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LESSONS FROM THE COMPUTER INDUSTRY / 53



1981: The IBM
Personal Computer

Working with the IBM design team, we encouraged IBM to build one of the first personal computers to use a 16-bit microprocessor chip, the Intel 8088. We could see that the move from 8 to 16 bits would take the personal computer from hobbyist toy to high-volume business tool. The 16-bit generation of computers could support up to one full megabyte of memory—256 times as much as an 8-bit computer. At first this would be just a theoretical advantage because IBM intended to offer only 16 kilobytes (16K) of memory initially— $\frac{1}{64}$ of the total memory possible. The benefit of going to 16 bits was further diluted by IBM's decision to save money by using a chip that employed only 8-bit connections to the rest of the computer—consequently, the chip could think much faster than it could communicate.

We could see that, with its reputation and its decision to employ an open design that other companies could copy, IBM had a real chance to create a new, broad standard in personal computing. We wanted to be a part of it, so we took on the operating system challenge. We bought some early work from another Seattle company and hired its top engineer, Tim Paterson. With lots of modifications, the system became the

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Microsoft Disk Operating System, or MS-DOS. Tim became, in effect, the father of MS-DOS.

IBM, our first licensee, called the system PC-DOS—"PC" for "Personal Computer." The IBM Personal Computer hit the market in August 1981 and was an immediate triumph. The company did a good job of marketing the machine and popularized the term "PC." The project had been conceived by Bill Lowe and shepherded to completion by Don Estridge. It's a tribute to the quality of the IBM people involved in the project that they were able to take their personal computer from idea to market in less than a year.

Few people remember this now, but the original IBM PC actually shipped with a choice of three operating systems—our PC-DOS, Digital Research's CP/M-86, and the UCSD Pascal P-system. We knew that only one of the three could succeed and become the standard. We wanted the same kinds of forces that were putting VHS cassettes into every video store to push MS-DOS to become the standard. We saw three ways to get MS-DOS out in front. First was to make MS-DOS the best product. Second was to help other software companies write MS-DOS-based applications software. Third was to ensure that MS-DOS would be inexpensive to license.

We gave IBM a fabulous deal—a one-time fee of about \$80,000 that granted the company the royalty-free right to use Microsoft's operating system forever. In other words, we practically gave the software to IBM. Giving software away to create strategic value has since become a well-established marketing technique in the industry, but it was uncommon at the time. The deal gave IBM an incentive to push MS-DOS and to sell it inexpensively. Our strategy worked. IBM sold the UCSD Pascal P-System for about \$450, CP/M-86 for about \$175, and MS-DOS for about \$60.

Our goal was not to make money directly from IBM but to profit from licensing MS-DOS to computer companies who wanted to offer machines more or less compatible with the IBM PC. IBM could use our software for free, but it didn't have an exclusive license or control of future enhancements. This put Microsoft in the business of licensing operating system software to the personal computer industry. Eventually IBM abandoned the UCSD Pascal P-system and CP/M-86 operating systems.

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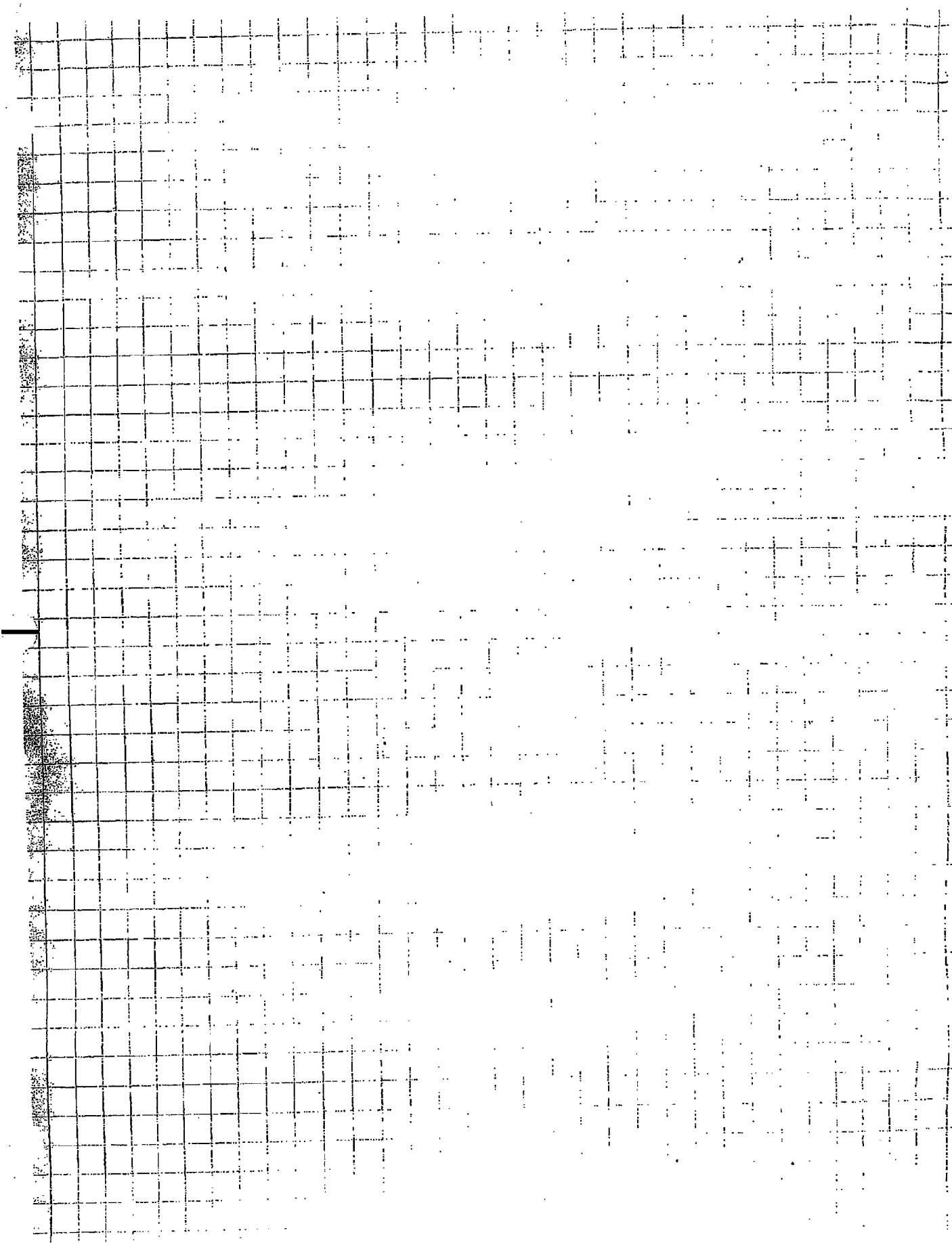


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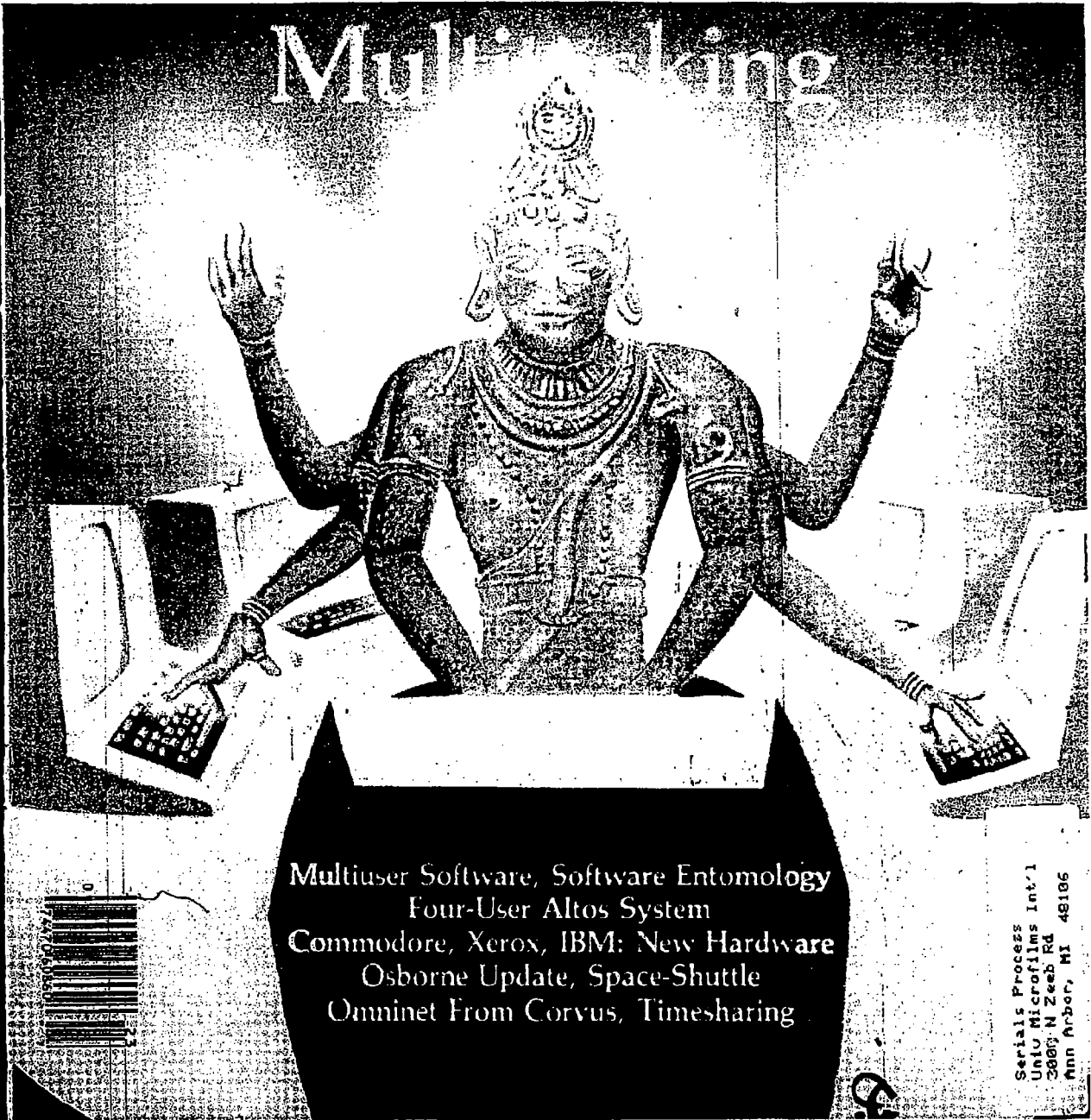
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The Newspaper for the Microcomputing Community

Spring '81 Is a Season for Hardware

A Shining Example of 'Human Engineering'

Xerox Brightens Market with New Star

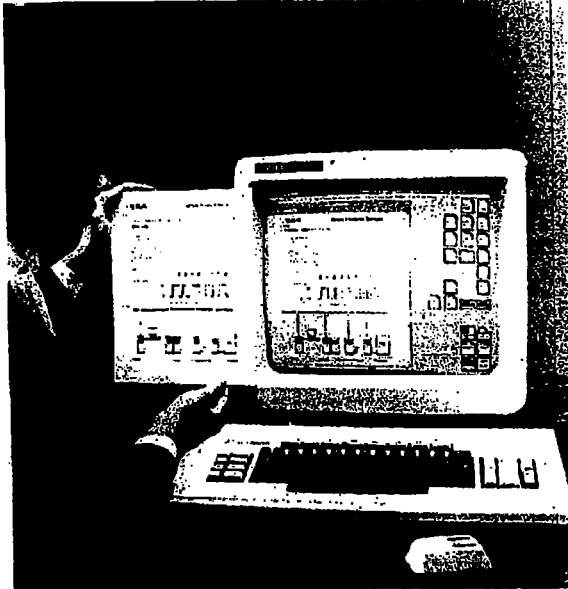
By Thom Hogan, IW Staff

NEW YORK—For over a year, computer observers have been waiting for a significant microcomputer-like product from a major manufacturer. The new Xerox 8010 Star information system may be it.

Priced at \$16,595 for a single work station, the Xerox Star is designed to create, modify, store and retrieve both text and graphics. The Star is impressive and unimimidating. "We believe the Star system will help professional people do creative work more easily and will significantly improve their productivity in the process," said David Little, vice-president of the Xerox office products division.

The 8010 Star consists of a processor/disk unit contained in one cabinet and designed to fit underneath a desk or table. Both a floppy-disk drive and a small fixed-disk system are included in the basic unit. The display, consisting of a desktop unit about 11 inches high by about 14 inches wide, shows two pages of text side by side. Also included are a detachable keyboard and a "mouse."

The mouse is really a substitute for the cursor control keys commonly found on terminals. As you move the mouse on the desktop, the cursor moves correspondingly on the display. Move the mouse two inches to the right and the cursor moves a predictable



Xerox 8010 Star information system: text and graphics created on screen can be reproduced on local or remote laser electronic printers.

System Coming in July

IBM to Pounce on Micro Market

InfoWorld Staff

BOCA RATON, FL—A reliable internal source within IBM's Entry-level Systems Group in Boca Raton has provided InfoWorld with exclusive details on IBM's new personal computer. The system is scheduled to be announced in New York in mid-July 1981.

The central processor for this new system will be the 16-bit Intel 8088. Memory sizes will range from 64K to 256K using 16K dynamic-RAM chips; and the five-slot motherboard will accept boards designed around IBM's new "personal-computer bus."

The system has a detachable keyboard, and its overall appearance is that of an IBM 3100 Series terminal. In the right side of the main chassis box are two double-sided, double-density 5 1/4-inch floppy-disk drives. One of these drives can be replaced by a Winchester hard-disk drive for added memory expansion.

The system incorporates high-resolution graphics (640 x 400) that can be displayed on either a color or black & white monitor, or on a television with an RF modulator. The monitors, manufactured for IBM in Taiwan, and the main chassis feature metal cabinets to help with EMI (radio-frequency interference) shielding. One of the system's

boards has an open socket, apparently meant for an add-on 8087 high-speed arithmetic chip.

IBM gave some thought to using CP/M

as the disk-operating system for the personal computer, but this would have been an incredible departure from normal IBM product-development strategies. Instead, the operating system for this new computer will be similar to

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Corvus Releases Omninet Network System

SAN JOSE, CA—Corvus Systems gave InfoWorld a sneak preview of a new microcomputer networking system to be introduced at the National Computer Conference in Chicago this month. The new Omninet system is touted as an inexpensive, high-performance way to link microcomputers and share expensive resources.

