INTEL CLUSTER READY AND PLATFORM OPEN CLUSTER STACK: CLUSTERS MADE SIMPLE

The Intel® Cluster Ready program is designed to provide a common standard for high-performance computing (HPC) clusters, helping organizations design and build seamless, compatible configurations. Integrating the standards and tools provided by this program with Platform™ Open Cluster Stack and certified Dell™ clusters can help significantly simplify the deployment and management of HPC clusters.

Related Categories:

High-performance computing (HPC)

Parallel systems

Platform Computing

Visit ***DELL.COM/PowerSolutions*** *for the complete category index.*

As the cost of high-performance computing (HPC) falls, a growing range of problems have become economical to solve with compute clusters based on commodity hardware components. These problems range from risk management for insurance portfolios to design optimization and durability studies on automobile and aerospace components, which can now be solved with levels of compute power formerly reserved for only the biggest and most costly problems. Even in areas where non-cluster HPC systems have been in use for some time, such as oil and gas reservoir simulation and life sciences clinical studies, commodity hardware enables analysis of larger problem sizes with more fidelity than was previously economically feasible.

According to IDC, the HPC technical server market, which is 50 percent compute clusters, is growing dramatically in the divisional, departmental, and workgroup areas. This growth is largely attributable to the use of commodity components, which have dramatically reduced the price/performance ratio of these systems. However, IDC still expresses concern that adoption may be limited, because "clusters are increasingly complex to deploy and manage" and require advanced or specialist skill sets for IT personnel.[1]

The source of this complexity is the cluster architecture itself. Cluster servers are fundamentally different from traditional symmetric multiprocessing servers, because they comprise individual units for processing and storage. In addition, using clusters for either multiple jobs or to run software applications that can use multiple processors simultaneously requires high-speed interconnects as well as workload management middleware. Because of these differences, clusters also require different approaches to specification, installation, and management than are used in traditional IT environments.

Until recently, it was difficult to ensure that HPC clusters met a minimum set of standards: each cluster may have had different hardware and software components, and the resulting combinations may or may not have functioned in the same way. To help avoid this problem, Intel has collaboratively developed the Intel Cluster Ready program and technology package with original equipment manufacturers, channel members, and independent software vendors (ISVs). By taking advantage of the standards and tools provided by this program, and combining them with Platform Open Cluster Stack (OCS) software and certified Dell HPC

This product includes software developed by the Rocks™ Cluster Group at the San Diego Supercomputer Center at the University of California, San Diego, and its contributors.

[1] "Intel Cluster Ready," by IDC, Doc #207312, June 2007.

"Platform OCS helps simplify the deployment and management of Intel Cluster Ready–certified clusters by installing and configuring Intel Cluster Ready software components on Dell HPC platforms."

clusters, organizations can help significantly simplify the deployment and management of HPC clusters.

Introducing Intel Cluster Ready and Intel Cluster Checker

Intel and its partners have created the Intel Cluster Ready program to help simplify the definition, acquisition, installation, and management of HPC clusters for organizations without prior experience in cluster computing and those working to increase their technical computing capacity. By incorporating certified hardware, cluster system software, application software, and cluster-ready configurations, this program helps reduce both deployment time and total cost of ownership—both of which can be critical in environments where HPC applications are delivering essential competitive and strategic advantages.

Intel Cluster Ready provides a reference specification for ISVs and system builders to help validate HPC clusters as well as a set of configurations describing in detail how to combine components to create an Intel Cluster Ready–certified cluster. For IT organizations, the key feature of this program is that it specifies a common basis for clusters, allowing them to select from a variety of hardware and software components based on their cluster's purpose and helping ensure that ISV applications that work on one certified cluster can also run reliably on a different certified cluster. This common basis significantly simplifies the processes of designing, building, acquiring, and deploying clusters based on Intel components, increasing flexibility and helping reduce total cost of ownership.

The Intel Cluster Ready specification is a key part of the program, but the program consists of more than just documentation. The Intel Cluster Checker, a script-based tool that performs direct computational tests and measurements, helps both vendors and IT organizations ensure conformance to the specification, provides an objective measure of system performance, and can assist in troubleshooting. Figure 1 illustrates the architecture of the Intel Cluster Checker engine. This tool is designed to significantly reduce deployment time while increasing uptime for certified clusters.

If a cluster passes all of the Cluster Checker tests, it is considered Intel Cluster Ready certified. Organizations can also use this tool to help ensure that the cluster continues operating properly and within the specification simply by running tests periodically on the cluster and comparing the results with those of previous tests. Doing so helps detect deviations from the original cluster certification to help ensure that the cluster remains certified.

Combining Platform OCS and certified Dell HPC clusters

Platform OCS is a pre-integrated, vendor-certified, modular software stack designed to streamline the deployment and management of clusters running the Linux® OS. Backed by available global 24/7 enterprise support, it transparently integrates open source and commercial software into a single consistent cluster operating environment. Platform OCS helps simplify the deployment and management of Intel Cluster Ready–certified clusters by installing and configuring Intel Cluster Ready software components on Dell HPC platforms (see Figure 2).

