. The system runs under Novell's *Advanced NetWare*.

CIRCLE 661 ON READER SERVICE CARD

Figure 3: Northstar Dimension, benchmarking in PCMAG, 9-Jun-1987, p.326



## ■ CLUSTERED CPU SYSTEMS

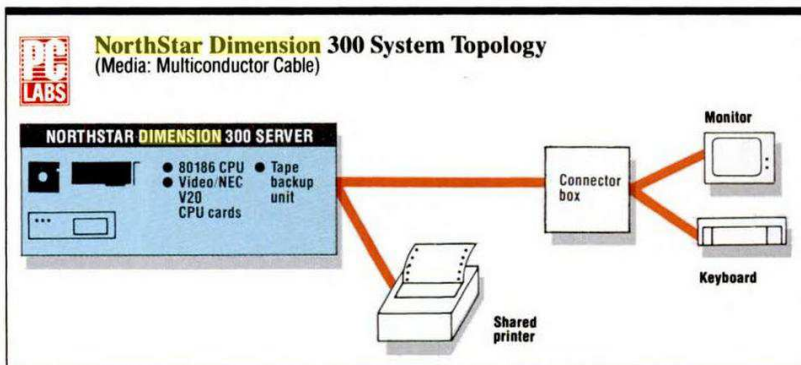
300 system consists of three major components: the central module, the **NorthStar Workstation-88** or any combination of PC-compatible keyboards and monitors, and the cabling that connects the workstations to the central module.

Some multiuser computers contain a single processor that must split its time among all users. The **Dimension 300** has a separate processor for each workstation and a server processor that the computer system itself uses. The separate processors and the server processor communicate through high-speed motherboard connections. The **Dimension 300** system is a local area network with a very short and fast shared media running under Novell's **NetWare**.

The **Dimension 300** central module comes standard with a 5¼-inch 360K-byte floppy disk drive and a 30-megabyte shared hard disk. The system includes a 60-megabyte tape archive system that's compatible with Novell's **NetWare**. The central module has 12 free expansion slots that can be used for **NorthStar** workstation CPU cards or other standard PC hardware options such as expansion RAM or an optional **NorthStar** controller card for a 120-megabyte second fixed disk drive. You can put a maximum of 12 workstations with clustered CPUs on this system if you don't use the slots for any other purposes.

The **Dimension 300**'s two types of access modes to peripheral devices are dedicated and shared. In dedicated mode the device is assigned to one user at a time. If a user requests a device that is already busy, the system displays a message identifying the station currently using the device. In shared mode, more than one user can access devices simultaneously. The Novell networking software manages access to these devices to prevent conflicts.

Standard shared devices include the **Dimension 300**'s one parallel and two serial I/O ports, which any user on the system can access. Optional shared devices perform functions such as communications or special I/O inputs. One of these devices is generally an IBM-compatible circuit board installed in the central unit. In this way, one user's CPU on the system can be "upgraded" with a device such as a main-frame communications gateway board for direct coaxial connection to a larger host



The **NorthStar Dimension 300** system puts everything needed to support a work group, except keyboards and CRTs, into one proprietary box. (1) The **Dimension 300** box contains combined video/NEC V20 (8088 equivalent) workstation cards and a separate 80186 CPU, a hard disk, floppy disk drives, and a 60-megabyte tape backup unit. The CPU cards for the workstations share the server's internal hard and floppy disk drives and I/O ports. To connect the **Dimension 300** to the workstations, the system uses thick multiconductor cable that terminates in (2) a connector box, which, in turn, plugs into (3) the monitor, keyboard, and any local serial device. The system runs under (4) Advanced NetWare.



Figure 4: Northstar Dimension, benchmarking in PCMag, 9-Jun-1987, p.328



## ■ CLUSTERED CPU SYSTEMS

computer. The ability to put dedicated PC-type expansion cards into the central module allows an individual user to have expansion capabilities even if his workstation doesn't have slots. The software to support the device must run in the user's CPU.

