

B.C. EDITION

Vol.2 No.8 August 89

The

COMPUTER PAPER™

WESTERN CANADA'S COMPUTER INFORMATION SOURCE

NEWS • FEATURES • REVIEWS • EVENTS

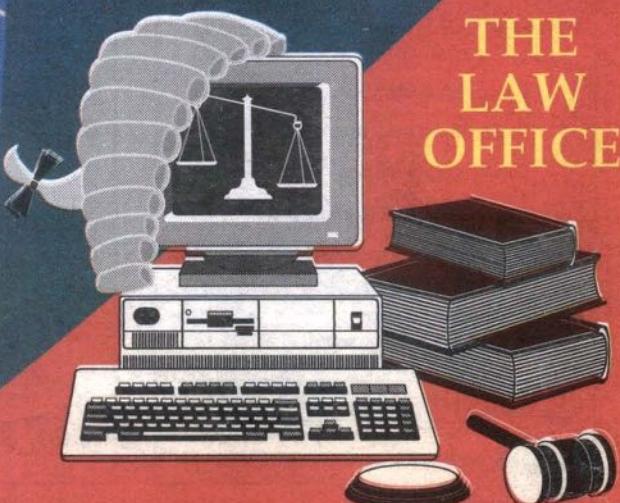
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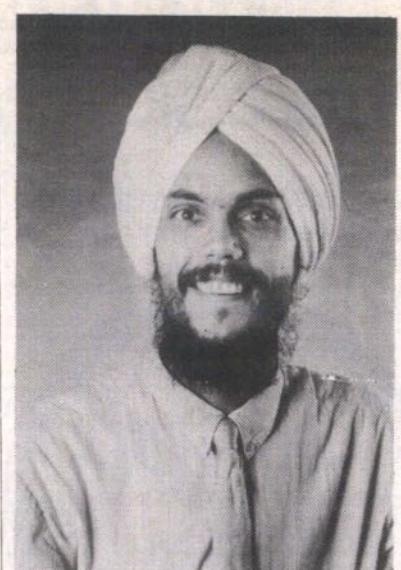
The Atari ST's Strong as a Music Computer.

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FROM THE EDITOR



Well, it is late night writing time again... I thought we were past this phase. I had heard a rumour that the computer industry slows down in the summer. I even took a week off based on the assumption.

— Never listen to rumours —

Local Area Networks

We would like to extend our thanks to Peter Lincoln from the Vancouver Network Users Group who kindly

offered his services as a contributing editor for the special section on Local Area Networks. His insight and intelligence prevades the articles and we hope you find them as enlightening as we did. As Peter said to me when he first proposed the articles, "Building a full fledged local area network is much like designing a custom chip". Not something for the faint of heart. But this is gradually changing; in some areas, the complexities are diminishing and many of the powerful features are becoming available to the unsophisticated user.

As people move beyond the initial confusion of their first systems, to satisfied, and in some cases, power computer users, the potential to harness not just one computer - but many computers, becomes very appealing. The demands of business cry out for coordination and cooperation between computers. All the jewels are held shining before us: multi-user databases to avoid duplication and re-keying of data, electronic mail to pass inter-office communications quickly between people, remote tasking to send computer-intensive tasks off to unused work stations on the network. It is all there, but it still takes work to achieve these efficiencies. Glory will be the day when it is truly "transparent"—when it really does get easy to manage.

The Law Office

We take a look at how computers are being used in legal offices this month, with an article on Farris & Co., a Vancouver firm, which has whole heartedly embraced the technology to the benefit of their customers.

What The Future Holds

We are looking forward to a brisk fall season, with a good line up of articles and features. Next month, along with half the population under thirty, we look at the wonderful world of education, specifically computer training. In October, "computers on the go" is our theme, with a look at laptops and the software to manage them. For November, we are looking forward to Tracon's Computer and Communications Show on November 7, 8, and 9. We will have a look at Telecommunications and telephone systems in general.

Changes, Changes

Enjoy the issue, hope you like our new format. Once again the change was precipitated by growth. We were hitting the top end of what our printer could fold in the old format. So we decided to go to what they call "stitch and trim". The salesman told us that it would increase the publications "retention value". We liked it because we could make Steve Demuth's wild covers bigger.

Kirtan Singh Khalsa

Kirtan Singh Khalsa
Publisher/Editor

Coming Editorial Schedule

ISSUE	DISTR. DATE	TOPICS	COPY DEADLINE	CAMERA READY ARTWORK	MARKET
AUG	July 28	Networks Computers in Law Optical Character Recognition	July 18	July 21	Law offices
SEPT	Aug 30	CD ROM Education & Training	Aug 18	Aug 22	General
OCT	Sept 29	UNIX Computers and Sales Laptops Personal Information Managers	Sept 19	Sept 22	Real Estate Direct Sales
NOV	Oct 30	Telecommunications Telephone Systems	Oct 20	Oct 24	Communications Pacific Rim Show
DEC	Nov 29	Multimedia Games	Nov 17	Nov 21	General Christmas

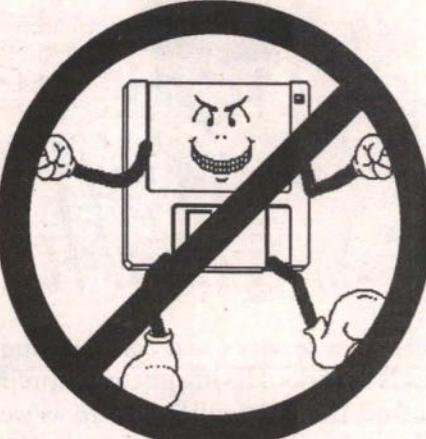
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The Computer Paper. (Shareware programs require a separate payment to authors if found useful.)



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LETTERS TO THE EDITOR



software, preferably games or simple typing programs, to run on the Osbornes which have been donated to us.

Again, many thanks for your help in this matter, and thanks also to those who have donated their hardware to the Association.

Catherine Wheeler
Burnaby Association For The Mentally Handicapped

(See the classifieds for telephone number.)

Better Than MacWorld?

Dear Sir:

Just a short note to tell you how much I enjoy reading your computer paper. I also subscribe to MacWorld but find I spend more time reading your publication and find that I learn a great deal from the informative articles. I also like the way the writers go back to basic steps or principles when they explain something. I like the short newsy items that give an update on the computer world.

Congratulations on a great publication and thank you for contributing to my computer education and literacy. I look forward to next month's publication. Reading your July issue was a great way to spend a rainy Sunday afternoon. W.D. Robertson

Better Than U.S. Publications?

I read your paper when I visited Vancouver and it is excellent. The American publications don't come up to your paper.

S. Goldron, San Leandro, Cal.

MASTHEAD

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Kirtan Singh Khalsa

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Subscriptions

The Computer Paper is published monthly. If you would like the Computer Paper mailed directly to your home, please send a cheque for \$13.99 to Suite 8, 3661 W. 4th Ave., Vancouver, B.C. V6R 1P2 Telephone (604) 733-5596. This will cover mailing and handling for 12 issues in Canada. American subscriptions please send \$25 in US Funds.

Overseas please send \$50 Canadian.

This is Volume 2, No. 8 August, 1989

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Alberta Office: P.O. Box 1644, Station 'O', Calgary, Alberta T2P 2C7 (403) 262-5737

2nd Class postage Registration Number 7718

Printed in Canada

Canada Computer Paper Inc.

Suite 8, 3661 W. 4th Ave.

Vancouver, B.C. V6R 1P2

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WHAT'S NEW

B.C. has described BC OnLine's launch as "one of the most significant events in registry use of this decade."

BC OnLine commenced in early July, providing access to the Land Title Registry, the Central Registry of Liens, and the Companies Registry. Access to other government databases will be considered based on the needs of the business community.

Contact: John Glaab, at BC OnLine, 4000 Seymour Place, Victoria, British Columbia, Canada V8X 458 Toll Free: 1-800-663-6102.

Rimart

Introduces MasterLINK

Rimart International Inc. has announced the release of MasterLINK, a two-station linking program that allows

users to operate in a full multi-user environment. The program is easy to install and offers the following features:

File transfers, full multi-user support for standard MS-DOS 3.1 file and record locking, Netbios compatibility, transparent background operation, DOS compatibility, the ability to run programs across the network, 115,000-baud access speed, and full upgrade-ability to other network products. MasterLINK is presently being offered as a software package for \$159.00 to network two PC-compatible computers. The required cables are additional, depending on length, and are available locally with prices starting at \$19.00 for a 6-foot cable. Contact: Rimart International, Box 12151 Nelson Square, Suite 1220, 508 Nelson St., Vancouver, BC V6Z 2H2, (604) 688-3717.

Omni College Offers Executive Courses

During a recent discussion with a number of executives, Omni Computer College discovered that most companies were not aware of the latest developments in software and as such were not using the computer to the efficiency levels that are readily possible today. As a result, they have developed several courses for executives that show how these programs can be used more effectively in most offices.

"The Finer Points of ACCPAC", and "Word Processing for the Executive", according to Omni's Bruce Morris, are the first of a number of courses being developed for the executive to learn the possibilities unleashed by the power of the

Ideal Network Station

The recently announced Superset 100 is one of the smallest desktop computers available, making it ideal as a small-footprint network station. The small size belies a good set of features including a 10 MHz speed, PC/XT compatibility, built-in clock, disk controllers, mouse port and a very reasonable price. Contact Computer Canada Corp 278-5115.

A4 Offers Sales Tracking, Accounting in 4th Dimension

A4 is a complete accounting, sales lead tracking and business communications product designed in the Macintosh custom-applications development language, 4th Dimension. The program's accounting features include A/R, A/P, G/L, Order Entry, Invoicing, and Inventory. The Sales Lead Tracking includes automatic notification of follow-ups, and a prospect can be turned into a client through the click of one button; retaining the complete contract history is simple. Communications capabilities include word processing and mailing-label generation. A4 can also be modified to suit a company's specific requirements. \$1,000 U.S. basic. Customizable version: \$2,000 U.S. Contact: Softek Design: 882 Calgary Way, Golden, CO 80401 USA, (303) 526-0606.

Paradoxical Accounting

VANCOUVER—A family of advanced relational-business applications for Borland's top-rated Paradox 3.0 database management system was released recently by Adapta Software Inc. The AdaptAccounts 3 modules derive from Adapta's field-proven versions for Paradox 2, but have been completely rewritten to take full advantage of the new multi-table forms and reports of Paradox 3.0, according to Peter Wolfe, Adapta's President. Features include a complete audit trail, multiple open periods, multiple sub-ledger control accounts, multiple bank accounts and controlled archiving of old transaction details, increased ease of use, higher performance and many new viewing and reporting options. Canadian end-user prices are \$179 for the System Manager, \$349 for General Ledger, \$239 for the Financial Reporter, and \$475 for Accounts Receivable or Accounts Payable. Reseller discounts are available. Evaluation versions are available now for \$29. Sales and support are at 4608 Cliffwood Place, Victoria, British Columbia, Canada, V8Y 1B5, telephone (604) 658-8484.

On-Line Access to Government Land Titles, Company Registry Databases

VANCOUVER—A new government information service, BC OnLine, will provide business and commercial users with remote-computer access to certain Government Registry databases on a user-pay basis. According to Tim Hicks at the BC Systems Group, lawyers are especially happy with the access. Hicks says that since the BC OnLine became operational, 313 accounts have been opened and 2,178 users already registered. The Continuing Legal Education Society of



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to be missing a few "minor" features such as a keyboard, monitor, operating system, etc.

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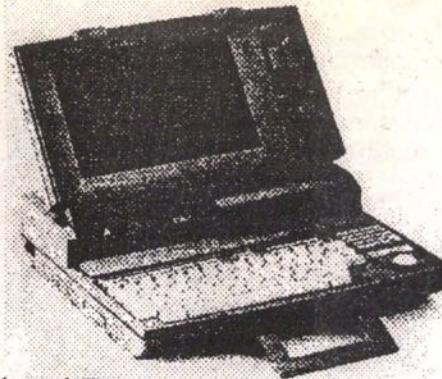
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computer. Contact: Omni College, Vancouver (682-6664).



Atari Prepares Onslaught of New Products

TORONTO, ONT. — Atari, the firm that founded the video game industry, is out to prove once again that innovation is the name of their game. The firm has introduced a sophisticated portable video-game system designed to compete directly with Nintendo and a similar system recently announced from NEC.

The system boasts hi-res graphics from a palette of 4,096 colors, and a connection cable, with which players can link up to eight Atari Portable Color Entertainment Systems for multi-player challenges.

Atari has also developed a compact, energy-efficient, Intel 80C88-based, hand-held, IBM-compatible personal computer called Portfolio. The one-pound computer, which is about the size of a VCR tape, is small enough to slip into a coat pocket. The unit runs at 4.92 MHz and has a suggested retail price of less than \$550.00.

Atari Computer has also introduced "Stacy," a portable version of their ST line of computers. The new laptop weighs fifteen pounds, and includes an LCD display, keyboard, trackball for mouse control, single drive, and battery pack. Features include a full megabyte of onboard memory, a 3.5-inch double-sided floppy-disk drive, and a system speed of 8 MHz. Options include a second floppy drive or a hard drive. Contact Atari (Canada) Corp., 90 Gough Road, Markham, Ontario, L3R 5V5, (416) 479-1266.

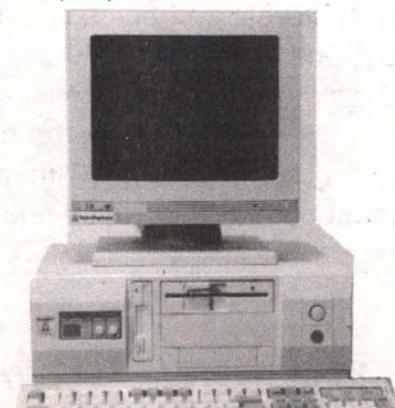
What Kind of Computer Education Do Employers Value?

Resolution Business Press will conduct an education survey on the needs of the computer industry in the Pacific Northwest and Western Canada later this month.

"We want to find out if the educational needs of the computer industry are being met, as well as the type of educational background and training a young person should have to prepare for a successful career in the industry," says Resolution Business Press publisher John Spilker.

Results of the survey will be made available to educators and industry officials.

To receive a questionnaire, please write or call Resolution Business Press, 713 110th Ave. N.E., Suite 208, Bellevue, WA 98004, (206) 455-4611.



DPS Debuts New Line-Up

DPS Distribution Inc., manufacturers of the DataPerfect/DPS line of compatibles, recently announced the new DataPro line of 286 and 386SX comput-

ers. The DataPro machines are a high-end addition to DPS's existing roster using premium parts at competitive prices.

The DataPro 286/14 runs at 14 MHz, 0 wait state. With a Landmark speed reading of 18.2, this machine competes directly against 286 16 MHz machines, while the DataPro 386SX runs at 20 MHz, with a Landmark speed reading of 25.5. This unit provides the processing power of a full 386, but at a far lower price.

DataPro machines use a Dallas clock module, which holds the time, date, and set-up accurately for ten years. Standardly packaged with MS-DOS 4.01 licensed directly from Microsoft Canada, each unit integrates a Tycor "Ultimate" power conditioner for spike, surge, and noise protection. All DataPro systems carry a complete three-year warranty.

DPS also sells a complete line of computers including 386 cache machines in 25- and 33-MHz configurations. Contact: Kent Lindsay at DPS Distribution (604) 325-5312.

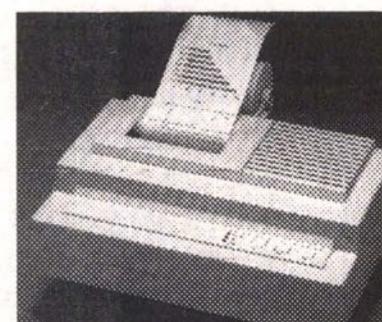
Shareware Off The Shelf

Canadian Shareware Library has announced plans to package and sell a Monthly Shareware Software Collection. The product is designed to compete directly with the likes of Compute!'s PC Magazine at \$17.95 and Big Blue Disk at \$13.95. Disks-to-Go will be priced at \$8.95. The product will contain popular shareware titles similar to its competitors, and all that will be missing is the glitz packaging. The first disk should appear on dealers' shelves shortly. Contact: Canadian Shareware Library, P.O. Box 2053, Surrey, B.C. V3W 9X5, (604) 597-0881.



Top-Rated ALR FlexCache Computers Available Locally

DGW Enterprises of Victoria has recently inked a deal to provide ALR computers in B.C. The ALR 25386 won the PC Magazine award for technical excellence in 1988. Features include a proprietary caching system, blazing 25-MHz power, and an industrial-strength package, all at a very reasonable price. Contact DGW Enterprises, 361-9882 in Victoria.

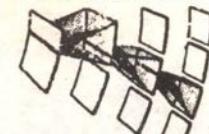


Dedicated Label Printer

After experiencing a landslide of interest in a label printer announced in these pages recently, Computer Canada Corp found that their supplier was slow to deliver on their promise of an economical serial printer custom-designed to do labels. CCC decided to develop their own. They claim to have come up with a package that is a little more expensive, but more versatile than the original. Priced at \$470, the unit can plug into an RS-232 or Centronics port and offers printing in either red or black. Contact: Computer Canada Corp for details: (604) 278-5115.

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NEWSBYTES

APPLE WORLD

Major Blow To Apple's "Look and Feel" Suit

SAN FRANCISCO, CALIFORNIA, U.S.A., 1989 JUL 22 (NB) A federal judge has ruled that Apples 1985 licensing agreement with Microsoft involving the use of on-screen windows still gives Microsoft a legal right to use them, and strikes out a major portion of Apples look and feel copyright violation suit against the software company.

In addition, Hewlett-Packard, by virtue of its license with Microsoft, is also within its legal rights in regard to the use of windows in the New Wave operating environment, which was also targeted by the Apple suit.

U.S. District Judge William Schwarzsers ruling, which has yet to be released and which is not final until next week, says that Microsoft and HP, are entitled to partial summary judgement on Apples infringement claim insofar as it is based on the use in Windows 2.03 of visual displays in Windows 1.0.

Still to be decided is Apples claim that its copyright on overlapping windows and icons is being violated by the two companies visual displays on Windows and New Wave. If the judge rules in Apples favor, substantial portions of both products would have to be redesigned. Initial reaction by legal experts is that this tentative decision, however, is a major blow to Apple.

The two sides appear in court next on September 8.

RISC Chip Improves Mac II Screen Speed Up To 600%

SAN JOSE, CALIFORNIA, U.S.A., 1989 JUL 17 (NB) Macintosh II owners seeking to souped up their graphics capability are the target of Radiuss new QuickColor Graphics Accelerator. The board executes Macintosh graphics on a six-million-instruction-per-second RISC or reduced-instruction-set processor, enhancing Apples 32-bit QuickDraw by 600 percent.

QuickColor accelerates common graphics functions such as window movement, text scrolling, fills and image displays by bypassing the Macintosh II processor. QuickColor software operates on the system level, allowing 32-bit Quickdraw applications to take advantage of the speed without modification.

To be used in such 16 and 32-bit applications as professional graphic arts and publishing, the Accelerator is shipping and lists for \$795.

(Contact: Jeneane Harter, (408) 434-1010)

Motorola RISC Chips For Apple

CUPERTINO, CALIFORNIA, U.S.A., 1989 JUL 7 (NB) — Trade sources report that Apple Computer has signed a deal with Motorola for reduced-instruction-set computer, or RISC chips, for future editions of the Macintosh. The Cupertino-based company had no comment on the reports for Newsbytes, except to say that "we are actively evaluating RISC technology but have no long term plans beyond that," according to an Apple spokeswoman.

Sources report Apple will build a new system around Motorola's 88000 technology. Apple has been shopping for RISC chips to make faster, more powerful machines, and was reportedly entertaining offerings from Advanced Micro Devices, among others. The decision to

The POWER LIST

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For those who know what they're looking for, Doppler offers this most competitive Canada wide listing. You may order by Fax, Phone or Computer. Government and Corporate Purchase Orders welcomed. For those wishing our full store personal service... visit us 7 days a week.	Newsmaster II 65 News Room Pro 89 PageMaster 3.0 IBM 619 Publish It 179 Ventura Publisher 2.0 595 Ventura Prof. Extern. 499 Ventura Network 918 Xerox Presents 399	SPREADSHEETS	Wordperfect 5.0 Netwk 619 Wordperfect 5.0 Station 119 Mouseperfect 5.0 49 Wordperfect Executive 179 Wordperfect Library 2.0 298	* TONER FOR ALL* call Roland PL100 2559 * HIGH SPEED PRINTERS	Seagate 120MB RLL+Cntr 998 Maxstore 760MB ESDI+Cntr 4498
Multline BBS (24 Hr) 682-6283 (modem)	Lotus 123 v3.0 399 Lotus 123 2.01 + Allways 376 Lucid 3D 2.0 89 MS Excel 2.1 274 Professional Plan v1.0 99 Quattro 195 Supercalc 5.0 299 VP Planner Plus v2.0 179	GRAPHICS	Wordperfect 5.0 Netwk 619 Wordperfect 5.0 Station 119 Mouseperfect 5.0 49 Wordperfect Executive 179 Wordperfect Library 2.0 298	* FONTS, MEMORY, BUFFERS	Bernoulli II Dual 20MB 2599 Bernoulli II 20MB Ext. 1659
Software	AST Model 80 no HD/MON 1998	UTILITIES	25-in-1 Fonts Cartridge 369 1MB LaserJet Memory 395	2MB LaserJet Memory 629 4MB LaserJet Memory 999	Sygen 5.25 FL + Interf. 419 Sygen 3.5 FL + Interf. 419
ACCOUNTING	AST Bravo/286 no " 1259	COMPUTERS	Logical Connection 256K 625	128K Printer Buffer 139	Seagate Hardcard 30M 499 Seagate Hardcard 49M/MS 598
ACCPAC+5.0GL/AP/AP-ea 596	AST 386C M300 no " 4249	HARDWARE	Plus Hardcard 20MB 789	Plus Hardcard 40MB 989	Plus Hardcard 40MB 989
ACCPAC Easy 78	AST 386C 33MHz "NEW" 7598	DIGITIZERS	Summasketch 12x12 Plus 545	Summasketch 12x18 Digit 929	Kalok 20M Kit 379 Kalok 30M Kit 399
Bedford 129	286/386 Compatibles VISIT	MONITORS	AT RLL HD Controller Card 199	Seagate 20M Kit 399 Seagate 30M Kit 415	
Bedford Wordsheet 79	HUGE SUMMER SALE ON !	LAPTOPS	Seagate 20M Kit 399 Seagate 30M Kit 415	• TAPE BACK-UP	Archive 40M EXT 599
Daceasy v3.0 85	AST 286/386 LAPTOPS	MONOCROME	Wyse 700 Hi Rez 1298	Colorado 40M EXT 579	
Daceasy Light 59	Sharp laptop 1888	AST 386C 14" 169	Sigma Laser View 19" 2698	Colorado 40M INT 428	
Managing Your Money 159	Toshiba T1000 1099	VGA	Toshiba T1000 21Bk mdm/num 2495	DC 2000 34	
Peachtree Complete II 279	To T1200 2 If Bk mdm/num 3479	MINI-MICRO	Mini Micro VGA 14" 519	DC 600A 43	
Draft Cadd Ultra 279	Toshiba T1200 Bklt 20M 3479	MULTIFREQUENCY	Mitsubishi 14" Diamond 788	600XTD/6150 45	
Generic Cad Starter Kit 159	Toshiba T1600 20MB 4888	MINI-MICRO	Mini Micro 600 599	DC 2080 48	
Generic Cadd Level 2 89	Toshiba T3100E 20MB 4245	NEC MULTISYNC	Nec Multisync 3d 969	SCANNERS	
Generic Cadd Level 3 219	Toshiba T3200 40MB 5150	LAPTOP ACCESSORIES	Logitech Scanman 400 DPI 299		
Generic Cadd add ons 55	Toshiba T5100 40MB 6149	ATI GRAPHICS	Data Copy FlatBed w/Soft 1678		
Mathcad 2.0 299	Toshiba T5200 100MB 9788	HERCULES	Logimouse 19,200 DPI 135		
COMMUNICATIONS	• PAINTING & DRAWING	COMPATIBLE	Logimouse Clear Case/Paint 129		
Carbon Copy Plus 5.1 149	Corel Draw 469	PARADISE	Logimouse C7 + Paintshow 139		
CrossTalk M4 IV 1 178	Designer 589	PARADISE EGA	Logimouse C7 109		
CrossTalk XVI 3.7 139	Deluxe Paint ii 98	ATI EGA	Genius Mouse w/Dr Halo 89		
Desk-Link 144	Fantasy III 89	WOND 512K	Dexa Mouse 69		
File Shuttle 106	Pixel 188	ATI VGA	MS Mouse /Paint 135		
LapLink III 123	Adobe Illustrator 489	VEGA	MS Mouse /Windows/Paint 179		
Novell Net ADV 286 2.15 2469	PC Paintbrush Plus 110	VEGA PRO	Paradise VEGA Professional 615		
Novell Net SFT 2.15 3159	Printshop 49	VIDEO CAPTURE	Video-7 VEGA Fast VGA 479		
PC Anywhere III 109	INTERGRATED	VIDEO RAM	Video-7 VEGA VRAM 699		
Procomm Plus 74	First Choice 3.0 125	• OPERATING ENVIRONMENT	WILLOW w/VGA 968		
Smarter 220 159	Framwork III 539	• GENERAL UTILITIES	• MEMORY 135		
Smarter 240 249	Lotus Symphony 2.0 569	BATTERY WATCH	Intel 8087-5 MHz 189		
Viewlink 139	MS Works 129	CRUISE CONTROL	Intel 8087-8 MHz 259		
DATABASE	Smart System 3.1 599	SOFTWARE BRIDGE	Intel 8087-10 MHz 215		
Asksam 4.1 289	PROGRAMMING	STAR NX1000	Intel 8087-8 MHz 298		
Clipper (Summer 87) 524	• EDITOR/DEBUGGER	• INFO MANAGERS	ATI VGA WOND 512K + 347		
dBASE III + v1.1 519	Norton Editor 79	MEMORY FOR ALL	ATI VGA WOND 512K + 549		
dBASE IV 545	Turbo Assembler 119	• NQL 132 COL. 9 PIN	PARADISE VGA PLUS 339		
dBASE IV LAN PAK 765	Dflow v1.27 129	• NLQ 80 COL. 9 PIN	PARADISE VGA PLUS 386		
Foxbase + 2.1 295	MS Windows Devel. Kit 449	• PRINTING UTILITIES	AST RAMPAGE PLUS/512K 769		
Foxbase + 386 2.1 448	Norton Guides 78	• RIBBONS FOR ALL	AST RAMPAGE PLUS/512K 569		
Foxbase + LAN 2.1 448	Norton Guides OS/2 89	• QL 132 COL. 9 PIN	AST RAMPAGE PLUS/512K 675		
Foxbase + LAN Runtime 498	Turbo Pascal v4.0 85	• MENU & SECURITY	AST RAMPAGE PLUS/512K 675		
Foxbase + Runtime 395	MS Pascal v4.0 309	• DIRECT ACCESS	AST RAMPAGE PLUS/512K 675		
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Paradox 386 749	MS Quick Pascal 78	GRAMMATIK	AST RAMPAGE PLUS/512K 675		
Professional File 2.0 219	MS Quick Pascal 78	MS WORD	AST RAMPAGE PLUS/512K 675		
QSA 3.0 273	Turbo Basic 85	MULTIMATE	AST RAMPAGE PLUS/512K 675		
Rapidfile 299	Turbo C 2.0 119	PROFESSIONAL	AST RAMPAGE PLUS/512K 675		
Rbase for dos 549	Turbo C Prof. 2.0 219	• PRINTING UTILITIES	AST RAMPAGE PLUS/512K 675		
Reflex Workshop 69	Turbo Pascal 5.5 129	• RIBBONS FOR ALL	AST RAMPAGE PLUS/512K 675		
R&R 3.0 (Report Writer) 144	Turbo Pascal Prof. 5.5 269	• QL 132 COL. 9 PIN	AST RAMPAGE PLUS/512K 675		
Reflex 124	PROJECT MGT	• MENU & SECURITY	AST RAMPAGE PLUS/512K 675		
VP Info 94	Harvard Project Mgr 3.0 499	• WORD PROCESSING	AST RAMPAGE PLUS/512K 675		
DESKTOP PUBLISHING	MS Project v4.0 399	GRAMMATIK	AST RAMPAGE PLUS/512K 675		
Byline 289	Superproject + 329	MS WORD	AST RAMPAGE PLUS/512K 675		
First Publisher v2.0 95	Superproject Expert 1.1 539	PROFESSIONAL	AST RAMPAGE PLUS/512K 675		
GEM Desktop Publisher 239	Timeline Graphics 2.0 159	• PRINTING UTILITIES	AST RAMPAGE PLUS/512K 675		
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B.C. BYTES

Bedford Offers

Accounting For Chickens

BURNABY, BRITISH COLUMBIA, CANADA, 1989 JUL 13 (NB) — Bedford Software has released an animated demonstration disk for its Macintosh-based Simply Accounting software. "An Introduction to Simply Accounting" is intended to help dealers educate themselves and their customers about computerized accounting. The theme is chickens, as in "computerizing business accounting can ruffle even the smoothest feathers," and "Simply Accounting makes stars of the most chicken-hearted computer users." The program is free to dealers and users who call Bedford at 604-294-2394.

(Contact: Jim Secord, Bedford Software, 604-294-2394)

Bedford Sale Completed

BURNABY, BRITISH COLUMBIA, CANADA, 1989 JUL 10 (NB) — Bedford Software has completed the sale of the company's accounting software business and related assets to Computer Associates, and has changed its name to Stratford Software Corp.

On July 4, shareholders of Bedford approved the sale, and the name change. Stratford Software will continue to be traded on the Toronto Stock Exchange, and will proceed with development of Suzy, an online information product. The accounting software business was sold for C\$15.65 million plus assumption of certain related liabilities.

(Contact: Terry McDonald, Stratford Software, 604-294-1311)

Vancouver Gets Mission Cyrus Plant

VANCOUVER, BRITISH COLUMBIA, CANADA, 1989 JUL 20 (NB) — Mission Cyrus, which announced an ambitious line of personal computers at Comdex/Spring earlier this year, hopes to build a highly automated factory here. The plant would build the Darius line of 386-based personal computers for the North American and European markets, said Farad Azima, president of Mission Cyrus. A subsidiary of the British electronics firm Mission Corp., Mission Cyrus has its North American headquarters in Vancouver.

Azima said his company hopes to start construction of the new plant. The structure will probably be built on the University of British Columbia's endowment lands, adjacent to the university campus. Costing about C\$10 million and covering about 75,000 square feet, the plant will be very much a 21st century manufacturing facility, based on flexible manufacturing techniques and a great deal of automation, Azima said. He added Mission Corp. is currently building a similar plant near Cambridge, England, to manufacture personal computers and audio equipment.

Azima said the Vancouver location was chosen for several reasons. One, he said, is that executives of the British company feel more comfortable in Canada than in the United States. Azima himself is a Canadian citizen. Another consideration was the desire for close research ties to a university. In Silicon Valley, Azima said, many companies are competing for involvement with the universities. The Canada-U.S. Free Trade Agreement made locating in Vancouver a little more attractive, he added. Azima said that by the time the plant is complete the target is early 1992 his company plans to employ about 300 people in Canada. About 50 work for Mission Cyrus now, he said.

The parent company recently invested about C\$4.5 million in Mission Cyrus. The Discovery Foundation of British

Columbia is putting in C\$1 million over two years, Azima said, and the provincial government has underwritten C\$2.5 million in loans from the Royal Bank of Canada. The company has also attracted money from overseas investors, he added.

(Contact: Farad Azima or Tania Elvin, Mission Cyrus, 604-432-7727)

BUSINESS

Dell To Play In Big League

SAN FRANCISCO, CALIFORNIA, U.S.A., 1989 JUN 27 (NB) — Austin, Texas-based Dell Computers wants to come out of its low-end mail order computer niche and start designing, producing and marketing more sophisticated and powerful systems.

The company sent its research and development team to the San Francisco area to show off Dell's technical expertise. The team made it known that Dell has the expertise to compete in a world of multitasking and multiprocessing, graphical interfaces and ASICs.

Part of Dell's move into higher-end computers will involve developing a RISC-based computer. The company is looking at four RISC-chip options but is not yet ready to commit to a particular RISC platform. Dell has commented that the company will produce CPUs based on the 80485 and 80585 chips if such ever come into existence. The company has also announced it is considering a multiple 80386-based architecture consisting of 2 or more 386 chips operating in parallel. Decisions as to which way the company will go seem to be hanging on software and operating system considerations.

Commodore Lowers Expectations

WEST CHESTER, PENNSYLVANIA, U.S.A., 1989 JUN 28 (NB) — Due to recent increases in the value of the U.S. dollar versus many foreign currencies, Commodore International has announced that it expects fourth quarter sales to be below those for the same period last year.

Commodore relies on overseas sales for 75 percent of its market, making it especially vulnerable to currency swings, and the company may even experience a modest loss for the quarter ending June 30 even though it reports strong sales in the professional-level Amiga 2000 and PC-compatible product areas.

(Contact: Carden Welsh, treasurer, Commodore International Limited, 215-431-9100; Gary Fishman of Donald Reynolds Associates, 212-661-1830)

Software Firm Slams Egghead

SYDNEY, AUSTRALIA, 1989 JUN 21 (NB) — Adaptive Software, the Australian developer and producer of Tracker business-contacts software package, has ended its trial of sponsored shelves in U.S. Egghead stores.

Following the long-term practice of supermarkets, Egghead sells shelf space to software publishers. For a reported US\$6000 for 30 days, a publisher can ensure shelf space for its products.

Adaptive did just this with Tracker, and despite a good response, the company has withdrawn from the scheme. "Doing business with Egghead was a nightmare," said Adaptive's Daryl Rosenmeyer in California. "We sold 257 units in the month but Egghead still wasn't interested in us without the subsidy."

CD-ROM

CD-ROM Up 500%

COLUMBUS, OHIO, U.S.A., 1989 JUL 6 (NB) — The Optical Publishers' Asso-



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APPLICATIONS

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CENTRONICS 150	5.70
CITIZEN 120D	8.00
DATA ROYAL 5000	6.10
DIABLO HYTYPE 2	5.00
EPSON EX800/1000	12.20
EPSON LQ 800	7.80
EPSON LQ1000	10.90
EPSON LQ1500	7.50
EPSON LQ2500	13.00
EPSON LQ2550	14.90
EPSON MX/RX/FX 80	6.30
EPSON MX/RX/FX100	8.20
FUJITSU DL2400,DPMG 24	30.20
FUJITSU DL3400	10.40
FUJITSU DX2100,2200	9.80
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IBM PROPRINTER XL	12.50
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NEC 5500-7700	6.40
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NEC PINWRITER P3,P7	13.20
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ciation says that 1988 was the year of the CD-ROM, with an industry growth of 500 percent.

The Optical Publishing Industry Assessment 2, co-sponsored by the OPA and Pittsfield, Vermont-based InfoTech, has released a recent study wherein 80 percent of CD-ROM publishers and hardware manufacturers show total sales of \$406 million in 1988 versus only \$81 million the previous year.

The installed base of CD-ROM players jumped from 32,500 at the end of 1987 to 171,000 by the beginning of this year.

The complete report is available for \$300 (non-members) or \$150 to OPA members. For further information call 614-442-1955 or fax 614-442-6522.

