Greatest Hits from The Computer Museum History Center
Gwen's Cut 4-17-00

CDC 6600 - S/N 1 (1964)
Core plane: 48K capacity.

The first successful supercomputer, the CDC 6600 was built under contract to Lawrence Livermore. Multiple arithmetic and logical units and ten peripheral processors, which were small computers themselves, made the 6600 a very powerful and fast computer.

Alternate text: Designed by Seymour Cray and introduced in 1964. It used a 60-bit word length and was the fastest machine in the world for about the next five years, even at 3 MIPS. The machine introduced multiple functional units running in parallel, a pure load-store architecture, and peripheral I/O processors. Five years later, Cray designed the follow-on machine, the CDC 7600.

Production run: 100 machines. Several minor variants in which quantity and distribution of Execution and I/O Units was modified... variations on a theme.

Facts from Murray, Charles, J., "The Supermen," John Wiley & Sons.:

6600 MTBF: 9 hours

Cray-1A (1976)
The Cray-1A was the first machine produced by Seymour Cray's new company--Cray Research Inc--founded in 1972 after he left Control Data Corporation. It was the fastest computer in the world for at least the next five years and its unique styling made it an icon of supercomputer power to expert and laypeople alike. The machine is wired almost completely by hand, uses a Freon cooling system, and cost upwards of $100,000 a month to operate. It also required its own mainframe computer system and dozens of very high speed hard disk drives to keep it operating at maximum efficiency. Power supplies for the computer are located under the circular bench that surrounds it.

This item comprises seven (7) pieces:

A: CPU
B, C, D, E: Power supply cover panel removed for replacement by clear plexiglass equivalent--allowing see-through exhibition of power supply.
F, G: Seat covers (Naugahyde) removed for plexiglass replacement as described above.

ENIGMA (Wehrmacht) (1943)

Interface Message Processor - IMP (1969)
Designed by the creators of the ARPANET- a community of academic institutions engaged in advanced research in computer science and technology- the IMP is a Honeywell 516 with a 16-bit word and has the capability to connect to 4 to 6 links.

Apollo Guidance Computer (1961)
See TCM Report and http://www.nasm.edu/nasm/dsh/artifacts/GC-ApolloDSKY.htm

Sun-1 Workstation (1982)

The first commercial product from fledgling Sun Computer Systems. This machine, based on the Motorola 68000 CPU, was tailored for UNIX and C programming. It was the first in a long line of the new computer category of 'workstation' emerging in the early 1980s.

Apple-1 (1975)
The "production prototype" that introduced the microcomputer to the world, the Apple-1 was designed by Steve Wozniak as a "way of showing off" to his friends at the Homebrew Computer Club. For $666.66, the buyer received the blank Printed Circuit Board shown here, a bag of parts, and a 16 page assembly manual. When The Byte Shop in Mountain View ordered 50 of these, Wozniak and a friend, Steve Jobs, went into small-scale production. Based on the success of the Apple-1's sales, the attracted financing and started Apple Computer.

Gene Amdahl / University of Wisconsin WISC (1953)
The WISC, or Wisconsin Integrally Synchronized Computer, was Gene Amdahl's Ph.D. project. The "integral synchronization" referred to the WISC's ability to execute four instructions at once (it was thus "superscalar"). It used 1,446 vacuum tubes, had a 50-bit word length, and a 1Kword magnetic drum memory. The WISC's clock rate was 100kHz.

Bill Gates, Altair BASIC Paper Tape (1976)
The Altair 8800 kit was introduced as the cover story on the January 1975 edition of Popular Electronics. Though 'home-brew' experimental systems exsisted well before the Altair, none had the Altair's wide-reaching popularity. Word length: 8 bits. CPU Circuitry: Intel 8080. Prymary Memory: 256 Bytes. Price: $ 397. The Altair inspired Bill Gates, then at Harvard University, to write a BASIC assembler so that users could easily program the machine. This was the start of Microsoft. MITS was sold to Pertec and the Altair line ceased production shortly thereafter.

