



HP and ANSYS, Inc.
Fast, efficient, and cost-conscious product development



Improve development from design concept to final-stage testing and validation

Computer-aided engineering (CAE) tools and technologies enable companies to improve their product development processes. Computer simulations replace time-consuming and costly physical prototyping and testing by accurately modeling components, subsystems, and systems. From concept to reality, simulation solutions provide a fast, efficient and cost-conscious information-based development process.

Leading the evolution of CAE tools

ANSYS, Inc. designs and develops engineering simulation solutions used to predict how product designs will behave in manufacturing and real-world environments in a wide range of industries. Technologies from ANSYS provide unparalleled breadth and depth for comprehensive multiphysics simulation, yielding powerful solutions that can be deployed throughout all stages of product development. The most prestigious organizations in the world turn to ANSYS for the development and delivery of reliable engineering simulation solutions.

ANSYS helps product development organizations achieve:

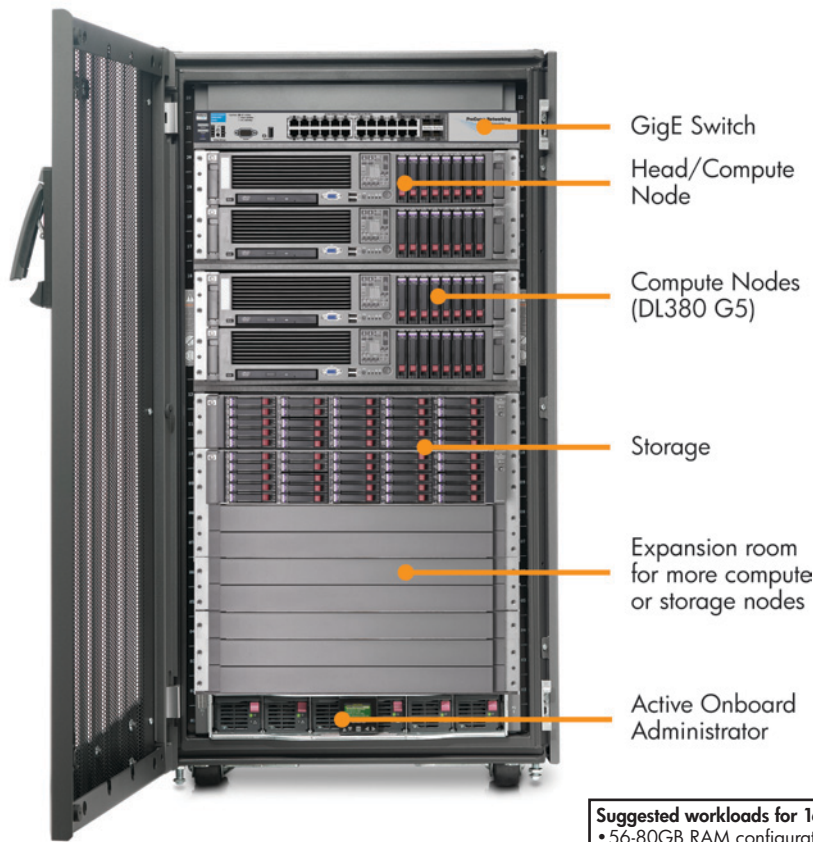
- Innovative products and processes that meet customer and cost requirements
- High-quality products and processes that reliably perform as intended
- Faster time-to-market and reduced engineering costs

Simulation delivers these key benefits by using virtual prototyping to optimize designs at earlier stages of development. The information-based product development process helps reduce the number of physical prototypes and tests required, leading to a faster and less expensive design process.

Comprehensive multiphysics and engineered scalability

In today's competitive market, the cost of being wrong is bigger than ever before. Engineering simulation is now a driving factor for success, and product development organizations are realizing the importance of solutions that incorporate the real-world behavior of products in their full environment.





HP Workgroup System Rack for Structural Analysis (ANSYS)

Solution Components: 16 core Small to medium configuration

Server Options

- Four DL380 G5 server nodes, each dual processor, dual core (2p/4c)
- Four cores per compute node
- Node 1 doubles as the head node

Total Memory for Cluster

- 8GB/core or 32GB total on head node
- 2 or 4GB/core (8 or 16GB/node) on each 3 remaining compute nodes

Storage

- From two to eight 72GB SAS drives
- Striped RAID-0 on 3 compute nodes
- 5x72GB SAS RAID-0 disk array on head node

Cluster Interconnect

- GigE cluster switch
- 100BT management switch

Operating Environment

- 64-bit Linux or
- Microsoft® Windows® HPC Server 2008

Suggested workloads for 16 cores:

- 56-80GB RAM configurations will handle ANSYS "megamodels" of 50-100M DOF

Instead of isolated, simplified, single-point simulations, today's design challenges require high-fidelity results that include the coupling between multiple physical phenomena. ANSYS delivers the depth and breadth of tools required to enable these real-world multiphysics solutions, incorporating fluids, structures, thermal, and electromagnetic phenomena.