"We feel we're leading the push," says Mark Hahn, vice-president of product development at Corvus. Omninet doesn't require a central computer, uses low-cost twisted-pair wire for connections and can accommodate up to 64 users separated by as much as 4000 feet, at a transfer rate of one megabaud.

"We were the first company to offer reliable hard-disk systems for microcomputer users, and now we're the first with an honest-to-goodness microcomputer network system," says Hahn.

The concept behind Omninet is simple. Each microcomputer has an interface board—called a "transporter"—installed in it. Each transporter is connected to the main twisted-pair cable and handles the receiving and transmitting of message "packets."

Each transporter consists of a 6801 microprocessor, a custom Omninet IC chip, the Omninet software in ROM and some associated coding and decoding circuitry. Interfaces are now available for Apple II, Onyx C8000 and DEC LSI-11 computers. The Apple transporters and those yet to be released for S-100 computers cost \$495, while the DEC and Onyx versions are slightly higher in price.

The mass-storage medium for the network consists of any of Corvus's hard-disk systems equipped with a stand-alone transporter. The hard disk is un-

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distance to the right on the screen.

Operation of the Star is said to be easy to learn. The primary function keys are labeled Select, Adjust, Move, Delete, Copy and Properties.

These functions may at first seem unusual to microcomputer users. The reason is that the Star uses what Xerox calls "icons"—symbols placed on the screen to represent the available actions and/or objects in the system. To move the current text to a floppy disk, for instance, a user presses the Select key, moves the mouse to the icon for the floppy diskette and presses another key to execute the action.

A glance at Photo 1 shows you one page of text displayed on the work station with a set of icons on the right. The icons in the upper right are for a number of predefined "folders," an "in/out" box and a memo file. The icons in the lower right represent the floppy disk, the printer, some special files, the directory and an introductory file for new users.

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Addition to PET Menagerie

By Maggie Carnon, IW Staff

CHICAGO, IL—"With the announcement of the VIC personal computer and the 8032 microcomputer in the last several months and now the announcement of the Super PET, Commodore is making a major effort to become a greater presence in the U.S. market," said James Finke, president of Commodore Business Machines, at the National Computer Conference.

This was the second debut for the Super PET; also known as the Micro-Mainframe, as it had recently been introduced at the Hannover fair in West Germany. In general, the company has been more successful in the European market than in the U.S.

The Super PET is a low-cost microcomputer with software that can be upgraded to a mainframe system without modification. Commodore announced that the system will sell for \$1995. This price includes an 8032 microcomputer, 12-inch video, a 6502 board, a 6809 board and software. (Owners of 8032 computers can upgrade their systems to the Super PET by purchasing a 6809 board.)

The software package for the Super PET has been developed by Waterloo Computing Systems, Ltd., of the University of Waterloo, Waterloo, Ontario. Super PET currently supports the following interpretive languages from Waterloo: microBASIC, microPascal, microFORTRAN and microAPL, which are all included in the \$1995 price.

Also included in the Micro-Mainframe are the disk-oriented assembler and linker program, known as the Waterloo 6809 Assembler and Linker. It supports development of general-purpose Motorola 6809 machine-language programs. The Waterloo microSupervisor

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The Super PET is a low-cost computer with software that is loaded to a mainframe system modification. Commodore advertises that the system will sell for \$1499. It includes an 8032 microprocessor, a 6502 board and software. (Owner: computers can upgrade them to the Super PET by purchasing a board.)

The software package for Super PET has been developed by Computing Systems, Ltd., of Watlington, Watlington, Watlington. Super PET currently supports following interpretive languages: Waterloo, microBASIC, microFORTRAN and microAL.

Also included in the MicroPET are the disk-oriented assembler program, known as the 6809 Assembler and Linker. It is a development of general Motorola 6809 machine language programs. The Waterloo micros-

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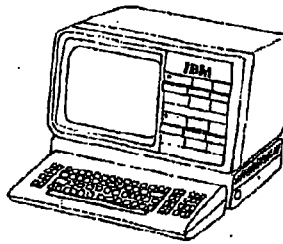
IBM Set

continued from page 1

CPM in many respects. The designers didn't strive for compatibility—just similarity.

With the Apple II in its sights, IBM will offer a stripped-down version of this system with a ROM-based operating system and cassette BASIC. This lowest-priced entry system will not have floppy disk drives and will sell for close to \$1000. Complete systems will range from \$3000 to \$5000. The low-cost Epson MX-80 printer will also be offered with the system.

We asked Harry Smith of the Entry-



An artist's conception of the upcoming IBM personal computer

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InfoWorld will have a full report on this bit of "speculation" after its introduction in New York in July.

Applefest '81 is scheduled for June 6 and 7 at the Plaza Castle in Boston. Jonathan Rotenberg, Chairman, Boston Computer Society Expositions Group, Three Center Plaza, Boston, MA 02108.

A seminar course to teach management executives the basic functions and capabilities of microcomputer devices has been announced by the American Institute for Professional Education. Sessions in June will be held in Rochester, NY, June 8-9; Boston, MA, June 15-16; New Orleans, LA, June 22-23; and Scottsdale, AZ, June 29-30. American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, NJ 07940, (201) 377-7400.

Rampant Featuritis Strikes 'Brain'

An outbreak of SB/E has hit Interlic SuperBrains. SB/E (for Super Bios and EPRCM) is a feature-filled software/firmware package that has been found on SuperBrains at government agencies, leading universities, and Fortune 500 companies.

Because it is standard CP/M, not one of those "compatible" derivatives, SB/E can be tricky to spot. Experts recommend holding down any key to check for auto repeat or audible key click; looking for greater disk capacity and much faster disk access times; or testing for programmable function keys and a real time clock.

Reliability Affected

If it's the automatic spindle motor shut off and the disk speed check, however, that have made identification difficult. These features directly lead to more reliable operation and longer MTBF. This means that SB/E equipped machines are less likely to turn up at repair centers. The usual place to monitor computer performance.

Source Located

Hundreds of SB/E installations have been reported. In America, Canada, Europe, Africa, and Australia. Investigators have traced the source of the outbreak to IE Systems, a group of high tech junkies operating out of a New England mill town.

IE Systems has been forced to publish a free booklet explaining what they've done. And to ease the anguish of people waiting for SB/E to hit their brain, IE has installed more phone lines. They have also agreed to sell directly to end users at \$105, as well as to dealers.

People who need immediate positive confirmation that SB/E is running on their machine should call the junkies and get their fix.

Trademark of Interlic Data System
Trademark of Digital Research



IE Systems, Inc.

Information Engineering

Box 305, 90 Main Street
Newmarket, NH 03857
603-659-5891

When Steinway builds a concert grand, they don't compromise on quality. Neither do we.

Steinway Systems Corporation

InfoWorld

IBM Set

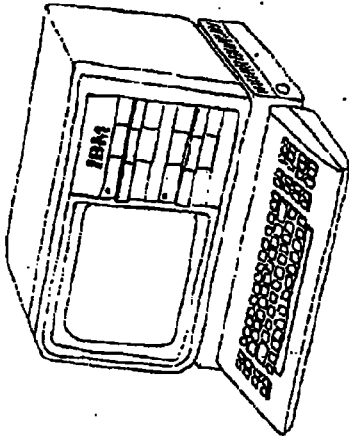
continued from page 1
CP/M in many respects. The designers didn't strive for compatibility—just similarity.

With the Apple II in its sights, IBM will offer a stripped-down version of this system with a ROM-based operating system and cassette BASIC. This lowest-priced entry system will not have floppy disk-drives and will sell for close to \$1000. Complete systems will range from \$3000 to \$5000. The low-cost Epson MX-80 printer will also be offered with the system.

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EXHIBIT T



TRIUMPH
THE NERDS



STARRING ROBERT X. CRINGELY

THE TELEVISION PROGRAM TRANSCRIPTS: PART II

The story so far.... In 1975, Ed Roberts invented the Altair personal computer. It was a pain to use until 19 year-old pre-billionaire Bill Gates wrote the first personal computer language. Still, the public didn't care. Then two young hackers -- Steve Jobs and Steve Wozniak -- built the Apple computer to impress their friends. We were all impressed and Apple was a stunning success. By 1980, the PC market was worth a billion dollars. Now, view on....

Christine Comaford
We are nerds.

Vern Raburn
Most of the people in the industry were young because the guys who had any real experience were too smart to get involved in all these crazy little machines.

Gordon Eubanks
It really wasn't that we were going to build billion dollar businesses. We were having a good time.

Vern Raburn
I thought this was the most fun you could possibly have with your clothes on.

When the personal computer was invented twenty years it was just that - an invention - it wasn't a business. These were hobbyists who built these machines and wrote this software to have fun but that has really changed and now this is a business this is a big business. It just goes to show you that people can be bought. How the personal computer industry grew from zero to 100 million units is an amazing story. And it wasn't just those early funky companies of nerds and hackers, like Apple, that made it happen. It took the intervention of a company that was trusted by the corporate world. Big business wasn't interested in the personal computer. In the boardrooms of corporate America a computer still meant something the size of a room that cost at least a hundred thousand dollars. Executives would brag that my mainframe is bigger than your mainframe. The idea of a \$2,000 computer that sat on your desk in a plastic box was laughable that is until that plastic box had three letters stamped on it - IBM. IBM was, and is, an American business

phenomenon. Over 60 years, Tom Watson and his son, Tom Jr., built what their workers called Big Blue into the top computer company in the world. But IBM made mainframe computers for large companies, not personal computers -- at least not yet. For the PC to be taken seriously by big business, the nerds of Silicon Valley had to meet the suits of corporate America. IBM never fired anyone, requiring only that undying loyalty to the company and a strict dress code. IBM hired conservative hard-workers straight from school. Few IBM'ers were at the summer of love. Their turn-ons were giant mainframes and corporate responsibility. They worked nine to five and on Saturdays washed the car. This is intergalactic HQ for IBM - the largest computer company in the world...but in many ways IBM is really more a country than it is a company. It has hundreds of thousands of citizens, it has a bureaucracy, it has an entire culture everything in fact but an army. OK Sam we're ready to visit IBM country, obviously we're dressed for the part. Now when you were in sales training in 1959 for IBM did you sing company songs?

Sam Albert
Former IBM Executive
Absolutely.

BOB: Well just to get us in the mood let's sing one right here.

SAM: You're kidding.

BOB: I have the IBM - the songs of the IBM and we're going to try for number 74, our IBM salesmen sung to the tune of Jingle Bells.

Bob & Sam singing

'IBM, happy men, smiling all the way, oh what fun it is to sell our products our products night and day. IBM Watson men, partners of TJ. In his service to mankind - that's why we are so gay.'

Sam Albert
Now gay didn't mean what it means today then remember that OK?
BOB: Right ok let's go.
SAM: I guess that was OK.
BOB: Perfect.

Sam Albert
When I started at IBM there was a dress code, that was an informal oral code of white shirts. You couldn't wear anything but a white shirt, generally with a starched collar. I remember attending my first class, and a gentleman said to me as we were entering the building, are you an IBMer, and I said yes. He had a three piece suit on, vests were of the vogue, and he said could you just lift your pants leg please. I said what, and before I knew it he had lifted my pants leg and he said you're not wearing any garters. I said what?! He said your socks, they're not pulled tight to the top, you need garters. And sure enough I had to go get garters.

IBM is like Switzerland -- conservative, a little dull, yet prosperous. It has committees to verify each decision. The safety net is so big that it is hard to make a bad decision - or any decision at all. Rich Seidner, computer programmer and wannabe Paul Simon, spent twenty-five years marching in lockstep at IBM. He feels better now.

Rich Seidner
Former IBM Programmer

I mean it's like getting four hundred thousand people to agree what they want to have for lunch. You know, I mean it's just not going to happen - it's going to be lowest common denominator you know, it's going to be you know hot dogs and beans. So ahm so what are you going to do? So IBM had created this process and it absolutely made sure that quality would be preserved throughout the process, that you actually were doing what you set out to do and what you thought the customer wanted. At one point somebody kind of looked at the process to see well, you know, what's it doing and what's the overhead built into it, what they found is that it would take at least nine months to ship an empty box.

By the late seventies, even IBM had begun to notice the explosive growth of personal computer companies like Apple.

Commercial

The Apple 2 - small inexpensive and simple to use the first computer.....

What's more, it was a computer business they didn't control. In 1980, IBM decided they wanted a piece of this action.

Jack Sams

Former IBM Executive

There were suddenly tens of thousands of people buying machines of that class and they loved them. They were very happy with them and they were showing up in the engineering departments of our clients as machines that were brought in because you can't do the job on your mainframe kind of thing.

Commercial

JB wanted to know why I'm doing better than all the other managers...it's no secret...I have an Apple - sure there's a big computer three flights down but it won't test my options, do my charts or edit my reports like my Apple.

Jack Sams

The people who had gotten it were religious fanatics about them. So the concern was we were losing the hearts and minds and give me a machine to win back the hearts and minds.

In business, as in comedy, timing is everything, and time looked like it might be running out for an IBM PC. I'm visiting an IBMer who took up the challenge. In August 1979, as IBM's top management met to discuss their PC crisis, Bill Lowe ran a small lab in Boca Raton Florida.

Bill Lowe

Hello Bob nice to see you.

BOB: Nice to see you again. I tried to match the IBM dress code how did I do?

BILL: That's terrific, that's terrific.

He knew the company was in a quandary. Wait another year and the PC industry would be too big even for IBM to take on. Chairman Frank Carey turned to the department heads and said HELP!!!

Bill Lowe

Head, IBM IBM PC Development Team 1980

He kind of said well, what should we do, and I said well, we think we know what we

would like to do if we were going to proceed with our own product and he said no, he said at IBM it would take four years and three hundred people to do anything, I mean it's just a fact of life. And I said no sir, we can provide with product in a year. And he abruptly ended the meeting, he said you're on Lowe, come back in two weeks and tell me what you need.

An IBM product in a year! Ridiculous! Down in the basement Bill still has the plan. To save time, instead of building a computer from scratch, they would buy components off the shelf and assemble them -- what in IBM speak was called 'open architecture.' IBM never did this. Two weeks later Bill proposed his heresy to the Chairman.

Bill Lowe

And frankly this is it. The key decisions were to go with an open architecture, non IBM technology, non IBM software, non IBM sales and non IBM service. And we probably spent a full half of the presentation carrying the corporate management committee into this concept. Because this was a new concept for IBM at that point.

BOB: Was it a hard sell?

BILL: Mr. Carey bought it. And as result of him buying it, we got through it.

With the backing of the chairman, Bill and his team then set out to break all the IBM rules and go for a record.

Bill Lowe

We'll put it in the IBM section.

