Computer History Museum

Volunteer Information Exchange

Sharing what we know with those we know

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Contribute To The VIE

When someone like Steve Jobs dies, there is so much to say, and so many people saying it, that it seems not be my place to try to add, except to say that he will be missed.

Many thanks to the several folks who responded to the ILLIAC articles. This issue features the IBM SSEC. If you have stories about it, please share them with us.

Do you have a favorite artifact, one that you know a great deal about? One that you know a great story about? Help us ensure that all those stories are passed along. Share your knowledge by contributing to the VIE.

Jim Strickland jlstrick@aol.com

Questions

These questions need your answers

Q: The Hollerith sorter has 26 slots. 24 of those are under control of the tabulator. Two have manual handles, and are not controlled by the tabulator. Tim Robinson asks, “Does anyone know what those two manually operated slots would have been for?”

Q: I know that when Xerox PARC gave extensive demos of the Alto computer, windows user interface, etc. to Xerox executives in Rochester, NY, the execs were not impressed, but (some of) their wives were. My question is: I heard that one of those wives later started a high tech company. Who, what company, was it successful, and did they use anything from PARC?

Kim Harris

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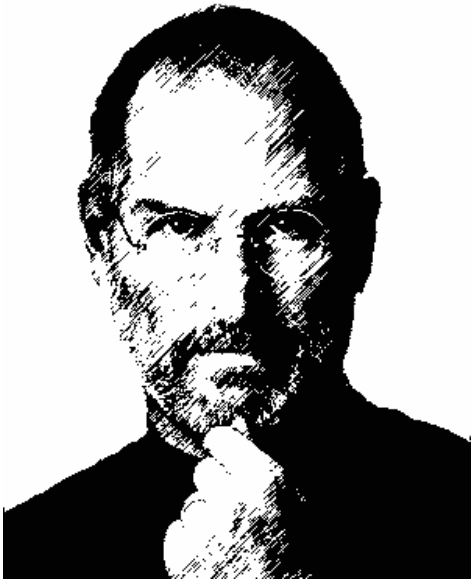
IN MEMORIAM



Steve Jobs

1955 -2011

… the people who are crazy enough to think they can change the world, are the ones who do.

(Excerpt from an Apple “Think Different” advertisement)

Watson vs. Aiken Round 2 – SSEC: The First Computer that Could Modify a Stored Program

After the blow-up with Howard Aiken in August of 1944, Thomas Watson Sr. reacted. He picked Frank Hamilton, who had been number two on the ASCC (Mark I) project with Aiken. "Put every IBM resource to work, Mr. Hamilton. I want the new machine to be faster than that one in Pennsylvania [ENIAC], more capable than the one we gave to Harvard. I want it to be installed here at World Headquarters, in one year. And I want it to be available to the scientific world, not hidden away at a selfish university or at a military installation."

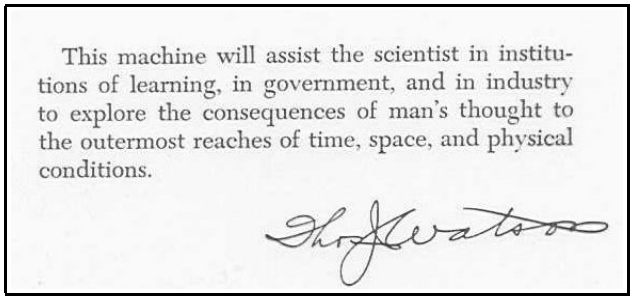
He recruited Wallace Eckert (no relation to ENIAC's J. Presper Eckert) from Columbia University and put him in charge of the super calculator design. IBM spent $950,000 to develop the machine, named the Selective Sequence Electronic Calculator (SSEC). The SSEC could compute more than 250 times faster than Aiken's Mark I. It was the first computing machine that could he programmed with software.

