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# A Look Back at the Personal Computer's First Decade—1975 to 1985

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In January 1975, a Popular Electronics magazine cover story about the $300 Altair 8800 kit by Micro Instrumentation and Telemetry officially gave birth to the personal computer (PC) industry. It came with two boards and slots for 16 more in the open chassis. One board held the Intel 8080 processor chip and the other held 256 bytes. Other PC kit companies included IMSAI, Cromemco, Heathkit, and Southwest Technical Products.

During that same year, Steve Jobs and Steve Wozniak created the 4K Apple I based on the 6502 processor chips. The two Steves added color and redesign to come up with the venerable Apple II. Equipped with VisiCalc, the first PC spreadsheet program, the Apple II got a lot of people thinking about PCs as business tools. This model had a built-in keyboard, a graphics display, and eight expansion slots. It sold for $1,298.

Meanwhile, Commodore introduced the PET PC based on the same processor chip. Radio Shack joined the PC ranks with its $998 4K TRS-80 Model 1, based on the Zilog Z80 chip. These PCs dominated the market because they were completely assembled and had wider distribution than the kit PC's. However, these early PC's relied on ordinary audio cassette recorder for storing files. Loading and saving programs and data files was slow and some times unreliable.

In 1979, the Radio Shack Model II hit the market sporting a bulky 8-inch floppy disk drive with an option to get bulky expansion bays to house three additional drives. The Model II didn't have the customary BASIC-in-ROM, thereby giving it an uninterrupted 64K memory space. The machine read BASIC off the disk. The Model II signaled the beginning of the business PC.

In May 1980, Apple Computer made a direct assault on the business market with the unveiling of the much awaited Apple III. Priced between $4,300 and $7,800, the new machine had a staggering 128K RAM, and a full 80 characteristics across by 24-line screen. The Apple III used the 6502 chip, which had an addressing capability of 64K RAM. It got around the addressing limitation by mapping pieces of the full 128K memory into the addressable 64K space. This technique became an early sign of pressure from even better programs and operating systems (OS's) to access more memory and to go beyond the shortcoming of the early eight-bit processor chips.

In late 1980, Adam Osborne, founder of Osborne Computer, jolted the business market with a machine resembling a World War II battlefield communications pack. Called the Osborne I, this first self-contained portable PC had 64K RAM, two floppy disk drives with 100K storage capacity each, a keyboard, and a five-inch monitor, which showed 24 lines by 52 characters. The unit weighed 23 pounds. The $1,795 price included $1,500 of free software, such as WordStar, SuperCalc, BASIC, and a host of utilities. The Osborne I sold briskly until the company announced its next version. With a huge inventory of Osborne I's, the company found itself with everyone waiting for the new version.

In the Spring of 1981, Xerox hit the high-end business market with its Xerox Star and the low-end business market with the Xerox 820 PC. Two features from Xerox's Palo Alto Research Center made the Star the star of the National Computer Conference—the mouse as an input device and the desktop graphical user interface with icons. However, this Star cost $50,000. Meanwhile, the 820 housed a plain vanilla Z80-based system with two floppies. However, both of Xerox's entries had poor sales.

IBM, the world's largest computer company, in August 1981 changed the entire direction of the PC industry. Until now, the PC had been the domain of hobbyists and technology hackers. However, the introduction of the IBM PC, along with Lotus Development's spreadsheet program Lotus 1-2-3, made it fashionable for everyone from doctors to major corporations to use PCs. The IBM PC didn't offer anything revolutionary. Starting at $1,565, it had 16K RAM,

## PC TRIVIA

- Bill Gates and Paul Allen wrote the first Microsoft BASIC for the Altair 8800.
- Steve Wozniak hand-built the first Apple from $20 worth of parts. In 1985, 200 Apple II's sold every five minutes.
- Initial press photo for the IBM PC showed two kids sprawled on the living room carpet playing games. The ad was quickly changed to one appropriate for corporate America.
- In 1982, Time magazine's annual Man of the Year cover didn't go to a political figure or a celebrity, but a faceless man sitting at a personal computer. The PC had arrived.

BASIC-in-ROM PC, a color monitor and a cassette recorder. An Apple newspaper ad welcomed the new competitor.

The high-end IBM PC model became a huge hit with the business market. The $4,085 model included 64K RAM, one floppy disk with a 100K capacity, and an 80-character-per-second dot matrix printer. IBM broke new ground by using the 16-bit Intel 8088 processor chip, which was faster than the eight-bit chips primarily used in competitors' machines.