Once IBM decided to do a personal computer and to do it in a year - they couldn't really design anything, they just had to slap it together, so that's what we'll do. You have a central processing unit and eh let's see you need a monitor or display and a keyboard. OK a PC, except it's not, there's something missing. Time for the Cringely crash course in elementary computing. A PC is a boxful of electronic switches, a piece of hardware. It's useless until you tell it what to do. It requires a program of instructions...that's software. Every PC requires at least two essential bits of software in order to work at all. First it requires a computer language. That's what you type in to give instructions to the computer. To tell it what to do. Remember it was a computer language called BASIC that Paul Allen and Bill Gates adapted to the Altair...the first PC. The other bit of software that's required is called an operating system and that's the internal traffic cop that tells the computer itself how the keyboard is connected to the screen or how to store files on a floppy disk instead of just losing them when you turn off the PC at the end of the day. Operating systems tend to have boring unfriendly names like UNIX and CPM and MS-DOS but though they may be boring it's an operating system that made Bill Gates the richest man in the world. And the story of how that came about is, well, pretty interesting. So the contest begins. Who would IBM buy their software from? Let's meet the two contenders -- the late Gary Kildall, then aged 39, a computer Ph.D., and a 24 year old Harvard drop-out - Bill Gates. By the time IBM came calling in 1980, Bill Gates and his small company Microsoft was the biggest supplier of computer languages in the fledgling PC industry.

Commercial

'Many different computer manufacturers are making the CPM Operating System standard on most models.'

For their operating system, though, the logical guy for the IBMers to see was Gary Kildall. He ran a company modestly called Interglactic Digital Research. Gary had invented the

PC's first operating system called CP/M. He had already sold 600,000 of them, so he was the big cheese of operating systems.

Gary Kildall
Founder Digital Research
Speaking in 1983

In the early 70s I had a need for an operating system myself and eh it was a very natural thing to write and it turns out other people had a need for an operating system like that and so eh it was a very natural thing I wrote it for my own use and then started selling it.

Gordon Eubanks
In Gary's mind it was the dominant thing and it would always be the dominant of course Bill did languages and Gary did operating systems and he really honestly believed that would never change.

But what would change the balance of power in this young industry was the characters of the two protagonists.

Jim Warren
Founder West Coast Computer Faire 1978
So I knew Gary back when he was an assistant professor at Monterrey Post Grad School and I was simply a grad student. And went down, sat in his hot tub, smoked dope with him and thoroughly enjoyed it all, and commiserated and talked nerd stuff. He liked playing with gadgets, just like Woz did and does, just like I did and do.

Gordon Eubanks
He wasn't really interested in how you drive the business, he worked on projects, things that interested him.

Jim Warren
He didn't go rushing off to the patent office and patent CPM and patent every line of code he could, he didn't try to just squeeze the last dollar out of it.

Gordon Eubanks
Gary was not a fighter, Gary avoided conflict, Gary hated conflict. Bill I don't think anyone could say backed away from conflict.

Nobody said future billionaires have to be nice guys. Here, at the Microsoft Museum, is a shrine to Bill's legacy. Bill Gates hardly fought his way up from the gutter. Raised in a prosperous Seattle household, his mother a homemaker who did charity work, his father was a successful lawyer. But beneath the affluence and comfort of a perfect American family, a competitive spirit ran deep.

Vern Raburn
President, The Paul Allen Group
I ended up spending Memorial Day Weekend with him out at his grandmother's house on Hood Canal. She turned everything in to a game. It was a very very very competitive environment, and if you spent the weekend there, you were part of the competition, and it didn't matter whether it was hearts or pickleball or swimming to the dock. And you know and there was always a reward for winning and there was always a penalty for losing.

Christine Comaford

CEO Corporate Computing Intl.

One time, it was funny. I went to Bill's house and he really wanted to show me his jigsaw puzzle that he was working on, and he really wanted to talk about how he did this jigsaw puzzle in like four minutes, and like on the box it said, if you're a genius you will do the jigsaw puzzle in like seven. And he was into it. He was like I can do it. And I said don't, you know, I believe you. You don't need to break it up and do it for me. You know.

Bill Gates can be so focused that the small things in life get overlooked.

Jean Richardson

Former VP, Corporate Comms, Microsoft

If he was busy he didn't bathe, he didn't change clothes. We were in New York and the demo that we had crashed the evening before the announcement, and Bill worked all night with some other engineers to fix it. Well it didn't occur to him to take ten minutes for a shower after that, it just didn't occur to him that that was important, and he badly needed a shower that day.

The scene is set in California...laid back Gary Kildall already making the best selling PC operating system CPM. In Seattle Bill Gates maker of BASIC the best selling PC language but always prepared to seize an opportunity. So IBM had to choose one of these guys to write the operating system for its new personal computer. One would hit the jackpot the other would be forgotten...a footnote in the history of the personal computer and it all starts with a telephone call to an eighth floor office in that building the headquarters of Microsoft in 1980.

Jack Sams

At about noon I guess I called Bill Gates on Monday and said I would like to come out and talk with him about his products.

Steve Ballmer

Vice-President Microsoft

Bill said well, how's next week, and they said we're on an airplane, we're leaving in an hour, we'd like to be there tomorrow. Well, hallelujah. Right oh.

Steve Ballmer was a Harvard roommate of Gates. He'd just joined Microsoft and would end up its third billionaire. Back then he was the only guy in the company with business training. Both Ballmer and Gates instantly saw the importance of the IBM visit.

Bill Gates

You know IBM was the dominant force in computing. A lot of these computer fairs discussions would get around to, you know, I. most people thought the big computer companies wouldn't recognise the small computers, and it might be their downfall. But now to have one of the big computer companies coming in and saying at least the - the people who were visiting with us that they were going to invest in it, that - that was er, amazing.

Steve Ballmer

And Bill said Steve, you'd better come to the meeting, you're the only other guy here who can wear a suit. So we figure the two of us will put on suits, we'll put on suits and we'll go to this meeting.

Jack Sams

We got there at roughly two o'clock and we were waiting in the front, and this young fella came out to take us back to Mr. Gates office. I thought he was the office boy, and of course it was Bill. He was quite decisive, we popped out the non-disclosure agreement - the letter that said he wouldn't tell anybody we were there and that we wouldn't hear any secrets and so forth. He signed it immediately.

Bill Gates

IBM didn't make it easy. You had to sign all these funny agreements that sort of said I...IBM could do whatever they wanted, whenever they wanted, and use your secrets however they - they felt. But so it took a little bit of faith.

Jack Sams was looking for a package from Microsoft containing both the BASIC computer language and an Operating System. But IBM hadn't done their homework.

Steve Ballmer

They thought we had an operating system. Because we had this Soft Card product that had CPM on it, they thought we could licence them CPM for this new personal computer they told us they wanted to do, and we said well, no, we're not in that business.

Jack Sams

When we discovered we didn't have - he didn't have the rights to do that and that it was not...he said but I think it's ready, I think that Gary's got it ready to go. So I said well, there's no time like the present, call up Gary.

Steve Ballmer

And so Bill right there with them in the room called Gary Kildall at Digital Research and said Gary, I'm sending some guys down. They're going to be on the phone. Treat them right, they're important guys.

The men from IBM came to this Victorian House in Pacific Grove California, headquarters of Digital Research, headed by Gary and Dorothy Kildall. Just imagine what its like having IBM come to visit - its like having the Queen drop by for tea, its like having the Pope come by looking for advice, its like a visit from God himself. And what did Gary and Dorothy do? They sent them away.

Jack Sams

Gary had some other plans and so he said well, Dorothy will see you. So we went down the three of us...

Gordon Eubanks

Former Head of Language Division, Digital Research

IBM showed up with an IBM non-disclosure and Dorothy made what I...a decision which I think it's easy in retrospect to say was dumb.

Jack Sams

We popped out our letter that said please don't tell anybody we're here, and we don't want to hear anything confidential. And she read it and said and I can't sign this.

Gordon Eubanks

She did what her job was, she got the lawyer to look at the nondisclosure. The lawyer,

Gerry Davis who's still in Monterey threw up on this non-disclosure. It was uncomfortable for IBM, they weren't used to waiting. And it was unfortunate situation - here you are in a tiny Victorian House, its overrun with people, chaotic.

Jack Sams

So we spent the whole day in Pacific Grove debating with them and with our attorneys and her attorneys and everybody else about whether or not she could even talk to us about talking to us, and we left.

This is the moment Digital Research dropped the ball. IBM, distinctly unimpressed with their reception, went back to Microsoft.

BOB: It seems to me that Digital Research really screwed up.

STEVE BALLMER: I think so - I think that's spot on. They made a big mistake. We referred IBM to them and they failed to execute.

Bill Gates isn't the man to give a rival a second chance. He saw the opportunity of a lifetime.

Bill Gates

Digital research didn't seize that, and we knew it was essential, if somebody didn't do it, the project was going to fall apart.

Steve Ballmer

We just got carried away and said look, we can't afford to lose the language business. That was the initial thought - we can't afford to have IBM not go forward. This is the most exciting thing that's going to happen in PCs.

Bill Gates

And we were already out on a limb, because we had licensed them not only Basic, but Fortran, Cobol Assembler er, typing tutor and Venture. And basically every - every product the company had we had committed to do for IBM in a very short time frame.

But there was a problem. IBM needed an operating system fast and Microsoft didn't have one. What they had was a stroke of luck - the ingredient everyone needs to be a billionaire. Unbelievably, the solution was just across town. Paul Allen, Gates's programming partner since high school, had found another operating system.

Paul Allen

There's a local company here in CL called CL Computer Products by a guy named Tim Patterson and he had done an operating system a very rudimentary operating system that was kind of like CPM.

Steve Ballmer

And we just told IBM look, we'll go and get this operating system from this small local company, we'll take care of it, we'll fix it up, and you can still do a PC.

Tim Patterson's operating system, which saved the deal with IBM, was, well, adapted from Gary Kildall's CPM.

Tim Patterson

Programmer

So I took a CPM manual that I'd gotten from the Retail Computer Store five dollars in 1976 or something and used that as the basis for what would be the application program interface, the API for my operating system. And so using these ideas that came from different places I started in April and it was about half time for four months before I had my first working version.

This is it, the operating system Tim Patterson wrote. He called it QDOS, the quick and dirty operating system. Microsoft and IBM called it PC-DOS 1.0 and under any name it looks an awful lot like CPM. On this computer here I have running a PC-DOS and CPM so and frankly it's very hard to tell the difference between the two. The command structures are the same, so are the directories, in fact the only obvious technical difference is the floppy drive is labelled A in PC-DOS and C in CPM. Some difference and yet one generated billions in revenue and the other disappeared. As usual in the PC business the prize didn't go to the inventor but to the exploiter of the invention. In this case that was Gary Kildall, it wasn't even Tim Patterson.

There was still one problem. Tim Patterson worked for Seattle Computer Products, or SCP. They still owned the rights to QDOS - rights that Microsoft had to have.

Vern Raburn

Former Vice-President Microsoft

But then we went back and said to them look, you know, we want to buy this thing, and SCP was like most little companies, you know. They always needed cash and so that was when they went in to the negotiation.

Paul Allen

And so ended up working out a deal to buy the operating system from him for whatever usage we wanted for fifty thousand dollars.

Hey, let's pause there. To savour an historic moment.

Paul Allen

For whatever usage we wanted for fifty thousand dollars.

It had to be the deal of the century if not the millenium it was certainly the deal that made Bill Gates and Paul Allen multi billionaires and allowed Paul Allen to buy toys like these, his own NBA basketball team and arena. Microsoft bought outright for fifty thousand dollars the operating system they needed and they turned around and licensed it to the world for up to fifty dollars per PC. Think of it - one hundred million personal computers running MS DOS software funnelling billions into Microsoft - a company that back then was fifty kids managed by a twenty-five year old who needed to wash his hair. Nice work if you can get it and Microsoft got it. There are no two places further apart in the USA than south eastern Florida and Washington State where Microsoft is based. This - this is Florida, Boca Raton and this building right here is where the IBM PC was developed. Here the nerds from Seattle joined forces with the suits of corporate and in that first honeymoon year they pulled off a fantastic achievement.

Dan Bricklin

After we got a package in the mail from the people down in Florida...

HBG000700

As August 1981 approached, the deadline for the launch of the IBM Acorn, the PC industry held its breath.

Dan Bricklin

Supposedly, maybe at this very moment eh, IBM is announcing the personal computer. We don't know that yet.

Software writers like Dan Bricklin, the creator of the first spreadsheet VisiCalc waited by the phones for news of the announcement. This is a moment of PC history. IBM secrecy had codenamed the PC 'The Floridian Project.' Everyone in the PC business knew IBM would change their world forever. They also knew that if their software was on the IBM PC, they would make fortunes.

Dan Bricklin

Please note that the attached information is not to be disclosed prior to any public announcement. (It's on the ticker) It's on the ticker OK so now you can tell people.

What we're watching are the first few seconds of a \$100 billion industry.

Promo

After years of thinking big today IBM came up with something small. Big Blue is looking for a slice of Apple's market share. Bits and Bytes mean nothing try this one. Now they're going to sell \$1,000 computers to millions of customers. I have seen the future said one analyst and it computes.

Commercial

Today an IBM computer has reached a personal.....

Nobody was ever fired for buying IBM. Now companies could put PCs with the name they trusted on desks from Wisconsin to Wall Street.

Bob Metcalfe

Founder 3COM

When the IBM PC came and the PC became a serious business tool, a lot of them, the first of them went into those buildings over there and that was the real ehm when the PC industry started taking off, it happened there too.

Commercial

Can learn to use it with ease...

Sparky Sparks

Former IBM Executive

What IBM said was it's okay corporate America for you to now start buying and using PCs. And if it's okay for corporate America, it's got to be okay for everybody.

For all the hype, the IBM PC wasn't much better than what came before. So while the IBM name could create immense demand, it took a killer application to sustain it. The killer app for the IBM PC was yet another spreadsheet. Based on Visicalc, but called Lotus 1-2-3, its creators were the first of many to get rich on IBM's success. Within a year Lotus was worth \$150 million bucks. Wham! Bam! Thank you IBM!

Commercial

Time to rock time for code...

IBM had forecast sales of half a million computers by 1984. In those 3 years, they sold 2 million.

Jack Sams

Euphoric I guess is the right word. Everybody was believed that they were not going to... At that point two million or three million, you know, they were now thinking in terms of a hundred million and they were probably off the scale in the other direction.