The Optical Publishers' Association is a trade association with members worldwide. The OPA's purpose is to promote the CD-ROM industry through co-op advertising and by sponsoring industry studies and professional seminars.

Upcoming OPA events include SIGIR '89, June 25-28 in Cambridge, Mass.; Hypertext and SGML, July 25 at Northeastern University, Boston, Mass.; and a deal-making industry networking session during the October CD-ROM Expo in Washington, D.C. SGML stands for Standard Generalized Markup Language, a CD-ROM industry technical standard, and SIGIR is Special Interest Group Information Retrieval.

The OPA also publishes a free bimonthly newsletter, "The Circular." For a subscription, write to Optical Publishing Association, 1880 Mackenzie Dr., Suite 111, Columbus, Ohio, 43220, U.S.A.

DATABASE

dBase III Under Windows

LONDON, ENGLAND, 1989 JUN 30 (NB) — Megatech Software has released dBfast/Windows, a software language development system running under Microsoft's Windows operating system environment on the PC. The package allows an MS-Windows interface to be added to dBASE and Clipper applications.

Interestingly, the package claims to be able to develop dBASE applications which run up to 15 times faster than ordinary interpreted dBASE applications. The code execution advantage is said to be due to the use of the Windows environment, which allows concurrent working of several modules within a given package.

Applications developed under dBfast/Windows can also be ported to the Apple Macintosh environment using Megatech's forthcoming dBfast/Mac package. dBfast/Mac also allows Mac applications to be ported over to the dBASE/Windows environment.

dBfast/Windows is available immediately in the U.K., whilst dBfast/Mac will ship from the end of July onwards. Both packages retail for UKP 249.

(Contact: Theo Van Dort, Megatech Software - Tel: 01-874-6511)

DESKTOP PUBLISHING & GRAPHICS

Chinese Mac At MacWorld Asia

SINGAPORE, S.E. ASIA, 1989 JUN 29 (NB) — Apple Computer International and Aldus Corporation today jointly announced a complete desktop publishing system for the Chinese-language market, which they claim places Apple at the forefront in this area.

Satish Chahil, Apple Pacific's director of marketing, accompanied by Paul

Brainerd, Aldus president, said the news reflects Apple's commitment to the development of localized systems, which is crucial to meeting the unique requirements of Asia.

The new Chinese desktop publishing system is made up of Apple's Chinese Talk 6.0.3 system software for the Macintosh and LaserWriter IIINTX-A laser printer that supports the Chinese-language character set, and Chinese-language versions of Aldus' PageMaker 3.0 page layout software.

Apple's Chinese Talk 6.0.3 is described, among a number of major enhancements, as offering support for Chinese Postscript fonts and MultiFinder compatibility, including background printing. Compatible with all Macintosh software, Chinese Talk 6.0.3 also boasts an enhanced user interface.

The LaserWriter IIINTX-A is designed to produce eight pages per minute at resolutions as high as 300 dots per inch for text and graphics and is able to meet the requirements of individual users or up to 31 users in a network.

Aldus PageMaker 3.0 is an improved version of Aldus' original interactive publishing platform which integrates text and graphics for the design, editing and production of high-quality printed documents.

Two Chinese versions of PageMaker 3.0 are available, one for traditional characters in use in Hong Kong and Taiwan, and the other for the simplified characters in the People's Republic of China and Singapore.

Aldus products are now available in 12 different languages, and the Macintosh can now display multiple scripts using Standard ChineseTalk, Simplified ChineseTalk, ThaiTalk, HangulTalk, UrduTalk, Devanagari, KanjiTalk, as well as the standard Roman characters, and other scripts such as Arabic, where text flows right to left instead of the normal left to right for English.

Aldus' new products require a Macintosh with 2 MB memory and a 20MB hard disk, Apple's Chinese Talk 6.0.3 and a LaserWriter or ImageWriter printer or the new LaserWriter IIINTX-A to run.

(Contact: Daniel Cheung, Apple Intl Hong Kong, Ph: [852] [5] 844.2415)

Interleaf Slashes Publisher Price

CAMBRIDGE, MASSACHUSETTS, U.S.A., 1989 JUL 5 (NB) — Interleaf has reduced the price of its text-and-graphics publishing product for the Macintosh to \$995 from a previous price of \$2,495. Considered the Rolls Royce of publishing software, Interleaf Publisher combines word processing, advanced graphics, and automated desktop publishing all in one package. It's useful for everything from business documents to book publishing.

The dramatic price cut was ordered because this version of the product is reaching the end of its life cycle. David Boucher, Interleaf's president, confirms that Interleaf is working on a new, enhanced version that will run on all of Apple's 68030-based machines.

AutoDesk Animation For The PC

SAUSALITO, CALIFORNIA, U.S.A., 1989 JUL 22 (NB) — Autodesk will enter the general-purpose desktop video and animation market with a \$299 package for the PC called Autodesk Animator. Due to be shipped in late August and unveiled at SIGGRAPH in Boston, August 1, Autodesk Animator is Autodesk's first mainstream product outside its computer-aided design line, and is designed to be for the PC what MacroMind Director is for the Macintosh.

Autodesk Animator allows a PC user to animate, edit, and produce on the hard

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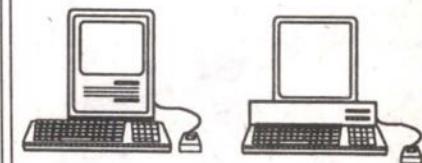
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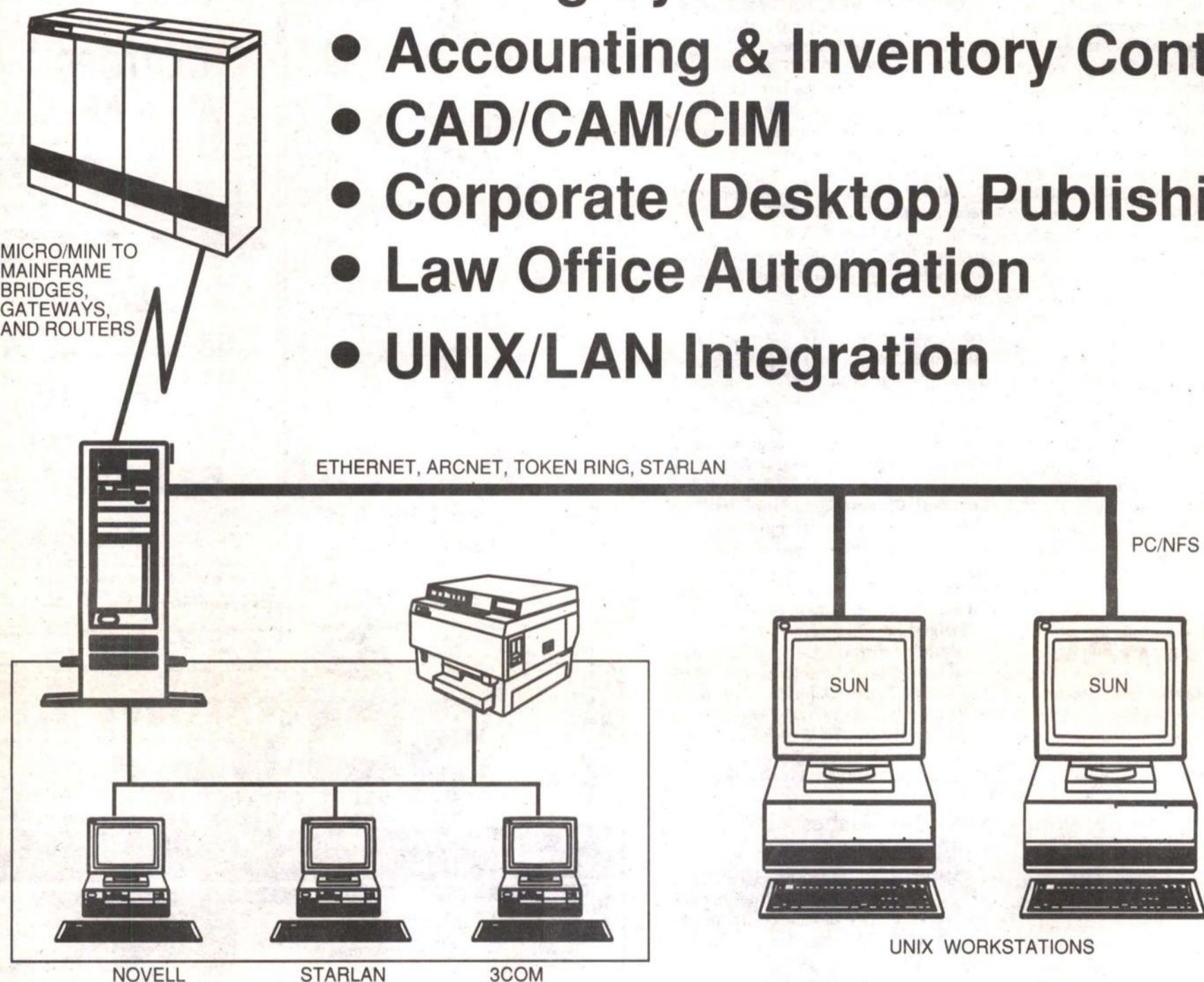
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disk a presentation from a few minutes to an hour in length. The finished product can be output to a VHS machine. There are five types of animation techniques, image processing capabilities, 572 true-color paint effects, a mouse interface, as well as a projector/player module which allows a scene to be played back for the user, or copied and played back for business associates and friends.

The program runs on Compaq, IBM PC, PS/2 and 100-percent compatible PCs equipped with a VGA card and mouse. Output requires a VGA card with NTSC output capability.

We think there's a huge market out there in animation for PC users. They've been at the back of the bus, as far as computer graphics are concerned, Autodesk spokesman Andrew Zarrillo tells Newsbytes.

Corel Draw Updated

OTTAWA, ONTARIO, CANADA, 1989 JUN 22 (NB) — Corel Systems has announced Version 1.1 of its Corel Draw graphics package. The new version, to be available in July, supports the clipboard in Microsoft Windows and imports and exports Computer Graphics Metafile [CGM] files. It also offers 45 new typefaces, bringing the total to 102. A typeface conversion program called WFNBOSS allows use of Agfa Compugraphic, Altsys Fontographer, Bitstream, Digi-Fonts, The Font Company, HP Compugraphic Type Director and Z-soft Type Foundry typefaces as well.

The new release is priced at US\$595. Registered users can obtain upgrades direct from Corel for US\$99. Corel Draw runs under Microsoft Windows on all 80286- and 80386-based PCs with at least 640K bytes of random-access memory.

(Contact: Arlen Bartsch, Corel, 613-738-8200)

GENERAL

Food Sensitivity Software

MONTEREY, CALIFORNIA, U.S.A., 1989 JUL 14 (NB) — If you frequently say "It must have been something I ate," when feeling ill, but never quite get around to figuring out what, a new PC program called WellAware: Food Sensitivity is aimed at you.

Designed by family physician Dr. Eliot S. Light, WellAware Version 1.5 is now shipping. The program gives users meal-planning capabilities, expanded ingredient and additive information, and a streamlined data-entry system. The program is used for detecting, confirming, and treating problems linked to food allergy and food sensitivity.

Version 1.5 not only allows the user to keep a food and symptom diary, employing a pattern-recognition function that identifies foods and additives most likely to be causing symptoms to worsen, but generates a chart showing whether suspected ingredients and additives are present in each of the user's foods.

The program comes with a database of over 3,000 foods, including fast foods, brand name, processed, and baby foods. The program can usually establish food sensitivity after examining five to 10 such occurrences, says Dr. Light.

The program costs \$99 and requires a PC or compatible with 512K bytes of random access memory and DOS 2.0 or later. It can be ordered by calling 1-800-462-WELL or 408-474-5739.

Computerized Big Brother Checks Aussie Taxes

CANBERRA, AUSTRALIA, 1989 JUN 26 (NB) — Australia's 11 million taxpayers will have their bank-account interest data located, searched, and compared to their tax returns by Tax Office computers using the new Tax File Number (TFN) system

by the 1991-1992 financial year. This follows the issue of TFNs to Australia's taxpayers in April this year, and the stringent rules which went with it, such as the requirement, and incentive, to quote a TFN when opening an account [unless they want their interest taxed at a rate of 47 percent] from July 1, 1990.

Taxpayers with existing accounts must give their banks their TFNs by July 1991 so the tax office can trace their accounts without relying on sometimes unreliable name-and-address information. The Tax Commissioner, Trevor Boucher, said omissions or understatements of interest income on bank accounts would be checked using the new TFN details, and earlier returns could also be checked.

Boucher said the measure would raise in at least AUS\$500 million that the ATO misses out on every year through tax evasion. Assistant Tax Commissioner Jerry Barry said banks supplied the ATO with name, address, and account interest information on magnetic media such as computer disks or tapes. He said banks were not required to give individual account numbers "even though it suits some banks to do so."

Officers of the Australian Bankers' Association were unable to comment by press time; neither were a number of banks. However, a Commonwealth Bank spokeswoman said banks — *were* — required to give the ATO detailed information about customers' accounts. And a National Australia Bank spokesman said banks — *had* — to give a list of customers' accounts and the interest they earned if it was more than AUS\$100.

This information is compared by ATO computers to details given in taxpayers' returns, and should any discrepancies occur, the accounts could be singled out for investigation. This is made much easier through the use of TFNs, which, unlike names and addresses, cannot be changed or confused with others, according to the ATO.

The advent of the recently introduced electronic tax returns, filed by tax agents using either magnetic media or an online link, would make the system even more efficient because the data does not need to be keyed in by the ATO.

An Wang Hospitalized

LOWELL, MASSACHUSETTS, U.S.A., 1989 JUN 29 (NB) — Dr. An Wang, the 69-year-old Chinese immigrant who founded Wang Laboratories on the money he obtained from selling a memory patent to IBM, is suffering from esophageal cancer, sources report.

Dr. Wang is currently undergoing tests and chemotherapy and will have surgery next month.

Wang Laboratories established a dominant position in the early 1960's with distributed processing based on small central calculators with hard-wired terminals located on desks throughout offices.

The original Wang computers were far less powerful than even today's wrist-watch calculators but, in their day, were very cost-effective. In recent years Wang lost much of its luster after the market for its dedicated office-computer systems fell apart.

Wang never successfully entered the personal-computer hardware or software markets but is currently making a big push with its optical storage and document-processing technologies.

Newsbytes has seen demonstrations of the latest Wang imaging system which features ease-of-use.

Dr. Wang has been the driving force behind Wang Laboratories since its founding, although his son took over much of the day-to-day management a few years ago.



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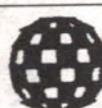
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Supercomputer Debuts

EDMONTON, ALBERTA, CANADA, 1989 JUN 21 (NB) — Myrias Research showed its SPS-2 parallel-processing supercomputer for the first time this week, at a conference in Toronto. Formally announced last fall, the SPS-2 is the only supercomputer manufactured in Canada. Ken Gordon, director of business development at Myrias, said one SPS-2 is already installed at the Alberta Research Council, and a second has been shipped to the United States Department of Defense. A third order will likely be announced soon, Gordon added.

Gordon said the Myrias SPS-2 exceeds the performance of the Cray Y-MP supercomputer in several benchmarks developed by the Los Alamos Laboratories in the U.S. However, he said, supercomputer applications tend to divide into those best suited to vector processors such as Cray's machines and others more applicable to parallel architectures such as that Myrias uses. Myrias's competitors are therefore likely to be other makers of parallel-processing systems rather than Cray, he said.

Prices for the SPS-2 start at about US\$700,000. A 256-processor system, like the one used in the benchmarks to which Gordon referred, costs about US\$3 million. (Contact: Ken Gordon, Myrias Research, 403-428-1616)

the serious user or developer who wants to create disks similar to the "Guided Tours" that Apple ships with its Macintoshes.

Macromind, now based in San Francisco, will also allow a user to distribute multiple copies of a presentation made with its products, for a one-time licensing fee of \$250.

While Apple's Macintosh is generally believed to be two to three years ahead of IBM's PC in terms of multimedia software and hardware support, IBM is attempting to catch up with its new Audio Visual Connection, which was on display. The software and two boards enable the PC to capture and manipulate single-frame video images. IBM is working closely with Microsoft, which has devoted its entire multimedia division to development of PC multimedia tools, bypassing the Macintosh.

IBM WORLD

New PS/2 Push

SAN FRANCISCO, CALIFORNIA, U.S.A., 1989 JUN 28 (NB) — IBM has launched a new ad campaign aimed at convincing America that the PS/2 series of computers is what America needs, now. "How're you going to do it? PS/2 it!" is the slogan which will blast out from four TV commercials and a series of print ads. The all-singing commercials feature animation and special effects, including computer graphics, and were designed by Lintas: New York.

Fortified by what finally appears to be industry acceptance of the OS/2 operating system and PS/2 computers, as evidenced by massive orders from such industry giants as American and Delta Airlines, Kentucky Fried Chicken, NCR and Burger King, IBM calls its PS/2 line "the most successful product ever introduced."

IBM hosted a two-day PS/2 forum in San Francisco June 26 to showcase software from 19 companies. Borland displayed Paradox 3.0, which takes full advantage of OS/2's protect mode, extended memory, and multitasking capabilities. Ashton-Tate showed the OS/2 version of dBASE IV, Microsoft showed the OS/2 version of Excel, Wordperfect showed Wordperfect 5.0 for OS/2 1.0, and Lotus showed its new 1-2-3.

IBM also used the occasion to show off its newly announced 486/25 Power Platform, a new motherboard for the Model 70, to be available as soon as Intel can make enough of them — probably this fall — which doubles the speed of the machine. The speed, however, comes at a high price — \$3995. Add that onto the cost of a Model 70 and this top-of-the-line speed demon produces a \$12,000 price tag.

Bill Gates, Microsoft chairman, was among several IBM executives answering press questions at the forum. He said the coming 386 version of OS/2, due out in 1990, will not require more memory to work on PS/2 systems, but it will have a new memory-management scheme and will be totally downward compatible with software written in previous versions of OS/2.

EISA Leaves

The Vapor Realm

FOLSOM, CALIFORNIA, U.S.A., 1989 JUL 10 (NB) — Intel has finally demonstrated the first chip set designed to implement the Extended Industry Standard Architecture pushed by Compaq and eight other major makers of IBM PC clones. This means add-in board makers can now begin designing EISA boards, while AST, Compaq, Epson, Hewlett-Packard, NEC, Olivetti, Tandy, Wyse and Zenith prepare to release large volumes of machines with the EISA bus, which is designed to compete with IBM's Micro

Channel Architecture used in the PS/2.

The EISA "Gang of 9" expect product using their slot design will ship in the fourth quarter of this year, on schedule. To date, more than 200 companies around the world have announced their intention to develop hardware products for EISA computers. Micro Computer Systems of Dallas also announced a program to simplify installation of add-in boards using EISA. The Extended ISA Configuration Utility can also make sure old boards are compatible with the new systems EISA makers are making. The utility will be sold to the computer makers, who can add their own proprietary twists to it if they want. The MCS utility automatically chooses direct-memory access (DMA) channels, interrupt request (IRQ) and memory address space requirements, and remembers the settings whenever the computer is turned on, simplifying the use and improvement of such PCs.

(Contact: Micro Computer Systems, Gary W. Phillips, 214-929-4182)

Advanced Logic 486 Plans

IRVINE, CALIFORNIA, U.S.A., 1989 JUL 9 (NB) — Advanced Logic Research (ALR) has unveiled its plans for the i486 chip.

The company had announced its intention to market i486 product immediately following a similar announcement by IBM several weeks ago. AST Research, also of Irvine, CA, also announced i486 product at the same time and last week revealed new upgrade boards for its high end computers.

ALR is taking a different approach. The company is unveiling a new computer, PowerFlex Model 40, which has a 12.5 MHz 80286 CPU that can be upgraded to either a 486 or a 386SX. Owners will be able to swap the 12.5-MHz 286 for a 16-MHz 386SX that will nearly double

the machine's performance, or for a 25 MHz 486 that would double the performance obtainable with the 386SX upgrade.

There is one possible problem. The PowerFlex uses a standard 16-bit AT-style bus. While this should not affect the performance with the 386SX upgrade, it may bottle up much of the 486's power. ALR does not plan to incorporate a large external cache on the 486 upgrade card but will depend on the 486's own 8 kbyte internal cache.

(Contact: Advanced Logic Devices, 714-581-6770)

CA Revises Payroll

VANCOUVER, BRITISH COLUMBIA, CANADA, 1989 JUL 3 (NB) — Computer Associates Canada has released Version 5.1 of Accpac Plus Canadian Payroll. The new release features an improved user interface and improved online help, support for departmental accounting, automatic indexing of TD1 claims, and greater flexibility in defining earnings and deductions. The new version also comes with the latest tax tables.

Accpac Plus Canadian Payroll can be run alone or integrated with other Accpac Plus modules in a complete payroll accounting system. It retails for C\$1,200 and includes both 3.5-inch and 5.25-inch disks. Those who bought Canadian Payroll since June 1 and those who subscribe to CA's SupportPlus program for Canadian Payroll will get the upgrade free. Others can upgrade for C\$295.

(Contact: John Schouten, Computer Associates Canada, 613-737-3322)

Testers Like New Windows

SYDNEY, AUSTRALIA, 1989 JUNE 23 (NB) — Australian developers of Microsoft Windows-based products have been testing the unreleased version 3.0 of the

product and have given it the thumbs-up. They told Newsbytes that the new features they liked include the ability to address up to 16 megabytes of memory, proportional system fonts, higher speed and new graphical interface.

The beta-test version is a 386-only product but the release version will also support 286 machines. One user likened the new product to OS/2. "We feel that this is just one more hint that IBM and Microsoft want to make the transition to OS/2 as smooth as possible," she said.

In addition, the developers talk of better development tools in the new package but warn that not all existing programs appear to run under the new interface. The product is expected by September or October.

Lotus Ships!

NEW YORK, NEW YORK, U.S.A., 1989 JUN 20 (NB) — Lotus Development has announced at the New York PC Expo that the long-awaited new MS-DOS and OS/2 upgrade to Lotus' popular spreadsheet is finally shipping.

Reportedly, the new release makes major improvements in database capabilities, data analysis, printing, and graphics, also adding full network support, external data-access capabilities, and easier customization.

Lotus 1-2-3 Release 3 runs in the protected mode and will need a minimum of an 80286-based computer with one megabyte, or 1 MB, of memory under MS-DOS and 3 MB minimum for the OS/2 version. Users can access up to 16 MB of extended memory directly, in addition to 8 MB of expanded random access memory, or RAM, using the Lotus/Intel/Microsoft Expanded Memory Specification 3.2, and up to 32 MB of RAM using LIM 4.0.

Many of the enhancements in the new \$595 version of 1-2-3 reflect capabili-

ties already available in other top-of-the-line spreadsheets, including the ability to work three-dimensionally, link up to 256 spreadsheets, and work with several files loaded into memory simultaneously.

Another new feature is the DataLens that lets 1-2-3 spreadsheets access data stored in dBASE III files as if they were in another linked spreadsheet. A tool kit for developers will reportedly ship in the third quarter of this year.

Network versions of Release 3 will be priced at \$695 for the server program and \$395 for each node, and the regular DOS and OS/2 version will be discounted to \$495 until the end of this year.

Foreign-language versions of the product will be available in French, German, Italian, Swedish, Spanish, and Dutch in the third quarter of this year. Portuguese and Danish versions of the product will follow in the fourth quarter.

To increase the ease of porting Lotus spreadsheet products to other computers, the newest version of 1-2-3 was coded in the C programming language which runs on nearly every computer and was the language used to create Unix. This should make Lotus' stated intent to market versions of 1-2-3 for a wide range of computers easier to accomplish.

Lotus plans to deliver 1-2-3 Release 2.2, a straightforward upgrade of the current Release 2.01, later this year. This is a smaller version which would run on any PC-compatible computer with 640 kilobytes of memory. Version 1-2-3/G is also being developed to take advantage of OS/2's Presentation Manager graphics capabilities, but that version will require a minimum of 4.5 MB of RAM and full VGA graphics capabilities because OS/2 PM requires a great deal of memory itself.

Lotus' dominance of the business spreadsheet market has recently been challenged by superior programs like



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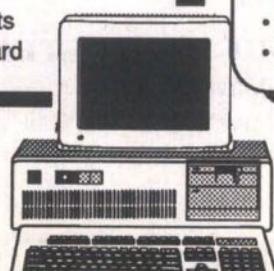
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SuperCalc 5, which shipped last year with most of the newly released Lotus product and maintained complete Lotus compatibility while enhancing nearly every aspect of the traditional spreadsheet. Other major competitors are Microsoft's Excel and Borland's Quattro, which take entirely new directions in spreadsheet development.

The success of the new versions of Lotus 1-2-3 are vital to the company's financial health, since, although Lotus offers a range of graphics, word processing, personal information management, and integrated programs, more than 60 percent of its income comes from sales of its spreadsheets.

(Contact: Susan Earabino, 617-225-1281)

IBM Goes To 486

NEW YORK, NEW YORK, U.S.A., 1989

JUNE 20 (NB) — IBM has beat all other U.S.-based computer makers to the punch by announcing an Intel 80486-based computer, upgraded from the 33-MHz PS/2 Model 70-A21 desktop computer.

The replacement processor board, designated the IBM PS/2 486-25 Power Platform, takes the place of the small processor board in the \$11,000-plus Model 70. The new processor operates at only 25-MHz, but because of special features of the new chip the machine will perform at least twice as fast as 33-MHz 80386-based computers now on the market.

The price of the Power Platform will be about \$4,000 (not counting the required Model 70-A21) and the adapter will ship in the fourth quarter of this year, according to IBM's Linda Dezan.

By entirely skipping the 33-MHz step for 80386 computers, IBM has jumped

past all its domestic competition. The announcement comes just one week after U.K.-based Apricot announced an i486 machine.

In a related move, the price of the 25-MHz 80386-based PS/2 Model 70-A21 will be reduced from \$11,295 to \$8,999.

The recently announced Intel i486 chip makes use of limited Reduced Instruction Code architecture, increased command and data buffers, and built-in floating-point coprocessor to provide performance two to four times faster than even 33MHz i386 computers.

LAW

New Grammatik For WordPerfect

SAN FRANCISCO, CALIFORNIA, U.S.A., 1989 JUN 26 (NB) — Reference

Software has announced a new version of Grammatik that will check grammar and style errors and make corrections without exiting WordPerfect 5.0.

By pressing a hot key, users of Grammatik III version 1.1 automatically save their document and then can check it to make corrections. Another keystroke returns the user to WordPerfect with the corrected document already loaded and the copy stored as back-up.

Also, Reference Software has improved Grammatik's error checking by incorporating new grammar rules and phrases, based on suggestions from Grammatik users. The program uses artificial intelligence to identify hundreds of common business-writing errors. The product is also compatible with Word 5.0, WordStar 5.5, Professional Write 2.01 and First Choice 3.0. Available on 5.25 and 3.5-inch floppies, the product retails for \$99 and can be ordered by calling toll-free 800-872-9933 or 415-541-0222.

(Contact: Pat Meier, 415-957-1733)

Barrister Markets With IBM

BUFFALO, NEW YORK, U.S.A., 1989 JUL 5 (NB) — A leading supplier of law office computer systems, Barrister Information Systems, has joined forces with IBM to market its financial software with IBM AS/400 and System/36 computers.

The one-year agreement will benefit IBM through increased sales of its AS/400 computers and let Barrister offer integrated systems that can be networked with IBM PS/2 PC computers using IBM as well as Barrister's own Series 3000 computers.

(Contact: Kathryn Apenowich, 716-845-5010)

McGraw-Hill Buys Novell Magazines

NEW YORK, NEW YORK, U.S.A., 1989 JUL 17 (NB) — McGraw-Hill, on a magazine-buying binge, acquired LAN Times, Selling Red, and NetWare Technical Journal from Novell, adding to its chain of publications which includes BYTE and UnixWorld, purchased last week.

All three former Novell publications cover computer networks, which are Novell's major hardware and software business, and LAN Times has a circulation of about 100,000. The magazines will continue to be published in Provo, Utah.

(Contact: Elizabeth L. Russo of McGraw-Hill, 212-512-3493)

SHAREWARE

Search & Retrieve With PC-Browse

SEATTLE, WASHINGTON, U.S.A., 1989 JUN 30 (NB) — Quicksoft has announced PC-Browse, a new RAM-resident tool which allows you to bring up file directories, ASCII text documents, or PC-Write word-processor documents on top of any application, either to search them or link them in hypertext-like style. File names or text strings within files can also be keyword searched, and wildcard characters allow the user to find a file without knowing the exact name.

Once the file is in view, pieces of it or the entire document can be printed or pasted into another application, or can be saved as another file name. All functions can be "hot-keyed," and the program is said to perform very fast.

Company President Bob Wallace says the product puts his company on the technological edge for the first time. "We're breaking new ground," he says.

Due out at the end of the summer, the program is shareware, but full registration, with support and manual, will cost \$49. The program will run on PC's or compatibles with 3.5 or 5.25-inch floppy drives under DOS 2.0 or higher.

Canada's Most Wanted!

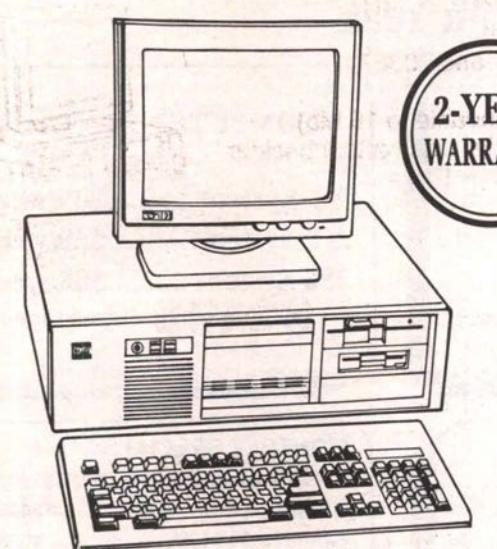
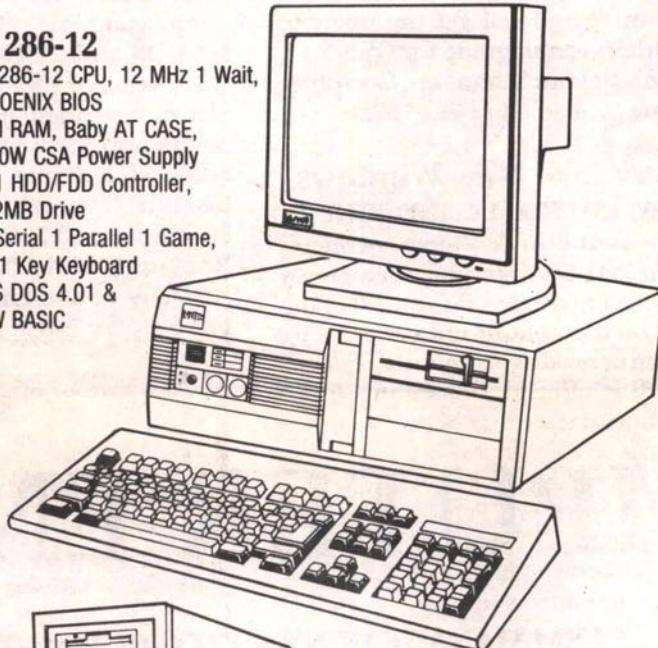


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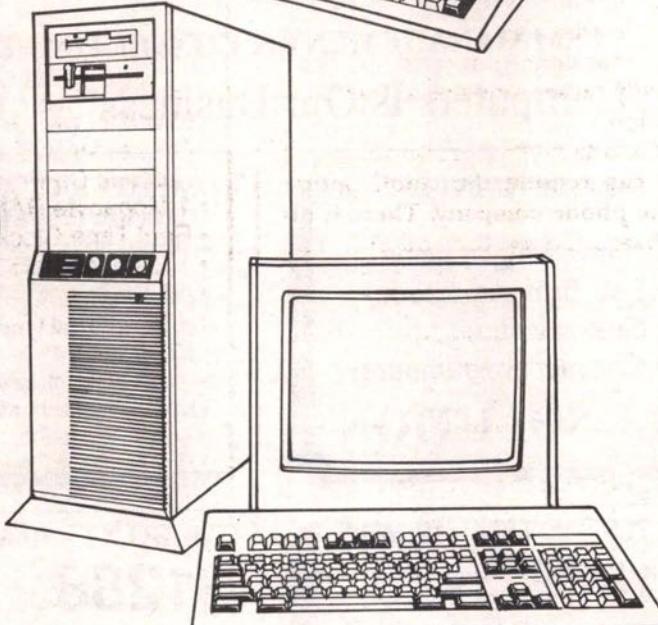
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(Contact: Miriam Harline)

TELECOM & FAX

An Obit For The Source

COLUMBUS, OHIO, U.S.A., 1989 JUN 29 (NB) — The Source, a 10-year old information utility which has hosted Newsbytes since 1983, will no longer exist as of August 1. The service, based in McLean, Virginia, has been purchased by long-time rival CompuServe, which will close it on that date.

CompuServe is a unit of H&R Block, which last year tried to buy National Data Corp., a large transactions processor. Earlier this year Block sold its NDC stock at a healthy profit. The Source, meanwhile, was purchased by venture capitalists Welsh, Carson, Anderson & Stowe in 1987, who were unable to realize their dream of synergy with related companies, most notably Comdata Networks of Nashville, Tennessee. WCA&S paid an estimated \$10 million for The Source. Most likely CompuServe paid much less, since it sought only the subscribers and not the on-going business. Earlier this year, The Source laid off one-fourth of its staff, and the remaining 60 will be let go by CompuServe, although they will be interviewed for open positions at the company.

The 53,000 remaining Source members will each get a Compuserve ID and password, good for a \$20 usage credit, or about an hour and a half of online time at normal rates. Source members can get their Compuserve passwords by calling 800-635-6225. Compuserve has not decided which Source features to port over to Compuserve, nor which private networks to maintain. Those decisions will be reached within a few weeks.

At its peak, The Source had about 80,000 subscribers, who paid a \$10/month minimum fee for the service. CompuServe, which built its subscriber base to over 500,000 without a monthly minimum, recently instituted such a program, and reportedly the number of subscribers has fallen as a result. CompuServe is facing increasing market pressure from GEnie, a service run by General Electric, the gateway services of the Bell Operating Companies, Minitel Services Corp., a joint-venture between the French videotex network and Infonet's data network service, and Prodigy, a joint-venture between IBM and Sears.

The end of The Source became obvious earlier this year when the Year-end Online Index compiled by Information Industry Bulletin, published by the Digital Information Group of Stamford, Conn., reported that while online information services in general grew by 14 percent in 1988, The Source was down 28 percent.

No FAX Thanks

— An Editorial

WASHINGTON, D.C., U.S.A., 1989 JUL 14 (NB) — Just to set the record straight, I am vehemently opposed to fax; sure, it lets non-technical types like my wife's former boss, who never did learn what that flashing "out of paper" light on the office photocopier meant, transport his missives to the waiting hands of other paper-bound executive types, but what about those of us who recognize technology as a tool rather than as an enemy?

Basically what fax does is take material which was probably already in computer-readable form, put it on paper, optically scan that text, convert that image into digital form to go over the telephone

wires, and reconvert it at the other end into a more or less blurred image which then is either filed — another word for "lost" in most businesses — or laboriously re-keyed into computer-accessible form.