Testing was completed in late 1947, when Watson made a decision that forever altered the public perception of computers and linked IBM's name to the new generation of information machines. He told the engineers to disassemble the SSEC and set it up in the ground- floor lobby of IBM's 590 Madison Avenue (New York City) headquarters. The lobby was open to the public, and its large external windows allowed a view of the SSEC for the multitudes cramming the sidewalks on Madison and 57th Street. There was a raised floor - another world first. Watson would not have his guests, his customers, his stockholders tripping over snarls of cable.

As part of putting the SSEC in front of the public, IBM announced that scientists could run problems through the SSEC for free, while commercial enterprises would pay $300 per hour, which was the cost of operating the machine. The point was to keep the SSEC running, so anyone who looked in would see that it worked.

Watson told IBM designers to make sure the SSEC looked sleek and impressive, just as Watson had wanted the Mark I stylized. The spectacle of the SSEC defined the public's image of a computer for decades. Kept dust-free behind glass panels, reels of tape ticked like clocks, punches stamped out cards and whizzed them into hoppers, and thousands of tiny lights flashed on and off in no discernible pattern. Operators standing at desk-size consoles in the center of the room fed the SSEC information on cards and watched the results print out.

The SSEC Dedication Plaque


This machine will assist the scientist in institutions of learning, in government, and in industry to explore the consequences of man's thought to the outermost reaches of time, space, and physical conditions.

Thos J Watson

For more than four years, the SSEC fulfilled the wish that Watson had expressed at its dedication: that it would serve humanity by solving important problems of science.

It enabled Wallace Eckert to publish a lunar ephemeris “... of greater accuracy than previously available... the source of data used in man's first landing on the moon".

The first application of the SSEC was calculating the positions of the moon and planets, known as the Ephemeris. Each position of the moon required about 11,000 additions, 9,000 multiplications, and 2,000 table look-ups, which took the SSEC about seven minutes. This application used the machine for about six months; by then other users were lined up to keep the machine busy.

Pedestrians stopped to gawk and gave the SSEC the nickname "Poppy." The New Yorker magazine published a cover story on the SSEC and its public display. The machine influenced Hollywood, most famously as the model for the computer in the 1957 movie Desk Set, featuring Katherine Hephurn and Spencer Tracy. Before the SSEC, most people thought of computers as fascinating but incomprehensible laboratory experiments. Watson took the computer out of the lab and sold it to the public. As a public relations strategy, it worked brilliantly and more than made up for the Aiken fiasco.

Continued on next page

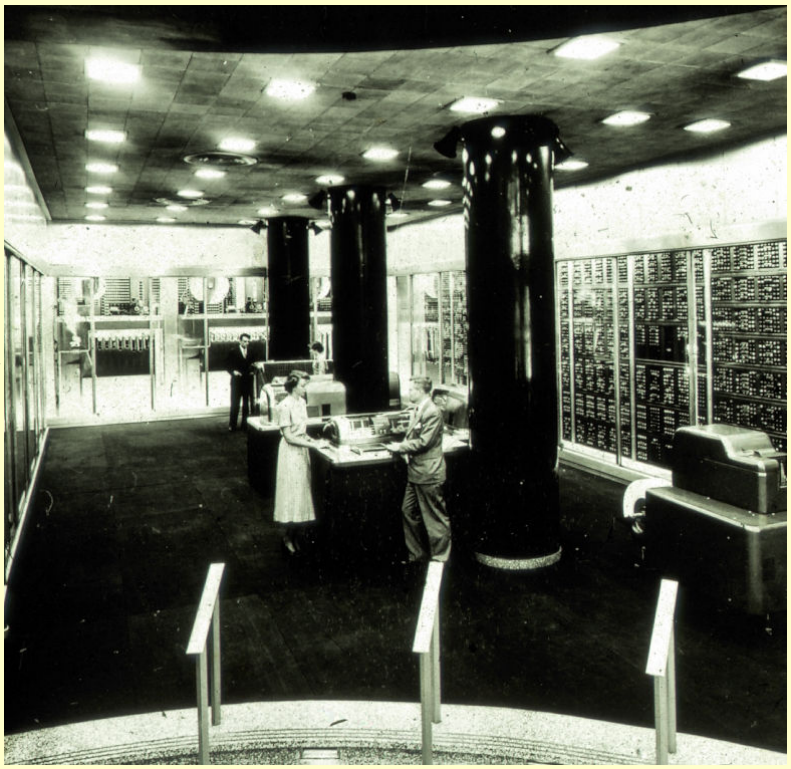
Still, the SSEC was not a real electronic computer. The engineers had concocted a hybrid of electronics and old punch card machines. Information was stored on punch cards, not on a new and more efficient invention: magnetic tape.

