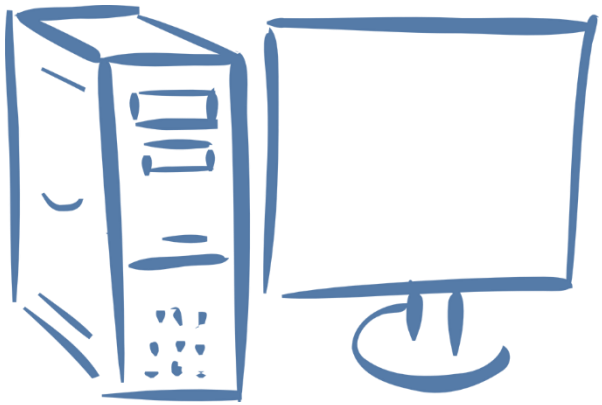
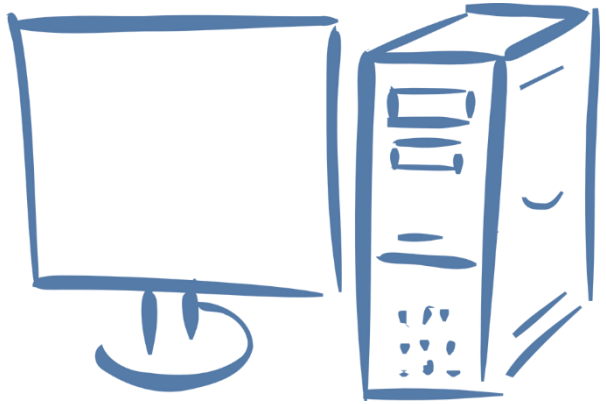
08/20/18

Advanced Placement Computer Science Principles
The Information Age



Where is it heading?
How big is the information?

Lesson 0-2



Objectives

Content: I will learn the relative measures of computer storage.
Language: I will discuss &record ideas with my classmates how technology has been changing..
Social: I will have productive conversations with my classmates.

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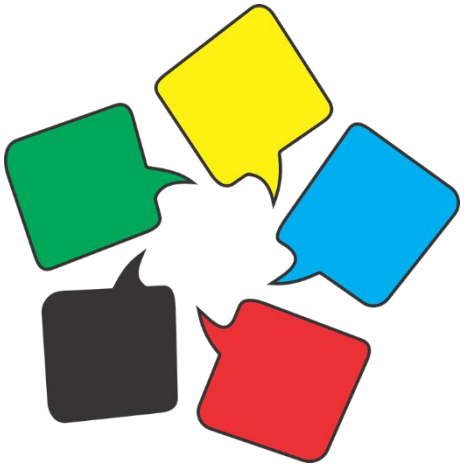
Journal Entry

How do you think computers and technology were different for your parents than for you?



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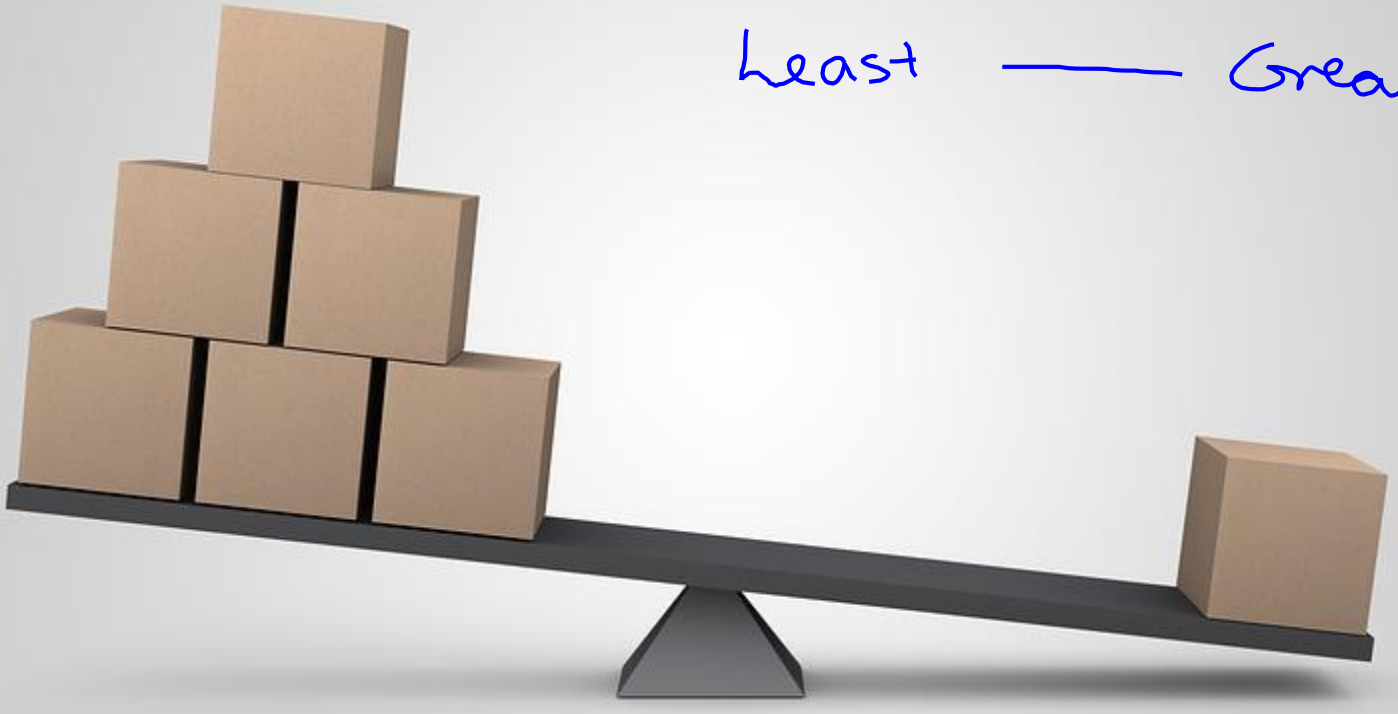
BAYLOR
BEARS

