

Speed product development with engineering infrastructure

Lenovo Solution for Engineering Analysis

Testing and simulation tools play a crucial role in helping engineering teams understand product performance and verify component designs in a risk-free environment. These applications require high-performance computing (HPC) systems capable of rapidly executing sophisticated simulations and processing large data sets. However, many organizations have limited IT resources to devote to deploying and administering the systems required for such tasks, and could benefit from a computing environment that is flexible, simple to manage and easy to scale without undue burden to their IT staff.

Lenovo is helping organizations across all industry sectors meet their engineering and design goals by providing an optimized computing infrastructure tailored to their unique requirements. Lenovo servers, storage and HPC software—including cluster, workload and data management software—are designed to help manufacturers develop products better, faster and at less cost.

Since no two engineering program requirements are the same, Lenovo offers a flexible, building-block approach that makes it easy for organizations to acquire, deploy and manage a robust engineering environment for their most demanding computer-aided engineering (CAE) workloads. With Lenovo Solution for Engineering Analysis, IT decision makers can simply deploy the right infrastructure—down to the recommended number and types of servers, storage, networking and adapters.

Essential solution to meet demanding engineering workloads

Across all industries, simulations now require increasingly complex models, which place unique workload demands on the computing infrastructure. Based on System x® servers, storage and software selected to meet these engineering requirements, Lenovo Solution for Engineering Analysis offers a flexible, yet powerful approach. The solutions are ideally suited for demanding CAE applications ranging from structural mechanical analysis and flow to general-purpose computational fluid dynamics (CFD), such as aerodynamics; heating, ventilating and air conditioning (HVAC); and fluid flow.

Using building-blocks for infrastructure deployment, adding compute capability, expanding storage capacity and upgrading acceleration are as simple as adding specific nodes to the chassis. Because each node is independent and self-sufficient, there is no contention for resources among nodes within the enclosure.

Recommended building blocks include:

- **Structural mechanics:** To perform structural integrity, vibration analysis or acoustics testing requires a high-performance server with large local storage for scratch I/O and moderate-to-extreme memory and I/O capabilities. The System x3650 M5 platform meets these demands with a combination of power, efficiency and reliability. The two-socket M5 rack server offers an array of storage configurations (up to 26 drive bays) that optimize structural testing workloads. It provides full end-to-end 12 Gbps support for up to four RAID adapters for enhanced performance and data protection. The platform enables users to create a mix-and-match offering with compute, storage and acceleration through a graphics processing unit (GPU) or Intel Xeon Phi coprocessor.
- **Computational fluid dynamics (CFD):** The density-optimized NeXtScale System™ nx360 M5 server combines superb performance and efficiency to meet the demands of aerodynamics, cooling, HVAC or combustion analysis applications. It leverages a dense chassis design with the ability to pack up to 72 servers, networking and storage into a standard 19-inch rack. A typical rack holds only 42 1U systems, but this chassis doubles the density (up to 84 compute nodes within the same footprint).
- **Impact analysis:** Crash or impact testing requires a server with parallel scalability, typically up to 64 or 128 cores. Modest memory requirements and I/O capabilities are also typical. Integrated with two Intel Xeon processor E5-2600 v3 product family, Lenovo NeXtScale servers provide optimum performance for demanding crash simulation and impact analysis workloads.
- **Head/management nodes:** To simplify deploying and managing CAE clusters, Lenovo offers IBM Platform™ HPC, an all-in-one workload and resource management software. With the ability to perform cluster provisioning, monitoring and management, along with workload scheduling and reporting, Platform HPC provides all the functions needed to easily deploy, administer, monitor and use a high-performance cluster.

- **2-D/3-D remote visualization:** With optional PCI NeXT Trays and the ability to pack two GPU adapters into a 1U slot, the NeXtScale System provides an effective visualization server. The system lets you create an ultra-dense GPU or Intel Xeon Phi node with up to two high-powered accelerators attached to a single compute node within 1U effective rack density. You can accelerate application performance by offloading compute-intensive portions to the GPU, while the remainder of the code still runs on the CPU.
- **Networking:** This essential solution contains integrated networking that is designed for ease of implementation, operations and optimal application performance. A Gigabit Ethernet “top of rack” switch handles cluster access and administration. The network can be readily incorporated into a variety of customer campus networks. Additionally, the solutions contain a high-speed InfiniBand-based network, built on industry-leading Mellanox Full Data Rate (FDR) technology. The majority of CAE software packages are designed to take advantage of this high-speed network using Platform MPI. The data storage system can also be readily configured to take advantage of the network.

Optimize storage efficiency, simplify management

To complement CAE server environments while delivering flexibility and innovative storage functions, Lenovo offers the IBM Storwize® V3700. This easy-to-use system can handle the volumes of data used and generated by engineering, design and simulation applications; enable rapid and flexible cloud services deployments; and deliver the performance and scalability needed to gain insights from the latest analytics technologies.