IBM's licensing of the PC's open architecture to other manufacturers gave way to the IBM-clone or look-alike marketplace. By 1982, a new crop of companies, such as Leading Edge Computer, started to produce IBM-compatibles consisting of an 8080 or an 8086 processor chip, a minimum of 64K, and with two floppy disks.

Meanwhile, Radio Shack, now calling itself Tandy, announced the debut of the TRS-80 Model 16, which was based on the Motorola 68000 and designed as a multi-user system (three users at a time). The system was one of the first to run Xenix, an operating system based on the popular Unix minicomputer OS. Whether this machine sold or not, it enabled Radio Shack to appear serious about being in business for business.

In mid-1982, Digital Equipment Corporation (DEC), the leading minicomputer manufacturer, declared its long-awaited PC entries. However, DEC could not duplicate its minicomputer success with this new marketplace. The DEC Pro350 was based on a proprietary DEC chip that was different from either the Intel 8088/8086 and the Motorola 68000. As a result, software developers had trouble porting their applications from IBM or Apple PC's to this DEC machine. On the other hand, the IBM-compatible DEC Rainbow ran software written for the IBM PC, thus making it a salable machine. However, DEC made a gallant, but ill-fated corporate effort to market the Rainbow.

During 1982, Apple revived its Apple II as the IIe workhorse. The company also made a serious stab at the business market with the introduction of the $10,000 LISA, which turned out to be a lemon. It used a Xerox Star-look-alike mouse and a GUI with icons, and had a 5 million-byte hard drive. However, the gluttonous LISA software ate up 2.25 million bytes of drive space. The system also strained the 68000 processors. Apple's strict guidelines for developing LISA software turned off third-party developers.

The acceptance of the Osborne I had triggered a fascination with the notion of portable computing, and the emergence of several new portable PC players. GRID Computer stalked out the end high with its $8,150 Compass PC, packed with an 8087 math coprocessor chip, orange plasma display, and bubble memory. Although the metal case helped to dissipate the heat, the PC ran so hot you could fry an egg on it.

The arrival of the $3,000 Compaq weighed 28 lbs. and tilted reviewers toward words such as transportable or luggable. However, the Compaq also crystallized the issue of true compatibility with the IBM PC. Up to this point, anyone hawking a floppy disk PC with an 8088 chip in it claimed it was IBM-compatible. Compaq refined the terminology. It achieved as close to 100 percent compatibility without treading on patents or copyrights.

By Spring 1983, other new portable PC vendors included Kaypro, Otrona, Epson, and Radio Shack. Meanwhile, IBM added a 10 million-byte hard disk to its PC and dubbed the combination the PC/XT.

The summer of 1983 triggered the PC shakeout with many companies, such as Osborne, declaring bankruptcy or closing their doors. Established computer companies continued to try their hand at the PC-compatible market. In late 1983, Hewlett Packard announced its HP150 PC, a $4,000 machine with a touch-screen and the new 3.5-inch, hard cased floppy disk.

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The second event since the IBM PC to put a big dent in the PC industry came in early 1984 with the announcement of the Apple's Macintosh for $2,495. It was Apple's third serious assault on serious business users. It had a high-resolution monochrome display, a Xerox Star look-alike mouse and Xerox Star GUI and icons. It was the LISA done right. Apple supplied two applications: MacWrite and MacPaint. Apple had cajoled more third parties into porting their products to the Mac. Based on a Motorola 16-bit 68000 microprocessor, the Mac struggled with 128K and a slow floppy, but a lot of people believed that in time this machine would prevail.

IBM followed the Apple Mac event with the PC/AT, which packed twice the speed of the PC/XT. Based on an Intel 80286 processor, the new machine had the potential to address up to 16 million bytes of RAM memory. Unfortunately, no OS at the time could tap the power of the new chip running at 6 MHz. The AT remained just a faster version of the IBM PC.

Apple started 1985 by promoting the Macintosh Office with AppleTalk, a low-cost local area network for connecting Macs, hard drives, and printers; and the Apple LaserWriter, a high quality laser printer capable of 300 dots per inch resolution. The $7,000 printer contained a 68000 processor and more memory than the Macintosh, which

## COMPUTERS ARE A THORN IN CHARLIE'S CROWN

In November, 1984, UPI reported that Prince Charles, heir to the British throne, had a nagging fear of PC's—his sons would know more about them than he ever would. While touring a computer plant that year in Scotland, the prince confessed that he was totally ignorant about PC's. He told workers that he didn't understand a single word that anybody was saying. He said he expected an instant generation gap would develop when his sons started school.