Another optional shared device is the floppy disk drive. The disk drive on the central module is available to one user at a time. A user requests access to the disk drive via the request utility in *NetWare's* public files. The user gains exclusive access on a temporary basis. The disk drive then becomes unavailable to other users until the user currently controlling it releases it.

All of the users always share the other resources. All users can simultaneously access the central module's hard disk(s). The *NetWare* operating system controls access to files stored on the shared disks. The parallel and serial ports on the central module offer shared printer or modem services to all users on the system.

**WORKSTATIONS** The workstation for the *NorthStar Dimension 300* consists of a standard PC-XT-type keyboard and monitor. You can use any brand of PC-compatible monitor and keyboard, but *NorthStar* markets its own Workstation-88 with a monochrome monitor. A complete Workstation-88 installation kit contains a Workstation-88 CPU/video circuit board, a Workstation-88 cable and connector box assembly, a standard PC-type keyboard, an RS-170 video cable (for a monochrome monitor), and a hook-and-loop fastener to keep the wiring neat.

Each Workstation-88 circuit board has an 8088-2 (or NEC V20) microprocessor chip and 512K bytes of RAM. The Workstation-88 circuit board can work with either a composite monochrome monitor (RS-170) or an IBM-compatible color video output (RGB-TTL). You select the desired video output by changing a jumper block on the Workstation-88 circuit board.

The *Dimension 300* and a workstation connect through a cable terminating in a device called the Workstation-88 connector box. The connector box is about the size of an AC power extension cord with four sockets. Powered separately by a small wall-mounted transformer, the connector box enhances the keyboard and



## Benchmark Tests: Clustered CPU Systems

All these systems ran the same NEC V20 processor but at different speeds. The Alloy Plus4 showed surprisingly good results, even when compared with the *NetWare*-based *NorthStar Dimension 300*. Certainly the 8-MHz CPU processor speed of the workstations, and the 8-MHz IBM PC AT we used as the host for the Alloy Plus4, improved the system's performance. We used the same 8-MHz IBM PC AT as the host for the OA-Link system from Our Business Machines, but the Alloy Plus4 and the *NorthStar Dimension 300* both used cache memory and much more sophisticated network operating systems.

The test of Network Speed Under Contention is particularly influenced by processor speed and how well the network handles batch file commands. The Alloy Plus4 flew through these tests with times we had never seen before. We attribute these results to the fast processor in the workstation and the efficiency of its cache memory.

### Performance Times

(Times given in seconds)

#### Network plus Server Cruncher

System	Interface card	Software	Server	Zero stations	One station	Two stations	Three stations	Four stations
OA-Link	None	ODOS	8-MHz IBM PC AT	20.5	49.4	75.1	102.5	137.4
NorthStar Dimension 300	None	NorthStar's Advanced NetWare	Dimension 300	45.1	68.1	91.1	98.0	107.7
Alloy Plus4	None	NTNX	8-MHz IBM PC AT	17.2	76.3	84.6	95.5	105.7
Ethernet	EtherLink 3+Share		8-MHz IBM PC AT	44.0	63.0	79.0	98.0	112.0
ARCnet	ARCnet	Advanced NetWare/286	8-MHz IBM PC AT	59.5	65.9	73.9	110.7	128.6

#### Network Speed Under Contention

System	Interface card	Software	Server	Zero stations	One station	Two stations	Three stations	Four stations
OA-Link	None	ODOS	8-MHz IBM PC AT	20.5	29.4	37.0	43.5	50.3
NorthStar Dimension 300	None	NorthStar's Advanced NetWare	Dimension 300	45.1	60.0	74.2	92.0	108.8
Alloy Plus4	None	NTNX	8-MHz IBM PC AT	17.2	19.2	17.5	20.1	20.4
Ethernet	EtherLink 3+Share		8-MHz IBM PC AT	44.0	54.0	66.0	76.0	97.0
ARCnet	ARCnet	Advanced NetWare/286	8-MHz IBM PC AT	59.5	62.1	67.8	78.2	92.6

