54 68 65 72 65 27 73 20 6f 6e 6c 79 20 31 30 20 74 79 70 65 73 20 6f 66 20 70 65 6f 70 6c 65 20 69 6e 20 74 68 69 73 20 77 6f 72 6c 64 2e 20 54 68 6f 73 65 20 77 68 6f 20 75 6e 64 65 72 73 74 61 6e 64 20 68 65 78 61 64 65 63 69 6d 61 6c 2c 20 61 6e 64 20 46 20 74 68 65 20 72 65 73 74 2e

Number Systems And Computer Hardware

Binary Ruins Everything

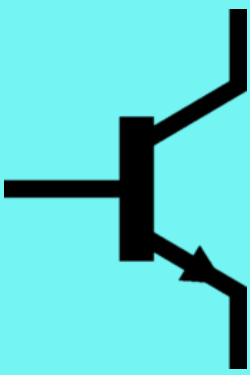
- Bi-nary: A number system that uses 2 digits 0 & 1

128's	64's	32's	16's	8's	4's	2's	1's	
1	0	1	0	0	1	0	1	= 1000101
128	+	32	+		4	+	1	= 165

- The above sequence is 8-bit (1 byte)
- A 64-bit storage can store numbers up to 9223372036854775808

Transistors

- Turns off and on billions of times/sec
- 7 nanometers thick

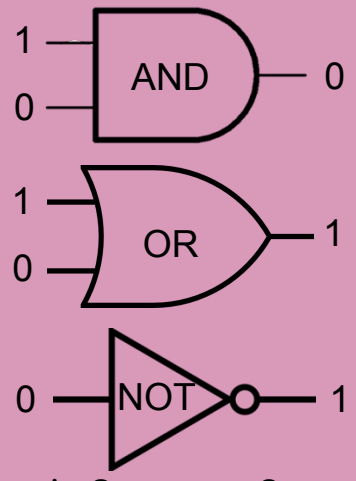


When it is on, it sends 1

When it is off, it sends 0

Logic Gates

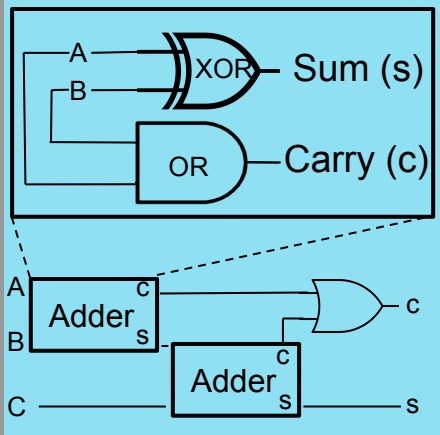
Takes input(s) & gives output based off logic arguments



Logic Gates are Created From Transistors

The ALU

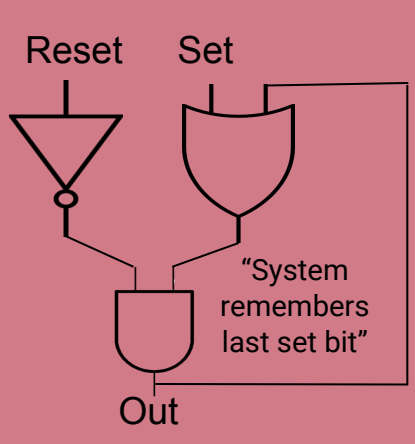
Performs Arithmetic & Logic Operations on Binary



Repeat these steps to create complex ALUs

The RAM

Allows data to be read and stored inside the memory



Combine similar components to form RAM

What about Octal & Hexadecimal

- *Binary is great and all, but it's hard to read. We need to* `simplify it`
- Base-10 may seem natural, but its hard to convert

The bases of Octal and Hexadecimal are **powers** of base-2 (4-bits are encoded in ever 2 hex digits)

- Html colors are often represented as a 6-digit Hex Code

#6BDEDE #A4E5F5 #C4C0ED #D17B88 #D999B9

Letters + Words?

- Letters were encoded in 2-digit hex code in WWII
- ASCII encodes capital/lowercase letters, & punctuation in 8 bits (It's how Mark Watney talked to Houston)
  - ASCII was designed for English and didn't take in account foreign languages and emojis 💩
- Unicode solved this problem with a 16-bit system (65,536)