# BOOK REVIEW

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Martin Campbell-Kelly and William Aspray, Computer: A History of the Information Machine (New York: Basic Books, 1996), 342 pp.. notes, bibliography, index, illustrations. ISBN 0-465-02989-2.

> Our home computer console will be used to send and receive messages—like telegrams. We could pay our bills and compute our taxes via the console. We would ask questions and receive answers from 'information banks'— automated versions of today's libraries.

The World Wide Web? America Online? The Internet? Guess again. This lyrical futurism described the "computer utility," as RAND Corporation guru Paul Baran imagined it in 1970.

"Computer utilities" were information services run from giant time-sharing mainframes. For a mere $10-20 an hour you could sit down at a terminal in a local computer center, and maybe even (gasp!) at home. Seem ridiculous? In the late 1960s, practically everybody in the industry saw these as the unstoppable wave of the future. Forget the Netscape IPO: stock shares in University Computing Company, which built major computer utilities in New York and Washington, rose 10,000 percent — from $1.50 to $155 — during 1967-68. But time-sharing stubbornly refused to "scale up" cost-effectively, and by the mid-1970s most computer utilities were dead or dying.

Forgotten episodes like these make fascinating reading of Computer: A History of the Information Machine, a welcome relief from the hype-ridden 20/20 hindsight that dominates computer history. Campbell-Kelly and Aspray hit all the high spots in this oft-told tale, from Babbage to IBM to the Internet. But their outstanding book also dredges up little-known details, corrects entrenched myths, and returns the story to its social context.

Their account covers four major periods. First come the pre-WWII precursors. In the 19th century, the word "computer" referred to clerks (mostly women) who cranked out numbers for astronomers, insurance agents, and the like. Babbage's 1840s design for an Analytical Engine — a programmable gear-based device amazingly similar in concept to modern computers — emerged from his attempt to automate this work. Babbage was first with the idea, but he never completed his machine, and his work had virtually no practical impact. Instead, the modern computer's most important precursors were office machines: punch-card tabulating equipment, typewriters, and cash registers. IBM, NCR, and other office machine companies, many with 19th-century roots, became the eventual leaders in electronic computing.

The second period began during World War II. Government-supported scientists and university-based engineers, not commercial firms, were the prime movers in developing the modern electronic stored-program digital computer. The authors debunk the seemingly immortal myth that the ENIAC was the first computer (it could not store programs internally). In 1948, Manchester University's Mark I, based on the ENIAC team's design for the ill-fated EDVAC, became the first *true* computer. In 1945-55 most research money came from the military, which wanted the machines for such purposes as nuclear weapons research, aerospace engineering, and code-breaking. Except for ENIAC engineers Eckert and Mauchly, founders of UNIVAC, few saw much commercial potential for the then unreliable and ultra-expensive (real cost: about $1 million apiece) electronic computer. Well into the 1950s, electromechanical equipment could perform most business tasks much more cheaply and practically.

In the third period, roughly 1955-1975, three main developments made computers a major commercial success. First, core memory, transistors, and ICs gradually solved the reliability and expense problems. Second, new techniques like real-time computing and time-sharing bridged the gap between expensive scientific computing and business applications, which had to meet cost-performance criteria. Real-time systems, for example, moved computing beyond batch processing — fine for scientific calculation and accounting, but not much else — to transaction processing for high-volume, time-critical operations like airline reservations. Third was software. By the late 1960s, when IBM started charging customers for its formerly "free" software, an independent industry was emerging, generating an ever-expanding menu of new applications. One 1960s surprise was the awesome difficulty of programming large systems. It was, write the authors, "the decade of the software debacle," exemplified by IBM's year-late, bug-ridden, and bad OS/360 — at $500 million, the company's largest-ever expense item.

<u>Computer</u> turns, finally, to the personal computer era. In an intriguing historical discontinuity, the origins of the PC lie not with the computer industry, but with amateur hobbyists. Although they borrowed off-the-shelf hardware, the mid-1970s idea of a private, microprocessor-based computer belonged uniquely to them. So did the crucial ultra-compact PC software. Mainstream industry simply couldn't be bothered. Thus Atari, Apple, Commodore, and their software counterparts walked into the PC world through a wide-open door. Rather than perpetuate the fawning popular hero-worship of PC pioneers, Campbell-Kelly and Aspray demonstrate that many of the industry's best-known success stories owed less to individual genius than to sheer luck and high-powered consumer marketing — the PC industry's largest single expense.

The authors might have paid more attention to things like 1950s military computerization (a huge development "push"), the antitrust lawsuits against IBM (not even mentioned), computerized control and communications (core of the modern computing paradigm), and mid-1980s office intranetworking (a major force for PC standardization and an indispensable underpinning of the World Wide Web). But these shortcomings don't diminish this remarkable, highly readable synthesis. Computer is now, hands-down, the best comprehensive history of computers in print.