

A Brief History of the Digital Computer Age

I spent my career (1959 – 2002) working in the information technology field. Here is how the “Computer Age” grew up - - Stan Gardner.

The 1950s

The first large-scale, general-purpose electronic computer was the ENIAC (Electronic Numeric Integrator And Calculator), built right after World War II in 1946. Its offspring, the UNIVAC I (UNIVersal Automatic Computer), appeared in 1951, designed for the U.S. census; it was also used prominently by CBS during the 1952 presidential election. It predicted a landslide victory for Dwight Eisenhower over Adlai Stevenson, and it was right. By the 1956 election, all networks (there were only three) had computers. IBM entered the computer business in the Fifties, and would dominate the industry later. Companies competing with IBM were Burroughs, Univac (Sperry Rand), NCR (National Cash Register), Control Data, and Honeywell. This group later became known as IBM and the B.U.N.C.H. Advances in technology gave rise to the first transistorized computers, built at the end of the 1950s, to replace vacuum tube technology.

Computer programming in the 1950s was mostly “assembly language” coding. At best, this meant using short mnemonic commands, each of which represented a single machine language instruction. At worst, programmers had to bypass the mnemonic commands and use either octal or binary commands as more direct communication with the computer. The binary number system uses only two digits, zero and one, and the octal number system uses only eight digits, zero through seven. Either number system is no fun for humans to read or write.

So assembly language mnemonic coding was preferable to that low-level numeric coding, but it was tedious, and each manufacturer’s computer had its own unique assembly language. IBM programmers came up with the idea to create a higher level programming language that would summarize many machine language commands into a single statement to make their jobs easier; the first such language was FORTRAN (FORmula TRANslator), shipped to IBM customers in 1957. FORTRAN was made for solving engineering and scientific problems; just three years later, in 1960, COBOL (COMmon Business-Oriented Language) was released to simplify commercial applications, such as accounting and sales. For the next twenty years, more programs were written in COBOL than in any other language.

The 1960s

The Sixties introduced a lot of new technology. Timesharing systems began to appear in 1961, to serve many users simultaneously. Transistors replaced vacuum tubes in computers. ASCII, short for American Standard Code for Information Interchange, was invented in 1963; computers would have a hard time communicating without it. IBM delivered the first of its System/360 product line in 1964, and led the industry with more than 70% of the world’s computers. Packet switching was invented in 1965 and became the basis for 1969’s ARPAnet – the forerunner of today’s Internet. In 1967, Doug Engelbart applied for a patent on the device that would become known as a mouse. Intel Corporation was founded in 1968 to build semiconductor memory and integrated circuits. Pioneering work on the Multics operating system early in this decade led to development in 1969 of a new operating system named in 1970 as Unix. Also released in 1970 was the first working version of the supermarket scanner.

A major software development was a computer program that would translate computer programs written in human-readable language to machine language. Such a program is called a compiler – it takes programming statements written in a high-level language such as FORTRAN and converts them to a low-level language, compiling them into an executable form.

Another major development was data base management software, which began to make organizing and interpreting large collections of information easier and more manageable.

An example of a ground-breaking integration of hardware, software, and communications was the U.S. Air Force's Satellite Control Network with satellite tracking stations around the globe. It enabled satellites to send telemetry data to a small computer at each tracking station as the satellite passed over it, and for the tracking station computer to send command data back up to the satellite telling it where to point its cameras during its next orbit. Then the tracking station computer would send its telemetry data to a central computer for consolidation with data from other tracking station computers, and get new command data back from the central computer for the next orbit.

The 1970s

The floppy disk was developed in 1971, but it was 8 inches in diameter and was used in mainframe systems – in 1976 it came out in 5.25 inch format, to be used later with personal computers. The C programming language appeared at Bell Labs in 1972, so named because its predecessor was called B. That same year, Seymour Cray founded Cray Research, which would create the world's most powerful super-computers. And the computer science lab at Xerox Corporation's Palo Alto Research Center (Parc) was developing the "Alto," generally credited as the first PC, with a graphical user interface, a mouse, a keyboard, and local removable disk drive. Bob Metcalf, then at Parc, defined the general principles of Ethernet technology in 1973.

