To search page

1965

Moore's Law proposed (Gordon E. Moore)

~ Integrated Circuit ~

The core part of the article on April 19, 1965 issue of Electronics Magazine is as follows.
Title: Cramming more components onto integrated circuits
The complexity for minimum component costs has increased at a rate of roughly a factor of two per year... Certainly over the short term this rate can be expected to continue, if not to increase. Over the longer term, the rate of increase is a bit more uncertain, although there is no reason to believe it will not remain nearly constant for at least 10 years. That means by 1975, the number of components per integrated circuit for minimum cost will be 65,000. I believe that such a large circuit can be built on a single wafer.

When Moore announced this paper, the degree of integration per chip was about 64, with the past trend graphically shown in Fig. 1. Moore predicted that it would be possible to integrate 65,000 elements in 1975, after 10 years, from the past trend of integration enhancement of twice every year.
Actually, in 1965, when this paper was published, Intel had not been established yet, and there existed neither world’s first MCUs, nor the world 's first DRAM. Although it is generally called “Law”, there was no technical grounds at that time, and it was a prediction more than a law. However, its prediction was supported by the actual increase of the degree of integration over 40 years, and it became a law.

Moore's Law has become a basic guide for semiconductor technology development and management. The miniaturization of semiconductor has been advanced with investment of enormous funds and huge engineering resources, but this was achieved by aggressive investment by the managers who believed in Moore's Law, coupled with the efforts of engineers. In fact, degree of integration has improved, and the higher functionality of LSI and the cost reduction have been achieved according to Moore's Law.
In the rule that "the number of transistors integrated in a semiconductor device doubles in 18 months to 24 months", there were some discussions whether it was 18 months or 24 months. It was initially said to be 18 months in the industry, but Moore himself insisted that he had never said 18 months, and he reconfirmed the prediction of doubling in every 24 months (2 years) in 1975. Looking back the actual integration enhancement in the last 40 years, the pace of double in about 24 months has been maintained.

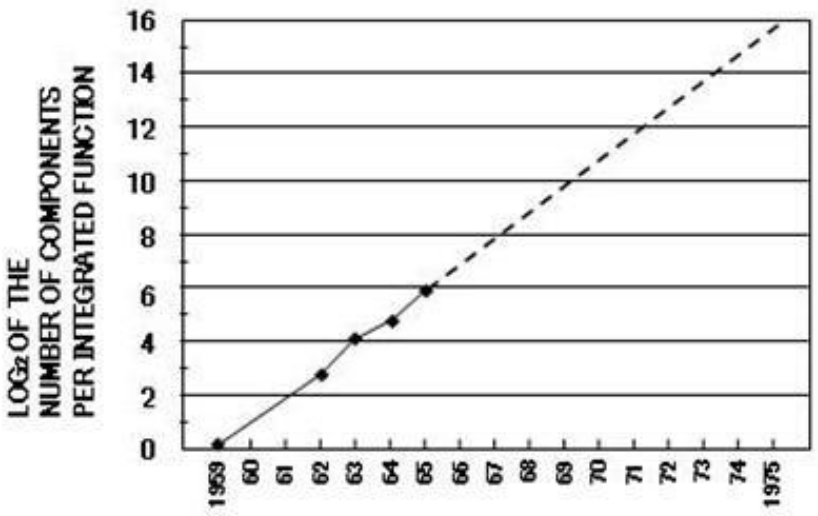

Fig.1: Figure which Moore presented on “Electronics” magazine in 1965, showing that integration level would increase by twice a year

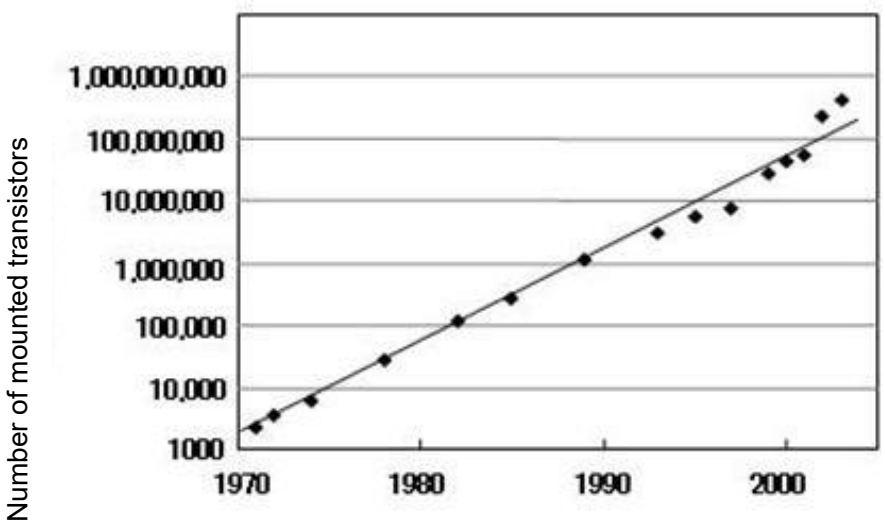

Fig.2: Actual progress of integration level (Intel MPU)

Version 2019/1/23