

The Graphics Processing Unit's Past Present and Future

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Thesis:

The GPU (Graphics Processing Unit) is already a globally used device, as technology becomes more advance its popularity and importance will only rise due to its value in modern technology.

I. Intro

- I'm a worker from nVidia who makes graphics cards
- Briefly tell what the card is

II. Facts

- All computers now are requiring some sort of graphics device whether it is portable or your desktop at home
- In order to watch videos or even just browse the web now you need to have a device to put those images, movies, or flashy graphic onto the screen without delay
- Since these things keep getting more advance such as HDTV you require more power to produce the images meaning a better GPU

III. Past

- In the past companies such as us, AMD, and Intel created graphics cards that produced in image using transistors inside of it
- After some time these needed an upgrade and since the CPU was now more powerful companies began integrating the two leaving the CPU to do most of the graphics ability
- This worked fine for typical computer users until the newer multimedia came out including Windows Vista

IV. Present

- We then went back to our graphics cards where we made architectures completely different than before and separated it completely from the CPU

- These cards are now power efficient and for under \$50 you can have a flawless performance of running day to day tasks and can even watch HD media without hiccups
- Developers are taking advantage of this technology to create media accelerators powered by access core usage in the GPU
- This leads to video and photo editing times being drastically reduced and giving your CPU more room to perform other tasks

V. Future

- The GPU is getting smaller and easier to implement into smaller devices such as PDAs, cell phones, and laptops
- With the mobile GPUs you can already create and develop movies and games on a device that can fit in the palm of your hand
- In a few years we hope to have a cell phone released capable of 1080p output via HDMI that can play games like the Xbox360 and PS3 have today
- As we advance more and more these technologies get cheaper for everyone and will lead to a new era of portable entertainment and power

-End-

The graphics processing unit or, GPU, is a small chip that decodes various signals that a central processing unit or, CPU, cannot. It is because of this unique trait that makes it so useful to computers. It hasn't always been as important as it is today but its uses have been made more mainstream and integrated to modern computer tasks such as watching videos and editing pictures.

Its origins date back to the earliest computers where the GPU was along the lines of nothing more than a chip that put numbers onto the screen in the form of binary code (ex. 1011100). This was very basic and was used solely for putting 2bit information onto screens. As more information was needed on screen and letters involving more than two hooks called for a better process. This is when the GPU began its earliest developments.

It evolved into a process much like integrated graphics do today using the CPU to process information into a format that the GPU can receive and decode then output it onto the screen. The early computers that used this could create early forms of word processing that we see now. Eventually with more system memory or, RAM, being added to the computers the GPU was able to produce images that had fluid motion much like that of the game PONG.

With this, arcade giant (at the time) Atari created a set top box that would play games onto your TV screen aka the Atari 2600. ("<http://www.atarimuseum.com>") From that point on the GPU would mainly advance for the sake of gamers needing more power to produce better looking video games. This demand for newer technologies created companies devoted to such a task. Of the many that were created only a few survived the years of battle of the best and many were either bought out or went bankrupt. The few remaining companies were ATI Technologies, Nvidia, Intel, and Realtek.

The 90's held many great achievements again for the market of Graphics cards as 3-D pictures were now capable of being produced and visual effects in movies like *Jurassic Park* were made. Video game systems were now being made with CD's that allowed for more space and textures to be

processed which, again, called for more advancement. (“GeForce 6600 GT for AGP-Based PCs”) This is what led to our current generation of cards that can do anything from creating an exact 3-D replica of Washington D.C. to a simulation of a nuclear bomb going off destroying a city with over 500 trillion different outcomes.

“I first started using the supercomputers out in California back in 1991, which back then the computers still made up a large room and only calculated as much as modern quad core computers do today,” according to U.S. Stealth Bomber designer Steve Jones. “As computers keep advancing it makes old technology keep piling up which just goes to show how much advancement has come these few years. Modern video cards can now create more powerful simulations than the supercomputers we worked with testing aerodynamics. Soon you won’t even need to have real test runs; computers will be able to do it for you.” (“The Supercomputer”)

These advancements were made possible by a change in how the actual GPU worked within itself. Information is now being sent through a graphics card, which can be up to a foot long and weigh over four pounds, at speeds that double that of older generations due to advancements in memory read and write speeds. This makes moving information through processors faster and so aroused a need to have many processors just to prevent back up of memory. With only so many visual tasks that needed this much power companies began looking for other uses of the resources. Nvidia, the largest graphics company in the world created CUDA in 2007 for this task. (“Nvidia GeForce GTX 295”) (“4800 Series”)

What CUDA does is get information designed for a CPU sent directly to the GPU for decoding. Most of the information is still left up to the CPU to decode but depending on what programs and drivers you have installed the GPU will take visual and audio bits to decode. Since certain types of files are chosen they typically decode faster in a GPU due to its direct ram access and thus emits the decoded information to the main system ram creating transfer speeds up to 25 times faster than if the CPU did all the work.

It's this same concept that makes GPU's so powerful in the supercomputer world now. Since the U.S. government lost interest in supercomputers post cold war due to nuclear war simulations being unneeded manufacturers stopped advancing the main components, thousands of CPUs linked together requiring thousands of different mini sets of motherboards. Today we still have supercomputers that use the same fundamental technology but more and more the supercomputer is becoming a server with multiple GPUs inside of them. This is because of the high speed processing that only GPU's possess. They do everything inside themselves instead of sending information away from its processors only to come back to it. This makes stacking hundreds of GPUs together feasible and more cost efficient to make due to less being needed to create the same amount of power. With this being said as GPU's increase in power and speed they will only become more valuable for all computers giving each of us our own little supercomputer, some coming in very small packages.

Mobile GPU's come in forms of cell connections in your cell phones or in small penny sized chips in laptops. ("Mobile Graphics") As these are relatively weak due to the lack of proper heat dispersion and size they still pack a punch. Whether it's playing Mario on your Nintendo DS or watching a video on your cell phone your mobile device is using a slimmed down version of a GPU. The current versions of these chips are weak for one main reason and that's to conserve battery. Removing the battery aspect you can find laptops that have those penny sized GPU's creating graphics that look just as good as the modern generation game systems and mid priced desktop GPU's. These just come at a much heftier price and are often overlooked because of this. When more programs start to utilize the power of the GPU consumers will see the benefits forcing the computer builders to produce cheaper systems with GPU's. ("The GPU is the Right Processor for Video Applications")

Going along with your laptop will be the ultra portable device like iPods and cell phones. Already companies have produced micro GPU's that create high definition resolutions on pocket sized contraptions. ("Play Xbox Games On Your Cell Phone") With this power you can run nearly anything in

the palm of your hand whether it's a simple music player or a complex video editor. This will then create the ultimate connection as you have everything you need right with you. ("A Solid First Try for Google Android") You can take a high definition video, edit it, and then send it to a social networking site all on the same device and within minutes.

Until developers find a completely new way of making computers interact internally the GPU has a long life expectancy that will only grow as technology evolves and proves its importance in modern society.

-End-

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