

# Class 365

# Computer Hardware

# Hardware Vs. Software

## Hardware

-The physical parts of a computer

-The Guitar = Hardware

-The Bike = Hardware

## Software

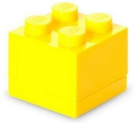
-The code that runs on the hardware

-Sheet Music = Software

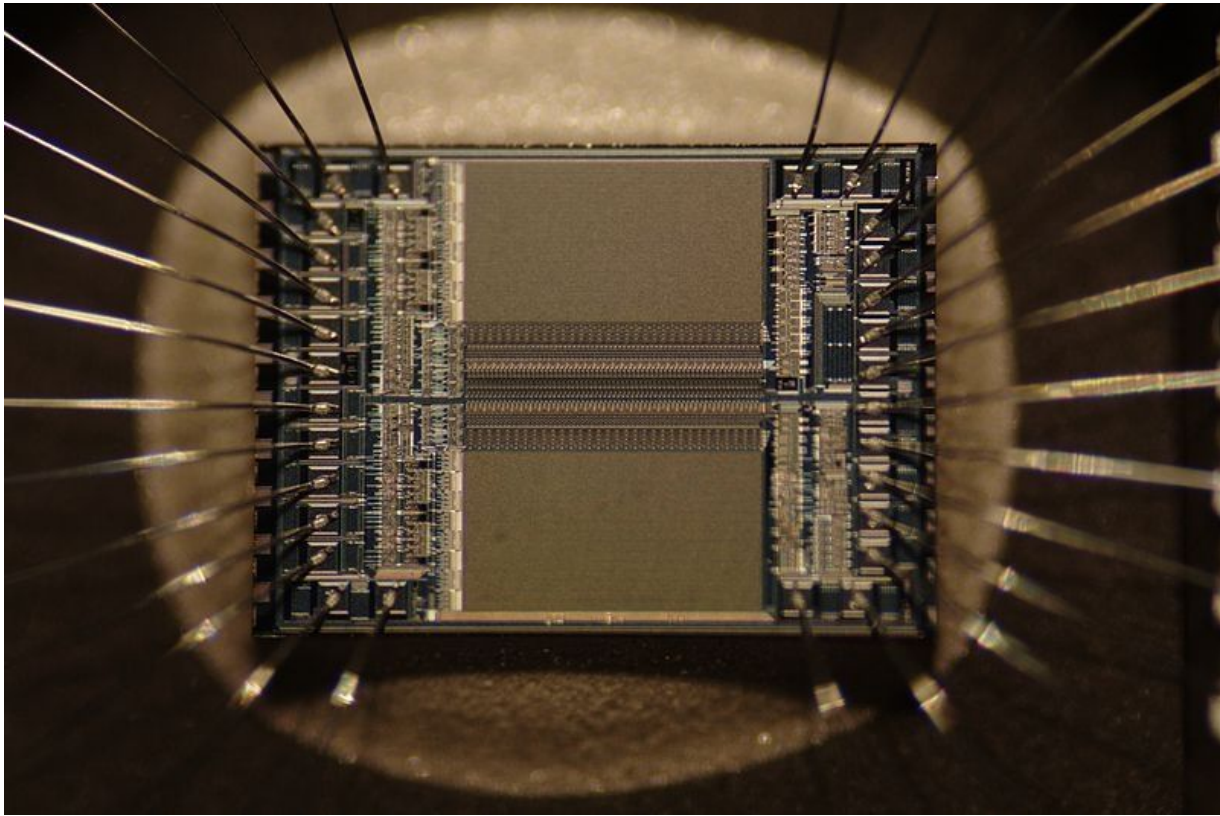
-You = Software

# Transistors

- The smallest building block of computing
- A switch that can be in either an ON or OFF position
- State is changed by electrical current
- Solid State (no moving parts)
- A collection of transistors etched on to a piece of Silicon is called a Chip



