Configure Hitachi Compute Blade 500 and Hitachi Unified Storage in an OpenStack Environment

Tech Note

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Tech Note

OpenStack is a flexible and powerful software ecosystem allowing administrators and end users to control compute, storage, and networking resources in environments ranging from small business networks through enterprise-scale datacenters. At present, OpenStack is one of the fastest adopted technologies in compute history, reflecting the current popularity of both open source and virtualization.

Many components constitute the OpenStack ecosystem with more components and features appearing almost every day. The foundational components of OpenStack are as follows:

- **Nova** – Compute management for deployment and management of virtual machines on hypervisor hosts
- **Neutron** – Newest generation of networking technology providing virtual switches, NAT, and more
- **Keystone** – Identity management for authentication and authorization shared among all components
- **Horizon** – Dashboard component providing GUI-based management of OpenStack
- **Glance** – Image management providing the ability to create templates of virtual machines that can then later be instantiated as instances of running virtual machines
- **Cinder** – A block storage service for OpenStack, is offered as a subcomponent of the Hitachi Block Storage Driver for OpenStack. It provides the ability to host virtual machines on block storage devices or attach block storage as secondary virtual disk drives to virtual machines
- **Swift** – Object storage subsystem providing the ability to use object storage within an OpenStack deployment

This tech note demonstrates an OpenStack architecture running on Hitachi Compute Blade 500 (CB 500) servers utilizing block storage served by Hitachi Unified Storage (HUS): the Cinder subcomponent connects the compute and block storage devices.
High performance block storage is highly desirable in OpenStack installations because of the performance and features mature enterprise block storage arrays provide. As an example, the primary OpenStack Hitachi Unified Storage device can replicate OpenStack volumes to other local or remote Hitachi Unified Storage devices. This replication occurs transparently to OpenStack services. As another example, Hitachi Unified Storage snapshots, a high performance and mature feature of Hitachi Unified Storage, support OpenStack Cinder snapshots via the Cinder subcomponent. Features like this provide disaster recovery functionality that may be much more difficult to implement using direct attach storage, iSCSI servers, or native OpenStack functionality running in a pure commodity environment.

The HDS Implementation Guide "Configure Hitachi Compute Blade 500 and Hitachi Unified Storage in an OpenStack Environment" constructs the OpenStack architecture implemented in this tech note. Use that document to construct the OpenStack architecture if you wish to execute the steps in this tech note. Note that the OpenStack architecture in this document is fully based on the OpenStack Red Hat installation guide in order to provide a consistent architecture and additional source of information. The primary difference between the architecture in this document and the OpenStack Red Hat architecture is the integration of Hitachi Unified Storage block storage via the Cinder subcomponent. This integration obviously accrues the performance and functionality advantages mentioned above.

Whereas the implementation guide mentioned above is entirely based on the Linux CLI in order to construct the OpenStack architecture, this document is entirely based on the Horizon dashboard service in order to provide a user-level GUI view of OpenStack with high performance Hitachi Data Systems block storage.

The companion Implementation Guide guides you through a detailed installation of an OpenStack controller node, an OpenStack network node, and two OpenStack compute nodes. In addition, that guide shows how to integrate a Hitachi Unified Storage block storage device into the controller and compute nodes via the Cinder subcomponent. Note that this driver can provide OpenStack compute nodes with block-level access to Hitachi Unified Storage, Hitachi Unified Storage VM, Virtual Storage Platform (VSP), and VSP G1000 devices as well as iSCSI access to Hitachi Unified Storage. Installation of the Hitachi Block Storage Driver is quite easy to do, is documented fully in the Implementation Guide, and comprises the following steps: registering the block storage, adding a DP Pool, installing the Hitachi Block Storage Driver for OpenStack, and pointing the driver to the created DP Pool.
How to Use This Document

- This document provides:
  - A proof point of basic functionality of this solution
  - High-level technical reference for considering this solution
  - High-level reference of the use case implementation

- This document does not cover:
  - Performance measurement
  - Sizing information
  - Best practice
  - Implementation details

For implementation details, please contact a Hitachi Data Systems representative or consult the companion implementation guide "Configure Hitachi Compute Blade 500 and Hitachi Unified Storage in an OpenStack Environment."
Use Case Overview

This tech note demonstrates the creation of a virtual machine instance followed by the creation of a block storage volume on Hitachi Unified Storage. The tech note then shows how to attach the volume to the virtual machine. The final result is that the HUS volume appears as a new disk attached to the virtual machine. This tech note uses OpenStack’s Horizon dashboard GUI to execute the above steps to demonstrate OpenStack ease of use and integration of HUS into the OpenStack user interface.
## Tested Components

