

Moore's law is an observation that the transistor density would double every 2 years. Doubling the transistor density makes them smaller thus increasing the speed.

It was true until few years ago. Now the processors reached the saturation point that the doubling of transistors has become very difficult.

The Physical limitations for Moore's law not working is:

- ➔ Power wall: As you increase the number of transistors on the chip, the power consumption goes high. Even when the power consumption is not an issue, but more power consumption emits more heat. When it reaches the extreme heat, the chip could be damaged.

Power can be computed by  $P = \alpha * CFV^2$

$\alpha$  = number of switching

C = capacitance

F = clock frequency

V = Voltage

- ➔ Dennard Scaling: If you scale down the voltage you can keep the temperature and power consumption low. This cannot be used as
  1. the voltage cannot be very low.
  2. There can be noise in the voltage signals.
  3. Doesn't consider leakage power.

From the Power equation we can increase the number of cores instead of clock frequency. Clock Frequency goes up slowly than any other parameters.