Digital Equipment Corporation PDP-6 & 10

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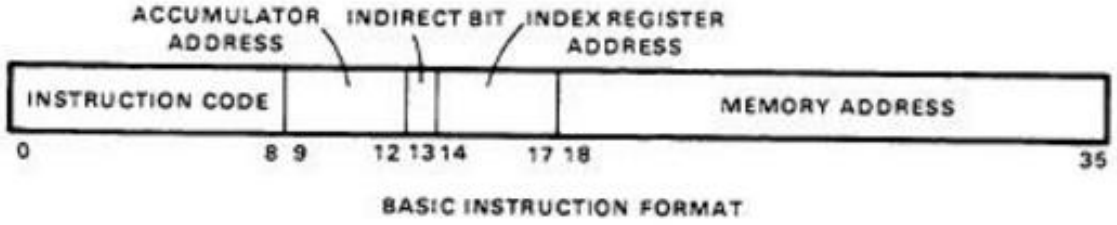
PDP-6 (1963-1966)

- Hardware Architecture
  - 36-bit words
  - 18-bit addressing, 256k word memory
  - Magnetic-core Memory
- ISA
  - Very symmetrical
  - One-and-a-half address
  - Every instruction consists of a:
    - 9-bit opcode
    - 4-bit register code
    - 23-bit effective address field
    - 1-bit indirect bit
    - 4-bit register code
    - 18-bit offset

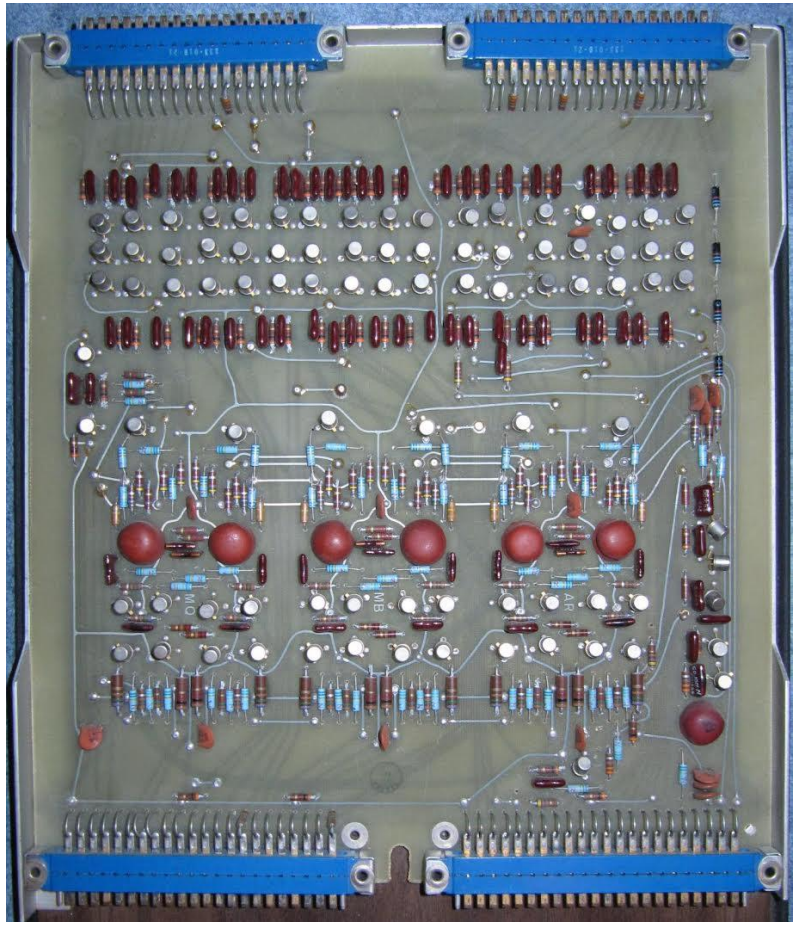


BASIC INSTRUCTION FORMAT

ACCUMULATOR ADDRESS IS 1 OF 16 ACCUMULATORS (GENERAL REGISTERS)
INDEX REGISTER ADDRESS IS INDEX DESIGNATOR TO 1 OF 15 ACs
BIT 13 IS INDIRECT ADDRESS BIT
MEMORY ADDRESS IS ADDRESS OR LITERAL

