Le Gia Hoang

Ian Harris

Moore's law

22 June 2020

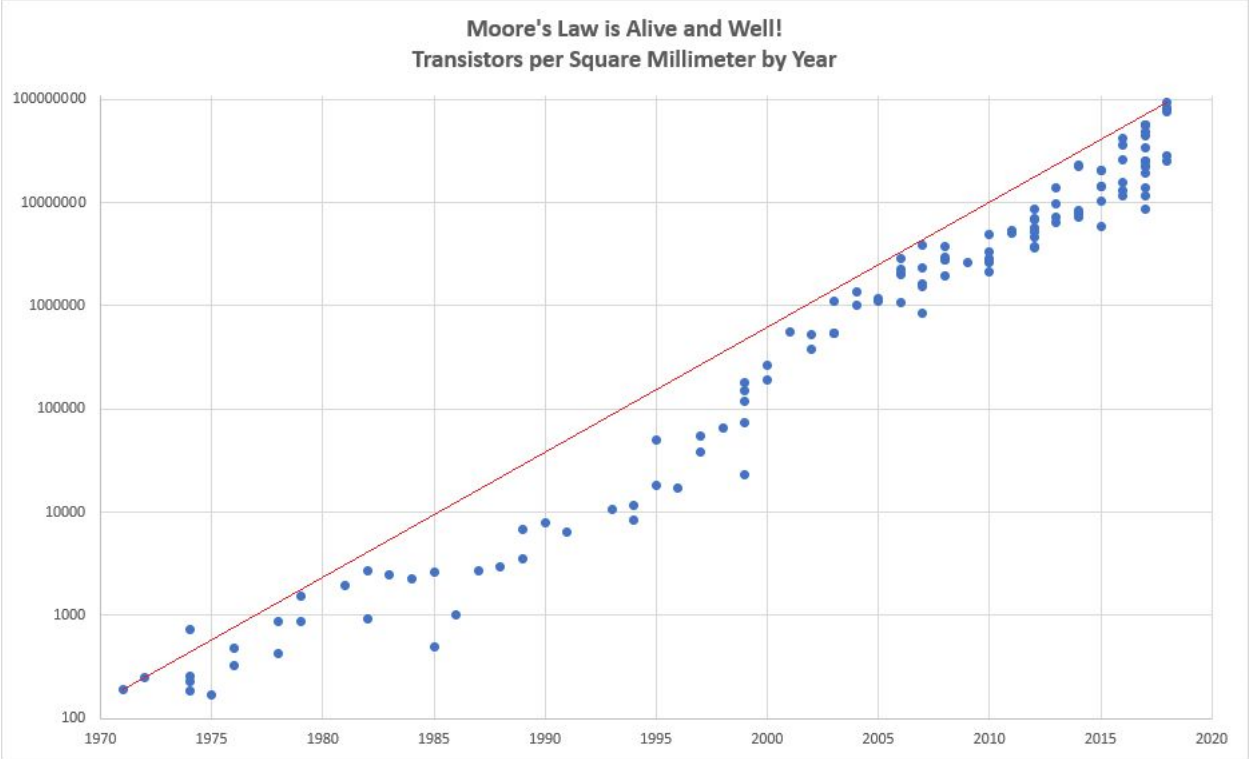
Question: **Define Moore's law** and explain why it has now stopped being true. Be sure to describe all of the physical limitations that have prevented Moore's law from continuing to be true.

Moore's law

Moore's law

It's a prediction that transistor density would double every two years.

It's not really a law but an observation



Why It has now stopped

To keep transistor density double every 2 years, Transistor size needs to be smaller and It's really hard work to keep the transistor smaller. Hardware designers are the one who need to figure out on How to get these transistors smaller.

Physical limitations

- Power/Temperature:
    - Transistor consume power, which generate heat and Cooling technique like fans can only remove a limit number of heat
    - $P = \alpha * CFV2$-as Dynamic Power equation we want to keep V low but it's impossible due to:
        - Voltage must stay above certain threshold
        - Noise margin need to maintained
        - Leakage power: because insulators get smaller as transistor

Others:

One day **IF** we will reach the atomic scale where we will have a transistor a fews atoms or maybe one atom length, This will be an absolute limit on the **moore's law**

Practically, It's really hard to keep making transistors smaller.

Works Cited

Martin, Eric. "Moore's Law Is Alive and Well." *Medium*, Predict, 11 Nov. 2019,

medium.com/predict/moores-law-is-alive-and-well-eaa49a450188#:~:text=Moore's Law states that transistors,well Moore's Law is doing.