Digital Equipment Corporation

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Engines of the Mind, Joel Shurkin

- After discussing transistors, Shurkin states:
  - The first person perhaps to smell the change was an MIT graduate and former IBM employee named Kenneth Olson. In 1957, he and Harlan Anderson founded Digital Equipment Corporation (DEC) with $70,000 in venture capital from Georges Doriot.
  - When Doriot sold his share in 1972, it was worth $350,000,000

Kenneth Olson (1926-)

- BS, MS in electrical engineering, MIT
- 7 years at MIT's Digital Computer Laboratory
- Leader for the Memory Test Computer for SAGE Air Defense Computer project
- Supervised the building of the high-performance transistorized digital computers, TX-0 and TX-2 which set the standard of comparison for transistor circuit performance.
- Believed that (1) computers should be fun to operate and (2) that they should be smaller than those sold by IBM and the "Bunch"

Assabet Mills, Maynard, MA

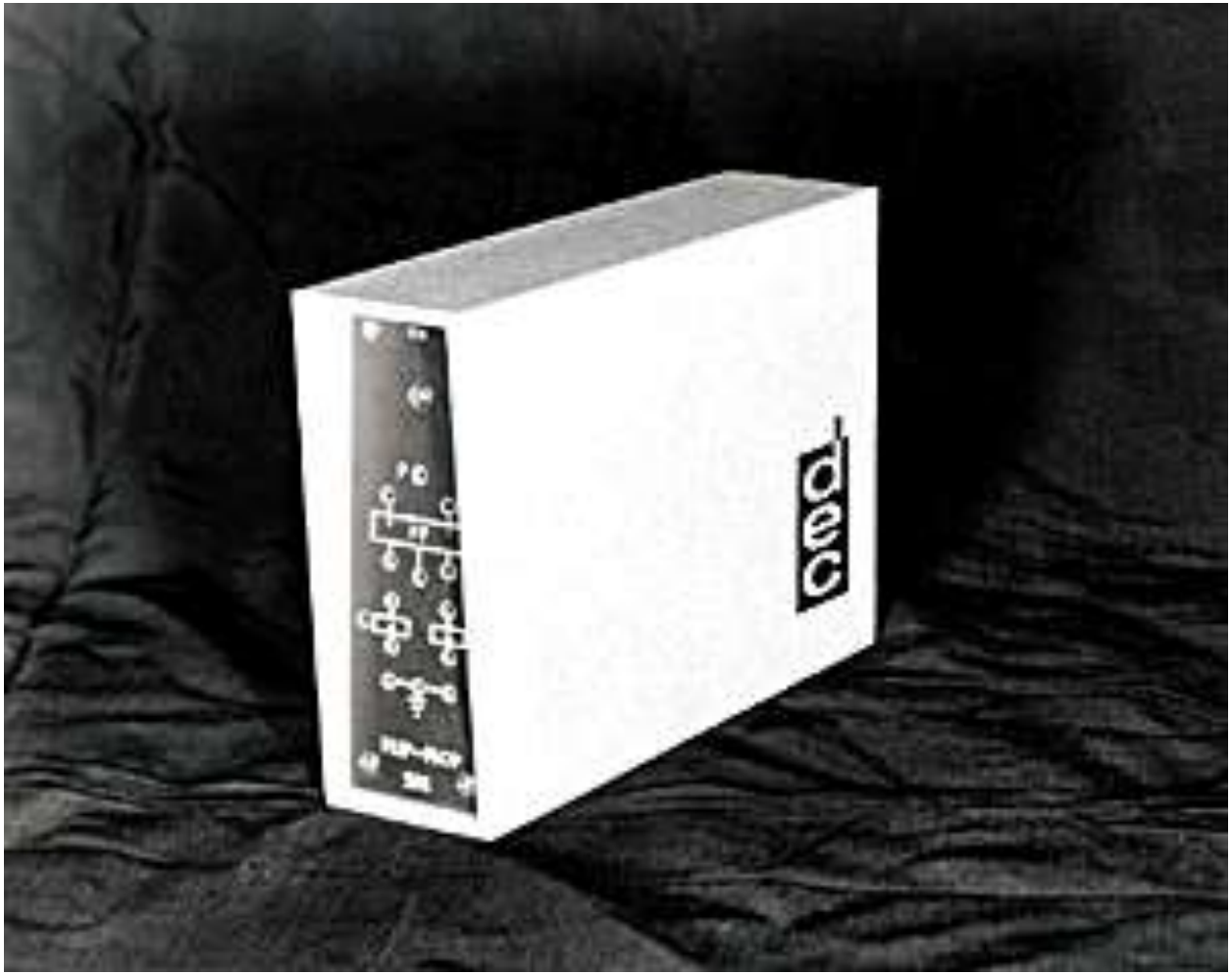
TX-0 Lincoln Test-Experimental Computer

- Operational: 1957
- Word Length: 18 bits
- Speed: 83,000 additions/second
- Programmed multiply and divide
- Memory: 64 K word core, 1 parity bit, 6 microsecond read-write time
- Technology: 3,500 Philco L-5122 transistors
- Power: 1000 watts
- Experimental: test large core memories and transistor circuitry
- Size: 200 square feet
- Number produced: 1

The “computer” is...out!

- Doriot tells Olsen and Anderson not to use the word “computer” in their requests for funding.
- It had recently been reported in Fortune magazine that “no one was making any money on computers.”
- It was also common belief that no one could compete with IBM!

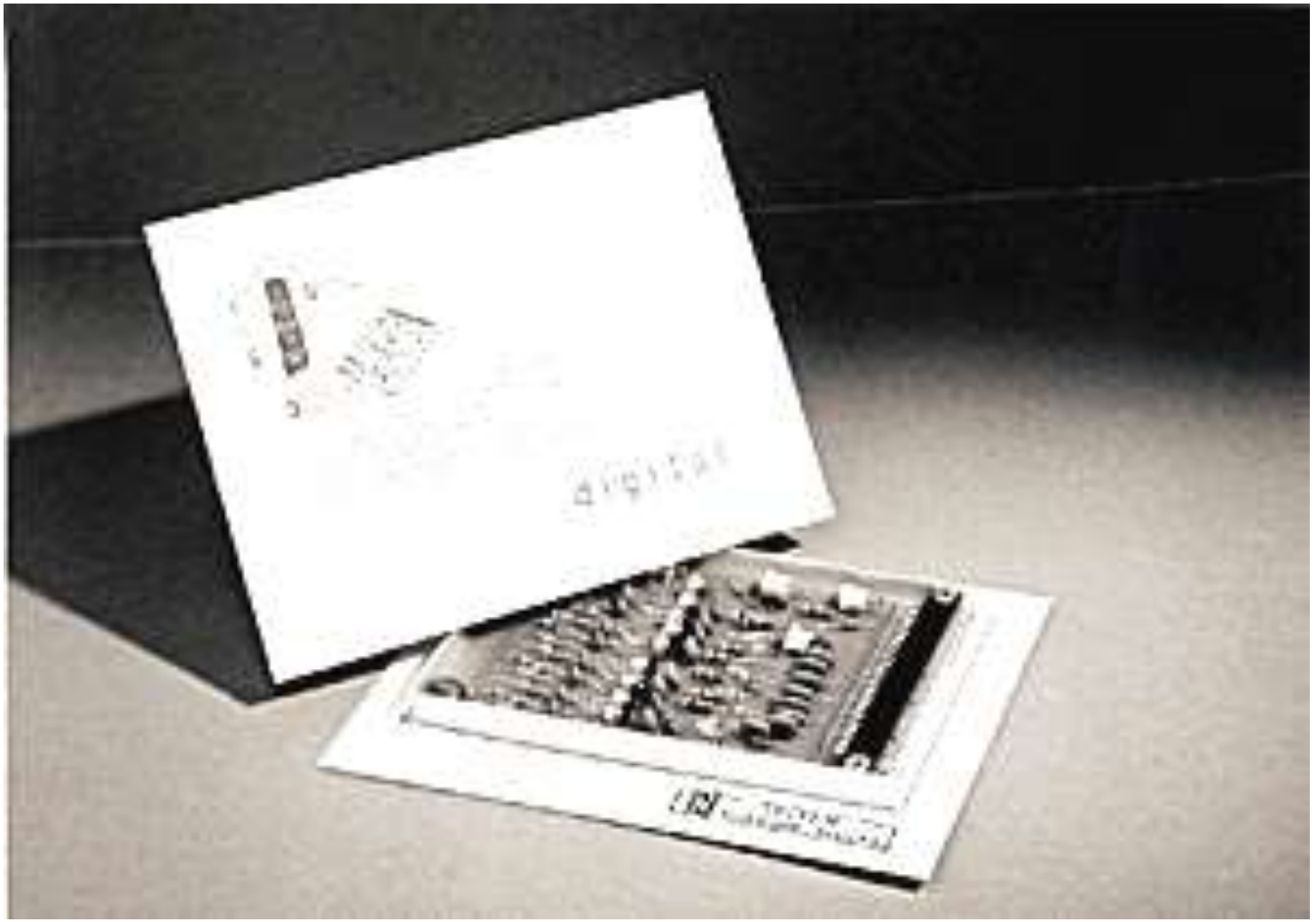
DEC's first products were "modules"



