

Define Moore's law

Moore's law is not a law, but an observation and projection made by Gordon Moore by historical increase in transistor density. It states that transistor density would double every two years.

However this law reached its limitations and stopped being true because of the following reasons:

- Densely packed transistors generate a lot of **heat, and temperature increases as power increases**. Having more active transistors results in a larger number of simultaneously switching, which consumes more power. This leads to heat and dissipation and cooling is a hard problem to resolve in most air-cooled devices. Power required **could be scaled by voltage scaling based on the Dynamic Power Equation** (<https://www.intel.com/content/www/us/en/docs/programmable/683418/21-1/dynamic-power-equation.html>), which would reduce the heat generated, but there is a **minimum threshold of voltage for activation** that prevents that.
- Also there are some other issues that can't be solved by voltage scaling. As transistors get very small, the insulation between them is smaller which can cause **quantum tunneling**, where electrons can jump between components and cause error. Signal interference is an issue with densely packed transistors because of **electromagnetic interference**.