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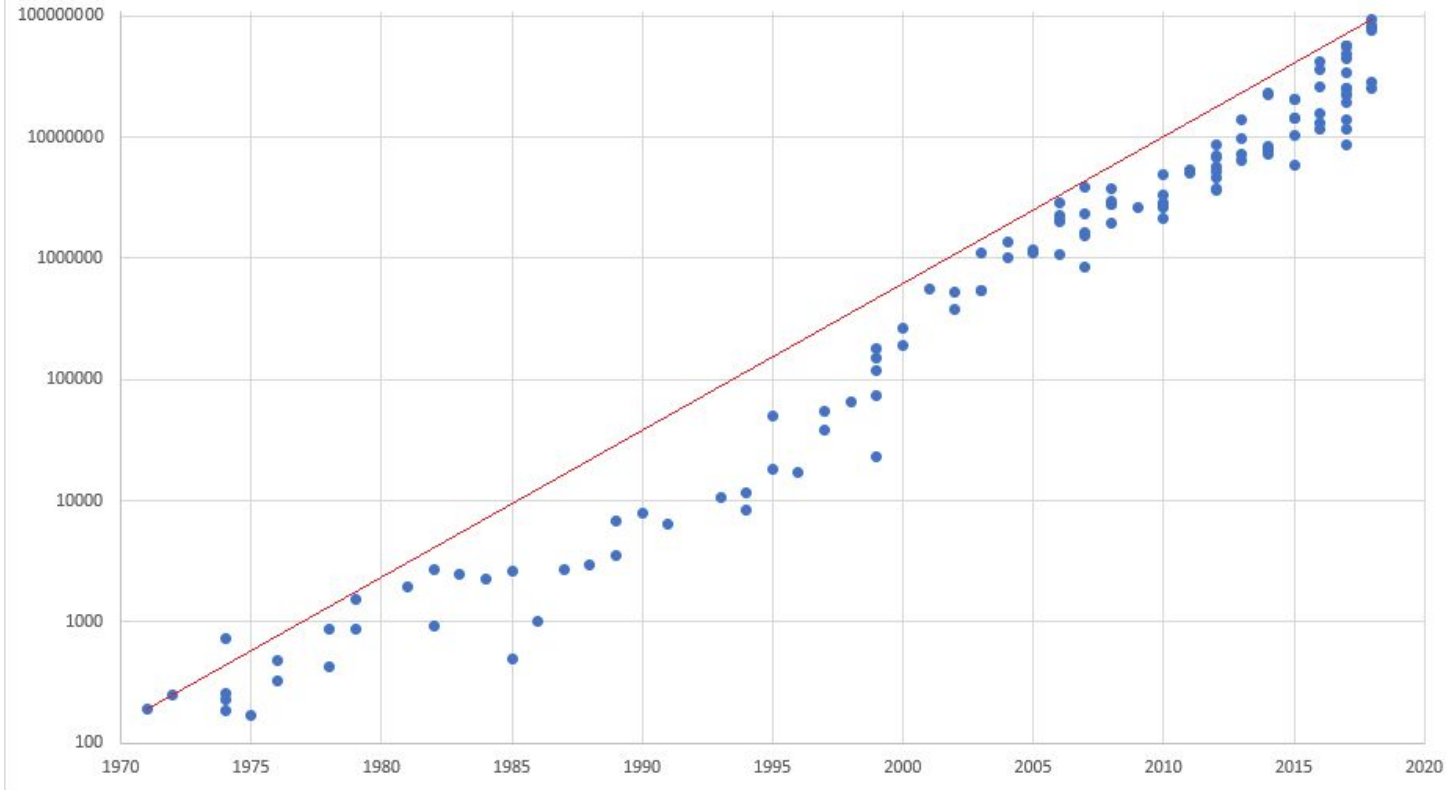
<https://web.stanford.edu/class/cs101/hardware-silicon-chip.jpg>

# Moore's Law

- Moore's Law states that density of transistors on a chip doubles every 2 years
- Is not a rule, simply a consistent observation
- This does not mean speed will double, but it is useful in other ways.

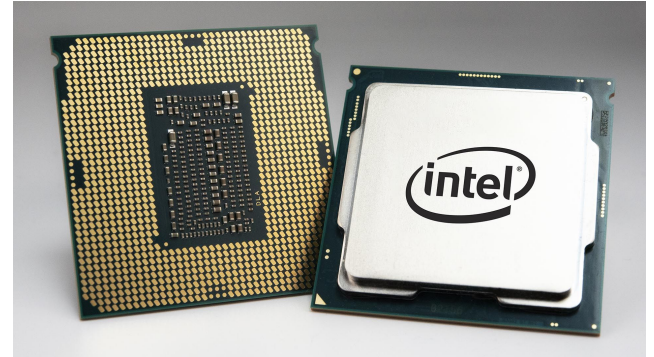
# Moore's Law is Alive and Well!

## Transistors per Square Millimeter by Year



# Central Processing Unit (CPU)

- Made using silicon and billions of transistors
- Acts as the main “brain” of the computer
- Performs calculations, such as adding two numbers
- does the active running of the code you give to it





# A few interesting things about CPUs

- A 1 gigahertz CPU can do one billion operations in one second

- A 2 gigahertz can do 2 billion

- 2 cores does not mean twice as fast. It will increase speed, and the ability to multitask.

- cores work semi-individualistically

Ex. having two cars wouldn't make you get to your location twice as fast

# Random Access Memory (RAM)

- also made up of transistors
- Stores data that is needed quickly
- assets loaded by websites, any running application will be using your ram heavily.