I realize that fax images do have a place, and contracts of various sorts need signatures which fax can transmit, but the vast majority of fax transmissions would be faster, more useful, and far less expensive if an electronic mail, or e-mail system were used.

Personally, I have two excellent fax cards on loan, one from Intel — the Connection CoProcessor, — the other from Quadram — a JT-Fax PSQ — but avoid using them as much as possible; for one thing, I far prefer calling an e-mail service when I want to. For another, I don't see how installing a separate fax phone line, a flat-bed scanner, and a fax card is a cost-effective alternative to my \$200/year FedEx bill.

One thing fax manufacturers have shown us is how a technology that was once completely moribund — fax machines have been available for years, but most people only started really using them two years ago — can become a major industry just because the makers decided to establish a standard so every fax machine could work with every other.

Fax cards for computers could do something similar for 9600-baud transmission if everyone got together and set a standard to transmit ASCII and binary files using the high-speed fax modems, but I for one don't hold out too much hope for this; cooperation for mutual benefit just isn't a big priority in the computer industry.

Do Not Disturb For Modems

TORONTO, ONTARIO, CANADA, 1989 JUL 13 (NB) — Some Bell Canada subscribers can now turn off the call-waiting feature on their phone lines while using a modem or making an important phone call. Bell is offering call-waiting cutoff throughout its territory — the provinces of Ontario and Quebec — wherever call-waiting is available from a central office that uses a Northern Telecom DMS-100 phone switch.

Bell spokeswoman Catherine Mason said the option was introduced mainly for people who use modems, because the beep that signals another call is waiting usually causes modems to lose their connection.

Bell Canada subscribers who have call waiting can request the cutoff option from the phone company. There is no extra charge. To use the option from a touch-tone phone, you pick up the receiver and press the star (*) key, then dial 70. On a rotary-dial phone, you dial 1170. Either way, you wait for the dial tone to return and then dial your call. Call-waiting is shut off for the duration of that call, and restored automatically once you hang up the phone. It is not possible, however, to shut off call-waiting for the duration of an incoming call.

(Contact: Catherine Mason, Bell Canada, 613-781-3332)

Multiplexed FAX-TV Debuts

TOKYO, JAPAN, 1989 JUN 20 (NB) — A new medium called multiplexed facsimile broadcasting is being eyed as the next consumer technology hit here. Multiplexed fax technology allows data to be sent via television transmissions to specially equipped fax machines.

Sanyo, Sharp, and Matsushita Electric Industries are aggressively developing the technology. They believe fax broadcasting will get fax machines in some 30 million more households, and each company has developed a prototype.

The television stations, however, say they will need considerable time to initiate the service since it is expensive and risky to offer yet another medium to the

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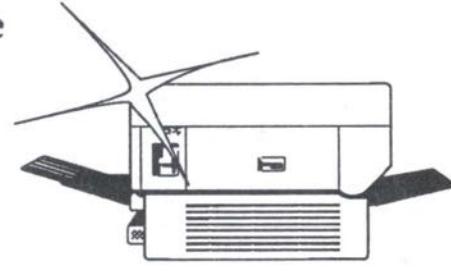
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- The same as the Desktop Model, although it is mounted in a space-saving Tower Case and includes a 250 watt Power Supply.

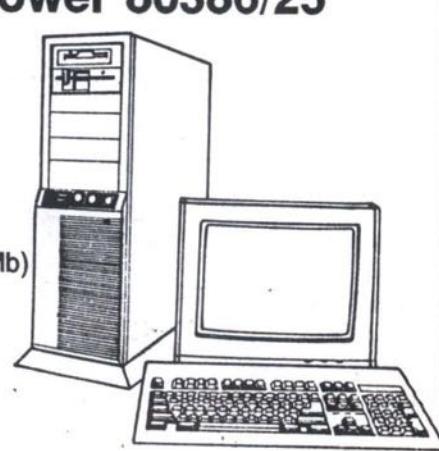


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- Serial, Parallel, and Games Ports



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public. Some have already been burned by the failure of teletext to reach a larger audience.

Colorado Tourist BBS Growing

DENVER, COLORADO, U.S.A., 1989 JUL 14 (NB) — Highly-specialized bulletin boards keep finding ways to grow, and while system operator Jay Melnick admits his Colorado TravelBank is not yet a full-time living, it's getting there.

The board is capable of handling 16 callers at once, and its data is used by X-Press Information Services for a cable-TV newswire. The system gets almost 400 calls each day, Melnick says, and pays for itself through advertising such items as condominiums for rent.

Melnick started his board in 1985 as the Colorado Snow Bank, but interest is now steady year-round with the addition

of things like white-water and river flow reports and other summertime information. The BBS can be reached on speeds of 300, 1200, and 2400 baud at 303-671-7669, 8-N-1.

The TravelBank runs the TBBS bulletin board program on an IBM PC AT computer. Melnick himself makes his living writing advertising and public relations copy, and says the key to success in the bulletin board business is persistence. "The longer you're around the more lists you get on. A lot of this business is word of mouth."

(Contact: Jay Melnick, 303-320-8550)

TRENDS

U.S. DRAM-Making Effort

SANTA CLARA, CALIFORNIA, U.S.A., 1989 JUN 21 (NB) — In a direct volley on Japanese dominance of the memory

market, seven chipmakers, backed by the Semiconductor Industry Association, have pitched in money and plan to offer technical expertise for a new chip-making venture called U.S. Memories to be based in the U.S. The last two American firms making memory chips in the U.S. are Texas Instruments, and Micron Technologies of Boise, Idaho; all others have buckled under from the low-cost, high-volume production in the Far East. America currently makes just 15 percent of the chips used in the \$12 billion North American market.

Hewlett-Packard, Intel, IBM, Digital Equipment, Advanced Micro Devices, LSI Logic and National Semiconductor each contributed \$50,000 to the patriotic venture and are seeking additional partners in order to amass \$1 billion to start the firm. Sanford Kane, formerly vice president of IBM's General Technology

Division, and a leader in the formation of the SEMATECH technology design consortium, is the group's president.

"The time is right for a collective memory manufacturing in what is truly a critical technology," said Kane at the news conference. "U.S. Memories represents a viable re-entry vehicle for America to add to its presence in the DRAM field." The group will license IBM's advanced memory design to produce four-megabit dynamic random access memory chips initially, but could go on to produce other kinds of integrated circuits.

The general feeling is that the alliance will not run into antitrust snags in Congress unless smaller U.S. firms object and take the matter to court. The firms have smartly vowed to buy product from U.S. Memories but will not have access to the proprietary chip-making technology.

(Contact: Jeanne Alford, SIA, 408-973-9973)

An End To Cable Jungle?

CAMPBELL, CALIFORNIA, U.S.A., 1989 JUL 10 (NB) — Using light to activate electronics is as old as the wireless microphone and television remote control. Now it's being applied to computer networks by Photonics Corporation in a new network scheme called Photolink.

Dick Allen is the man behind this new wrinkle, which bounces infrared light, instead of cabling, to send data between networked computers, and bounces data off sensors on the ceiling. The problem remains getting around corners. The best prospects for Photolink are companies with open offices, huge rooms using moveable chest-high dividers.

Allen explains that Photolink can be likened to an open office in which one worker aims a flashlight at the ceiling and spells out "SOS" in Morse code. That message could be communicated to virtually anyone in the office with an unobstructed view of the light "spot" on the ceiling. The light pulses are fast enough to simulate a data bit stream, as on the common television remote control. Each Photolink will support up to four computers or terminals and their accompanying peripherals. Priced at \$995 each — about \$250 per connection — Photolink will be sold initially in the United States and Canada.

Among the investors in Photonics, founded in 1985, are Apple Computer and four major venture-capital firms: Partners, Cornerstone Ventures, Crosspoint Venture Partners, and Venrock Associates.

(Contact: Photonics, Stephen P. Walsh, 408-370-3033)

Smallest 4-Meg DRAM

TOKYO, JAPAN, 1989 JUL 7 (NB) — Toshiba claims to have fit a four-megabit chip inside a one-megabit chip-sized package. Toshiba says its next-generation four-megabit dynamic random access memory (DRAM) chip has a circuit line 0.1 micron thinner than the current 4-megabit chip, and that access speed has been improved to 60 nanoseconds, 20 nanoseconds faster than ordinary 4-megabit chips.

Toshiba plans to sell this product next March after monthly output of its first-generation 4-megabit DRAM exceeds one million units. Toshiba expects that the new chip will immediately be attractive to firms already buying one-megabit chips and will help Toshiba gain the upper hand in the DRAM market.

16-MB Chips On The Way

TOKYO, JAPAN, 1989 JUL 7 (NB) — Makers of photoresists for semiconductor manufacturers, such as Japan Synthetic Rubber and Sumitomo Chemical, have started shipping sample photoresists

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for 16-megabit DRAM chips to large chip makers. Photoresist is a material needed to print circuit patterns on silicon wafers, which are the basis of integrated circuits. Each photoresist can be used to draw circuit lines as thin as 0.4 micron. Since a line width of 0.5 micron is vital to 16-megabit DRAM chip production, these photoresists are the precursors to volume production of this massively powerful memory storage medium.

Chip makers are now proceeding with technical evaluation of the photoresist on each test line. Photoresist makers intend to further improve the quality of the photoresist in the areas of sensitivity and heat resistance, which are necessary for volume production.

Though each new photoresist is targeted at 16-megabit DRAM chips, it could be adopted for manufacturing miniature versions of 4-megabit DRAM chips at an early stage.

Fastest Machine Unveiled

BEAVERTON, OREGON, U.S.A., 1989 JUN 19 (NB) — The fastest computer system in the world is what NCUBE, based here, claims to have made with its Ncube 2 Scalar Supercomputer. The modular, massively parallel supercomputer uses between 32 and 8,192 processors operating simultaneously to execute 60 billion instructions per second and 27 billion scalar floating-point operations per second — nine times the speed of a top-of-the-line Cray Y-MP. The Cray Y-MP also executes 32 billion instructions per second.

The parallel architecture is what allows this unit to operate so fast and what technical experts expect will be widely adopted by the industry.

But a computer is worthless without software, and this one has one package in addition to the Unix System 5.3 operating system. Oracle of Belmont, California, announced that it will create a Parallel Server Architecture version of its popular database management system (DBMS).

Prices start at \$495,000 and run up to \$30 million. At this price, there are already 170 customers waiting for delivery, says Ncube.

(Contact: Ann Lokey, Angus & Rudin, 415-363-0982)

Intel i786

NEW YORK, NEW YORK, U.S.A., 1989 JUN 20 (NB) — With IBM barely announcing implementation of the i486 computer chip, David L. House, Intel's vice president for microcomputer products, told attendees at Tuesday's PC Expo that the one-inch-square i786 chip would hold 100 million transistors and would be the heart of computers that would respond to voice commands.

The chip, which would include four central processors as well as an artificial intelligence-based user interface, is predicted to be available by the year 2000, just reaching actual computers by the turn of the millennium.

Although the comments were of a general nature and not meant to describe any actual device in detail, the address did shed light on Intel's general intentions and can be used as a guide to the future course of the Intel line of processor chips.

Japanese Women Buying Computers

TOKYO, JAPAN, 1989 JUN 21 (NB) — NEC, in a survey of PC-9800 and PC-8800 owners, says an increasing number of computers in Japan are being purchased by women.

According to the report, females accounted for 5.2 percent of all computer buyers last year — an increase from 2.9 percent in 1986 and 3.7 percent in 1987.

In a related development, NEC says more buyers are getting into PCs for the first time. People buying personal computers for the first time amounted to 63.3 percent of all computer buyers last year, compared to 32.9 percent in 1986, and 57 percent in 1987.

NEC believes the survey shows personal computers are now a widely accepted fixture in offices and are reaching a wider audience. Usage of the computers, however, has been limited to a single purpose, such as PC-8800 for playing games and PC-9800 for word processing.

Armed with the knowledge of the increasing interest of women, NEC plans a new marketing campaign aimed directly at them.

New Waves

Boost Fiber Optics

MORRISTOWN, NEW JERSEY, U.S.A.

1989 JUL 7 (NB) — Researchers at AT&T's Bell Labs are playing with a new wave called the soliton which could speed fiber-optic transmissions by nearly a hundredfold. The New York Times reports that although solitonic waves have long been known to physicists, they're only now being used. In recent experiments scientists sent a laser wave through 3,700 miles of fiber optic cable without a booster.

The most likely development from a new-wave form in fiber optic technology could be telefax transmissions of startling clarity. The New York Times reports that harnessing solitonic waves to transmit information on fiber optic lines could bring sharper, clearer fax images by boosting the number of lines which can be transmitted per page of fax, much like high-definition television improves image clarity by adding lines to transmissions.

(Contact: Bell Labs, Bob Ford, 201-564-4260)

World's Tiniest PC From Fujitsu/Poqet

TOKYO, JAPAN, 1989 JUL 5 (NB) — Fujitsu has invested \$8.7 million in a U.S. venture aimed at releasing the world's tiniest personal computer in the U.S. and Japan. Fujitsu now owns nearly half — 46 percent — of Sunnyvale, California-based Poqet Computer.

Poqet Computer has developed what it claims is the world's smallest and lightest IBM PC/XT-compatible, called PQ/XT. The \$US2000 hand-held unit measures 22 by 10 by 2 centimeters (US/English 8.6 by 3.9 by .7 inches), weighs 450 grams (US/English .992 pound, or 15.8 ounces), and works for up to 100 hours on two small dry batteries. The new gadget is scheduled to be available

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- 1 Parallel/Serial/Game
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- 6 Drive Bays
- Optional 80387-16 co-cpu
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With the tie-up with Poqet Computer, Fujitsu launches into a brand new market, that of the pocket PC, smaller than a hand-held. At some point in the future, when a Japanese version of the PQ/XT is available, Fujitsu will import and sell it in Japan.

Fujitsu expects 100,000 of the units to be sold in the U.S. and Europe when it goes on sale next month.

Epson's Faster Optical Disk

NAGANO, JAPAN, 1989 JUL 3 (NB) — Seiko-Epson has entered the erasable magnetic-optical disk field with a product that has an unique write/read film alloy. The ordinary composition of the film consists of cobalt, ferrum, and terbium. But Epson found that it had better results when neodymium and dysprosium, rather than terbium, were used in the film.

Seiko-Epson says the new alloy provides a more sensitive medium into which the read/write laser operates. The result is a data transfer rate that is double the standard 1,800 to 3,600 revolutions per minute.

Floppy Optical Disk

OSAKA, JAPAN, 1989 JUL 4 (NB) — One of the top polyester makers in Japan, Teijin Ltd., is forging ahead with research into a new flexible optical disk that is far more durable and stores more data than anything else on the market.

Based on technology licensed to Teijin last year by U.S.-based Optical Technology, Teijin Limited will accelerate development of the disk by assigning ten researchers to the product. Teijin believes this is the time to enter this market, what with competing storage methods, including optical cards, high-density floppy disks, hard disks, and erasable magnetic disks all being sold.

Teijin says this flexible optical disk can be read and written one million times, far more than the 2,000 times allowed by current optical disks. The 3.5-inch medium also is capable of storing between 100 and 200 megabytes of data.

The company expects to apply the disk in the consumer electronic field, including the compact-disk music market.

UNIX

Sun Clones From Taiwan

CALIFORNIA, U.S.A., 1989 JUN 21 (NB) — Sun Microsystems has licensed its SPARC reduced-instruction-set-computer architecture to two Taiwanese PC makers who will make low-cost Unix PCs. The deal, aimed at establishing the SPARC microprocessor architecture as a standard in the low-cost Unix computer market, was signed with Datatech Enterprises Company and Tatung Company. The systems will use the Open Look graphical interface developed by Sun and AT&T.

The involvement of Taiwanese PC clone-makers in the Unix market also signals a departure from the venerable MS-DOS, and Microsoft's ubiquitous operating system. Microsoft Chairman Bill Gates reportedly made a secret trip to Taiwan before this deal was closed, appealing to the firms not to depart from the beaten track. The trip reportedly paid off — one firm which was interested, Acer Technology, backed down from the deal, according to the San Francisco Examiner.

Scott McNealy, Sun president, says the two firms chose Sun's chips because they offered the most software possibilities. Some 600 applications exist for SPARCware, more than those offered for all other RISC/Unix platforms combined.

Tying up with Taiwan was a strategic move for Sun, as that country's PC industry is growing the fastest of any in the world. The country turned out 2.5 million PCs last year, according to International Data Corporation, with 84 percent of them sold in the U.S.

New SCO Unix 3.2

SANTA CRUZ, CALIFORNIA, U.S.A., 1989 JUL 3 (NB) — Santa Cruz Operation has released its latest version of Unix for the PC — SCO Unix System V/386 Release 3.2. You'll notice it's now called Unix and not Xenix. That's because AT&T has finally eased up the restrictions on the use of its operating system name, as it's determined that Santa Cruz Operation is friend, not foe. From now on, all releases of Unix from SCO will be called Unix, and not Xenix. SCO's Unix System V/386 is the first operating system licensed by AT&T to carry the Unix trademark.

The new version of Unix will also run on the coming 486-based systems, and is the latest offering in a line of operating systems that will support Industry Standard, Extended Industry Standard, and IBM's Micro Channel Architecture. It offers the ACER Fast File System, which is supposed to have a disk throughput up to 600 percent faster. Other improvements include more online documentation, and an integrated system administration shell. There's also a streamlined installation procedure along with a new mail-system configuration which allows it to communicate with a variety of different e-mail systems.

(Contact: Zee Zaballos, 408-425-7222)

NCR Adopts Motif & Open Look

TOKYO, JAPAN, 1989 JUN 22 (NB) — One of the major backers of Unix International, NCR, will provide both Open Look and Motif for its clients. Open Look has been presented by Unix International and Motif has been presented by the Open Software Foundation as part of two different graphical user-interfaces for AT&T's Unix System V4.0.

Standing firmly on the fence in this matter, NCR has decided to offer both graphical interfaces for its clients, mainly in the financial markets, where requests for both interfaces have originated.

Meanwhile, AT&T has announced it will jointly develop a Japanese version of Open Look with Fujitsu. The graphic interface will be developed in Fujitsu's Kawasaki Laboratory and the prototype version will be completed by November.

Sun Loses Some Shine

MOUNTAIN VIEW, CALIFORNIA, U.S.A., 1989 JUL 14 (NB) — With its glory already diminished by what analysts term highly competitive offerings this week from Digital Equipment, workstation maker Sun Microsystems announced it may report its first quarterly loss. Revenues, says the firm, may drop below the \$497 million mark and may result in the first quarterly revenue decline since 1986 — the year Sun went public.

The bad news, attributed to production problems, has caused Sun Chief Executive Officer Scott McNealy to implement an immediate austerity program. Employees must "view the future with caution," said Sun VP of Corporate Resources Crawford Beveridge, reportedly in a memo. "We want to take those steps which are most protective of employees and therefore do not want at this time to consider layoffs."

The austerity measures include cutbacks in travel, phone calls, and client entertainment, as well as a slowdown in completion of a Linlithgow, Scotland, assembly plant. A limited hiring freeze has also been implemented.



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Unix World Sold

MOUNTAIN VIEW, CALIFORNIA, U.S.A., 1989 JUL 14 (NB) — Unix World has been purchased by McGraw-Hill, publisher of Byte magazine, for an undisclosed sum. The purchase, from Tech Valley Publishing, indicates the Unix market, and this Unix magazine in particular, is attracting the interest of the largest corporate publishers. Unix World has a paid readership of 51,000.

"Part of McGraw-Hill's long-range plan is to acquire publications in strong growth markets," said Joseph Dionne, chairman and chief executive officer of McGraw-Hill. "Unix World affords us an immediate, market-leading presence in this market segment, while complementing our other products and services in the computer field."

Immediate plans call for no change in personnel, including no change of publisher, currently Robert Billheimer.

(Contact: Elizabeth Russo, 212-512-3493)

OSF/Motif Available

CAMBRIDGE, MASSACHUSETTS, U.S.A., 1989 JUL 11 (NB) — Unix has a new face designed to make it far more "user-friendly." The Open Software Foundation has announced the availability of the Motif user environment, the first graphical user interface or GUI with PC-style behavior and appearance on any system running X Windows.

Source code sells for \$1,000, with binary code licenses going for \$10 to \$40 depending on volume. The licenses would be required for any application software using the Motif interface.

The following vendors have announced a commitment to integrate OSF/Motif into future software: Bull Information Systems, Digital Equipment Corporation, Hewlett-Packard, Hitachi, IBM, Interactive Systems, Intergraph, MIPS, Nixdorf, Oracle, Sequent Computer, and the Santa Cruz Operation.

Unix is a powerful but very user-unfriendly operating system first created by AT&T and widely used in scientific and university applications. A GUI offering easier user interface and more consistent command structures would go a long way toward making Unix a more popular operating system among less technically-inclined users. A common Unix interface would also greatly reduce training and support costs for corporate Unix users.

Motif is based on the Massachusetts Institute of Technology X Window System and conforms to X/Open's XPG3, ANSI C, and POSIX.

While this graphical user interface is not in legal trouble, others have been the subject of court battles. Apple Computer claims that both Microsoft Windows and Hewlett-Packard's NewWave GUIs violate Apple's copyrights. Observers suggest that should Apple win, however, other GUIs, such as OS/2's Presentation Manager and OSF/Motif would also be seriously affected.

(Contact: Donna Ruane, 617-621-8772)

New VAXes Match Wits With Sun, HP

MAYNARD, MASSACHUSETTS, U.S.A., 1989 JUL 11 (NB) — Digital Equipment has announced new hardware which will help it go head-to-head with the likes of Sun Microsystems and Hewlett-Packard in the workstation market, and which enhances the connectivity of its products.

Among the new products is a very aggressively priced DECstation 2100, a RISC or reduced instruction code-based Unix workstation with eight megabytes of memory, which will be offered at \$7,950 in the monochrome version.

The new VAX 6000 System 400 will

feature an 85 percent performance increase over the previous model, providing up to 36 times the performance of a VAX 1180 with prices starting at \$239,000.

The MicroVAX 3100 System 40 will provide a lower entry level to the MicroVAX computer family and the new 6000 Model 210 will start at only \$129,000.

Upgrades for current VAX 6000s are available and DEC has announced its intention to add vector processing to Model 400 systems next year.

The main thrust of the new software and hardware announcements was to place DEC squarely in the forefront of vendors offering integrated services extending across computer systems using hardware from different vendors.

(Contact: Myles Faldalla, 508-264-5986)

Japan: Canon

Beefs Up Apple/NeXT

TOKYO, JAPAN, 1989 JUL 5 (NB) — Canon, which has invested \$100 million in Steve Jobs' NeXT Computer, has set up a massive new sales network to distribute the Unix-based workstations in the Far East.

Canon has established a direct-sales division which will be staffed by 100 salespeople, system and maintenance engineers, in order to facilitate the product launch in September. Another major investment of two billion yen (US\$13.8 million) will be spent to send Canon engineers to the U.S. to be trained at NeXT, to translate the NeXT manuals into Japanese, to provide training for Japanese software houses and end-users, and to finance a NeXT showroom in Tokyo.

Meanwhile, Canon, also the Japanese agent for Apple Computer, will boost its Apple sales force, increasing its 35 retail computer shops featuring Apple machines to 100. Canon is also sponsoring a Japanese branch of the Apple Developer Program, a society created to exchange information between software houses and to call for alliances with software vendors. Canon believes these measures will result in a 60 percent increase in sales of Apple products, making the market worth 16 billion yen or \$110 million annually.

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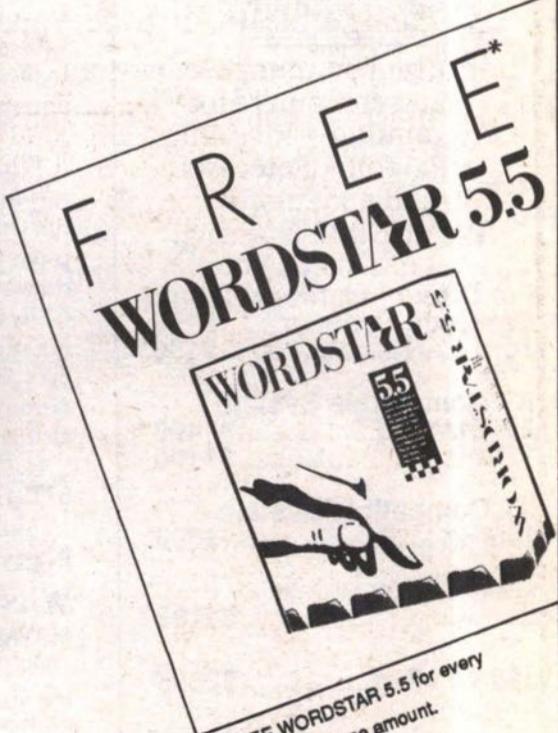
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LOCAL AREA NETWORKS



Definition of a network: A solution to a problem.

Above and beyond all the fancy descriptions you are going to be confronted with, it is important to keep this definition in mind. So what are the problems that a network solves?

Problems, Problems...

You have a company and you have two people entering invoices. If you have two separate computers, the people could enter different invoices into each one and then once in a while, one person could take their disk over to the other person and merge the two files. A little awkward; lots of room for records to go out of sync. This is a problem that a network can solve.

You have a publishing business and you are in the process of editing books prior to publication. One editor wants to make some changes, the author rejects some and offers alternatives, the editor rejects some in turn and suggests alternatives; another editor wants to make some other changes, the Ayatollah suggests some alterations to the author, etc., etc. Without a network, everybody has to keep track of every version of theirs and each others'. This is usually done through a "sneaker net" - I give you my disk, you make some changes, give it back to me, I lose disk, you've left on holiday and nobody remembers what you saved the file under. Don't worry, we'll straighten it out. Time's not an important factor, is it?

You run a school computer course and you have dozens of students working with a variety of computer packages. You could lock the disks up in a cupboard and dish them out to each class and then make sure that they hand them back in, at which point you put them back in the cupboard. Or perhaps you've gone beyond the diskette stage and you have hard disks. Now all you have to do is load 12 programs on 50 machines. Nothing to it. Then you have to load 12 upgrades a year onto the hard disks. Then you have to worry about students making copies of the software.

You have an engineering office with an expensive plotter. Five engineers have to line up with their disks in hand and fight for their turn on the computer attached to the plotter.

You have a law office with twenty people working on various cases and some do not

have particularly good habits about making backups. A network could ensure that you don't end up losing a lot of files and accordingly a lot of cases.

All these problems lend themselves to network solutions. The key to the problems is sharing resources - you are already sharing them, but not in a very coherent manner. Why not have the brains of a computer harnessed to the problem?

A network, then, in brief, allows us to share resources. The whys, hows and whys of this sharing is what distinguishes one network system from another

What to share?

Many readers undoubtedly have shared resources in a very primitive manner if they have worked with the classic A/B printer switch - two computers hooked up to one printer. Those who have used a modem to access a database or bulletin board have also "networked." The resources that can be shared are the catalogue of what can be hooked up to a computer: printers, plotters, hard disks, (floppies too), modems, fax boards, scanners, even CPU's, RAM, co-processors and video displays.

How are you going to get your share?

Network systems distinguish themselves from each other by how many ways they allow resources to be divvied up. Like economic systems, the division of spoils varies from "everybody shares everything" to "you take what you're given when we decide to give it you." In some systems you need to flash I.D. to get in, and there are still special shops for "network party" members; in other systems it's whoever pushes to the front of the line first. What users will be required to do to get things done is the practical question. Will they have to remember passwords just to use the computer? If I'm in WordPerfect on the network and I finish editing a document and want to print it, will I use the regular WordPerfect functions to choose a laser printer for output and then print to it, or will I have to clutter my brain with a whole bunch of new commands? What happens if the printer is not hooked up - am I going to get the familiar message on my

screen? Can I use the WordPerfect I already have (an original, of course) or do I have to go out and buy a special network version of WordPerfect? (And while we're on the topic, can I use WordPerfect at all? What about my nearly-Epson-for-1/4-of-the-price printer?) For every new little piece of knowledge that the user has to absorb to utilize the network, can a tangible benefit be demonstrated? For every level of sophistication that is added, what benefits accrue to the enterprise that make up for the additional cost of that sophistication, including hardware, software and training costs?

Am I going to get mine soon?

Don't be afraid to ask this question for fear of sounding greedy or impatient. Novell has made a name for itself against a lot of its more well-heeled competition by concentrating on speed. Is my 3000-letter mail-merge going to be even slower than it already is? Could I have walked Jane's diskette over quicker than sending it over the network? Will I have to send for it six times before it comes over properly? Undoubtedly you bought a computer to save time; a network should not degrade performance without a real good explanation.

What about the future?

I don't want to get something that's going to be obsolete in a few years.

Art is for all time; computer systems are for three years. Make sure you can download everything into ASCII and get ready to spend about half of what you spent today to get twice as much as you got today in three years time. You always should have waited in this game. I come from a mainframe environment where changing from one system to another, or better yet, an upgrade from one version of one system to a later version, cost hundreds of thousands of dollars, took all kinds of high-priced guys in pin-stripe lab coats and never really worked before we had to get our next fix. Nowadays, on a network, you're staring at a few thousand dollars to go from one system to another. You get to keep your computers, your software, maybe even your cables and cards. It's true, however, that you may have to face the possibility that the letter you edited for your grandmother on WordGalore is going to be lost when you convert three years from now. Or, perhaps, you won't be able to recover the details of that invoice you sent six years ago to your customer in North Bend. If you can't accept that kind of problem outright, don't worry - somewhere in this world, there's a salesman waiting just for you who won't let such a bad thing happen.

A crash course on network construction

I've already briefly mentioned simple sharing devices - the A/B box and the modem. They provide a glimpse at the essentials: a place on the computer to hook things into; some wire to plug into the opening (not necessary, as we will see, in some leading-edge technology); a network device (the modem or printer switch in the above examples, though there are networks that need no special device, e.g. zero-slot LANs); and another piece of electronics at the other end of the wire with a place to be plugged in. There are a lot of ways to couple a network.

A port is a socket by any other name

First, the places to plug in to a computer come in three basic varieties - serial port, parallel port, or the port that comes

with the network adapter card that you plug into your computer expansion slot (A.K.A. bus - sort of a built-in extension cord under the hood of the PC). One esoteric twist here is computers-on-cards - you open up your computer and plug these computers-on-a-card into one of the available expansion slots and... lo and behold, two computers in one! (Clustered CPU's in trade lingo - works out to the same price as OS/2, probably, and you can parallel-task your old DOS programs without buying a 386 and waiting for OS/2 to be able to work out the multiple-DOS-machines problem.)

Wiring/wireless

The basic varieties of wiring are:

- A) telephone-type wiring, of which there are two basic varieties:
 - 1) unshielded twisted pair (no, that's not Dan and Marilyn Quayle speaking impromptu, but regular phone wire)
 - 2) shielded twisted pair (safe networking for the nineties);
- B) coaxial, of which there are also two kinds:
 - 1) baseband
 - 2) broadband;
 - C) fiber optics;
 - D) your regular AC circuits (right out of the wall);

The basic wireless alternatives are:

- microwave;
- RF radio;
- infrared (like remote-on-VCR)

A final alternative is the computer-on-a-card-type, in which computers are hooked up through the internal wiring of the expansion bus.

Network devices

These can be as simple as a piece of cable and a file-transfer program (Brooklyn Bridge, FileShuttle, LapLink), or a modem or a print switch - data switches - but more often include a special network adapter card you put in all the computers you want to link together. (Remember that "all" when trying to figure out how much this linking is going to cost.) In addition, there may be more exotic pieces of electronic equipment that will centralize or extend your wiring: hubs - active and passive; Multiple Access Units (MAU's), etc. You can classify such devices under the generic acronym BUCKS (Bitty, Unmentioned and Costly Komputer Stuff). Two additional devices that can hook your computers and peripherals together come from the phone end of things: a PBX (the front-desk switchboard gadgetry), or a CO - central office - variety of PBX. This is a PBX type of service where the switchboard is in the phone company's office instead of yours. Finally, you may want to network networks, and there is a wide variety of devices that hook two or more networks up to each other (bridges, routers and gateways).

Network devices come in three flavors, or MAC's (Media Access Controls). The MAC is the Morse code your network adapter card is going to use to send your singing telegram across the network as opposed to the lyrics of the song itself - that's another guy/guyette's job. (Actually, by choosing your card, you simultaneously choose the MAC.) There are three basic varieties and, as hard as this may be to believe in the computer world, they are incompatible. (Not completely, of course. There's a little gizmo you can get that...) The names are Ethernet, Token Ring and Arcnet, and each has its supporters/detractors armed with relevant statistics to prove their case that one is faster/slower in any of several theoretical environments. One buzz sound you will hear in this area, and in networks in

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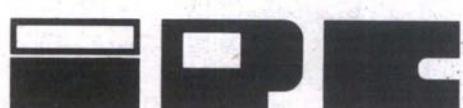


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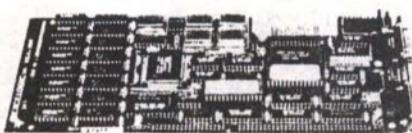
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general, is standards, e.g.: "This here system conforms to your I-triple-E standard." Some systems, not wanting to be limited to a single standard, are offering prospective buyers double standards. WordPerfect, Lotus, DOS and all the software you've ever heard of has never been approved by any standards committee. Teletype, however, has extensive standards that it conforms to. That should help to explain something about the relevance of standards to most users.

A further wrinkle in networks is that the physical wiring - the shape of the wire circuit itself can vary from a string-like Christmas-tree style to a circle, while logically/operationally it can seemingly work differently than what it looks like physically. A physical star may work like a logical ring.

Lest this give the impression that it's mix and match here, not every network card works with every MAC works with every type of wire in every type of wiring configuration. That's why we have consultants and that's why consultants have catalogues.

Network Operating Systems

Finally, to put it all together, we have a network operating system (NOS) - that's DOS for many computers. These come in several varieties, and of course, do not work with every card, type of wire, MAC, etc. Two basic flavours - data switches and zero-slot LAN's - comprise the so-called low-end device and file-transfer kind of NOS. The full-fledged systems do all that the lower-end models do but allow for sophisticated simultaneous access for data and programs.

The simplest form of network software allows users hooked up to the network to use some resource - e.g., the laser printer - in a shared manner. A further extension of this model allows users to transfer files between each other's machines or allows all to transfer files back and forth between their machines and a central hard disk. Instead of person X carrying his/her diskette over to person Y, person X can send a copy of his/her file to person Y over the wire. This is more convenient, but things can get out of sync; X may change the original, and Y may make changes independently, and it becomes a case of who's got the latest version. This type of peripheral sharing and file transfer is found in simple cable and transfer programs, on data switches and zero-slot LAN's (the concept will be defined later) and functions somewhat like an electronic "sneaker net" - you sneak your diskette over to me.

The most common type of network software allows for a much more sophisticated form of sharing - person X works with a file and person Y works with the same file at the same time. The file and all other files reside on a central hard disk, and, in cases of conflicts for a particular piece of data, messages are sent out to users that a particular record is not available for them to work on, as someone else is working on that record.

At its most sophisticated level, network software allows for all resources on a network to be shared by all qualified users. Thus, there is security - everybody has certain rights to certain resources assigned to them. Sharing of all resources means just that - a user can theoretically take over another's PC from their own and it would be just as if they were sitting at that PC and interacting with it.

