

# SIMPLIFYING HPC CLUSTERS

BRINGING SUPERCOMPUTING POWER TO WORKGROUPS AND DEPARTMENTS WHILE AVOIDING THE NORMAL ADMINISTRATIVE AND MANAGEMENT BURDENS

## EXECUTIVE SUMMARY

- Many organizations could improve productivity and time to results with high performance computing
- Proprietary systems are costly to maintain and lack flexibility to run a variety of applications
- Use of enterprise clusters limits a group's ability to make changes and control workflows
- The lack of a dedicated IT staff has stymied the adoption of workgroup clusters
- Dell and Intel have teamed up to simplify the management of HPC clusters
- The effort brings supercomputing power to workgroups and departments to help improve productivity while minimizing administrative and management burdens

Many organizations have departments and workgroups that could benefit from high performance computing (HPC) resources to analyze, model, and visualize the growing volumes of data they need to conduct business. Unfortunately, these groups often do not have sufficient IT support and may lack the specialized IT skills required to run their own HPC clusters.

To help address these issues, Dell, Intel, independent software vendors (ISVs), and others have teamed up in an effort called the Intel Cluster Ready program, which provides a standardized and replicable way to build clusters and run high-performance applications.

HPC cluster solutions that meet the certification criteria of the program are easy to deploy, and "registered" ISV applications can run "out of the box" on these clusters. This allows individual groups to deploy and run their own clusters quickly and easily, accelerating their work projects and driving more business for the company.

## MEETING TODAY'S GROWING HPC DEMANDS

Virtually every industry today -- be it energy, life sciences, manufacturing, or financial services -- runs on data. And for that data to be of practical use, it must be analyzed, visualized, or modeled quickly.

At the same time, the applications used to make sense of the data, model it, or perform simulations and forecasts with it are becoming increasingly sophisticated. Such applications often use realistic conditions, incorporate complex scientific and math-





emational analysis, and offer highly refined and granular outputs.

Additionally, the sheer volume of data is growing dramatically. Organizations that are most able to effectively utilize this data can create a competitive advantage.

For instance:

- In the energy industry, new exploratory techniques and equipment are producing significantly more data that must be analyzed rapidly to

models that calculate the market value of stocks, bonds, loan rates, and other products.

Furthermore, all of these fields constantly evaluate new technologies and are highly competitive. So adaptability and time are essential.

These factors lead to one conclusion: Businesses today need easy-to-use, flexible, and robust HPC clusters to enhance their day-to-day operations.

*When selecting a system, the emphasis should be on improving workflow and throughput.*

make decisions about where to drill for oil and gas.

- In healthcare, data from higher-resolution CAT scans and MRIs must be visualized quickly, and is often combined into 3D images to help professionals make rapid diagnoses.
- In the life sciences, mass spectrometers and sequencers are producing orders of magnitude more data that must be compared to known genomic and proteomic structures to accelerate drug discovery and new releases.
- In the automotive industry, many parts suppliers must adapt their component designs and test them using computer-aided engineering (CAE) simulations to meet the changing requirements of manufacturers.
- In financial services, more real-time data from more new sources than ever is funneled into forecasts and

## BRINGING COMPUTING POWER TO THE PEOPLE

For years, many workgroups and departments have had limited choices when it came to running applications needed to conduct their HPC work. They could either use workstations (typically based on proprietary technology) or they could submit jobs to an enterprise cluster if that resource was available in their company

The workstations gave them more flexibility to try new applications or modify existing ones, but the systems were often very expensive to purchase and, by virtue of being proprietary, many applications were simply not supported.

The enterprise clusters offered the required processing power, but because these were operational systems relied on by the entire company, departments and workgroups could not use these systems

to develop or try new applications, nor could they make changes on their own.

As servers built on standards-based technology have become available, clusters have provided the necessary processing power at a price point where even workgroups could afford them.

That leaves one problem: the administration of the cluster. In most companies, IT supports core enterprise applications and services, including e-mail, back-office applications (e.g., ERP, CRM, SFA, etc.), desktop support, and helpdesk. Most workgroups and many departments will get little or no help from IT for their HPC clusters.