Solutions from ANSYS are also engineered for scalability, allowing simulation to be applied at the level of detail required for reliable results. From simple initial design studies to highly detailed optimization work, software from ANSYS has been tuned to perform exceedingly well on the latest high-performance computing systems. This optimization ensures that as the complexity of simulations increases, turn-around time remains low and results are available to impact engineering decisions. ANSYS and HP work closely together to ensure optimized performance of ANSYS solutions on HP systems. Experts help customers select the best configurations for successful product development at all levels.

Finally, software solutions from ANSYS are built around an adaptive and open architecture that contributes to efficient workflow. Fully integrated with the leading computer-aided design (CAD) packages

and extensible to integrate with other analysis tools, the ANSYS simulation environment can be easily tailored to specific organizational needs.

Powerful, expertly architected systems

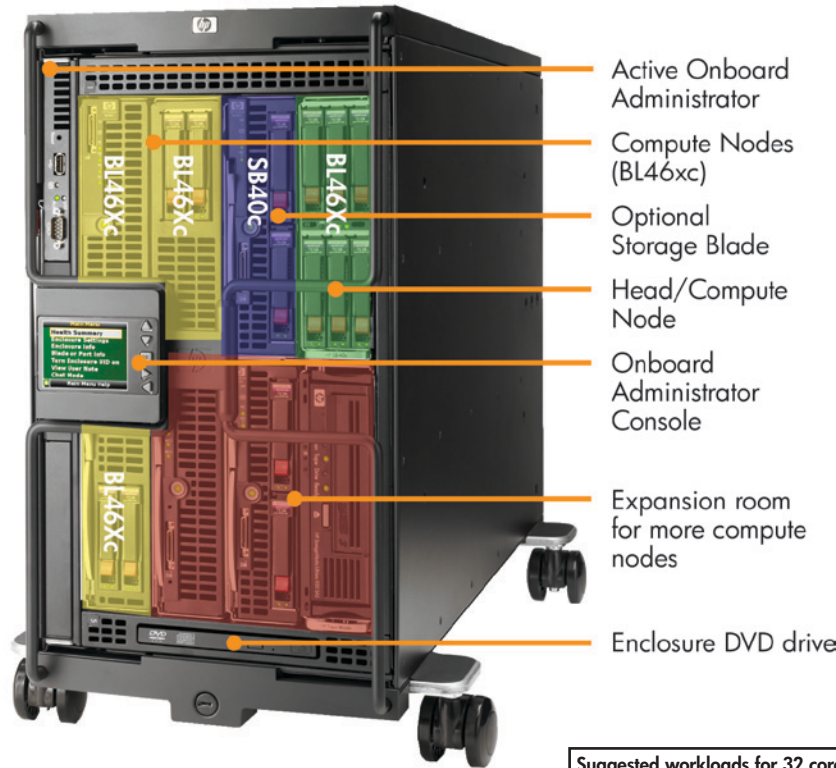
HP servers deliver powerful throughput, flexible operation, and easy system management. Servers range from rack-mount 1U "pizza box" enclosures on the low end, to a mid-range array of blades, to the high-end 128-core HP Integrity Superdome system. All servers leverage standards-based economics to maximize price/performance, application availability, and configuration flexibility. For example, HP Integrity servers running HP-UX11i have supported virtually all CAE solver codes since 2003, tuned to achieve the highest possible performance.

Blade systems help solve the challenges typically associated with cluster cabling complexity, increased power/cooling requirements, configuration changes, and total cost of ownership. HP is leading the way in blade server adoption with solutions that provide higher performance and greater flexibility at lower costs. The HP BladeSystem series, the fastest blade solution available for HPC, delivers innovative virtualization, power and cooling, and system management capabilities.

HP Cluster Platform Workgroup System

The HP Cluster Platform Workgroup System is a smaller, versatile blade system enclosure—ideal for small sites like business offices or branch locations that only need four to eight server or storage components at a time. It can plug right into the wall¹, uses standard power, and doesn't need special air conditioning.

¹Facility planning may be necessary. HP BladeSystem Power Sizer is available to help size power consumption and heat load.



HP Cluster Platform Workgroup System for fluids simulation (FLUENT and/or ANSYS CFX)

Solution Components: 32-64 core
Small to medium configuration

Server Options:

- 4 ProLiant BL460c or BL465c nodes, each using two quad-core processors. (For BL460c, dual-core processors are also available)
- 8 cores per compute node
- 72GB SAS drive

Options:

- Configure a "head" node for decomposition, large jobs, and/or pre/post processing. (Two 72GB SAS drives suitable for head node.)
- Replace a compute node with a storage node

Total Memory for the Cluster:

- Compute nodes: 2GB/core (16 GB/node)
- Head Node: up to 8GB/core (up to 64GB/node)

Cluster Interconnect:

