Ivan Oliveras

In this homework we will be looking at the CPU and GPU trends for processor transistor count, die size, and transistor density; this causing an increase in processing power, and following Moore's Law. First, the transistor count has exponentially gone up for both CPUs and GPUs.

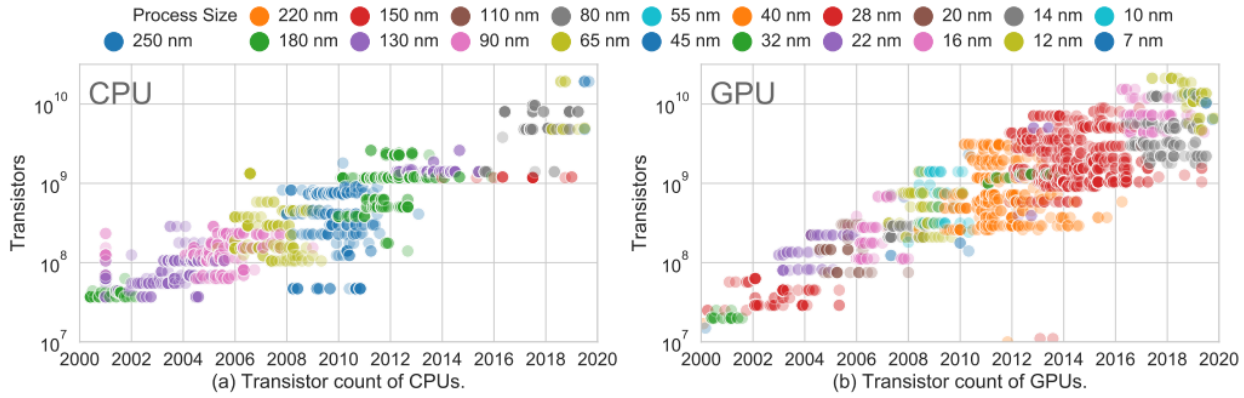
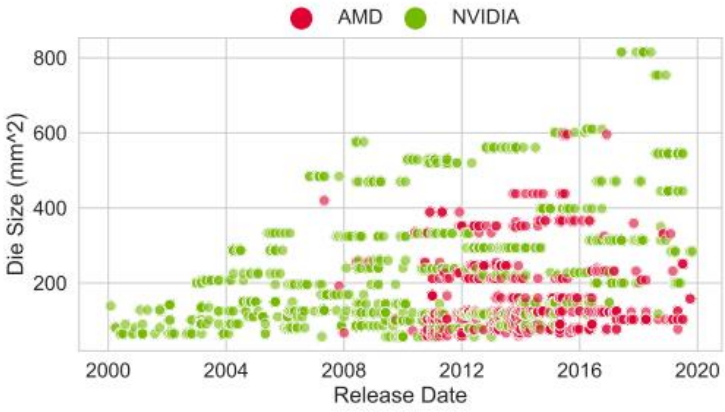


Fig. 1. Moore's Law is still valid for both CPUs and GPUs.

While GPUs have been ahead in processing power than CPUs, CPUs have still scaled following Moore's law. Then, the die size. You'd think that as transistor density goes up the die size would go down, but the transistor count is continuing to increase so much that the GPU dies have gotten larger.



Graphics Cards have only gotten larger, and every new NVIDIA GPU generally requires better cooling, often these cooling solutions provided by the NVIDIA board partners. AMD is sort of a different story. The die sizes have certainly gone up, but AMD is currently competing on the mid-range Graphics Card market. Not only this, but their 7nm process has helped maintaining their die size lower than NVIDIA's. Finally, transistor density. As the process size decreases (to 7nm currently), the transistor density increases.

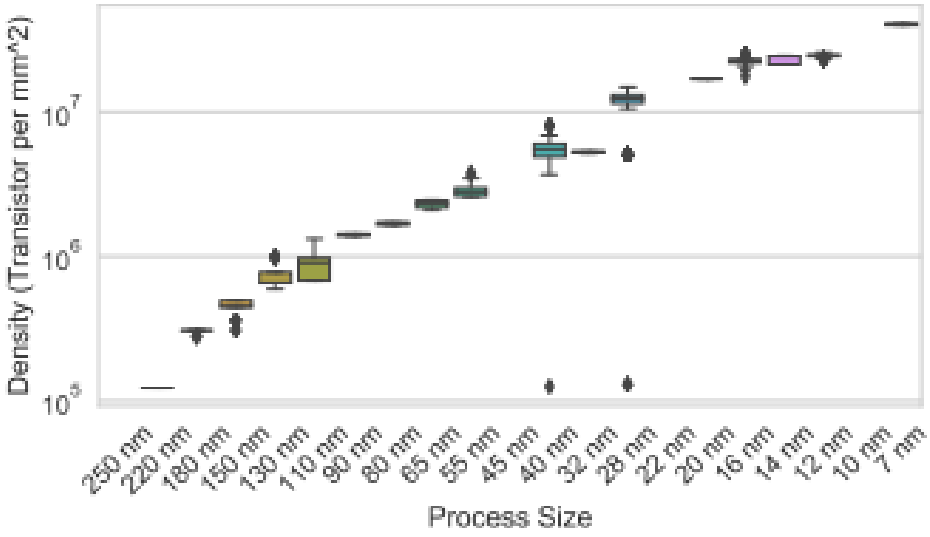


Fig. 2. Transistor Scaling.

CPU and GPU wise, AMD has developed 7nm process chips. Despite their big competition like Intel or NVIDIA, launch issues, and previous failures, due to time to market, they have gained shares of both industries. Business, engineering, and scientific decisions have all come together to influence these trends and make processing power follow Moore's law.

Reference: https://arxiv.org/pdf/1911.11313.pdf "Summarizing CPU and GPU Design Trends with Product Data" Yifan Sun, Nicolas Bohm Agostini, Shi Dong, and David Kaeli (Northeastern University)

This paper explains in better detail the trends of CPUs and GPUs in terms of their design and how they perform based on product data. I highly recommend a full read.

All pictures and some paraphrased information were provided by this reference to make this homework. The rest of the information is based on experience and opinion, and they are my own statements. I (Ivan Oliveras) did not look for this information anywhere and I expect for it to not appear on other homework.