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GPUs and Computing Infrastructure



The Headline: Nvidia Corporation (Nvidia), known for popularizing graphics processing units (GPUs), has experienced a surge in demand as the tech industry scrambles to develop new AI Chips. On May 30, 2023, Nvidia achieved a trillion-dollar market value, surpassing that of Tesla and Facebook, making it one of the world's most valuable companies alongside Apple, Google, Microsoft, Amazon, and Saudi Aramco.¹

Originally founded in 1993, Nvidia initially focused on creating computer chips for complex visuals and found success in gaming consoles like Microsoft's Xbox.² However, the recent demand for Nvidia's graphics processing units (GPU chips) is for a different purpose as tech giants and startups seek to implement advanced artificial intelligence (AI) programs, like powering the chatbot sensation, ChatGPT.³ The company is expanding its specialized chips into areas of AI, as well as designing GPUs for gaming, cryptocurrency mining, and professional applications.

What Are GPUs? GPU chips are specialized electronic circuits that process graphics and visual data quickly and efficiently.⁴

While initially developed for rendering images and graphics, GPUs have matured into powerful processors with high parallel processing capabilities, or the ability of a computer system or processor to perform multiple tasks or operations simultaneously.⁵ The optimization is made possible by breaking tasks into smaller, concurrently executable subtasks and using stream processors or thousands of smaller processing cores to speed up computation.⁶ GPUs are geared for simultaneous repetitive calculations, as opposed to central processing units (CPUs), which are made for general-purpose computing operations.

Primarily due to parallel processing, GPUs have propelled scientific research, machine learning, artificial intelligence, data analytics, and cryptocurrency mining by accelerating computationally intensive tasks. Specifically, GPUs have become an integral part of the AI ecosystem for processing large datasets and performing matrix calculations required in deep learning algorithms, enabling faster training and inference. Additionally, GPUs have dedicated memory called VRAM (video random access memory) that supports their processing capabilities and allows adequate data storage and retrieval during processing activities. The performance of AI models is also anticipated to be boosted by developments in GPU technology, including the integration of high-bandwidth memory (HBM) and improved parallel computing capabilities.

Conclusion: Computing infrastructure, which refers to the physical (hardware) and virtual components to support the delivery of computing services, is a pillar of Morgan Creek Digital's investment thesis, for we believe that the exponential software of the digital age requires exponential hardware. Specific to artificial intelligence, dedicated hardware, and optimized architectures will continue to be tailored to the needs of advanced AI computations, such as matrix operations (Deep Learning) and neural network calculations. Furthermore, as AI applications become more prevalent across various sectors, including healthcare, finance, and autonomous vehicles, the demand for GPUs infrastructure will continue to rise, which we believe will create potential investment opportunities.

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- ¹<https://www.reuters.com/technology/nvidia-sets-eye-1-trillion-market-value-2023-05-30/>
 - ²<https://www.nvidia.com/en-us/about-nvidia/corporate-timeline/>
 - ³<https://www.cnbc.com/2023/03/07/nvidia-grew-from-gaming-to-ai-giant-and-now-powering-chatgpt.html>
 - ⁴<https://www.intel.com/content/www/us/en/products/docs/processors/what-is-a-gpu.html>
 - ⁵<https://www.boston.co.uk/info/nvidia-kepler/what-is-gpu-computing.aspx>
 - ⁶Ibid.

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