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20 Most Promising HPC Solution Providers - 2017

The proliferation of the usage of High Performance Computing (HPC) systems beyond the scientific and academic world is quite eminent today. In the business of all sizes and types, HPC is widening its wings more into transaction processing and data warehousing. This exceptional desire for an advanced technology is empowering the users with a competitive edge in day-to-day business processes by overcoming the barriers to supercomputing in an increasingly aggressive market.

Spreading its wings into Data Storage and Analysis, Data Mining, Modelling and Software Development, HPC is instrumental in improving performance and productivity with enhanced software techniques. The HPC systems are reaping benefits of increased processing speed, reducing the cost, streamlining the processes, analyzing product development cycles within enterprises. Vendors have so far sensed these potential benefits of HPC technology and are now leveraging their expertise and experience to entice the customers with varied offerings.

With numerous HPC Solution providers in the industry today, finding the right solution is often critical for businesses. Our distinguished panel comprising of key decision makers and experts having industrial knowledge of HPC along with CIOReview's editorial board has selected the 20 Most Promising HPC Solution Providers of 2017 offering the ability to develop innovative technologies while offering outstanding computing speed.

In our selection process, we looked at the vendors' capabilities to fulfill the need for cost-effective and concrete solutions that add value to the HPC landscape. In this edition of CIOReview, we bring to you the "20 Most Promising HPC Solution Providers of 2017."

Company:
D2S

Description:
Develops GPU-accelerated platforms and solutions for semiconductor design and manufacturing

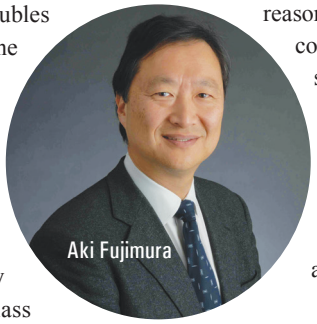
Key Person:
Aki Fujimura
Chairman & CEO

Website:
design2silicon.com

D2S

GPU-Acceleration—Critical to the Future of the Semiconductor Industry

According to Moore's Law, the pace of progress in semiconductor manufacturing doubles approximately every two years. "The semiconductor design and manufacturing industry has always been a heavy consumer of High Performance Computing (HPC) throughout its scaling needs for new product development," Aki Fujimura, the Chairman and CEO of D2S. As a provider of Electronic Design Automation (EDA) solutions, D2S efficiently caters to this pivotal need by offering a best-in-class Computational Design Platform (CDP) underpinned by GPU acceleration.



GPU acceleration is critical for semiconductor manufacturing and design as it possesses immense scaling capabilities without hitting the Amdahl's Law where the overhead of dividing the problem into subproblems eventually overtakes the scalability of coarse-grain parallelism. CDPs power the firm's GPU-accelerated engines to enable fast and precise simulation of semiconductor design and manufacturing processes. Clients can gain extensive cost and time benefits from D2S's proficiency in simulating various natural phenomenon around semiconductor development.

The firm develops EDA and semiconductor manufacturing software on CDPs that support up to 888 Teraflops of processing speed and performance enabling trillions of floating point operations per second. The CDP is GPU-accelerated for quick processing of images and high-precision photomask writing—a key process in semiconductor manufacturing. "D2S's GPU-accelerated applications enable more accurate manufacturing of these nanometer scale devices that need to be precisely created, and further enables arbitrary curvilinear features to be drawn on these devices," states Fujimura.

Through their unique CPU-GPU solutions, D2S manifests unmatched mastery in enabling developers to precisely understand and to correct for the complex interactions of various physical effects of a semiconductor manufacturing process in multifarious environments. A typical photomask for the leading edge semiconductor process requires 0.1nm accuracy over a 130mm x 100mm space. If a 0.1nm grid was used to represent this space, it would be a 1.3 billion by 1.0 billion grid space that computations need to take place in. 1.3 quintillion pixels is an extremely large number, but D2S optimizes with advanced computer science in the single-instruction multiple data (SIMD) style for GPU-based computing to uniquely enable this enormous task in reasonable time. The various capabilities include complex semiconductor manufacturing process simulation, inline precision enhancement, thermal effect correction, and wafer aerial image analysis from photomask pictures taken by a Scanning Electron Microscope. The solution also supports geometric checking and manipulation of curvilinear shapes on photomasks and wafers.

Reliability and serviceability are critical factors in the semiconductor manufacturing equipment space. D2S CDPs are designed with redundancy having both cold and hot spares, and is optionally water-cooled for meeting 24x7 operational demands even in a clean room environment. The firm's platform is resilient to temperate variation—a must-have capability for a clean-room operation.

> **"GPU acceleration is critical for semiconductor manufacturing and design as it possesses immense scaling capabilities"**

With an impressive track record spanning more than 10 years, D2S has been a leader in addressing HPC challenges and related burdens throughout the semiconductor ecosystem since its inception. For instance, D2S established the eBeam Initiative in 2009, a move toward educating and promoting projects around new design-to-manufacturing approaches throughout the ecosystem. The eBeam Initiative now numbers more than 45 companies and delivers an annual survey of photomask makers which helps the ecosystem plan for the year ahead.

D2S envisions increased adoption of GPU-accelerated applications everywhere, particularly in semiconductor design and manufacturing. With simulation of natural effects, image processing, and deep learning as the strengths of GPU-acceleration, the company continues to develop new capabilities quickly. The latest release of its fifth-generation GPU-acceleration platform continues the company's push to scale computational capability through massively parallel computing. CR