



# Book Fire in the Valley

## The Making of the Personal Computer

Paul Freiberger and Michael Swaine  
McGraw-Hill, 2000  
First Edition:1984

---

## Recommendation

Authors Paul Freiberger and Michael Swaine offer the second edition of their extremely popular 1984 chronicle of the birth of the personal computer. They recount how the PC industry began, who fueled its growth and why things happened as they did. The central stories cover the emergence of MITS, IMSAI, Apple, Tandy and Microsoft. This second edition adds the development and maturation of the hardware and software industries. Apple and Microsoft's sagas still dominate, but new stories emerge, including tales of Dell, Oracle, Netscape and the Internet. The second edition shows how the PC child has grown up. You'll see how the nerds took a hobby and reformed the world using Boolean logic, integrated circuits, motherboards and chips. *BooksInShort* recommends this book to everyone with an interest in the computer industry and particularly to those who are hungry for the real stories behind the growth of the 20th century's most pivotal industry.

## Take-Aways

- The first "thinking" machines arose from the marriage of electricity and Boolean algebra.
- Charles Babbage's analytical engine ran on electricity, though he first considered steam power.
- The Mark I computer was the first computer introduced and the first rendered obsolete by advancing technology.
- The vacuum tube ENIAC computer could process commands 1,000 times faster than computers using electrical switching relays.
- Transistors changed the computer industry, and silicon - on which transistors were made - created Silicon Valley.
- The first personal computer, the Altair 8800, was sold via mail order and delivered unassembled and without programs.
- Hobbyists developed many early computer games.
- Oracle was a CIA code name for a software project that company founder Larry Ellison helped develop.
- Hewlett-Packard senior engineers rejected the original Apple I design.
- IBM signed Microsoft to develop DOS for its new PCs after a software competitor missed a meeting.

# Summary

## Boolean Algebra, Vacuum Tubes and Steam

The question that launched the personal computer industry was, "Can a machine be programmed to think?" In 1833, British inventor Charles Babbage claimed that steam could be harnessed to run an analytical engine that could solve mathematical problems. Although Babbage never developed his concept, American logician Charles Sanders determined in 1888 that Boolean algebra could be used as a model for electrical switching circuits. Logic therefore, could be represented by electrical circuitry.

“The success of the first product in a market wasn’t always just a matter of somebody filling an existing niche first. It was sometimes a matter of creating the niche, of inventing a new kind of thing in the world.”

If logic could be applied to switching circuits, then electronic machines could be built to solve logical problems. In 1936, Benjamin Burack did just that; he built a logic machine. His machine could process statements made in the form of logical syllogisms. International Business Machines (IBM), which built non-thinking calculating machines, entered the fray at that time by giving \$500,000 to Harvard professor Howard Aiken to develop a calculating device inspired by Babbage’s analytical engine. The Mark I was introduced in 1944 to high praise, though without acknowledgement of IBM’s support. But Aiken’s device suffered from a larger problem, which would haunt the new industry: Advancing technology already was making the machine obsolete.

“Those early computer enthusiasts had no choice but to write their own software. No one imagined that anyone would actually buy software from someone else.”

By the time the Mark I was announced, electronic vacuum tubes were replacing electric switching relays in computer designs. ENIAC, introduced in 1946, was the first computer to use vacuum tube technology. The government used ENIAC, which ran 1,000 times faster than the Mark I, to perform atomic bomb testing calculations at Las Alamos. ENIAC’s builder, the Remington Typewriter Company changed its name to Sperry Univac, giving birth to the mainframe computer industry. Within 10 years, ENIAC’s Sperry Univac had competition from IBM, Control Data Corporation, Honeywell, Burroughs, General Electric, RCA and NCR. IBM would come to dominate the mainframe computer market, but computer technology was never static. By the 1960s, technological advancements created the new minicomputer market. Even as Digital Equipment Company (DEC) and Hewlett-Packard (HP) made cheaper, smaller minicomputers, newer technology always barked at their heels.

## The Transistor

Creation of the personal computer required the invention of the transistor. Vacuum tubes were large, hot and subject to burn out. Transistors were small, used less heat and, most importantly, could be integrated into a single semiconductor. These integrated circuits, or chips, were made from silicon and the area of California where they were developed and manufactured became known as Silicon Valley.