Peer-to-peer and server-based are often used to describe network models. A server-based network refers to the fact that one central computer "services" the other computers. In the most common example, there is a central computer with a large hard disk on which all program and important data files reside and each user issues a request to that "server" computer to access the files or programs on it. The higher levels of the Novell

system are based on this type of architecture. (Another term you will hear in this regard is dedicated versus non-dedicated - the central computer is dedicated to the other computers on the network.) Often peer-to-peer is contrasted with the server-based systems with the implication that everybody is equal in a peer-to-peer. In fact, a peer-to-peer network is more an equal-opportunity server network. Everybody, not only the central file server (in fact, you don't need a central file server, the sales-type might add) can be called upon to provide services to other computers (one minute a king, the next minute a slave). The brains of the network are distributed (or scattered, the critics of this approach might say). As you may have guessed, having everybody capable of doing everything means, if nothing else, more money - each computer has to be much more highly trained, which in computer terms means loaded with more software and more hardware. OS/2's LAN Manager prides itself on its specific predilection for being configured to the peer-to-peer architecture. Novell's NetWare prides itself specifically on not being designed this way.

In this special network edition of the Computer Paper, we will be exploring the various real-world alternatives of all that has preceded, and, in fact, an alternative to networking altogether. By necessity, in such a complex and varied field (sounds like the opening pitch for ConsultingMan, don't it), the articles will be in the nature of overviews. For those who want to follow up in more depth, here's a quick guide:

Resources

Books:

The Local Area Network Book, by E.G. Brooker. Howard W. Sams & Company, 1987. This is a relatively inexpensive, concise and simple overview of the field.

Rather than name additional books, I recommend that you get in touch with LAN Bookstore, c/o LAN, The Local Area Network Magazine, 12 W. 21 Street, New York, NY 10010 (FAX 212-691-1191) and ask for their catalogue. Probably as authoritative and contemporary a listing as you're likely to get on the subject anywhere. Local bookstores such as Granville Books, Silicon Connections, Unihall and Cody Books will also have a smaller but good selection of books on networking.

Magazines/Periodicals

LAN, The Local Area Network Magazine (probably the first and probably the best).

LAN Technology (relative newcomer, formerly Micro Technology; good reading).

Frank Derfler's Connectivity Clinic section of PC Magazine.

LANTimes. Formerly a Novell house organ and now apparently independent but still definitely Novell-centred; however, good generic coverage of all areas can be found and, after all, with something like 400,000 installations, 60% market share (and the next guy in line with probably 20%), Networks-R-US, as they say at Novell marketing meetings.

Courses/Lectures, public

Network courses are offered at the following public institutions: Vancouver Community College's Continuing Education Department Langara Campus offers through its Computer Skills in the Workplace Program a Certificate in Local Area Network Administration.

Vancouver School Board offers through its night-school program an introduction to Novell Local Area Networks.

Private Courses

Courses in networks, generally concentrated around Novell, are offered at a wide variety of places including: Independent Technical Services, Concentric Technology, Drake, MicroAge, Computerland and Source Data.

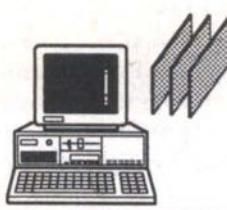
User Groups

VNUG - Vancouver NetWare User's Group. This is a group of users concentrating on Novell's NetWare but, once again, by default because of NetWare's market penetration, this is the de facto network user's group in Vancouver. Meets the first working Monday

of every month other than August and September with a workshop, dinner and after-dinner speaker format. More than Novell gets talked about. Produces a lively, insightful, informative and well-researched newsletter, "The VNUG Server," which I coincidentally edit.

Peter Lincoln is the president of High Order Systems, a Vancouver company which specializes in the planning, implementation and training involved with integrating technology and organizational objectives. Networking is an area of particular interest to him. He is also editor of the Vancouver NetWare User's Group newsletter and teaches a series of courses that lead to a Certificate in Local Area Network Administration. The courses are put on by the Continuing Education division of Vancouver Community College Langara Campus and are part of its long-running Computer Skills in the Workplace series.

Multi-Processing



Multiple CPU's within one computer: Three heads are better than one.

Multi-processing - more than one processor working in the system, usually/hopefully working in conjunction with each other. When they are really working with each other, it's called highly parallel processing, or tightly-coupled processing. See the NEWSBYTES article on NCube for the ultimate in this kind of thing.

Multi-tasking - more than one process going on at one time in one processor. Actually it's a matter of each process getting a hot second to do its thing and then the next one gets a shot. It all happens so fast that it looks like it's simultaneous.

Multi-User

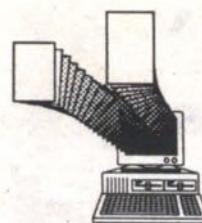


Multiple computers access the processing power of one central "server" computer

Multi-user - more than one user using the system.

OS/2 by itself is a multi-tasking system; you can start your mail-merge in your word-processing program and then while all the letters are being merged and printed go to your spreadsheet and start a large recalculation all the while the mail-merge is still taking place in the "background." And for good measure you can also be receiving a long file via your modem. Aha - what's the difference, then, if Fred comes over and starts another process? Isn't that multi-user? No, because you are

Multi-Tasking



One computer performs multiple tasks at the same time.

only using one processor and as far as the machine is concerned you and Fred are just Mr. User. That may explain a lot of why OS/2 is seen to have a "security" problem

NetWare is a multi-user, multi-tasking, multi-processing system. The server manages several tasks at once - receiving data, starting the printer, getting a file from disk. There are several users accessing the network at once: each has their own processor in their workstation. OS/2 with LAN Manager is similarly multi-user, multi-tasking and multi-processing.

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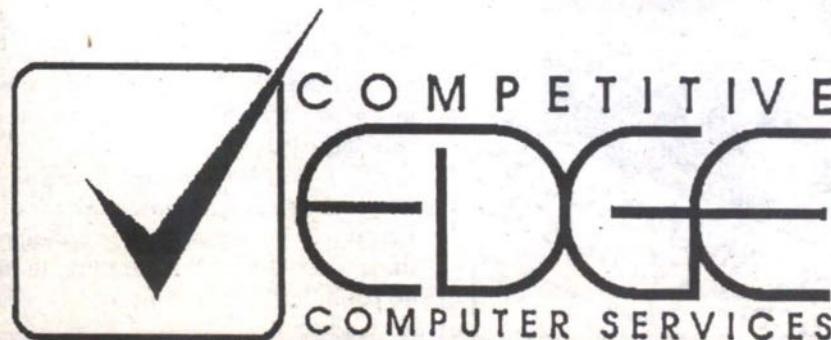
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Do You Really Need A LAN?

by Roedy Green

Introduction

A LAN is a Local Area Network — a way of tying a group of AT and XT computers together to let them share information.

Most of the people who think they need a LAN would be much happier with something simpler. In this article, I will discuss some of these alternatives. I will also give you some guidelines to help you know when you do need a full-blown LAN.

Keep It Simple

You may hear computer jocks talk about the KIS principle: Keep It Simple. The ideal computer system should be as simple as possible, but no simpler. If your computer or LAN has extra features in it you do not use, these features will confuse you, they will slow your computer down, and they will waste RAM.

Why Would Anyone Need a LAN?

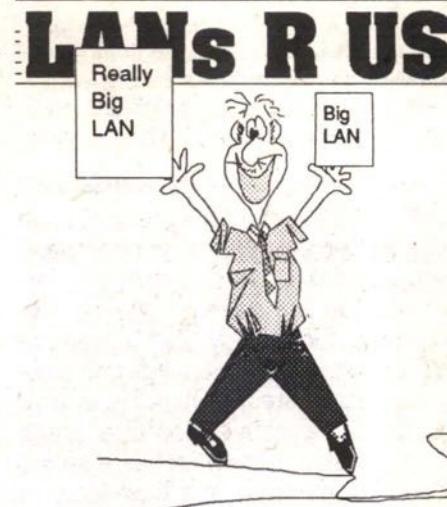
The most common reason I hear for wanting a LAN goes like this: "I have already bought five or six AT computers. I have a vague notion that if they were able to communicate with each other it would be a good thing."

What will a LAN do for you?

1. File transfer. A LAN lets you copy files from machine to machine without having to exchange floppies.

2. File Server. A LAN lets many users share a single copy of a file stored on a central file-server AT. For example, a lawyers' office might have a common pool of documents that the various secretaries can access and update.

3. Application accessibility. For example, a LAN lets anyone run the accounting software from any of the AT



workstations.

4. Application sharing. For example, a LAN lets two people use the same copy of the MS Word 5.0 word processing program. The two people cannot edit the same file simultaneously.

5. Simultaneous keying into an application. An advanced LAN application program lets two people key into it at once. For example, two people could key general ledger transactions at the same time. Note that most programs do NOT allow simultaneous keying.

6. Printer Sharing. Using a LAN, you can share one expensive printer between several AT's. You could also, for example, share three cheap printers between five AT's. Sharing is flexible. When one printer is busy you can use another.

7. Electronic Intercom. You can use a LAN as an intercom to send short messages to other people sitting at computers in other parts of the building. This function, sometimes called E-MAIL, is not an important use for LAN's. E-MAIL is crucial only when the people conversing work in different cities.

8. Modem Sharing. A LAN can let you share a modem. This is not that useful since a decent 2400-baud internal modem costs only \$160. You wouldn't buy a LAN just to share a modem, but you might attempt to share a modem once you already had the LAN in place.

The Downside

These advantages are very exciting. Why not race out and buy a full-blown Ethernet or Token Ring Novell Netware LAN? The downsides are cost, excessive RAM usage, complexity, additional cost from being forced to be honest, and the danger of putting all your eggs in one basket.

Cost

The LAN may well end up costing you more than the AT's themselves when you add up all the expenses. High-performance LAN's require at least one expensive central computer called the file server. In a distributed system, you might get away with \$125 floppy backup software or \$400, 120-megabit DC2000 magtape cartridge backup. However, with all your files centralized in one enormous pool, you have no choice but to buy a costly high-speed magnetic tape or worm-drive backup. Besides the cost of the LAN hardware, you must include LAN software, wiring, consultants and new LAN-capable application software.

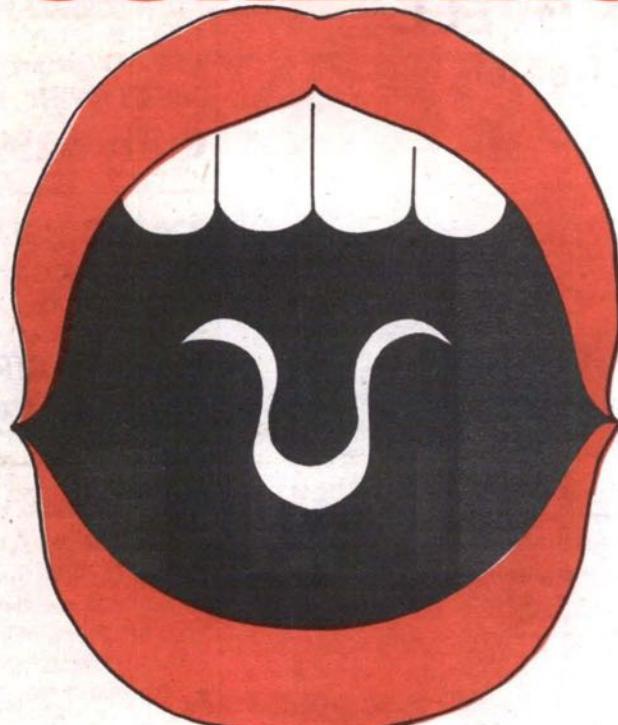
RAM Usage

Big, complex LAN's eat up a lot of RAM. Running a LAN is like having a few extra copies of Sidekick running in your machine. There is no room left over to run large programs such as Ventura, Excel, or Windows. If the whole point of the LAN were to allow you to share Ventura documents, you are out of luck, since when the LAN is running, there is no room left to run Ventura.

Complexity

You must install coax or other special wiring with special connectors and junc-

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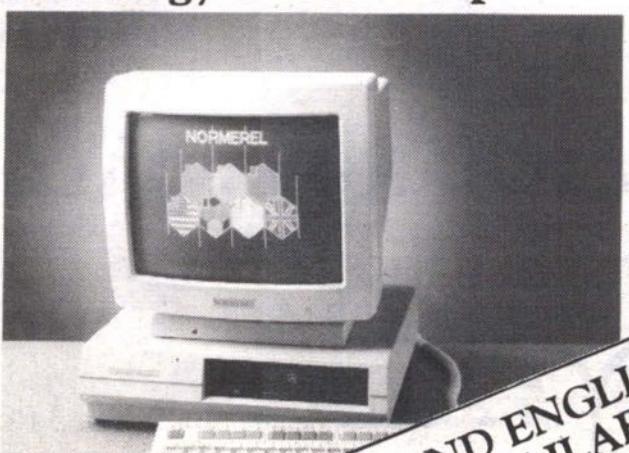
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tion boxes. The LAN software comes in a big red box the size of a suitcase crammed full of technical manuals. Mere mortals have almost no chance of understanding these manuals. You will need to hire a god-like Consultant to get the LAN going for you.

Cost of Honesty

Much to nearly everyone's surprise, with a LAN, more than one person at a time cannot use an ordinary software program. You must buy multiple copies of the program and put them in uniquely named sub-directories. You then need to invent techniques to ensure no two people try to access the same copy at once. At best, using ordinary software is awkward and wasteful of hard disk space.

Some ordinary software will not work on LAN's at all. For example, you must buy a special, more expensive, LAN version of the QDOS DOS shell, Backit diskette backup program and WordPerfect.

The LAN software is licensed for a specified number of users. Unlike ordinary software, LAN software will usually not let you cheat and use the program on more machines than you have licensed. People accustomed to buying one copy of a program and illegally installing it on all their machines will have a rude awakening when they buy a LAN.

Danger

A LAN is much like putting all your eggs in one basket. A serious mistake on one AT can bring the whole system to its knees. If the central file-server computer breaks down, everyone in the entire office must twiddle their thumbs until it is repaired. There are ways to build in redundancy, but of course that increases costs still further.

Security is more complex on a LAN. A disgruntled employee, sitting at any computer, can potentially access or corrupt any file in the system unless special measures are taken to thwart him.

Who Needs A LAN?

If you have a business with ten people going full tilt keying in invoices, purchase orders, general-ledger transactions and inventory transactions while printing waybills on several printers, then you need a full-blown LAN, or even better, a mini computer running UNIX, with the AT clones acting as intelligent terminals. You need a real LAN to support the traffic. That sort of company has the resources to hire consultants or full-time computer staff to keep one of these LAN's operating smoothly.

What Are the Alternatives?

1. Nike Net (also known as sneaker net). Copy files to floppy and run them from machine to machine. This is cheap and simple and, believe it or not, faster than some Zero-Slot LAN's.

2. Tape LAN's. With a bit of clever-

ness, two independent machines with mag-tape backup units can give you LAN-like effects.

3. Printer Switches and buffers. Printer switches allow a collection of AT's to share a collection of printers.

4. Zero Slot LAN's. These superficially look much like LAN's. They use the spare printer LPT2: parallel port or spare modem COM2: serial port to connect machines. These are stripped down LAN's. They do not allow more than one person to key into the same program at once, though they do allow people to get at files on other people's machines with primitive locking mechanisms to prevent two people from trying to use the same file at the same time.

5. Mini LAN's. These are similar to full LAN's, except they are much cheaper. They can run most true LAN software. Because they are simpler, there is more RAM left to run your application programs. They do not have the elaborate security features of the big LAN's. They cannot handle heavy traffic the way big LAN's can.

Nike Net

To make Nike Net work, you need a few software tools. I use four. First, I use the Shareware program RmPath to quickly erase all the files on a floppy. Then I use QDOS II to rapidly find and copy the files I want to the floppy. You might use some other DOS shell such as 1DIR, Norton Commander, XTree, or PCTools.

When the files are too large to fit on one floppy I use Gazelle's Backit to select the files I want and copy them to a set of floppies.

If even that would be too unwieldy, I back up the files to a Colorado DC2000 mag-tape cartridge. It can hold 120 megabits, so that is quite sufficient for anything I ever do. I only have one mag tape unit that I move from machine to machine. If each machine had its own mag-tape drive, I would never bother with Backit and floppies.

Tape LAN's

We have a client in India who "needed" a LAN. They wanted to have two people simultaneously entering names and addresses, looking up names, and preparing printed lists with a custom Abundance program we wrote for them. I did not want to use a LAN because of the high import duties, the complexity, and the difficulty of long-distance support.

Instead, we used a low-tech solution — two identical independent machines. Each day we back up machine "A" and read the files into machine "B". During the day, we key the new data into machine "A" and prepare the reports based on one-day-old information with machine "B". If machine "A" breaks down, we switch roles and machine "B" becomes the main machine where we do data

entry. We print the highest-priority reports on machine "B" and postpone the rest until machine "A" is repaired.

You can avoid LAN's in a similar way by using either floppy or mag-tape backups and breaking the workload over two machines.

Printer Switches

The simplest printer switch is only \$25. It allows two computers to share one parallel printer. When you use mechanical switches, you should power off the two printers before switching, though many people never do. Their printers seem to survive, though they make great ka-lunking noises on each switchover.

You must not use a mechanical switch if you have a laser printer. If you do, it will void the printer warranty. Using a mechanical switch is about the only way you can kill those indestructible Hewlett-Packard Laserjets. You must use a more

expensive electronic switch that makes the switchover more gently.

Electronic switches come in many configurations. You can cascade them into wondrous banyan trees capable of connecting almost any number of computers and printers.

Some electronic switches also have buffers in them. Instead of sending the characters directly to the printer, your computer rapidly sends them to the buffer. Then, from the computer's point of view, the job is done, and you can use your computer for something else. The printer switch then feeds the contents of the buffer to your printer.

Zero Slot LAN's

Zero Slot LAN's include Travelling Software's Lap-Link Plus, Software Link's LANLink, Server Technology's EasyLAN and the local Rimart's BoxNet. There are two reasons to use such a LAN. The



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main reason is they let you transfer files without pestering the user of the other machine. For large files, Nike net may be faster, but for short files, a Zero Slot LAN will be faster and more convenient.

The second reason to buy a Zero Slot LAN is some of them let you share printers.

Note that most Zero Slot LAN's will not let you run the special LAN versions of application programs. To keep these LAN's light on their feet, the designers left out all the features needed to support simultaneous keying into an application. If you want true LAN compatibility, look for DOS 3.3 record locking and NETBIOS support.

The big drawback of Zero Slot LAN's is they are VERY slow. You can read more about them in PC Magazine, November 26, 1985.

Mini LAN's

There are two styles of mini LAN's: centralized and peer-to-peer. A centralized LAN dedicates one server computer in the middle of the LAN to control one huge hard disk. All the peripheral-node computers share the data on this one central server. The node computers might also have their own private hard disks. The data on these local disks cannot be shared. The server computer cannot run ordinary programs since it is dedicated to handling requests from the node computers.

In peer-to-peer systems, there is no central server. All the computers can access data on all the disks attached to all the computers. Another way of looking at this is: in peer-to-peer systems, each computer acts as both a node and a server.

There are also hybrid systems with some computers acting both as a node and as a server, some acting just as nodes, and some acting just as servers.

Server-based systems usually run faster than peer-to-peer, especially if the server runs an operating system other than DOS. (DOS is poorly designed for LAN servers.) The software that runs in the nodes is usually smaller and simpler than the combined server/node software used in peer-to-peer nodes.

Peer-to-peer systems are inherently more reliable since any one machine can fail, and the rest of the net can carry on.

The two most famous mini-LAN's are Artisoft's LANtastic and Novell's Entry Level System (ELS) NetWare II. Both systems are hybrids, but LANtastic is primarily peer-to-peer, and ELS is primarily central server.

LANtastic

LANtastic is a true LAN because it supports NETBIOS. It is a little simpler, a little slower, and lot less expensive than a full LAN, about \$275 per station including hardware, software and cables.

If you will remember, one of the big drawbacks of the big LAN's is that they take up so much RAM that there is not enough room left for your applications. The LANtastic engineers did something brilliant to solve this problem. The LANtastic controller card you stick into your AT has its own separate 10 MHz computer with its own 32K RAM. The bulk of the LANtastic software fits in EPROMS and RAM's inside this little computer, leaving the RAM in your machine free for you to use. LANtastic eats up only 10K of your RAM in a node machine and 40K in a server. The other advantage of having a separate computer is that the small computer shoulders the bulk of the LAN housekeeping workload, leaving your main computer free to handle your applications.

Novell ELS NetWare II

Novell's ELS Netware II is a subset of

the big Novell system. ELS supports many kinds of hardware, but if you use ARCNET hardware, it would cost about \$340 per station for hardware and software.

Why would you spend the extra money for ELS? There are many Novell experts around. If they know the big LAN, they can find their way around ELS with no problem. There are fewer experts with LANtastic experience. If you plan to grow into a full LAN, the growth path will be smoother with ELS. There are special high-performance versions of Btrieve for Novell. Many programs use Btrieve to do things like look up customer accounts by name. Novell is the IBM of LAN's. Finally, ELS will give better response times, especially as the number of stations increases and the traffic grows.

The main drawbacks to ELS are that it is more complicated and it takes up more RAM, meaning trouble running large programs.

If you want to read more about mini-LAN's see PC Magazine March 28, 1989.

Full LAN's

If you have to ask the price, you probably cannot afford a full-blown LAN. The two best known are Novell Netware, which runs on all kinds of different hardware, and Banyan Vines, famous mainly for abilities to interconnect differing types of computers and for the need to mortgage your house to buy it.

If you are serious about buying a large LAN, you absolutely must get someone to help you who has experience. Before you leap, make sure you add up all the costs: LAN software and hardware, wiring, consulting, new application programs, training, backups, servers and phone support.

You may find you have already grown into UNIX minicomputer territory. If you are growing rapidly, you might be best to go the UNIX route right off; you

then have unlimited upward growth potential.

Before You Buy

Before you spend a lot of money and take on a lot of headaches, look over the alternatives. Pick the simplest one that will still fit your needs.

Nike net can be spiffy if you have the right software.

Tape LAN's are inexpensive, simple and headache free.

If all you want to do is share printers, don't buy a LAN, get a printer switch or printer-sharing box.

If all you want to do is pass small word-processing files back and forth, go for a Zero Slot LAN.

If you need all the functionality of a big LAN, but don't have that much traffic, go for a Mini LAN.

When you need many people keying into the same program updating a common database, go for a full LAN. Before you buy, ask an expert to help you select the right speed and features.

If your expert looks at your plans and finds that you will saturate even a fast LAN, go with a UNIX mini computer.

To learn more about deciding which route to go, see Wayne Rash Jr.'s series of articles in Byte Magazine circa January 1989.

Roedy Green is president of Canadian Mind Products, a company that specializes in hardware and software for AT clones. He and a group of kids built a simple LAN by soldering X.25 chips into prototype boards for the Apple II. He helped Mitek, a local firm, write XT-based file-server software for a low-cost LAN, compatible with the BBC Econet. Canadian Mind Products, #162 - 1020 Mainland, Vancouver BC, V6B 2T4, (604) 684-6529.

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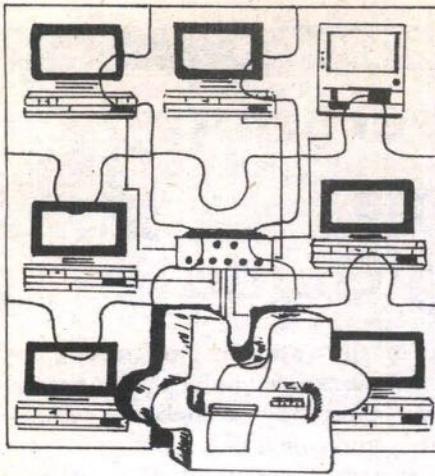


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Alternatives to Networks

The World Before Networks.

Before the advent of PC's, mankind lived in a centralized computer state, the original multi-user state. In this era, CPU's were expensive and so was everything else concerned with a computer. There was no time for games and dBase 3+ recipe files; no home computers; no computer on every desk. There was one big computer in the room, which you only entered with a special access card. If you wanted to talk to this computer, you were given a screen and a keyboard and that was it - a dumb terminal, no processing power.

The big computer processed things so fast and gave everybody a piece of its mind so fast, it felt like you were actually behind the wheel. At least, that's how it worked in theory. This was the era that made IBM, IBM. There were others like DEC but IBM was IBM and there were not a lot of clones being shipped over from Taiwan to mimic it. We're talking margin. Large-sized businesses spent millions, and medium-sized business spent hundreds of thousands.

Software was all home-grown; only a wimp bought software. "A-programmer-in-every-office!" was the cry of the day. Today this traditional world is under siege, particularly from networks. However, there are still a lot of the traditional systems out there doing the daily processing chores for a lot of organizations. And they may in some cases be the answer for you, at least until SQL server matures. (See later article on the importance of SQL.)

3 Alternatives To Networks

There are three basic alternatives to

Networking Options

Data Switches

A-B Switches
Mechanical Switches
Electronic Switches

RS-232 Networks

BoxNet
Lap-Link Plus
EasyLAN

Mini-LANs

LANtastic
Novell Entry Level System (ELS)

Multi-user Operating Systems

PC-MOS
386 Multiware
Concurrent DOS/386

Novell

Advanced Netware (ANW) 286
System Fault Tolerance (SFT) 286
Macintosh Support
Netware/386

OS/2

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IBM OS/2 LAN Server

Unix

SCO Unix
Minix
Posix

the network model. The first is the classic mini-mainframe central-processing model running proprietary operating systems as described above. This was the world of computers until just recently.

A second alternative is based on the central-processing model but features UNIX as its operating system. UNIX was developed by AT&T in the early 70's and is written in C. There is currently an argument in the UNIX world over whether UNIX should continue to be "owned" by AT&T or by mankind - either way, it is a very portable system; it works with a lot of hardware; and it has support in all major areas.

The problem for DOS users, of course, is that the first two systems are not DOS based, although UNIX can cohabit with DOS in a variety of ways (many of them are of the Tyson-Givens type of relationship).

Of course, where there's a gap, there's

a vendor, and into this gap have come products such as PC-MOS/386, 386 Multiware, Concurrent DOS/386, and VM/386, products which allow you to use all your DOS applications (in theory) in multi-user mode. This brings us to the third alternative: DOS-based multi-user systems.

What's the difference, anyway? You don't have to buy three PC's, just one big 286 or 386 PC and three dumb terminals. Dumb terminals are a lot cheaper than PC's. This is also the pitch of UNIX. Note however that you may not want a terminal that's too dumb - no graphics, no color, weird keyboard and as soon as you start adding these "frills" you may find you could have bought a PC.

Still, you don't need the network cards - there's a saving there. Of course, the cost of that savings is that stuff moves back and forth a lot slower than with the specialized cards.

Finally, remember that the savings also have to be evaluated against down time. When we're talking down time here, though, it's DOWNTIME. When the big box goes bye in the central processing world, it's "Husha, husha, we all fall down." Nobody does nothing until it all comes back. With a network of PC's, with even just one floppy, somebody can get something done - edit a letter, produce a spreadsheet, print it out. (Of course, if you really want to you can duplicate this effect on a LAN by buying diskless workstations.)

The really big advantage of the proprietary and UNIX multi-user systems is the tons of more-or-less working code that's in place right now for so many vertical market applications. Networks right now just don't have that little ol' farm-implements-manufacturing program you might be searching for to make your life complete.

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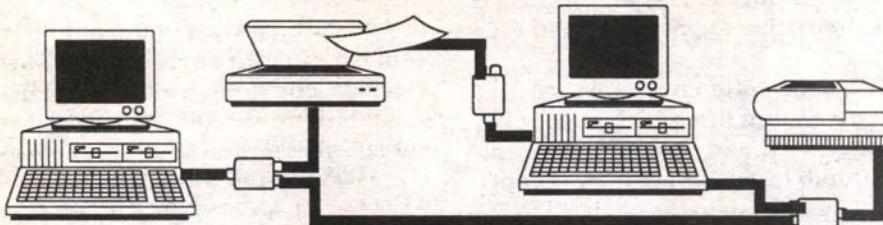
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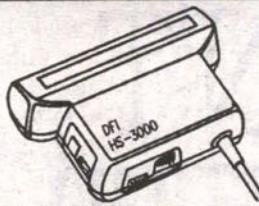
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LOCAL AREA NETWORKS

Network Operating Systems A Shopping Guide

As mentioned previously, full-fledged network operating systems usually feature network adapter cards and wiring that combine to give bandwidth - lots of speed, in simple terms. They offer the ability to share the resources of a wide variety of PC's and peripherals in very sophisticated ways.

For example: user #1 can use the laser printer anytime; user #2 only after 5:00; user #3 can change anybody's stuff; user #4 can look at everything but is not allowed to touch; user #5 doesn't even get a floppy drive, just a keyboard that has a CPU built into it and a screen - hard to steal data or programs without a diskette.

Full-fledged network operating systems require, officially or unofficially, network administrators. Lots can go wrong and lots of time can be spent trying to bring a network back up.

Without a doubt, Novell is the big player here, with 400,000-plus installations world-wide. The major competitor is Microsoft's LAN Manager and its variants - IBM LAN Server, 3-COM, Power-Lan (Microsoft sells you LAN Manager and you add your own twists and turns to it and sell it under your own label). LAN Manager is based on OS/2 and bears the burden/distinction of that association.

LAN Manager is Microsoft's second attempt at a network system; MS-Net was its first. Novell accumulated a great many of its customers thanks to MS-Net. To date, there are reportedly 70,000-plus copies of OS/2 sold. The great majority do not have LAN Manager with them. So Novell is still out in front, but hopefully Microsoft will still plug away to keep the race honest - does anyone really think that WordPerfect would be the better if they didn't have to compete with Word?

There are many network operating systems out there besides Novell's and Microsoft's. (I said many *systems*, but not much market share.) The following is a checklist you might want to take with you to your neighborhood network store.

Software Application:

Can you run your current programs on it?

Do they run as fast as before? As easily? Will it run the programs that are soon to come?

What level of multi-user functionality is available? File locking? Record locking?

If I'm in the middle of a massive update and someone pulls the plug, was anybody keeping track?

How fast is it? How fast is it? How fast is it?

Operating system

What operating systems does it talk to/with? DOS? OS/2? UNIX? One, all? Does it have a lot to say to these fellows? Do they have anything to say to it?

Can I talk to the rest of the world? Can it talk to me? How? Special hardware? Built right in?

Third-party support

No NOS does everything by itself all for one low price. What add-ons are available? Made by the same company that makes the NOS, or by third parties? A plethora of third parties or a cult?

Hardware considerations

What do you need to run the NOS in terms of: (1) hard-disk requirements - minimum and maximum, not just one or the other; (2) memory - minimum

and maximum again, and type - expanded versus extended; (3) network cards - everybody's, somebody's or one-body's, and type/clock speed.

Very important point: the hardware of a network means the hardware of more than one computer; it means servers and workstations. You will need to know the hardware support/constraints for the different types of computers you have on your network.

Remember rule *numero uno* of computers: Nothing works with nothing until it works. Again, as with the software, what about the range of support for hardware - scanners, modems, CD-ROM, optical disk, tape drives, plotters?

Range of services

Printservers: What kind and how many printers can be supported? Where can they be attached? To any computer? Specially-designated computers? More than one on a computer? Will it be different to print than before?

Process servers: (servers that are built to run specific programs better than average, e.g., a "compiler" processor that runs your CPU-intensive compiles.)

Communications servers: allow sharing of a fax/modem or a link to outside networks

SQL servers: database access?

Security Access

Who is allowed to do what, with what, and by who's say-so? Can everybody who should be kept out be kept out without infringing on the freedom of the majority of upstanding network users to go about their business? Specifically with files: Can they be made public, private and every shade in between, e.g., group files? Back-up: What can be backed up and how automated can the back-up be made? e.g., Can all files regardless of where they are located on the network - floppy, workstation hard drive(s), server hard drive(s) - be backed up in one fell swoop at a predetermined time and with a report on my desk the next morning about how it went? The answer is no, but how close does the system come? Fault Tolerance: What level of support is there for power problems, hard-disk crashes? If the power goes off, is it instant "System Kaput," or do I have a few minutes to worry myself silly that I only have a few minutes? If the server crashes, is there one ready to take up the slack immediately?

Performance Monitoring

Who is using what and when, for why? Tune-up statistics available in readable form with a touch of the button? Running low on disk space, memory always close to full? A lot of traffic in one particular direction? Or do we just wait until it all hangs up and then try to figure out why?

Manageability/Support

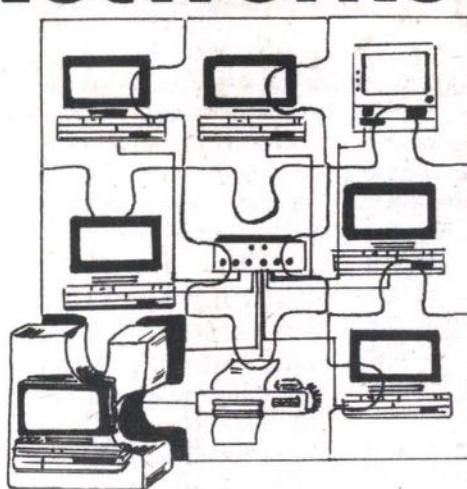
Can all the management stuff be done with a mouse and pull-down menus, or does the manager have to walk around at all times with a technical reference manual and a manual explaining the technical reference manual?

Can a person of reasonable intelligence and conscientiousness do minor troubleshooting and upgrades, or will a specialist be needed to load the latest version of WordPerfect 5.0?

How much do the specialists charge? Are there a lot of them? What makes them a specialist? their business card?

LOCAL AREA NETWORKS

Networked PCs vs. UNIX



by George E. Pajari

While networked PCs can certainly solve a wide range of problems requiring multi-user systems, it is this author's opinion that usually a true multi-user system such as UNIX is more cost effective and suitable. Although Novell technology is available to other companies under licence, it is still the case that if you wish to run the latest version of Novell on a 386-based server there is only one company selling it: Novell. The result is a closed, non-competitive market in which Novell can charge upwards of \$10,000 for the software for a 386 server. UNIX, although developed and licensed by AT&T, is available from many companies. The result is a wide range of choices, from very-cheap UNIX with few enhancements and little support, to very-expensive UNIX with excellent support and substantial added-value. Typical prices for a 32-user licence for a 386 machine are

around \$1,000.

Novell network clients are essentially limited to the Intel 8088 or 80286 CPUs. (Although Novell and MS-DOS or OS/2 will run on the 80386, they do not take advantage of its 32-bit operation). Users requiring additional power in their client machines have to wait either for a faster processor from Intel and/or for a new operating system from Microsoft that can take advantage of the 80386 or 80486. UNIX users can avail themselves of the full power of the 80386 as well as most of the new generation of RISC chips, most supermicros and mainframes, and most supercomputers (including the Cray series). At last count, 699 different hardware platforms were available for UNIX.

Adding a user to a Novell system means adding a PC-compatible with a networking card, MS-DOS, and Novell software (about \$1200 and up). Adding a user to a UNIX system means adding a cheap ASCII terminal (about \$400-800).

Novell performance drops off drastically under heavy load. Tests recently published show that doubling the number of users from twelve to twenty-four can more than double the time required to perform a given task (using a 386/25 server). Benchmarks of UNIX running on the same 386/25 machine show negligible performance degradation as the number of users doubles through the same range.

Protection and security are concepts grafted on top of MS-DOS and OS/2 by Novell. With UNIX, protection and security are intrinsic to the operating system. Indeed, the most recent version of UNIX/386 from the Santa Cruz Operation has been certified to the C-2 level by the US Department of Defense computer security group. This level provides for security event audit trails, separate system administration "subsystems", and password management in accordance with DOD guidelines. Other versions have been certified to the much more stringent B-2 level.

