Accelerating the OpenStack Cloud

Partner Solution Brief

Benefits

• Enhanced integration and testing enables OpenStack partnerships to manage and accelerate the cloud
• Enables dramatically lower latency and higher bandwidth
• Low host CPU utilization with host-offload architecture

Seagate® Nytro™ Accelerator Cards and Mirantis Data Center Management

The data center is going through a drastic transition as new technologies, innovators and partnerships emerge. OpenStack is a leading community-driven open source software platform for building private and public clouds. OpenStack offers dynamic data resources, on-the-fly scalability and developer flexibility and innovation.

Mirantis Data Center Management

Mirantis is one of the top five contributors to the OpenStack project and the number one pure-play OpenStack company. Mirantis OpenStack is an OpenStack distribution bringing together hardened configurations of community OpenStack, the broadest range of drivers and plug-ins, plus related projects like Murano (Application Catalog) and Sahara (Hadoop Big Data Analytics as a Service) in a single package. Included with Mirantis OpenStack, the open source, web-administered Fuel deployment engine enables easy, automated OpenStack deployment in proven reference configurations, helping customers create production clouds in hours or days—not months; backed by Mirantis enterprise-class support, global integration services and worldwide training.
Keeping Up With OpenStack Performance Demands

Mirantis Fuel dramatically accelerates OpenStack deployments, saving time and money. Likewise, acceleration, particularly when applied to reducing the impact of storage bottlenecks, maximizes the performance of the underlying cloud infrastructure. The compute and storage nodes are the workhorses of the OpenStack architecture, and the ability to accelerate their performance can allow OpenStack to churn through massive amounts of data.

In OpenStack deployments, data is kept in three nodes, which typically are running either an instance, the individual virtual machines (VMs), or images, which are disk images (templates) for VM file systems. These nodes include:

- **Nova**: A compute node where the user instance runs
- **Cinder**: A storage node that provides persistent block storage
- **Glance**: Responsible for the storage and management of images

It is important to understand that each node has unique performance demands to drive the value of the OpenStack cloud. For Glance, performance is not critical; providing adequate capacity is sufficient. Nova and Cinder, on the other hand, require immediate access to data as instances are mixed and their requirements are unpredictable. Block storage in Cinder needs to ensure very quick response time and adequate I/O bandwidth. In addition, database response time is also very important for OpenStack installations to run efficiently, especially since all services will store authorization tokens and service data in the database, and the speed of acquiring the data will affect the productivity of the cloud.

Without meeting these performance demands, data is not being processed quickly enough and is possibly inhibiting the effectiveness of the cloud. These challenges are leading the adoption of new flash storage innovations, such as PCI-based flash to significantly increase the performance of OpenStack.

Seagate Nytro Accelerates the OpenStack

The Seagate Nytro application acceleration solutions are at the core of many OpenStack installations and bring the value of flash to the masses. Server-side flash, such as the Nytro application accelerator card, can provide dramatically lower latency and higher bandwidth required to bridge the performance gap. Nytro cards also have the ability to cost-effectively and efficiently scale across the massive amounts of servers in a cloud environment with minimal footprint.

CPU resources are also under a great deal of pressure to process the data in OpenStack environments. The CPU can also become a performance barrier if its processing resources are pulled away to other tasks. Nytro cards, in comparison to other flash technologies, utilize host-offload architecture for I/O and flash management, which results in consistent performance and low host CPU utilization to enable the CPU to be fully available for its primary task of processing data.

OpenStack Architecture with Mirantis

[Figure 1. OpenStack architecture with Mirantis and Nytro]
Mirantis and Nytro have collaborated by joining Mirantis’ leadership in OpenStack and Nytro server-side flash innovation to deliver an accelerated OpenStack cloud. Together they considerably improve the speed of deployment and agility of OpenStack. By integrating the Nytro software management API into the Mirantis Fuel platform, users have a single-user interface for optimal simplicity. This integration enables Fuel users to deploy Nytro drivers, utilities and scripts from the Fuel API, which is available in the Mirantis OpenStack distribution.

Nytro and Mirantis Drive Innovation Across the OpenStack

Mirantis and the Nytro team jointly conducted various tests using the Mirantis Rally Benchmark tool with CentOS 6.5 installed as the host operating system and in the system configuration illustrated in Figure 2, leveraging traditional storage as the base configuration and the Nytro XP6209 accelerator card to benchmark the performance improvements.

Figure 2. Mirantis Rally Benchmark test configuration

Figure 3. Testing baseline without the Nytro accelerator card

Figure 4. Testing with the Nytro accelerator card
The test results from the runs using the Mirantis Rally Benchmark tool have demonstrated the following:

- **On Compute Nodes in Nova:** Deploying the Nytro application accelerator card in place of traditional storage, such as rotational media (i.e., SAS HDDs), provides up to 3× performance improvement for typical VM boot and execution of commands within the VM when block size of I/O requests is 8KB, and in excess of 10× when the block size of I/O requests is 1MB.

- **On Storage Nodes in Cinder:** Deploying the Nytro application accelerator card in place of traditional storage provides up to 4× performance improvement for typical creation and deletion of Cinder storage volumes.

### Enabling the Overall Acceleration of the Cloud

Not only does this solution provide simple, automated deployment, as well as management of the OpenStack cloud, it enhances enterprise-class performance and scalability. This can enable the cloud installation to realize drastically improved OpEx and CapEx by efficiently increasing performance, reducing CPU cycles and lowering utility costs, all within a relatively small form factor. The end result is unlocking the ability to meet customers stringent SLAs while achieving business goals such as low $/CPU and low $/performance.

### Summary

OpenStack is rewriting the data center and Mirantis and Nytro are enabling this charge. Powering a cloud deployment using Mirantis OpenStack with Fuel software and Nytro application acceleration cards is a must in fast-tracking OpenStack deployments, and achieving agility and operational efficiencies. Please visit www.mirantis.com and www.seagate.com.