#### Smart Applications

System	Interface card	Software	Server	Zero stations	One station	Two stations	Three stations	Four stations
OA-Link	None	ODOS	8-MHz IBM PC AT	33.0	71.0	103.0	159.0	228.0
NorthStar Dimension 300	None	NorthStar's Advanced NetWare	Dimension 300	60.0	73.0	77.0	80.0	88.0
Alloy Plus4	None	NTNX	8-MHz IBM PC AT	28.0	33.0	34.0	38.0	36.0
Ethernet	EtherLink 3+Share		8-MHz IBM PC AT	50.0	51.0	51.0	53.0	53.0
ARCnet	ARCnet	Advanced NetWare/286	8-MHz IBM PC AT	47.0	49.5	49.5	50.5	50.5

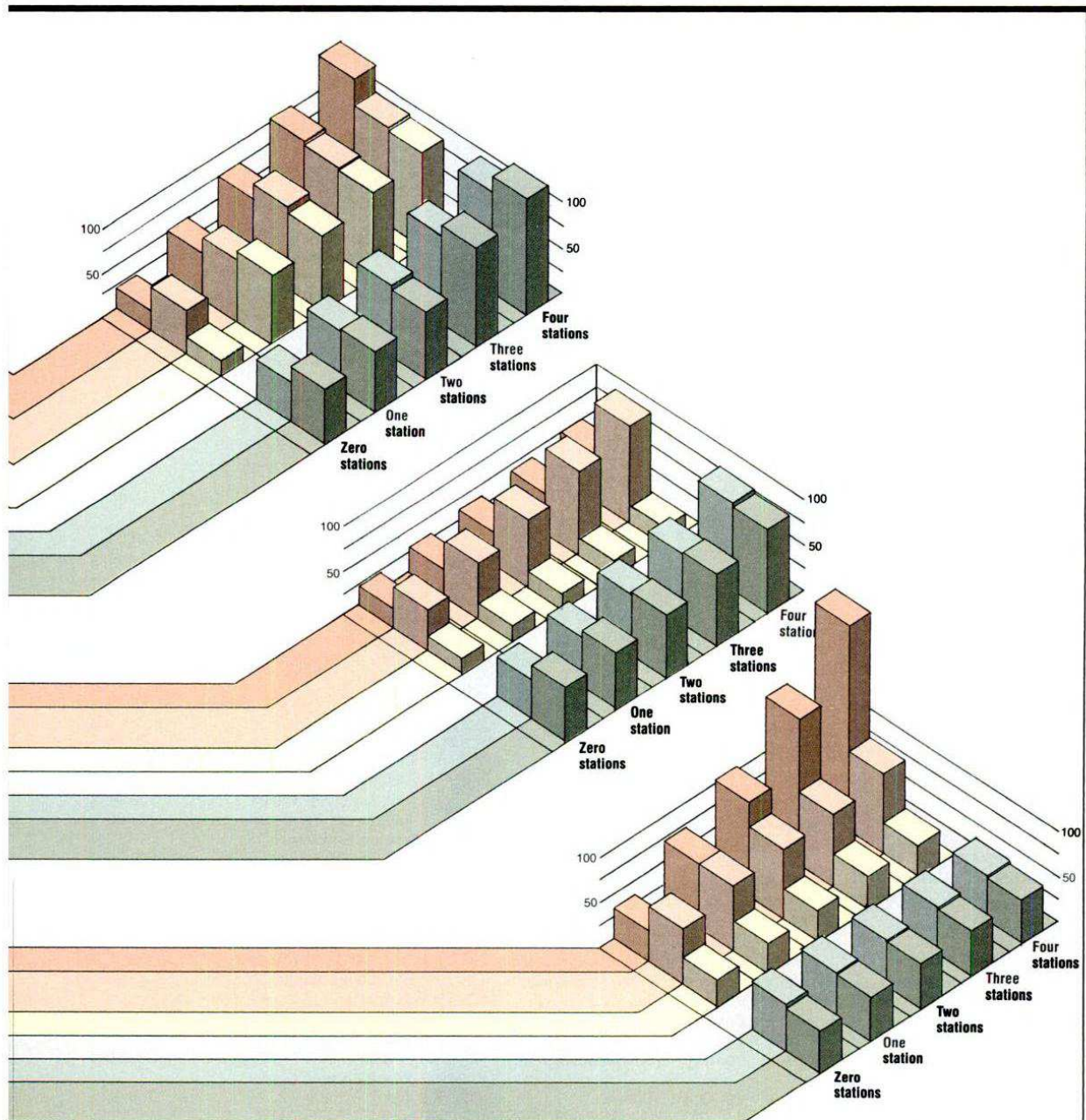
Since we used the workstation CPUs that the manufacturers provided, instead of our standard testbed, the benchmark tests for the clustered CPU systems are not entirely comparable with the previous benchmark tests we've published. The workload is the same, but it is distributed differently among the processors. We ran all of the timing tests on one of the workstation's processors. The results of the Smart Applications tests here and those published previously, though, are comparable enough to be useful because they both include applications program processing and network access. To give you some idea of how these systems