Thin provisioning optimizes efficiency by allocating disk storage space in a flexible manner among multiple users, based on the minimum space required by each user at any given time. This process can help organizations save power, lower heat generation and reduce hardware space requirements. Storwize V3700 also includes storage pool balancing that operates automatically to distribute data across arrays in a pool to deliver balanced array performance and help eliminate the need for manual tuning. The function is sensitive to different drive types and takes each of their capabilities into account with no intervention required.

Accelerate engineering testing and analytics

When you need to run more design cycles, simulations and analysis to get business results more quickly, HPC cluster and workload management can help accelerate your results. The Lenovo Solution for Engineering Analysis offers pre-integrated IBM Platform Computing™ software or the ability to plug into your existing managed environment. Reasons to consider Platform HPC or high-end Platform LSF®:

- **IBM Platform HPC** allows engineers to focus on their work rather than on the intricacies of managing the workloads of finite element analysis (FEA), CFD and similar applications. It includes out-of-the-box features designed to help reduce the complexity of CAE environments and improve productivity. You get higher utilization and greater throughput—the software stops and starts jobs automatically, moves them to the right resource in the right priority and helps maximize your infrastructure for every task.
- **IBM Platform LSF** includes a comprehensive set of tools for intelligently scheduling workloads and dynamically allocating resources to help ensure engineering environments are fully utilized for maximum speed and productivity. A highly scalable and available architecture lets you schedule complex workloads and easily manage your computing resources.

Reduce complexity and save time

Lenovo Solution for Engineering Analysis can be deployed as a cluster with individual part numbers per building block, or as an Intelligent Cluster™. The Intelligent Cluster significantly reduces complexity by delivering a preassembled, pretested, integrated cluster comprised of best-in-industry Lenovo and third-party components. Lenovo provides on-site setup of an Intelligent Cluster and supports as a single solution instead of as hundreds of individual components. Lenovo also serves as a single point of contact for solution-level support for maximum system availability throughout the life of the system. As a result, engineering companies can spend less time maintaining systems and more time producing faster, higher-quality results.

Faster time to results

Lenovo Solution for Engineering Analysis can help engineering companies transform and integrate their engineering analysis infrastructure to develop products better, earlier and at less expense. Key benefits of this high-performance, building-block approach include:

- **Faster time to value:** The pre-integrated, pretested and preinstalled Intelligent Cluster helps ensure engineering environments are rapidly deployed with greater reliability
- **Improved performance:** Applications run more quickly because they are running on clusters optimized for CAE
- **Reduced costs and complexity:** Resource and workload management software improves IT resource utilization and manageability
- **Lower IT risks:** End-to-end support of the complete cluster reduces deployment and operational issues

Build on a solid foundation

As data volumes expand, engineering and testing applications require more compute power, and engineering companies of all sizes need more powerful and affordable solutions. Lenovo Solution for Engineering Analysis enables you to create a high-performance environment that is efficient and flexible. Your organization gains greater access to computing and application resources to meet today's demanding workloads. These resources can be rapidly provisioned and deployed with minimal management. Engineers can become productive quickly, easily submitting more simulations and completing more complex design analysis faster.

Why Lenovo?

Lenovo is a USD39 billion personal and enterprise technology company—the largest PC and systems company in the world—serving customers in more than 160 countries. Dedicated to building exceptionally engineered PCs, mobile Internet devices and servers spanning entry through supercomputers, Lenovo has built its business on product innovation, a highly efficient global supply chain and strong strategic execution. The company develops, manufactures and markets reliable, high-quality, secure and easy-to-use technology products and services. Lenovo recently acquired IBM's x86 server business. With this acquisition, Lenovo is adding a best-in-class x86 server portfolio along with HPC and CAE expertise.

For more information

To learn more about Lenovo CAE infrastructure solutions, please contact your Lenovo marketing representative or Lenovo Business Partner, or visit: ibm.com/systems/x/hpc

© 2014 Lenovo. All rights reserved.

Availability: Offers, prices, specifications and availability may change without notice. Lenovo is not responsible for photographic or typographic errors. Warranty: For a copy of applicable warranties, write to: Warranty Information, 500 Park Offices Drive, RTP, NC, 27709, Attn: Dept. ZPYA/B600. Lenovo makes no representation or warranty regarding third-party products or services. **Trademarks:** Lenovo, the Lenovo logo, For Those Who Do, Intelligent Cluster, NeXtScale, and System x are trademarks or registered trademarks of Lenovo. IBM, the IBM logo, ibm.com, LSF, Platform, Platform Computing, and Storwize are trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Intel, Xeon, and Xeon Phi are registered trademarks of Intel Corporation in the U.S. and other countries. Other company, product, and service names may be trademarks or service marks of others. Visit <http://www.lenovo.com/lenovo/us/en/safecomp.html> periodically for the latest information on safe and effective computing.

IBM x86 products are now products of Lenovo in the U.S. and other countries. Learn more at ibm.com/lenovo-acquisition

