

# History of Computing

COMP 131  
Computer Science I w/ Lab  
Dickinson College



## History of Computing

- When was the first computing device invented?
  - Depends what is meant by “Computing Device”
    - Abacus (2400 BC)
    - Napier’s Bones (1615)
    - Slide Rule (1630)
  - Automatic Computers



## Computer Science

- What is Computer Science?
  - Algorithm Design and Analysis
  - Organization and Architecture
  - Artificial Intelligence
  - Databases
  - Operating Systems
  - Programming Languages
  - Theory of Computation
  - Networking



## History of Computing

- The history of computing is usually divided into generations:
  - Mechanical Era / Generation 0 (1623-1945)
  - First Generation (1937-1953)
  - Second Generation (1954-1962)
  - Third Generation (1963-1972)
  - Fourth Generation (1972-1984)
  - Fifth Generation (1984-1990)
  - Sixth Generation (1990-????)



## Mechanical Era (1623-1945)

- Analog Machines
- Digital Machines



## Mechanical Era (1623-1945)

- Digital Machines
  - Electromechanical Relays
    - Computing based on switches turning on and off.
      - Eliminates accumulation of error.
      - Basis for all modern computing.
    - [Harvard Mark I](#) (1944)
  - Programming:
    - [Punch Cards and Paper Tapes](#)

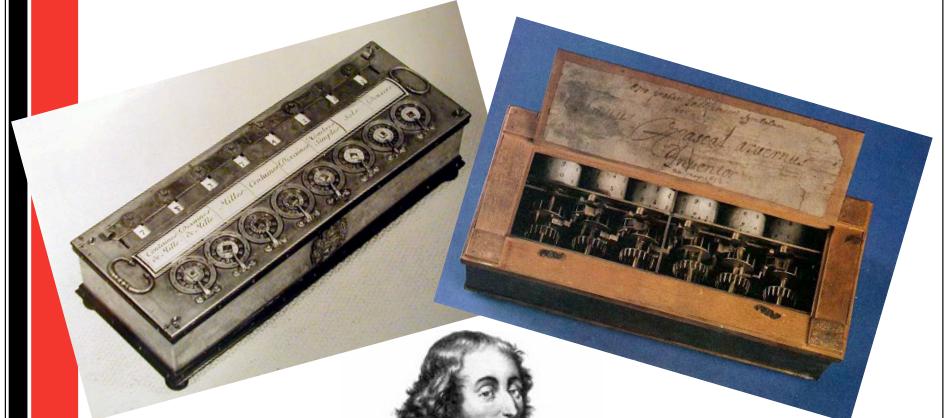


## Mechanical Era (1623-1945)

- Analog machines
  - Shafts and Gears
    - [Pascaline](#) (1642)
    - [Analytical Engine](#) (1842)
      - First programmable machine
  - Shafts and gears lead to *accumulation of error*.



