Moore’s Law

Define Moore’s law and explain why it has now stopped being true. Be sure to describe all of the physical limitations that have prevented Moore’s law from continuing to be true.

Moore's law is an observation that the number of transistors double every 2 years.

Moore’s law stopped being true because more transistors means more heat in our microchip, that is because if power increases temperature increases.

Transistors consume power when they switch.
Power increases as transistor density increases.

Dynamic Power formula:
$P = \alpha . CFV^2$

α is percent of time of transistors switching.

C is capacitance (related to size of the transistor) goes down as the transistors shrinks.

F is the clock frequency (want to increase).

V is voltage swing (from low to high).

can't increase frequency because Dennard Scalling. so we increase the number of cores.

Dennard Scalling

Voltage should scale with transistor size.

Keeps power consumption and temperature low.

Problem: Voltage can't go too low

- Must stay above threshold voltage
- Noise problems occur

Problem: Doesn't consider leakage power.

Dennard Scalling must stop.