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X-ISS has been providing cross-platform management and analytics solutions for the High Performance Computing (HPC) and Big Data industry for more than 10 years. With a reputation for the highest levels of quality and customer satisfaction, X-ISS has been helping customers make effective use of their HPC and Big Data investments through software and services that cater to their specific needs. The solutions include a full-service remote cluster management service called ManagedHPC® that removes the worry from customers about managing their cluster environment effectively. Additionally, X-ISS provides DecisionHPC®, a smart business analytics SaaS product that allows customers to keep their clusters operating at maximum efficiency.

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X-ISS Sets Up Diskless Windows HPC Cluster for Secure Military Environment

A secure Department of Defense site needed a powerful Microsoft Windows HPC cluster to run mission-critical simulation applications.

The Challenge: Creating Large Diskless Cluster

At 196 nodes, the site's cluster was relatively large, and due to security constraints, it had to be diskless.

In a diskless cluster, a central storage area network is typically loaded with a small number of physical hard drives storing files that serve as virtual hard drives to boot the compute nodes. Diskless Linux HPC systems were already relatively common at the time, but a diskless Windows HPC deployment was not.

The DoD site chose Dell to deliver this system, and since X-ISS had already been a long-time HPC-delivery partner, Dell called on X-ISS to assist with the job.



We start with detailed planning.

The Solution

Proud of the platform-neutral reputation built over the past 15 years, X-ISS dispatched senior Windows analyst Jonathan Raines to the Dell integration facility to assist with building the cluster from the ground up. Specifically, X-ISS was tasked with customizing and installing the Windows cluster management system and testing the cluster.

"Starting with basic system architecture, we had to figure out how to make this work," said Raines. "Diskless booting with Windows is complex. It requires detailed planning to ensure all hardware is configured and set up to meet specific requirements."

From a practical and financial perspective, diskless clusters make a lot of sense for any secure facility, Raines explained. Organizations handling classified information deal with stringent security protocols for their computer networks. Among these is the



ProjectHPC

The Solution continued

mandated periodic DoD-grade wiping or outright destruction of disk drives containing sensitive data. For the military customer, this would have meant time-consuming and expensive cleansing – or destruction – of the 392 drives required for a standard 196-node system.

To customize the diskless Windows cluster, Raines interfaced extensively with Dell, Microsoft and the client.

After several conversations with Microsoft, Raines concluded that differencing disk technology would be key to a diskless system which met the military base's requirement for system speed while also minimizing the number of hard drives. The differencing disks would enable the client to minimize the physical drive count and run and modify the simulation numerous times without ever changing the master boot image. Each change, or simulation modification, is saved to a differencing disk on a virtual drive.

Rather than set up hundreds of virtual drives, each taking up 15 gigabytes of space, the team created an equivalent number of differencing disks against a single 15GB virtual drive. The savings in disk space was enormous, and the system speed was not impaired.

A primary challenge was setting up the SAN with enough performance to boot up 196 nodes yet kept the physical drives to a minimum. Dell had specified an iSCSI SAN for the deployment. The team decided that 24 drives would be used in the SAN along with aggregated network connections to supply the needed performance.

“We took Microsoft Windows technology that was familiar to us, but assembled it in a new way to make a system that worked uniquely to meet the customer’s needs.”

The Benefits

“The cluster boots sufficiently fast,” said Raines, “and when the client wants to wipe out the modifications, they can simply reinitialize the differencing disks and the original simulation program remains. If they need to completely wipe the system, wiping only 24 drives is required versus nearly 400.”

“There was really no new technology in this job,” said Raines. “We took Microsoft Windows technology that was familiar to us, but assembled it in a new way to make a system that worked uniquely to meet the customer’s needs.”

And it worked great. Raines and his team were onsite at the base when the system was installed by Dell. X-ISS oversaw the testing phases to ensure the diskless HPC clusters ran according to the performance specifications required by the military client.

QUICK FACTS

- **PROBLEM:** A secure site's 196 node cluster was relatively large, and due to security constraints, had to be diskless.
- **SOLUTION:** The team applied differencing disk technology using a single 15GB virtual drive.
- **RESULTS:** The new system boots fast and provides vastly improved disk wiping speed and efficiency.



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