Moore’s Law

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Moore's Law is the observation made in 1965 by Gordon Moore, co-founder of Intel, that the number of transistors per square inch on integrated circuits had doubled every year since the integrated circuit was invented. Moore predicted that this trend would continue for the foreseeable future. In subsequent years, the pace slowed down a bit, but data density has doubled approximately every 18 months, and this is the current definition of Moore's Law, which Moore himself has blessed.

Moore's law is an observation and projection of a historical trend and not a physical or natural law. Although the rate held steady from 1975 until around 2012, the rate was faster during the first decade. In general, it is not logically sound to extrapolate from the historical growth rate into the indefinite future.

Moore’s law is stopped being true in today’s world because of several reasons which are as follow:

- Power increases as transistor density increases.
  As the transistor density increases, total amount of power which is consumed also increases because now there are more transistors to consume power.

- Temperature increases as power increases.
  The tower power increase on the dice where all transistors are installed results in the amount of heat which gets dissipated when transistors change their state.

- Voltage scaling reduces (dynamic) power consumption.
  The power which is applied to the transistors is directly proportional to the square of voltage applied to it. So if we reduce the voltage scaling total dynamic power can be reduced hence the amount of heat dissipation.

- Voltage scaling cannot prevent leakage power loss.
  When transistors are made very small the insulation between the layers of transistors also gets thinner. When we are considering micro or even smaller scaling the insulation can’t prevent the flow of leakage of power. Hence beyond certain size we can’t make transistors smaller.

- Voltage scaling is limited due to noise or threshold voltage.
  Transistors get activated when the applied voltage is above its threshold voltage. So when voltage is applied there is always some noise and due to which the applied voltage is not exactly we say. It could be either littler smaller or slightly larger than the actual voltage value. So we have to ensure that the voltage is large enough such that it can handle such noises.