Novell workstations are limited to the software available for MS-DOS or OS/2. Many UNIX systems can run almost any MS-DOS (either using software emulation, using an additional processor card, or using the 386's virtual 86 mode) as well as the thousands of applications available only for UNIX (simultaneously).

The US Government has decided to issue a standard (a Federal Information Processing Standard, or FIPS) for multi-user computers purchased by the government. In spite of the numbers of PCs with the US Government, this standard is based on UNIX. With the large purchasing power of the US Government it is expected that the number of software and hardware offerings supporting UNIX will increase substantially over the next few

years.

And finally, UNIX does not mean your existing PCs have to be orphaned. It isn't a case of UNIX or networking. With UNIX you can have both. Most UNIX systems support the networking of PCs in addition to the above. Indeed, even Novell has announced plans to support Novell software running on UNIX.

Although networking PCs can provide adequate multi-user computing, it is inherently less flexible or powerful than UNIX. With UNIX, not only does one have the advantage of a standardized true multi-user operating system that is available on a wide-range of machines and architectures, but also one can still run MS-DOS applications and network PCs. It would seem that not only can UNIX do almost everything Novell can do (and frequently better), but also UNIX can do many things that Novell can't even pretend to do.

Is there really any choice?

George Pajari is president of the UNIX consulting company Clarendon Datex Ltd. and of Trainix, a company that specialises in UNIX training. Although the author truly believes that UNIX is frequently the superior solution, he is not blind to the strengths of Novell and has even gone so far as to recommend to a client that his UNIX system be returned to the vendor and a Novell network be installed instead.

**Alternative definition
of a network:
A device that allows
a user to
share consultants.**

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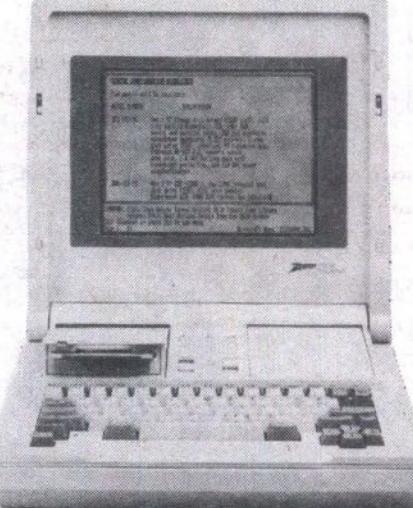
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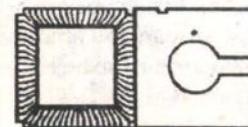
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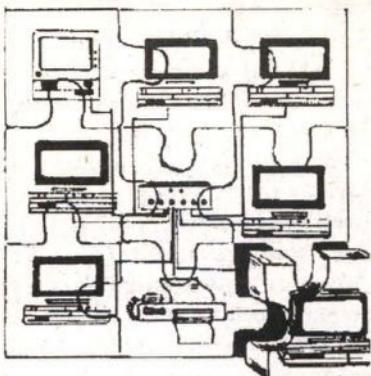
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LOCAL AREA NETWORKS



Novell Networks

As of April, 1989, the number of NetWare installations exceeds 400,000 file servers, with over 4,000,000 workstations

being connected. Various sources estimate that Novell Netware is being shipped at a rate of 10,000 to 20,000 copies per month. These numbers translate into a market share exceeding 60% on the LAN operating systems market, making Novell's operating system, Netware, the de facto industry standard.

Novell Netware supports over 135 different network adapter cards running virtually every available LAN protocol and connects microcomputer LAN's to them in computer and mainframe Wide Area Networks (WAN) with the release of Netware/VMS and Portable Netware.

Novell's Product Line

Entry Level Systems: Novell has two entry-level network systems: ELSI, which supports four users, and ELS II, which

supports up to eight users. Apart from those restrictions they have many of the features of Novell's full-fledged Advanced Netware 286 and they provide a growth path to Advanced Netware 286.

Advanced Netware (ANW) 286 is designed for the medium-to-large LAN. Features include support for: 100 users, duplicate directories, read-after-write verification, automatic media-defect redirection ("Hot Fix") capability, 2.2 Gigabytes (GB) of disk space, 16 mega bit RAM in the File Server, Value-Added-Process (VAP's) - generally third-party software that runs on the server, support for over 135 netware adapters, support for four internal bridges, external bridges (bridges subdivide and link networks), and remote communications. ANW 286 is described as having Level I fault-tolerant capabilities.

SFT Netware 286 is a superset of Advanced Netware with System Fault Toler-

ance (SFT) Level II with the addition of non-stop processing through use of the Transaction Tracking System (TTS), drive mirroring (two separate drives on one controller keeping track of each other) and drive duplexing (two separate drive/controller combos keeping track of each other). TTS protects the integrity of shared-data resources against a variety of network faults. Automatic transaction backout, audit trail, and roll-forward capabilities provide a fault-tolerant environment for multi-user and distributed applications written to take advantage of these features.

Support for Other Systems:

Novell products support both DEC and MAC environments and the latest product along these lines is Portable Netware, in which Netware/386 source modules have been licensed to a number of well-known mini-computer vendors, including HP, NCR, Prime, and others. This product allows these vendors to implement Netware/386 on their hardware platforms in a similar fashion to Netware/VMS, Novell's DEC connection product.

Major Features of Advanced Netware V2.15

Part of Novell's success lies in its dedicated-server architecture and the refinements they have built into it. NetWare uses several techniques to get that networks-on-steroids-look including: extensive use of file caching (keeping lots of data on hand in fast RAM memory versus on the slower hard disk); index hashing (looking up what files and directories you want in a quick non-sequential way) at the File Server; optimized elevator-seeking drive access - Netware picks up data in the best order for picking up rather than the order it was necessarily requested in; and the ability to internally bridge (connect) several different network adapters.

Data security and integrity are provided by features such as "Hot Fix," which eliminates the possibility of a drive defect corrupting data by verifying all drive writes and redirecting data to replacement areas of the drive if the verify process fails. The suspect area of the drive is then marked "out-of-bounds" and is no longer available.

Macintosh Support

ANW 286 V2.15 also offers substantial Macintosh support, which allows MAC's to attach by either Ethernet or Apple's AppleTalk. Many application programs which offer both MAC and PC versions of their application programs now allow virtually transparent transfer of data between these formerly non-compatible systems.

The Nine Rights Of Novell

Unlike MS-DOS, Netware offers the ability to protect individual files and directories from unauthorized access by granting various "rights" to end-users. The nine rights can be assigned individually or to groups of end-users collectively. These rights can be set up to allow read-only, read-write, or read-write-delete, etc. They form a powerful tool which allows Netware to fully protect sensitive data. Some application programs offer additional security levels to further enhance confidentiality. A centralized security facility directs a concert of security options, including: (1) account-level security [the user I.D.], (2) password-level security, (3) directory security, (4) individual file security, and (5) internet security. Any and all of these options may be combined to secure the LAN from unauthorized access.

Highlights

32-bit 80386SX Microprocessor
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Memory expandable to 8 MBytes
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- Byte Magazine, March, 1989



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Printing Options

There are a number of print methods

available to workstations attached to a LAN. The workstation can have a local printer attached and can share a printer "through the I/O". Printing on the network comes in a variety of sophisticated options including the idea of pooling printers on a first-come, first-served basis, or building queues for special printers or devices, e.g. a laser-printer queue.

Software Compatibility.

Besides the above features, one of the major reasons for the popularity of Novell Netware is the wide support by third-party software developers such as Ashton-Tate, Computer Associates, Lotus, WordPerfect, Microsoft, Foxbase, and many others. Netware provides full support of all versions of MS-DOS and PC-DOS V2.0 or higher, as well as supporting OS/2. This allows almost every stand-alone DOS-application program to be installed (in single-user mode) with no loss of features.

The Future

With the performance question of a network-specific, dedicated operating system clearly answered, Novell offers a look into the future with several recent product announcements. The major product announced is Advanced Netware 386 V3.0 (Netware/386). Netware/386 was completely rewritten from scratch using the full 80386, 32-bit native mode of operation. Critical portions were written in 386 assembler for optimum performance considerations. This product is Novell's LAN-platform operating system for the 1990's. Netware/386 V3.0 removes the various restrictions of ANW 286 V2.15 with regards to the 80286 CPU to take full advantage of the power and features of the 80386 and 80486 CPU chips. Features include: all features of ANW 286 V2.15 as well as support for 250 users, 32 Terabytes (TB) of

disk capacity, 4 GB file size, 4 GB of RAM in the File Server, 32 physical disk drives, and greatly enhanced print protocol and management abilities, duplexed file servers, and additional security levels for users. A significant new security feature of Netware/386 V3.0 is the encryption of password information during transfer over the communications system for all protocol systems. This is important for large LAN-installation owners concerned about unauthorized access to the LAN and to their data.

A not-so-distant revision with a release date of early 1990 will have support for one thousand users. Novell Netware is continuing to dig the mainstream channel of the local area network operating system river well in advance of its competitors.

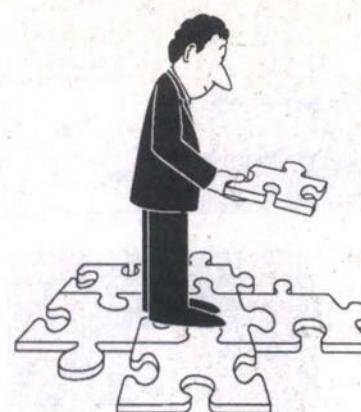
Ian Frazer is a staff member of Softrak Systems Inc. (736-3741), a Novell gold-level authorized dealer (the highest level of authorization available). Softrak is also a Novell Independent Software Developer (ISD), which gives Softrak direct access to in-depth technical assistance directly from Novell. Ian has over eleven years' experience in the microcomputer field, the last four concentrating on the LAN market-place with Novell Netware-based systems.

Confessions of a famous wiring person.

"I guess I just got wired the wrong way around."

— Elvis Presley, commenting on how he switched ambitions from electrician to musician.

Tips, Tricks and Traps



1. Your network installer should have tested all the components at his/her site before bringing them to your site. As much as is possible, the network should have been up and running off-site before being brought on-site.

2. An older installer is better than a younger one.

3. Nobody knows; some people can look up faster than others.

4. How easy is it to move a workstation? A clump of workstations? A whole network? Often a lot more important question to ask than trying to read through seven manuals about the ideal packet size and whether Ethernet, Arcnet or Token Ring delivers it.

5. Never ask the price until you've already decided what system you really want.

6. Dot matrix printers are cheap; a lot cheaper than trying to get away with one big printer for everybody. The neat part of a network is sharing very expensive devices that everybody wants but can't justify individually, e.g., cold fusion digitizer.

7. Think of charging departments for non-use of computer time rather than the other way around.

8. Keep a couple of spare network cards and cable around when you install. A great many of the physical problems with networks come from these two areas. Even if you do have to call someone out because you don't want to open the box or rip out the old cable, you'll save yourself one additional problem - getting parts in a hurry.

9. Networks don't run themselves; who's going to do it for you? What to look for in a network administrator: someone who types labels on every one of their file folders and color codes all of their files. What not to look for in a network administrator: computer programmers or, in general, those who are "really weird" but know a lot about computers.

10. Remember: In Canada there is no law currently in place against the solicitation of customers for the purpose of selling a LAN.



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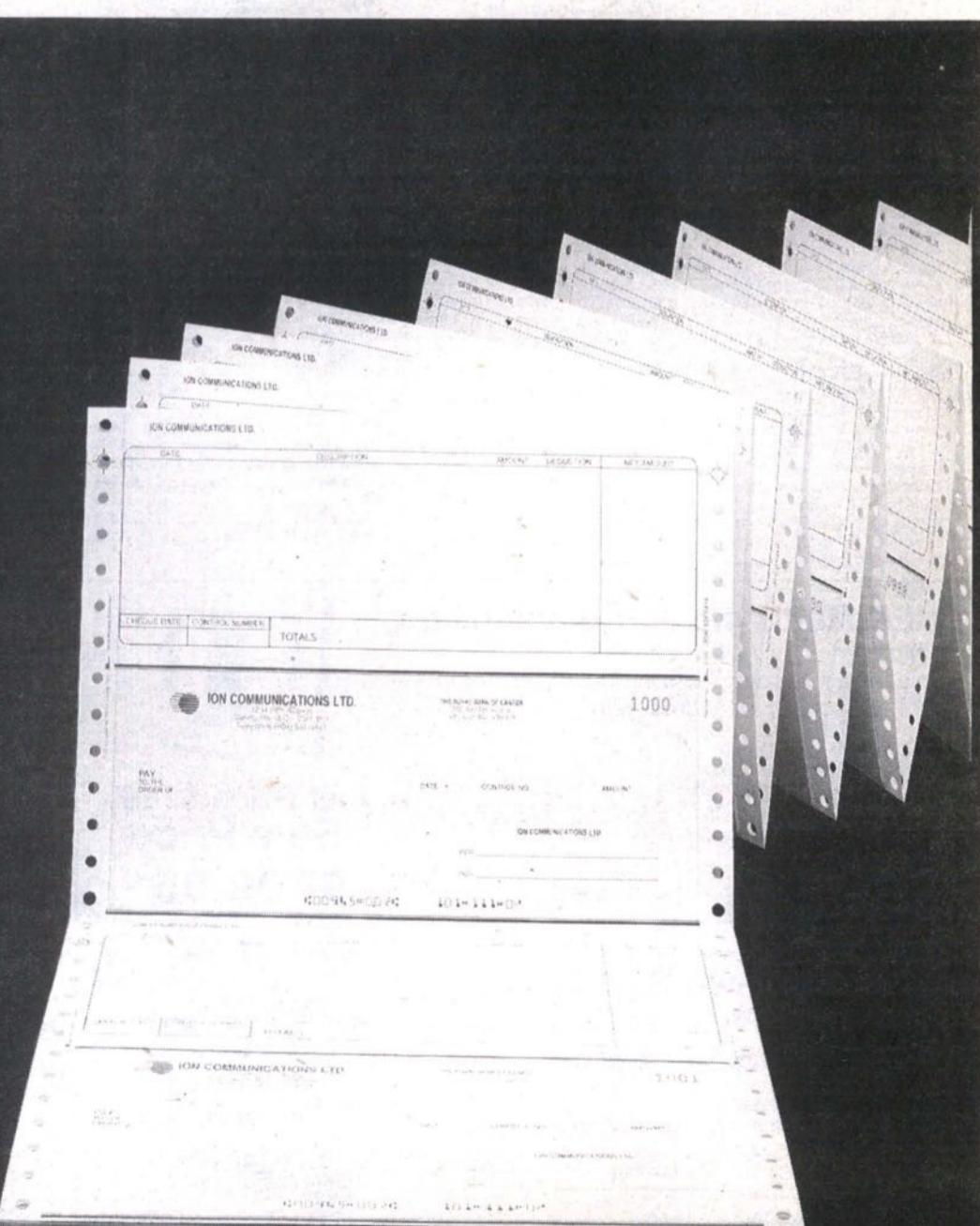
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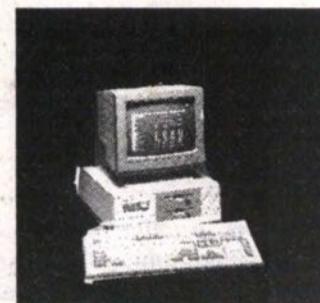
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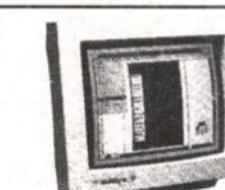
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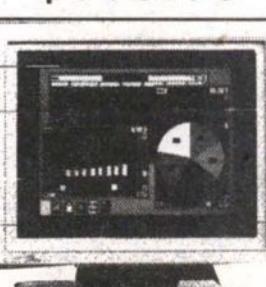
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OS/2

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3+ Open is constructed on top of OS/2 LAN Manager and offers the following features: 3+ Open LAN Manager operating system, Entry Level (5 user) and Advanced (unlimited users).

3+ Open Mail: server-based, running under 3+ Open LAN Manager. Clients can be OS/2, DOS, or Macintosh workstations. 3+ Open Mail will be compatible with numerous other gateway products; some are currently available and planned, such as MCI Mail, DISOSS, PROFS, All-In-1, and X.400 (in early development stage).

With 3+ Open Mail network, users can send messages and attachments to one another easily and efficiently. Features include the ability to send, receive and print electronic mail, forward mail to others, reply to mail messages, transfer binary and text files, also file, arrange and locate messages in electronic folders, and print electronic messages. 3+ Open Mail allows complete transparent electronic mail interchange between DOS, OS/2, or Macintosh nodes using either 3+ Mail or 3+ Open Mail. 3+ Open Internet allows inter-network bridging between Ethernet (coax and twisted pair), Token Ring and LocalTalk.

Also, PC's from a remote office or home workstations can access complete network services, all transparent to the network user. Internet maintains inter-networking and remote-PC access over telephone lines of speeds of up to 19.2 kilo baud.

3+ Open Backup: Includes a full-screen menu interface, which allows administrators to schedule automatic, unattended backup of network servers on 3COM's 3S/400 servers. The network manager can choose either an incremental (files that have changed since last backup) or complete backup.

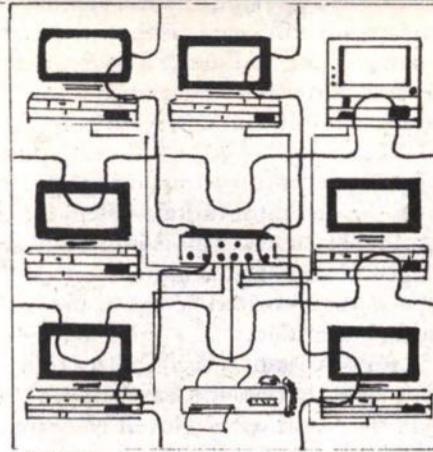
3+ Open for Macintosh (due 4th quarter 1989): Connects Macintosh Plus, SE and II computers to 3+ Open and 3+ network, while maintaining the standard Macintosh interface, thus allowing: 1) Macintosh user interface to access file and print abilities; 2) Network management from any Macintosh; 3) Transparent data sharing between Macintosh, OS/2 and DOS workstations; 4) LocalTalk and Ethernet support and a path to Token Ring networks. Presently the network user can have Macintosh connectivity via the old 3+ network environment, which can coexist with the new 3+ Open LAN Manager.

R&D for this article supplied by John Denenfeld of Coastway System Technology.

IBM OS/2 LAN Server

Running on either Token Ring or IBM PC Networks, OS/2 LAN Server Version 1.0 takes advantage of the features, functions and capabilities provided by the IBM Operating System/2 Extended Edition Version 1.1 environment.

Some of these include: Protected mode, multi-tasking functions and large memory support; NETBIOS, Presentation Manager and spooler support. In addition, the LAN Requester function provided by OS/2 Extended Edition Version 1.1 can be used to communicate with systems running OS/2 LAN Server Version 1.0.



OS/2 based LAN's come in many different incarnations, the two most common being 3COM's and IBM's. The following illustrates the features of both.

3+ Open LAN Manager

Corporate-Enterprise-Wide Networking

One of the most pressing concerns for large corporate networking is what has been prosaically called inter-connectivity. How do you get the IBM mainframe talking to the local area network or to the engineering division's UNIX multi-user system? Firstly, they are all different operating systems. Secondly, they are all from different vendors who have a historic predilection towards creating unique and incompatible systems. But the pressure for a more open approach has come, and it is for this reason that 3COM has chosen the OS/2 platform.

3COM's 3+ Open allows for maintaining uniformity within the large corporate inter-network environment with support for servers such as UNIX, OS/2, VMS, and proprietary systems. UNIX, LAN Manager (LM/X) and Digital are already developing versions of the OS/2 LAN Manager which will offer respective services to both DOS and OS/2 workstations. Theoretically, any network based upon OS/2 LAN Manager will be inter-operable (work together, for the uninitiated). 3+ Open LAN Manager also supports standard protocols such as: NETBEUI/DLC, TCP/IP, OSI, XNS, plus a host of others, thus supporting multiple transports among various networks transparently to the end user. This means the diverse systems work hand in hand. Most other major network systems experience degradation due to the required use of costly Service Protocol Gateways.

The results of numerous tests have shown that the performance of 3COM networks is very similar to some of the other major networks, such as Novell. The speed and performance of the system is based in part on the use of track-caching in the server and file-caching in the workstation. This allows frequently-used files and applications to be sent into a high-speed cache for instant access rather than waiting for and tying up the hard drive. LAN Manager offers true concurrent network I/O, which means that information can be sent to and from the network card(s) and hard drive simultaneously. Hence, system performance is greatly improved. It also has a new feature called absolute local/remote transparency. This allows totally-transparent remote-user access to the network services.

For some more jargon: it supports remote file, print and device I/O and remote inter-process communications via API's (application program interfaces). The API's are called such esoteric names as Named Pipes and Mailslots. These are important because a developer can call for network services, particularly processor-to-processor links, in a simple and straightforward manner.

One important new feature is a Uni-

CONTINUES ON PAGE 63

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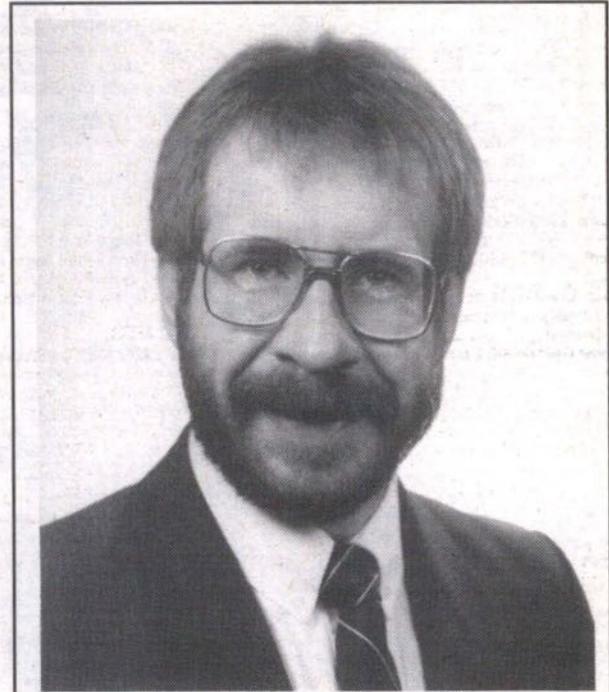
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Novell vs. UNIX : The Costs

by Mike Wolfe and George Pajari

This article is an attempt to shed some light on the perennial argument over Novell vs UNIX. We asked two consultants, one an expert in Novell networks (Mike Wolfe), the other an expert in UNIX (George Pajari), to draw up four hypothetical system configurations and priced them using a Novell solution and a UNIX

solution.

All configurations use brand-name systems and components using 286 or 386 CPUs. Whenever possible, the same prices for comparable systems, memory, and disks have been used for the UNIX configurations as for the Novell configurations. All products are currently shipping. No clone components are used. Each configuration can be upgraded without discarding components.

With both UNIX and Novell systems there is no "standard" configuration or magic rule for choosing the components of the system. Each situation is unique. Each presents its own problems and requires its own solution. Also, considerable leeway exists in trading off performance for cost. For these reasons the prices and configurations listed here are for comparison purposes only. Neither author suggests that the configurations are necessarily appropriate for anyone's re-

quirements.

All pricing is based on the manufacturer's suggested list with no allowance for discounts based either on "street" pricing or volume discounts (i.e. 50 workstations are priced at 50 times the one terminal price). Not included in these configurations are printers, cables, uninterruptable power supplies, power conditioners, installation, testing, or training.

While the authors of this article believe the configurations and pricing chosen for this article fairly reflect real-world conditions (to the extent described above), remember the prices are for comparison purposes only and do not represent a quotation or commitment on behalf of the authors or their companies.

Each system is configured for an average load per user.

Special Notes on the Novell Configurations

Each server CPU is configured for an average load per workstation. A non-dedicated server (also used as a workstation) is used for the four- and eight-user configurations. A dedicated server is used for the sixteen- and fifty-user configurations. Disk size and server RAM are estimated based on user population. Each server is running a "Red Box" version of Novell Standard Netware (not an OEM version).

A standard workstation configuration is used throughout, each being a reasonably fast 80286-based system. This is considered more than adequate for the specified software but can be expanded if required (i.e. to support OS/2).

Arnet is used as the communications topology for all but the fifty-station configuration. Eight-bit Arnet cards are used in all workstations and in the four-user server. Sixteen-bit Arnet cards are used in all other servers. In the fifty-user configuration, the load is arbitrarily split 50/50 between Arnet and Ethernet using 16-bit Ethernet cards in the server and workstations for higher performance.

Microsoft Word v5.0, Supercalc 5, and Dbase IV (the real thing, not look-alikes) are licensed for all users on each LAN.

Special Notes on the UNIX Configurations

The smaller systems have been configured with more memory than is usually required in order to handle worst-case scenarios. On all systems except the multiprocessor the console is used by one of the users.

Although not included in the pricing, the 386-based systems can all run MS-DOS software simultaneously with UNIX with the addition of VP/ix (a \$1,235 software package). Some MS-DOS software running under UNIX may be limited to the console or require additional hardware in order to display graphics.

The terminal selected is a top-end monochrome terminal (suggested list \$880). Other terminals suitable for UNIX are available starting at around \$400.

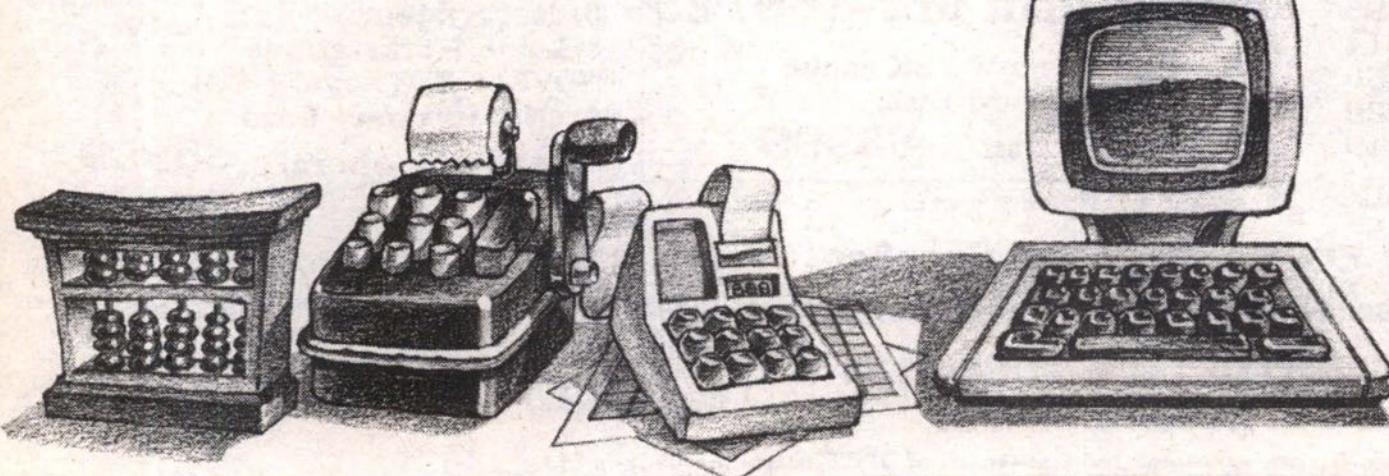
There are two fifty-user configurations. The first networks together two twenty-five user configurations. This is suitable if users can be partitioned into two groups such that the majority of disk traffic does not travel over the network.

In the case that all fifty users are generating transactions against a single database, then the second configuration is more appropriate. This configuration uses a multiprocessor system built by Sequent and optimised for high-volume transaction processing. The system selected here is an entry-level machine with expansion capability to twenty processors supporting over five hundred users generating over one hundred transactions per second. Because this machine represents the smallest configuration of a very expandable system, the per user cost is higher than usual. This would drop significantly with more users.

For the smaller systems the operating system is the most recent version of SCO XENIX for The Santa Cruz Operation (other versions of UNIX are available at similar or lower cost). The software is Microsoft Word (XENIX Version 3.0), SCO Professional (Lotus 1-2-3 look-alike for UNIX), and either FoxBASE + (a dBASE III look-alike for UNIX) or SCO Integra (an SQL database).

For the Sequent systems the operating system is Sequent's port of UNIX optimised for symmetrical multiprocessing (with a licence for 64 users). The software is WordPerfect, Lotus 1-2-3, and an SQL relational database.

George Pajari would like to thank Walter Zmud of CGS Support Inc. (the Chaps Group) for assistance in preparing the Sequent configuration.



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Novell Prices**4 USER ARCNET Total: \$17,794.**

Non - Dedicated Server: \$ 6,820.
286 10MHz, True 0 wait on ALL RAM
80 MB disk, 2 MB RAM
Mono screen and Controller
8 bit Arcnet
Novell ELS I Advanced Netware

3 Workstations: \$ 7,767.
286 - 8MHz True 0 Wait on ALL RAM
1 MB RAM
Mono screen and Controller
8 bit Arcnet

Miscellaneous: \$ 3,207.
1 Passive hub
MS Word for 4 stations
Supercalc 5 for 4 stations
Dbase IV for 4 stations

8 USER ARCNET Total: \$34,875.

Non Dedicated Server: \$10,083.
286 10MHz, True 0 wait on ALL RAM
80 MB disk, 4 MB RAM
Mono screen and Controller
16 Bit Arcnet
Novell ELS II Advanced Netware

7 Workstations: \$18,123.
286 - 8MHz True 0 Wait on ALL RAM
1 MB RAM
Mono screen and Controller
8 bit Arcnet

Miscellaneous: \$ 6,669.
1 Active hub
MS Word for 8 stations
Supercalc 5 for 8 stations
Dbase IV for 8 stations

16 USER ARCNET Total: \$67,529.

Dedicated Server: \$13,537.
386 20MHz True 0 wait on all RAM
150 MB disk, 5 MB RAM
Mono screen and Controller
16 bit Arcnet card
Novell Advanced Netware V2.15

16 Workstations: \$41,424.
286 - 8MHz True 0 Wait on ALL RAM
1 MB RAM
Mono screen and Controller
8 bit Arcnet Card

Miscellaneous: \$12,568.
1 Active Hub
5 Passive hubs
MS Word for 16 stations
Supercalc 5 for 16 stations
Dbase IV for 16 stations

50 USER ARCNET / ETHERNET

Total: \$202,911.
Dedicated Server: \$21,853.
386 20MHz True 0 wait on all RAM
600 MB SCSI disk, 9 MB RAM
Novell Disk Co-Processor
Mono screen and Controller
16 bit Arcnet card
16 bit Ethernet card
Novell Advanced Netware V2.15

25 Workstations: \$64,725.
286 - 8MHz True 0 Wait on ALL RAM
1 MB RAM
Mono screen and controller
8 bit Arcnet

25 Workstations: \$79,675.
286 - 8MHz True 0 Wait on ALL RAM
1 MB RAM
Mono screen and Controller
16 bit Ethernet

Miscellaneous: \$36,658.
2 Active Hubs
7 Passive hubs
MS Word for 50 stations
Supercalc 5 for 50 stations
Dbase IV for 50 stations

UNIX Prices**4 USER UNIX**

286 (10MHz 0 wait state) 4Mb RAM,
80Mb SCSI disk: bus-master controller,
Mono screen and controller, and an
intelligent 8-port board \$8,610

3 terminals 2,640

SCO XENIX/286, MS Word,
SCO Professional, FoxBASE+ 3,592.

TOTAL \$14,842.
per user 3,711.

8 USER UNIX

386 (20MHz 0 wait state): 6Mb RAM,
150Mb SCSI disk: bus-master controller,
Mono screen and controller, and an
intelligent 8-port board \$14,218.

7 terminals 6,160.

SCO XENIX/386, MS Word,
SCO Professional, FoxBASE+
or SCO Integra (SQL database) 4,569.

TOTAL \$24,947.
per user 3,118.

16 USER UNIX

386 (25MHz 0 wait state) with: 9Mb
RAM,
150Mb SCSI disk: bus-master controller,
Mono screen and controller, and an
intelligent 24-port board \$22,223.

15 terminals 13,200.

SCO XENIX/386, MS Word,
SCO Professional, FoxBASE+
or SCO Integra (SQL database) 4,569.

TOTAL \$39,992.
per user 2,500.

50 USER UNIX**(VERSION 1)**

TWO 386 systems, each with:
386 (33MHz 0 wait state): 16Mb RAM,
300Mb SCSI disk: bus-master controller,
Mono screen and controller,
intelligent 24-port board,
and Ethernet \$35,554.

24 terminals 21,120.

SCO XENIX/386, MS Word,
SCO Professional, FoxBASE+
or SCO Integra (an SQL database),
and network support 6,569.

TOTAL (each) \$63,243.

TOTAL (for two) \$126,486.
per user 2,530.

50 USER — CONFIGURATION 4**(VERSION 2)**

Sequent Multi-Processor with
2 processors (expandable to 20 CPUs)
528Mb disk, 8Mb RAM,
tape drive, 64 serial ports \$199,140.

50 Terminals 44,000.

UNIX, WordPerfect, Lotus 123,
SQL database 98,040.

TOTAL \$341,180.
per user 6,824.

Mike Wolfe is a partner with Softrak Systems Inc., responsible for the sale, installation, and support of Novell LANs.

George Pajari is president of the UNIX consulting company Clarendon Datex Ltd. and of the UNIX training company Trainix.

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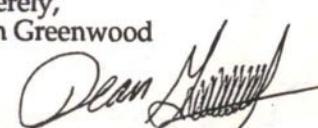
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- INDEPENDENT Service Contracts (4 hour response time locally)

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Dean Greenwood

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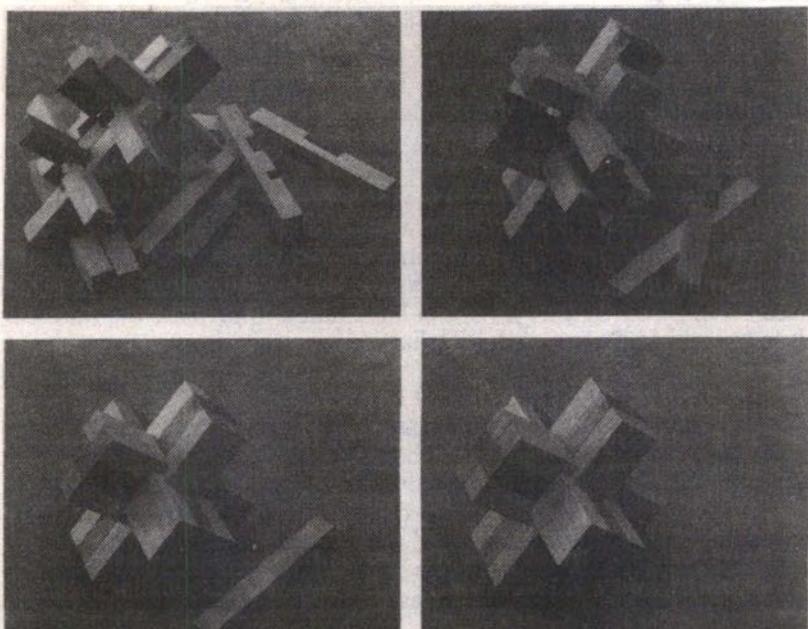
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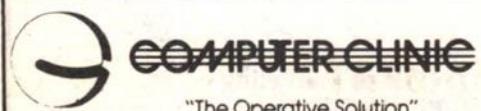
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LOCAL AREA NETWORKS

Sharing a Laser Printer

Preliminaries

Let's talk briefly about the most common parallel and serial cables and how they are used.

