



A (BRIEF) HISTORY OF COMPUTING

By Dane Paschal



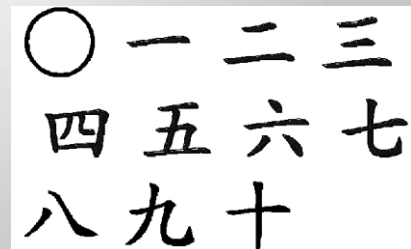
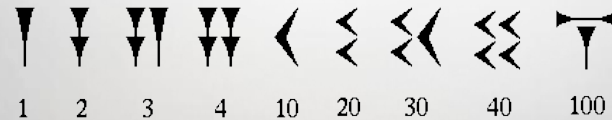
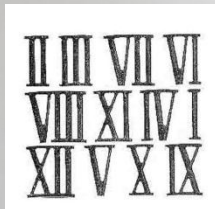
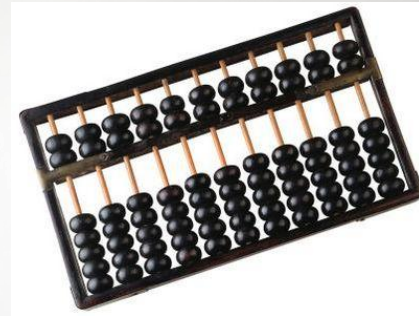
BIASES

- ❖ Amero-Euro centric
- ❖ Computer science centric
- ❖ Google centric

ANCIENT ORIGINS

❖ Counting is hard...

- The Human Brain
- Abacus
- Numerals



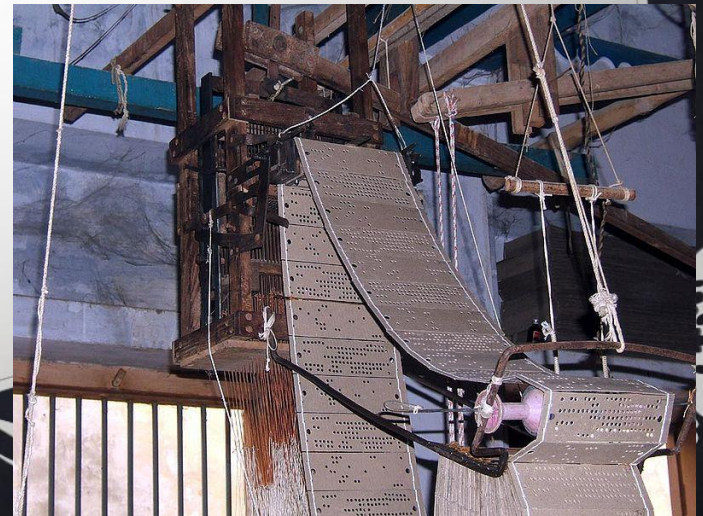
THE 1700'S AND 1800'S

❖ Computing as a job

- Moved beyond governmental in a big way
- Industries now need large pools of computing power
- Scientific inquiry requires more brainpower and number crunching

❖ Inventions

- Pascal's wheel
- Slide rules
- Napier's bones
- Jacquard's loom ← programmable!



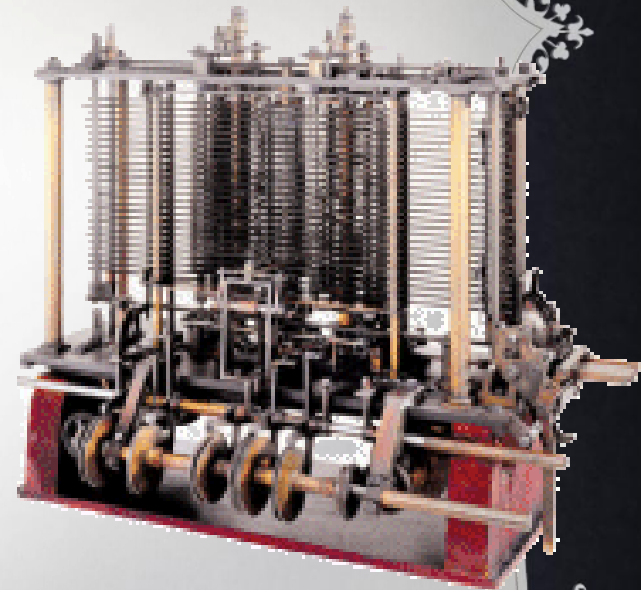
BABBAGE AND LOVELACE

❖ Charles Babbage

- Math professor at Trinity College in Cambridge
- Difference engine
- Analytical engine
 - Mill and store (cpu and memory)

❖ Ada Augusta, Countess of Lovelace

- Amazing mathematician, helped Babbage
- “first programmer”



