The manufacturing industry is in the midst of a revolution that is powered by HPC.

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Produced by the editors of Digital Engineering
Manufacturing is in the midst of profound change as companies large and small work to digitize product development and better connect to an increasingly supply chain. Factories are able to collect and analyze data from simulation-driven product design processes as a way to test drive concepts in the digital world—a more cost effective approach compared to building physical prototypes. Enabling simulation and 3D modeling solutions as part of a virtual prototyping workflow also encourages greater design freedom and flexibility, enabling a more iterative design cycle.

In fact, optimizing and testing product designs in a virtual world has been proven to empower manufacturers to develop best-in-class products with far fewer resources and without the protracted cycles that characterize traditional development efforts. Digital prototyping has far fewer physical and budgetary constraints compared to traditional prototyping practices, while encouraging almost unlimited design exploration. The technique also allows manufacturers to systemize and perfect in a virtual world, reducing tooling costs and supporting a more efficient and error-free engineering change order process throughout a product’s lifecycle.

As companies transition to these digital prototyping and virtual test workflows, they are bumping up against the limitations of existing multi-core workstations, especially for advanced simulation and digital design work. Many installed workstations are at maximum capacity, unable to scale to meet the demand for increasingly complex products. As a result of the need for more computational power, it’s common for manufacturers to encounter challenges such as slow or incomplete job runs or delays in critical modeling, simulations or data analysis work. Compare that to high performance computing (HPC) technologies, which are not bound by similar constraints.

 Tight deadlines for increasingly complex product design have resulted in many large manufacturers relying more on their network of suppliers for simulation and analysis. HPC is a key enabler of effective virtual product development and testing, particularly for manufacturers looking to make the leap to HPC. The pre-configured solution, designed and tested by industry experts, is optimized specifically for the manufacturing domain and architected in a way that integrates HPC capabilities into existing workstation environments without disruption and without breaking the budget.

The Dell EMC HPC System for Manufacturing was created specifically to deliver the capacity and performance required for computationally intensive workflows, including those involving widely used CAE tools like ANSYS Fluent, ANSYS Mechanical, SIMULIA Abaqus, MSC Nastran, NX Nastran, LSTC LS-DYNA, and CD-adapco’s StarCCM+ among many others. The solution integrates computing, storage, network-
Nissan Integrates End-to-End Manufacturing Infrastructure

The need for scalable storage and data backup drove Nissan Motor Company to tap Dell EMC’s end-to-end infrastructure solutions. The automotive giant, striving to achieve efficient work procedures and maintain quality standards while controlling costs, transformed the infrastructure at its Tochigi plant and is now using it as a standard for rolling out infrastructure at new plant locations. While its older servers and file systems struggled to keep up with increasing volumes of data and larger backups, the Dell EMC infrastructure is keeping Nissan on the cutting edge, providing scalable storage capacity for handling up to 40TB of data, slashing data backup times by 93%, and providing access to services that ensure redundancy and high availability. The virtualized solution also helps keep costs in check by reducing the number of servers, thus lowering maintenance costs.

“This will become the model for opening new Nissan manufacturing plants overseas,” said Takehiko Kashihwazaki, facilities maintenance section No. 2, Manufacturing and Engineering Department No. 2 at the Tochigi plant. “The deployment, with Dell EMC products, represents an important step in keeping Nissan Motor Company on the cutting edge of technology.”

The ability for large manufacturers like Nissan along with smaller and mid-size players to readily gain access to scalable infrastructure like HPC resources is a critical element for success in the new age of digital transformation and product innovation.

HPC WITHOUT THE GUESSWORK

Configuring HPC servers, storage and networking can be a guessing game that if not done right, can dramatically degrade performance of the environment and impede scalability.

The Dell EMC HPC System for Manufacturing takes the guesswork out of this equation. Depending on your specific needs, Dell EMC might recommend a disk-side or rack-mounted chassis configured with the appropriate servers with Intel Xeon processors and memory, shared HPC storage and networking technologies.

For example, a Dell EMC PowerEdge C6320 server equipped with Intel Xeon E5-2697v4 processors with 128GB of DDR4 memory may be best for highly parallel calculations, whereas Dell EMC PowerEdge R730 server with Intel Xeon E5-2608v4 processors, an optional GPU to help specific workloads, 236GB of RAM and eight 300GB hard drives.

Some solutions can make use of shared storage. The Dell EMC HPC NFS Storage solution with High Availability is designed for a cluster with up to 100 users and moderate share storage performance requirements. The system delivers 30% better throughput compared to non-optimized NFS solutions and can scale from a minimum of 48TB of raw capacity to 480TB in a single name space.

Another HPC storage option is the Dell EMC HPC Lustre Storage aimed at clusters with more than 100 users and designed for high-performance storage requirements. It can scale from 120TB to petabytes of data in a single file system namespace and is aimed at big data workloads using Intel Hadoop Adapter for Lustre (HAL). The Dell EMC HPC System for Manufacturing also provides multiple networking options based on each manufacturer’s needs, from simple gigabit Ethernet up to 100 GbE, to more sophisticated high-performance networking choices and options.

The flexible converged systems approach can help manufacturers of all sizes embrace the benefits of high performance computing, bringing HPC out of research labs and further into industry. “HPC is no longer a tool only for the most sophisticated researchers,” said Jim Ganther, senior vice president, Validated Solutions Organization, CPSD, Dell EMC. “We’re taking what we’ve learned from working with some of the most advanced, sophisticated universities and research institutions and customizing that for delivery to mainstream enterprises.”

Learn More Online

- “Democratization via Virtualization” white paper: digitaleng.news/de/delwp1
- Nissan Motor Company creates a reliable and highly available backup solution: goo.gl/98Ogj
- Dell EMC virtual desktop solutions: goo.gl/8PMelG
- Dell EMC data center virtualization: dell.com/en-us/work/learn/de-virt
- Dell EMC Blueprints for Virtualization: goo.gl/u1NhJL
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