“The Apple name was actually Job’s idea. He later insisted that he picked the name at random, but it may have been inspired by either the Beatles’ record label or by Job’s experience working in apple orchards in an Oregon commune.”

Intel Development Corporation, a new Silicon Valley company, received a commission from a Japanese calculator company for a line of chips to run their calculators. Martin "Ted" Huff, Intel employee number 12, was assigned to design the new calculating chips. In 1969, Huff proposed a set of chips that included a chip that could run programs. In actuality, Huff had created the microprocessor, a computer without memory or peripherals. The chip was called the 4004 - for the number of transistors upon it. In 1971, when Intel launched the 4004 chip, it found that it needed to provide customer support. Intel assigned Adam Osborne, future developer of an eponymous portable computer, to write a documentation manual. Thus a new profession was born. At the same time, Intel hired professor Gary Kildall to write a high level implementation or programming language. The language he wrote was called PL/M (Programming Language for Microcomputers). Again, a new profession was born.

## MITS, the Altair and BASIC

In 1975, Albuquerque, New Mexico's Micro Instrumentation Telemetry Systems (MITS) became the first firm to sell a no-frills microcomputer, the Altair 8800. MITS delivered the bare bones computer with a CPU with 256 bytes of memory, but no terminal or keypad. Buyers had to assemble their own units and - to make the \$397 machines do anything - write their own programs. MITS could not produce kits fast enough to satisfy demand. When MITS began selling the Altair 8800, Bill Gates was a Harvard freshman and Paul Allen was working for Honeywell in Boston. After seeing an article on the computer in Popular Mechanics, Gates and Allen called MITS founder Ed Roberts and offered to sell him a version of BASIC customized for the Altair 8800. Roberts told the young entrepreneurs that he would buy the first version of BASIC that he saw running on an Altair. They told him they had the software. Six weeks later, after actually writing the software, they flew to Albuquerque. Before leaving Boston, they changed the name of their company from Traf-O-Data to Micro-Soft.

## **Homebrew Computer Club**

The Homebrew Computer Club began in San Francisco in 1975 as a hobbyists' exchange community. Sometimes, representatives from Intel showed up at meetings and distributed newly designed chips to club members in exchange for feedback on the chips' performance. The intellectual ferment at these meetings spawned several companies, including Processor Technology, Cromemco, North Star, Vector Graphics and Godbout. However, conversation at the meetings always returned to a discussion of the "big boys." When was IBM or some other big company going to produce a personal computer? Meanwhile, dozens of new computer-related companies emerged, including Apple Computer, Commodore, IMSAI, Digital Microsystems, Alpha Micro Systems, Heathkit and Ohio Scientific.

“Wozniak was unarguably an outstanding engineer, but he could only work on projects that interested him, and then only for as long as they interested him.”

Software also interested the Homebrewers. By necessity, the Altair 8800 had forced hobbyists to write their own programs. When a club member figured out how to play music on an Altair 8800, club members became tremendously interested in making these personal computers do something. Many turned to creating games, because making games was a good way to learn to program these machines. They developed such games as Star Trek, Breakout, Target, Adventure Land, Pirate Adventure and MicroChess, which was particularly significant because it was one of the first personal computer games sold to the general public. Peter Jennings, the owner of MicroChess, reinvested his earnings into marketing a business program developed by a new company called Personal Software. The product was VisiCalc.

## **The Rise of Software Empires**

VisiCalc made Personal Software part of the new wave of software companies that sold both to hobbyists and business owners. Two Atlanta high school friends launched Structured Systems Group to market business software for microcomputers and sold a general ledger program by mail for \$995. Eventually, the company changed its name to Peachtree Software. Another company, MicroPro, began selling SuperSort, a data sorting program, and Word-Master, a text editing program, through retailers. Following customers' requests, MicroPro created WordStar, a new word processing program that fixed the word wrapping problems in the more established word processing program, Electric Pencil. Together, Personal Software, Peachtree Software and MicroPro International created the industry standards for consumer sales of software products.

“There's money to be made in this business.”