Modules Timeline

- 1957 100 Series Laboratory Modules (5 MHz)
- 1959 1000 Series LM (500 kHz)
- 1960 3000/4000 LMs (10 MHz)
- 1961 4000 Series System Ms (500 kHz to 1 MHz)
- 6000 Series SMs (10 MHz)
- 1963 8000 Series SMs (30 MHz)
- 1964 Blue Flip Chip Modules (10 MHz)

Systems Modules



Flipchip

Modules Timeline (continued)

- 1965 Red Flip Chip Modules (1 MHz)
- 1967 K series Industrial (100 kHz)
- 1969 M series modules for computers using small, medium and large integrated circuits
- 1970 Register Transfer Modules (RTM)
- 1973 MPS (8008 microprocessor based)

DEC's first patent: core memory

Programmed Data Processor

(at Bolt Beranek and Newman)

PDP-1 Programmed Data Processor

- Word length: 18 bits
- Speed: 5-microsecond cycle time
- Memory: 4 K word core
- Instruction Set: Memory address instruction, operate class, I/O class
- Input: Typewriter, paper tape
- Output: Cathode ray tube
- Options: light pen, magnetic Tape
- Number produced: 50
- Price: $120,000
- Size: 4 cabinets (8’ X 2+ X 6’)

- ***Digital had brought the prototype PDP-1 to demonstrate at the 1959 Joint Computer Conference in Boston. The whole show was buzzing about this fledgling company and its little machine which cost less than $150,000. Nothing was that affordable at the time. Bolt Beranek and Newman recognized the importance of the machine and bought the prototype right off the floor.***

- ***--Bert Singer***

18-Bit Family Timeline

- 1960 PDP-1 first 18-bit computer
  - PDP-1 donated to MIT
  - Spacewar developed by MIT students (first interactive video game)
- 1963 PDP-4
- 1964 PDP-7, uses flip chip modules; used by Ritchie and Thompson to develop UNIX
- 1966 PDP-9, program compatible with the PDP-7
- 1969 PDP-15, replaces PDP-9

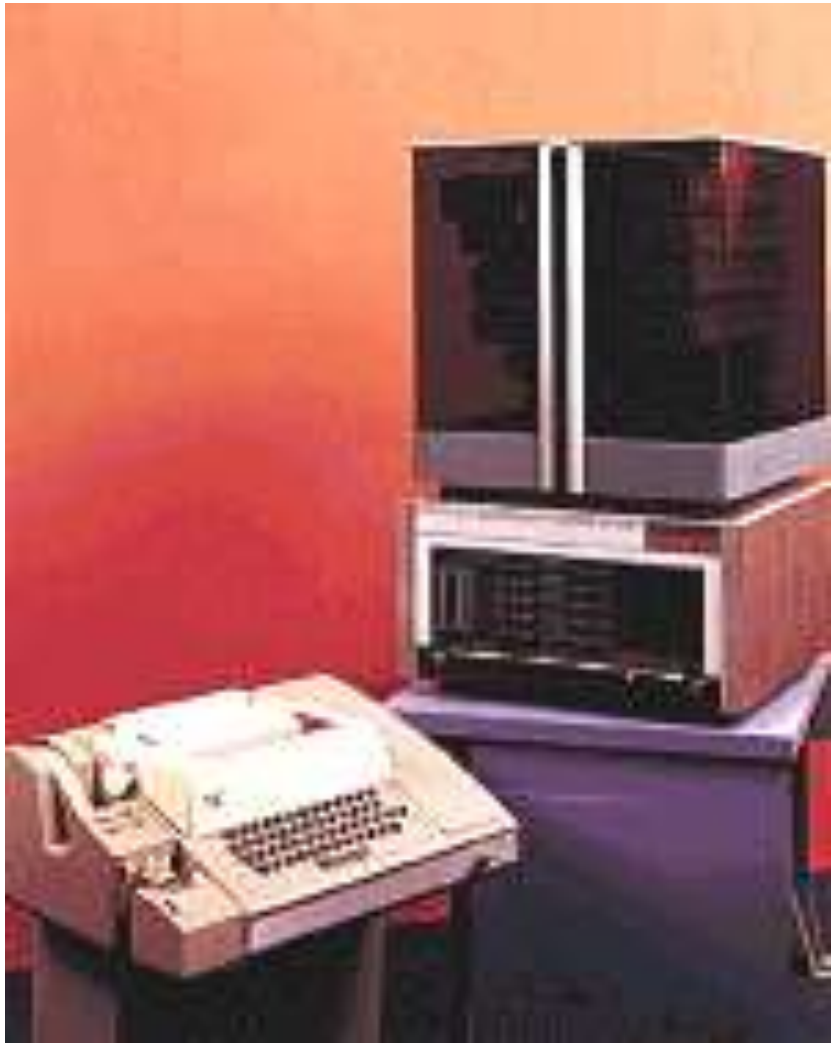
PDP-4 (1963) and PDP-7 (1964)

