Module

Data Types, Variables, and Constants

Lesson

Data Types, Variables, and Constants

Lecture

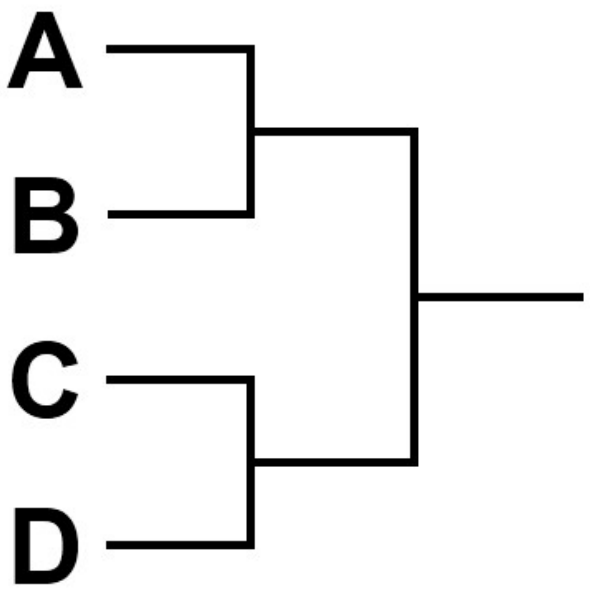
Bits and Bytes

Everything in a computer is represented in binary

What’s binary?

- Why do we care?
- 1s and 0s to represent anything, so computers are powerful
- But how many bits do we need to represent something?

Christmas morning, my family was trying to decide who of the 4 of us (one of my sons wasn't there yet) would get to open the first present using coin flips. My son (another computer scientist) and I came up with one answer while the non-computer scientists came up with another answer.



- Treat it like a tournament
- Flip 1: Person A vs Person B
- Flip 2: Person C vs Person D
- Flip 3: Winner of Flip 1 vs Winner of Flip 2
- 3 flips

00	01	10	11
A	B	C	D

- Use the power of binary!
- 00: Person A wins
- 01: Person B wins
- 10: Person C wins
- 11: Person D wins
- 0 for tails, 1 for heads
- 2 flips

$$2^b = n$$

We need b bits to represent n distinct things

- Recap
  - $2^b = n$
  - $b = \log_2 n$