Gary Kildall, Industry Pioneer, Dead at 52

Created First Microcomputer Languages, Disk Operating Systems

by John Wharton, Applications Research

Gary Kildall died on July 11 in Monterey, Calif., at the age of 52. He is survived by his mother, a sister, and two children.

Gary was often called a microcomputer-industry visionary. I think that sells him short. A visionary may speculate idly about the possible long-term ramifications of a technology, without doing anything to make the future happen. Gary was more of a pioneer, blazing a trail through the high-tech wilderness, marking the way for settlers of the new frontier. He was there every step of the way, conceiving the products, designing the algorithms, and debugging the code that would let the microcomputer industry reach its full potential.

Early Microcomputer Development Tools

In fact, Gary may have been the first person to appreciate just what that potential might be. At a time when Intel was positioning microprocessors as a replacement for random logic in fixed-function desk calculators, postage scales, and traffic-light controllers, it was Gary who advised Intel that these same chips were flexible enough to be programmed as general-purpose computers. At a time when microcomputer software developers were debating the merits of machine-language programming in octal vs. hex, Gary defined the first programming language and developed the first compiler specifically for microprocessors. PL/M is still widely used for developing dedicated microprocessor-based control applications.

Gary was also one of the first people to recognize that even the early, simple micros were powerful enough to support a complete minicomputer-style operating system, and proved it by creating the first microprocessor OS. This "control program and monitor" used floppy disks as a general-purpose storage medium; until then, floppy disks had been used just as a replacement for punched cards. He offered the complete package to Intel, along with an editor, assembler, linker, and loader, for $20,000. Intel turned him down, and CP/M went on to sell a quarter of a million copies and become by far the highest-volume OS of its time.

Then, as the "personal computer" paradigm was first starting to catch on, Gary saw that the true potential of PCs would lie in their connectivity, so he developed extensions to CP/M that let computers share files and peripheral devices over a network in a way that was fully transparent to applications software.

The Founding of Digital Research

You had to be around back then to appreciate the true magnitude of the contributions made by Gary and his company, Digital Research, Inc. (first called "Intergalactic Digital Research," now part of Novell). DRI introduced OSs with windowing capability, preemptive multitasking, and menu-driven user interfaces years before Microsoft did Windows. Digital Research operating systems were the first to take advantage of the 386's built-in protection mechanisms—years before Microsoft or IBM attempted the same.

Gary fostered a work environment in which good, creative people could set about the task of revolutionizing the world, and enjoy themselves in the process. He and his people implemented the first ever diskette track-buffering schemes, read-ahead algorithms, file directory caches, and RAM disk emulators for micros.

Back before the introduction of the IBM PC, CP/M supported protocols for memory allocation, file sharing, process switching, and peripheral management. When Microsoft bought the rights to an unauthorized "quick and dirty" knockoff of CP/M from Seattle Computer Products and renamed it MS-DOS, these protocols were removed, since Microsoft programmers didn't understand why they were needed. To this day, Microsoft is scrambling to retrofit DOS and Windows with capabilities it unwittingly removed when it "simplified" Gary's original design.

But perhaps Gary's most profound contribution was the first successful open-system architecture. All previous computer software had targeted specific hardware environments. Gary isolated the system-specific hardware interfaces of his OS within a set of "basic I/O system" routines, so it and all applications code would be fully machine independent. This idea created the third-party software industry by expanding the potential market several orders of magnitude.

(Microsoft lifted the term "BIOS" for MS-DOS but wrote the software to be machine-dependent anyway. Again, it wasn't until the concept of a "Hardware Abstraction Layer" was introduced for Windows NT in 1993 that Microsoft seemed to understand the point of Gary's original design.)

The list goes on. Gary developed an early microprocessor-based arcade game and the first computer-controlled interface for video disks to allow automatic nonlinear playback—the precursor to today's interactive multimedia. When audio CDs were first intro-

duced, Gary recognized their potential as a medium for high-capacity, low-cost distribution of digital data.

In fact, it was Gary who developed the file system and data structures needed for the world's first consumer CD-ROM, an electronic encyclopedia. He personally wrote the software that munged the original text database, built the cross-referenced index, and generated the final CD master. Gary also designed the user interface and wrote its hypertext-based data-retrieval engine—the first consumer software of its kind.