In 1974 the Z-80 chip from Zilog Inc. came out, and Intel introduced the 8080, which was used by Micro Instrumentation Telemetry Systems (MITS) in creating the Altair – a build-it-yourself kit computer named after a planet on an episode of "Star Trek." It sold for \$400, and was so successful that two Harvard students, Paul Allen and Bill Gates, dropped out of school to develop BASIC (Beginner's All-purpose Symbolic Instruction Code) for it. Steve Jobs and Steve Wozniak completed the Apple I in 1976, and Wang Laboratories created a word processing system built on a microprocessor.

Microcomputers from several companies (Apple, Tandy, Commodore, and others) hit the market in 1977, and Digital Equipment Corp. introduced its VAX superminicomputer. Texas Instruments brought out its "Speak and Spell" in 1978, a toy that verbally asked a child to spell one of 200 words in its memory; using a keypad, the child would key in letters, and the toy would respond "Correct" or "Try again." The first truly useful software programs for PCs came out in 1979, including VisiCalc, Wordstar, and WordPerfect, and in 1980 IBM asked Microsoft to create a PC operating system for the machine that IBM was building.

Corporations became interested in "the office of the future" for perceived potential benefits, and many vendors provided word processing systems as the progenitor solution, adding on electronic filing and record management systems. Then more general-purpose PCs began superseding dedicated word processors as the preferred office electronic system, evolving into local-area networks.

The 1980s

IBM brought its personal computer to the market in 1981, along with Microsoft's PC DOS (Disk Operating System). The PC ran an Intel 8088 processor at 4.77 MHz, with up to 640 K bytes of memory and up to two 5.25-inch diskettes. That same year, Ashton-Tate shipped dBASE II, the early industry-standard database program. Then in 1982, the standards committees governing Arpanet adopted TCP/IP as the standard protocol for connecting to the network. Mitch Kapur

started Lotus Development Corporation and introduced its Lotus 1-2-3 spreadsheet program. It ran faster than its competition (primarily Dan Bricklin's VisiCalc) by writing directly to the video system, bypassing DOS, and became the market leader.

Compaq brought out its portable (28 pounds!) IBM-compatible PC in 1983. It ran all software developed for the IBM PC. Apple Computer introduced the Lisa, a PC with a graphical user interface. At \$10,000, it didn't sell well, and became a commercial flop. RadioShack delivered the TRS-80 Model 100 "book-size" computer, which weighed only four pounds and had built-in word processing. Novell introduced NetWare, a file-server network operating system.

The Bell system broke up in 1984 and AT&T tried to get into the computer business without much success. Along the way, it tried partnering with Olivetti for PCs, and acquired NCR in 1991 for minicomputers. Eventually, AT&T got out of the computer business. Meanwhile, Apple introduced the Macintosh in 1984, with the first commercially viable graphical user interface. HP brought out the LaserJet laser printer and the ThinkJet ink-jet printer. IBM created the second generation of PCs with the PC Jr. and the PC/AT. The Junior failed, but the PC/AT, with its 80286 processor, was a success. Ashton-Tate shipped dBASE III, and 2400-bps modems came out.

Cray Research introduced the Cray-2 in 1985, dubbed the world's fastest and most powerful computer. It was installed, among other locations, at a NASA facility at Moffet field in California, and the University of Minnesota Supercomputing Center, both placed on Arpanet. The first version of Microsoft Windows came out in 1985 but had little commercial success due to slow processors and the need for a mouse. But in 1987, Microsoft introduced Windows 2.0 and Excel for Windows 2.0, and IBM championed a user interface called SAA, for Systems Application Architecture, including now-familiar components like pull-down menus, pop-up dialog boxes, and context-sensitive help.