HOLLERITH AND THE CENSUS

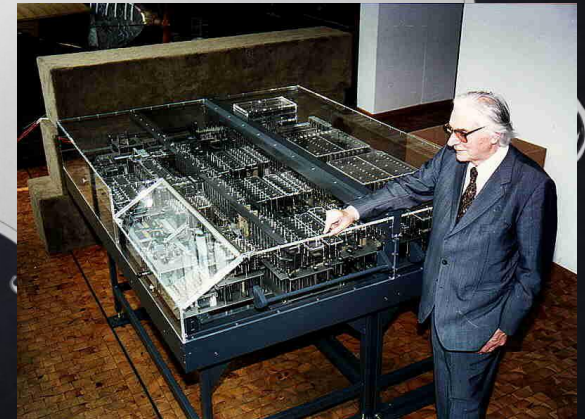
- ❖ U.S. needed help with the 1890 census
 - Dr. Herman Hollerith, statistician and inventor was hired to help
 - Took punch cards from the Jacquard loom and turned it into a punch card database!
 - Cut down the census tabulation by 6 years (from 8 to 2) saving millions
 - Founds company that would become IBM
 - Production of punch-card machines and mechanical calculators



ELECTRICITY AND BINARY

❖ Konrad Zuse

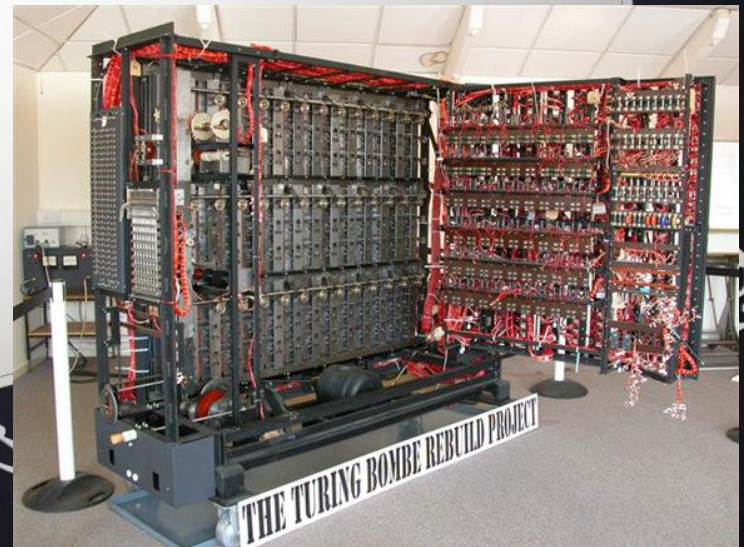
- Civil engineer
- “you can say I was too lazy to calculate so I invented the computer”
- Created the Z1 using binary and electrical circuits
- Drafted into German military for WWII, but was soon hired to build the Z2
- Saw the use of vacuum tubes for faster computing, but calculated it would take too long to implement.



LEARNING TO LOVE THE BOMBE

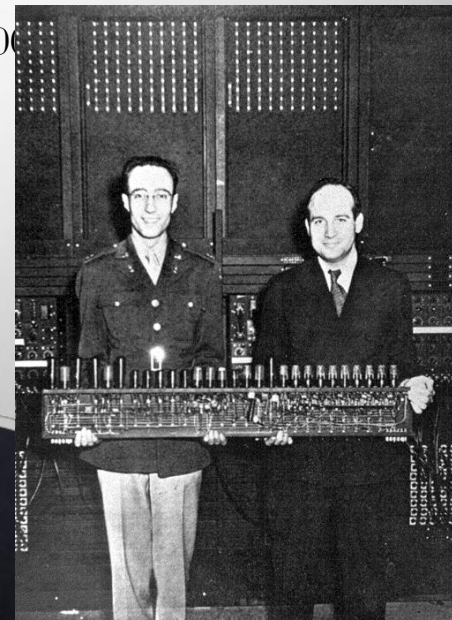
❖ Alan Turing

- Hired by England to crack codes set by the enigma machine (the bombe)
 - Electrical machine using logical operators to brute force a solution to enigma settings
- Turing machines
- Turing test and AI



ARTILLERY AND VACUUM TUBES

- ❖ ENIAC (Electronic Numerical Integrator And Computer)
 - Artillery and bombing tables took too long
 - Military hired Dr. Presper Eckert and Dr. John Mauchly for a solution
 - Began in 1943, announced in 1946, cost \$500,000, 30 tons, required 18k vacuum tubes!
 - Was thought impossible, too unreliable
 - Programmed by wire...