What these groups need are easy-to-use HPC cluster solutions and applications that can run without major configuration modifications.

Besides ease of use, the clusters must also enable high productivity. The issue here is not so much how quickly any one job can run, but how much work can be done in a given time. Basically, when selecting a system, the emphasis should be on improving workflow and throughput: How fast can an analysis be done, a conclusion reached, a decision made? These are the most pressing criteria for judging a new system.

To complete the most work possible in a given time means there can be no conflicts (such as contention for system resources) that cause a program to crash. And the components--including the server nodes, interconnection technology, and storage systems--must be high-quality and reliable.

In the past, some workgroup or departmental clusters were purchased

to run a single application or class of applications. But as research and business priorities change over time, there is often a need to run additional applications. The problem is that a cluster selected for one application or one class of applications does not necessarily run others efficiently. For instance, commonly used CAE applications such as ABAQUS, ANSYS, FLUENT, NASTRAN, Pam CRASH, and STAR CD all have different memory, CPU, I/O, and bandwidth requirements.

So an additional challenge in sustaining high-productivity computing is having a cluster that can support a variety of applications, each with different systems requirements, without significantly modifying the cluster's configuration.

## *The combination of Dell HPC and the Intel Cluster Ready program results in simpler operation and management of an HPC cluster.*

### DELL AND INTEL AS YOUR TECHNOLOGY PARTNERS

Dell is focused on scalable solutions that simplify HPC, reducing complexity and cost, and helping enhance productivity, while addressing the pain points of today's workgroup and departmental users.

Dell offers high-performance, built-to-order systems for workgroup and departmental HPC clusters, drawing on Dell's expertise with larger HPC cluster systems. This is an area where Dell has significant credentials. For example, 25 Dell clusters were included in the June 2008 Top 500 list of the world's most

powerful supercomputers (five Dell systems were in the top 50).

To address the specific needs of workgroup and departmental users, Dell has teamed with Intel, Platform Computing, Clustercorp, ISVs, and others in the Intel Cluster Ready program.

The Intel Cluster Ready program helps ensure application and component interoperability. The program has a number of features that help users when selecting, deploying, and operating their clusters. These include:

- **Intel Cluster Ready Specification:** A common basis for building clusters and registering applications for HPC. The specification includes requirements for hardware, software, manageability and functionality,

helping to ensure that each cluster component conforms to industry standards or best-of-class practices.

- **Certification:** Purchase of a certified system ensures that the cluster is designed and built to the program's specifications.
- **Labeling:** By labeling components as certified, users can easily select interoperable hardware and software.
- **Communications:** Best practices are made available so users can benefit from the work of others.

Additionally, the program offers users a way to validate and test the on-going operation and performance of all

cluster components. This is done using the Intel Cluster Checker. This tool is used by systems vendors to ensure their clusters meet the specifications of the program. Users can run the tool when installing a cluster to speed deployment, and they can use it over time to ensure a cluster remains compliant as new applications are added or configurations change.

Using the Intel Cluster Ready program specifications, Dell offers a number of integrated solutions to meet a variety of workgroup and departmental HPC needs. These clusters can include Platform OCS, a pre-integrated, certified software solution that simplifies the deployment and management of HPC clusters running Linux, or Clustercorp Rocks+, a complete HPC cluster software stack including everything from the operating system to a modular applications level environment.

Rounding out the Dell solutions, users can run, out-of-the-box, cluster-ready applications from Ansys Inc., CD-Adapco, ESI Group, Livermore Software Technology Corp. (LSTC), MSC Software, SIMULIA, and others.

The combination of Dell HPC and the Intel Cluster Ready program results in simpler operation and management of an HPC cluster. Additionally, the program's certification criteria, combined with the Intel Cluster Checker, gives workgroups and departments the confidence to deploy and run their own clusters with little or no help from IT. ●

For more information about Dell HPCC solutions go to:  
<http://dellhpcc.ziffdavisenterprise.com/>

