Signal types:

- Analog signal
  - Most information types are inherently analog
  - Continuous time signal, each voltage has unique meaning
- Digital signal
  - Continuous signal where levels are mapped into 1 or 0
  - Convert a single analog signal to a set of digital signals

Transistor

- Electrical computers require some kind of “switching” technology that allows one signal to turn another signal on or off. From “vacuum tube” to “transistors”.
- Use semiconductor materials
- Much faster, smaller, reliable, dissipate less power
- Moore’s Law: number of transistors able to be fabricated on a chip doubles every 1.5-2 years

Transistor and Logic

- Transistors act as switches
- Logic operations formed by connecting them in series/parallel

Gate

- Each logic operation can be implemented ass a digital device called “gate”
- Each logic gate can be built by connecting transistors in various configurations

AND Gates

- Outputs 1 of ALL inputs are 1
- Can have several inputs
- Use truth tables

OR Gates

- Outputs 1 if ANY input is 1
- Can have several inputs

Buffer Gate

- Passes a digital value, strengthen it electrically

NOT(Inverter) Gate

- Inverts a digital signal to its negation

NAND & NOR Gates

- Add a NOT gate after AND/OR gates

XOR & XNOR Gates

- XOR: true if inputs are different; XNOR: add a NOT after XOR