TRANSISTORS AND THE UNIVAC

- ❖ Transistors came about from research at AT&T's Bell Labs and was the work of Bardeen, Brattain, and Shockley
- ❖ was a smaller, faster, safer, cheaper and more reliable version of the vacuum tube
- ❖ 1950's census is taking too long, the census needs help again
- ❖ Hires the makers of the ENIAC to take advantage of the transistor.
- ❖ The result is the UNIVAC I, which predicts the 1952 presidential election, shocking all with Eisenhower's victory



```

DEFINE FILE 3(100,50,L,11)
5 READ(5,100)ICOD,Q
100 FORMAT(I5,F7. 2)
   I1 = MOD (ICOD,997)
3 READ (3'I1,100) ICO,QUAN
4 IF (I COD - I CO) 1,2,1
1 PAUSE 3050
   GO TO 5
2 QUAN=QUAN+Q
   I1=I1-1
   WRITE (3'I1,100)ICO,QUAN
   GO TO 5
END

```

LANGUAGES!

- ❖ With the success of the UNIVAC and other large computers, more people are taking advantage of them.
- ❖ Programming these computers is tough stuff... either it's binary or assembly coding
- ❖ FORTRAN (Formula Translation) (John Backus, 1954) comes about to help mathematicians. One of the first “high level” languages
- ❖ COBOL (Common Business-oriented Language) (Grace Hopper 1959) comes about to help businesses program.

<p>The OCCURS clause marks an array.</p>	<p>The DEPENDING ON clause marks a counter field for the array, if one exists.</p>	<p>The array ASSIGNMENTS is a nested array within COURSES.</p>
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```

01 STUDENT.
20 ID PIC 9(8).
20 FIRST_NAME PIC X(32).
20 LAST_NAME PIC X(32).
*
20 DATE_OF_BIRTH PIC 99(8) COMP.
20 NUMOF_COURSES PIC 9(4) COMP.
20 NUMOF_BOOKS PIC 9(4) COMP.
20 COURSES.
  25 COURSE OCCURS 8 TIMES DEPENDING ON NUMOF_COURSES.
    30 COURSE_ID PIC 9(8).
    30 COURSE_TITLE PIC X(48).
    30 INSTRUCTOR_ID PIC 9(8).
    30 NUMOF_ASSIGNMENTS PIC 9(4) COMP.
    30 ASSIGNMENTS OCCURS 4 TIMES DEPENDING ON NUMOF_ASSIGNMENTS.
      40 ASSIGNMENT_TYPE PIC X(12).
      40 ASSIGNMENT_TITLE PIC X(48).
      40 DUE_DATE PIC 99(8) COMP.
      40 GRADE PIC 999.
  20 BOOKS.
    25 BOOK OCCURS 1 TO 5 TIMES DEPENDING ON NUMOF_BOOKS.
      30 ISBN PIC X(10).
      30 RETURN_DATE PIC 9(8) COMP.

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ERMA AND MICR

- ❖ 1955, Bank of America announces it's latest project with the Stanford Research Institute: ERMA the Electronic Record Method of Accounting
- ❖ Seeks to revolutionize the banking industry with raw computing power
- ❖ ERMA comes equipped with MICR (Magnetic Ink Character Recognition) allows computers to read checks and changes the consumer experience forever.

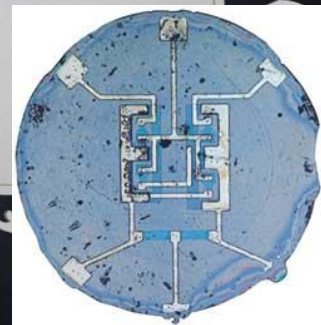
From Computer Desktop Encyclopedia
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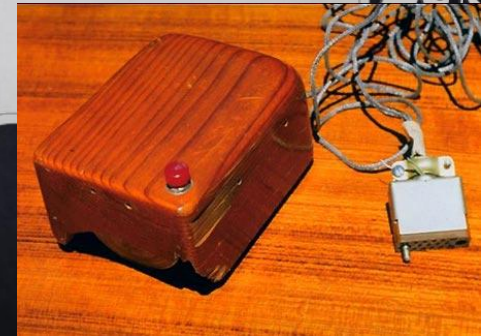
INTEGRATED CIRCUITS AND THE SPACE RACE

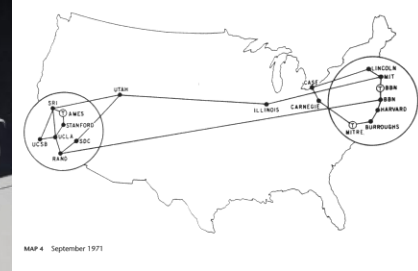
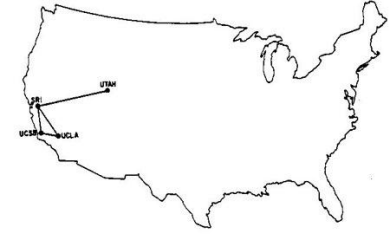
- ❖ The “Tyranny of Numbers”
- ❖ Seeking to miniaturize transistors, Jock Kilby and Robert Noyce separately come upon the Integrated circuit
- ❖ Combines transistors, resistors, capacitors, and all the wiring onto a single chip of semiconductor material
- ❖ Smaller, safer, faster, more reliable, easier to make, but more expensive
- ❖ Wasn't until the manned mission to the moon that they were put into use on a large scale (1960ish)