Relative Size



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Measured Quantities

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How Big is Big?

How big is 1,000? kilobytes

Is it big or small?

If we're talking about **milliseconds**, 1000= the number of milliseconds that it takes me to say "one thousand". Is that big?

If we're taking about **pixels** (*dots on a computer screen*), then 1000 a few inches. Is that big?

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Measuring size in the Information Age

- Size of information
  - A bit is a single binary digit: a 0 or 1
  - A byte is 8 bits, big enough to store one digit of a number or one letter of a word
  - A kilobyte is about 1,000 bytes, 1024 enough to store a double spaced page of writing, or a tiny picture.

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- megabyte = (a million bytes) A small novel, or a minute of high quality sound
- gigabyte = (1 billion bytes) A symphony in high fidelity. One movie. All the words on a pickup truck filled with paper.
- terabyte = (1 000 000 000 000 Bytes) All the books in the Library of Congress. One day of data from the NASA Earth Orbiting Satellite
- petabyte = (1,000 TeraBytes) all words in all the libraries in the USA
- exabyte = (1,000 petabytes) a typed list of all the words ever spoken by humankind
- zettabyte = (1,000 exabytes) all video recorded for TV and movies
- yottabyte = (1,000 zettabytes) amount of data the National Security Administration can store

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Show the video: The information age. Big Data is Changing the World (3:51)
https://www.youtube.com/watch?v=WFgT9KCxQ0k

It's an advertisement for Oracle.
Oracle is a database company that specializes in storing data for businesses.

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Activity – step 1

- Make some guesses:
  1. How many people used the Internet each day in 2000?
  2. How many people use the Internet each day now?
  3. How often did the electric company check the meter for each house in the 1990's?
  4. What about now?
  5. How many searches a day were done on Google in 1998?
  6. How many searches a day are done on Google now?

Work in groups to come up with your best estimates.
Write them down and see which group comes closest.

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Activity – step 2

- Find the right answers:
  1. How many people used the Internet each day in 2000?
  2. How many people use the Internet each day now?
  3. How often did the electric company check the meter for each house in the 1990's?
  4. What about now?
  5. How many searches a day were done on Google in 1998?
  6. How many searches a day are done on Google now?

1969

738 million

More than 1 billion

Once a Month

9

10 thousand

3.5 billion per day

How close were you?

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The Computer Revolution

- How fast did this happen?
  - 1973: HP 65 (programmable calculator)
  - 1977: Apple II (a huge breakthrough, the first mass-produced, inexpensive personal computer)
  - 1982: First version of Windows OS
  - 1998: Google founded
  - 2007-8: first iPhone and MacBook Air
  - And since then?