Programs resided on paper tape which was actually uncut IBM card stock, more than seven inches wide, weighing 400 pounds per roll.

Watson could not, or would not see the enormous advantages of magnetic tape for data, such as the storage space it would save, and the way it could shoot the data into a machine at great speed. As Watson often pointed out, magnetic tape could accidentally get erased. Punch cards held information on a tangible medium.

It remained for T. J. Watson Jr. to bring IBM into the electronic computer age.

The SSEC as installed at 590 Madison Avenue in New York City.



Watson Senior, upon first viewing SSEC prior to the public unveiling: "There is just one thing," he said somewhat off-handedly. "The sweep of this room is hindered by those large black columns down the center. Have them removed before the ceremony." But since they supported the building, the columns stayed. Instead, the photo in the brochure which was handed out at the ceremony, was carefully retouched to remove all traces of the offending columns.

Note that the man at the rear is Ted Codd, then a programmer of the SSEC. Dr. Codd later became the father of Relational Data Base.

The retouched photo

Visible along the wall in the background are three punches and thirty readers that form the paper-tape storage, with a large roll of tape above each punch. The paper tape was actually uncut IBM card stock, more than seven inches wide, weighing 400 pounds per roll. Along the left wall are banks of vacuum tube circuits for card reading and sequence control and 36 paper tape readers comprising the table-lookup section, many of them loaded with custom tape loops for commonly referenced data. Most of the panels along the right wall are occupied by the electronic arithmetic unit and storage. In the center of the room: card readers, card punches, printers and the operator's console.

Ted Codd and John Backus: Early Programmers of the SSEC

Edgar, “Ted” Codd was a Britisher who flew for the RAF during WW II. After the war, Codd moved to the USA and in 1949 joined IBM as a mathematical programmer for the SSEC, the huge vacuum tube computer used to solve many of the largest scientific problems of its day.

In 1967, he moved to California to work at IBM's San Jose Research Laboratory where he undertook the research that was to lead to the relational database model. In 1981 Codd received the A M Turing award, the highest honor in the field of computer science.

As a matter of fact, Ted Codd is shown in the rear of the “black column” photograph of the SSEC.

During the spring of 1949, John Backus visited the IBM Computer Center on Madison Avenue, where he toured the Selective Sequence Electronic Calculator (SSEC). While on the tour, Backus mentioned to the guide that he was looking for a job. She encouraged him to talk to the director of the project and he was hired to work on the SSEC.

The SSEC was not a computer in the modern sense. It had no memory for software storage, and programs had to be entered on punched paper tape. It had thousands of electromechanical parts, making it unreliable and slow as well. Part of Backus's job was to attend the machine, and fix it when it would stop running. Programming the SSEC was also a challenge, as there was no set way of doing it.

Backus spent three years working on the SSEC, during which time he invented a program called Speedcoding. The program was the first to include a scaling factor, which allowed both large and small numbers to be easily stored and manipulated. Backus went on to “invent” Fortran, the first and arguably the most popular high level programming language.

Docent Quiz

Docents: Take this test to be sure that you are qualified to work with our visitors.

Spelling Test

a) How do you spell IBM? __ __ __
b) How do you spell CDC? __ __ __
c) How do you spell NCR? __ __ __

Computer History

Early IBM Tabulators used as input:
a) punched cards
b) punched cards
c) punched cards
d) all the above

Word Scramble

Rearrange the letters to make a word or words related to computer history.
a) Large computer company: PH __ __
b) Desktop computer: CP __ __
c) World Wide Web: WWW: __ __ __

Museum Knowledge

The Computer History Museum's address is:
a) 1401 Shoreline
b) PDP-1 Shoreline
c) 305 Ramac

Answers on page 6.