### Table 1. Hardware Components Used in This Tech Note

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Description</th>
<th>Version</th>
<th>Quantity</th>
</tr>
</thead>
</table>
| Hitachi Unified Storage 150 | - Dual controllers  
- 16 × 8 Gb/sec Fibre Channel ports  
- 32 GB cache memory  
- 12 × 600 GB 10k RPM SAS disks, 2.5 inch SFF | 0937/A-H | 1 |
| Hitachi Compute Blade 500 chassis | - 8-blade chassis  
- 2 Brocade 5460 Fibre Channel switch modules, each with 6 × 8 Gb/sec uplink ports  
- 2 Brocade VDX 6746 Ethernet switch modules, each with 8 × 10 Gb/sec uplink ports  
- 2 management modules  
- 6 cooling fan modules  
- 4 power supply modules | SVP: A0165-B-8205  
FOS 7.0.2c  
VDX6746: NOS 3.0.0_dcb3 | 1 |
| 520H A1 server blade (on Hitachi Compute Blade 500) | - Half blade  
- 2 × 8-core Intel Xeon E5-2680 processors, 2.70 GHz  
- 256 GB RAM  
- 6 × 16 DIMMs | BMC/EFI: 01-87 | 4 |

### Table 2. Software Components Used in This Tech Note

<table>
<thead>
<tr>
<th>Software</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Hat Enterprise Linux</td>
<td>6.5</td>
</tr>
<tr>
<td>OpenStack</td>
<td>Red Hat Icehouse</td>
</tr>
<tr>
<td>Hitachi Block Storage Driver for OpenStack</td>
<td>01-01</td>
</tr>
<tr>
<td>Hitachi Storage Navigator Modular 2</td>
<td>27.5 or greater</td>
</tr>
</tbody>
</table>
High Level Test Infrastructure

The OpenStack architecture used in this tech note is almost entirely based on the OpenStack Red Hat implementation guide. The differences are as follows:

- This tech note implements two compute nodes for a total of four nodes, each node running on one CB 500 blade.
- Hitachi Unified Storage provides block storage to OpenStack via the Cinder subcomponent.

Figure 1 is reproduced from the OpenStack Red Hat implementation guide in order to maintain consistency between Red Hat documentation and this tech note. It shows the OpenStack Red Hat reference architecture.
OpenStack Block Storage Demonstration

Log in to the OpenStack Horizon GUI by connecting a browser to the URL http://controller/dashboard. Your URL may vary; in this OpenStack architecture, the Horizon dashboard service runs on the OpenStack controller node.

Create a new virtual machine instance, as shown in Figure 2. The Red Hat reference architecture loads an image of a CirrOS virtual machine disk during installation that you will use in this step.

Figure 2
Figure 3 shows the newly created virtual machine instance named hbsd-instance.
Create a 100 GB volume from the Hitachi Unified Storage as shown in Figure 4. The *Configure Hitachi Compute Blade 500 and Hitachi Unified Storage in an OpenStack Environment Implementation Guide* provides detailed instructions for installing and configuring the Cinder subcomponent and Hitachi Unified Storage.

**Figure 4**
After creating the volume, the Horizon dashboard GUI shows the volume as available as shown in Figure 5.
Now attach the Hitachi Unified Storage volume to the newly created virtual machine. Select the virtual machine instance to attach the volume to by using the pull down list box in the lower left corner of the window as shown in Figure 6.

Figure 6
The Horizon dashboard GUI now shows the new volume as attached to the new virtual machine instance, as shown in Figure 7.

**Figure 7**

Start up the virtual machine and log in using the default CirrOS credentials.
Execute `fdisk -l` on the new virtual machine instance and note that a new disk with size 100 GB is attached to the virtual machine as disk `/dev/vdb`, as shown in Figure 8.

![fdisk output](image)

**Figure 8**

**References**

- Configure Hitachi Compute Blade 500 and Hitachi Unified Storage in an OpenStack Environment *Implementation Guide*
- OpenStack Installation Guide for Red Hat Enterprise Linux, CentOS, and Fedora
- Hitachi Block Storage Driver for OpenStack 01-01 Operation Manual 046951
For More Information

Hitachi Data Systems Global Services offers experienced storage consultants, proven methodologies and a comprehensive services portfolio to assist you in implementing Hitachi products and solutions in your environment. For more information, see the Hitachi Data Systems Global Services website.

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