Chapter 2

Generations and Trends in Computer Systems
First Generation Computers
- the vacuum tube -

• 1930 - vacuum tubes used as an electronic switch for computers
• 1937 Dr. John Atanasoff and Clifford Berry – “first” electronic digital computer (ABC)
  (Konrad Zuse in Germany in the late 30’s)
• 1943 – Alan Turing – Colossus – secret until 1970’s
• 1945 – Dr. John von Neumann – “stored program concept” – modern computers
• 1946 - ENIAC - Electronic Numerical Integrator and Calculator
• 1951 - UNIVAC - Universal Automatic Computer – first commercially available computer – predicts Eisenhower presidency
ENIAC

- Used during World War II - announced in 1946
- Built by Eckert and Mauchly at the University of Pennsylvania
- Lights dimmed in sections of city when first turned on
- 18,000 vacuum tubes
- 80 feet long and by 8.5 feet high
- 1900 additions in one second
ENIAC - changing a vacuum tube

Replacing a bad tube meant checking among ENIAC's 19,000 possibilities.
Second Generation Computers
- the transistor -

- 1947 - transistor invented at Bell Laboratories by William Shockley, John Bardeen and Walter Brattain
- replaced the vacuum tube as an electronic switch (off and on)
- faster, smaller, less expensive, more reliable than vacuum tubes
- (1953 – IBM model 650 – first widely used computer system)
- 1954 - TRADIC - Transistorized Airborne Digital Computer used 800 transistors
The transistor
Third Generation Computers  
- the integrated circuit-

- 1959 – Robert Noyce at Fairchild semiconductor (also IC – different technology) (later also founded Intel) (10 year legal battle with TI)
- (also known as chip, microchip, IC)
- faster, smaller, less expensive, more reliable than transistors and vacuum tubes
- can now fit many millions of electronic circuits (transistors) on a single microchip
- 1964 – approx. 18,000 computers worldwide
- 1965 – Digital Equipment Corp. (DEC) introduces first minicomputer – the PDP – 8 (timesharing)
Integrated Circuit (chip) - system of interrelated circuits packaged together on a sliver of silicon

Motorola's PowerPC™ 620 32/64-Bit RISC Microprocessor
Fourth Generation Computers
- the microprocessor -

- **1971** - Intel introduced the first microprocessor, the Intel 4004 (by Dr. Ted Hoff) (2300 transistors)
- **1975** – World’s first microcomputer – the Altair by MITS (no keyboard, mouse, screen, storage, software – kit $4000)
- **1978** – Apple II microcomputer – Steve Wozniak and Steve Jobs – “first successful mass-market computer”
- **microprocessor** - a CPU (Central Processing Unit) on a single chip
- **microcomputer** - uses a microprocessor (PC, Macintosh and others)
- faster, smaller, less expensive, more reliable
The microprocessor
A microprocessor
A microprocessor
Trends in computers

1. Faster
2. Smaller
3. Less Expensive
4. More Reliable
5. Easier to Use