Quora

Sign In

What makes CPU models increasingly faster today? How come there are so many small improvements but no major ones?

All related (35) Sort Recommended

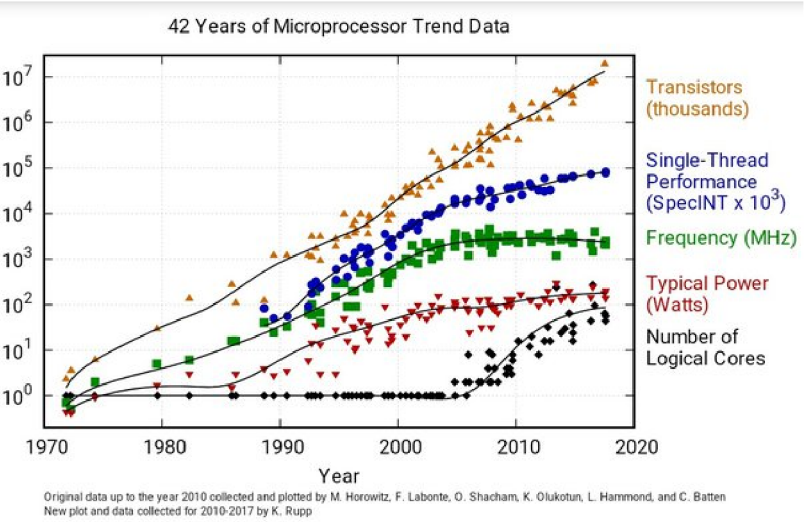
Assistant · Bot

The increasing speed of CPU models today is primarily due to a combination of small

Continue reading

E. Boulesteix
Author has **3K** answers and **15M** answer views · 4y

CPUs are still getting a heck of a lot faster year over year. It's just that you as a user may not necessarily benefit from these improvements due to the fact that the way these advancements are made has changed.



The graph above plots single-thread performance under a benchmark called SpecINT, which is a fairly generalist workload, and quite representative of what i'd call everyday performance. You'll notice that single-thread performance (the performance of individual processor cores) has slowed down substantially. This is probably what you're thinking of when you claim no major changes have been made. And it's true: single thread performance has largely stagnated over the last decade.

In the past, manufacturers had 2 major ways of increasing performance: higher clock speeds and better per-clock performance. The improvements brought tremendous increases in performance for virtually every workload: these advancements lift all boats, so to speak.

But the metaphorical well has dried up: extracting more ILP from modern processor cores is proving more and more difficult, and clock speeds have stagnated, both due to power concerns and due to the fact that memory can't keep up at high clock speed (the memory gap).

So designers have been looking at other ways to increase performance. Of course, per-clock performance and clock speed have been rising slowly over the years, but that's not the main source of improvements: multicore is.

To improve performance, we've been seeing processors with more and more cores.The good news is that this approach scales well as transistor count increases. the bad news is that not all workloads benefit as much from high core counts. High performance processors have dozens or even hundreds of cores (some research chips have thousands!). This has enabled massive throughput gains over the years.

But as a regular user browsing the web and playing video games, the gains have been much slower.

10 9 1

使用 Google 账号登录 Quora

Andy Bally
ugearth@163.com

Accela Zhao
accelazh@gmail.com

Would installing an SSD into my computer make it faster?

Are CPUs faster the more recent they are released?

Intel's CPU performance has not improved in a few years. How does the Apple CPU make huge progress every year?

Will smaller and cheaper CPUs eventually replace the current more expensive and less powerful CPUs as technology advances?

Quora

Related questions More answers below

- What makes one CPU better/faster than another?
- What advances are needed to improve CPU design and make them faster?
- Would installing an SSD into my computer make it faster?
- Are CPUs faster the more recent they are released?
- Intel's CPU performance has not improved in a few years. How does the Apple CPU make huge progress every year?

2

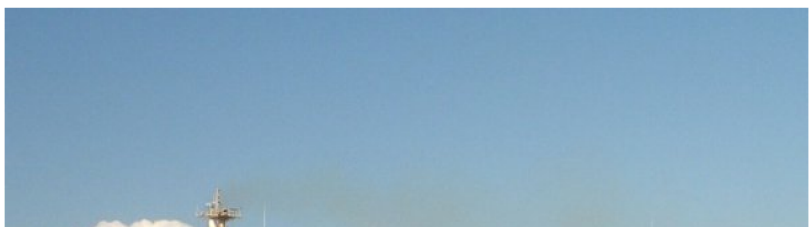
There are major improvements, but they seem small on the shoulders of all the improvements which have already occurred.

The main improvements which can be made with classical computers now are about efficiency

22.3K 47 190

Related **Why are CPUs still being made when GPUs are so much faster?**

This is a GPU:



Most processors are designed with an RTL methodology, and are emulating ISAs designed for old 32 bit machines that were just stretched to 64 bits.

Quora

is on its performance limits, and scaling it only improves power consumption.

