

Computing at the Psychometric Lab

1

The JOHNIAC at RAND, 1950s

The collage features a block diagram of the JOHNIAC architecture. At the top is a box labeled 'Memory Program & Data'. Below it are three boxes: 'Central Unit (CU)', 'Central Processing Unit (CPU)', and 'Input / Output (I/O)'. Arrows indicate the flow of information: from Memory to CPU, from CPU to I/O, and from I/O back to CPU. A green circular arrow labeled 'Fetch next instruction' points from the CPU back to the Memory box, and another green arrow labeled 'Execute instruction' points from the Memory box to the CPU.

2

Royal McBee (later General Precision) LGP-30

The Psychometric Lab's first computer; \$30,000-\$40,000



Think desk-sized computer

LGP-30

LGP-30

LGP-30

Desk-sized and dollar-costless... the LGP-30, LGP-30 and RMC-400 general-purpose digital computers make electronic computing economically practical for almost every organization from small business to large corporation.

LGP-30 Computer: LGP-30 computer... the desk-top computer system (LGP-30 computer)...

RMC-400 Computer: RMC-400 computer... the desk-top computer system (LGP-30 computer)...

More today for Standard facilities on the operations and applications of General Precision's desk-top computers.

4K 31-bit words (16KB) drum memory, 0.017 sec multiply, paper tape I/O

3

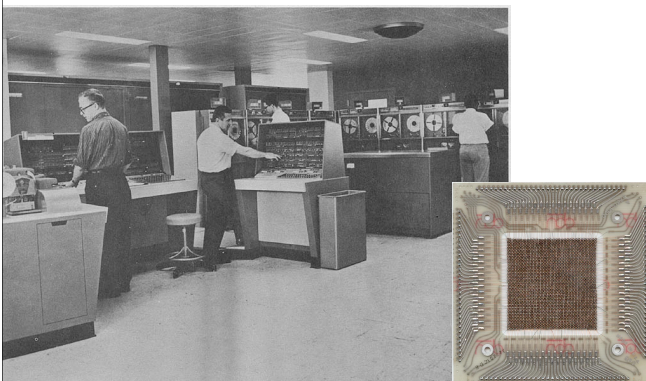
Royal McBee (later General Precision) LGP-30



4

Univac 1105

UNC-CH's first computer; \$2-3,000,000

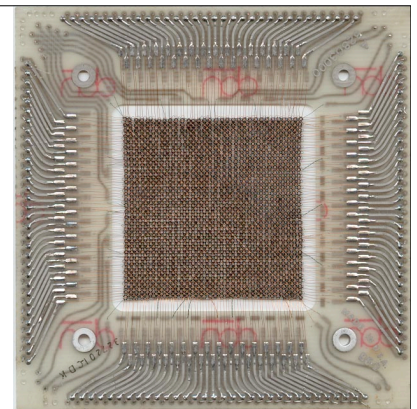


8-12K 36-bit words core plus 2-3 times that in drum memory, tape I/O

5

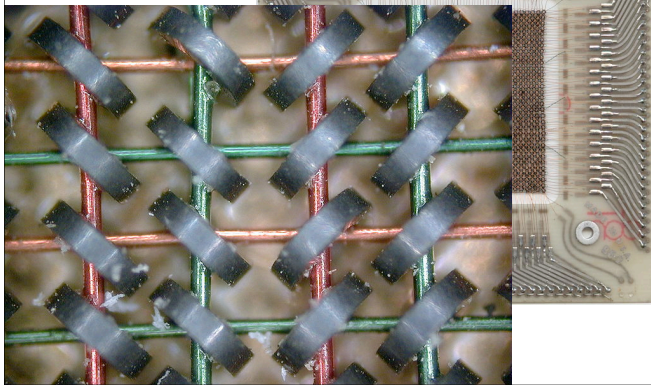
Univac 1105

A complete UNIVAC 1105 computer system required 160 kW of power and an air conditioning unit with a power of at least 35 tons (123 kW) for cooling input water. The computer system weighed 63,753 lb and required a room 49 x 64 x 10 ft. The floor space for the computer was approximately 3,752 ft²; the power, refrigeration and equipment room was approximately 2,450 ft².

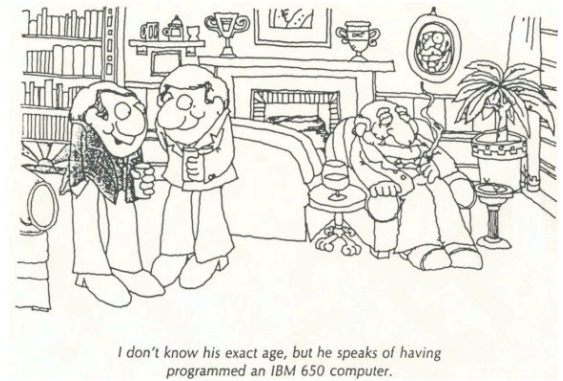


6

"Magnetic Core" memory, enlarged:



7

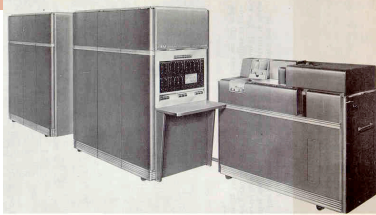
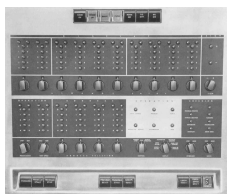
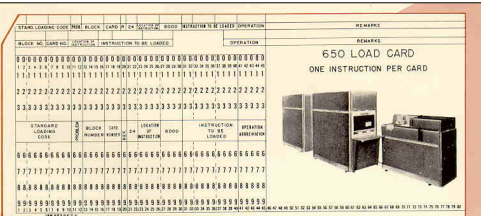


I don't know his exact age, but he speaks of having programmed an IBM 650 computer.