- Integrated Gigabit Ethernet or InfiniBand DDR (recommended for jobs using 32 cores and above)

Storage:

- Optional SB40c storage blade
- Extended direct attached storage on the head node
- Up to 6 SFF SAS drives

Operating Environment:

- 64-bit Linux or
- Microsoft® Windows® HPC Server 2008

Suggested workloads for 32 cores:

- Ideally suited for fluids simulation models up to 50M cells
- Or, run 3-4 simultaneous fluids simulation models on the scale of 10M cells

HP also offers the HP Cluster Platform Workgroup System (CP Workgroup System) a complete, integrated supercomputer-in-a-box. The CP Workgroup System delivers nearly a TFLOP/s of computing power without the complexity and expense of an enterprise-level cluster system. Designed for small to midsize organizations or workgroups, the system is affordable, simple to deploy and easy to manage. Best of all, the CP Workgroup System requires no special power, cooling or staff. It puts the power of supercomputing in your hands, improving productivity, speeding design, and reducing the cost of innovation.

Finally, HP leadership in CAD/CAE workstation performance and quality is legendary. We combine engineering innovation, solutions excellence, and a strong commitment to industry relationships to maximize engineers' productivity. CAE users will find that HP Personal Workstations provide the ultimate in power at affordable prices. For example, you can choose an xw8600 workstation configuration with two dual- or quad-core processors, resulting in four or eight processor cores in a single desktop with up to 128GB of RAM.

Clusters that are easy to deploy and manage

HP has developed a common cluster platform framework supporting all of our clustering options, so you can choose the hardware and software that best suits your computing environment. Our building-block design offers configuration tools for easy ordering, predefined systems for rapid deployment, and reference platforms for ISV certification testing. We leverage industry-standard hardware and software components for more affordable and open cluster solutions.

Providing customers with a choice of tested options is significant to the appeal of HP's cluster portfolio. The modular design supports a full spectrum of customer requirements and enables easy expansion. Configuration choices include node counts, processors, interconnects, operating systems, open source and commercial middleware, and application software. You have access to technologies and products with the assurance that they have been thoroughly tested and integrated with every component in the portfolio. This array of choices enables you to select the best technology for your workload, budget, and experience.

HP BladeSystem c7000 Enclosure

The BladeSystem c7000 enclosure provides all the power, cooling, and I/O infrastructure needed to support modular server, interconnect, and storage components.

The enclosure is 10U high and holds up to 16 server and/or storage blades plus optional redundant network and storage interconnect modules. It includes a shared, five terabit/s midplane for wire-once connectivity of server blades to network and shared storage.



GigE Management Switch

Compute Nodes (BL46xc)

Optional Storage Blade

InfiniBand DDR Switch (back)

Onboard Administrator

Storage

Expansion room for more compute or storage nodes

HP c7000 System Rack for fluids simulation (FLUENT and/or ANSYS CFX)

Solution Components: 64-128 core Large configuration

Server Options:

- Up to 8 to 16 ProLiant BL460c or BL465c nodes, each using two quad-core processors. (For BL460c, dual-core processors are also available)
- 8 cores per compute node
- 72GB SAS drive

Options:

- Configure a "head" node for decomposition, large jobs, and/or pre/post processing. (Two 72GB SAS drives suitable for head node.)
- Replace a compute node with a storage node or add DL38x as head node

Total Memory for the Cluster:

- Compute nodes: 2GB/core (16 GB/node)
- Head Node: up to 8GB/core (up to 64GB/node)

Cluster Interconnect:

- Integrated Gigabit Ethernet or
- InfiniBand DDR recommended for jobs using 32 cores and above

Storage:

- Optional SB40c storage blade
- Extended direct attached storage on the head node
- Up to 6 SFF SAS drives

Operating Environment:

- 64-bit Linux or
- Microsoft® Windows® HPC Server 2008

Suggested workloads for 64-128 cores:

- Ideally suited for fluids simulation models up to 100M cells
- Or, run 6-8 simultaneous fluids models on the scale of 10M cells

Cluster management tools in the HP framework are either HP-developed or partner-based. The XC software stack offers a turnkey Red Hat compatible system for Linux installations. HP also offers SUSE Linux with a set of third-party cluster tools that HP has tested with the most popular CAE applications. For small to mid-sized organizations, HP offers Microsoft® Windows® HPC Server 2008 (CCS)—an integrated, standards-based compute clustering platform.

Complementing the HP cluster operating environments is HP's high performance Message Passing Interface library (HP-MPI). HP-MPI is distributed by over 25 CAE ISVs for their Linux cluster platform support, making it the de facto standard for cluster computing in CAE.

Driving product designs and development

ANSYS provides comprehensive, scalable, and adaptive solutions that drive the information-based product development process. HP's innovative and cost-effective systems enhance development with scalable, reliable, HPC solutions. Together, ANSYS and HP help companies innovate and stay competitive, making product development less costly and more reliable.

Technology for better business outcomes.

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