PDP-6

- Achievements
  - Supported time sharing
    - Status bit selecting between two operating modes
    - Supervisor and User modes
  - Could handle 20 - 30 users (with a single disk drive)
  - TOPS-10 Operating System
    - Introduction of virtual memory
- Problems
  - Prone to failure
  - Large ‘6205’ boards would often break
    - Mechanical couplings
    - Powering related failures from powering on/off



PDP-6 Success?

- Complex and expensive
- Difficult to install
- Difficult to operate
- Targeted technical users in academia
- 23 total sold
- **Claimed this was the end of their 36-bit machines**

PDP-10 (1966 – 1980s)

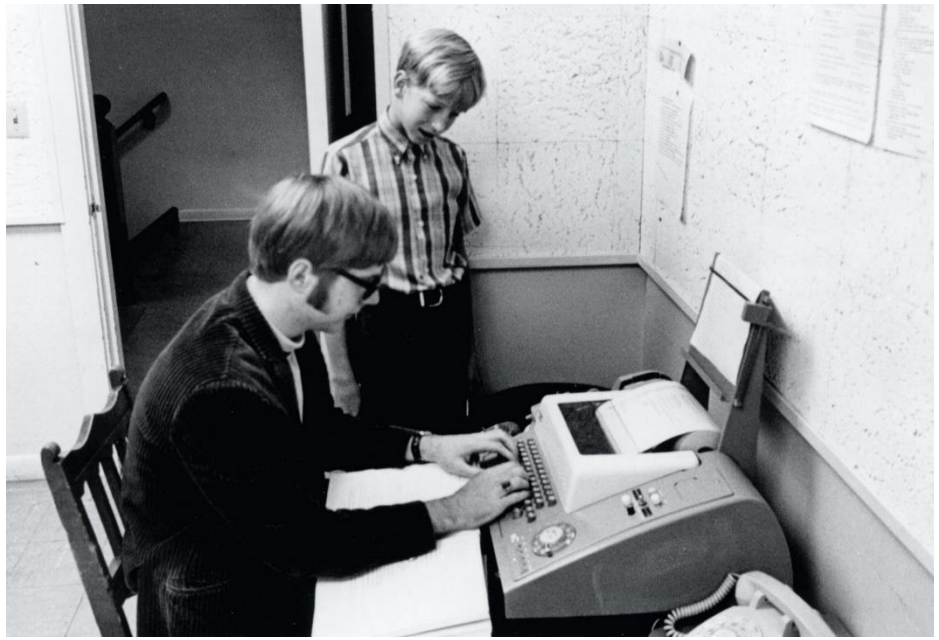
- Hardware Architecture
  - 36-bit words
  - 18-bit addressing
  - 16xGeneral-purpose 36-bit registers
  - 3 major processors
    - KA10 – Flip chip transistors
    - KI10 – TTL SSI (Small Scale Integrated Circuit)
    - KL10 – ECL (Emitter Coupled Logic)
- ISA
  - Almost same as the PDP-6
  - Used byte instructions

Time Sharing Architecture

- OS: TOPS-10 (later TOPS-20)
- Virtual Memory
- Supervisor mode
  - Instruction addresses correspond directly to physical memory
  - Access I/O operations via Unimplemented User Operations (UUO's)
- User mode
  - Addresses are translated to physical memory

PDP-10 Influences

- Birth of Open Source Development
  - Assembled different components from non-DEC developers
- Birth of variety of operating systems used
  - ITS (Incompatible Time Sharing by MIT)
- CompuServe data centers
- Paul Allen and Bill Gates to design Altair BASIC



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Picture source

- https://en.wikipedia.org/wiki/PDP-6#/media/File:Dec_pdp-6.lg.jpg
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