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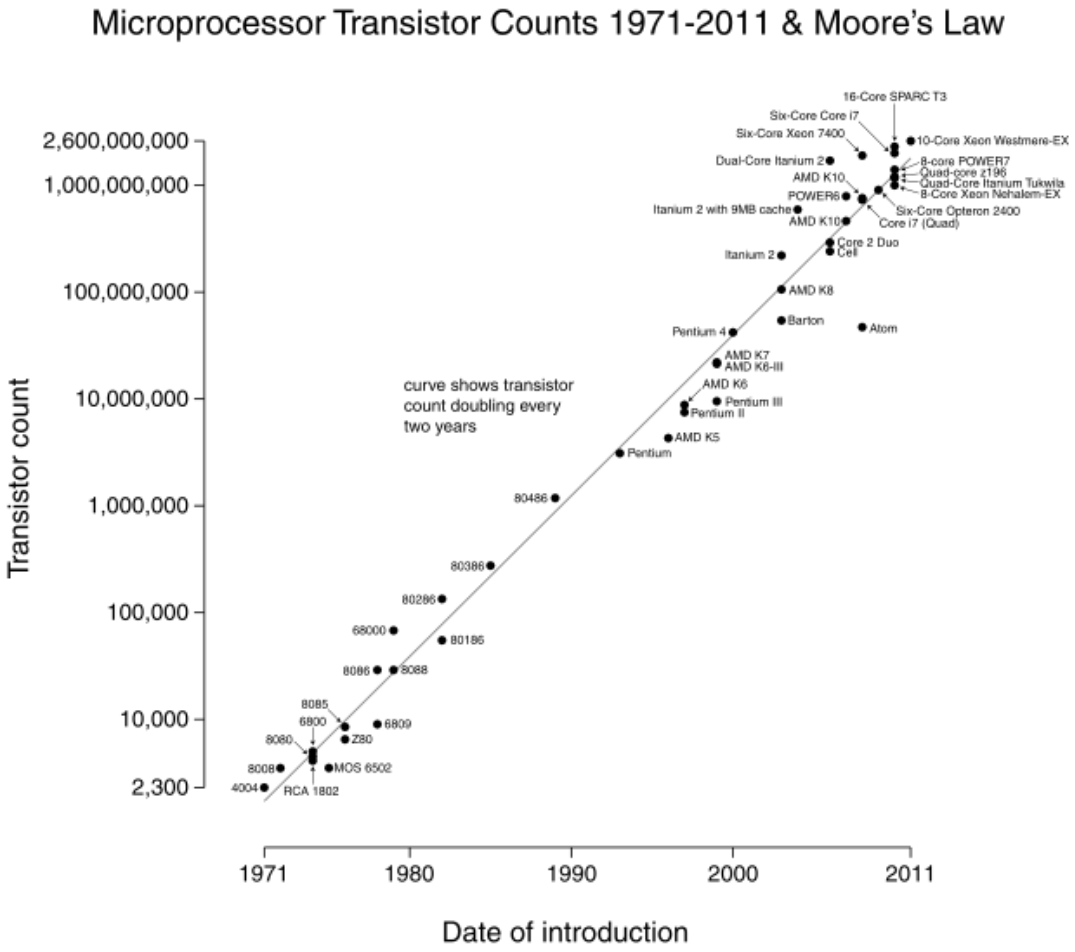
How fast is it changing?

Moore's Law

- Computer memory (and processing speed, resolution, and just about everything else) increases exponentially
  - (roughly: doubles every 18-24 months)



* Source: wikipedia

What Was It Like Then?

- The PDP-11/70s in the 80's had 64K of RAM, with hard disks that held less than 1M of external storage

*

It's Not Just Speed, It's Quantity

- So just how big a revolution are we talking about?
- How many computers do you think were in the room in a college programming class in the 1980's?
  - Answer: ZERO.
- ***How many computers are in this room?***

*

“The work performed by the computer is specified by a program, which is written in a programming language. This language is converted to sequences of machine-language instructions by interpreters or compilers, via a predefined set of subroutines called the operating system. The instructions, which are stored in the memory of the computer, define the operations to be performed on data, which are also stored in the computer's memory. A finite-state machine fetches and executes these instructions. The instructions as well as the data are represented by patterns of bits. Both the finite-state machine and the memory are built of storage registers and Boolean logic blocks, and the latter are based on simple logical functions, such as And, Or, and Invert. These logical functions are implemented by switches, which are set up either in series or in parallel, and these switches control a physical substance, such as water or electricity, which is used to send one of two possible signals from one switch to another: 1 or 0. This is the hierarchy of abstraction that makes computers work.”
-- W. Daniel Hillis, *The Pattern on the Stone*

Group Brainstorm

What new technology might the next generation have?

How will technology be different in these categories?

- Communication
- Education
- Automation (robotic)
- Transportation
- Medicine & health
- The internet
- Privacy
- Entertainment