Platform Load Sharing Facility (LSF®) HPC, a powerful, comprehensive, policy-driven workload management application for engineering and scientific distributed computing environments, works in conjunction with Platform OCS to intelligently schedule parallel and serial workloads, helping maximize available computing resources. By utilizing hardware-specific integrations, Platform LSF HPC and Platform

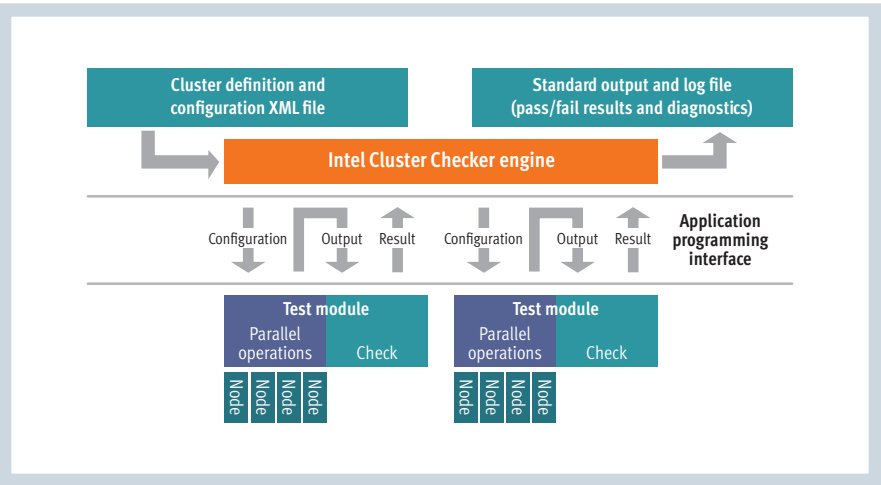

Figure 1. *Intel Cluster Checker engine architecture*

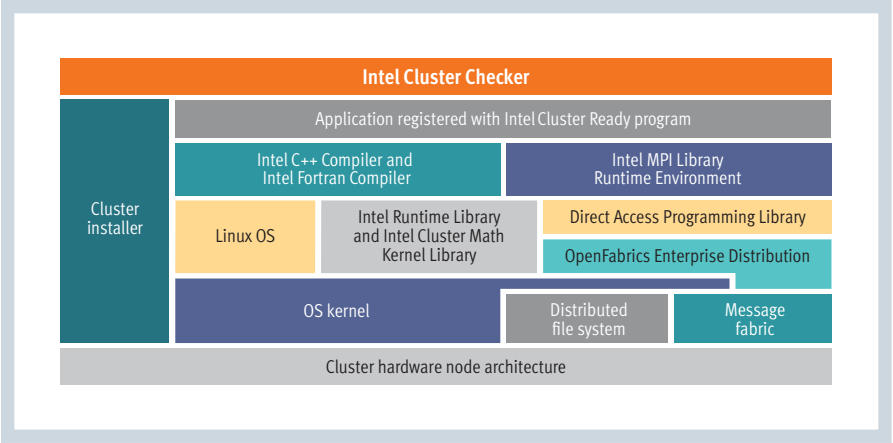

Figure 2. *Intel Cluster Ready components installed and configured by Platform OCS*

OCS also enable organizations to take advantage of the high-performance network interconnects available on clustered systems and supercomputers.

Combining Platform software with Dell hardware allows organizations to easily create and deploy HPC clusters using industry-standard components. HPC clusters incorporate a diverse array of hardware components, and the appropriate choice of computers, processors, memory, hard drives, storage arrays, network devices, cabling, switches, and power supplies depends on the cluster's purpose. Organizations must carefully match the hardware with their goal to help achieve the desired performance. Hardware from Dell—a leader in HPC—can provide a standard, reliable reference platform when building clusters.

Because Platform OCS is already a part of several Intel Cluster Ready configurations, using it helps alleviate the need for organizations to assemble, configure, and install the necessary components either manually or by using other cluster management tools. They can use Platform OCS to quickly install and configure Intel Cluster Ready–certified Dell HPC clusters with the following components:

- Certified Dell hardware
- A Message Passing Interface (MPI) implementation such as Open MPI or Intel MPI Library
- The Intel Runtime Library, including the Intel MPI Library Runtime Environment
- The OpenFabrics Enterprise Distribution stack (optional)

For example, an Intel Cluster Ready configuration might include Platform OCS with the Intel Cluster Checker Roll as well as the following hardware components:

- One Dell PowerEdge™ 2950 server as the front-end node
- 12 Dell PowerEdge 1950 servers as the compute nodes
- One 16-port Dell PowerConnect™ switch
- KVM (keyboard, video, mouse) over IP switch, cables, server rack, cable management system, and power distribution system

Building a standard for simplified cluster deployment

The Intel Cluster Ready program is designed to let organizations easily deploy and manage HPC clusters, helping eliminate the need to create custom implementations in which they must individually install and configure each application while modifying the cluster hardware and system software to meet these applications' requirements. This program also helps significantly simplify the work required by commercial and noncommercial application vendors, who can focus on certifying their applications for Intel Cluster Ready configurations rather than on porting and configuring the applications for different potential combinations of hardware and software. By integrating the Platform OCS software stack with Intel Cluster Ready–certified Dell HPC clusters, organizations can easily create seamless cluster environments to help meet their HPC requirements.

"Combining Platform software with Dell hardware allows organizations to easily create and deploy HPC clusters using industry-standard components."

MORE ONLINE
DELL.COM/PowerSolutions

QUICK LINKS

Intel Cluster Ready:
www.intel.com/go/cluster

Platform OCS:
www.platform.com/Products/Platform.OCS

Dell HPC cluster solutions:
DELL.COM/HPCC

This product includes software developed by the Rocks™ Cluster Group at the San Diego Supercomputer Center at the University of California, San Diego, and its contributors.