Ironically, many of the techniques Gary pioneered are being rediscovered now, ten years later. Apple and DEC are touting binary recompilation as a "new" technology for porting existing software to the PowerPC or Alpha architecture. Actually, DRI introduced an 8080-to-8086 binary recompiler in the early 1980s.

One of the biggest challenges facing the PC industry today is that of supporting multiple CPU architectures in a heterogeneous environment. Yet in the early '80s one could sit down at a CP/M computer, insert a floppy disk, search its directory, edit and assemble a source file, and print out a listing—all without knowing (or caring!) whether the CPU inside the computer was a Zilog Z80, Intel 8086, or Motorola 68000. If only today's systems were as consistent and simple to use!

Gary also did much to make computers accessible to the masses. Years ago, he developed a commercial version of Logo so children would be able to learn good software design methodologies from the start. Long before HyperCard, DRI software included a hypertext-based on-line help facility. And at a time when microcomputers appealed chiefly to hard-core technonerds, Gary was a host of "The Computer Chronicles," a PBS television program that is still on the air.

And yet, outside of a small circle of friends, few people seem to appreciate the scope of Gary's work. I first met Gary in 1980 at a microcomputer workshop near Monterey. I last saw him at the same workshop this past April. Gary had helped organize this conference 20 years before; to this day, it's the oldest, best, and probably least well known conference devoted to microcomputer technology and its ramifications. I think this meshed nicely with Gary's unassuming personality: work softly and do good things.

Gary's Legacy

The *San Jose Mercury News* ran a page-one obituary that began with the statement that "but for a single failed business deal [Gary] might have enjoyed the wealth and fame of Bill Gates." Again, I disagree. To receive international acclaim and obscene wealth for your work, you must first want it. That wasn't Gary; that's not what spurred him on. His early systems were developed not for their commercial potential but instead so he wouldn't have to drive from Monterey to Silicon Valley to use a client's mainframe.

The same obituary also repeated the myth about how Gary supposedly blew his chance at a slice of the PC pie by skipping a meeting with IBM to go joy-flying instead. I'm sure Gary grew weary of constantly having to answer questions about that day. Gary *did* meet with IBM that day, as scheduled, and they *did* agree to do business—yet the myth seems to reappear every time Bill Gates talks about the origins of MS-DOS.

In fact, IBM licensed *both* MS-DOS and CP/M-86 for the PC. But while DOS generally came free with every PC, CP/M-86 was sold as a $240 added-cost option, and had to be specially ordered. IBM consciously chose to kill CP/M-86, I think, precisely because it was machine independent. There was clearly a strategic advantage to IBM in promoting an OS that locked customer software into its then-proprietary hardware.

Deep down, though, I don't think Gary ever really begrudged Bill Gates his business success or his personal fortune. Before the IBM deal, the two had worked together closely. If Gary was disappointed at the way things turned out, I suspect his frustration was due to the feeling that IBM had deliberately misrepresented its OS intentions, and to the apparent willingness of the public and press to grant Gates credit for "inventing" a piece of software that he hadn't designed and did not understand.

No, Gary didn't much care about self-aggrandizement. He'd much rather play with his computers, cars, and other high-tech toys. He found a much greater thrill in designing a new program and watching it spring to life than in finding ways to undercut and outmaneuver a competitor. Gary was much more comfortable interviewing new job applicants while wearing a toga and roller skates than he was in negotiating licensing deals with a multinational corporation.

Gary was more interested in giving away free software and documentation to a junior applications engineer he'd just met than in building his own satellite-based global communications network. In the end, what I think Gary wanted most was to share his excitement and enthusiasm for computers and technology with others, and to get his ideas into the hands of as many people as possible.

There are more than 120 million PCs in the world today. All run disk-based operating systems and high-level compiled applications, and all use floppy-disk data storage. Many have menu-driven windowing systems, connect to local-area networks, and support CD-ROM-based multimedia.

Each of these systems owes a debt to Gary Kildall. Each of these capabilities originated in Gary's head. When I consider the hundreds of millions of ordinary people who benefit from Gary's inventions every day, I have to think most of his wishes have been met. ♦