What did all this mean to Bill Gates, whose operating system, DOS, was at the heart of every IBM PC sold? Initially, not much, because of the deal with IBM. But it did give him a vital bridgehead to other players in the PC marketplace, which meant trouble in the long run for Big Blue.

Bill Gates

The key to our...the structure of our deal was that IBM had no control over...over our licensing to other people. In a lesson on the computer industry in mainframes was that er, over time, people built compatible machines or clones, whatever term you want to use, and so really, the primary upside on the deal we had with IBM, because they had a fixed fee er, we got about \$80,000 - we got some other money for some special work we did er, but no royalty from them. And that's the DOS and Basic as well. And so we were hoping a lot of other people would come along and do compatible machines. We were expecting that that would happen because we knew Intel wanted to vend the chip to a lot more than just than just IBM and so it was great when people did start showing up and ehm having an interest in the licence.

IBM now had fifty per cent market share and was defining what a PC meant. There were other PCs that were sorta like the IBM PC, kinda like it. But what the public wanted was IBM PCs. So to be successful other manufacturers would have to build computers exactly like the IBM. They wanted to copy the IBM PC, to clone it. How could they do that legally, well welcome to the world of reverse engineering. This is what reverse engineering can get you if you do it right. It's the modest Aspen, Colorado ski shack of Rod Canion, one of the founders of Compaq, the company set up to compete head-on with the IBM PC. Back in 1982, Rod and three fellow engineers from Texas Instruments sketched out a computer design on a place mat at the House of Pies restaurant in Houston, Texas. They decided to manufacture and market a portable version of the IBM PC using the curious technique of reverse engineering.

Rod Canion

Co-founder Compaq

Reverse engineering is figuring out after something has already been created how it ticks, what makes it work, usually for the purpose of creating something that works the same way or at least does something like the thing you're trying to reverse engineer.

Here's how you clone a PC. IBM had made it easy to copy. The microprocessor was available off the shelf from Intel and the other parts came from many sources. Only one part was IBM's alone, a vital chip that connected the hardware with the software. Called the ROM-BIOS, this was IBM's own design, protected by copyright and Big Blue's army of lawyers. Compaq had to somehow copy the chip without breaking the law.

Rod Canion

First you have to decide how the ROM works, so what we had to do was have an engineer sit down with that code and through trial and error write a specification that said here's how the BIOS ROM needs to work. It couldn't be close it had to be exact so there was a lot of detailed testing that went on.

You test how that all-important chip behaves, and make a list of what it has to do - now it's time to meet my lawyer, Claude.

Claude Stern

Silicon Valley Attorney

BOB: I've examined the internals of the ROM BIOS and written this book of specifications now I need some help because I've done as much as I can do, and you need to explain what's next.

CLAUDE: Well, the first thing I'm going to do is I'm going to go through the book of specifications myself, but the first thing I can tell you Robert is that you're out of it now. You are contaminated, you are dirty. You've seen the product that's the original work of authorship, you've seen the target product, so now from here on in we're going to be working with people who are not dirty. We're going to be working with so called virgins, who are going to be operating in the clean room.

BOB: I certainly don't qualify there.

CLAUDE: I imagine you don't. So what we're going to do is this. We're going to hire a group of engineers who have never seen the IBM ROM BIOS. They have never seen it, they have never operated it, they know nothing about it.

Claude interrogates Mark

CLAUDE: Have you ever before attempted to disassemble decompile or to in any way shape or form reverse engineer any IBM equipment?

MARK: Oh no.

CLAUDE: And have you ever tried to disassemble....

This is the Silicon Valley virginity test. And good virgins are hard to find.

CLAUDE: You understand that in the event that we discover that the information you are providing us is inaccurate you are subject to discipline by the company and that can include but not limited to termination immediately do you understand that?

MARK: Yes I do.

CLAUDE: OK.

After the virgins are deemed intact, they are forbidden contact with the outside world while they build a new chip -- one that behaves exactly like the one in the specifications. In Compaq's case, it took 15 senior programmers several months and cost \$1 million to do the reverse engineering. In November 1982, Rod Canion unveiled the result.

Bill Murto

What I've brought today is a Compaq portable computer.

When Bill Murto, another Compaq founder got a plug on a cable TV show their selling point was clear 100 percent IBM compatibility.

Bill Murto

It turns out that all major popular software runs on the IBM personal computer or the Compaq portable computer.

Q: That extends through all software written for IBM?

A: Eh Yes.

Q: It all works on the Compaq?

The Compaq was an instant hit. In their first year, on the strength of being exactly like IBM but a little cheaper, they sold 47,000 PCs.

Rod Canion

In our first year of sales we set an American business record. I guess maybe a world business record. Largest first year sales in history. It was a hundred and eleven million dollars.

So Rod Canion ends up in Aspen, famous for having the most expensive real estate in America and I try not to look envious while Rod tells me which executive jet he plans to buy next.

ROD: And finally I picked the Lear 31.

BOB: Oh really?

ROD: Now thart was a fun airplane.

BOB: Oh yeh.

Poor Big Blue! Suddenly everybody was cashing in on IBM's success. The most obvious winner at first was Intel, maker of the PCs microprocessor chip. Intel was selling chips like hotcakes to clonemakers -- and making them smaller, quicker and cheaper. This was unheard of! What kind of an industry had Big Blue gotten themselves into?

Jim Cannavino

Former Head, IBM PC Division

Things get less expensive every year. People aren't used to that in general. I mean, you buy a new car, you buy one now and four years later you go and buy one it costs more than the one you bought before. Here is this magical piece of an industry - you go buy one later it costs less and it does more. What a wonderful thing. But it causes some funny things to occur when you think about an industry. An industry where prices are coming down, where you have to sell it and use it right now, because if you wait later it's worth less.

Where Compaq led, others soon followed. IBM was now facing dozens of rivals - soon to be familiar names began to appear, like AST, Northgate and Dell. It was getting spectacularly easy to build a clone. You could get everything off the shelf, including a guaranteed-virgin ROM BIOS chip. Every Tom, Dick & Bob could now make an IBM compatible PC and take another bite out of Big Blue's business. OK we're at Dominos Computers at Los Altos California, Silicon Valley and this is Yukio and we're going to set up the Bob and Yukio Personal Computer Company making IBM PC clones. You're the expert, I of course brought all the money so what is it that we're going to do.

Yukio

OK first of all we need a motherboard.

BOB: What's a motherboard?

YUKIO: That's where the CPU is set in...that's the central processor unit.

BOB: OK.

YUKIO: In fact I have one right here. OK so this is the video board...

BOB: That drives the monitor.

YUKIO: Right.

BOB: Terror?

BILL LOWE: Oh, of course. I mean we were able to sell a lot of products but it was getting difficult to make money.

YUKIO: And this is the controller card which would control the hard drive and the floppy drive.

BOB: OK.

Rod Canion

And the way we did it was by having low overhead. IBM had low cost of product but a lot of overhead - they were a very big company.

YUKIO: Right this is a high density recorder.

BOB: So this is a hard disk drive.

Rod Canion

And by keeping our overhead low even though our margins were low we were able to make a profit.

YUKIO: OK I have one right here.

BOB: Hey...OK we have a keyboard which plugs in right over here.

YUKIO: Right...

BOB: People build them themselves - how long does it take?

YUKIO: About an hour.

BOB: About an hour.

And where did every two-bit clone-maker buy his operating system? Microsoft, of course. IBM never imagined Bill Gates would sell DOS to anyone else. Who was there? But by the mid 80's it was boom time for Bill. The teenage entrepreneur had predicted a PC on every desk and in every home, running Microsoft software. It was actually coming true. As Microsoft mushroomed there was no way that Bill Gates could personally dominate thousands of employees but that didn't stop him. He still had a need to be both industry titan and top programmer. So he had to come up with a whole new corporate culture for Microsoft. He had to find a way to satisfy both his adolescent need to dominate and his adult need to inspire. The average Microsoftee is male and about 25. When he's not working, well he's always working. All his friends are Microsoft programmers too. He has no life outside the office but all the sodas are free. From the beginning, Microsoft recruited straight out of college. They chose people who had no experience of life in other companies. In time they'd be called Microserfs.

Charles Simonyi

Chief Programmer, Microsoft

It was easier to to to create a new culture with people who are fresh out of school rather than people who came from, from from eh other companies and and and other cultures. You can rely on it you can predict it you can measure it you can optimise it you can make a machine out of it.

Christine Comaford

I mean everyone like lived together, ate together dated each other you know. Went to the

movies together it was just you know very much a it was like a frat or a dorm.

Steve Ballmer

Everybody's just push push push - is it right, is it right, do we have it right keep on it - no that's not right ugh and you're very frank about that - you loved it and it wasn't very formal and hierarchical because you were just so desirous to do the right thing and get it right. Why - it reflects Bill's personality.

Jean Richardson

And so a lot of young, I say people, but mostly it was young men, who just were out of school saw him as this incredible role model or leader, almost a guru I guess. And they could spend hours with him and he valued their contributions and there was just a wonderful camaraderie that seemed to exist between all these young men and Bill, and this strength that he has and his will and his desire to be the best and to be the winner - he is just like a cult leader, really.

As the frenzied 80's came to a close IBM reached a watershed - they had created an open PC architecture that anyone could copy. This was intentional but IBM always thought their inside track would keep them ahead - wrong. IBM's glacial pace and high overhead put them at a disadvantage to the leaner clone makers - everything was turning into a nightmare as IBM lost its dominant market share. So in a big gamble they staked their PC future to a new system a new line of computers with proprietary closed hardware and their very own operating system. It was war.

Presentation

Start planning for operating system 2 today.

IBM planned to steal the market from Gates with a brand new operating system, called - drum roll please - OS/2. IBM would design OS/2. Yet they asked Microsoft to write the code. Why would Microsoft help create what was intended to be the instrument of their own destruction? Because Microsoft knew IBM was the source of their success and they would tolerate almost anything to stay close to Big Blue.

Steve Ballmer

It was just part of, as we used to call it, the time riding the bear. You just had to try to stay on the bear's back and the bear would twist and turn and try to buck you and throw you, but darn, we were going to ride the bear because the bear was the biggest, the most important you just had to be with the bear, otherwise you would be under the bear in the computer industry, and IBM was the bear, and we were going to ride the back of the bear.

Bill Gates

It's easy for people to forget how pervasive IBM's influence over this industry was. When you talked to people who've come in to the industry recently there's no way you can get that in to their - in to their head, that was the environment.

The relationship between IBM and Microsoft was always a culture clash. IBMers were buttoned-up organization men. Microsoftees were obsessive hackers. With the development of OS/2 the strains really began to show.

Steve Ballmer

In IBM there's a religion in software that says you have to count K-LOCs, and a K-LOC is

a thousand line of code. How big a project is it? Oh, it's sort of a 10K-LOC project. This is a 20K-LOCer. And this is 50K-LOCs. And IBM wanted to sort of make it the religion about how we got paid. How much money we made off OS 2, how much they did. How many K-LOCs did you do? And we kept trying to convince them - hey, if we have - a developer's got a good idea and he can get something done in 4K-LOCs instead of 20K-LOCs, should we make less money? Because he's made something smaller and faster, less KLOC. K-LOCs, K-LOCs, that's the methodology. Ugh anyway, that always makes my back just crinkle up at the thought of the whole thing.

Jim Cannavino

When I took over in '89 there was an enormous amount of resources working on OS 2, both in Microsoft and the IBM company. Bill Gates and I met on that several times. And we pretty quickly came to the conclusion together that that was not going to be a success, the way it was being managed. It was also pretty clear that the negotiating and the contracts had given most of that control to Microsoft.

It was no longer just a question of styles. There was now a clear conflict of business interest. OS/2 was planned to undermine the clone market, where DOS was still Microsoft's major money-maker. Microsoft was DOS. But Microsoft was helping develop the opposition? Bad idea. To keep DOS competitive, Gates had been pouring resources into a new programme called Windows. It was designed to provide a nice user-friendly facade to boring old DOS. Selling it was another job for shy, retiring Steve Ballmer.

Steve Ballmer (Commercial)

How much do you think this advanced operating environment is worth - wait just one minute before you answer - watch as Windows integrates Lotus 1, 2, 3 with Miami Vice. Now we can take this...

Just as Bill Gates saw OS/2 as a threat, IBM regarded Windows as another attempt by Microsoft to hold on to the operating system business.

Bill Gates

We created Windows in parallel. We kept saying to IBM, hey, Windows is the way to go, graphics is the way to go, and we got virtually everyone else, enthused about Windows. So that was a divergence that we kept thinking we could get IBM to - to come around on.

Jim Cannavino

It was clear that IBM had a different vision of its relationship with Microsoft than Microsoft had of its vision with IBM. Was that Microsoft's fault? You know, maybe some, but IBM's not blameless there either. So I don't view any of that as anything but just poor business on IBM's part.

Bill Gates is a very disciplined guy. He puts aside everything he wants to read and twice a year goes away for secluded reading weeks - the decisive moment in the Microsoft/IBM relationship came during just such a retreat. In front of a log fire Bill concluded that it was no longer in Microsoft's long term interests to blindly follow IBM. If Bill had to choose between OS2, IBM's new operating system and Windows, he'd choose Windows.

Steve Ballmer

We said ooh, IBM's probably not going to like this. This is going to threaten OS 2. Now we told them about it, right away we told them about it, but we still did it. They didn't like

it, we told em about it, we told em about it, we offered to licence it to em.

Bill Gates

We always thought the best thing to do is to try and combine IBM promoting the software with us doing the engineering. And so it was only when they broke off communication and decided to go their own way that we thought, okay, we're on our own, and that was definitely very, very scary.

Steve Ballmer

We were in a major negotiation in early 1990, right before the Windows launch. We wanted to have IBM on stage with us to launch Windows 3.0, but they wouldn't do the kind of deal that would allow us to profit it would allow them essentially to take over Windows from us, and we walked away from the deal.

Jack Sams, who started IBM's relationship with Microsoft with that first call to Bill Gates in 1980, could only look on as the partnership disintegrated.

Jack Sams

Then they at that point I think they agreed to disagree on the future progress of OS 2 and Windows. And internally we were told thou shalt not ship any more products on Windows. And about that time I got the opportunity to take early retirement so I did.

Bill's decision by the fireplace ended the ten year IBM/Microsoft partnership and turned IBM into an also-ran in the PC business. Did David beat Goliath? The Boca Raton, Florida birthplace of the IBM's PC is deserted - a casualty of diminishing market share. Today, IBM is again what it was before - a profitable, dominant mainframe computer company. For awhile IBM dominated the PC market. They legitimised the PC business, created the standards most of us now use, and introduced the PC to the corporate world. But in the end they lost out. Maybe it was to a faster, more flexible business culture. Or maybe they just threw it away. That's the view of a guy who's been competing with IBM for 20 years, Silicon Valley's most outspoken software billionaire, Larry Ellison.

