

1. The definition of Moore's law:

There is the observation that every two years the density of transistors will double due to the hard work on hardware.

2. Why the law is not true now:

Because of the power and temperature limitation: not matter how small the transistor is, the battery can be run off easily if the density is too high, and more important is that the higher density consuming larger power will bring higher temperature that may melt the transistor(the air cool, also some pipe cool for super computer can only remove part of the temperature.)

To be more specific, there is a power wall for increasing the density of the transistors. Considering the dynamic power equation: $P = aCFV^2$, to reduce the power used when switching the transistors, the voltage 'V' can be extremely important. And according to Dennard Scaling, the voltage should scale while doubling the density. However, the decrease of voltage scale also has the limitation:

- (1) Voltage scaling cannot prevent leakage power loss.
- (2) Voltage scaling is limited due to noise or threshold voltage.