Serial cables look almost identical on both ends in terms of both size, and the number of connectors or pins. The only difference between the two ends may be that one is male, with visible pins, and the other, that it plugs into, is female, with only holes visible. Parallel cables look a lot like serial cables, but one end of the cable, (the printer end), is considerably different in that it is wider and has more pins. Both types of cable do essentially the same job—carry data from one end of the cable to the other. The major difference is that the serial cable sends only one bit at a time, while the parallel cable can send data several bits at a time. To make a long story short, parallel cables can send data faster than serial cables.

Parallel cables normally connect to the LPT1 or LPT2 parallel port on your computer, while serial cables connect to COM1 or COM2.

Centronics parallel, the most commonly used parallel cable, usually has length restrictions. The cable should not be used over distances greater than 15 to 20 feet. Serial cables are recommended for greater distances. We have clients that are currently running cables that total over 75 feet with little difficulty, but these distances are not recommended by any cable manufacturer. Properly shielding cables may help prevent interference over longer distances.

Cable Swapping

The most common way to share a printer is by switching cables between users and printers when it is time to print. When you are ready to print, you make certain that your cable is plugged into the printer. When another user needs the printer, he unplugs your cable and plugs his own cable into the printer. This is the most inexpensive method of sharing, but can be annoying if you need to do it very often.

Cables plugged and unplugged frequently may end up worn or having bent pins, so if you are using this method, keep a spare cable on hand, just in case.

Caution: Take the printer OFF LINE before making the switch.

Mechanical Switch-box

Another inexpensive way to share printers is to purchase an inexpensive mechanical switch-box that will require flipping a switch instead of plugging and unplugging cables. The users are always connected to the box, and flipping the switch on the box has the same effect as swapping the cables as described above. This is still somewhat inconvenient, but easier than whipping cables around. The user closest to the printer is usually the one who gets less work done because they end up doing the switching.

Caution: Take the printer OFF LINE before making the switch, as above.

Electronic Switch-box

Electronic switch-boxes are little more than the mechanical box above with one major addition: the box automatically makes the switch when it senses any user sending data to the printer. The other users are automatically put on hold until the active print job has finished. This is slightly more convenient than the mechanical box in that no one user has to manually make the switch.

Now, unless the box has a buffer to store and print a considerable amount of data, other users may have to sit around

and wait until the current user has finished, and then they get their turn on the box. There are boxes available with a buffer that will allow one user to send data, store the data in the memory (buffer) of the box, and let another user send while the first user's data is being passed on to the printer. The larger the buffer, the less waiting time. A single page of text, depending on the size of font used, can contain 2,000 to 3,000 characters. The computer software also sends positioning commands, carriage returns, line feeds, and other control information that could easily add up to 5,000 characters per page. If you add a complex page of text and graphics, the amount of information can easily reach 100,000 or more characters. This means that another user may have to take a coffee break before their printout starts transmitting from their computer to the box.

If you plan on sharing printers between two or more users, try to get a share box with at least a 256,000-character buffer. The more users, the larger the buffer should be. The buffer stores and prints the first user's data while, at the same time, receiving and storing the next user's data. This method allows the second user to continue working on the computer because the print information has been sent, freeing up the computer, and is waiting in the buffer until the first user's printout has been completed by the printer.

Some sophisticated boxes which can connect several serial and parallel users together and offer memory of up to 1,000,000 characters for buffers include a spooler, and allow you to connect to two or more printers. This means the user can select which printer to print on, and also connect two or more switch-boxes together directly or over modems/telephone lines. The spooler even allows you to change the order of the printouts, in some cases.

Although these devices are generally fairly easy to use, some technical knowledge may be necessary to configure them properly. Other than that, they are highly recommended by existing users.

Caution: Use a separate power source for the share-box to prevent burning out the power supply on the box itself. Power surges can be caused by your laser printer's heating element as it turns on and off. A large surge can damage the power supply in the share box.

Networks/Dedicated Print Spoolers

A personal computer network allows each user to print to a printer as if he/she was connected directly to the printer. This is perhaps the most efficient way to share a printer, although not the least expensive, since the network itself is usually a complex and expensive item.

The network can have a dedicated personal computer as a front-end processor that does the buffering, spooling, and allows the changing of the order of the printouts.

Printers With Built-in Sharing Capabilities

The Dataproducts LZR-1230 laser printer is a popular office printer for many reasons, one of which is that it includes one parallel and two serial connections for sharing. The parallel is normally connected to the computer with the higher volume of printing, while the two serial connections can be used by other users.

The printer internally polls each of the

users, and when any one is sending data, the other users are placed on hold, or buffered, if there is enough memory. When the current job has finished printing, the next user will be selected automatically.

If you have more than three users, you can split one or more of the ports by putting in a sharing device, using one of the methods described above.

Sharing Paper/Forms

One of the headaches of sharing printers is changing paper and/or trays at the right time, all of the time. One alternative is to purchase printers with multiple feeders or bins (or trays) for different forms, allowing several forms to be available on the printer at any time, including envelopes, and by selecting the correct bin, you get the correct form.

A shortcut method is to program-in forms, such as one for letterhead, that can be stored in the printer and then printed by selecting the correct form on the keyboard. This method allows printers with only one tray to appear as if they had multiple forms in them. The form information is stored directly in the printer, and requires only blank paper in the single tray. This way, paper changes and/or expensive paper bins, trays, or feeders are not required.

Resolving to Share

Printers can be shared for as little as the cost of the cable. A switch-box sells for under \$100, an electronic sharing device for \$200 or more, a buffered sharing device for \$600 and up, or you can buy printers with sharing equipment built-in.

The final choice is yours. Good Luck!

Roman Woroch is president of Dante Group Software Inc., which specializes in laser printers and laser software. He can be reached at 596-0111.

Network Software

As mentioned earlier, most network operating systems do not have everything built in. Often the full power of a network is not unleashed until application software is installed. What follows is a quick rundown of what types of software there are specifically for networks that do things in a network way.

Document managers - these programs allow you to catalogue and classify all the files on a network, much like a library. There can be special check-out privileges and different viewing statuses.

Workstation access tools - these programs allow for the accessing of workstations across the network as if they were your own. Great for user support, demos and spying.

Network monitoring - monitors the resources of the network: who's using what and when.

Network trouble shooting - tracking the performance/problems of the cable, cards, etc.

Print services - enhancements such as priority levels, using local printers as network printers.

Electronic mail - often one of the justifications for purchasing a network in itself in offices with heavy paper traffic; note that's paper traffic, not voice.

Back-up - keeps track of all those tapes and versions of those tapes; automates back-up.

Front-end software - used sometimes when your network software does a lot of wonderful things behind the scenes but doesn't allow you to present the pretty face you want the world to see.

LOCAL AREA NETWORKS

Data Switches and RS-232 Networks

At the low end of the network market are a variety of mostly card-less networks - i.e. ways of getting computer-to-computer or computer-to-peripheral communications. These follow two basic models: cable/software systems, and data switches.

Zero-Slot LAN's

These cable/software combinations have been dubbed the zero-slot LAN's (they don't take up a slot) or RS-232 LAN's. The most elementary forms of these are exemplified by products such as LAP-Link, File Shuttle and the Brooklyn Bridge. These programs allow you to transfer files between two computers via a special cable. And that's about it for these.

More commonly, zero-slot LAN's allow for two or more computers and peripherals to be hooked up to each other to allow file transfer to take place between the computers and the sharing of the peripherals. One very important shaping feature here is background transfer of files. If you're sending or receiving a large file, you do not want to have to wait for it to be completely delivered before you can go back to your work. And it will take time - because they use the standard PC ports, zero-slot LAN's are not too fast. One nice feature with a zero-slot LAN is the ability to transfer files between machines other than the one that's initiating the transfer.

Print services are another important area and the considerations addressed in the article evaluating print services for network operating systems should apply

as well. Ditto for bac-up, workstation memory and disk requirements and robustness of peripheral support.

Data Switches

Rivalling the cable/software combinations are hardware devices that allow for almost all the same features. The simple example given earlier was the A-B printer switch. As usual, more money buys you more connection possibilities. Cabling, particularly trouble shooting, might be easier with one of these devices than with an equivalent zero-slot LAN, as everything hooks into one central box. Distances, speed and number of users are important in both these configurations.

Multi-user applications such as intensive database operations need not apply here or in the zero-slot LAN's. Both of these strategies - cable/software and data switches - can, as mentioned, get more complex. Ump teen devices can be hooked up and bundled; software can include security features; cable and software combinations - often termed the zero-slot or RS-232 LAN (because of the predominant use of the RS-232 or serial port on the PC) that mimic sophisticated multi-user network operating systems that cost many times more.

Why pay more, then? Speed is a big factor. These devices move information a lot slower than their card-based network-operating-system siblings. As well, simultaneous access to databases or other data files is not available. But if you just need to share a laser printer or you occasionally want to see what Jane has on her disk, this might be just the ticket.

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LOCAL AREA NETWORKS

Why You Should Know What "SQL" Stands For

Perhaps the most significant trend for networks is the SQL server. SQL is short for Structured Query Language and we won't go into any of the gritty details of it, except to tell you why it is so important.

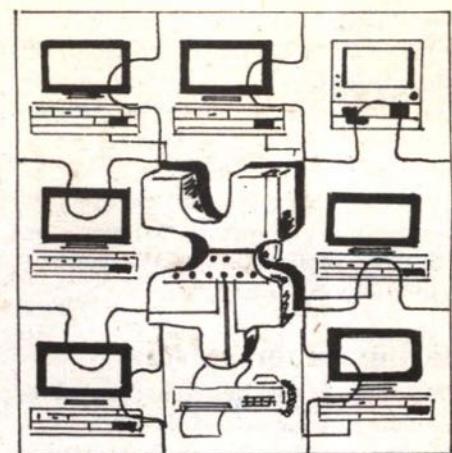
To date, in the more traditional style of network, while files were centralized on a server, they were processed at the local workstation. The operation went something like this: the user loaded a

program from the server into their workstation memory. With high speed cabling, the transfer of the program from the remote server was often quicker than loading the program from a local hard disk; it was, as the ad-men are wont to say, transparent.

Once the program was loaded, the user would then load the file the program was to work with, e.g. if the user was working on their resume they would then load the file with their resume into their local memory. As with the program, the resume was kept on the server but as far as the user was concerned it could have been his/her local floppy or hard disk. The file would be processed in memory and then saved back to the server. For RAM-intensive processing this was acceptable as there was little running back and forth between the server and the

workstation, and performance was comparable to local access.

Database processing, however, does not fare as well in this environment. In this case, once again the program - this time the database program - is loaded into the user's workstation memory. When the user requests a record from the database, the record is retrieved from the server and brought into the memory of the local workstation. Here it is processed and saved back to the server. It would be fine if users only requested one such record and processed it in great detail and then saved it and called it a day. In fact, it works in the opposite manner: users request one record from the server, process it relatively quickly and then ask for another. There are all kinds of ways to make this more efficient: disk caching, optimizing buffer sizes, choosing a network architecture that supports the 'right length' of packet to transport the data



between the server and the workstation one of these, however, will cut it in the world of heavy duty data base operations and it is for this reason that networks have to date not put much of a crimp in the mini and mainframe markets in this area.

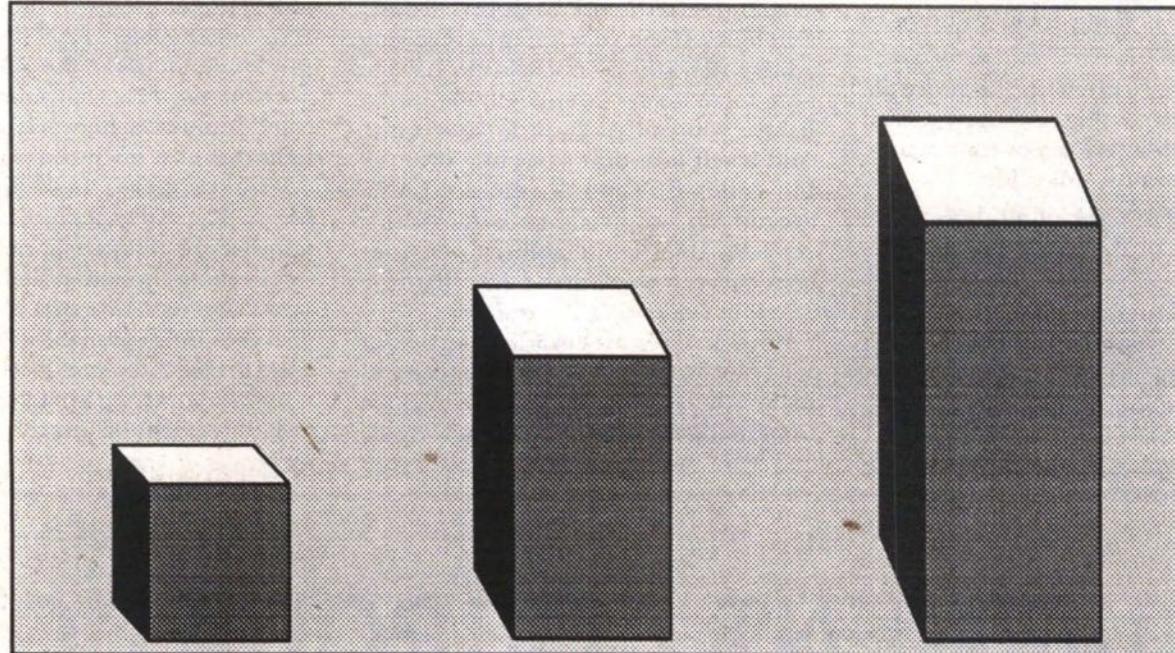
SQL servers afford network operating systems a chance to break this monopoly. In the SQL server environment, there is a specially dedicated computer with special software loaded on it that takes a great deal of the processing away from the workstation.

Workstations are almost dumb terminals; they ask for things to be done and the SQL server does it in-house using its own processing power back-end processing in data base terms. While the architectural aspect of this offers enhanced performance, the more important aspect is that these SQL servers are offering a standardized structure database (product X) and database (product Y) - both can talk SQL. With such a standardized interface around the corner, developers can develop applications of great power and portability.

In particular, the accounting area will see an upsurge in SQL server-based LAN accounting applications that will rival in performance and eclipse in price and flexibility a lot of vertical software developed for the mini and mainframe markets. The year of the LAN has been predicted for a long time and it seems that while there has been no one year that stands out, there has been dramatic growth every year.

With SQL servers in place, the LAN is ensured of continuing its industry-leading growth trend. There may never be a Year of the LAN - there may just come a year when there ain't much else.

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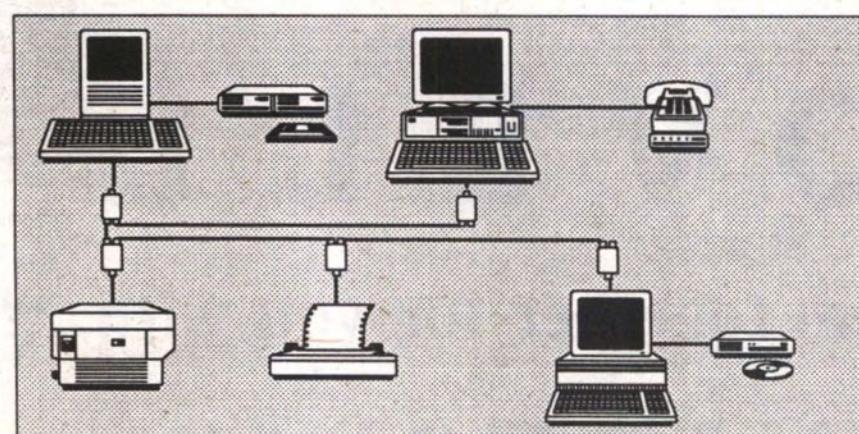
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ELS-2

Up to 8 users

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The Debate Rages On

Stay tuned for next issue when: Mike Wolfe for Novell tries to tell you why you should buy a system that needs a consultant to format your hard disk and it takes him two days to do it; Ian Glass for 3COM and LAN Manager attempts to explain why you should trust an operating system whose first answer to security was telling you to lock your server in a cupboard; George Pajari elucidates why a system that has double standards should be your standard.

Thanks

Special thanks to Peter Lincoln of High Order Systems for coordinating and editing many of the articles contained in this special Networking issue. Thanks to all of the following: Ian Frazer of Softrak (736-3741), John Dennenfeld of Coastway Systems (736-5039), Derek Mak of Namtec (682-8122), Russell Hennessey at ACT Systems (888-0994) and product support at IBM Canada.

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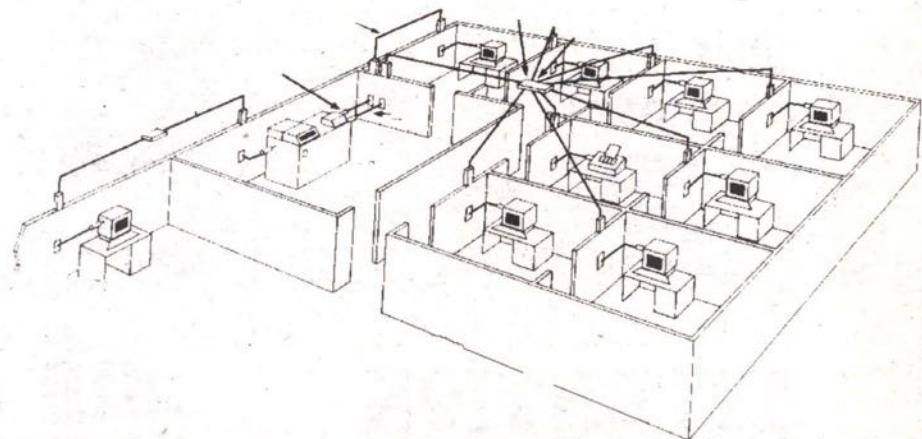
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MACINTOSH

A Macintosh Network Primer



AppleTalk is the life blood in the Macintosh world. It flows from your Mac to networked printers, servers, E-mail systems, bridges, gateways and the world beyond. It is a network protocol that is built into the circuitry of any Mac, large or small. It is supported in the hardware in the form of LocalTalk devices. Its most basic form is a few Macs sharing a printer. It gets as complicated as joined networks (called internets) that span the globe and share information with other networks that are based on totally different computer systems such as IBM mainframes and DEC minicomputers. But we're getting ahead of ourselves, so let's look at the individual components of an AppleTalk network.

Printing

A laser printer or AppleTalked Imagewriter can be used as a shared printing resource on a network. With a large amount of printing activity, a print spooler can be set up where the print job is sent to disk and waits in line (called a print queue) for its turn to be printed. Once available, the job is retrieved from disk and sent to the printer.

File Servers

For the ability to move data between computers, a file server can be set up. This allows for the sharing of files between computers by creating a central pool of files that any user can access. There are a few different strategies to accomplish this.

The two most popular types of servers

AppleShare is a dedicated file server that stores the file pool on a centralized Mac with a hard drive. It does nothing

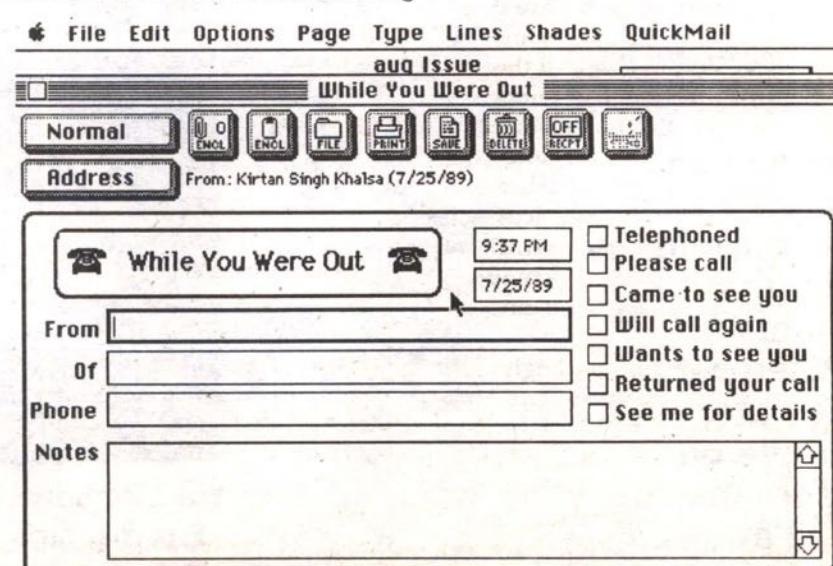
but run the server software and maintain the pool of files. No one uses the computer locally; it is used only through remote access by users who send info to it and receive information from it.

The second approach is a distributed file server that uses the hardware resources of the existing Macs on the network. The pool is spread amongst several computers that are also being used locally. In effect, all computers on the network can become file servers and remote terminals AT THE SAME TIME. This sometimes results in performance degradation and can get confusing as to where the resources are. On the other hand, a dedicated Mac is not wasted solely on server duties. This scenario is advantageously used on small networks.

The Physical Layer

The physical cabling is more than a mere connection between computers. It is one of the main components that dictate the performance of the network. The main staple is LocalTalk cabling and connector boxes (computer-to-cable interface) from Apple. The more cost effective and flexible alternative is Phonet cabling system from Farallon. It consists of fully-AppleTalk-compatible connector boxes and the use of standard telephone cable. In fact, you can plug the cabling into existing telephone jacks and run most of your network over the cabling already installed by your friendly telephone company. Also, the size and configuration of the network is greatly enhanced with this scheme.

For large or spread-out networks, Ethernet is the alternative of choice. It offers many times the speed of LocalTalk or Phonet cabling and is of an industrial standard, allowing for seamless connectivity to other computer systems. The



CE Software's Quickmail allows computer user's to send messages between computers. Forms can be easily customized to different work environments. In-office communications can be greatly enhanced with this simple tool.

price of this added performance is not only in the cabling but also in the network interface. The AppleTalk circuitry is superseded by Ethernet cards that are either installed in the computer or exist as stand-alone boxes that connect to the SCSI port. Prices on these units start at about \$500 U.S. versus about \$1000 U.S. and up on Ethernet Cards.

Performance

We've already touched on performance issues in cabling but there are other factors that affect the network. The CPU of the server is critical in the dedicated-server strategy. Since all the nodes on the network access it (sometimes simultaneously), the quicker it handles the request, the higher the efficiency of the network becomes. The 68030 machines (Mac IIx, cx and the SE/30) are top-of-the-line in this respect. The above also holds true for the distributed server for the machines doing the distributing.

The hard disk plays another key role. The faster the seek time and transfer rate of the drive, the faster the data is moved in and out of the server. Generally, the bigger the hard drive, the higher these values are.

The design of the topology and how a busy internet is divided up to balance the load are also important issues.

Electronic mail provides a means to send messages and files to other computers in the network. This is typically done with a message centre that handles the holding, distribution and security of the messages. The mail arrives at a node and is indicated to the user. He can stop work and look at it immediately or when he has time. Multiple services can be provided, such as "While You Were Out" messages, and copying of messages only for people with the right security clearance. InBox, QuickMail and Microsoft Mail are popular E-Mail packages.

Bridges provide the connection to link two networks together. This is necessary when connecting physically separated networks together and also for networks that have grown too large to exist as a separate entity. Typically, a bridge (such as the Hayes InterBridge) is a stand-alone hardware device teamed up with a modem. Each end of the bridge needs this hardware set-up.

A gateway is similar to a bridge but differs because the connection is between two dissimilar computer environments. A typical link is between Macs and DEC minicomputers, where you move from LocalTalk to Ethernet.

The Connection

SuperLaserSpool (a local spooler) and AppleShare Print Server (a network spooler) are two popular print spooling choices, that send data (files) to a printer for printing later.

The gateway exists as a stand-alone unit or as interface cards that reside in the Mac itself. environments. (Kinetics Fastpath and network cards have dominated this area although there are now new products that will contend this.)

Other avenues of AppleTalk networks are the sharing of peripherals such as modems and CD-ROMs. Remote control of other computers is another fascinating aspect. Connectivity services such as CL/1 offer seamless data transfer of foreign databases such as SQL databases found in mini and mainframe environments.

All this adds up to an increasingly virile connectivity environment for the Mac. No longer is it Macs for Mac's sake. The market for networking products is now exploding with new ideas and approaches. In the not too distant future, all computers will be able to work hand in hand with the Macintosh and provide unimagined power and versatility to the network user!

Roger Stefaekis MacSupport, 681-9087

Macintosh Connections To MS-DOS Computers

Macintosh connectivity has come a long way in the past two years, says Infomax's (688-0696) networking expert, Iron Simek. Infomax sells and supports both Novell and 3COM networks, which incorporate Macintoshes into MS-DOS network environments. According to Simek, 3COM has a larger installed base because their solution has been available for the past three years, whereas Novell's product is only about six months old. This will likely change, given the strength of Novell on the PC side, where it dominates the market.

Simek claims both products work well, but there are major differences. Novell uses the Apple's File Protocol (AFP) whereas 3COM does not. The result is that some applications will not work well with 3COM. Although he had not tested everything, he has had first-hand experience with problems running Filemaker II, a popular Macintosh database, on the 3COM network.

Novell, on the other hand, uses a system very similar to AppleShare, Apple's own file-server software. "Moving to Novell from AppleShare has virtually no learning curve," says Simek.

The 3COM system does however have some very desirable features which Novell lacks, including the ability to back up Macintosh files on an MS-DOS-based server. Novell's back-up will not copy Apple files whereas 3COM has no problem with them. "This gets important on larger networks where back-up must be done quickly and with no hassles," continues Simek. 3COM is not sitting still with their product, either. The recently announced OS/2-based 3+Open offers new functionality.

Both these systems are designed primarily to allow Macintoshes to function on existing MS-DOS-based networks. Novell, however, is promising a completely Macintosh-based networking solution in the future.

The most common method of integrating Macs to PC's is with some type of LocalTalk board on the PC server. Some larger companies will go for the more expensive Ethernet. There are two routes to doing this, either putting Ethernet boards on all Macs, which gives everyone a speed boost, or by using a product like Kinetics FastPath, which connects a LocalTalk network to an Ethernet network. The Ethernet boards which can be inserted into the slot of an SE or Mac II are costly, sometimes as much as \$2,000 per board. Cheaper solutions are coming, including Ethernet boxes that attach to the SCSI port on any Macintosh. These units are priced around \$500 U.S. As yet, Simek had not had a chance to experiment with these units. The speed difference provided by Ethernet is attractive, with rates of up to 10 megabits per second versus the built-in LocalTalk speed of 230 kilobits per second.

According to Simek, the difference in switching to Ethernet is like "night and day." He says "simple things like having remote disks behave like your own hard drive are very impressive over the network." He adds, "It is strange, though. On a PC, paying \$750 to \$1,000 per computer is not unheard of, but on the Macintosh where users are accustomed to their network being built in, to pay that price makes many users nervous. Although Macs are perceived as being expensive, there is a lot of functionality built-in."

Kirtan Singh Khalsa

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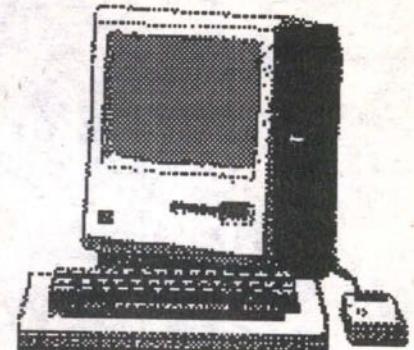
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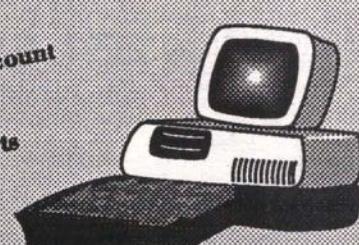
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MACINTOSH

TOPS FlashBox: Not Quite Ethernet, Better Than LocalTalk

Product: FlashBox

Manufacturer: Sun Microsystems, TOPS Division, Alameda, CA, 94501 (415) 769-8700.

System Requirements: DIN-8 version: Macintosh Plus, Macintosh SE, Macintosh II, SE/30, DB-9 version: Macintosh 512KE, System 4.1 and Finder™ 5.5 or higher (MultiFinder™ compatible) Cabling: Twisted pair (recommended - up to 600 ft unshielded), standard telephone cabling (up to 600 feet), or Apple LocalTalk (up to 400 ft).

Protocols: Compatible with all AppleTalk standard protocols. Supports AppleTalk (230 kilobits per second) and FlashTalk (770 kilobits per second) transmission rates. Multi-user Software: 4th Dimension, FileMaker II, Double Helix, Omnis 3Plus, and Great Plains Network Connectors: TOPS TeleConnector, PhoneNET™ Plus, Apple LocalTalk Network Cards (for PCs), TOPS FlashCard, Hercules® Network Card Plus, TandyLink™.

Price: U.S. \$189 per FlashBox

Speed In A Box

FlashBox™, from the TOPS Division of Sun Microsystems, Inc., is a plug-in device for Macintoshes that upgrades the performance of AppleTalk® networks without the expense or complications of Ethernet. Unfortunately, you don't quite get the speeds of Ethernet, either.

FlashBox itself costs much less than an Ethernet card for your Mac (U.S.\$189 vs. U.S.\$600-\$700). FlashBox moves data from one computer to another rapidly by increasing the data-transfer rate of AppleTalk networks. This data-rate increase means you can put more Macintoshes on your network with a less noticeable decrease in performance.

FlashBox transfers data at up to 770 kilobits per second across low-cost cabling such as twisted pair, versus Apple's built in LocalTalk at 230 kilobits per second. Ethernet in contrast moves up to 10 megabits per second.

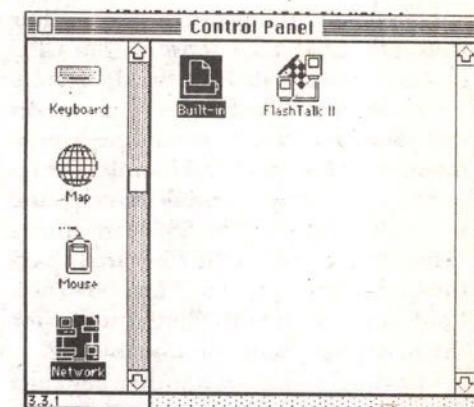
TOPS claims that you get 80% of Ethernet performance at a fraction of the price.

An important point when you consider buying FlashBoxes is that to get any effect at all, you must buy FlashBoxes for all the Macintoshes on your network. Even one without a FlashBox will wipe out any gain and send you back down to LocalTalk speeds.

FlashTalk computers will transfer data between each other at 770 kilobits per second, switching automatically to AppleTalk when communicating with AppleTalk-only devices (like the Apple LaserWriter).

Installation

TOPS FlashBoxes are fairly straightforward to install. Once you read the short manuals that come with them, it takes about five minutes per station. There are three holes in the FlashBox: one goes to the Mac, one goes to the network, and one goes to a transformer that you plug into a wall socket. Next you run an install program that throws an INIT into your system folder and then you re-start your computer. You can drop back to LocalTalk at any time just by selecting it in the Control Panel.



Once the hardware is installed, FlashBoxes each have a software program which is controlled through the control panel. It allows you to default back to the slower LocalTalk speeds if you encounter any problems with software.

Speed

Speed is definitely up, but not as much as you might hope. In our tests, using FlashBoxes doubled the speed of copying files between stations. Using the network was noticeably faster, but not twice as fast. Unfortunately, data transfer isn't the only thing moving over the network. Database access was better, but because of the way the database works, it is accessing little bits of data at a time rather than moving big chunks, so performance enhancement may be limited.

FlashBox increases the performance of your network, but it does not have any effect on disk- or CPU-bound tasks. In a procedure like a file copy, the time that it takes for the data to be transferred between nodes will be reduced, but the time to read the file from the server's disk, and write the file to the client's disk will not be affected by FlashBox. These functions can be speeded up with accelerator boards and faster hard disks. FlashBox is apparently compatible with the Radius 16, Radius 25, and GCC Hypercharger accelerator boards.

How It Works

FlashBox externally clocks the data at three times the normal AppleTalk data rate, meaning that data gets on and off the network wire at 770 kilobits per second - three times AppleTalk's rate of 230 kilobits per second. This doesn't change the "velocity" of the signal; it increases the amount of information transferred in a given unit of time. Therefore each transmission occupies the line for a shorter interval, the line is clear more of the time, allowing users to access the network without waiting (users work more, wait less).

More-Demanding Network

FlashTalk is more demanding of network signal quality than AppleTalk. The network must be very stable and carry signals strongly (i.e. the net must meet Apple's AppleTalk specs). If people have a marginal or illegal network (such as a passive star), FlashTalk may not run correctly. That means there are nets out there that can run AppleTalk but not FlashTalk. Network length limits of 400 ft. (LocalTalk) and 600 ft. (standard telephone wire) are recommended unless repeaters are employed.

Kirtan Singh Khalsa

MACINTOSH

FoxBASE+/Mac 2.0 Leads the Mac Pack

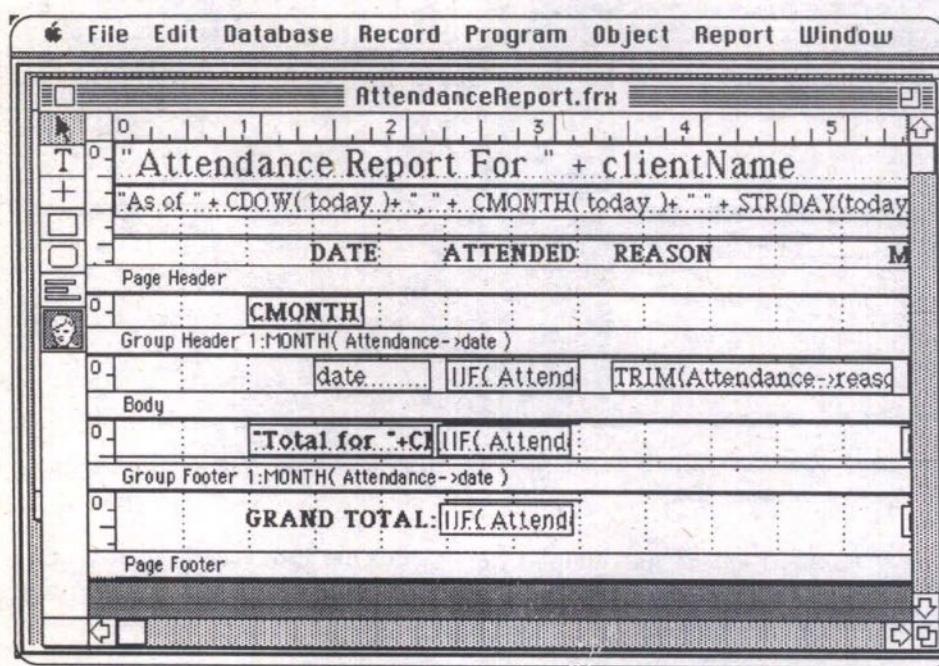


Figure 1. The new FoxReport screen. A report is divided into bands that carry information for the body and title of the report as well as headers and footers for pages, groups and columns.