Complete Hewlett-Packard calculator collection

Xerox PARC Alto (1972)
In the late 60's Xerox was alarmed at competition from Japan and wanted to diversify out of copiers. They established the Palo Alto Research Center in 1969 to develop "office of the future" technology. They hired the best and brightest computer scientists from Stanford, UC Berekely, and around the world. They practiced "experimental" computer science by building real systems instead of just theorizing about them.

The ultimate vision, promoted by Alan Kay, was of a notebook-sized Dynabook which would accept and produce thousands of page-equivalents of information faster then our senses could use them. Not practical to build then, they began to implement "interim" Dynabooks.

In 1972 they began work on the Alto desktop computer which prototyped the graphical user interface that we all use today. It was based on a special monitor that could display an 8½ x 11 sheet of "paper". Unlike terminals of the day, it used proportionally-spaced characters that looked like they had been typeset. The Alto had a mouse (invented earlier by Doug Englebart at SRI in 1965), and the now-familiar desktop environment of icons, folders, and documents. Just like a Mac or Windows-based PC, but in 1975 before there were any personal computers! And on a machine with only 128K bytes of memory. As part of that project they also invented Ethernet networking to connect the Altos together to build a distributed system that shared information and resources like printers. The had 150 of them at PARC, making it the most advanced personal computer lab in the world.

Xerox commercialized successors to the Alto as the "Star 8010 workstation" in 1981. But whereas Xerox had gotten almost everything right technically, it got almost everything wrong in marketing (especially: too expensive), and the Star turned out to be one of the biggest product disappointments of the decade.

But although Xerox was "Fumbling the Future" (cf book of the same name), the Alto/Star provided the vision for what would come. Steve Jobs visited PARC in 1979 ("Why aren't you marketing this – you could blow everybody away!") and returned convinced that the next computer (after the Apple II) would have to be like what he had just seen. And it was.

Xerox Dover Printer facts
Prior to the 1970's, computer printers were fixed-width character printers that could do very little graphics. Xerox was a copier company making machines that could print any kind of graphics, and they were designing graphic computers at PARC, so it would seem a natural to marry the two technologies. Xerox corporate in Connecticut was sceptical, but it could always be justified to them as a "remote copier" sort of like a fax.

In 1974 Gary Starkweather at the Xerox Palo Alto Research Center took a Xerox 3600 copier apart and designed a computer-controlled laser scanner to write images on the drum instead of optically copying from a page placed on the glass. Based on the lastest in copier technology, it was even fast and detailed compared to today's laser printers (1 page/second and 500 dots/inch). About 50 copies of a slightly cheaper version called "Dover" (384 dots/inch) were made and widely distributed.

Although Xerox was never successful with the PARC-developed personal computers, the Xerox 9700 computer printer based on Starkweather's work was a commercial success as a large-computer or shared printer. The small printer market eventually went to HP and the Japanese copier companies.

Xerox PARC Dover Laser Printer prototype (1978)
This is the world's first laser printer. Developed at Xerox PARC in 1978, the laser printer began as an experimental project led by PARC physicist Gary Starkweather. It used a modified Xerox photocopier with a scanning laser engine of Starkweather's design and immediately proved to be highly reliable and capable of high quality output. The original laser engine has since been dramatically reduced in size and cost but the operational principles of all laser printers began with this prototype.

SRI Mobile Van (1977)
On November 22, 1977, from this van, TCP was first used to connect a terminal to a host through three dissimlar packet networks. The terminal was radio-based and mobile. Because of the local packet radio network and TCP, the terminal was able to move throughout the [San Francisco] Bay Area while maintaining a reliable connection. The actual packet route, together with equipment similar to that used, is shown inside the van.

In November 1976, a file describing progress on DARPA's Packet Radio Project was dispatched via a TCP connection to several ARPAnet sirtes from the SRI van located at a "remote" location. That location was the Apline Inn in Portola Valley, better known locally as Rosotti's. At that time, there were perhaps three or four ARPANet TENEX hosts running a TCP server. This colorful event was staged in recognition of this Internet capability.

France Telecom Minitel (1981)

MITS Altair 8800 (1976)
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MITS was sold to Pertec and the Altair line did not last long.

