Overview of the NetApp HCI Infrastructure Platform

NetApp HCI Solutions

Kevin Hoke
May 22, 2020

This PDF was generated from https://docs.netapp.com/us-en/hci-solutions/nhci_intro.html on October 26, 2021. Always check docs.netapp.com for the latest.

Table of Contents

Overview of the NetApp HCI Infrastructure Platform . . . 1
- Overview . . . 1
- NetApp HCI Use Cases . . . 1
- NetApp HCI Key Features . . . 1
- NetApp HCI Design Principles: Predictability, Flexibility, Simplicity . . . 2
- Compute and Storage Nodes . . . 3
- Element Software . . . 3

Overview of the NetApp HCI Infrastructure Platform

NetApp HCI provides great flexibility combined with enterprise level capabilities. Let’s delve into the features and benefits of the platform.

Overview

NetApp HCI is an enterprise-scale infrastructure that consists of a mix of storage nodes and compute nodes. NetApp HCI delivers predictable performance on a highly flexible, efficient architecture, making it easy to manage. With NetApp Element software, you unlock the power of the data fabric, enabling NetApp HCI to participate in hybrid cloud services.

The installation and configuration required to deploy VMs are automated with NDE. Compute clusters are managed with VMware vCenter, and storage clusters are managed with the vCenter plug-in that is deployed with NDE. A management VM called mNode that deploys as part of NDE handles version upgrades, pushing events to vCenter, vCenter plug-in management, the VPN tunnel for support, and the NetApp Active IQ® collector. It also enables you to extend NetApp cloud services to on-premises environments, thus enabling hybrid cloud infrastructure. With multiple options for compute and storage nodes,

NetApp HCI is suitable for multiple workloads, including:

- DevOps
- Container workloads
- Edge computing
- Database workloads
- Artificial intelligence
- Machine learning
- Virtual desktop infrastructure (VDI)

NetApp HCI Use Cases

- **On-premises private clouds.** With the option to start small and grow your infrastructure, NetApp HCI future-proofs your datacenter for later growth and flexibility.
- **Hybrid clouds.** NetAppHCI can serve as the infrastructure for hybrid multi cloud or private cloud deployments.
- **End-user computing.** You can deliver anoptimal user experience with NetApp HCI and VMware Horizon.
- **Workload consolidation.** NetApp HCI QoS settings let you deliver guaranteed application performance.

NetApp HCI Key Features

NetApp HCI provides enterprise reliability and availability. Some of the important features of NetApp HCI include:

- Guaranteed performance
    - Allocate storage performance independent of capacity

- Manage performance in real time without affecting other volumes
- Guarantee performance to every volume with fine-grain QoS settings

- Global efficiency
  - Inline and post-compression
  - Automatic distribution of data (no hot spots) with always-on deduplication
  - Global thin provisioning
- Data assurance
  - NetApp HCI Helix RAID-less data protection
  - Real-time replication (synchronous and asynchronous)
  - Integrated backup and recovery (cloud)
  - Data and performance availability regardless of system condition or application activity
  - Data safeguarded with 256-bit encryption

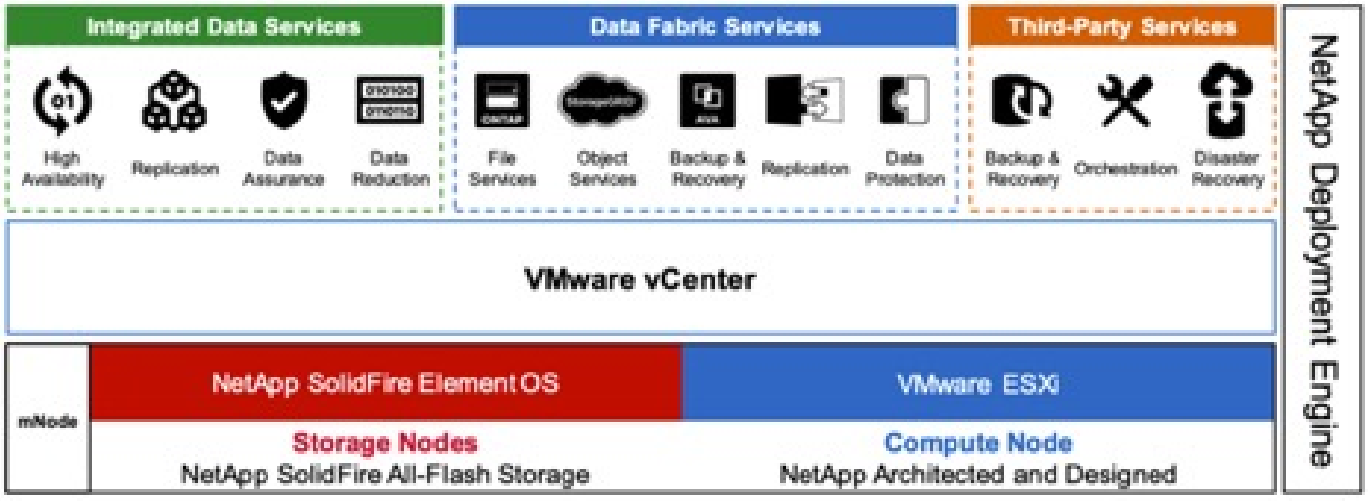

Figure 1. NetApp HCI Infrastructure components

NetApp HCI Design Principles: Predictability, Flexibility, Simplicity

NetApp HCI gives you flexible and straight forward control over your enterprise-class workloads. It is designed to provide predictable performance, linear scalability, and a simple deployment and management experience.

