Computer Science? WTF?

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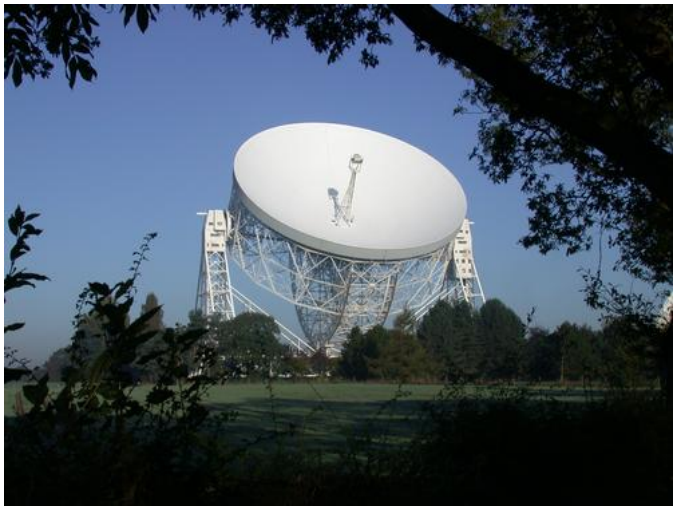
COMP6046, Lecture 2

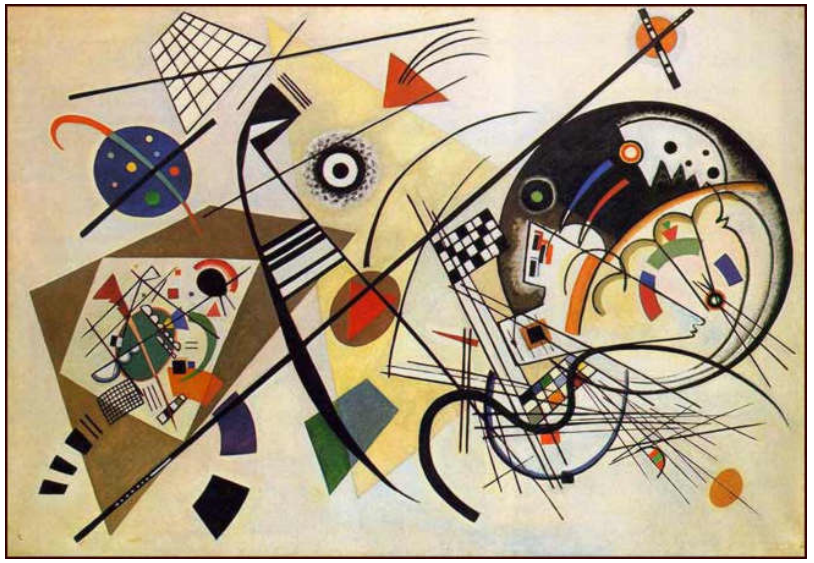
It’s Not Really About Computers

- Calling Computer Science “Computer Science” is like calling
- Astronomy



- Telescope Science

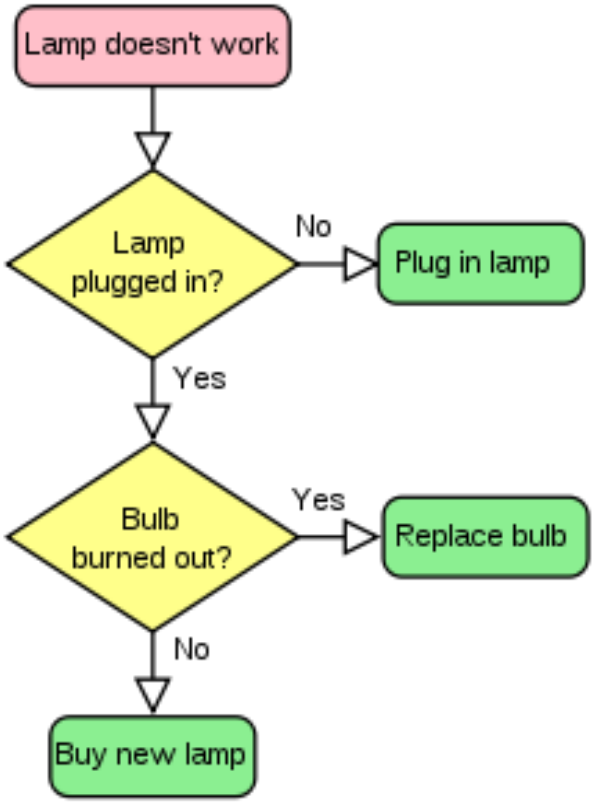
Abstraction



- Computer science uses *abstraction* as a tool for controlling complexity
- Systems building
- Black box
- Choose important properties
  - Ignore details

Algorithms

- Rules by which a process is carried out
- Governed by rules of mathematics
- Embodied in programs

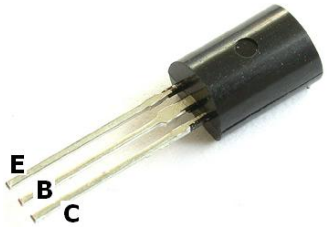


Computer Science is…

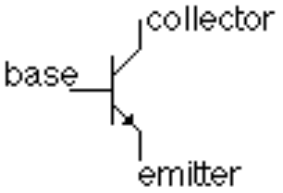
- theoretical foundations of **information** and **computation**, and of practical techniques for their implementation and application in computer systems

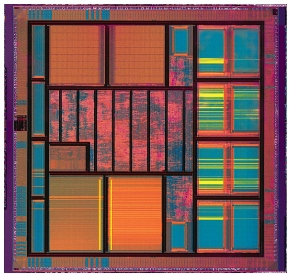
