overview

- moore's law is about number of transistors per unit area, not about performance/speed.
- until 2002, computers got really fast each year and then they hit the heat wall → they couldn't increase the frequency enough to cool down the systems enough because of limitation of rate of heat absorption by air.
- since then its been about many cores and parallelism, but you can't always naively take advantage of this.
- memory mapping a device means treating as though reading/writing to main memory. a certain amount of the address space is devoted to the device.
- a virtual machine is one that supports the software emulation of an entire OS + applications running on it.
- a hypervisor or virtual machine monitor (VMM) is computer software, firmware or hardware that creates and runs virtual machines. A computer on which a hypervisor runs one or more virtual machines is called a host machine, and each virtual machine is called a guest machine.
- OS is kind of like the government + laws. it makes sure resources can be shared for everyone's good, without letting one or a few screw over the rest, in theory.
- "the one program that's always running on the computer" is the kernel. this is the core of the OS. everything else is system programs or apps.
- why do cloud providers rent out VMs?
  - isolation
  - you can break up a big machine into many small VMs and rent 'em out, in a way that you can make up the VM as required (during the day, many small VMs and during the night few big ones, all made from the same underlying instances)
  - legacy systems can keep running as is, because the OS and software in the VMs can be copied and replicated and as many copies as needed can be run