Introduction

Just two months after it was introduced early in 1988, FoxBASE+/Mac became the best-selling database for the Macintosh—and it has held that lead. With the release of the new version 2.0, it will be hard for the competition to catch up to the Fox. New features in version 2.0 include:

- A MacDraw-like Report/Label generator that allows free-form graphics, color, completely flexible fonts, and page preview.
- Enhanced menu management allowing for menu icons and full hierarchical menu control.
- Access to HyperCard XFCN's and XCMD's for extended functionality.
- Ability to create stand-alone applications with custom desktop icons, start-up screens, and "About" menus, using the runtime version of FoxBASE+/Mac.
- Improved file and screen management.
- Twice as fast.
- Numerous bug fixes and refinements to existing commands.

Beta Tester Bias

I have been using Beta versions of FoxBASE+/Mac 2.0 for the past three months and am very pleased with it. The new report generator is by far the biggest improvement and is simply the best report-generation facility I have seen on any database program. The only complaint I have with FoxBASE+/Mac 2.0 is its somewhat more demanding use of memory. However, unlike Version 1.x which sometimes bombed inelegantly due to poor memory management, Version 2.0 simply stops quietly with a friendly "Out of Memory" error message. But this appetite for memory is not unique to FoxBASE+/Mac. Almost all new major Macintosh software releases require more than one megabyte for optimal performance. I guess they're trying to tell us something. Thank goodness the price of RAM has finally begun to drop rapidly. These days it seems to go down about \$10/Megabyte/month.

Report Generator

The new report generator can do free-form reports on any size paper you define. It can handle little index cards or big 15" computer-paper forms. User-defined paper sizes can be added to the

Page Setup dialog box. When it comes to labels, you can either type in the exact size you want or drag boxes on the screen to show how big the labels are and how they are organized on your label stock. A mouse click determines if 2-up and 3-up labels will be printed across and down or down and across. Several default report choices will automatically print out database fields or labels in standard formats with one or two mouse clicks.

The real power of the report generator is in the design of custom reports. You have total control of title pages, headers and footers, columns and page breaks. Control break programming, where you calculate subtotals of groups of information from a sorted database, is really easy. For extra control, you can still write little programs within data fields using such functions as IIF() (Immediate If) along with a rich set of text string manipulation tools.

Graphics are easy to incorporate into your reports and FoxBASE+/Mac allows you to import graphics from anywhere in your Mac environment, even from resource forks of other applications. Graphics can be made to overflow from one band to another and can be defined with many kinds of bit overlapping so that text can appear in front of, behind or even reversed out of graphics in reports. Besides being able to use any type or size of font, you can also use color and draw boxes, lines or circles. Many fill patterns are available and shades of grey are also supported.

Better Menus

Version 1.0 had reasonably good menu control, but in the new version this has been streamlined. Menus are easier to program and are much more powerful. You now have access to the standard File and Edit menus and even the Apple menu where you can define your own "About..." menu item. In addition you can now use icons in menus, and full hierarchical menus are supported.

I also noticed that version 2.0 fixed some minor bugs that caused the menu bar to flicker when menus were being changed. Now the menu bar is rock steady.

External Commands and Functions

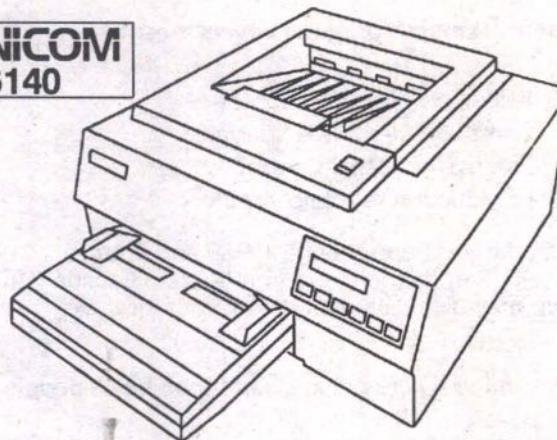
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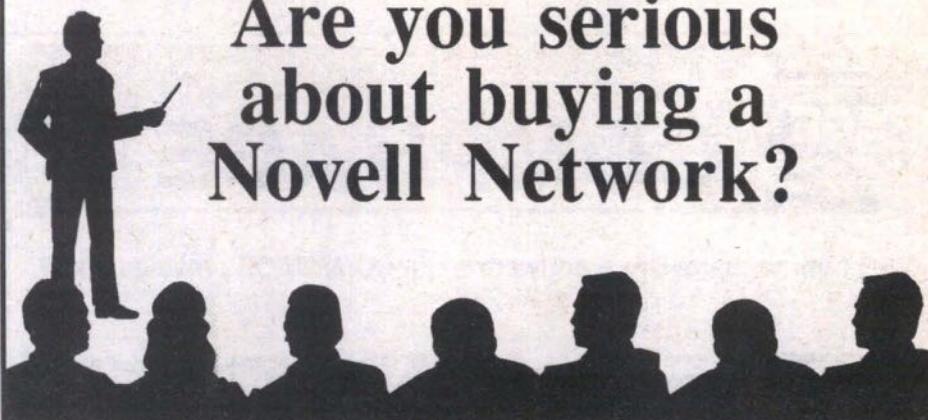
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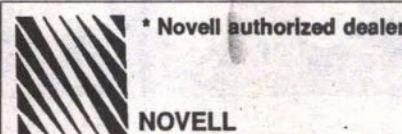
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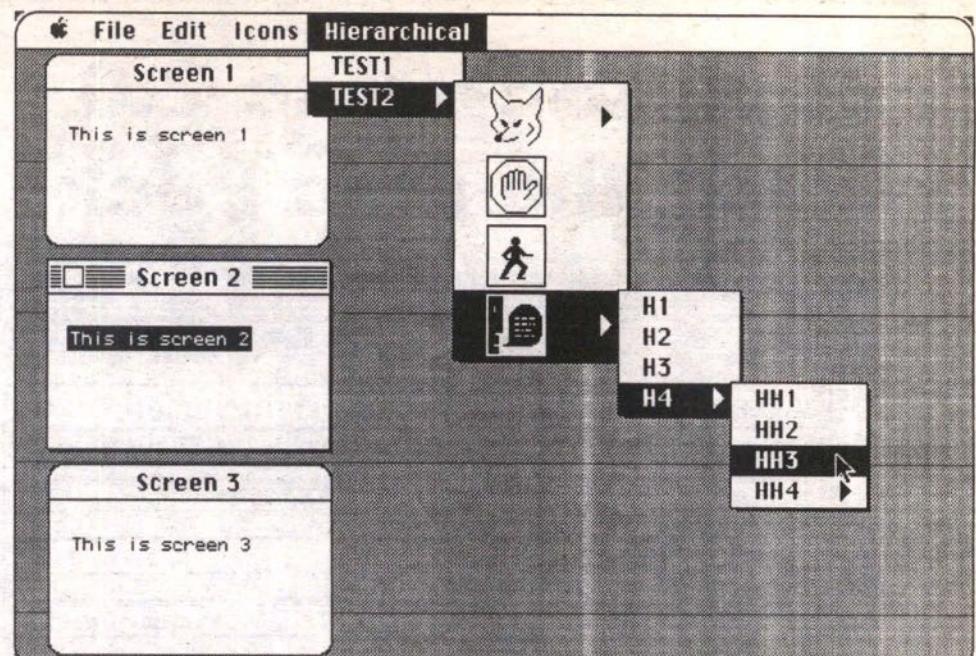


Figure 2. FoxBASE+/Mac 2.0's new hierarchical menu choices. Note how icons are now supported in menus, too.

days, FoxBASE+/Mac has jumped on the HyperCard bandwagon by providing a means to run XCMD's and XFCN's written in compiled languages for use with HyperCard. This means you can add the ability to create new folders, display scrolling lists, play songs, use MacInTalk, or do animation in your custom-database applications. In short, you can make FoxBASE+/Mac do anything that is programmed into an XFCN or XCMD—and there are a lot of them out there, many in the public domain. Only two or three extra commands are required in program code to run External commands or functions. Arguments are passed as if you were in HyperCard.

What's Coming

The people at Fox Software are now concentrating their efforts on a new MS-DOS product called FoxPro, a dBASE IV-compatible database that will do all the things dBASE IV does, but better. The interface will be character-based but graphically oriented and will incorporate all the best features of the FoxBASE+/Mac interface. In an interesting move, Fox has implemented a character-based windowing environment that does not require Microsoft Windows to run. Ultimately the goal is to create a FoxPro/Mac version in 1990 that will be functionally equivalent to the MS-DOS product.

Fox has also entered into a joint-development agreement with Novell to develop FoxServer, a product that will combine NetWare SQL, Novell's open-interface relational database engine, with FoxBASE's dBASE language technology. The product will mean that many database chores like indexing will be handled by the server rather than individual workstations, greatly speeding up networked database systems. In addition, mainframe databases can be accessed using standard SQL code that will be automatically generated from FoxBASE commands. FoxServer is expected to ship in early 1990 in the MS-DOS version, with a Mac version soon to follow.

Fox has also recently opened offices in England and Europe. Interestingly, France is the strongest market for FoxBASE after the USA. The company is working closely with French developers in both the Macintosh and MS-DOS arenas. Judging from the incredible software products that have come out of France in recent years (e.g. 4th Dimension, Ami, Architron) I expect to see some exciting new developments in the Fox product line in years to come.

Conclusion

As a company, Fox Software is reminiscent of the way Apple used to be: small, dedicated to outrageously great innovative products, and responsive to the needs of users. What a refreshing alternative to the monolithic corporate behemoths that tend to make up the bulk of the computer industry today. When I call Fox with bug reports or ideas, I sometimes see them fixed or implemented in new versions of the product that come by Federal Express in the same week.

Just four years ago, Fox Software consisted of five people. Today, they have a staff of over 70. But they still maintain the "small is beautiful" ethic in their software development. FoxBASE+/Mac was created by just two or three programmers, and Version 2.0 was done in LightSpeed C by a single individual: Marty Sedluk. According to staff at Fox, Marty likes to hang out in the tech support department, looking over people's shoulders to get ideas for program enhancements from user's comments. Apparently, he never sleeps. I met Marty at MacWorld Expo last January, and looking at this well-dressed, ordinary-looking, humble young man, I would never have guessed that he was almost solely responsible for the best-selling database product on the Mac today.

Barry Shell is a computer consultant in Vancouver. His company specializes in custom application design and training for Apple Macintosh computers. He has written two books on Hypercard.

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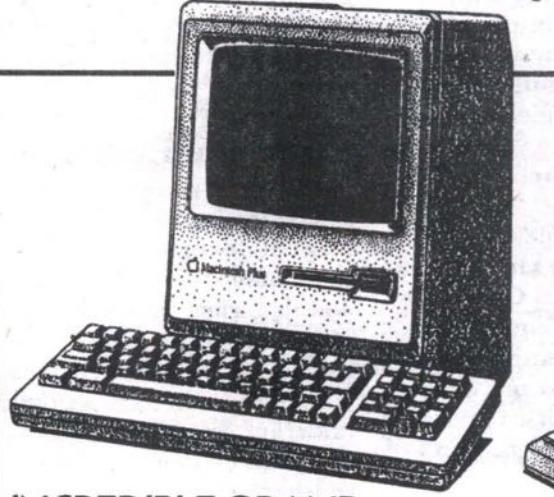
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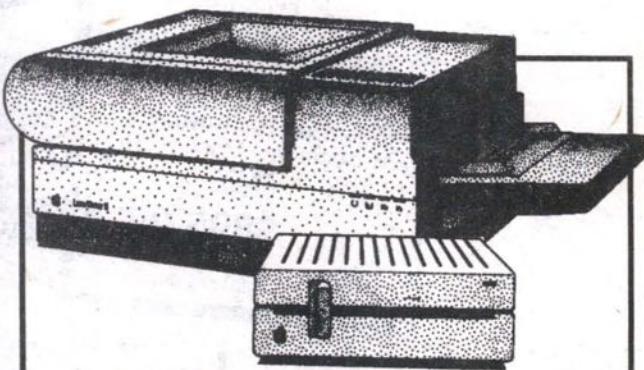
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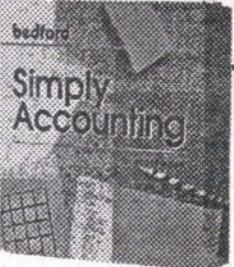
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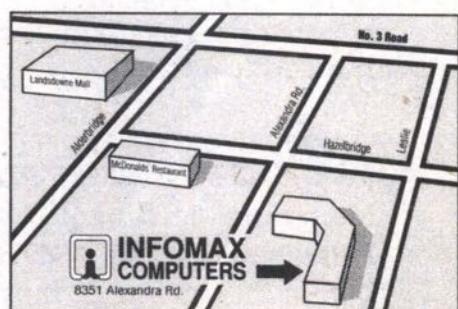
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NEW USENET GROUPS ADDED

This month we've added a number of new UseNet groups to the hundreds of groups available on MIND LINK!. NET.SkyDive is for those interested in skydiving. The new NETREL forum contains two busy discussion groups pertaining to Christianity and Religion in General. Finally, NET.Xenix is all about the XENIX operating system.

UseNet is an international network of over 14000 computers with more than half a million users worldwide. Discussing timeless questions and recent events with people from Germany, Israel, Holland, etc. can be quite a thrill!

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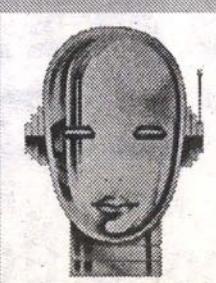
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UNIX

OCR Becomes Automated Document Recognition

By Peter Turner

We were recently invited by a vendor to review a new document-recognition system. He was saying, "Getting printed information off a document and into your word processor or desktop publisher is as easy as making a photocopy." Sure, buddy, I thought, and if you believe that I have a bridge to sell you. I was skeptical. Not long ago we put to the test with a simple printed page of text, an optical recognition system (OCR). It was nothing fancy, you understand, but the result was unrecognizable in both form and content. "But," the vendor pleaded, "we have new software coming in next month. Let's try it again then." Is it little wonder that OCR technology's worst enemy is its own past? It is a past of great promises, unreasonable end-user expectations, and unfulfilled hopes, with applications that required greater accuracy from a fledgling technology.

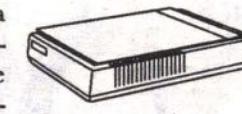
But to our surprise this new document-recognition system worked. And the process was straightforward. The page we fed it was scanned into the system. The system next appeared to assess the page's layout - blocks of text, indenting, etc. Next came conversion of the text into ASCII format. Those characters that gave it difficulty were highlighted and available for correcting. When this process was completed we were asked to specify the format the document was to be converted to: word processor, spreadsheet, desktop publishing, or database. In a relatively short time we had a document in word processing format and the text in ASCII. Our grubby little piece of obsolete paper was now captured in the word processor!

Recognition Techniques

When OCR equipment was first introduced over 25 years ago it was bulky, expensive and very prone to errors. Only a few standard fonts could be recognized and the document had to be of high quality. High error rates made OCR practical for only very select applications. Originally, OCR referred to a recognition technique known as matrix matching, which identifies characters by matching the input character's image against a matrix of pre-defined character images. The number of fonts and sizes depended upon the device's memory capacity, and proportional spacing proved very difficult.

Another recognition technique is feature extraction, which depends on comparison of the components of characters such as diagonal lines, intersecting lines, etc. with a reference table to identify the characters. Feature extraction is sensitive to the quality of the type, as broken characters will be easily misread. A broken "O" for example will be read as a "U".

Newer, intelligent recognition techniques have significantly expanded OCR capability to recognize text in a wide range of fonts and sizes, and regardless of proportional spacing. Using artificial-intelligence methods, the computer "learns" to read a document. If the software can't identify a word early in the document, it will often return to correct the errors as it learns more about the document. The speed of the interpretation also improves as the software becomes more familiar with the document. But that first document can be oh...so...slow!



Scanner

Vendors using their own proprietary versions of these methods have now pre-trained their algorithms to recognize all major fonts and sizes. They refer to this capability as "Omnifont" to indicate that font type does not impede recognition algorithm. Adding page or document recognition features was the logical next step.

Document Recognition

Document recognition goes beyond simply recognizing text within a document. It de-composes a document into its elements, importing both the text and its format into a file usable from within word-processing or desktop publishing packages, which means maintaining the character attributes (bold, underline, etc.), paragraph structures, and column layout in addition to OCR, which converts images of characters into actual ASCII text. True document recognition captures more than a document's content, it captures its style as well. This includes:

1. character recognition (typewritten, typeset, laser print, or dot-matrix);
2. character attributes (bold, italic, underline, super- or sub-script);
3. automatic de-columnization (recognizing columns of text)
4. style retention: tables and lists; paragraphs, indenting; centering and justification
5. graphics.

There is a surprising number of document-recognition products on the market and most are relatively new:

- ReadRight 2.0 by OCR Systems
- TrueScan by Calera
- Spot OCR Text Reader by Flagstaff Engineering
- Omnipage by Caere
- AccuText by DataCopy (Xerox)

The one we were invited to see is TrueScan from Calera Recognition Systems, formerly Palantir Corporation. Calera is well known for its high-end OCR products, such as its RS9000 recognition server for specialized OCR applications. Calera expanded its OCR recognition techniques to include style as well, and packaged the product as a "scanner recognition" card that fits into a PC. It supports a variety of scanners and fax cards. Cost of the unit is about \$5,000, with 4 Mbytes on board and a recognition speed of about 100 characters per second. A lower-priced model with 2 Mbytes of memory and a scan rate of 75 characters per second is available. The HP Scanjet Plus is a scanner that is highly recommended for this type of application because its resolution goes as high as 1500 dots per inch. Also, its software, the HP Scanning Gallery, will handle a resolution of 1500 dpi whereas Calera's graphics software will not. This may be important to those whose desktop publishing uses high-quality, Linotronic-type printing.

Errors

With the new character-recognition methods, automated character recognition is becoming faster and more accurate. New techniques relieve difficulties with fonts and type styles but often create their own problems. For example, building in intelligence often means

CONTINUES ON PAGE 62

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COMPUTERS & LAW

Computers In The Law Office

"I think the firm really sat up and took notice of the importance of computers for the future when four out of six articling students hired one year came to the firm with computers under their arms."

In the last few years the legal profession and the practice of law have, albeit clumsily but with increasing enthusiasm, become part of the computer revolution. The arrival of affordable microcomputers of increasing power and the evolution and development of networking is transforming the use of computers by the legal profession, and the service lawyers provide their clients.

We spoke with a Vancouver firm affected by this PC invasion, Farris, Vaughan, Wills & Murphy. Farris & Co. is located in downtown Vancouver, with about 60 lawyers split evenly between litigation and solicitor's work. PCs have had an impact on almost every aspect of the firm.

Document Creation

The backbone of any law firm's document creation is its word processing. All of Farris & Co.'s approximately 80 PCs run on WordPerfect 5.0. Farris & Co. has standardized its WordPerfect styles, macro libraries and electronic precedents in order to increase the speed and quality of the documents prepared within the firm.

In addition there are a number of publications which now offer commer-

cial precedents on disc in WordPerfect. Precedents available electronically, whether developed internally or purchased, have prompted significant increases in productivity in the production of documentation of the highest quality.

Precedents are not limited to being mere templates. With "document building" applications, a document can be created by answering a series of questions. So far, Farris & Co. has created these using WordPerfect macros, but packages specifically designed for this application are under review. One document-creation tool which draws rave reviews is a product called CompareRite, which "blacklines" or "redlines" all differences between two documents in order to show the changes from draft to draft. This has greatly increased the speed and quality of revisions to long and complex documents.

Clients appreciate the clarity of the presentation and the ease with which they can see the revisions which have been made from previous drafts, especially in the case of long and complex documents.

Solicitors are extensively using grammar and spelling checkers with customized style checkers such as "Grammatik III" in the preparation of memoranda and correspondence.

Litigators and solicitors are using outliners such as "MaxThink" for the organization and development of arguments, pleadings and contracts.

The firm also has a Dest WorkLess Station optical character reader. Not only does it save the grind of manually reentering and proofing documents, it allows lawyers the flexibility to revise other lawyers' documents and return them revised, rather than relying on the cumbersome process of having the other lawyer make revisions agreed to over the phone or by letter.

The look and feel of documents has changed as well. The proliferation of desktop publishing and graphics packages has changed the face of commercial documents, allowing for the increasing use of graphs and charts.

Litigation Support

Litigation support is becoming a much needed and relied upon facility. The firm has 3 trials under way of sufficient size to have specially dedicated full-text retrieval systems for the storing and filing of transcripts, exhibits, expert reports and other materials. These are stored on a Hewlett-Packard 3000 linked to PCs by network or by modem. The software in use is a product of Computrac, Inc. who also supply the firm's accounting program, which is called Darwin.

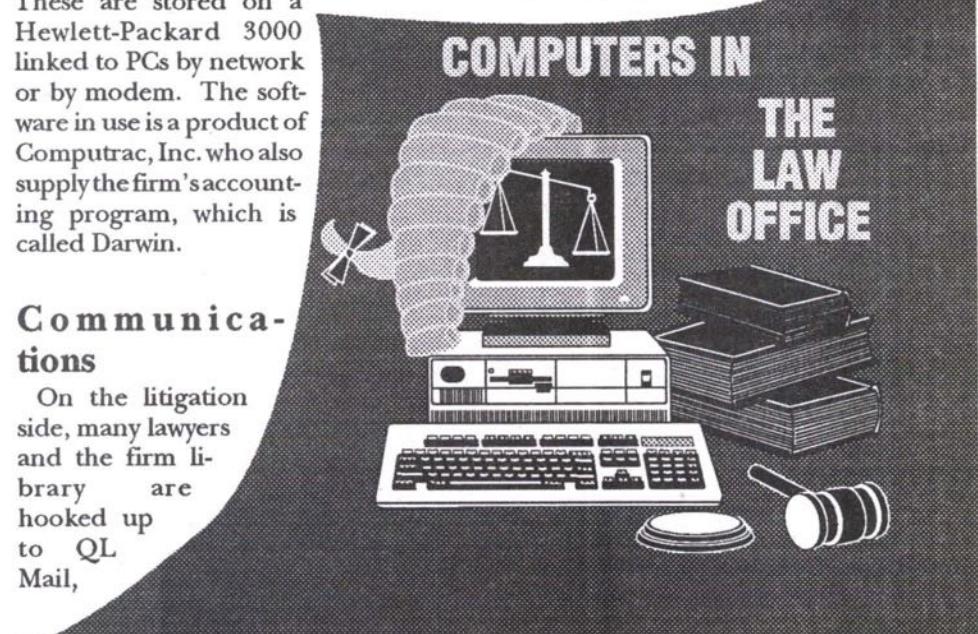
Communications

On the litigation side, many lawyers and the firm library are hooked up to QL Mail,

a service of QL Systems Inc., and to CBANet. This permits searching of external data bases from material not generally available within the firm. The firm has access to thousands of data bases through various vendors. For legal research, lawyers at Farris regularly use QL Systems Inc., and CanLaw for Canadian legal cases, statutes and regulations. WestLaw and Lexis supply case law for American and Commonwealth jurisdictions.

PCs are also used to access government, business and newsline information on Infomart, Infoglobe and Dialogue. Nexus and Can/Orbit are used for scientific, medical and technical information.

Patent lawyers use their PCs for online searching. A securities lawyer maintains a data base of Orders of the Securities Commission which can be researched, regenerated and revised. The firm is considering commercialization of this



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New data bases provided by the Provincial Government of British Columbia give access to the Office of the Registrar of Companies, the Land Title Office, the Central Registry and to Assessment Authority information through BC Online.

An increasing number of clients are communicating with Farris & Co. by way of modem. This avoids the "dead" copy that facsimile transmission produces and provides for lawyer and client copy which can be amended, developed and returned with great speed or discussed and amended as the client and lawyer work together on the screen.

Personal Productivity

The firm has tried to standardize the interface of its machines through the use on each machine of WordPerfect Library, which provides for a uniform menu and permits people to move between different machines in the firm. Where possible, machines are networked. In addition, some lawyers are using personal productivity tools such as Agenda and DESQview. For

the future, the firm is considering voice mail and electronic mail applications already in use by many of its clients.

Accounting

Computers are of course used extensively for accounting and billing functions. All lawyer's time and disbursements, including long distance telephone calls, photocopying, and facsimile transmissions are automatically recorded and posted to the client's file.

Recent improvements in this kind of technology enable the system to generate draft statements of account. These draft accounts are translated into WordPerfect, permitting lawyers and their secretaries to do the final preparation.

Leveraging on Knowledge and Experience

For the future the firm is developing its own internal data bases. The corporate records department is using a Powerhouse application to build a data base of all its corporate clients including names and address, directors, shareholders, officers and other relevant details. In addition, a project known as the "Firm Wisdom Project" is integrating and indexing on a fulltext retrieval system the firm's internally generated memoranda, opinions, written procedures and precedents. The system will in the future incorporate materials which are not currently indexed, including current practice manuals, continuing legal education materials and other periodicals. The immediate availability to members of the firm of these materials and of the fruits of the firm's experience is expected to provide enormous advantages.

As well, the firm is tentatively exploring the application and utility of expert sys-

tems. One expert system which has been partially developed in the firm determines whether or not a particular transaction is a "notifiable transaction" under the Competition Act, that is, whether or not a particular transaction requires notice to be given to Investment Canada. Expert systems are difficult to develop and take a great deal of time to complete. Lawyers anticipate, however, that by becoming familiar with them, they will become proficient more quickly with expert systems becoming commercially available and of wider application.

New Areas

Computers are used extensively in a growing number of specific applications. Real property and conveyancing lawyers rely extensively on a system developed by a lawyer formerly employed by Farris. The system consists of a series of WordPerfect macros and templates and Farris precedents which automate the process of generating documentation for conveyancing.

Similarly, the firm's trade-mark practice has been thoroughly computerized through the use of electronic precedents. Trade mark information is available through data bases maintained by Dynis, Dialogue and Nuans. The Canadian Trade Marks Office eventually expects to allow electronic filing of Trade Mark applications. As individual lawyers increasingly rely on their computers to build on their own experience in their own fields, the list of applications grows.

The Results

The use of computers has permitted lawyers to capture their own experience and that of others and to leverage that experience to provide more efficient delivery of a better quality of legal service and advice. The firm is of the view that an increasing use of computers has greatly increased its efficiency.

Increased efficiency has permitted the firm to improve the quality and the timeliness of the services it delivers. In many cases, work on a real-time cooperative basis with the client has replaced the traditional approach to providing service. Farris, Vaughan, Wills & Murphy has gone from a traditional and responsive provider of legal advice in both litigation and solicitor's matters to a full service firm actively involved in the affairs of its clients, reaching out through computer-assisted tools to direct involvement in the field with its clients.

Corporations and individuals in business, and the lawyers who serve them, are faced with an increasingly complex environment. The move from quill and ink to PC is part of what makes it possible for the lawyers at Farris & Co. to meet their clients' increasingly complex needs more efficiently and completely than ever before.

Allan Earle with thanks to James Hutton at Farris & Co.

WordPerfect For The Law Office

Drake Training's Elizabeth Williams has a course in WordPerfect designed specifically for use in the legal office. "WordPerfect 5.0 has some very industry-specific features that are missed by most courses," says Williams. Features such as snaking vs parallel columns, tables of contents and tables of authority, extensive use of headers, footers and footnotes, the use of macros for boilerplate text and master documents are all features covered in the course. The courses will begin in September and October. Call Drake for more details (669-8789).

Law-Office Automation: From A Retail Perspective

Larger Law Offices Moving Away From Mini-Computers

Computers snuck into the offices of Canada's law firms through the hands of the secretaries and the accounting personnel, but now lawyers are getting interested in litigation support. So says Glenn McKay, president of Source Data (687-7044), a Vancouver firm that specializes in computerizing law offices. "These packages aid lawyers in looking up precedents as well as in entering their time and billings. Some of the most interesting developments have been in the U.S., where some law firms are now using voice-recognition systems with their telephone calls. The lawyer just says the file name at the beginning of the conversation, and it will immediately open a file in that name and store the incoming data."

Another area which quickly demands the attention of computers is in managing all the information that can be generated by a prolific law firm. According to McKay, "It is amazing how quickly a large amount of documents are created once a system is installed." Advanced document-management software can help automatically create a consistent set of file names based on the matter number.

One trend that is consistent with what is happening in other industries, McKay says, is the movement away from mini-computer based systems. Local Area Networks and integration with 386-based UNIX systems are quickly emerging as powerful alternatives to mini-computers. According to McKay, the more-distributed processing is desirable because then if the main system goes down, the entire office does not come to a halt. His company sells a lot of AT-type workstations to lawyers.

Small Law Offices Start With a 286 Computer and a Laser Printer

Coastway Computer's John Denenfeld also works with a number of law firms to provide computer solutions. He sees many of the smaller law firms taking a different approach to computerization. "Most law firms are in the 1 to 6 lawyer size and their needs are very different from a 50 or 100 lawyer office," says Denenfeld.

The smaller firms usually start with a PC or two and build up a network, as opposed to working their way down from the larger and more expensive mini-computers. Their approach to networking is likely to start with a data-switch or an RS-232 Local Area Network solution.

Many of the firms are buying laser printers because of the polished look it gives documents. 286 AT-style computers are popular, with the less-expensive 386 computers coming on strong. According to Denenfeld, "law firms tend to follow the leader; if one installation is successful, then many others will follow suit."



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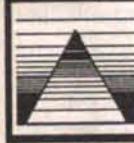
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AT WORK WITH SOFTWARE



The Amazing Worlds of WORD

By Cathalynn Labonté-Smith

Microsoft Word is a very popular program; unfortunately it is often under-utilized. Here is one temporary typist's odyssey through the Worlds of Word.

This summer I discovered that offices are worlds unto themselves, worlds where Word had been planted by management and left to grow under different conditions of nurture. I was like a lone astronaut visiting these seeded planets, expecting consistent development and some resemblance to the parent but finding that each offspring was unique, and it was hard to comprehend that they belonged in the same universe or used the same word-processing package. Word had evolved most often into a limping, half-utilized, spindly freak and very rarely into the sophisticated, strong, thick-rooted program it was meant to be.

My word-processing business that serves UBC students keeps me busy all year, except for the months of May and June between sessions. During the slow months this summer I surrendered the AT to my programming partner/husband, Steve Smith, and signed up as a temporary word-processing operator through an agency. As an expert in Microsoft Word on the PC and the Macintosh, I had no trouble getting assignments, which ranged in length from two days to several weeks in medium to large-sized companies.

All I brought with me into these new worlds was Rinearson's book, Word Processing Power with Microsoft Word (not even the latest version) a ThinGi document holder (this \$8 piece of twisted plastic fastened onto the monitor by velcro strips turned out to be a necksaver, as many places did not have any document holders), a notebook in which I jotted down miscellaneous long path names, and my lunch.

The following are case studies of these Word worlds, which include an inventory of their hardware. Perhaps you will find that your own office resembles these regardless of which word-processing package you use. Don't despair—you may be able to save your Word world, as I will then offer some suggestions as to how an ideal Word world can be built.

Word World #1 - The Land of the Exalted Secretaries

Novell Network, 20 PCs, 3 HP LaserJets.

This office would be the best example of how to set up an office that I was to encounter. I entered this office on Secretary's Day just before the bosses took the secretaries to a special luncheon, so I was given a terminal and just left there with some work to enter. This office had just switched from the WANG to PCs and everything needed to be re-entered. Which was a less costly alternative to going to a disk conversion service, as often cleaning out extra spaces, paragraph markers and reformatting can make conversion not worth your while.

The secretaries, once they got back from lunch where vast amounts of champagne had been consumed, I found to be excellently trained and they had even read the documentation. They all utilized the more advanced features of Word, the most important of which was a style-sheet for consistency. If they would have carried the stylesheet one step further and implemented a universal style, rather than each secretary using their own style codes, I would say they were about perfect. My supervisor explained

that they had all been trained at the same time, by an employee who had taken on the responsibility and became their support person. They understood sub-directories very well, paragraph formats, divisions and tabs, which sound basic but in Word worlds are often mysterious blinking satellites hovering far above the planet surface.

They had a good innovation in their printer room; wall files for each user. When you came to pickup your own work you could clear the printer while keeping confidentiality, as each manuscript came out of the printer with a cover page with the user's name on it, then you could just insert the pages into John or Jane's wall file. They also did an amusing little dance in the printer room while shaking their toner cartridges to squeeze a few more pages out of them. This office had a great atmosphere for learning and problem-solving. They will do very well with the upgrade to Word 5.0 and will take advantage of the new features.

Word World #2 - Land of 10,000 Floppies

Sneaker Net, 3 PCs, 3 HP LaserJets.

This relocation employment agency used Sneaker Net to run files containing CVs, broadcast letters, and mail merge files back and forth on disks between three PCs. The problem was that being new I had no idea where to find the right disk, as there was no comprehensive record such as a printout of the directories attached to the disks.

There was also a problem with their sub-directories. For example, I was to type a letter for a Mr. A. J., so I looked for subdirectory J, under which all files for people with their last name starting with J. should be found. After repeated tries to find the directory, I was told that there wasn't a subdirectory made for J yet, so look under K subdirectory. In spite of their confusing method of keeping files, I was very productive because I had a printer next to me and completed the estimated three days of work in two.

The lifeforms on this Word world were inflexible, hostile and tense with regards to their program, because they had had no training and were understandably insecure. When I did a mail merge list using tabs between the fields rather than commas, they were very freaked out. They had obviously stumbled upon how to do something once, but didn't realize that Word offers many alternates.

This office could have benefitted by allowing the employees the time to study the program, and I'm not talking about those one-day courses that are a waste of money because a person cannot possibly absorb all that they give you in one day. A good plan for training could simply be to incorporate an hour seminar every week. At these workshops employees could bring their questions about Word, or the network, or DOS, for example. Perhaps, a company could get an expert in for the weekly seminars to deal with problems, which is a less costly alternative to hiring a full-time analyst.

Word World #3 - Land of Ever-Expanding Spreadsheets (That Still Have to Fit on One Page)

3COM, 2 Macintoshes, 1 Apple LaserWriter.

There was a deadline to produce their

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annual budget that had not yet been written. This company had spent over \$10,000 on a new server, but the installer overlooked the fact that my computer was hooked up directly with the printer, so if I sent something it would override what the other user had sent. The Word 4.0 update on the Mac Plus, that only had 1 meg of memory, was buggy. There was absolutely no support person. I heard conversations like, "Who's turn is it to back up the server? Is it yours?", "No, it's my turn to buy cookies for the kitchen, I really don't know who's turn it is." Consequently, it took me three days to complete five pages of work.

I was given an impossible task near the end of the week – to put a giant spreadsheet into Word as a table. I had to shrink the characters to a 7-point font, that I could not read on the Mac screen and spent many hours trying to keep it all on one page. I did find the page preview feature very handy for dragging margins, but they have their limits. Once I had accomplished this frustrating feat, the supervisor complained that the text wasn't big enough to read and could I use a larger font. No, I couldn't possibly get it all on the page with a larger font. In this case they could have used a companion program to Lotus like Always that makes charts and tables.

I feel that I made a small difference, as I convinced the users to start sending me their Lotus files through the new network, and they were even talking about getting Word 5.0 for their PCs, instead of using Lotus as an editor (sometimes entering as much as 50 pages of text).

Word World #4 - Land Where Elephant-Sized Printers Go to Die

Sneaker Net, 4 Mac SE/30s, 1 Apple LaserWriter.