There are fixes, but no sign of the major players applying them — e.g. switch from off-chip DRAM to on-chip memory, and use more special purpose processors.

61

Related questions More answers below

- Will smaller and cheaper CPUs eventually replace the current more expensive and less powerful CPUs as technology advances?
- What makes modern CPUs slower than older CPUs?
- What makes modern CPUs slower than the older ones?
- How are CPUs made? How does it go from being an idea, to a finished, working CPU? What makes it superior to other CPUs; new competition and older models?
- What is the difference in speed between modern CPUs and older ones? How much faster will CPUs get in the future?

493 4 13

Related **How can a CPU be so small and do so much while other components are big and don't do as much?**

The Apple M1 SOC is freakishly small at 119mm^2 and yet contains a staggering 15 billion transistors.

I spent ten years running a 1466MHz Barton core Athlon with what I thought was an impressive 54 million transistors. To be fair, it was always extremely fast. The fact that a 5nm chip can cram the equivalent of **300 of those** onto a single piece of silicon smaller than the Athlon itself has me completely mind-blown.

It almost seems laughable that the original IBM Hard Disk Drive introduced in 1956 had a capacity of 5MB and weighed over a ton.

Continue Reading

5

Related **How do modern CPUs keep getting faster with each generation if clock speed is not increasing?**

Firstly, they add more cores. Multiple cores are now routine for even low end devices.

Secondly, they are becoming more efficient at handling the speed difference between the CPU and main memory. Bigger caches, more layers of cache, speculative execution to keep going with a cache miss, branch prediction, prefetching, hyperthreading.

Continue Reading

Quora

124 3 6

What is a CI server in DevOps?

Continuous integration (CI) is a DevOps practice designed to avoid the problems that come from integrating changes late in the development process, such as merge conflicts and build errors, bugs, or even the ultimate realization that your software doesn't actually do what your users need. With CI, you commit, build, and test everyone's code changes as you go.

Continue Reading

243 8 12

Related **Why are processors increasing in cores rather than increasing in clock speeds?**

The speed of the clock on the fastest currently available CPU core is around 5 GHz...but most CPU's have been sitting around 3GHz

We're running into Moore's Law limits on the size of a transistor - so shrinking the circuitry (which has historically allowed for higher clock speeds) is reaching the edge of becoming

Continue Reading

Your response is private

Was this worth your time?
This helps us sort answers on the page.

Absolutely not Definitely yes

1

The introducttion of the EUV technology is a major step ,and it will have a bit of an impact on CPUs released in the months ahead.

129

9 1

Moving to 6 cores as the standard is not exactly a small improvement, compared to 2 or 4 from just a couple years back.

And then there's this, which is currently happening: To Keep Pace With Moore's Law, Chipmakers Turn to 'Chiplets'

431 17 29

Related **Why/when does adding more CPU cores not always have a significant increase in performance?**

Quora

drive or whatever (plus gas and sleeping.) Great.

Does adding another car get me there faster? No. Obviously not. But it does let me bring more people/cargo.

This is why most questions about computers depend on the details of what you are doing.

It could be that you have CPU oriented multithreaded workload but not enough ram so you are

Continue Reading

187 5 6

Related **How can a CPU be so small and do so much while other components are big and don't do as much?**

The other components may be physically large due to form factor or thermal reasons but they also contain tiny CPUs which do various other tasks.

A typical example is a SATA SSD, it is physically similar to any laptop-sized drive but internally, only a fraction of the space is used:

Continue Reading

24 1

Related **Why aren't CPUs getting much faster?**

If you bought a dual core 2.7GHz CPU, and now we have octacore 2.7GHz CPUs, we ***do*** have faster CPUs. Eight cores running at 2.7 GHz have a lot faster thruput than 2 cores running at 2.7 GHz.

Continue Reading

Quora

Related questions

- What makes one CPU better/faster than another?
- What advances are needed to improve CPU design and make them faster?
- Would installing an SSD into my computer make it faster?
- Are CPUs faster the more recent they are released?
- Intel's CPU performance has not improved in a few years. How does the Apple CPU make huge progress every year?
- Will smaller and cheaper CPUs eventually replace the current more expensive and less powerful CPUs as technology advances?
- What makes modern CPUs slower than older CPUs?
- What makes modern CPUs slower than the older ones?
- How are CPUs made? How does it go from being an idea, to a finished, working CPU? What makes it superior to other CPUs; new competition and older models?
- What is the difference in speed between modern CPUs and older ones? How much faster will CPUs get in the future?
- Why aren't there any new types of CPUs that are much faster than current CPUs but use less power/are smaller/cheaper to produce?
- What is the smallest size a CPU can be before it becomes impractical? How much more efficient or powerful could a CPU possibly get at this point in time?
- What makes a CPU faster besides of Ghz?
- Which factor contributed most to the CPU efficiency over recent years?
- How does the size of a CPU affect its performance? Is it true that smaller CPUs are faster than bigger ones?