Bright Computing

Bright Cluster Manager Used To Build A New Cluster Infrastructure For Advanced Cancer Research

CASE STUDY

Many organizations that work with high performance computing (HPC) clusters are focused on research and lack the skills to properly manage and control such a cluster. They are, therefore, heavily dependent on expensive, external expertise. The Research Center for Molecular Medicine of the Austrian Academy of Sciences (CeMM) overcame this problem with the implementation of Bright Cluster Manager.

Bright Cluster Manager gives system administrators control over high performance computing at the Austrian Academy of Sciences' Center for Molecular Medicine.

The Customer

CeMM is focused on molecular and genetic research of human diseases such as cancer. It is tightly connected to the Vienna General Hospital, one of Europe's largest hospitals, and is one of the few research groups within the academy with its own HPC cluster. CeMM uses the computing power of the cluster mainly for gene sequencing and mass spectrometry data analysis.

The Challenge

Although demand on IT resources was rising, in-depth knowledge of cluster setup and management was not available in house. This placed the future of the CeMM cluster in question. The parallel file system was suffering from poor performance due to increasing demand for sequencing. An extension of the existing system would be very expensive due to the "locked-in" nature of the hardware, software, and service dependency on the existing vendor. Something had to be done.

The Solution

In late 2013, a project to address the cluster problems was started, with Bright Cluster Manager playing a critical role. "The decision to implement an intelligent management software layer was key to overcoming the dependency on expensive systems and external knowledge," says Michael Ruepp, who joined the CeMM team in order to plan, design, and implement the new systems. "By moving to easy-to-use software such as Bright, any systems administrator can now carry out everyday tasks in quick order with the Bright GUI, freeing them to focus on user support and other important tasks."

Switching to the high performance Fraunhofer Filesystem (BeeGFS) and utilizing a single modern InfiniBand network fabric for storage and RDMA, the complexity of management and deployment of two different interconnect technologies was greatly reduced. The Bright head node and the BeeGFS management node, were both set up as virtual machines on the newly implemented VMware cluster, benefiting from
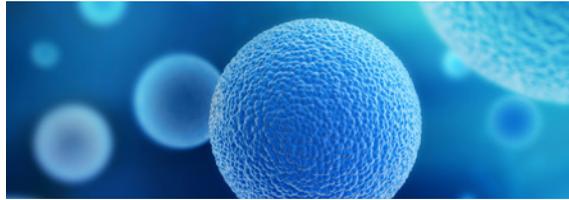
VMware and Veeam features such as high availability, failover, and replication. By doing this, expensive hardware was freed up to use as additional compute power, instead of working as redundant head nodes.
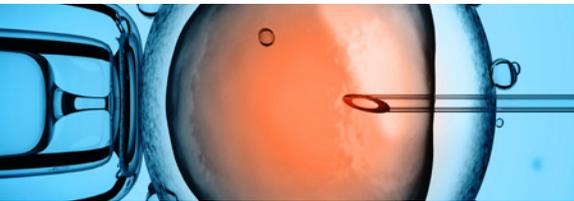
Future Ready

The cluster was integrated seamlessly into the Windows Active Directory over LDAP/Kerberos, giving the system administrators the possibility to control authentication and authorization (including system resources) with only a few active directory groups. The BeeGFS was exported to the Office Clients over Samba 4 and 10GBit Ethernet with seamless SSO control.

All of the nodes are now capable of running three MICs or GPUs, such as Xeon Phi or NVIDIA Tesla. The performance of the cluster, theoretically, could be extended to approximately 500 teraflops in five racks, which would rank it somewhere in the region of 100th place in the TOP500 Supercomputing list. The storage, which is now at 840TB@10GByte/s aggregated, can be extended easily by deploying additional storage servers using Bright software.

The Results

Ruepp was very happy with Bright. "Thanks to Bright management software, new nodes and server storage can be deployed literally in minutes and without the need for a deep knowledge of Linux, OFED, CUDA, or similar

technologies. It is easy to start with a small and cost-effective setup and extend on demand. The administrators know that the updates coming from the Bright repository have been tested, and software dependencies have already been considered."

The overall cost savings achieved were approximately €500,000 as the need to purchase additional hardware and services from external service providers was largely removed. The implementation phase, which included the migration of all IT services onto the new VMware platform and much more, took just six months.

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