This office had just got their Macs and was quite fresh and eager. They offered me a full-time position because I made good coffee and I understood Word, which I politely declined. The manager had done a lot of research into the hardware and had settled on Mac SE/30s because of their user-friendliness. She had mistakenly believed that no training would be needed with a pet like the Mac. Some employees who had been trained on AES were adjusting better to the Mac than others. And I wondered, with her enthusiasm for the computers, why didn't the supervisor have one on her own desk?

This office had gone through the change of computers using a disk conversion service and had less than satisfactory results. Part of my job for the single day I was there was to reformat some CVs. After studying the problem I came to the conclusion that the best way to reformat dozens of these CVs would be to set up a stylesheet and attach it, so that they could assign formatting consistently. I couldn't possibly complete the job in the remaining hours, so I studied the documentation for Word 4.0 for the Mac and made notes to the employee about the best way to go about it.

I was slowed down considerably by the location of the printer in this office, through a swinging door behind a counter lost in a room full of ancient, dormant, giant printing creatures.

The atmosphere of the office was teachable, and they could make a good go of it if they follow through with the on-site training they were planning.

Word World #5 - Land of Bulging File Cabinets

Novell Network, 20 PCs, 1 HP LaserJet (No font cartridges).

On this assignment I was replacing an ill secretary who had been off work for two weeks already. The secretaries had

had their computers for over a year; however, the management had only had computers on their desks for three months. While the secretary had been ill, they adapted and learned to use Word themselves, so they did their own letters, memos and faxes; a very good thing. All they needed me to do was to wedge hard copies of all this correspondence into bloated file cabinets, which I felt was redundant and beneath my skills.

One day I was handed a letter by a manager and asked to type it, "Where did you get this from?" I asked him, "I typed it on my computer in Word," he replied. I managed to convince him that using the network I could copy his file over to my computer and do the edits.

I had to find the support person, though he was hardly supportive, and convince him that I could complete the file copy if he told me how it was set up, or at least give me a blank floppy to copy it on. He started to look for a floppy and couldn't find one, in fact, none of the employees had blank disks. He reluctantly came to my terminal and showed me how to use XTree to copy the file. The letter writer leaned over us and said, "That's neat; I wonder if anyone else knows about this?"

The printer was in another room, and there wasn't a PC there so you could watch the queueing and know when to insert special paper; you just had to hope someone wasn't using it at the time. The print-to-PC ratio was far too low, for the price of one HP LaserJet that comes with only one font (and in this case Courier 12 was all they had) you could get 3 Epson LQ-850s or 950s, or even 2 LQ-2550s that come with at least three resident fonts and distribute them closer to the computer stations.

All the executives and managers had MultiSync II monitors, which sell for about \$800 each, though half of the computers used Hercules Graphics cards and couldn't use the color anyway. For under \$200 you can get a wonderful flat, white, 14" screen that is much easier on the eyes for word-processing and spreadsheet, which is all that they used at this office, and with the money saved buy more printers.

The security on this system was nonexistent. I found that I had access to all of the over 5,000 files on the server. Everyone used the same password – it was a potential security disaster waiting to happen.

I must say it was encouraging to see people adapt to a computer environment so quickly, but there were still some concepts that hadn't jelled yet, like the paperless office.

The Ideal World of Word Hardware

If it is ever your appointment to create an entire new Word world, remember to stay compatible. Offices that mix PCs and Macs don't seem to run as smoothly, if you already have the machines, of course you have to utilize them, but if you have a choice I would recommend using PCs. There is nothing magical about the Mac, it is merely a receptacle for software just as the PC is. The Mac screen is very hard to see as it is only 9" and much of the space is occupied by rulers, bars and menus. I even searched desperately for a magnifying glass on occasion. Of course, if you can afford the bigger screen, and none of these offices could, this won't be such a disadvantage, but I still think that Word 5.0 for the PC has more to offer than Word 4.0 for the Mac.

Printers

Location - More time is wasted walking back and forth to a printer loading papers and picking up completed work, than is spent actually inputting the work.

As I mentioned before it is better to buy more high-quality, 24-pin dot matrix printers than a single laserprinter. The closer the user can be to the printer, the more time saved.

Laserprinter - Or if you absolutely need a laserprinter in the office, just invest in one and it may as well be a postscript printer, because loading up an HP LaserJet with fonts and memory could cost you as much as a ready-to-go postscript printer. Maintenance of laserprinters is about three times the maintenance of a 24-pin dot matrix printer. All of the cited offices experienced down time due to breakdowns.

Letter-Quality Dot Matrix - I have owned two Epson LQs and found them absolutely reliable, with superior quality print, good graphics output and I can re-ink my ribbon cartridges for about \$3, which lasts 200 crisp pages. With a bin sheet feeder and extra memory buffer, these machines can keep up speed with the laserprinters, especially the new LQ-2550. Please consider a 24-pin dot matrix; if not Epson, there are many competitively priced brands now.

Training

When you give employees the opportu-

nity to learn the system, you encourage their imagination, curiosity and problem-solving skills, so they will eventually be able to take an active role in office efficiency. The saddest thing on Word worlds was that there was tens of thousands of dollars tied up in the latest equipment and software and no one knew what it could do. Employers should at least allow employees to study manuals on company time, if they aren't prepared to set up a training program or have the weekly hour seminars as I mentioned before. Look for a dealer who will give you full support, answer questions, and isn't too money hungry.

Also take time to analyze your present and future needs in the office so that stylesheets can be drafted, a consistent method of file names can be established, a record of files can be kept current, security can be decided upon, are just a few of the issues that need to be dealt with.

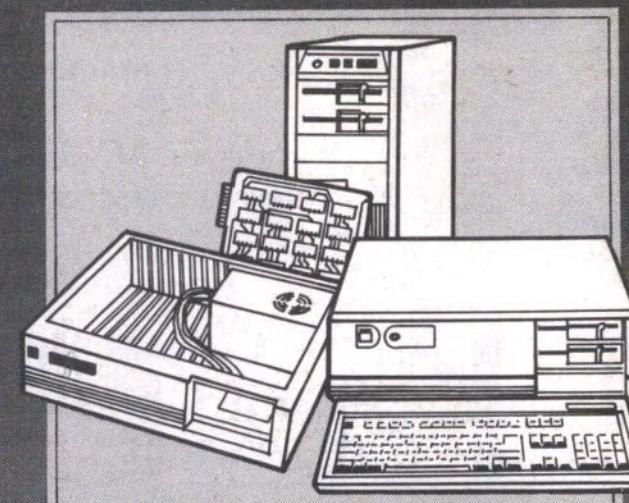
For example, the major problem at most offices was lack of consistency in naming files. Every user seemed to have their own way of naming their creations. The disadvantage of DOS is that you are allowed only 8 characters to give a file name, so employees would often include the date and the initials of who the correspondence was going to. The date is

CONTINUES ON PAGE 62



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Color FAX and the Ultimate Integrated Software

By John Kaiser

July 4 marked another milestone in the Vancouver Stock Exchange's struggle to restore credibility to its claim as North America's leading venture capital market. That date happened to be the deadline for new issues grandfathered under the old listing requirement policies. Any company that had already filed a primary prospectus when modified listing requirements were announced last December was given until July 4 to conduct its initial public distribution. Now, both resource and industrial issuers must meet higher capital requirements directed at accomplishing two key objectives.

The first objective is to stem the production of new listing "shells", the proliferation of which had become epidemic in recent years. A "shell" is a public company that has minimal assets and no active business. Shells deemed "good" are those that have at least some working capital, a low number of shares outstanding and a tightly held structure. Such companies are sought by many promoters, who will purchase control and arrange for a reverse takeover (RTO) of a private company seeking a fast public listing.

In a reverse takeover the public company issues shares in exchange for privately held assets such that the vendors end up controlling more than 50% of the public company. The advantages of such a "back-door" listing include bypassing the lengthy filing and approval process of filing for an initial prospectus, and obtaining quicker access to capital. The disadvantages include the dilution suffered by the vendors, who rarely inherit any assets to offset the dilution of their controlling interest. Furthermore, the promoters not infrequently promoted the stock, sold their shares, and walked away, leaving the entrepreneur to flounder with neither funding nor an understanding of stock-market dynamics.

Recycling old listings that had legitimately tried and failed in their speculative venture is one thing; creating new listings designed to fail inexpensively in a "venture" so that they can go on to do an RTO is another thing. The Alberta Stock Exchange, recognizing the counter-productivity of such a process, created the mechanism of junior capital pools (JCP), or blind pools, as their American cousins are called. A JCP is nothing more than a formalized shell that has raised a small amount of money and must consummate an acquisition of a tangible project within 18 months of listing, or be delisted by the ASE. Many new listings on the VSE, however, were achieving the same status by conducting minor work programs on mediocre properties that rarely yielded anything but discouraging results. With no further work warranted, such companies would have little recourse but to offer themselves as shells for new projects.

The VSE would prefer a new listing's project to be a legitimate venture, and accordingly resource issuers must now raise a minimum \$150,000 in seed capital, of which \$75,000 must have been spent on the property to be funded by the prospectus offering. Of the minimum \$200,000 that the public offering must net, at least \$75,000 must be allocated towards the next work program.

recommended for the property. In other words, at least \$150,000 must be spent on a property before it can be declared a dud. That still leaves a fair amount of unallocated working capital, but shell packagers may be deterred by the greater amount of money they must put up, and a restriction that prevents a change of control within one year of listing.

The second objective of the new listing requirements is to ensure that industrial issues are better funded than in the past. Too often companies that went public directly through a prospectus offering were woefully underfunded, lacking sufficient funds to give their business plans even a chance at unfolding as projected. Industrial issuers must now have raised a minimum \$275,000 seed capital before proceeding with a prospectus offering that must net a minimum \$350,000.

The majority of RTO candidates have historically been hi-tech ventures that felt they could not afford to wait out the prospectus approval process. Their impatience is understandable in view of the fast-paced high-technology industry, where on-year leading edges enjoyed by fledgling ventures can quickly evaporate when industrial giants focus their heavily financed resources on an emerging technology. Hi-tech companies opting for the RTO route need not fear a shortage of public vehicles for RTO's; the inventory of unused shells is high and the VSE has introduced new policies to encourage the reorganization of spent, dormant listings.

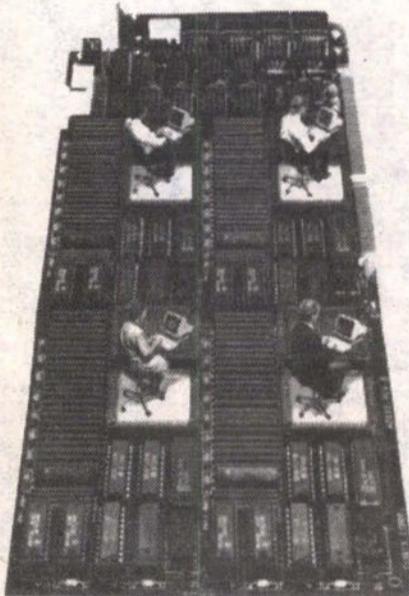
Color FAX

An RTO is not necessarily the fastest way to obtain a public listing. Omoco Holdings Ltd (OMO-V) had been trying to consummate a reverse takeover of California based StarSignal Inc since late 1987. StarSignal had developed an algorithm that compressed color video images into a fraction of the memory space normally required. The image compression board would have allowed personal computer users to transmit color images over telephone circuits. Although this board was first intended for file-photo applications such as police databases, it dawned on management that their technology could facilitate transmission of color faxes.

Color printers, however, are far from being established equipment, though the photocopier giants are working hard at it. Nevertheless, StarSignal teamed up with Howtek Inc of New Hampshire to incorporate StarSignal's compression board with Howtek's color printers. Unfortunately for Omoco's shareholders, the RTO of StarSignal will now never take place. Instead, the \$608,000 advanced by Omoco over the last two years has been settled through the issue of a 10% equity interest in StarSignal, which now plans to file a prospectus in the United States to go public directly. How long that will take is anybody's guess, but once it occurs, Omoco has promised to distribute its StarSignal holdings to shareholders as a stock dividend.

The Ultimate Integrated Software Package?

Squeaking under the wire was Exor Data Inc (EDI-V), which was listed on July 4 after completing a public offering



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of 750,000 shares at \$0.55 through Pacific International Securities. Headed by William Elder, Exor is developing an integrated productivity software package called *Essential Solutions*, which promises to meet all the needs of sales oriented businesses, including a fax management capability.

The package comes in limited and unlimited versions for both single and multi-users. The limited user version is restricted to 550 customers and will retail for only \$495, a price whose lowness some industry experts fear could generate a negative quality/price perception among consumers. However, most users will probably need more than 550 customer and prospect records, and for the unlimited version they will have to pay about \$2,700. There is no fundamental difference between the two versions, the restriction being controlled by an internal lock code.

Designed to run in the MS-DOS environment of IBM-compatibles, *Essential Solutions* has been written in a fourth generation language developed by ODBS of Washington so that it can more easily be adapted to new operating systems. Development has apparently been completed, though the software must still undergo beta testing. The package is expected to be ready for marketing in 2-3 months.

Within the North American market Exor must compete with industry giants such as Ashton-Tate, Microsoft and Lotus. While production costs for software are very low, marketing expenses overwhelm most junior hi-tech companies. In order to tap into an alternative market, Exor has targeted the emerging East Bloc market for computer technology. Another line of business for Exor is the sale of computer equipment to Soviet agencies, and to boost these sales Exor plans to bundle *Essential Solutions* with its

hardware. But since the average Russian does not speak English, Exor is translating *Essential Solutions* into Cyrillic, complete with printer drivers for this Slavic alphabet.

Signal Processing

Another new issue that was finally listed on June 21 after a lengthy wait is *Spectrum Signal Processing Inc* (SSY-V), which distributed 1,000,000 shares at \$0.75 through Canadian International Securities. Spectrum, which has the financial backing of the Ventures West Group and the Federal Business Development Bank, is in the business of marketing digital signal processing (DSP) equipment. The best known application of DSP is found in the production of compact disc recordings, where analog signals are converted to digital signals that are mathematically massaged to strip them of unwanted background noise. DSP has numerous other applications, and with the advent of single-chip DSP microprocessors, the market for DSP applications is expected to grow substantially. Spectrum is targeting this growth market by offering development systems that enable software engineers to design and test applications in simulated DSP microprocessor environments. Spectrum also markets a DSP microprocessor and data-acquisition boards to system integrators, value-added resellers and original-equipment manufacturers.

John Kalser is manager of information services and an account executive at Pacific International Securities Inc. PI, its employees, and clients may from time to time have positions in the securities mentioned herein. Any opinion expressed is solely that of the author. He can be reached at (604) 669-2174. Charts were provided courtesy of Independent Survey Company, PO Box 6000, Vancouver, BC.

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MUSIC & COMPUTERS

Part II: The Atari ST's Strong as a Music Computer

The Atari ST quickly rose to prominence and power in Europe due to its inexpensive price tag, built-in MIDI ports and third-party software development. In the first part of this article, we reflected back to the beginning days of the ST's acceptance in Europe and the first major product line for the Atari ST by Steinberg Research. Let's turn our attention to another German company, C-Lab whose MIDI products entered the market only in the last year or so. With the release of their Creator sequencer for the Atari ST computer, C-Lab created a new wave in the music business that has still hasn't subsided. The reputable American company Digidesign, (well known for Sound Designer, Softsynth, Q-Sheet and Sound Tools for the Macintosh) became the North American distributor for C-Lab products. This is a significant in lieu of the fact that Digidesign had plenty of clout in the American market and as mentioned, gained its notoriety by releasing high-end professional software products for the Macintosh.

Creator's many features can not be addressed fully in this article, but some of the attractive features of this program include the ability to be used by novice and expert alike. Quantizing a music performance upon input, auto looping in record mode, real-time clock display, fine resolution, loading songs from disk while a song is playing, variable quantization, System Exclusive dumps of Voice data are a few features to be mentioned. Like the Steinberg Research software, C-Lab also uses a copy protection scheme



which requires that a key be inserted in the connectors next to the MIDI ports on the ST before the power is turned on. C-Lab's Creator impressed many professional musicians with its simplicity and versatility. It uses only two screens and can be controlled via computer keyboard or with the mouse, and most real-time record functions can be done remotely from a music keyboard. The learning curve for the program is very smooth and it has a very precise manual.

To complement their Creator sequencing software, C-Lab soon released their Export MIDI Expander which allows Creator to assign any of its 64 tracks via four discreet outputs, each capable of handling 16 MIDI channels. This kind of expandability allows the musician to use dedicated sequencer tracks for program changes for external sound-generating devices and the flexibility to address a staggering number of MIDI devices at one time.

Before North America could catch on to Creator version 1.3, C-Lab unleashed Notator, an integrated sequencing/notation package which combines score-writing and transcription with the company's Creator MIDI sequencer in one

package. Presently at version 2 in both cases, Notator and the "stand-alone" Creator package contain identical Creator features. Sequencing and notation have been the target of many developers but none are so complete and easy to use as Notator and are at such a competitive price. Notator removes the distinction between MIDI notes and score notes by allowing the sequencing and scoring software to use the same data formats. One of Notator's impressive features is the ability to record music and allow real-time editing while displaying the music notation. Real-time cut-and-pasting of notation parts in turn affects the sequenced parts, meaning that if for instance you want to preview a certain arrangement, you can cut out any part of the music notation and paste it somewhere else and the sequencer will also adjust almost immediately.

To complete their present product line, C-Lab released a MIDI hardware device called The Unitor which offered the ability to read and write SMPTE time-code and convert it into MIDI information. Unitor takes the place of the key (in fact it has a key built right into it) and also features two MIDI Ins and Outs offering even more expandability when used with the Export MIDI Expander device. The total system is capable of sequencing 96 different MIDI channels and accept MIDI input from three different controllers simultaneously — allowing MIDI Clocking from one while inputting note data from the other two. Unitor also features a D-connector-type Multi-Port which is for controlling an external tape recording device's servo-control signals as well as VCR's and synchronizers. This of course paves the way for the complete C-Lab system's viability in film and video.

In simple terms, C-Lab's product releases elevate the Atari ST to sharing the centre stage spotlight alongside the Apple Macintosh. The reactions to C-Lab's Notator haven't as yet reached a peak. Retailers and musicians alike are starting to sing a different tune and many professional studios, sensing the financial potential of this new trend, have added C-Lab Notator and the Atari ST to their studios — and why not? The price of the Atari ST and C-Lab software and hardware delivers a complete MIDI work station capable of all facets of music and audio production including SMPTE synchronization for film and video. The multi-computer studio is becoming more the status quo in North America, with a number of studios already supporting more than one Macintosh. An Atari ST can easily work in tandem with the Mac to create a powerful music-production environment capable of handling everything from sequencing to sample editing.

Canadian music retailers have mixed feelings about the upgrade policy in place in Canada. If someone had purchased Creator and wants to exchange it for the Notator package, the end user would have to send away to Digidesign in the US to make arrangements, based on the warranty being registered by the purchaser when they originally purchased

the Creator package. If someone has purchased Notator and wishes to upgrade to Unitor, they have to get the retailer to exchange their Notator key with either a Canadian distributor or Digidesign in the US. This leaves the end-user without a key for a variable period of time which, needless to say, can be very aggravating because they cannot use the sequencer without the key. Unfortunately, Digidesign's upgrade policy won't allow the Notator key to be returned after the retailer exchanges Unitor with the end-user. This scenario means that if for some reason Unitor has any malfunction, the end-user is left without anything until another replacement package is sent from Digidesign. This has led to a lot of criticism by Canadian music retailers who feel this system is unnecessary and unfair to the end-user. If a key becomes defective, the end-user of course can't simply return it to the retail dealer for another, he has to wait until it is returned to Digidesign who in turn then sends the retailer a new key to give to the frustrated end-user.

If you are using any of the above products and run into any of the above situations while working on a professional studio project, the time delays can be very costly.

As discussed throughout this two-part article, the Atari ST's appeal was originally its inexpensive price tag. We took a close look at the life and times of the Atari ST in Europe and the evolving product development. With the high-end quality of C-Lab's products being a by-product also of Europe, economy minded end-users it is a strange twist of events that has led to C-Lab's product line being amongst the most expensive products available for the ST. Significantly cheaper in Europe, the price of the products in Canada is also higher than in the US. Digidesign has been reluctant to allow direct shipping of C-Lab's products to Canada, meaning that Canadians pay the C-Lab price plus American excise and customs, Digidesign's commission and the cost of Canadian excise and customs when shipped from the US.

On top of all of this, the Canadian distributors and retailers add their profit margin and the result is a package like the Unitor and Notator that together cost more than the computer they are created to work with. Here are current retail Toronto prices: Creator \$450.00, Notator \$725.00, Export \$235.00, while the Unitor lists at \$725.00. The resulting scenario leaves Canadian Atari ST users in a strange position; the software they may want to use, while being as professional as any of the products available for Apple Macintosh and IBM computers, has now been elevated to amongst the most expensive MIDI products available on the Canadian market.

This also means American manufacturers' MIDI software and hardware products can compete with European packages such as C-Lab, but will have to work hard to match the integrity and quality. However, it would seem more thematic and just financially to allow Canadians to buy direct from Europe rather than being subject to the American domination of products that were originally targeted at a more economical musical environment.

Danny Mott is a Toronto based computer products marketer specializing in

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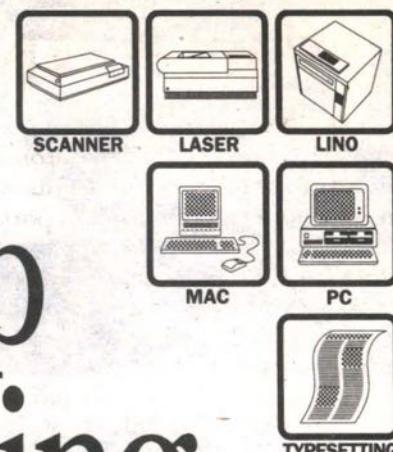
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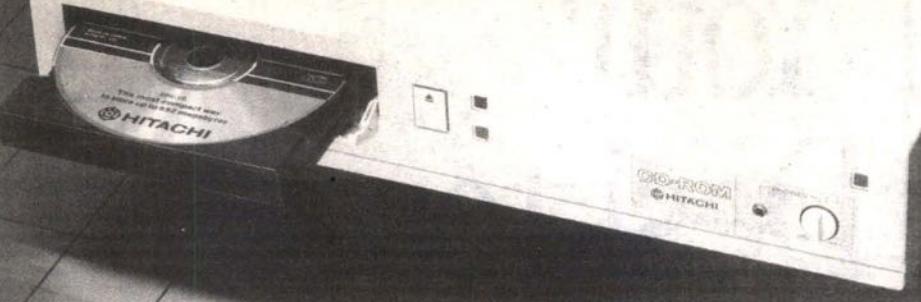
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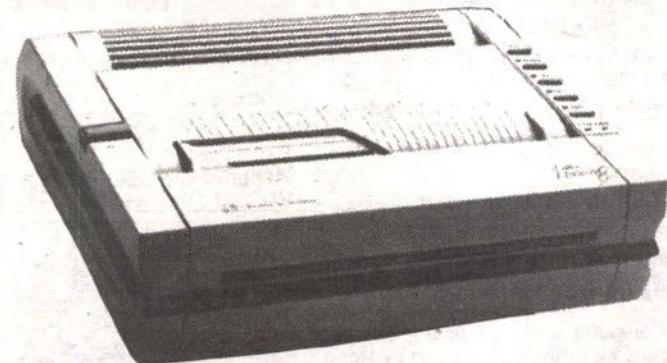
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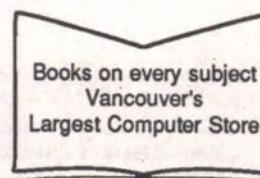
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WORLD OF WORD CONTINUED FROM PAGE 53

not necessary to add, as that can be retrieved through the summary sheet, an under-utilized feature, by doing a document retrieval. As for the initials, no one will be able to remember what they stand for, and certainly in the case that an employee is off the job, someone else cannot possibly begin to find files.

The files that had the simplest possible names with a number following, i.e. Tokyo1, Tokyo2, were the easiest files for me to find. And this is how I reference my own files, because you can automatically tell that the highest number beside a file name is the most recent version. Especially when using a network, such as Novell or 3COM it becomes even more important to use relevant names, as it was difficult enough to find the correct directories. Luckily, Word 5.0 for the PC has now taken care of the problem by giving complete access to drives and files through the F1 key. But many offices do not yet have the update; in fact, my mention of Word 5.0 was the first time many employees had ever heard of an update. I imagine many offices haven't even ordered it. If you haven't done so, do so now.

Support

If you have an office with a server, you most definitely need someone who is responsible for keeping the network running, trouble-shooting and answering the staff's questions, if not training them. If you can't have a support person, have a plan for consistent support.

I was very happy to complete my exploration of the Word worlds, and return to my own little, familiar Word world.

Cathalynn Labonté-Smith is a freelance writer and partner in the computer-services company, ComputerSmiths, 3724 West Broadway, Vancouver, B.C. V6R 2C1, 224-5242.

OCR CONTINUED FROM PAGE 49

checking the context or word in which a character is used. A limited lexicon will limit error-correction effectiveness. Even worse, an error may be corrected incorrectly. For example, a bad "o" in "cop" could be mis-recognized as "cup". The problem with such a mistake is that within a body of text, if the software doesn't think it has made a mistake, it won't highlight it. A computer that won't admit it's wrong...! Aren't you glad humans aren't like that? Such an error is very difficult for a user to detect.

We live in an imperfect world. As a result, the state of the documents we present to the computer will often dictate the accuracy of its recognition. This is true for the document recognition (page layout) and the character recognition. Poor-quality copies, mis-printed, badly formed, or smudged type, and text skewing are by far the most common source of errors.

Summary

The new document-recognition systems are a vast improvement over older OCR systems in terms of accuracy, versatility, and cost. The ability to convert a printed page into a desktop publishing file or any one of the other common computer formats is indeed powerful. But automated recognition systems are not perfect. Errors will occur. With an accuracy rate of 99%, a typical document with 800 characters will still have about eight errors. For some applications this is still not good enough. However, is the alternative that much better?

Peter Turner is president of Optical Storage Systems (876-3838), a Vancouver company specializing in CD-ROM and WORM drives.

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OS/2 LAN MANAGER CONTINUED FROM PAGE 35

Resource Sharing

The OS/2 LAN Server makes it easy for users at interconnected workstations to access resources throughout a LAN network no matter where those resources are located. From the individual user's perspective, these resources seem to be resident right at the workstation. Users can access and share directories, files, printers and programs, as well as such serially attached devices as plotters, modems and scanners. Because the OS/2 LAN Server provides optional pooling and queuing capabilities, users' requests will be ordered and arranged automatically to allow access to the first available device.

Security Services

The OS/2 LAN Server offers a comprehensive set of security services to protect network resources. Through these services, a designated network administrator can control access to directories, files, programs, printers and serial devices. The administrator can: Create and update user profiles; Define and manage groups; Authorize access at user, group and administrator levels; Grant/restrict rights to create, read, delete and write files and information; Grant/restrict rights to execute (and copy) programs; Limit the number of users who can share a program at one time. The OS/2 LAN Server's security services include a log-on facility that allows users to log on to a network by user identification and password. Having logged on once, users can access all resources to which they have been granted rights.

Printer Management

The OS/2 LAN Server uses the OS/2 Extended Edition print spooler, which can support multiple printers concurrently. That is just the beginning of a long list of print-management benefits, including: Printer-pool support - Automatic job routing to the first-available, appropriately configured printer; Automatic release of queues of jobs for printing after a specified time of day; Optional messaging to notify users of print-job disposition; To simplify the task of print management, the OS/2 LAN Server uses the OS/2 Extended Edition Presentation Manager, a convenient screen interface. Administrators can use it to gain full control over status and configuration of network printers and print queues. They can view local or remote print queues and add, delete, pause, continue, reconfigure, result-prioritize and restart jobs as needed. Similarly, users at workstations operating under OS/2 Extended Edition Version 1.1 can display the status of jobs and delete their own jobs from print queues.

LAN Resource Administration

The resource/network administration functions provided by the OS/2 LAN Server link separate LAN software and hardware components into a cohesive system. As a result, users see all resources as a single system. Administrators have the capability to control multiple servers as well as all facets of resource sharing from any OS/2 Extended Edition Version 1.1 workstation. To help administrators optimize network performance and analyze usage patterns, the OS/2 LAN Server offers a full set of high-level diagnostic capabilities for audit trailing, statistics collection and error logging. In addition, it provides an administration notification feature that sends pre-programmed messages when server disks become nearly full, or when excessive password violations take place.

Remote Program Execution

A special utility provided by the OS/2 LAN Server, Net Run, permits author-

ized OS/2 Extended Edition users to run programs on the server machine. This can help minimize data traffic across the network by allowing file-intensive programs to run at the server machine where the files are located. It can also provide for greater efficiency in carrying out server back-up operations, document formatting, data-base indexing, and program compilations.

Migration.

The OS/2 LAN Server offers a migration path at the workstation from PC LAN Program Version 1.3 to Operating System/2 Extended Edition Version 1.1. It will support both PC LAN Program and OS/2 users on the same LAN, providing enhanced flexibility of configuration and migration in the OS/2 environment.

R&D for this material provided by IBM

Rumours of OS/2's Death Are Greatly Exaggerated

Ian Glass of Cadence Computers believes reports that OS/2 is dead are much exaggerated. With several installations of 40 or more nodes running 3+Open (3Com's version of OS/2 LAN Manager) and several orders pending, Ian probably wouldn't have enough time to attend the funeral for OS/2 if there really were one. And for good reason: Cadence's installations are healthy and thriving. They talk to DEC, IBM and Prime. Never mind strangers, that's easy! They even talk to members of their own family, such as IBM's LAN Server and 3+Share. They run WordPerfect, Lotus, Excel, C and

SQL Server. They leave lots of room on ordinary DOS workstations on the network so you can run your CAD programs and Ventura. They do real-time work in data capture in an industrial-process system for major corporations. Fiber optics? No problem, got kilometres of it. How fast? 800% faster than 3+Share, says Ian. Ian feels so good about the product, he bought one himself and now has several servers in-house operating 3+Open running RBase, Dbase III and IV and AccPac. Vaporware? "Vapor prophets," says Ian Glass.

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• 102 Key Enhanced Keyboard
• Reset Switch & Keylock
• Optional 8087 Math Co-Processor
20 MB HARD DRIVE

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HI-RES MONITOR

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• 1 MB RAM • Quicell BIOS, IBM Compatible
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• Clock & Calendar
• 101 Key Enhanced Keyboard
• 1 Parallel & 2 Serial Ports
• Reset Switch & Keylock
• Optional 80287 Math Co-Processor
40 MB HARD DRIVE

• Seagate ST251-1, 28ms Access Time
HI-RES MONITOR

• Amber Display • 12" Screen
• Tilt/Swivel Base
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• 1 MB RAM • AMI BIOS • IBM Compatible
• Panasonic 1.2 MB Floppy Drive
• 8 Full-Length Expansion Slots
• 3 Half-Height Storage Bays
• Clock & Calendar w/ Battery Back-up
• 1 Parallel & 1 Serial Port & 1 Games Port
• 101 Key Enhanced Keyboard
• Reset Switch & Keylock
• Optional 80387 Math Co-Processor
40 MB HARD DRIVE

• Seagate ST151, 28ms Access Time (fast drive)
HI-RES MONITOR

• Amber Display • 12" Screen
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• Mono Graphics Card • Hercules Compatible

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• 5 Half-Height Storage Bays
• Clock & Calendar w/ Battery Back-up
• 1 Parallel & 1 Serial Port & 1 Games Port
• 101 Key Enhanced Keyboard
• Reset Switch & Keylock
• Optional 80287 Math Co-Processor
63 MB HARD DRIVE

• Mitsubishi 4226, 28ms Access Time (fast drive)
• C/W 1-1 RLL HD Cont. Card, (3 X Data transfer rate)
HI-RES MONITOR

• Amber Display • 12" Screen • Tilt/Swivel Base
• Mono Graphics Card • Hercules Compatible

AUGUST SPECIAL

BIOS SYSTEM 286-12

80286-12 MHz AT™ COMPUTER

• 1 MB RAM • Award BIOS • IBM Compat.
• Teac 1.2 MB Floppy Drive
• 8 Full-Length Expansion Slots
• 5 Half-Height Storage Bays
• Clock & Calendar w/ Battery Back-up
• 1 Parallel & 1 Serial & 1 Games Port
• 101 Key Enhanced Keyboard
• Reset Switch & Keylock
• Optional 80287 Math Co-Processor
40 MB HARD DRIVE

• Seagate ST251-1, 28ms Access Time
HI-RES MONITOR

• Amber Display • 12" Screen
• Tilt/Swivel Base
• Mono Graphics Card • Hercules Compatible

AUGUST SPECIAL

BIOS SYSTEM 286-20

80286-20 MHz AT™ COMPUTER

• 1 MB RAM • Quicell BIOS, IBM Compat.
• Teac 1.2 MB Floppy Drive
• 8 Full-Length Expansion Slots
• 5 Half-Height Storage Bays
• Clock & Calendar w/ Battery Back-up
• 1 Parallel & 2 Serial & 1 Games Port
• 101 Key Enhanced Keyboard
• Reset Switch & Keylock
• Optional 80287 Math Co-Processor
40 MB HARD DRIVE

• Seagate ST251-1, 28ms Access Time
HI-RES MONITOR

• Amber Display • 12" Screen
• Tilt/Swivel Base
• Mono Graphics Card • Hercules Compatible

AUGUST SPECIAL

BIOS SYSTEM 386-20

80386-20 MHz COMPUTER

• 1 MB RAM • Phoenix BIOS • IBM Compatible
• Teac 1.2 MB Floppy Drive
• 8 Full-Length Expansion Slots
• 5 Half-Height Storage Bays
• Clock & Calendar w/ Battery Back-up
• 1 Parallel & 1 Serial Port & 1 Games Port
• 101 Key Enhanced Keyboard
• Reset Switch & Keylock
• Optional 80387 Math Co-Processor
40 MB HARD DRIVE

• Seagate ST151, 28ms Access Time (fast drive)
HI-RES MONITOR

• Amber Display • 12" Screen
• Tilt/Swivel Base
• Mono Graphics Card • Hercules Compatible

AUGUST SPECIAL

BIOS SYSTEM 386-20

80386-20 MHz COMPUTER

• 1 MB RAM • Phoenix BIOS • IBM Compatible
• Teac 1.2 MB Floppy Drive
• 8 Full-Length Expansion Slots
• 5 Half-Height Storage Bays
• Clock & Calendar w/ Battery Back-up
• 1 Parallel & 1 Serial Port & 1 Games Port
• 101 Key Enhanced Keyboard
• Reset Switch & Keylock
• Optional 80387 Math Co-Processor
40 MB HARD DRIVE

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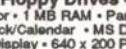
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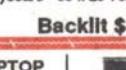
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40 MB Hard Disk • Hi-Res Gas Plasma Display • 16/8 MHz 80386 Processor • 2 MB RAM • 1.44 MB Floppy Drive • Parallel, Serial, EGA, Enhanced Keyboard Ports • Real Time Clock/Calendar • 82-key Keyboard • 80 x 25



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TOSHIBA T5200 386 LAPTOP

100 MB Hard Drive • Hi-Res Gas Plasma Display • 20 MHz 80386 Processor • 2 MB RAM • 1.44 MB Floppy Disk Drive • Parallel, Serial, VGA, Enhanced Keyboard Ports • Real Time Clock/Calendar • 91-key Keyboard • 12 function keys • MS DOS 3.3



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