## THE PENTIUM PACKS POWER FOR FUTURE PC'S

In the late 1980's, the IBM 386 models took a backseat to the faster Intel 80486 with its integrated floating point unit (FPU) to speed complex math calculations. However, in the early 1990's, Intel's Pentium swept through the PC industry faster than any of Intel's previous chips. The Pentium specifically introduced the next leap forward in the X86 micro architecture—superscaler pipelines. They allowed a processor to execute more than one instruction per clock cycle. As a result, the Pentium could have a one GHz three-way superscaler processor executing, in theory, three billion instructions per second. Skeptics said a complex instruction set architecture—one which uses micro code to execute very comprehensive instructions—could not do this. The Pentium proved them wrong.

The Pentium did have one flaw. In 1994, the media had a field day reporting an error in the Pentium's ability to divide. Like the 486, Pentium chips included an FPU to speed math calculations. Programs that used FPUs needed to tell the chip how to divide them using integer arithmetic. The Pentium included these instructions in the chip itself in their FPUs. This technique made the Pentium more complex and expensive than its predecessors.

Many software programs, including those with floating-point numbers, were not written to take advantage of an FPU. As a result, these programs didn't show the error. Most people never experienced a problem.

On the other hand, the Pentiums Intel manufactured for almost a year had this problem. When it finally accepted responsibility for the problem, Intel said it would replace Pentium chips for those who could explain their need for accurate calculations. Everyone decided they fell into this group. Intel finally relented and gave away free replacement Pentiums for any owner who asked for one. The rest is history.

now routinely sold in a 512K configuration. The computer-hidden-in-a-printer brought the PC debut of the PostScript page-layout programming language. Apple happily discovered that it dominated the burgeoning, even if brand new, desktop publishing market. This was Apple's fourth serious assault on business users. In fact, Apple used the word Office in its advertising campaigns so there would no mistaking where this system fit.

Later that year, AT&T responded to the marketplace by introducing the AT&T Unix PC. The $5,590 model had a 10-million byte hard disk, and the $6,590 version, a 20-million byte hard disk. Both models had a Motorola 68010 processor, keyboard, mouse, one million bytes of memory, a built-in 300/1200 baud modem and provision for both voice and data telephone line hookups. True to its name, the AT&T machines ran Unix, and not programs written for the IBM PC. However, AT&T's machines became a jumping off point for widespread adoption of Unix as a PC OS. Unfortunately, many Unix PC users wanted to run DOS programs.

DEC reintroduced its IBM-compatible Rainbow, having spiffed it up to 640K with a 10-million byte hard disk. DEC proclaimed death to stand-alone office PC's with the announcement of the Rainbow's $295 DECnet option, connecting Rainbows to networks and to DEC's VAX minicomputers.

Major software vendors, such as Lotus and Microsoft, teamed with Intel to proclaim an expanded memory standard to boost accessible memory on the IBM PC from its then maximum 640k to eight million bytes of RAM. A number of top selling software packages could now take advantage of the potential new expanses of the IBM PC's memory.

Meanwhile, during 1985, a flood of IBM AT compatibles hit the market. Compaq showed an AT compatible version of its Portable, as well as a desk-bound version. NCR appeared with its PC-compatible Personal Computer Model 4, while AT&T introduced its PC-6300.

By the end of 1985, Data General had finally made a PC-compatible announcement. However, the DG/One had a hard-to-read 25 line by 80 character LCD display.

Apple's Macintosh Plus was firmly in place in mid-year 1986. It doubled RAM memory to one million bytes and also doubled the disk capacity to 800K. A SCSI port added to the Mac's back vastly simplified connecting third-party hard disks and peripherals.

The year also showed a torrent of laptop PC's. Toshiba took first place with its T3100 Plus computer in the battery-operated category at the Spring Comdex show. This AT-compatible laptop cost $4,500, had a plasma screen, and a 10-million byte hard drive.

Later that year, Compaq became the first major computer company to present a machine based on the Intel 80386 chip. To most, the 32-bit 386 processor chip was the chip of the future, along with Motorola's 68020. The 386, with its multitasking capabilities, allowed Windows to do more than one function at a time.

The problem remained that hardware had raced ahead of software. No software could exploit the power of the 386's antecedent—the 286—let alone any software for the 386 itself. The 286 in the IBM AT and in AT-compatibles turned out to be just a faster 8086 chip. For quite some time, the 386 was destined to be the same—just a faster, faster 8086 chip.

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The pace of computer technology from 1975 to 1985 had been furious. Computers' base memory had increased 1,000 fold from a puny 250 bytes to a routine 256K. Ergonomic keyboards and high-resolution video displays had become standard. For many computer companies, the price of progress had been huge, if not fatal.

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