Shortly after I joined IBM in 1964, I went to my first IBM class.

In addition to learning about punched card equipment, (computer studies would come later) we learned about IBM's history and culture.

On an easel at the front of the class was a poster, similar to the one below, showing the Beatles with their soup bowl haircuts and collarless suits.

Under the poster was the admonishment “IBM'ers don't dress like this.”

Jim Strickland

The ILLIAC IV article in Issue 15 reminded some of our folks of their experiences.

*Former docent and old friend **Bill Selmeier,** writes from Raleigh:*

When I was giving tours back in the old Visible Storage and got to the Illiac IV, I'd tell them this was my favorite exhibit. After explaining how the central program storage sent out the instructions to the 64 mid-sized Burroughs processors to use on their own data and how a bomb set off by radical students at the University of Wisconsin convinced the Dept. of Defense to not let the world's most powerful computer live minimally protected on any college campus, I'd ask them if they liked science fiction. Did they remember a three part movie in the late 60's that started off with some apes banging bones on the ground. Of course most recognized 2001 A Space Odyssey, so then I'd ask how did Dave shut HAL down at the end. When they remembered that he climbed inside the machine and began removing his optical memory blocks, I'd lean over with a gloved hand and pull out one of the boards in Illiac IV's main store. A curator had told me that Illiac IV had been shown to Kubrick when he was making the movie. He might have misunderstood and thought that all future computers would be built on that architecture.

***Ed Thelen** of the CHM 1401 Restoration project writes:*

I have two friends who were involved with programming the ILLIAC IV at NASA. As programmers they might not have been so aware of the troubles the hardware maintenance people were having. (When I was fixing computer equipment for G.E., I hoped the customers were (largely) unaware of the of the grief I was having trying to keep their operations relatively smooth.)

I wanted to write a program for the ILLIAC IV. One of the (software) friends advised that I write it for only 40 processors, that way if some processors were down, they could run it anyway.

I have mentioned that suggested constraint to others, and was firmly told the machine was very reliable.

Eugene Miya

- The fourth ILLIAC was not the last. The name continues to be used. An ILLIAC V was done, post-named after the real life Cedar Project (which consisted of many Alliant computers two (non-UIUC) of which CHM has in storage), and there is now an ILLIAC VI. I've also seen parts of the III and II at UIUC.
- One really should not use the term "processors" they are more properly called processing elements (PEs) because they lacked control. Four control unit were planned, and CHM has the single surviving one. The PE memories were too small (barely 2 K words), so they were used more like caches and the disk drives acted as primary memory.
- It is more accurate to say that ILLIAC IV was designed by Dan Slotnick and it was he that convinced both Burroughs and the University of Illinois to team up to build it.
- Keep in mind that a researcher was killed when the University of Wisconsin - Madison was bombed. Two of the three guys were caught and served time (now released, interview on the web). The third has never surfaced.
- The project was picked up by Hans Mark, who at 38 was the youngest director Ames ever had. He came from Lawrence Livermore Lab where he saw the computational future when nuclear testing had to go underground. My first Ames office actually had a copy of the proposal which I wish I still had.
- "outperformed by the Cray" is not quite right. The ILLIAC, because it had fixed head disks, could do faster I/O (no seek time). Some jobs would be faster, others slower. Parallelism is constrained by the serial (Amdahl's Law).
- IVTRAN,TRANQUIL, and Glypnir were all dead languages, only good for academic papers. No one would use an ALGOL-based language in this country except for toy problems. The only real operational languages were CFD (CFD didn't stand for anything. I asked my boss Ken who wrote it. Computation Fluid Dynamics was the principal application, but Ken denies that was the reason for its name. If you believe that, care to buy a bridge?) and Vectoral. Back then, only the University of Illinois (Dave Kuck) would do research on parallel language software. Dave has seen it all, I feel sorry somewhat for him. Dave has seen all the issues and he has been ignored by many.
- Programming vector and parallel machines has been cited by DARPA as still a major problem. Don't let any one fool you. Only the simple stuff has been solved; there is no simple “drop-in” parallelism.