IBM came out with its AS/400 midrange computer in 1988, the same year that Motorola unveiled the 88000 RISC microprocessor chip, and Microsoft announced SQL Server. The following year, 1989, Intel released the 80486 microprocessor, and a number of manufacturers debuted portables – Compaq's 7-pound LTE/286, Toshiba's 6-pound model, Apple's Portable Mac, Poqet's 1-pound pocket-size IBM-compatible, and Grid System's laptop with touch-sensitive pad. Finally, IBM unveiled the RS/6000 RISC-based workstation line in 1990, Microsoft introduced Windows 3.0, and Arpanet was superseded by the Internet and World Wide Web.

The 1990s

Linux was started in 1991 by Linus Torvalds, a student at the University of Helsinki. He built the kernel of an operating system that contained the basic UNIX components – task-switching, a file system and device drivers. That kernel was made available for free download over the Internet and open-source software was born. Linux 1.0 was released in 1994 as a full-fledged operating system that included the kernel, networking support, hundreds of utility programs, and development tools. By the end of the decade, version 2.0 offered 64-bit processing, symmetric multiprocessing, and advanced networking capabilities.

Microsoft announced Visual BASIC for Windows at Windows World 1991. The same year, the University of Minnesota released gopher, an Internet search system, and Philip Zimmermann released Pretty Good Privacy, a free Internet encryption tool. In 1992, IBM introduced the ThinkPad, a line of notebook computers; Microsoft shipped its Access database program; and Palm Computing's first product, the Zoomer, was a flop.

The Intel Pentium processor, introduced in 1993, improved the PC's handling of speech, sound, handwriting, and photographic images. Windows NT was formally launched to provide support for Intel, RISC, and multiprocessor systems. In 1994, the Web spawned four companies that would shape its destiny for the rest of the decade: Amazon.com, RealNetworks Inc., Yahoo Inc., and Netscape. Together, these companies defined the categories that led to the Web gold rush.

Mid-decade, IBM acknowledged the Year 2000 (Y2K) problem. Microsoft's Windows 95 was released and Sun's Java programming language hit the scene. In 1996, CD-rewritable (CD-RW) technology was announced, and Microsoft announced ActiveX technologies. The next year, Microsoft released Office 97, Intel unveiled the Pentium II, and Amazon had a wildly successful initial public stock offering. And in 1998, the public became aware of "that Y2K thing." Microsoft released Windows 98.

As the decade neared its end, enormous resources were directed to the Y2K issue, and consultants fanned the panic fires as Corporate America sought to avoid a nation-wide blackout when the electronic calendars rolled over from '99 to '00. Some fears seemed well-founded; for example, many believed the embedded processors in, say, railcar switching yards and geosynchronous satellites would cease to function at midnight on December 31, 1999. Mostly, nothing happened, and the final year of the decade rolled out to a few calls of "crying wolf!"

The 2000s

The "computer age" was intensely busy in the first decade of the 21st century. wikipedia.org was founded and came online in January 2001. Dell Computers became the largest PC maker the same year, and USB 2.0 was introduced. Hewlett-Packard bought Compaq, Apple introduced the iPod, and Microsoft released Windows XP.

In April 2003, Apple opened the iTunes store. The next month, Internet site LinkedIn was launched, and later in 2003 Skype went public. The MySpace site was launched to start 2004, followed shortly by Thefacebook – later renamed Facebook. Also in 2004, Flickr began operation, as did Google's Gmail. Google then acquired Picasa. Firefox was introduced in November and IBM sold its PC business to Lenovo at yearend.

Google Maps was launched in February 2005 and YouTube came online the same month. Blu-ray technology was introduced in 2006, and Apple announced Boot Camp which allowed users to run Windows XP on Apple computers. Twitter was officially launched in July. The Nintendo Wii was released in November and Microsoft introduced Windows Vista in December.

Apple launched the iPhone in January 2007, and Amazon released the first Kindle in the U.S. in November. The Hulu website was released in March 2008, and Google introduced the first public version of Chrome in December.

Microsoft launched the Bing search engine in June 2009, and Compuserve shut down the next month. Microsoft released Windows 7 in October, and the first Barnes & Noble Nook came out in November. In January 2010, Apple introduced the iPad and tablet computing took off big-time.