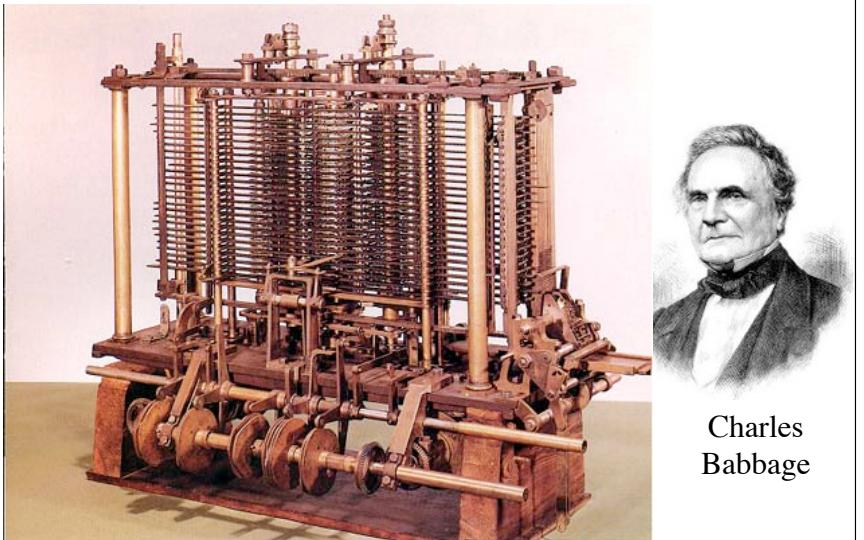
### Pascaline



Blaise  
Pascal



## Analytical Engine (1842)



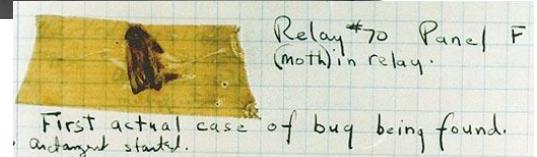
## Harvard Mark I



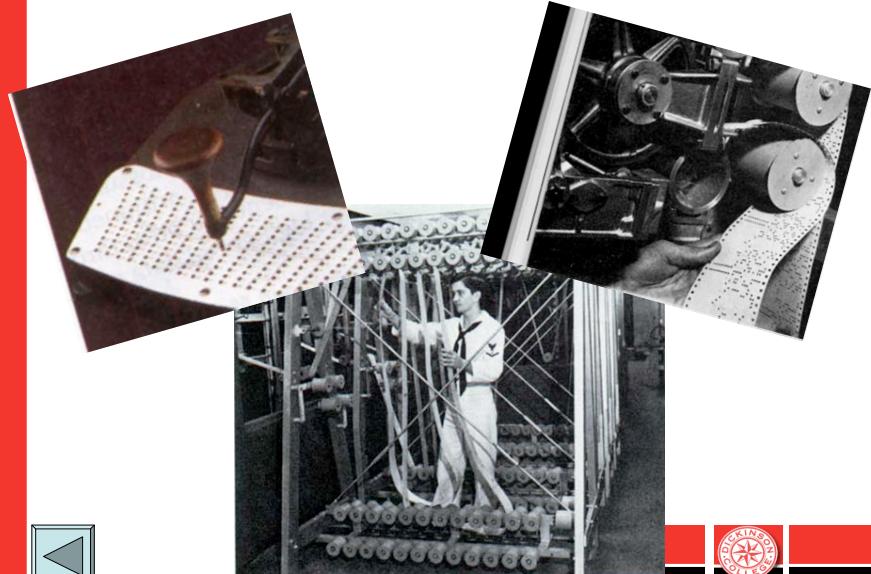
Howard Aiken



Grace Hopper



## Punch Cards and Paper Tape

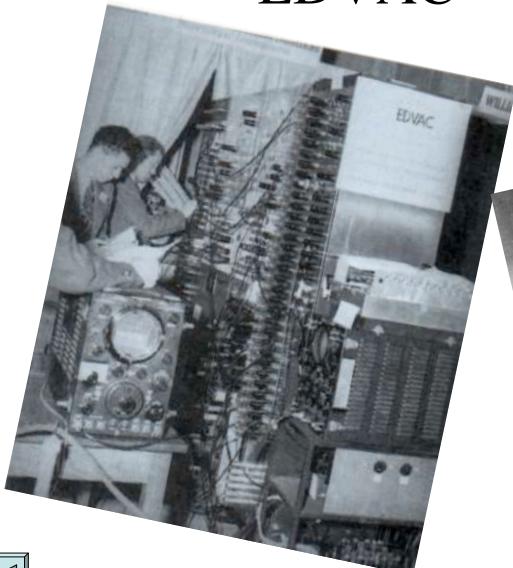


## First Generation (1937-1953)

- Vacuum Tubes
  - Exactly the same functionality as a relay
    - Fully electronic
    - No moving parts
    - Faster than relays
  - EDVAC (1948)
    - Stored Program



## EDVAC



John  
von Neumann



## First Transistor (1947)



John Bardeen  
Walter Brattain  
William Shockley



## Second Generation (1954-1962)

- Discrete transistors

- Same functionality as a vacuum tube
  - Smaller, faster, cheaper, more reliable

- First commercial computers
  - IBM (1954)

- High Level Programming Languages
  - Fortran (1955) / Cobol (1959)



## More Generations

- Third Generation (1963-1972)

- Integrated Circuits (10-1000 transistors / chip)

- Fourth Generation (1972-1984)

- Very Large Scale Integration (VLSI = 1k to 100k transistors / chip)
  - Personal Computing

- Fifth Generation (1984-1990)

- Improved VLSI (100k to 1M transistors / chip)
  - Parallel processing / Networking

- Sixth Generation (1990-????)

- Ultra LSI (10M to 100M transistors / chip)
  - Multiprocessors / Internet



## Apple I Computer (1976)



Steve Jobs  
Steve Wozniak



## Moore's Law

- “the density of silicon chips doubles every 18 months.”
  - Intel Founder, Gordon Moore (1965)