Twentieth Anniversary of Linux

On Oct 4, 1991, Linus Benedict Torvalds' post to comp.os.minix begins the Linux OS. Finnish student, Linus Torvalds announced his project to create an operating system kernel. Since then, the resulting Linux kernel has been marked by constant growth. It has grown from a small number of C files under a license prohibiting commercial distribution to its state in 2009 of over 370 megabytes of source under Public License.

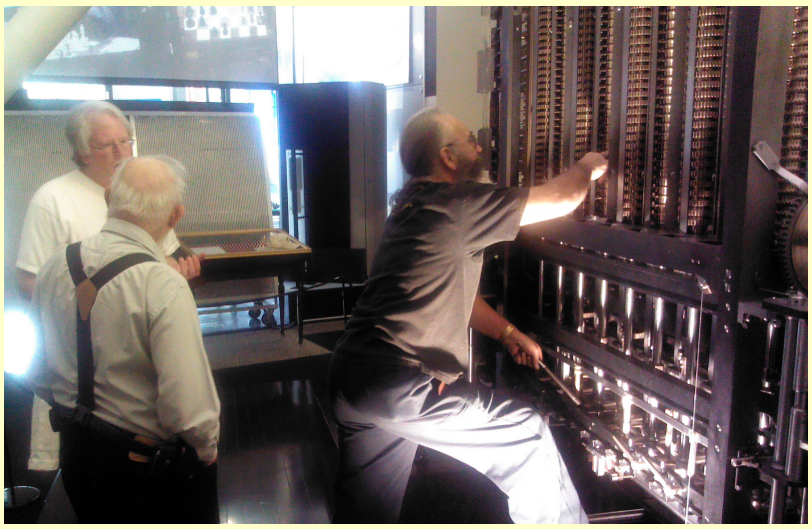
Torvalds had wanted to call his invention Freax, from "freak", "free", and "x" (as an allusion to Unix). Early on,he stored the files under the name "Freax." Torvalds had already considered the name "Linux," but initially dismissed it as too egotistical.. One of Torvald's coworkers did not think that "Freax" was a good name so he named the project "Linux" on the server without consulting Torvalds. Later, however, Torvalds consented to "Linux."

BABBAGE MACHINE REPAIRED

Tim Robinson, with help from Randy Neff and Herb Kanner have replaced the broken bell crank and the Babbage engine can be demonstrated again.

It is a temporary part but should hold up until the real thing arrives.

Many thanks to Tim and all who helped.



Docent Quiz

You didn't really expect answers, did you?

Coming Events			
Date	**Day**	**Time**	**Event**
Oct 15	Sat.		Opening of the new exhibition: *An Analog Life: Remembering Jim Williams*
Oct 25	Tues.	6:00 PM 7:00 PM	Reception Worm: The First Digital World War. Author Mark Bowden and Microsoft's T.J. Campana in Conversation with John Markoff of The New York Times
Nov 05	Sat.	02:00 PM	The Challenge and Promise of Artificial Intelligence, a Bay Area Science Festival Wonder Dialog
Nov 08	Tues.	6:00 PM 7:00 PM	Member Reception The Technology of Animation -- DreamWorks Animation's Jeffrey Katzenberg and Ed Leonard will kick off this series, in a conversation moderated by HP's Phil McKinney.
Nov 15	Tues.	6:00 PM 7:00 PM	Member Reception A Computer Called Watson: IBM Research's David Ferrucci in Conversation with the Financial Times' Richard Waters

Please contribute to the Computer History Museum Volunteer Information Exchange.

Share your stories, your interesting facts (and factoids) and your knowledge.
Send them to Jim Strickland (Jlstrick@aol.com)