8

IBM 650

2000 10-digit words drum memory, 0.013 sec multiply, punch card I/O, \$3-5,000/mo.



Type 650

Type 533

9

IBM 7090, transistorized version of the tube-based 709



10

IBM 1130

8K (4K-32K) 16-bit words core memory, 3 microsecond memory access, punch card input, line printer output, around \$40,000.



11

IBM 1403 Line Printer

Printed for 1130s and 7094s, ...



12

IBM 1403 Line Printer

Printed for I130s and 7094s, and could play music:



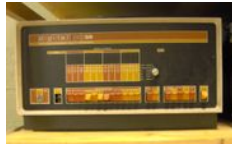
Or draw pictures ...

13



14

Digital Equipment Corporation (DEC) PDP-8



15

Digital Equipment Corporation (DEC) PDP-11



16

Thompson (Unix) and Ritchie (C) use a PDP-11



17

Translating Languages

English: Display the sum of A times B plus C.

C++: `cout << (A * B + C);`

Assembly Language:
`mov eax,A
mul B
add eax,C
call WriteInt`

Intel Machine Language:
`A1 00000000
F7 25 00000004
03 05 00000008
E8 00500000`

9

18

IBM 7094 System, circa 1965

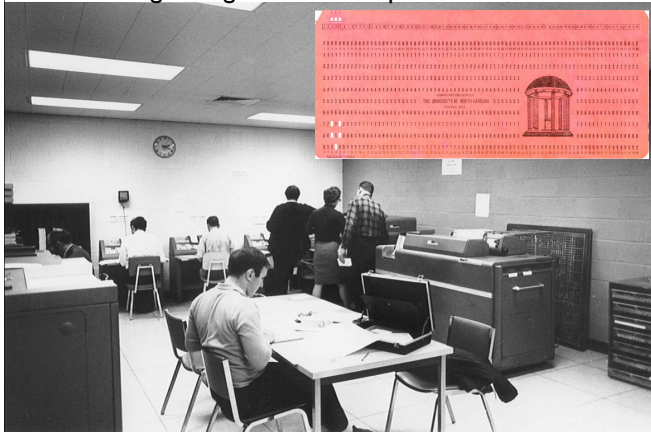


32K 36-bit words (147KB) memory, 0.5MHz clock, no disks (tape I/O)

This system was at Columbia University

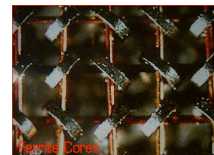


Programing was done on punched cards



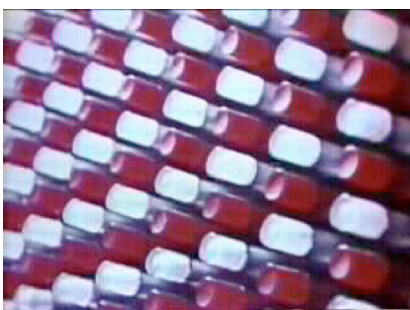
in the "keypunch room"

Memory was magnetic "core" that cost about \$1/bit; that would be \$32billion for today's standard 4GB



Entire 7094 systems cost \$2.5-4million (that would be \$15-24million now), or rented for about \$70,000/month (\$415,000 now)

These computers were the stuff of story and myth...



IBM 7094

IBM Series 360

GE 635

Honeywell 6000

& DPS8

Multilog was written to run on KU's Honeywells

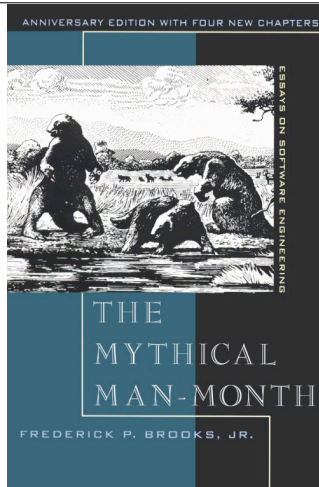


The IBM 360 Series created the "byte" (8 bit alphanumeric characters), EBCDIC, and went on to the 370s, 303xs, 308xs and 3090s before the death of the mainframe

Frederick Brooks headed the design project for the IBM 360 series



Brooks subsequently recounted his experience on that project in a book, *The Mythical Man-Month*, which is the bible for software engineering and design... and he founded the Computer Science department at UNC-CH



Multilog was subsequently ported from the Honeywell to IBM's VM/CMS system (the birthplace of BITNET—"Because It's There NET"), DEC VMS for VAXen, the IBM PC's MS DOS (and the Mac OS, but don't tell)

Frederick Brooks gave a great invited address when he received an award from the ACM

I borrowed heavily from Brooks' address for my Psychometric Society presidential address

Everything is connected

Moore's Law