DECtape introduced with the PDP-7

18-Bit Family Timeline (cont.)

- **1972 MUMPS-15 (Massachusetts General Hospital Utility MicroProgramming System), timesharing system to handle medical records (in use)**
- **1988 PDP-1 saved from a barn in Wichita, Kansas and donated to the Digital Historical Collection**

PDP-8, first mass produced Mini



PDP-8

- First shipped: April 1965
- Word length: 12 bits
- Speed: 1.5 microseconds cycle time
- Memory: 4K 12-bit-word (core)
- Secondary memory: 32K maximum
- Software: Symbolic editor, FORTRAN, PAL II Assembler
- Modules: flip chip series
- Power: 780 watts
- Price: $18,000

12-Bit Family Timeline

- 1962 Laboratory Instrument Computer (LINC) developed at MIT

- 1963 PDP-5, Digital's 1st 12 bit machine
- 1965 Classic PDP-8
- 1967 PDP-8, manufactured in Reading, England
- 1968 PDP-8I, integrated circuit version
- 1968 LAB-8, small, general purpose laboratory package with TSS/8 time sharing software
- 1982 DECmate II word-processor

PDP-8E (1970) AU Math Dept

PDP-11 (1970)

PDP-11

- First shipped: 1970
- Word length: 16 bits
- Speed: 800 nanoseconds
- Memory: Magnetic core (56K max)
- Instruction set: PDP-11
- Software: symbolic editor, debugger, utilities, PAL
- Price: $20,000
- Became industry standard for 16-bit minicomputers

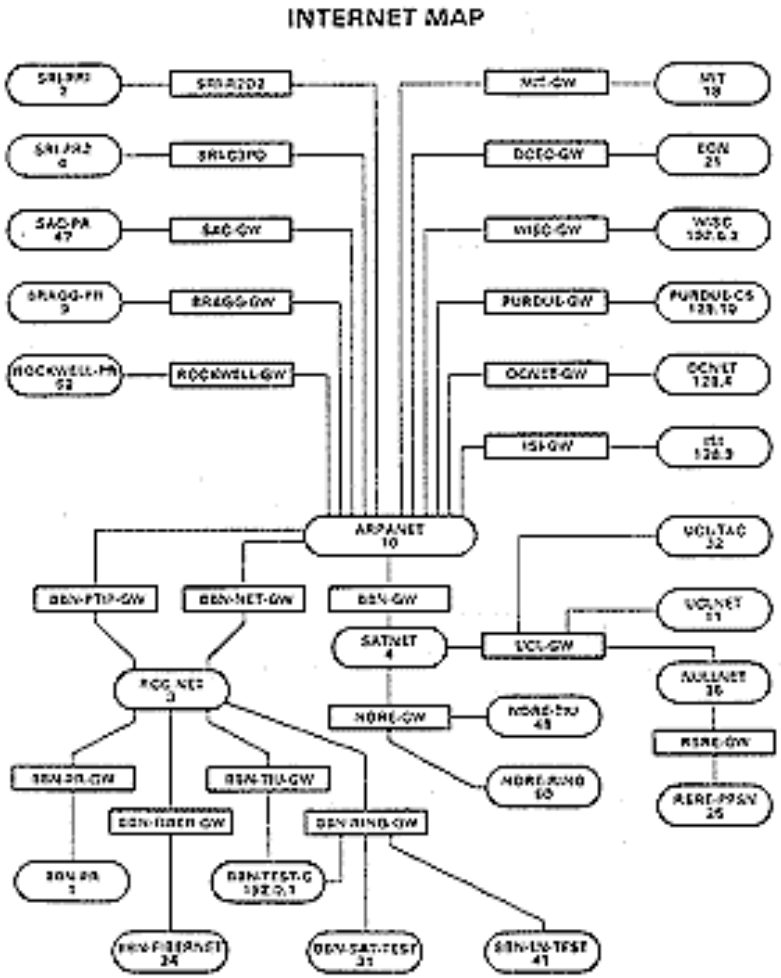
PDP-11/34 (1976)