Larry Ellison

Founder, Oracle

I think IBM made the single worst mistake in the history of enterprise on earth.

Q: Which was?

LARRY: Which was the manufacture - being the first manufacturer and distributor of the Microsoft/Intel PC which they mistakenly called the IBM PC. I mean they were the first manufacturer and distributor of that technology I mean it's just simply astounding that they could ah basically give a third of their market value to Intel and a third of their market value to Microsoft by accident - I mean no-one, no-one I mean those two companies today are worth close to you know approaching a hundred billion dollars I mean not many of us get a chance to make a \$100 billion mistake.

As fast as IBM abandons its buildings, Microsoft builds new ones. In 1980 IBM was 3000 times the size of Microsoft. Though still a smaller company, today Wall Street says Microsoft is worth more. Both have faced anti-trust investigations about their monopoly positions. For years IBM defined successful American corporate culture - as a machine of ordered bureaucracy. Here in the corridors of Microsoft it's a different style, it's personal. This company - in its drive, its hunger to succeed - is a reflection of one man, its founder, Bill Gates.

Jean Richardson

Bill wanted to win. Incredible desire to win and to beat other people. At Microsoft we, the whole idea was that we would put people under, you know. Unfortunately that's happened a lot.

Esther Dyson

Computer Industry Analyst

Bill Gates is special. You wouldn't have had a Microsoft with take a random other person like Gary Kildall. On the other hand, Bill Gates was also lucky. But Bill Gates knows that, unlike a lot of other people in the industry, and he's paranoid. Every morning he gets up and he doesn't feel secure, he feels nervous about this. They're trying hard, they're not relaxing, and that's why they're so successful.

Christine Comaford

And I remember, I was talking to Bill once and I asked him what he feared, and he said that he feared growing old because you know, once you're beyond thirty, this was his belief at the time, you know once you're beyond thirty, you know, you don't have as many good ideas anymore. You're not as smart anymore.

Bill Gates

If you just slow down a little bit who knows who it'll be, probably some company that may not even exist yet, but eh someone else can come in and take the lead.

Christine Comaford

And I said well, you know, you're going to age, it's going to happen, it's kind of inevitable, what are you going to do about it? And he said I'm just going to hire the smartest people and I'm going to surround myself with all these smart people, you know. And I thought that was kind of interesting. It was almost - it was like he was like oh, I can't be immortal, but like maybe this is the second best and I can buy that, you know.

Bill Gates

If you miss what's happening then the same kind of thing that happened to IBM or many other companies could happen to Microsoft very easily. So no-one's got a guaranteed position in the high technology business, and the more you think about, you know, how could we move faster, what could we do better, are there good ideas out there that we should be going beyond, it's important. And I wouldn't trade places with anyone, but the reason I like my job so much is that we have to constantly stay on top of those things.

The Windows software system that ended the alliance between Microsoft and IBM pushed Gates past all his rivals. Microsoft had been working on the software for years, but it wasn't until 1990 that they finally came up with a version that not only worked properly, it blew their rivals away and where did the idea for this software come from? Well not from Microsoft, of course. It came from the hippies at Apple. Lights! Camera! Boot up! In 1984, they made a famous TV commercial. Apple had set out to create the first user friendly PC just as IBM and Microsoft were starting to make a machine for businesses. When the TV commercial aired, Apple launched the Macintosh.

Commercial

Glorious anniversary of the information...

The computer and the commercial were aimed directly at IBM - which the kids in Cupertino thought of as Big Brother. But Apple had targeted the wrong people. It wasn't Big Brother they should have been worrying about, it was big Bill Gates.

Commercial
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Commercial
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|| History || Who Are These Nerds? || Guess the Computer || The Transcript ||
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EXHIBIT U

Many Factors Causing Cool Deskpro Reception

HOUSTON—Two months after it was introduced as their apparent to Compaq's best selling first product. Compaq's Deskpro portable computer is leaving many retailers cold.

Two of the larger computer store chains,

the 50-unit CompuShop chain and the 77 Sears Business Centers, spurned the product last week.

Future Computing, the micro market analyst based in Dallas, says fewer than 1,000 of the 8086-based machines have

been sold at retail out of the 2,000 so far shipped and that only one in six of the 1,650 Compaq dealers are carrying them.

Despite company assertions to the contrary, Compaq hasn't even shipped the Deskpro Model 4 with tape backup, according to such customers as Ray McDonald of East Brunswick, NJ. McDonald considered the Deskpro Model 4, but opted for the PC AT mainly because it was available.

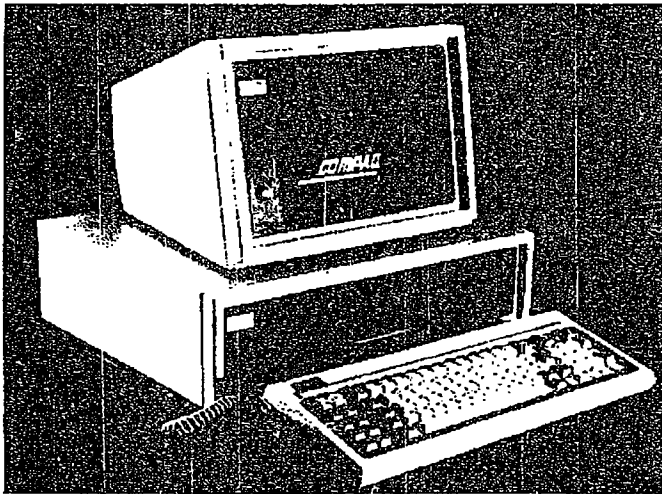
The problem, say independent retailers, including franchisees of large chains, is that the Deskpro—which they insist is a good, well designed microcomputer—lacks a niche in the market. "It was a great idea and a great machine," according to one of the largest East Coast retailers who describes himself as a Compaq supporter. "But it was too little and too late."

"It was all a matter of timing," according to a Midwestern retailer. "If we had the Deskpro say, six months ago, we could have sold it on its superior functionality," he said, pointing out the micro's speed.

Its 8086 chip and its internal clock rate of 7.1 megahertz (MHz), he said, allow the Deskpro to perform most standard operations at least twice as rapidly as the 8088-based IBM PC.

The Model 4 also contains a unique internal tape back up unit that has been widely touted as a major selling point.

(Continued on Page 97)



One retailer calls it "a great machine," but, so far, the Deskpro isn't catching on.

The Compaq Rebuttal

Compaq officials dispute this conclusion. Conceding that the company has not met its goals for manufacturing and shipping the product, a spokesman nonetheless tells of "an enthusiastic response" and of retailers who have doubled their orders.

He refused, however, to release sales or order figures, citing the short time the product has been on the market. Rebutting Future Computing's gloomy assessment, he insisted the "vast majority" of Compaq dealers carry the product.

Two of the larger chains, Businessland and Entre, have recently reordered the Deskpro, hoping word of mouth among small-business users will result in a steady stream of customers throughout the fall.

Sears, CompuShop and several independent retailers, as well as Future Computing, give several reasons the Deskpro is not doing as well as they had hoped. The importance of keeping a good relationship with Compaq, they say, compels them to remain unidentified.

PC AT, Other Competition Cited

Their reasons range from external factors (IBM's new PC AT, competition from other compatibles, hard times in computer retailing) to those having to do with Compaq itself (the machine's design and Compaq's marketing strategy). The recent introduction of the IBM PC AT, they said, dealt a heavy blow to the Deskpro.

VisiCorp-Software Arts Settlement Reached

WELLESLEY, MA—Software Arts and VisiCorp have settled out of court their legal tussle over *VisiCalc*, one of the top selling software packages for microcomputers.

Under the settlement, VisiCorp will pay Software Arts \$500,000 and will renounce the use of the *VisiCalc* trademark.

Software Arts will become the sole marketer of *VisiCalc* products and will receive all customer lists and copyrights from VisiCorp, according to Dan Bricklin, chairman of Software Arts and developer of *VisiCalc*.

Software Arts will also take over all customer-support duties from VisiCorp, Bricklin added.

VisiCorp, meanwhile, will continue to market the VisiSeries products and will remain its newer spreadsheet, *VisiOn Plan*.

"We're very glad this thing is settled, so now we can move on to other things," Bricklin said. Earlier this month, Software Arts began to ship a version of *VisiCalc* competing against VisiCorp's *FlashCalc* spreadsheet.

The imbroglio began last spring when VisiCorp, which had bought *VisiCalc* marketing rights from Software Arts, sued the company, claiming that it was tardy in upgrading the program.

Software Arts promptly countersued, claiming that VisiCorp had neglected *VisiCalc* in favor of new products. ■

COMPANY PROFILE

Microsoft Expands, Weighs Dependence Against Autonomy

By Kevin Strehlo

Last week we examined Microsoft's beginnings as a partnership between college buddies and its rise to preeminence in the world of programming languages for micros. This time it was that when a group from IBM's facility in Boca Raton began competing for the right to build Big Blue's entry into the PC arena, they approached Bill Gates to design a BASIC system for the machine. Part II of our three-part series.

BELLEVUE, WA—Bill Gates sent the Boca Raton group down to Digital Research Inc. in California after he convinced them they should build a

(Continued on Page 93)



Multiplan innovator Charles Simonyi



Microsoft president Jon Shirley

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Microsoft

(Continued from Page 89)

disk-based computer and would need a disk operating system.

The group's solid choice of CP/M for the machine began to dissolve, however, when the faction that wanted to use the Z-80 microprocessor (for which CP/M was written) lost to the adherents of Intel's new 8088 microprocessor, which would be able to run much larger and more sophisticated programs.

"Thus there was no particular reason Digital Research should have an edge, because DRI didn't have an operating system for the 8086 family yet," Gates said.

According to Gates, the issue was complicated by the changes IBM wanted made in CP/M—a more efficient file system, for example—and the need to finish the job before a deadline looming only four months ahead.

"Boca had signed up to finish the project in only 18 months, because that's what they figured they had to do in order to win the race inside IBM," Gates said. According to Gates, DRI was put off by that tight schedule and the need to violate the company's



Gates: Another 15K was no big deal.

The \$50,000 sale of what became PC-DOS may be the bargain of the century.

long-standing policy that nobody dictated changes in CP/M.

"They failed to even bid on the project," Gates said.

So Microsoft, which was already committed to putting several languages and application packages on the new machine, signed on to deliver the operating system, too.

What's Another 15K?

"We had already agreed to do about 300K of code," Gates said, "so another 15K didn't seem like a big deal."

Gates's confidence was aided by his knowledge of a CP/M-look-alike operating system for Intel's 8086 family that was being developed at a small local firm, Seattle Computing.

Gates convinced Seattle's owner, Rod Brock, to sell all rights to the partially completed operating system; Brock couldn't be told who the software was actually for because of tight IBM security.

Then Microsoft hired Seattle's operating-systems guru, Tim Patterson, to finish what he had started with a few changes to

conform to the mystery customer's specifications.

The purchase of what was to become PC-DOS and MS-DOS for a flat fee of a reported \$50,000 may have been the bargain of the century.

Although IBM also announced the forthcoming availability of Digital Research's CP/M-86 and Softech Microsystems' UCSD p-System when it introduced its PC in August of 1981, PC-DOS was priced much lower than the other two. Moreover, all the software available at in-

duction ran under it, and it was the only one of the three for which IBM had indicated it would provide further support.

PC-DOS Does It

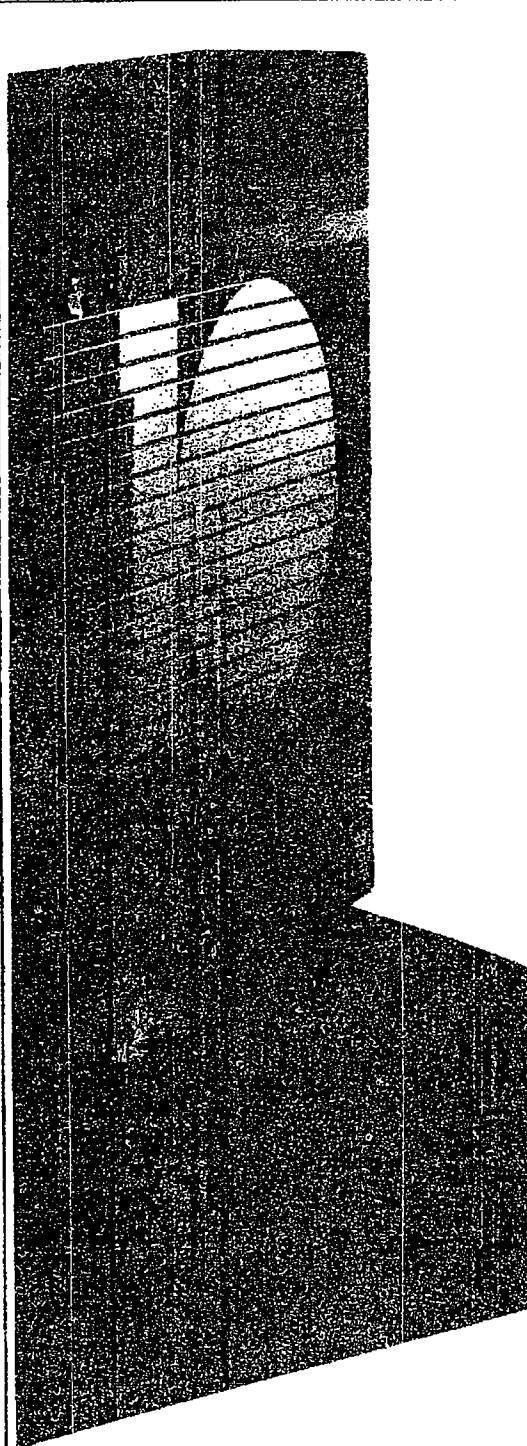
It wasn't very long before PC-DOS—along with the nearly identical operating system Microsoft sold to other manufacturers as MS-DOS—had become the operating system of choice for most software developers.

MS-DOS was actually the second operating system that Microsoft had adapted

from another company's technology, however.

Microsoft licensed the UNIX operating system from AT&T in February 1980—before IBM approached the company about its secret PC project—and began the development of Xenix.

With AT&T's campaigning so extensively for its UNIX System V as "the standard," it may be eye opening to note that Microsoft's Xenix accounts for approximately 70 percent of all UNIX systems. *(Continued on Page 94)*



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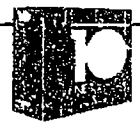
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EXHIBIT V

DOS 4.0: Time to Upgrade?