Exhibit label: The Altair 8800 is commonly thought of as the first successful "personal computer" or "PC." Ed Roberts, the creator os the machine, coined the term; he saw the personal computer as distinct from hobby machines, development systems, and industrial machines in that the PC would run programs designed for larger computers while remaining affordable and retaining a conventional console interface.

Roberts' company, MITS, built calculators and terminal systems throughout the early 1970s, but "when we found out about the Intel 8080 in late 1973, we started design on the Altair, which was finished in the summer of 1974." Initially, programs had to be entered a line at a time with the switches on the front panel. Soon, MITS and other manufactureres were offering expansion memory boards, and the 4K BASIC interpreter written by Bill Gates and Paul Allen (original paper tape on display at The Computer Museum) became a standard.

The demand for the $395.00 machine exceeded MITS' wildest expectations. More machines were sold in the first day (through a Popular Eletcronics cover story) than the company expected to sell during the entire lifetime of the product. Roberts point out that the Altair increased the installed base of computers by 1% each month during 1975-76. The company was eventually superceded by other, more powerful and felxible computers, but MITS' marketing sytle, relying on trade shows, hobby and user magazines, and add-on and software options, survives.

USAF SAGE (1961)

News of the Russian A-bomb in August 1949 created awaremess that we needed a system for information processing of air defense radar to detect attacks from over the north pole. Conventional radar detection plotted on manual boards was too slow to keep up with a enemy attack using supersonic bombers.

SAGE (Semi-Automatic Ground Environment) was a huge computer installation designed to detect and track all aircraft, match against known friendly scheduled or military activity, and identify hostile tracks. It could then assign and guide manned interceptors or missles. Communications with ground and shipboard radar, weather stations, air traffic schedules, and other SAGEs were over phone lines, for which modems were invented. Operators used a "light gun" the way we use the mouse, in blue-lit dim rooms with built-in cigarette lighters and ashtrays in the console. Housed in windowless four-story blockhouses with blast-resistant walls.

Whirlwind had been designed by Jay Forrester at MIT Lincoln Labs for the Navy, and was transformed into the AN/FSQ-7 for SAGE. It was a military-industrial collaboration: IBM for the hardware, System Development Corporation (a RAND spinoff) for the software (1800 programmer-years!), Burroughs for radar detection equipment, and Western Electric for buildings, communications, testing, and project management.

SAGE becomes 23 centers, with duplexed computers (live/standby), each with 49,000 tubes, 250 tons, and using the newly-invented core memory and magnetic drums. Largest computer ever in 1958, with the most complex software (250K lines). Even with vacuum tubes, it was reliable! (Pluggable units, lots of preventive maintenance and early replacement.) First operation in 1958 and fully deployed by 1963 for $8B, it lasted until the early 80's

The military effectiveness of SAGE was questionable, especially after ICBMs were deployed in the mid 60's. The real contribution of SAGE was not to military defense, but the technological spinoff to civilian computing. TJ Watson Jr: "It was the Cold War that helped IBM make itself the king of the computer business".

One spinoff was the airline reservation system: SABRE (Semi-Automatic Business-Research Environment). Conceived in '57 by AA and IBM, spec'ed by '60, and operational by '64 on duplexed 7090's. 1000 agents, 10M reservations/year, 3 second transaction times.

Steve Wozniak "Blue Box" (1972)
See The Computer Museum Report, Fall 1986, page 4-5.

NEC NEAC Computer (1960)
A very important and useful historical source is in the Accession Folder and entitled: " A Summary Report of NEAC 2203."

Original Newell Teapot (1974)
Original white porcelain teapot on which the widely distributed teapot data set is based. The teapot has frequently been used to test techniques of rendering three-dimensional objects using computer graphics. Teapots rendered as a wire frame outline- Warnock- Gouraud and Phong shaded have been published as well as many versions withsimulated reflections of an environment- and shape distortions. The frequency of use of the teapot as a test object in computer graphics has given it the status of a benchmark.Data for the teapot created and input by Martin Newell- 1974- University of Utah- Salt Lake City.