Convinced that money could be made in software, Phillip Kahn started Borland International. Larry Ellison started SDL, which became Oracle (the CIA code name for a software project that Ellison helped develop). George Tate and Hal Lashlee founded Ashton-Tate. Gordon Eubanks founded C&E Software, which acquired Symantec and took its name. Most of these companies developed microcomputer products, although Oracle focused on the minicomputer market. Ashton-Tate's dBase was the largest cash cow with millions of users and Borland's Turbo Pascal was the fastest running program. Microsoft competed against it by launching QuickBasic, which also supported the firm's reputation in the area of programming language. The software wars were hot and heavy, and any issues that weren't decided in the marketplace were decided in the courts.

“The transistor was the technological breakthrough that made both the minicomputers of the 1960s and the personal computer revolution of the 1970s possible.”

Magazines, clubs, shows and stores emerged to distribute personal computer products and information. The earliest magazine to capture the rapture was Byte. Other successful magazines were Dr. Dobbs's Journal, Recreational Computing, Personal Computing, PC Magazine, PC World and MacWorld. The Whole Earth Software Catalog, one of the first books in the new field, received a \$1.1 million publisher's advance. On the retail side, computer stores opened, offering advice and gear. The Computer Store, first of its breed, opened in Los Angeles in 1975. Soon the Byte Shop opened and eventually national operators, such as ComputerLand and Radio Shack, entered the market with in-store computer sales people who handled branded and private label products.

"Logic, in other words, could be replaced by electrical circuitry."

Apple Hewlett-Packard was a typical Silicon Valley company. It made everything from mainframe computers to pocket calculators. But when an engineering employee presented his design for a personal computer to senior engineers to evaluate, they rejected his idea as not being an appropriate HP product. The engineer, who lacked a college degree, went back to his parent's garage to build the rejected computer - he was Steve Wozniak and it was the Apple I.

"The early purchasers of the Altair had no choice but to write their own programs."

Wozniak didn't build Apple I alone. His friend Steve Jobs, took Woz's engineering skill and pushed the business concept, selling 50 Apple I machines to the Byte Shop. Wozniak and Jobs incorporated their new company, Apple, on April 1, 1976. Their first task was to find financing to fulfill the Byte Shop's order, but they were already looking ahead to creating the Apple II. To get financing for that, Jobs sought the advice of Atari's founder Nolan Bushnell. He introduced Jobs and Wozniak to Silicon Valley venture capitalist Don Valentine, who, in turn, introduced them to retired Intel engineer Mike Markkula, who invested in the company. Apple's success opened the door to the personal computer market for software companies.

## Microsoft

A few years before the two "Steves" founded Apple Computer, Paul Allen and several of his friends were working for Computer Center Corporation. Their job was to debug DEC programs. One of Allen's friends, Bill Gates was known as the local expert at subverting computing system security. Gates took great pleasure in invading the DEC systems he and his friends were debugging. He was, in industry terms, a hacker - at 13 years old.

"The hobbyists of the day looked at their new machines and asked themselves what they could do with them. Play games, they answered."

By 1980, Allen and Gates were running Microsoft, which sold more than \$8 million of software annually and employed 32 people. Although they sold products, mostly programming languages, for all types of computers, the BASIC product written for the Altair dominated their sales. Microsoft had a problem with the Apple 6502 processor. Its software had to be translated before it could run on Apple machines; this was costly and time consuming. As Microsoft was trying to figure out what to do, it received a call from IBM.

"Instead of researching the market, the programmers simply decided at the outset, what features to put in their software."

IBM sought an operating system and other software for its new personal computers. IBM had selected two companies as potential software suppliers, Microsoft and Digital Research. When IBM representatives tried to purchase the CP/M operating system from Microsoft, they were told that the Digital Research owned the product. When they arrived for a meeting with Digital's owner, he was out flying his plane. Eventually, they met with him, but they did not agree to terms for Digital's CP/M. IBM went back to Microsoft, which negotiated to convert a local Seattle company's operating system into DOS, the operating system for IBM. Thus, Microsoft started its fast climb to the top of the software universe.

## About the Authors

**Paul Frieberger** is the co-author of *Fuzzy Logic*, winner of the 1993 Los Angeles Times Book Prize. He has written for the *San Jose Mercury News*, the *San Francisco Examiner* and National Public Radio and now works at the Interval Research Corporation in Palo Alto, California. **Michael Swaine** is editor at large for *Dr. Dobbs's Journal*. He is also a popular columnist for

print and electronic magazines in the United States, Italy and Germany and maintains *Swaine's World*, a Web site that tracks computer industry news, at [www.swaine.com](http://www.swaine.com).

---

---