Randy Dykhuis

Several columns back, we explored reasons to upgrade your operating system when we looked at several commands that had been added to versions 3.1 and higher. In this column, we'll take a look at the latest version of DOS, DOS 4.0, and show several reasons why it might be a good time to upgrade, especially if you're still using a version previous to 3.0.

History

We'll begin with a brief history of DOS. In 1981 when IBM was ready to enter the personal computer business, they needed an operating system, the basic software that operates the computer. The company reasoned that since most of the non-Apple computers operating at that time were running on CP/M (Control Program for Microcomputers), they should talk to the man responsible for the success of the system, Gary Kildall.

The main difference between the computers running CP/M and the computer IBM had in mind was that CP/M was designed for an 8-bit processor — that is, it processed data 8 bits at a time — and the new PC from IBM used a 16-bit chip, the Intel 8088. Hence, IBM couldn't just take CP/M and install it in the new computer. They needed something new.

The story (possibly apocryphal) goes that the men from IBM made an appointment with Kildall. Back in the early days of microcomputing, IBM was considered the enemy by many computing entrepreneurs, and as the story has it, Kildall was out to show IBM that he was not going to jump when they said to.

The day the IBMers arrived, he was out flying his airplane. Instead of landing at the appointed time, he continued flying, letting his guests cool their heels for several hours. By the time he landed, the people from IBM were quite upset, and

Randy Dykhuis is with the Local Systems Office of OCLC.

Computers in Libraries

any business that may have happened between them was postponed.

At about the same time, another young man approached IBM with an offer to design an operating system for the new PC. They asked how long it would take, he told them, and the deal was struck. The young man was Bill Gates, and his company was Microsoft. Gary Kildall thumbed his nose at IBM, and in the process set up the formation of the most successful partnership in microcomputing history, that of IBM and Microsoft.

DOS 1.0

The operating system that Gates and Microsoft developed for IBM was modelled on CP/M. Microsoft had purchased the rights to the operating system that was to become DOS from a Seattle computer engineer named Tim Patterson. Patterson had developed an operating system for 16-bit computers called QDOS (for Quick and Dirty Operating System) that retained many of the basic features of CP/M. This is the programming that was later to become DOS 1.0.

Some of the most annoying aspects of DOS, such as the eight-character file name limit, the silent A>, and the lack of any confirmation upon erasing a file, are direct imports from CP/M. DOS did take some of CP/M's quirks, such as the file copying utility, and make them more logical.

DOS 1.0 was primitive. Many commands we now take for granted were absent and users were limited to disks of 320 kilobytes. It was also quite buggy, although many of the major problems were fixed with release 1.1.

DOS 2.0

Version 2.0 addressed some of the major issues confronting IBM and Microsoft as the IBM PC gained popularity. Hard disks were beginning to proliferate, and DOS had to be adapted to use them. They decided to adopt a tree-like structure, similar to the method used by another

operating system, UNIX. Each hard disk has a central or root directory and from the root shoot off other directories containing program or data files. Each of these directories may then have other directories shooting off from them — hence, the tree analogy.

Other important features introduced in DOS 2.0 included the CLS command (DOS 1.0 and 1.1 had no way to clear the screen), batch files, the PRINT command, and the ability to format and write to 360-kilobyte disks. DOS 2.0, like version 1.0, contained so many bugs that about a year later another version, 2.1, was released to fix them. DOS 2.1 was such a major upgrade from earlier versions that many people are still using it.

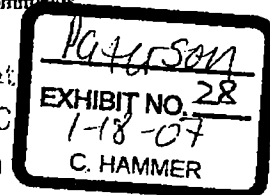
DOS 3.0

DOS 3.0 was released when IBM introduced the IBM PC/AT. The AT featured a new microprocessor, Intel's 80286, and ran at 6 megahertz. IBM sold a 20-megabyte hard drive with the computer and introduced a new floppy disk drive as well. The new floppy drive could store up to 1.2 megabytes of data. To ensure backwards compatibility, it was designed to read lower density floppies, too. To handle all the new features, Microsoft shipped DOS 3.0.

Microsoft publicly admits that DOS 3.0 was not quite ready when it was first shipped, but marketing pressures forced them to release it. For example, the new operating system was supposed to provide support for local area networks, but these features were not activated until version 3.1. In fact, Microsoft did not advertise version 3.0 as a replacement for DOS 2.1.

Versions 3.1 through 3.3 offered many enhancements that most users found tempting enough to abandon version 2.1. Improvements included new commands and utilities such as XCOPY.EXE, enhancements to BACKUP and REPLACE, better hard disk partitioning, and additional batch file commands.

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SHELLC/TRAN/COLOR/DOS/MENU/MUL/SND/MEU:SHELL.MEU/CLR:SHELL.CLR/PROMPT/MAINT/EXIT/SWAP/DATE

Figure 1

DOS 4.0

When IBM introduced DOS version 4.0, it was intended to be an interim system until OS/2 became the dominant micro-computer operating system, which was supposed to happen by 1990. Things didn't quite work out the way IBM intended, and now more and more computer manufacturers are licensing and selling DOS 4.0 with their systems.

With 4.0 came a couple of major changes. First and foremost was the ability to format hard disk partitions larger than 32 megabytes. Through version 3.3, this size limitation had been imposed because of the method DOS used to store file locations and file names. Some DOS licensees got around the limitation, but only with some nonstandard tricks. DOS 4.0 changed that. Now users can format their 40-, 60-, and 100-megabyte hard disks into one huge partition, if they desire.

The other feature that stands out is the DOS Shell. One complaint heard over and over since the early days of DOS has centered on the DOS prompt. From its inception, DOS had never featured anything other than the stark A: or C: prompt. And in the absence of anything easier, an entire industry sprang up to try to make MS-DOS comprehensible to the occasional user.

The DOS 4.0 Shell

Many of these menu programs or "shells" have become quite popular and quite adept at sheltering users from the vagaries of DOS. With DOS 4.0, Microsoft sought to introduce its own graphical interface to DOS. With the shell, you can start programs, delete or view files, and format diskettes. And you can set up the shell's interface to best suit your particular needs.

Another addition in DOS 4.0 is the Select program. Using Select, you provide information about your computer and the program configures the software to best match your hardware.

Also in Select you are given the option of installing the shell. If you do so, you will be prompted for the kind of options you wish to include. For example, you can opt for the ability to leave the shell temporarily to use the command line, or you can specify that you do not

want to be able to exit the shell at all. With this option, you need to reboot the system to get to a command prompt.

After the initial configuration, a batch file is created called DOSSHELL.BAT. If you display the contents of this file, you will see a line similar to the one in Figure 1.

Using your manual, you can decipher each of the switches. In this command, the /COLOR switch indicates that you can change colors from within the shell, /DATE that the date and time will display in the menu bar, and /TRAN that

available. From there it's easy to choose Dialog, Wilsonline, or EPIC.

After you have your programs entered and ordered, you can use the built-in File System to view files, move them, copy them, or delete them. One frustrating thing about the File System is that you cannot edit files. You either must load a word processor or go to DOS to use EDLIN. For major files, you would choose the word processor anyway, but for quick-and-dirty edits on small batch files, a built-in file editor would be a nice enhancement.

If you are using DOS 3.2 or 3.3 and you don't want the shell or are happily using another (like XTREE Pro or Norton Commander), there is no compelling reason to upgrade right now.

the shell program is cleared from memory upon exit.

Once you have the program installed, you need to tell it which programs you wish to be able to run from the shell. You do this using a pull-down menu that can be accessed using either a mouse or the keyboard and arrow keys. With a mouse, the whole process can be done by pointing, clicking, and typing in the program's name and the subdirectory in which it is located.

On the initial screen you are limited to sixteen program names. Fortunately, if you have a larger number of programs, you can combine programs that serve similar functions into a "group" — for example, if you use Crosstalk to call three or four online services and you have log-on scripts written for each service.

In each case, the command to begin Crosstalk is different. To call Dialog, you type "XTALK DIALOG," to call Wilsonline "XTALK WILSON" and so on. You may run out of room quickly on the opening screen of the shell, so you need to create a group. You may name it "Telecommunications" or "Online" or something similar.

When you choose that group, another menu appears with all the choices

The shell takes a little getting used to, but once you have learned some of the major points, it quickly becomes an effective way of using the PC. Not all DOS commands are accessible from the shell and a very experienced user may find it inhibiting. But this is the point of using a shell in the first place; experienced users can opt for the command line, while neophytes and occasional users have a visual interface that is easier to use.

No Comparison

Comparisons to the Macintosh are inevitable. In short, there aren't any. It's obvious that the DOS Shell is an attempt to place a graphical interface on a text-based system. It is not as easy as the Mac and not nearly as intuitive. With the Macintosh you have a system that was designed from the bottom up for a graphical interface, and it shows. Such is not the case with the PC, and you need to move to Windows or one of the other more sophisticated graphical interfaces before you can start to compare, on more equal footing, the PC and Macintosh interfaces.

DOS 4.0 does add a few other enhancements to some of the familiar

commands. For example, when deleting files you can now specify that you wish to confirm each deletion. When you type `DEL *.* /P`, for example, you will be asked whether each file should be erased. When using `BACKUP` you no longer need to have every floppy formatted before you begin. Using a `/F` switch, the program will detect an unformatted floppy and automatically format it.

Time to Act?

By now you may be asking yourself, "Is it worth it to upgrade?" The answer depends

on your needs. If you need a hard disk partition greater than 32 megabytes, definitely. If you want to take advantage of some of the new commands or the new DOS Shell, sure.

But if you are using DOS 3.2 or 3.3 and you don't want the shell or are happily using another (like `XTREE Pro` or `Norton Commander`), there is no compelling reason to upgrade right now. You may want to wait until the next major release. Anyone using a DOS version prior to 3.2, though, would probably benefit from the upgrade to 4.0.

Notes

1. Because each manufacturer licenses DOS from Microsoft and markets it under their own name, 4.0 is not available for every type of computer. It came bundled with the machine I recently purchased, but was not available for some of the other brands I looked at. Many are still selling version 3.3.

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EXHIBIT W

"A detailed and devastating portrait of life inside the International Business Machines Corporation—a diagnostic report on the slow decline of an American institution."

NEW YORK TIMES BOOK REVIEW

PAUL CARROLL

BIG

BLUES

The Unmaking of IBM



Parsons
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C. HAMMER

*To Kim, with love—
all ways, all days.*

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they wanted to hash through one more time whether they were violating their implicit understanding with Kildall and DRI that Gates and company would stay out of the operating system business.

Nishi suddenly jumped out of his chair and yelled, "Fuck 'em! Fuck 'em! Fuck 'em!"

They all looked at one another and decided to do an operating system.

Easier said than done. An operating system could take a year or more, yet IBM needed one in a few months. The problem resolved itself quickly when Allen heard through the grapevine in Seattle computing circles about a homegrown operating system called QDOS, which stood for "quick and dirty operating system." It turned out to borrow ideas and terms freely from DRI's operating system, but this was back in the days before some heavy-duty lawsuits made programmers more cautious about doing knockoffs of someone else's work. Allen called the software's author, Tim Paterson, and found that Microsoft could probably license QDOS from him.

When Gates told Sams he could probably provide an operating system, he explained all about it. Most people, including senior IBM executives at the time, think that Gates hid the source of the operating system from IBM to protect this precious find. But Sams denies that; he says Gates told him all about the system.

"The question was, Do you want to buy it or do you want me to buy it?" Sams says.

But Sams says IBM, having gotten bogged down in software so often in the past, wanted nothing to do with the operating system. The guiding principle of the PC project was that IBM would just pull pieces together from the outside, so he wanted Microsoft to have to worry about getting the operating system to work, about making sure the languages were nicely integrated with it, about doing upgrades of the operating system down the road, about handling customer inquiries, and so on.

"Besides," Sams now says, "if we'd bought the software, we'd have just screwed it up."

Microsoft ultimately bought the system, paying about \$75,000. IBM, in forgoing the chance to buy what became DOS, missed an opportunity that made Microsoft's value go from a pittance back then to a stock-market value of some \$27 billion today, making Gates the richest man in the United States.

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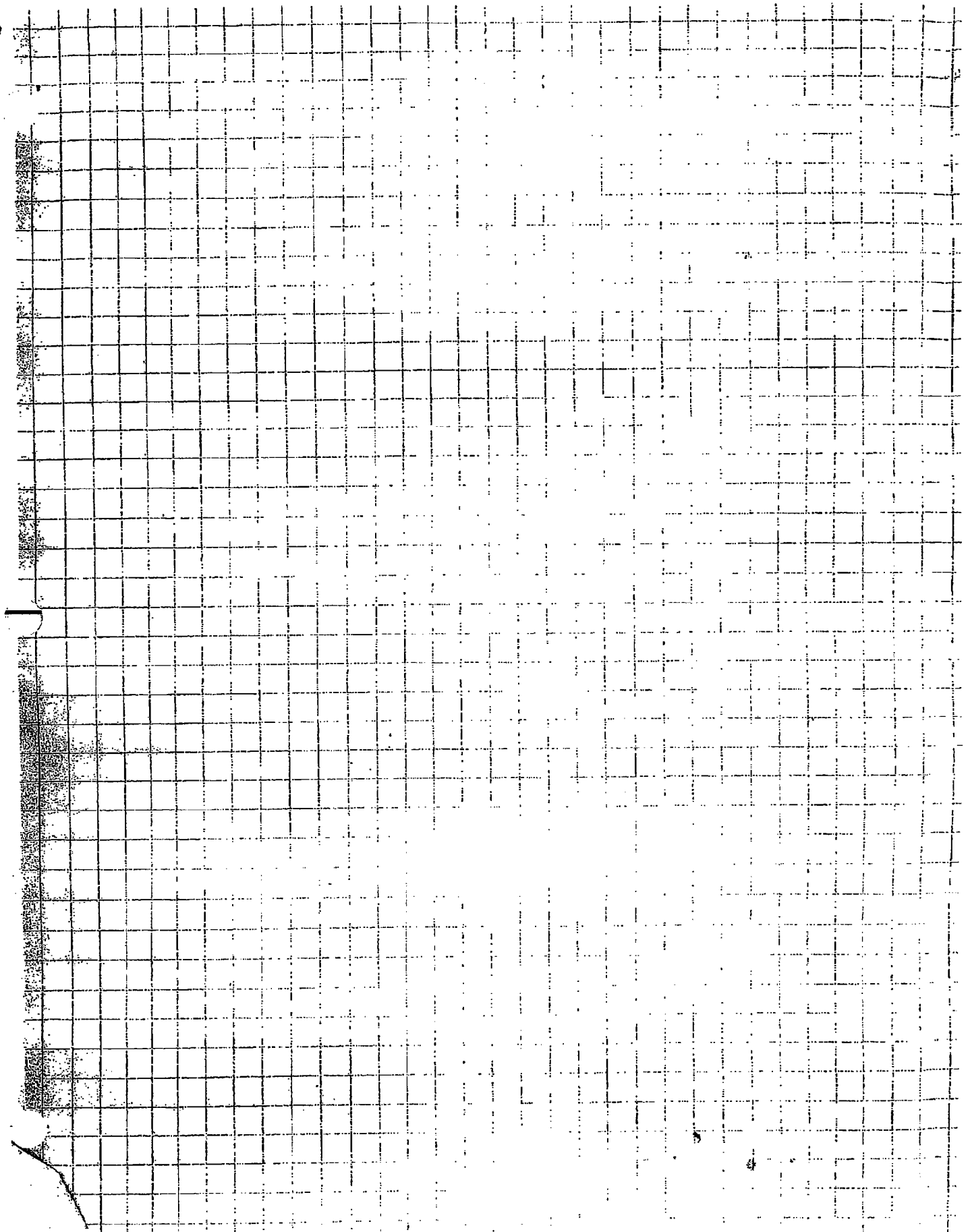


EXHIBIT X

Copyright 1994 CMP Publications, Inc.
InternetWeek

July 25, 1994

SECTION: NETWORK APPLICATIONS; Pg. 19

LENGTH: 546 words

HEADLINE: Rash's Judgment;
A REQUIEM FOR THE FATHER OF MODERN OPERATING SYSTEMS

BYLINE: Wayne Rash Jr.

