Difference between desktop GPU and laptop GPU

The smaller space inside a laptop shouldn't be the reason your games run slower. The main reason is because desktop GPUs and laptop GPUs are fundamentally different things.

If you're wondering whether to build a gaming PC or buy a gaming laptop, you may be thinking about GPU issues. Let's say your final choice is to weigh between a gaming desktop and a gaming laptop equipped with an RTX 3080 Ti.

However, the laptop, although more expensive and uses the same GPU, seems to run the game slower.

You are not mistaken! The smaller space inside a laptop shouldn't be the reason your games run slower. The main reason is because desktop GPUs and laptop GPUs are fundamentally different things.

How do desktop GPUs work?

The graphics processor inside the desktop is what you usually call a "graphics card". They are very simple in design. A GPU die in a printed PCB, connected to a PCI Express bus and multiple rear ports. You buy it and plug it into your computer's PCI Express slot. Then you screw the PCI bracket into the computer case to keep it in place, plug in the HDMI/DisplayPort cable connecting your GPU to the monitor and now you should have the image on the screen.

With gaming becoming more and more demanding, GPUs have adapted and evolved to accomplish that task. For this reason, it is common to see graphics cards with large power connectors (maybe even two or three depending on the graphics card's power requirements), extreme cooling solutions and fans. great.

Desktop GPUs are power-hungry and, as a result, they also give off a lot of heat. However, that's usually not a problem for desktops. Desktops often have a generous amount of space inside and depending on the airflow of

the case, it allows the card to breathe and escape the heat that the graphics card generates.

How does laptop GPU work?

Laptops obviously can't match a full, full graphics card, at least there will be a few trade-offs. Most laptop GPUs work because separate lines of laptop GPUs are made to fit the thin profile of laptops. They need to meet a range of requirements, such as being small enough to fit in a laptop, powerful enough to run the latest AAA titles, and efficient enough that the laptop won't overheat, and the battery won't take a toll.

Therefore, laptop GPUs are fundamentally different products from desktop products. Power efficiency is an important part here. Laptops can take many steps to reduce power usage, including keeping an integrated GPU for battery saving purposes.

What is the difference between desktop GPU and laptop GPU?

The biggest priority on a laptop GPU, aside from running games well, is to keep power consumption as low as possible. While laptop and SoC manufacturers take steps to maintain those goals, often the most basic solution to reduce power consumption is chosen. That makes the actual GPU weaker.

The reason separate GPU lines exist for desktops and laptops is that you can't just throw an Nvidia RTX 3090 Ti in a laptop and expect everything to go smoothly. The most likely scenario is that, unless it's really thick or has

some miraculous heat dissipation, your laptop will catch on fire and the battery will melt within two days. However, the fact that desktop and laptop GPUs are separate products may not be immediately obvious to most users.

Take for example the RTX 3080 Ti. The desktop version of this graphics card is on another level. It's an absolute monster with best-in-class 4K gaming. However, the laptop version of the RTX 3080 Ti is similar to the desktop RTX 3070 in terms of performance. It's still really good, but it's probably not the level of performance you'd expect from an RTX 3080 Ti-equipped computer, especially since such a laptop can be as expensive or even more expensive than a laptop. Desktop PC with 3080 Ti.

That's the price you pay for portability. You can't cool everything efficiently on a system you can take with you, so downsizing is required to allow things to run.

Is it possible to use a desktop GPU in a laptop?

The good news is that you can, and the best part is that you don't need to do any weird tricks or workarounds. However, be prepared to equip an expensive dock.

If your laptop has a Thunderbolt 3 port with external graphics card (eGPU) support, the Razer Core X could be a worthy choice. It's an eGPU that lets you insert a desktop-compatible GPU inside a dock. You can open it up and find a PCI Express slot where you can insert your GPU. From there, connect it to the built-in power source and connect it to the laptop with a Thunderbolt cable. If you've done everything right, the eGPU should show up on the laptop and let you play games with it.

While not the most convenient option and you definitely shouldn't use it if your laptop already has graphics cards (unless they're broken or you really need more performance), it's an option. Great choice for people with old laptops or thin and light laptops without GPU.

Just like the Razer Core X, there are many options available from other OEMs. It's just a matter of looking and finding the best option for you. Some options may even come with an integrated GPU!

While everyone wants to see real performance like the RTX 3080/3090 on a laptop, that just can't happen. The same desktop GPU can't run in a laptop without quickly experiencing thermal limitations that keep it from working to its full potential, or even worse, crash the machine.

You really have options to get desktop-like performance on a laptop. However, you will need to spend a lot of money.