# Persistent Storage

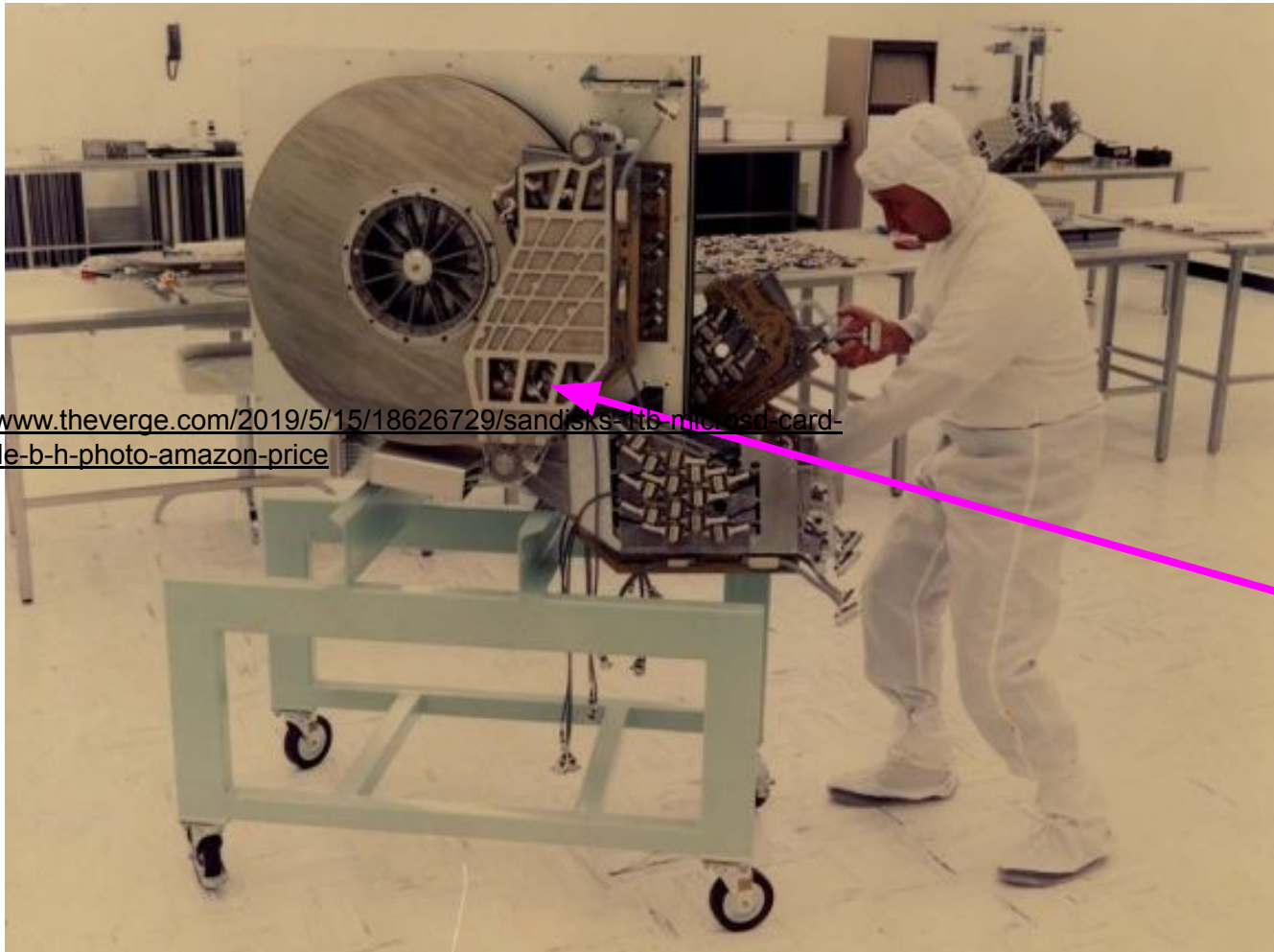
- Preserved even when not powered
- Old Tech = Hard Disk Drive (HDD)
- New Tech = Solid State Drive (SSD)

# HDD

- OLD school
- A magnetic spinning disk
- loud
- slower
- CHEAP

# SSD

- Solid state (like the transistors, remember?)
- Much more popular nowadays
- better in literally every way except price
- Does not last forever, is limited by a number of cycles, however that number of read write operations is so high that it is less concern nowadays



<https://www.theverge.com/2019/5/15/18626729/sandisks-1tb-microsd-card-available-b-h-photo-amazon-price>

3.75 mb  
WOW!



<https://www.theverge.com/2019/5/15/18626729/sandisks-1tb-microsd-card-available-b-h-photo-amazon-price>

# Software

- the code that actually runs, and gives your computer directions on what to do
- cannot be held



# VM (virtual machine)

- An abstraction of a computer created using certain amounts of your own computer hardware
- can be set up to use as many or as little resources as you want
- used for testing applications in a safe environment, with fewer outside factors to account for

# Assignment

1. Create a github repository
2. Create a folder on your computer, and initialize a git repo locally
3. Create a file in the folder you have created.
4. Add, commit, add remote origin, and push to the cloud
5. Make a change to the file
6. Add, commit, and push to the cloud