BODY:

THE FIRST TIME I MET Gary Kildall, the entire world seemed to be going his way.

In those days I was a young writer for a now long-forgotten magazine called Interface Age, and he was running the most important company in those early days of small computers. Since I only asked him a single question, I'm sure he never remembered me, but I never forgot the way he changed the world.

I didn't realize it at the time, but a few months earlier he had failed to come to terms with IBM when they were looking for a new operating system for their new computer, the IBM-PC.

It was from a little company that until now had sold a version of Basic. To those of us who wrote about computers in those days, it looked a lot like CP/M, the flagship product from Kildall's company, Digital Research Inc.

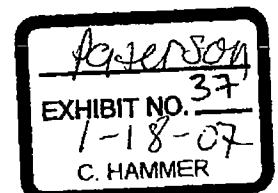
CP/M was a marvel of efficiency. It crammed the entire operating system into 6 kilobytes of memory, doing the same work in that tiny space that MS-DOS performed in four times as much. That was good, because the computer I had then was a homemade machine that used disks that held 85 kilobytes.

Total memory in that computer was 48 kilobytes, although I eventually built a memory card myself and upgraded the machine to the astonishing size of 64 kilobytes. That was enough to run WordStar and dBase II, and a number of other programs that served me for years.

It was only later that I realized the enormity of the opportunity that Kildall had missed. Digital Research did well enough, but it never compared in size to Microsoft Corp.

Kildall, meanwhile, carefully built his company on the base of its experience. CP/M became CP/M-86, and IBM eventually started selling that, too. Then it became Concurrent CP/M, and supported multitasking and multiuser operations. While MS-DOS got the headlines, CP/M in one version or another continued to sell.

It was CP/M that ran the supermarket scanners, controlled the emergency room monitors, and ran the operations of those dedicated word processors you see in the discount stores. Of course, Kildall and Digital Research kept selling consumer products, too. CP/M eventually became Concurrent DOS, and supported MS-DOS programs in a multiuser environment. Later, that platform became DR-DOS



Through all of this, Kildall remained the gentleman. He repeatedly declined to follow the advice of those who would have him act against Microsoft despite the tales that the Redmond giant had infringed his patents, or that it had borrowed a bit too heavily from CP/M's code in the beginning. Instead, he built his company quietly and steadily until one day Novell Inc. came calling. Kildall came away with \$80 million.

Over the years, any number of people have written about how Gary Kildall, who died two weeks ago at age 52, had missed his opportunity. He could have been as rich as Bill Gates, they say.

Instead, he came away with a piece of history: He built a large part of the foundation of this industry that keeps all of us employed, and that has changed the world so much.

Wayne Rash Jr. is a Washington-based networking systems integrator. He can be reached on CompuServe at 72205,221, on the Internet at RASHACCESS.DIGEX.COM and on MCI Mail at WRASH. The opinions expressed are his own.

LOAD-DATE: August 3, 1994

EXHIBIT Y

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San Jose Mercury News (California)

July 31, 1994 Sunday MORNING FINAL EDITION

SECTION: FRONT; Pg. 1A

LENGTH: 2829 words

HEADLINE: FAREWELL TO TROUBLED GENIUS KILDALL'S WORK OVERSHADOWED BY RIVAL

BYLINE: Rory J. O'Connor, Mercury News Staff Writer

BODY:

Fifteen years ago, in the salad days of the personal computer industry, anybody remotely familiar with the business could extol the virtues of Gary Kildall.

Kildall was a software genius, an inventor who created much of the foundation upon which today's personal computers are based.

In the hypergrowth of 1980s Silicon Valley, though, his technical genius couldn't compensate for his lack of business acumen. As with many of his contemporaries, his accomplishments were soon overshadowed by those of better businessmen, especially Microsoft Corp. chairman Bill Gates, and Kildall was ultimately forgotten.

He watched, tormented, as Gates became a billionaire, gained international fame and -- in Kildall's view -- stole the credit for fathering the software industry.

In the past few years, Kildall had spiraled downward into depression and alcoholism, according to friends. At age 52, he died in Monterey three weeks ago in a bizarre episode that is the subject of a police investigation, one that has garnered him more publicity in a fortnight than he had received in the last decade of his career.

Many of the circumstances of Kildall's final days remain unclear. What is certain is that he died at 9:45 p.m. July 11, three days after striking his head against the floor of the Franklin Street Bar & Grill, a tiny basement watering hole in downtown Monterey. Despite initial observation by paramedics and two separate visits to the same hospital, nobody discovered the bleeding inside his head caused by the blow -- bleeding that eventually killed him.

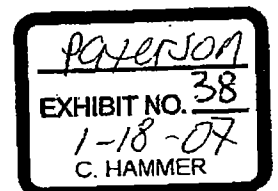
But friends and acquaintances say the real culprit in Kildall's death was his inner torment over an industry that had forgotten him, and a media that obscured his seminal role in computing.

Operating system

preceded MS-DOS

THE ONE PIECE of software that rocketed Gates and Microsoft to fame, MS-DOS, was similar to Kildall's CP/M operating system. And Gates was able to turn that into a software empire only because he cut a deal with IBM in 1980 that Kildall and his company, Digital Research Inc., bungled.

People who know both men maintain that this single deal didn't make the difference in their fates. Kildall's family and closest friends insist that, even if the IBM deal had gone Kildall's way, Kildall would not be a billionaire mogul,



nor would Gates be a forgotten man. And they're angry that, since Kildall's death, the press has focused on the deal that might have been instead of the man that was.

"I don't want this to come across as Bill Gates bashing. My dad would never be what Bill Gates became," said Kildall's son Scott, 25. "Bill Gates is an excellent businessman. My dad was an excellent inventor."

But over the ensuing years the growing public adulation of Gates embittered Kildall.

It was not because Kildall yearned for fame, nor because Kildall was jealous of Gates' vast fortune. Like Gates, who is more interested in making a mark than a fortune, money did not consume Kildall's soul.

"He was an inventor; he loved to create things," said daughter Kristin, 23. "I don't think he was ever in programming for the money. He would have done it for \$10,000 a year or \$10 million a year."

In fact Kildall was, by any measure, a wealthy man. His California estate, according to probate records, includes more than \$5 million in securities from which Kildall derived \$240,000 in annual income. Although officially a resident of Austin, Texas, he owned \$3 million in real property in California, including a sprawling, multimillion dollar home with a walk-in refrigerator and an all-glass side with a spectacular ocean view on 17 Mile Drive in Pebble Beach. In Texas, he owned a posh lakefront home where friends said he kept a stable of 14 sports cars. He was a passionate pilot who owned and flew his own Lear Jet, for which he also employed a pilot and co-pilot. When he finally sold Digital Research to Novell in 1991, he pocketed a good chunk of the \$120 million sale price.

"I think Gary suffered for many years from the problem of Bill Gates," said one close friend of Kildall, who asked not to be named. "He had a hell of a lot of frustration over all the publicity that Gates got. It's a hell of a thing to see this guy (Gates) on the cover of every business magazine (and know he's) worth \$8 billion and know that that could have been you."

In fact, Kildall had little business sense and was unashamed of it. He said in numerous interviews that he preferred tinkering with gadgets to keeping books and that he hated competition.

In that respect, Kildall was little different from most of his contemporaries in the early days of personal computing, in which machines were geared toward hobbyists and not used seriously by corporations.

"It's not fair to single Gary out," said Gordon Eubanks, chief executive of Symantec Corp., who met Kildall in 1975 and was a Digital Research vice president in the early 1980s. "Look at all the companies of that era. The only one left is Microsoft. The industry wasn't exactly full of business tycoons back then. In perspective, Gary did better than most of them."

Kildall's family and friends said he never aspired to be a businessman but loved to teach and had settled on a career as a math teacher by the time he entered college.

"He should have become a teacher," said Bob Kildall, Gary Kildall's uncle and at 73 the family patriarch. "It's what he always wanted to do."

If he had steered that course, he would have followed a family tradition.

From navigation

to computer chips

KILDALL'S FAMILY arrived in Seattle from Norway in 1883. His grandfather opened a school of navigation in 1924, and his father followed on the faculty of what the family called the "Kildall College of Nautical Knowledge."

At first, Kildall didn't seem the part. Born in 1942, he nearly flunked high school, preferring to steal hubcaps and fix up cars, friends said: first a blue 1947 Ford and, a few years later, a black 1963 Corvette Sting Ray.

He graduated with a 2.1 grade point average -- but only after repeating an English class where he sat behind a girl named Dorothy McEwen. The two became high-school sweethearts and married in 1963.

After high school, Kildall began teaching at the family school of navigation. A short time later, he enrolled at the University of Washington to study mathematics with the aim of becoming a math teacher. He quickly became seduced by some of the earliest computers and earned a doctorate at the school while tinkering with them.

Upon graduation, he entered the U.S. Naval Reserve. When offered a choice between duty in Vietnam and a post teaching computer science at the Naval Postgraduate School in Monterey, he readily chose the latter.

It was there that Kildall encountered his first computer chip and took a side job as a consultant to its inventor, Intel Corp. When Intel created a more powerful chip that could serve as the heart of a full-function computer, the 8008, Kildall got busy writing software for it.

First, he wrote a version of a programming language called PL/I. A year later, in an attempt to fashion a functional computer with one of Intel's chips, he wrote an operating system that would control the computer's main components: screen, keyboard, microprocessor and floppy disk drive.

That was the first version of CP/M, which Kildall decided to sell to other hobbyists for \$75, a new practice. Hoping to support his own computer habit with the proceeds, he and McEwen started a company in 1975 at their brown Victorian house in Pacific Grove. CP/M became a runaway success, and soon Kildall was one of the richest and best-known people in the nascent software business.

But Kildall never allowed himself to become managerial or the company bureaucratic. McEwen managed the business aspects of Digital Research; Kildall tinkered, not only writing all his own software but finding and fixing all its bugs and writing the manuals. Perennially casual, he treated employees as true colleagues, inspiring great admiration and loyalty.

One former employee, John Wharton, recalls Kildall being far more comfortable "interviewing job applicants while wearing a toga and roller skates" than dabbling in license agreements. Another, Bill Haygood, posted an on-line remembrance of the company as having "the most loyal workforce I have ever seen anywhere -- a company that allowed its people freedom to do their very best unfettered by petty rules and company policies."

But it also meant, Eubanks said, that "Gary just didn't care that much about building a business. It wasn't until the money stopped coming in that he would worry."

That nature may have left Kildall and his company unprepared to deal with the fateful meeting with IBM in 1980.

Suspicious surface

in dealings with IBM

THE BUTTON-DOWN COMPUTER GIANT, as different as could be from blue-jeans clad Digital Research, was secretly developing its own personal computer in Boca Raton, Fla. It needed an operating system. It wanted the market leader, CP/M. On short notice, it sent executives to Pacific Grove to get it.

The morning of the visit, Kildall and his director of engineering, Thomas Rolander, were flying together, some of the more than 1,000 hours the two logged together in the cockpit. As usual, McEwen was attending to the business end of the company, signing that same day a licensing deal with Hewlett-Packard that was the biggest in Digital Research history. McEwen also met with IBM.

She did not like the representatives or their terms. Kildall met with them in the afternoon but also balked at terms, which called for a flat payment instead of the standard royalties, and in which IBM insisted on a one-way secrecy deal that benefited IBM.

Besides, along with most people in the business at the time, Kildall considered IBM too staid to ever succeed in the free-spirited personal computer business. Even IBM's own aspirations then were modest, so it didn't seem worth the effort to engage in hardball negotiations.

So IBM went to Kildall's hometown of Seattle and met with Gates, whose company then existed in the shadow of Kildall's. Gates, whose sharper business sense found no downside in such a deal, promised them an operating system. He got it from a friend, Tim Patterson, who had written a program called QDOS that Kildall always believed was copied largely from CP/M.

While Patterson has strongly denied those assertions, such practices were fairly common at the time. In the early days of personal computing, there was little concept of intellectual property protection in software.

There were no software patents and little case law to help companies suing for copyright infringement, something Kildall's attorneys had urged him to do to Patterson's Seattle Computer Products.

"Gary was a very forward-looking guy," Rolander said. "He believed that by the time you litigated and went through the process, you should have been one technology ahead instead."

When Kildall discovered IBM's plans, he informed them of the source of Gates' operating system, which IBM called PC-DOS. IBM agreed to cut a deal for CP/M, too -- but forced Kildall to give up his right to sue, and priced CP/M \$200 higher than PC-DOS.

For three years or so Kildall's CP/M-86 battled in the marketplace with PC-DOS and MS-DOS, a virtual clone that Gates had, under terms of his IBM deal, kept the right to license to other manufacturers. But with IBM's brand name endorsement and Gates' aggressive business dealings, Microsoft won, and Digital Research -- and Kildall -- began a slow decline.

