Prompt: 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.

Description:
Moore's law is more an observation than a physical law like Newton's laws of gravitation etc. It basically places confidence in the fact that every two years, the density of capacitors on a processor increases. However, in recent times this principle has stopped being true due to physical limitations on a processor mainly due to power constraints.

The physical limitations that have prevented Moore's law from continuing to be true are clearly presented in factors represented in Dennard's scaling. Some of these physical factors are:

- device dimension and thickness
- doping concentration of the transistor MOSFET
- voltage
- current
- capacitance
- heat
- delay time
- transistor power

For Moore's scaling of transistors to be true, newer hardware needs to fit more transistors onto a limited size board in order to increase computing performance. Since the total area has to remain consistent, the size of the transistors have to go down in order to admit more number of transistors. As the size of a MOSFET transistor goes down, we want to preserve performance by scaling it down proportionally but fitting many transistors can lead to nano-scale problems which often can permit power-leakage (or tunnelling in electron-wells). These constraints also need to permit lower or similar power consumption in order to not heat up the processor. These physical limitations have played a significant role in hardware not being able to keep up with industrial processor demands which has necessitated more cores in GPUs and other software optimizations to meet speed demands.