would compare with a standard media-sharing LAN, however, we included our results from our Editor's Choice for media-sharing LANs, Standard Microsystems Corp.'s ARCnet and 3Com Corp.'s Ethernet networks (see "Making Connections: 13 LANs in Perspective," *PC Magazine*, Volume 6 Number 8). The comparisons among the clustered CPU systems themselves are a measure of how fast comparably loaded networks, with the manufacturer's workstation, work.

We evaluated the clustered CPU systems both for their performance on the network, under increasing network load, and as standalone comput-

Figure 5: Northstar Dimension, benchmarking in PCMAG, 9-Jun-1987, p.330





ers. The network tests consisted of the following:

The **Network Speed Under Contention** benchmark test is run on the workstation under busy network conditions with many stations contending for network access. The network contention is performed using batch files that call files from the server's hard disk cache and deposit them to null. Clustered CPU systems with good I/O efficiency between the CPU card and the data bus perform well on this test. Efficient caching by the server software particularly improves performance on these tests.

The **Network plus Server Cruncher** bench-

mark test is run on the workstation under conditions that should put more of a load on the server's hard disk drive, data bus interface, and the networking software. The server load is performed using batch files that cause the other network stations to read files from a shared subdirectory and write them to private subdirectories. Disk caching is still a factor, but the response time of the hard disk drive and the efficiency of the networking software become more important.

For comparison, we provide the time it takes to draw files from the server under conditions of no network load and move them to other subdirecto-

ries on the server's hard disk. This test is affected by the speed of the server's hard disk, but the effect is held constant across the various workstations.

The **Smart Applications** benchmark test runs a timed DBMS exercise. This test is a general measure of performance because it requires calling for data through the network and locally executing the *Smart DBMS* program.

We evaluated the clustered CPU processors as standalone computers using the PC Labs processor benchmark tests. The benchmark tests were loaded from the server but executed in the CPU of each workstation.

Figure 6: Northstar Dimension, benchmarking in PCMAG, 9-Jun-1987, p.321



## ■ CLUSTERED CPU SYSTEMS



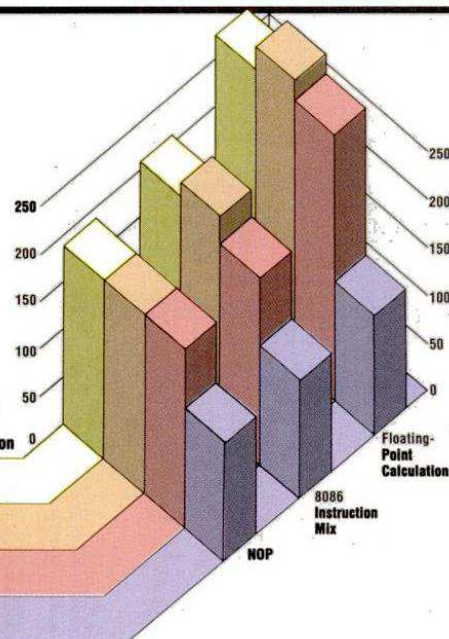
### Benchmark Tests: Clustered CPU Cards

The combined CPU/RAM/video circuit boards in the clustered CPU systems we tested use the same NEC V20 processors and general configuration, so it is no surprise that the results of the CPU benchmark tests are similar. Overall, these boards aren't quite as fast as an 80286-based machine, but they guarantee good performance for almost all applications.