VAX-11/780

Virtual Address eXtention (VAX)

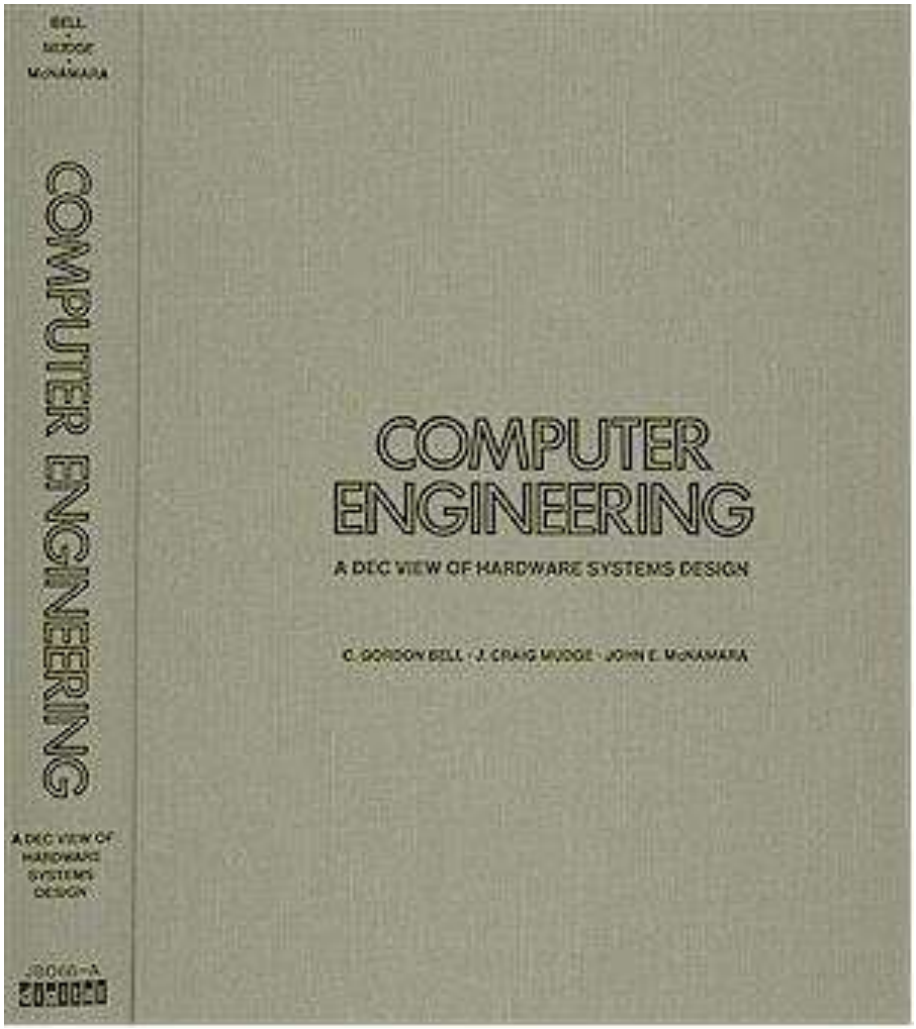
- First shipped: 1978
- Word length: 32 bits
- Speed: 1 VAX MIPS
- Memory: 1 megabyte (originally)
- Cycle time: 1,200 nanoseconds (originally)
- Software: FORTRAN-77, COBOL, BLISS-32, VAX VMS Version 1
- Price: $120,000 to $160,000

ARPANET (1977)



Gordon Bell et al, Computer Engineering

First time computer industry was examined from an evolutionary perspective (1978)



References

- Pearson (ed), *Digital At Work: Snapshots from the first thirty-five years*, Digital Press, 1992
- Lee, *Computer Pioneers*, IEEE Press, 1995
- Shurkin, *Engines of the Mind*, *the evolution of the Computer from Mainframes to Microprocessors*, W.W. Norton, 1984
- Gordon Bell et al, Computer Engineering

Show and Tell

- Flipchips: red and blue
- DEC documentation for PDP-1, PDP-8 etc
- boards
- DECtape
- Gordon Bell et al, Computer Engineering