- systematic study of algorithmic processes that create, describe, and transform **information**

Smallest Things



- A transistor: an amplifier or a switch



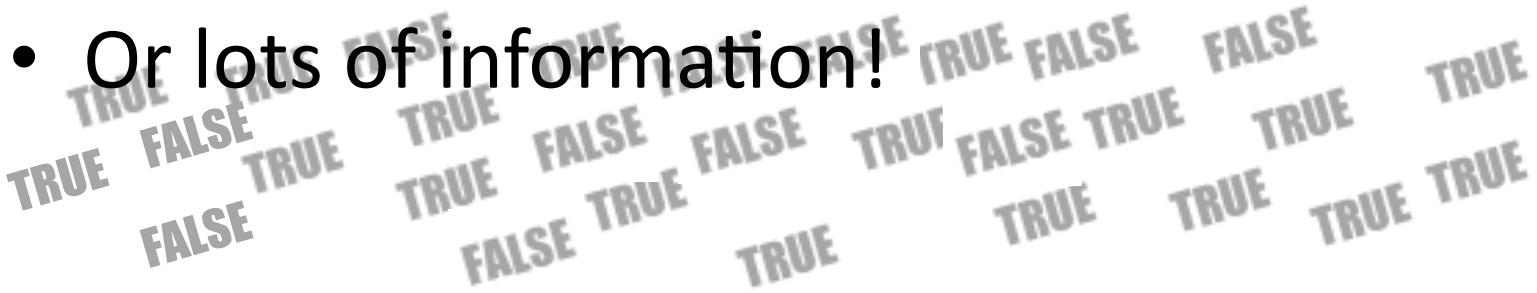


Chip: 10mmx10mm
Contains 125,000,000 transistors
Each transistor: 50nm

Influenza virus: 100nm
Visible light: 400-700nm wavelength

Computers Can't Add Up

- A logic gate consists of two transistors
  - NAND
  - AND OR NOT XOR
- A computer doesn't calculate numbers, it evaluates binary logic values
- From logic on single 'bits' we can build arithmetic on arbitrarily big numbers
- Or lots of information!



Information

- 1 byte = a character (256 values)
- 1 kilobyte =
- 1 Megabyte = size of a photo or a dissertation
- 1 Gigabyte = 30 mins of digital video
- 1 Terabyte = desktop computer hard drive
- 1 Petabyte = a decade of HD TV, or all of the photos on Facebook (10bn!)
  - Amount of information processed by Google in 1 day? 20 Petabytes!