#### Performance Times (Times given in seconds.)

System	Software	Server	NOP	8086 Instruction Mix	Floating-Point Calculation
Alloy Plus4	NTNX	8-MHz IBM PC AT	6.0	15.0	79.0
NorthStar Dimension 300	Advanced NetWare	Dimension 300	6.0	16.0	86.0
OA-Link	ODOS	8-MHz IBM PC AT *	6.0	14.0	80.0
8-MHz IBM PC AT	None	None	4.0	9.0	36.0

Relative Times  
(Ratio: 8-MHz IBM PC AT = 100)



The NOP benchmark test is designed to measure raw clock speed and memory access time while minimizing differences in microprocessors and the effect of memory caching. This test executes almost nothing but NOP ("No Operation") machine code instructions in a big 128K loop.

The 8086 Instruction Mix benchmark test measures the time it takes to execute a selected series of processor-intensive tasks. The test program uses 8086 instruction code. These instructions are a subset of the total processor instruction set.

The Floating-Point Calculation benchmark test measures processor speed by looping through a series of floating-point calculations, including multiplication, division, exponentiation, and logarithmic and trigonometric functions. The benchmark program uses the floating-point library included with Microsoft C Compiler 4.0.

monitor signals so that they can travel through the longer cable.

As its name implies, the connector box is loaded with connectors. A 6-pin modular telephone jack accepts the cord from the keyboard. A 9-pin D-connector supplies the interface for a color monitor, and the RS-170 mini-jack hooks to a monochrome monitor. A 25-pin D-connector provides the RS-232C connection for any local serial device used at the workstation, such as a serial printer, a modem, or a mouse. This serial I/O device is local to the workstation, and no other user on the system can access it.

Serial printers connect to the workstation port through a "null modem," or cross-wired cable. Devices such as modems and mice (but not serial printers) that meet the RS-232C standard connect through a straight-through cable.

The maximum distance between the

central module and a workstation is 525 feet. Extension cables are available, and you can splice bulk cable to extend a standard Workstation-88 cable. Bulk cable approved for extension use is a 24-gauge composite cable containing 12 twisted pairs plus 1 pair with foil and braid shield.

NorthStar recommends Belden 8112 for conduit applications and Saxton 440-12-86 for plenum-type applications.

### ■ The NorthStar

**Dimension 300** is a good alternative to media-sharing LAN systems.

The **Dimension 300** comes with Novell's *Advanced NetWare*, Version 2.0, loaded on the hard disk. Although you must configure *NetWare* for the users and the passwords on the system, the software requires no lengthy disk-swapping installation process.

*Advanced NetWare* controls communications with workstations, printers, and disk drives. Each workstation's CPU boots from the server's hard disk using *Advanced NetWare's* MS-DOS shell. The DOS shell receives user's requests, interprets them, and then communicates them to the central module or handles them itself. *Advanced NetWare*, Version 2.0, requires approximately 4 megabytes of disk space on the server for all system and public files.

You can easily configure *Advanced NetWare* to support network cards like the Corvus Omnilink and the 3Com Ether-

Figure 7: Northstar Dimension, benchmarking in PCMag, 9-Jun-1987, p.334



## ■ CLUSTERED CPU SYSTEMS

Link, which you can use to add standard PCs or diskless PC LANstations to the Dimension 300 server or to link servers together.

**INSTALLATION** Unpacking the different components of the system took more time than actually assembling them and making the network operational. The cable for this system is many times thicker than the 3Com Ethernet coaxial cable or the AT&T StarLAN twisted-pair wire, but it is about the same size as the cable used in the 3Com Token-Ring or the IBM Token-Ring Network systems.

Our only complaint about installing the system is that both ends of the cables connecting the Dimension 300 central module to the workstations have large connectors on them. This cable would be difficult to fish down walls or through cable troughs with the connectors on. You can easily run the cable across false ceilings or around baseboards, but runs that have to be fished through walls will require assembling complex connectors.

