Computer Architecture

Ancient History
Computer Architecture
“Ancient History”

- ABC Computer - 1942
  - Iowa State College
  - Not fully developed

- ENIAC - 1945
  - University of Pennsylvania
  - Eckert and Mauchly
  - 30 tons, ~18K tubes
  - 200 uS cycle time, 5K ops/sec, ~500FLOPS
  - 36 tubes/digit, “10’s complement”
Computer Architecture
“Ancient History (con’t)”

• UNIVAC I - 1951 - First commercial computer
  • First Customer - US Census Bureau
  • Designed for business applications
  • ~5500 tubes, ~2K ops/second
  • Memory - 1K words, 12 chars each, mercury delay lines

• IBM 701 - 1952
  • 18 bit instructions, 36 bit registers
  • Memory - 2K 36 bit words
  • Add - 60 uS, Multiply - 456 uS
Computer Architecture
Some Software milestones

• FORTRAN ("Formula Translation")
  • Scientific Computing
  • Developed by IBM, 1957, Standardized

• COBOL
  • Developed by group headed by Grace Hopper
  • Business Applications
  • Developed for US Military, 1959
Computer Architecture
Mainframes

- IBM 360 - 1964
  - Cover the “full spectrum” of applications (a “360 view)
  - An architecture, not just an implementation
  - Many members of the family
  - Standardized some aspect of computing
    - Byte, floating point size
Computer Architecture
Minicomputers

- Digital Equipment Corporation (DEC) - mid ‘60s
  - Typically 16 bits, some models were 12 bit, 18 bit
  - Less restrictive environmental react
  - 1-4mB memory
  - DEC called them “Programmable Data Processors” (PDP)
  - Pinnacle: DEC VAX - 32 bit mini, competed with low end 360’s
Computer Architecture
Microprocessors

- INTEL 4004 - 1971 - 4 bit
- INTEL 8080 - 1974 - 8 bit
- INTEL 8086 - 1978 - 16 bit
- IBM PC - 1981
- INTEL 80286 - 1982
- INTEL 80386 - 1985 - 32 bit
- PENTIUM - 1993
Computer Architecture

RISC - “Reduced Instruction Set Computer”

• Three main projects
  • IBM 801 - 1974 (in research lab)
  • MIPS - Stanford - 1985
  • SPARC - Berkeley - 1987

• Acorn RISC Machine - 1983 (ARM)
  • Acorn Computer was a micro-computer company in the UK
  • Intellectual Property (IP) now owned by ARM Holdings