CPU Versus GPU

Which One Is Better And How Are They Different?

Do you want to understand the difference between CPU and GPU?

There may be many questions about GPU and CPU like;

1. Which is better?
2. Are GPU and CPU the same?
3. Can GPU replace CPU?
4. Does GPU increase computer's performance?

What are CPU and GPU?

Before talking about the differences between the CPU and GPU, let us understand them first.

CPU (Central Processing Unit)

The central processing unit (CPU) is a general-purpose processor or main processor, or microprocessor or just processor. Any task which runs in a device like arithmetical, logical, controlling, and I/O (input/output) are taken care of by the CPU. For example when we surf the internet, watch movies, use the excel/word sheet, CPU is designed for **serial processing,** which means it does one task at a time very efficiently. CPU does very complex tasks, so it requires lots of memory RAM (Random Access Memory). CPU is a silicon chip made out of many tiny transistors.

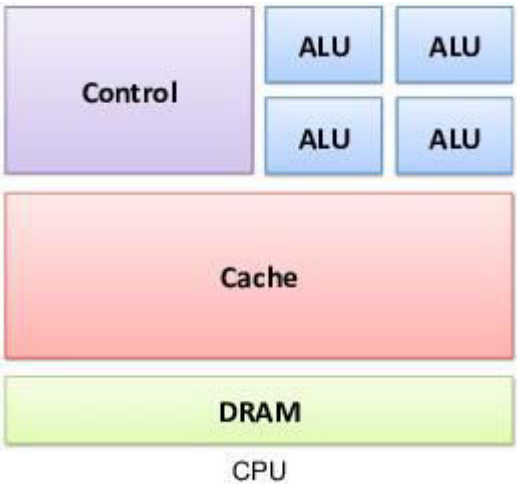
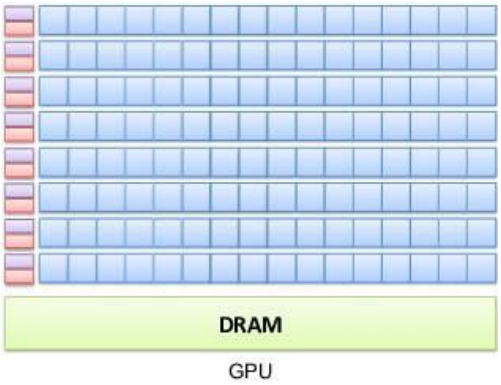


Image source: https://www.researchgate.net/figure/Difference-Between-GPU-and-CPU-Architecture-GPU-architecture-belongs-to-the-family-of_fig1_308730753

GPU (Graphics Processing Unit)

GPU stands for Graphic Processing Unit. As the name suggests, GPU does all tasks related to intense graphics or graphics like it works when you play the game, do animations, edit your videos, etc. GPUs are specialized processors, which are designed to handle any visual related instruction, which was done by CPU earlier but because it reduces its performance so GPU was introduced to reduce CPU's burden. In comparison to CPU, GPU has thousands of cores in it and is a lot faster than CPU. GPU works in a parallel processing fashion, it split its tasks into thousands of small tasks and work parallelly because graphics-related tasks are not dependent on each other.



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Because of GPU's parallel computation working fashion, it is also used in machine learning, deep learning, bitcoin mining, and many other scientific calculations and research-related task because it splits a big task into thousands or millions of small tasks and work on them at once. This makes it faster than a CPU.

CPU Versus GPU

Let us discuss an analogy to help you understand the difference between CPU and GPU. Think of a military knife which is a general-purpose cutting weapon and can cut many things, from paper to wood but can it be used for the surgical purpose can it cut human skin, maybe it can but it will make a tattoo on it which we don't want. So, for that purpose, we have a special knife (scalpel) which is specialized for only surgical purposes and can do it very well compared to a normal knife right. But again will you use a surgical knife for cutting your veggies, no right because it will not be as efficient as a normal knife. Similarly, we have a CPU for general instruction and a GPU for graphical instruction let's understand their work by a simple example.

Suppose you are playing a game, let's say PUBG and in there you fired some bullets on an enemy, now the rendering of blood effect, the motion of your enemy, and your gun are all processed by your GPU, and suppose he fired two bullets on you with 'UMP45' and you fired 1 bullet with 'AWM' then who will knock out, it's a logical task right so it will be decided by your CPU.

Technical Difference

Now let's also see some of the technical differences between CPU and GPU, in case you want to understand it more deeply.