In addition to running the cables and making the connections, you must install the CPU/video boards. The only thing to check before the boards are put into the slots is that the video jumper is in the right position to select monochrome or color operation. Flipping the power switch on the server loads the networking software, and turning on the monitor begins the workstation boot process. The final installation step is for the network administrator to log on as the supervisor and customize the software system for the work group.

In theory, the tightly integrated architecture of the Dimension 300 could make it a very fast performer. Yet while it is comfortably in the top range of all the network systems we have tested so far, it didn't set any speed records. System loading affected the benchmark test numbers little, however, so this network should carry heavy processing loads well. Sometimes consistent performance is more important than top speed.

The NorthStar Dimension 300 is a powerful system, yet it is very simple to install and make operational. The network administrator must still be familiar with DOS and take precautions to ensure the security and data integrity necessary with any net-

work, but he won't have to worry about problems with networking software, hardware configuration, or installation. The keyboards and monitors that make up the workstations are familiar hardware available at competitive prices. The ability to mix the clustered CPU workstations with regular PCs on an Ethernet or similar media-sharing network gives you flexibility and a clear expansion path.

Novell's NetWare operating system, which the Dimension 300 runs under, is a standard in the industry, with a large base of enhancement and productivity programs supporting it. If you can install its cables easily in your office area, you'll find the NorthStar Dimension 300 a good alternative to media-sharing LAN systems.

### OUR BUSINESS MACHINES

#### OA-Link

Local area networks give three classes of service: file exchanges, printer sharing, and access to the same data files by multiple stations. The OA-Link clustered CPU system, from Our Business Machines, supplies file exchange and printer-sharing functions in a network with up to eight small workstations, but its file access capabilities are meant for a group of disciplined friends. The system software offers no protection against file corruption or unauthorized access to data files.

The OA-Link system consists of combined CPU/RAM/video circuit boards that are inserted into expansion slots of a host PC- or AT-type computer and cables that connect the CPU cards to the workstations. The workstations consist of standard PC-style keyboards and either CGA or monochrome monitors. Our Business Machines does not provide the workstation equipment—only the special CPU cards, cable connections, and software that augments DOS. The keyboards and monitors can be PC-XT compatibles from any computer manufacturer.

OA-Link gives you an inexpensive way to share files and resources among the members of small work groups. The keyboard-plus-monitor workstations occupy a small amount of room, they are quiet, and they prohibit anyone from walking away with data on a floppy disk. As long as the members of the group follow certain rules

## ■ OA-Link gives you an inexpensive way to share files among the members of small work groups.

about using files, this clustered CPU system can be effective.

The host for an OA-Link system can be any kind of PC-XT, PC AT, or compatible system. It must have a minimum of 256K bytes of internal RAM memory and at least 10 megabytes of hard disk storage. The system software is designed to work with MS-DOS 3.1 or 3.2.

Each OA-Link workstation consists of a combined CPU and video card that fits into the 8-bit data bus in a PC, AT, or expansion unit, an interface box linking the user station and the connecting cable, and two cables. Each cable has a 15-pin D-connector on each end to make the connections with the interface box and the CPU card. A separate, wall-mounted AC power transformer supplies power for the interface box.

The CPU card has a NEC V20 proces-



### FACT FILE

#### OA-Link

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El Monte, CA 91731  
(800) 433-1435 (outside Calif.)  
(818) 350-0683

**List Price:** \$695, including 256K RAM, one serial port, one parallel port, OA-Link card with CGA chip, NEC V20 CPU, interface box; including all of the above, keyboard, and monochrome monitor, \$995.

**In Short:** This clustered CPU system is an inexpensive, easy way to exchange files and share printers in a network with up to eight small workstations consisting of keyboards and monitors, but it lacks software protection against file corruption or unauthorized access to data files. The system runs under Our Business Machines' ODOS.

CIRCLE 660 ON READER SERVICE CARD

Figure 8: Northstar Dimension, benchmarking in PCMag, 9-Jun-1987, p.336