"There's a Kildall trait, they don't look for credit for things they've done," said Bob Kildall. "But it always bothers them if somebody else takes credit for their work."

Kildall and McEwen separated, then divorced in 1983. At the same time, he began seeing the woman who would become his second wife, Karen. The two made their home in Austin, where Kildall did pioneering work in multimedia far from the limelight that was increasingly shining on Gates.

"What happened to my father, not getting credit for what he did, I think that was very unjust," said Kristen Kildall. "He didn't express how he felt about it, and I didn't ask."

A spokeswoman for Gates said that he considered Kildall's death "unfortunate" and that Gates regarded Kildall as one of the early pioneers of the personal computer industry who deserves to be so recognized.

Most recently, Kildall was developing a prototype multimedia telephone. He completed an unpublished memoir of the personal computer industry. And he created a series of children's stories -- written and illustrated by Kildall on computers -- that involved characters based on fish.

'The Bill Gates

thing never left him'

PRIVATELY, THE GROWING CULT of Gates "ate away at him," said Tom O'Neal, a Carmel Valley photographer who became Kildall's friend while taking pictures for Digital Research in 1981. "The Bill Gates thing never left him."

Kildall's long-time drinking turned into alcoholism, although family and most friends politely but firmly refuse to discuss the subject.

"In the past few years it had gotten real difficult to communicate with him because the drinking had gotten so bad," said O'Neal. "He had gained weight big time, his face was real puffy, he just wasn't very healthy-looking at all. It was like the old Gary had died, and the demons had taken over his body."

Monterey police, citing the coroner's findings, say Kildall had suffered from the illness for some time; his heart and liver had both begun to enlarge. In April 1991, he was convicted in Monterey Municipal Court of drunken driving, according to Department of Motor Vehicle Records.

O'Neal said that the last few times the car-loving Kildall had made the trip from Pebble Beach to his Carmel Valley studio, he didn't drive: He took cabs. In April 1994, Kildall and Karen divorced, and his heavy drinking continued. It apparently helped end his life.

On July 8, a Friday night, Kildall went to dinner with a group of people, including Patricia Marra, whom police describe as Kildall's live-in girlfriend. They dined and drank at Cibo's, an upscale Italian eatery in downtown Monterey. Around 11:20 p.m., Kildall and Marra crossed the street and cut through a public parking lot to the back entrance of the Franklin Street Bar & Grill, a place frequented by locals during the week but largely by tourists on the weekend.

Police said several witnesses described Kildall as being drunk or intoxicated.

Nine minutes later -- and nobody can yet say how -- Kildall fell with a jarring thud. He lay flat on his back at the left side of the bar near a pinball machine, his head straddling tiny white hexagonal ceramic tiles and thin, dirty carpeting laid over a concrete slab.

"The waitress said she felt the floor shake," said Laura Bruno, owner of the bar said.

When fire department paramedics arrived, however, Kildall refused treatment and went home with Marra, according to police.

But by Saturday morning at 6:51, Marra summoned an ambulance to the home, and Kildall was taken to the emergency room at the Community Hospital of the Monterey Peninsula, where he was soon released.

The hospital refuses to say what care he received, and it is unclear if Kildall again refused treatment. But detective Sgt. Frank Sollecito of the Monterey Police, who is investigating the case, said that "as far as I know, no one treated his head. I don't know why the head wasn't treated."

Police say the hospital isn't under investigation.

Kildall again went home.

At memorial, tears

for pioneer, joker

ON SUNDAY AFTERNOON, he was again brought to the hospital and this time admitted. He died there at 9:45 p.m. Monday of a subdural hematoma -- bleeding under the lining between the skull and the brain. The coroner, after performing an autopsy, forwarded the case to police on July 15 for investigation.

On a hot, sunny morning four days later, a small knot of people gathered for a memorial service for Kildall in Seattle. Mostly family members and childhood friends, they sat quietly, a bit stunned, in the first few pews of Trinity Episcopal Church, an old Gothic stone building perched halfway up the hillside from which downtown Seattle was carved when his family first settled there.

They listened to eulogies for a man whom they called a pioneer, a man of responsibility and calculated risks; a practical joker whose second wife called him "the nutty professor"; a father who taught his children to water ski and constantly took them flying -- even after son Scott threw up in Kildall's prized flight bag.

They prayed. They wept.

And a scant three miles north, not far from the bridge that will take you to the lakefront property where Gates is building his new 42,000-square-foot, \$35 million home into the Lake Washington hillside, they laid his ashes to rest.

GRAPHIC: Photos (3);

PHOTO: JOHN PIERCE -- SPECIAL TO THE MERCURY NEWS

Digital Research staff gathered outside the firm's Pacific Grove building in 1981. Kildall watched, tormented, as Gates became a billionaire, gained international fame and -- in Kildall's view -- stole the credit for fathering the software industry.

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PHOTO: TOM O'NEAL -- SPECIAL TO THE MERCURY NEWS

John Rawley of Digital Research and Gary Kildall, center, with Regis McKenna in 1982.

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PHOTO: Gary Kildall died July 11 after hitting his head in a fall.

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HEADLINE: What ever happened to ... Gary Kildall? CP/M disk operating system developer

BYLINE: Veit, Stan

BODY:

On July 14, 1994, the Associated Press reported Gary Kildall's death at 52, from unknown causes. Though lately unsung, he was one of the great founders of the personal-computer world. Few of today's computer users will recognize his name or recall his inventions and their critical impact on today's DOS operating systems. His influence extends even into the realms of graphical user interfaces and CD-ROM.

The Original DOS: CP/M

Kildall invented a disk operating system called CP/M, which was the first pervasively popular operating system for PCs and represents the foundation for the PC- and MS-DOS systems created for the Intel processor platform. The programming environments he developed for CP/M permitted the creation of much early application software--even multi-user programs and desktop-publishing systems.

Some industry experts express the opinion that Kildall and his Digital Research Inc. should have raked in the billions that came to Bill Gates and Paul Allen (founders of Microsoft). But Kildall never felt that way. His interests were always aimed at the advancement of computer technology rather than in the acquisition of gobs of wealth.

He twice passed up opportunities to cash in on his genius. The first time he failed to come to terms with IBM for the use of a 16-bit version of CP/M for the new IBM PC computers. There are many variations of that story, including the one that a disinterested Kildall was out flying his plane when IBM came to discuss using his system. Another story describes how Kildall told IBM that he would do a 16-bit version of CP/M when he got around to it. Kildall laughed at both those stories.

These are the popular Kildall stories, but few people realize that he also didn't exploit his own GUI system, GEM, which he concocted while running Digital Research. Declaring that Digital Research was in the systems business rather than in application software, he allowed a team of developers to depart with the software and set up their own company--a little outfit called Aldus. This fledgling promptly sold PageMaker, which became the foundation for the entire desktop-publishing industry. Digital Research Inc., the company Kildall and his wife, Dorothy McEwen, founded in 1976, was sold to Novell in 1991 in a stock-swap deal and shortly absorbed.

Hands-on entrepreneurs like Kildall are rare in any age, and seem to becoming even more scarce now that the PC industry is maturing. With Kildall's death, one of the most exciting eras in the development of computing comes to a sad close.

An Unsung Hero



To fully understand Kildall's accomplishments, you must go back to 1972 when Kildall was retained by Intel to write software for a pioneer microprocessor, the 4004, which the company had originally built for Visicom, a calculator company. At that time, there were plenty of calculator chips, but the 4004 was different because it could be programmed to do various custom calculations. This idea quickly became popular for other applications besides calculators.

Soon, Intel decided to sell the 4004 as an all-around controller chip. Instead of building individual control circuits, you could merely program the microprocessor to do your job. In 1973, Intel designed the 8008, an improved 8-bit processor, which was the forerunner of the 8080, the 8086, and the entire Intel family of x86 microprocessors.

Soon designers started to use the 8008 for more than random logic functions. They were using it as a computer, and Kildall was hired by Intel as a consultant to write a programming language for this chip, called PL/M (Programming Language/Microcomputers). When Intel produced the second-generation 8080 processor, the microcomputer revolution truly began with the arrival of the first Altair and Imsai computers. These new machines had little memory and only one peripheral: the Teletype, which provided input/output and also served as data storage using punched paper tape.

About that time, Memorex and Shugart became involved with floppy disks--which had been developed by IBM--as a replacement for the punch card. Kildall acquired one of these drives, but couldn't find an interface that would work with a microprocessor. Even though he really didn't have enough hardware experience, he nevertheless set about building such an interface. While he was trying to manage this, Kildall wrote a disk operating system using an 8080 simulator on a mainframe. Kildall called his system Control Program/Microprocessor (CP/M). Finally, after a year, an electrical engineer friend, John Terode, built a floppy disk interface that worked with the 8080 and Kildall's CP/M. By today's standards, the original operating system was relatively small, only about 4K! However, in those days, the biggest memory systems only had about 16K.

A Self-Hewn Monument

By mid-1985, Kildall had the CP/M system going pretty well; and just in time, too, because hundreds of new personal computer owners were creating a demand for a reliable data-storage device. Imsai, one of the new S-100 bus computer manufacturers, had developed a floppy disk system but had no operating system or controller--even though they advertised an "intelligent floppy disk subsystem." Imsai had commitments to many people who had bought this product, and they were desperate. Not only did the Imsai lack an operating system and controller, but it would eat 8-inch floppies like pizzas. Kildall made a deal with them on a royalty basis of about \$30 per machine. He then ported CP/M to Imsai's floppy disk pizza eater. It was after this that he and his wife started Digital Research Inc. to market the operating system.

One problem was that each personal computer system was different and Kildall had to recode a large portion of his OS each time to accommodate the differences. To get around this, Kildall designed a software subsystem called the Basic Input/Output System or BIOS. This little number was the only part of the operating system that directly communicated with the computer's input/output devices; in fact, it still is today. Although changing the BIOS is certainly not a task for non-experts, it's still easier than rewriting the entire operating system. Once Kildall had developed his BIOS, CP/M could be adapted to any computer powered by Intel processors or the Z-80 (see below), which used a similar instruction set. The concept of a system BIOS was so handy it was quickly adopted by the PC-/MS-DOS operating systems. A BIOS is what today allows PC clones to run the same compatible software.

The world builds monuments to honor great people after their death. Kildall built his own monument: the concept of a BIOS, and it will endure as long as the computer world uses disk drives to run software.

Early Business Boom

Computer owners bought these disk systems as fast as they could. A typical 8-inch drive system and controller cost between \$800 to \$1,000, but the CP/M system to run it only cost \$75, including its six poorly written manuals. However, even with the enthusiastic attention of hobbyists, most of Digital Research's business remained with the royalty-based computer and disk-system manufacturers.

But Digital Research was never an application-software company. They sold operating systems and development languages. However, the main language used by personal computer users was Microsoft BASIC, which ran best under CP/M. Microsoft saw the growth of the Apple II (which had its own operating system and BASIC) and Bill Gates decided to go after this market.

Microsoft bought an OEM license from Digital Research and produced a plug-in adapter Z-80 CPU board, called the SoftCard. This enabled the Apple II to run Microsoft BASIC under CP/M. Soon Microsoft was selling as much CP/M as Digital Research. When IBM decided to use a non-IBM-designed operating system for their new Personal Computer, CP/M was the logical choice, but it required some major changes to run on a 16-bit processor. For one reason or another, Kildall could not come to an agreement with IBM over this modification.

CP/M-86 was chronically unready, and Kildall could not be pinned down to a fixed schedule. It's said the confusion resulted mainly from a clash of cultures, with Kildall refusing to let IBM dictate to him the terms under which they would do business. He was exactly the opposite of Big Blue's corporate man. Bearded, relaxed, dressed in jeans or slacks, he was the picture of the intelligent, independent, nonconformist. Kildall would work around the clock on something that he felt was important, but he would not allow IBM to set the terms.

Kildall's failure to come to an agreement with IBM provided an opportunity for Microsoft. To fill IBM's need, Bill Gates bought a 16-bit operating system owned by Rod Brock of the Seattle Computer Company. This was pretty much a CP/M clone, but it ran on the 16-bit 8086 CPU. Now, with both the BASIC language and the operating system IBM needed, Microsoft was able to enter into a non-exclusive agreement with the computing giant for the additional development work needed for the IBM PC.

As a token to Digital Research (and probably to preclude future litigation), IBM agreed to include DRI's CP/M-86 as an alternate operating system for the IBM PC. However, they charged \$260 for CP/M-86 and only \$60 for PC-DOS. Naturally, CP/M-86 was not a giant seller.

Introspection

In a 1988 interview about these events, Kildall said, "Well, there were at least 50 CP/M clones at the time, so it wasn't a strange thing to have someone like Seattle Computer do another. But it typically wasn't a problem because we had control of the standards. Our thousands of OEMs wouldn't deal with the clones because they wanted to make sure they had the latest versions.

"But it was a different thing when IBM came along. They could not only knock out all the OEMs, but they could redirect the standards. There was no question that PC-DOS was a functional duplicate of CP/M externally and internally. It would be a closed case nowadays, but in those days there was a more liberated atmosphere as far as what you could do with other people's concepts, especially software. You could do a knockoff word processor exactly like WordStar and nobody would say anything. It's hard to speculate, but the essential thing was that IBM didn't do anything improper. It's just the way business works.

"You take business opportunities and make the best of them. It's unfortunate sometimes, but that's the way business works. You've got to fight for every piece of ground. In reality, PC-DOS definitely stemmed from CP/M--even today it looks like CP/M. The first time I went and used PC-DOS, I did without the documentation and used it just fine. "

After the introduction of the IBM PC, Kildall and Digital Research put these events behind them and went on to develop Concurrent DOS. This was actually a multitasking system that worked fine way back in 1984 and eventually evolved into the first practical GUI system, GEM. Strangely, GEM lost out to Microsoft's Windows because it wasn't multitasking and lacked applications. Eventually Digital Research came out with and subsisted on DR DOS.

Kildall went on to pioneer in the field of multimedia; he was first with video discs and then with CD-ROM. He founded Knowledge Set, a company that exists today, providing multimedia electronic manuals for Boeing aircraft. Kildall was always on the leading edge of the computer industry. He saw far into the future and made his visions come true.

As long as people discuss the history of the personal computer, they'll be comparing Gary Kildall the inventor with Bill Gates the merchandiser. However, unlike many spectators, Kildall wasn't bitter about his situation. He always recognized that the personal-computer revolution needed both a Kildall and a Bill Gates. None of this would have happened if it hadn't been for both of them.

GRAPHIC: Photograph

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