OF MICE AND FOLDERS

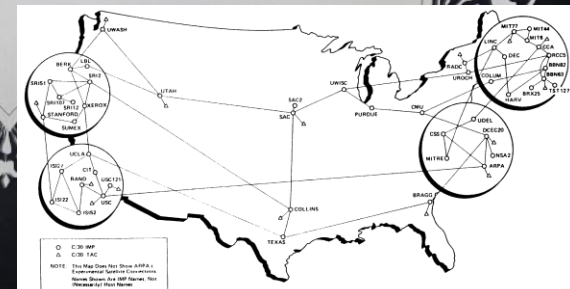
- ❖ Much like computer programming, computer interfaces are designed for and by a specialized group. All interaction is either physical or text.
- ❖ A wider group of individuals were using computers (they were getting smaller and more prevalent), they required a very specific skill sets to use.
- ❖ Machine interaction becomes a field of study
- ❖ Doug Engelbart invents mouse, uses it in conjunction with one of the first GUI's (1964)
- ❖ Not the first interactive tool, but one that stuck around along with the “office” metaphor (files, folders, projects, desktops)

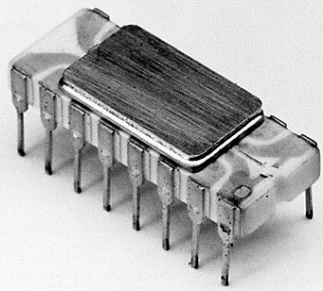




THE INTERNET AND GLOBAL THERMONUCLEAR WAR

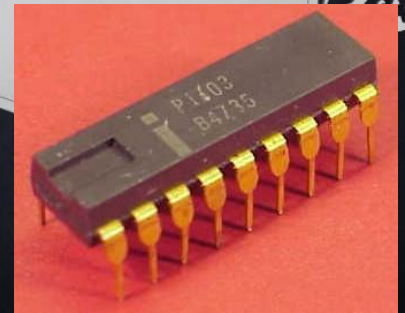
- ❖ 1969 ARPAnet, links computers with a standard protocol for the flow of information.
- ❖ Started with 4 university computers, grew quickly in both size and structure
- ❖ Innovations included: email, telnet (remote computing), and FTP (file transfer protocol).
- ❖ As it became larger, became unsafe for strictly military applications (MILnet)
- ❖ Spawned Local Area Networks (LAN's)
- ❖ NSFnet (National Science Foundation network) starts as a LAN, branches out to connect other LAN's (1986), starts to replace ARPAnet (closed 1990) for universities, evolves into the current internet.





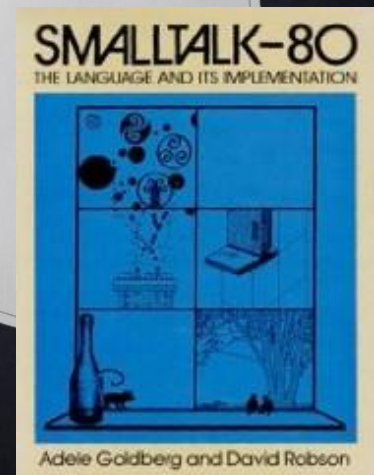
RAMMING SPEED! AND MICROPROCESSORS

- ❖ The integrated circuit improves processing speed so much that memory speed (especially for non-sequential memory) becomes an issue.
- ❖ In 1970, Intel comes out with the first Dynamic Random Access Memory (DRAM)
- ❖ RAM had been around since 1947, this makes it smaller and faster, mass marketed.
- ❖ 1969-1971 Fredrico Faggin at Intel designs the first microprocessor, thus completing all of the hardware components necessary for the personal computer



SMALLTALK AND OBJECTS

- ❖ 1960's and 70's saw the rise of many new programming languages including BASIC, C (what comes after B), Pascal, and Smalltalk
- ❖ Smalltalk is one of the most influential object oriented languages, based on the ideas of encapsulation, message passing, and modular programming.
- ❖ Revolutionized how computer programs were written.





DONALD KNUTH

- ❖ Often called the “Father of Computer Science”
- ❖ As a child he won an anagram competition for “Ziegler's Giant Bar”, finding over 4,500 words that could be made out of those letters (2,000 more than the judges of the competition had found)
- ❖ Barely chose physics over music as a major at Case Institute of Technology
- ❖ Wrote: “The Art of Computer Programming” a guide to programming algorithms and their analysis that helped set computer science apart from other disciplines.