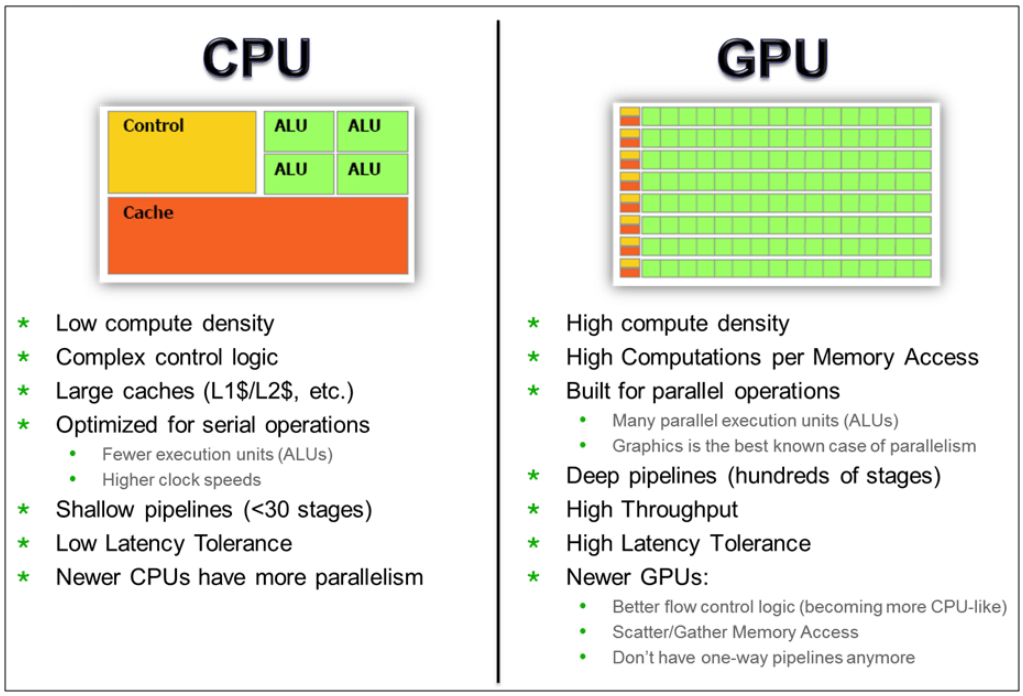

Image Source: https://i2.wp.com/www10.mcadcafe.com/blogs/jeffrowe/files/2017/03/CPU-and-GPU.png?fit=925,625&ssl=1

GPU Vs CPU Performance?

If you are trying to compare GPU and CPU then let me tell you GPU is not faster than a CPU it's faster only in parallel computation because it has more than 1000's of cores in it as compared to CPU which only have 18 or more cores, (it could be different in today's date). But yeah in parallel computation it will be more than 100x faster than a CPU. For task-related to deep learning and machine learning, it may not satisfy you sometimes but usually, its speed is 4-5 times faster than CPU.

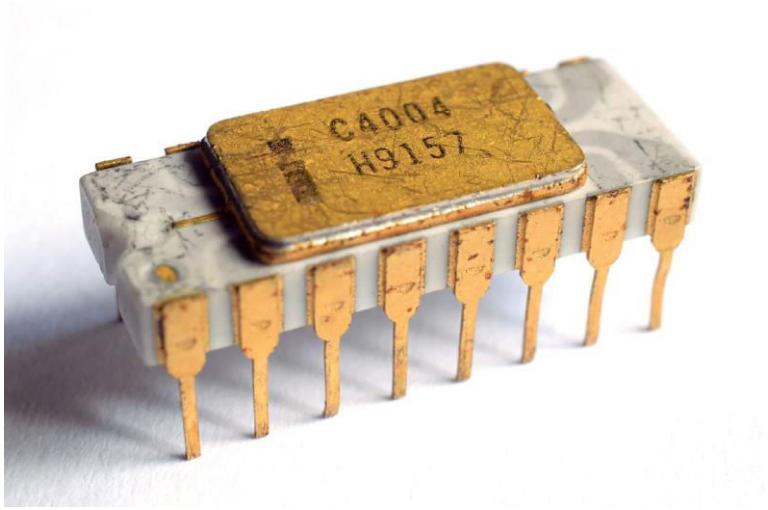

Image Source: https://en.wikipedia.org/wiki/Intel_4004

CPU- The speed of the CPU depends on the numbers of cores it has, for example when the CPU was first developed by Intel in 1971, it has a single core of 4-bit processor called 'Intel 4004' which was capable of 0.092 MIPS (millions of instruction per second) only and was designed for calculators, cash register, atm and other small businesses for performing arithmetic and other small operations.

But now our current CPU which is a multicore 64bit processor is capable of 3.8GHz (3.8 thousand million instructions per second) at a base speed that is more than 40K faster than our 1st version of CPU.

Can GPU Replace CPU?

Both have their own specialty and can't replace each other. They complement each other but can't replace each other, at least not yet. But yeah some companies are trying to build GPU that can kind-of replace CPU, if I am not wrong it's called GPGPU stands for General-purpose GPU.

Does GPU Boost Your System Speed?

It depends on the things you are doing, like if you are playing games, editing video, creating animation, or any graphical work then it will increase your system performance. But it won't boost your system performance in any non-graphical work.

The whole circuit board is a Graphic card and the chip you see surrounded by a green rectangle is a GPU.

Conclusion

GPU and CPU are two silicon chips that increase our system performance. GPU and CPU are complementary of each other and can't replace each other. GPU is used for increasing the performance of graphics-related work and CPU is used for increasing the performance of logical, arithmetical, controlling, and I/O (input/output) related tasks.