- Predictable
  - Prevent noisy neighbors and satisfy performance SLAs with industry-leading performance QoS.
  - Combine Storage Policy Based Management (SPBM) toautomate and manage QoS.
- Flexible
  - Confidently scale compute and storage nodes independently with zero share architecture.
  - Prevent inefficient over provisioning and reduce TCO.
  - Mix small, medium, and large compute and storage configurations.
- Simple

- With NDE, eliminate manual deployment and risk of user errors.
- Manage NetApp HCI with the Element Plug-in for vCenter

Compute and Storage Nodes

NetApp HCI offers multiple form factors for various compute and storage needs. A minimum starting configuration includes two chassis with two compute and four storage nodes. More nodes are needed for GPU-driven workloads such as VMware Horizon or machine learning. Compute nodes used for database workloads are also available with this architecture.

Compute Nodes

NetApp H300E, H500E, and H700E nodes are based on Intel Xeon E5 v4(Broadwell) processors. NetApp HCI H410C and H610C nodes are based on Intel Scalable (Skylake) processors. The NetApp HCI H610C node contains two NVIDIA Tesla M10 cards. NetAppHCI compute nodes can scale up to 64 per cluster.

NetApp strongly recommends reading the NetApp HCI datasheet for more information about NetApp HCI compute and storage offerings. For details about how NetApp HCI works, see the NetApp HCI Theory of Operations white paper.

Storage Nodes

Storage nodes are available on either half-width or full-width rack units. Half-width rack units are populating two rack unit chassis, which can contain either storage or compute nodes. At least four storage nodes are required and can be expanded to up to 40 nodes. A storage cluster can be shared across multiple compute clusters offering asynchronous, synchronous, and Snapshot replication methods for integrated data service. Storage nodes contain a cache controller to improve the write performance. A single node provides either 50K or 100K IOPS at 4K block size.

NetApp HCI storage nodes run Element software, which provides a QoS feature that supports minimum, maximum, and burst limits. The storage cluster allows a mix of storage nodes; the only caveat is that one storage node size can’t exceed 1/3 of total capacity.

Element Software

Element software is designed for data centers that require rapid, modular growth or contraction for diverse workloads. Because of its flexible handling of permanent and transient workloads with varioust hroughput and capacity requirements, Element software is the storage infrastructure of choice for service providers.

Element provides modular, scalable performance with each storage node, delivering guaranteed capacity and throughput to the environment. Each Element storage node added to aNetApp HCI environment provides a set amount of IOPS and capacity, allowing predictable, planned growth.

Because each node provides a set throughput (IOPS) to the storage environment, QoS for each workload can be guaranteed. Element helps you ensure minimum SLAs because the total throughput of the cluster is a known, quantifiable amount. For more information, see the Element software product page.

Element software is 100% programmable and delivers unmatched agility and guaranteed application performance. With the ability to mix nodes within a cluster, you can build a private cloud architecture to meet your business needs at any scale.

Copyright Information

Copyright © 2021 NetApp, Inc. All rights reserved. Printed in the U.S. No part of this document covered by copyright may be reproduced in any form or by any means-graphic, electronic, or mechanical, including photocopying, recording, taping, or storage in an electronic retrieval system-without prior written permission of the copyright owner.

Software derived from copyrighted NetApp material is subject to the following license and disclaimer:

THIS SOFTWARE IS PROVIDED BY NETAPP “AS IS” AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY DISCLAIMED. IN NO EVENT SHALL NETAPP BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

NetApp reserves the right to change any products described herein at any time, and without notice. NetApp assumes no responsibility or liability arising from the use of products described herein, except as expressly agreed to in writing by NetApp. The use or purchase of this product does not convey a license under any patent rights, trademark rights, or any other intellectual property rights of NetApp.

The product described in this manual may be protected by one or more U.S. patents, foreign patents, or pending applications.

RESTRICTED RIGHTS LEGEND: Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.277-7103 (October 1988) and FAR 52-227-19 (June 1987).

Trademark Information

NETAPP, the NETAPP logo, and the marks listed at http://www.netapp.com/TM are trademarks of NetApp, Inc. Other company and product names may be trademarks of their respective owners.