Electronics: Out of Style or Keeping on Style?

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**Introduction**

In the process of technological development, the power consumption and price of computer chips are decreasing, the manufacturing cost of unit computing power is declining, and Moore's Law still dominates everything. Many of the computers that were purchased three years ago have now outperformed their computing power. However, the price and performance of a new generation of products have provided tremendous appeal to these older machine users. But not all areas of the computer must keep up with the trend. At any time, according to the purchasing power, making a reasonable choice of hardware configuration is the most sensible choice.

**1. Moore's law and Von Neumann architecture**

Gordon Moore, then at Silicon Valley Fairchild Semiconductor in April 1965, published the famous “Moore's Law.” (Weng, 1998) He watched the data from 1959-1965 on the chip and found that the number of transistors on a chip doubles every 18-24 month. As a corollary of Moore's Law, the microprocessor, at a constant cost, Doubled every 18-24 months. For more than 30 years, Silicon Valley semiconductor companies have followed this rule. The observation is named after Gordon Moore, whose 1965 paper described a doubling every year in the number of components per integrated circuit, and projected this rate of growth would continue for at least another decade. In 1975, looking forward to the next decade, he revised the forecast to doubling every two years. The period is often quoted as 18 months because of Intel executive David House, who predicted that chip performance would double every 18 months (being a combination of the effect of more transistors and the transistors being faster).

After the first computer releasing, the structure of the computer hasn’t changed very much yet. They are all designed based on John von Neumann’s research. Von Neumann architecture is the basic design idea of stored procedures and program control. The use of stored procedures means that programs are programmed and stored in main memory in advance, and the computer can automatically and continuously retrieve instructions from memory and execute them once the program is run. (Yue, 2012)

**2. Ryzen Processor Release**

AMD released their new central processing unit(CPU) on 3, 2017 and they named it Ryzen. A great compact was given by Ryzen. Ryzen is cheaper and more powerful than other products in the current market.

Intel hastily releasing the new Core i9 against his enemy AMD. The battle between the two companies makes the CPU market more active, which undoubtedly helps consumers to buy. Many of the technology for the i9 CPU comes from the server platform. Intel has long used these technologies on the Xeon processors in the 14nm process. Now the i9 uses these technologies to enhance the process technology. Some of the technologies of the Xeon processor allow Intel’s new platform to achieve even greater performance with lower power consumption. (Bharath, 2016)

The price has never been lower, but does that mean we need to replace the computer we bought last year or the year before? According to Moore's Law, the performance of the new platform has doubled and the same price can buy even better computers. However, this is not necessarily the case because many computer systems are still in serviceability or even excess performance. Moore's Law merely points out a general direction. This law is only an empirical one, not a strict one. Buy a computer, you should first examine your own purposes, if the performance exceeds the demand too much, will inevitably lead to waste; if performance is less on demand, then it will not work properly.

**3. Calculation of general computing power arrangements**

If it comes to some common scientific calculations, the performance is as high as possible. Not to meet the demand can be. This means that you can buy a new platform to expand the computing power. However, many computing resources are very expensive, especially when computing needs are huge. At this time, to be able to make a reasonable choice has become even more important.

For example, after many servers are decommissioned, their parts are split into the secondary market. Because many servers work well and the performance is still very stable, you can still choose to buy such a product without enough budget. Even though Moore's Law tells us that computing chips do not have a collectible value, this does not mean that the products of the previous generation or even the last two generations are completely rubbish. This is very unscientific.

When the new product appears, the price of the old product becomes very low. As a result, you can increase the computing power by increasing the capacity. For example, you can increase the computational power with a dual CPU, to the same level as a new product. The price of buying two may be much lower than the price of buying a new product.

From another point of view, when an electronic product is manufactured, it immediately lags behind. Because the concept is always new. So, follow the trend is not desirable, more impossible. Rational planning is the rational choice.

However, this choice is not very reasonable in many cases. Sometimes, keeping up with the trend is correct. Because over a long period of time, the overall structure of electronic products will be an upgrade, so if at this juncture cross-generation purchase, it would be very unwise, the old products completely unable to meet the new needs.

Moreover, the GPU is entering the field of general computing recently, GPU technology is changing rapidly, the purchase of the old product is not very cost-effective behavior. Therefore, it is equally important not only to make sound judgments and understand market and technology developments.

**4. Conclusion**

So, it can be concluded that under the objective fact of Moore's Law, the new product can provide better computing power at the same price; however, the change of market will further widen the gap between the scissors and the price of the old product will further Reduce, making the purchase of old products has become a very cost-effective means.

If we can reasonably arrange and do not think too much about power consumption, it would be advantageous for students to purchase the old platform for learning or designing. After all, not all consumers have a strong memorizing power to keep up with the trend.

**References**

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**Appendix**

1. **Original text**: Intel (R) introduced a novel power delivery scheme utilizing Fully Integrated Voltage Regulators (FIVRs) in the Xeon (R) line of microprocessors fabricated using the 22nm process technology. In this paper, some of the implications of integrating FIVR in the context of Moore's law scaling are addressed. As the Xeon r line is scaled from a 22nm process to a 14nm process, circuit blocks on-die (such as the Core) shrink and the passives required for FIVR are scaled in tandem and optimized. This allows FIVR to continue delivering a compelling power performance benefit to support the scaling of the die. In this paper, an optimized 14nm FIVR power delivery design is presented. The performance metrics of FIVR such as efficiency and transient response were measured and correlated to pre- and post-silicon simulations. (Bharath, 2016)  
   **Summary**: Some of the technologies of the Xeon processor allow Intel’s new platform to achieve even greater performance with lower power consumption.
2. **Original text**: Moore Law 1965年4月当时在美国硅谷仙童半导体公司工作的摩尔（Gordon Moore）发表了以后著名的“摩尔定律”。他观察了1959-1965年芯片上晶体管的数据，发现每隔18-24个月，芯片上晶体管数目就增加一倍。(翁寿松, 1998)  
   **Summary**: Gordon Moore, then at Silicon Valley Fairchild Semiconductor in April 1965, published the famous “Moore's Law.”
3. **Original text**: 冯·诺依曼体系结构的基本设计思想就是存储程序和程序控制，具有以下特点。… 2) 采用存储程序方式。这是冯·诺依曼思想的核心内容，它意味着事先编制程序并将程序（包含指令和数据）存入主存储器中，计算机在运行程序时就能自动并且连续地从存储器中依次取出指令并执行。 (岳珂娟, 2012)  
   **Paraphrase**: Von Neumann architecture is the basic design idea of stored procedures and program control. The use of stored procedures means that programs are programmed and stored in main memory in advance, and the computer can automatically and continuously retrieve instructions from memory and execute them once the program is run.

**2017-2018上学期 2015级 I级起点班**

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