



Hybrid MultiCloud Infrastructure

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Senior Solutions Engineer



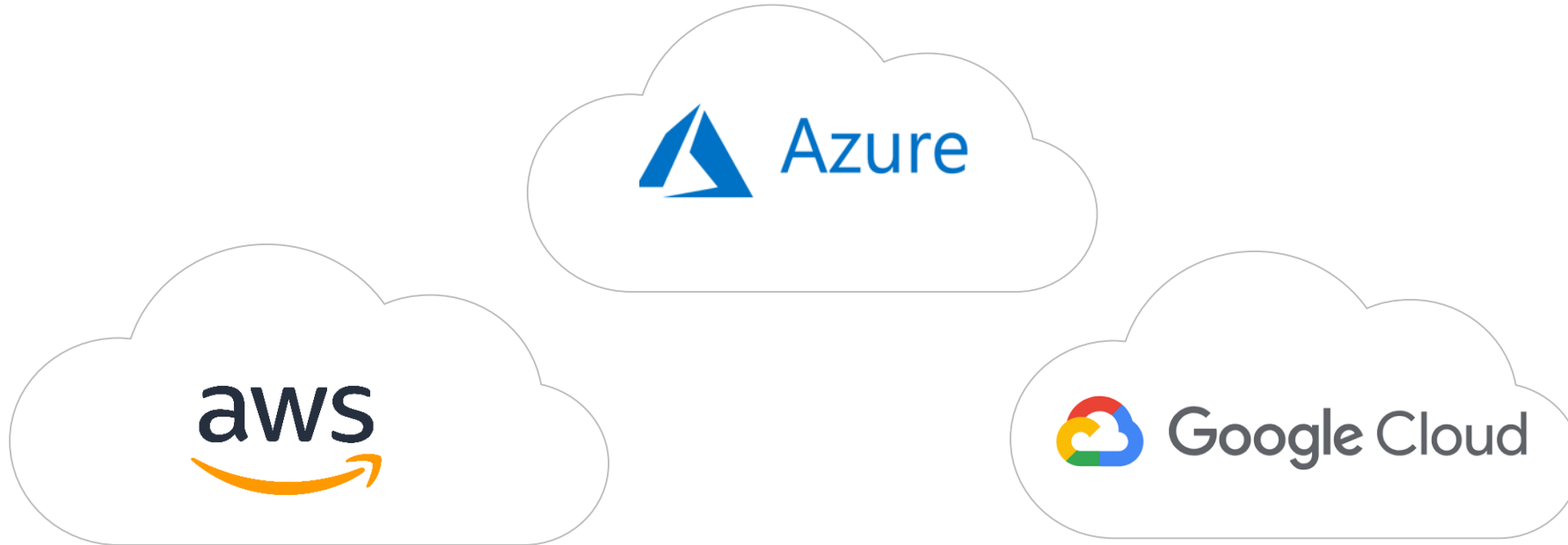
Agenda

- 1) What is MultiCloud / Hybrid MultiCloud
 - Data Fabric
- 2) NetApp HCI
 - Next generation infrastructure
- 3) NetApp Kubernetes Services
 - Multi Cloud Kubernetes Clusters





What is MultiCloud?





“Most organizations adopt a **multicloud** strategy out of a desire to avoid vendor **lock-in** or to take advantage of **best-of-breed** solutions”

Gartner.com





[Home](#) > [News](#) > [Technology](#) > [Amazon AWS Outage Shows Data in the Cloud is Not Always Safe](#)

Amazon AWS Outage Shows Data in the Cloud is Not Always Safe

By [Lawrence Abrams](#)

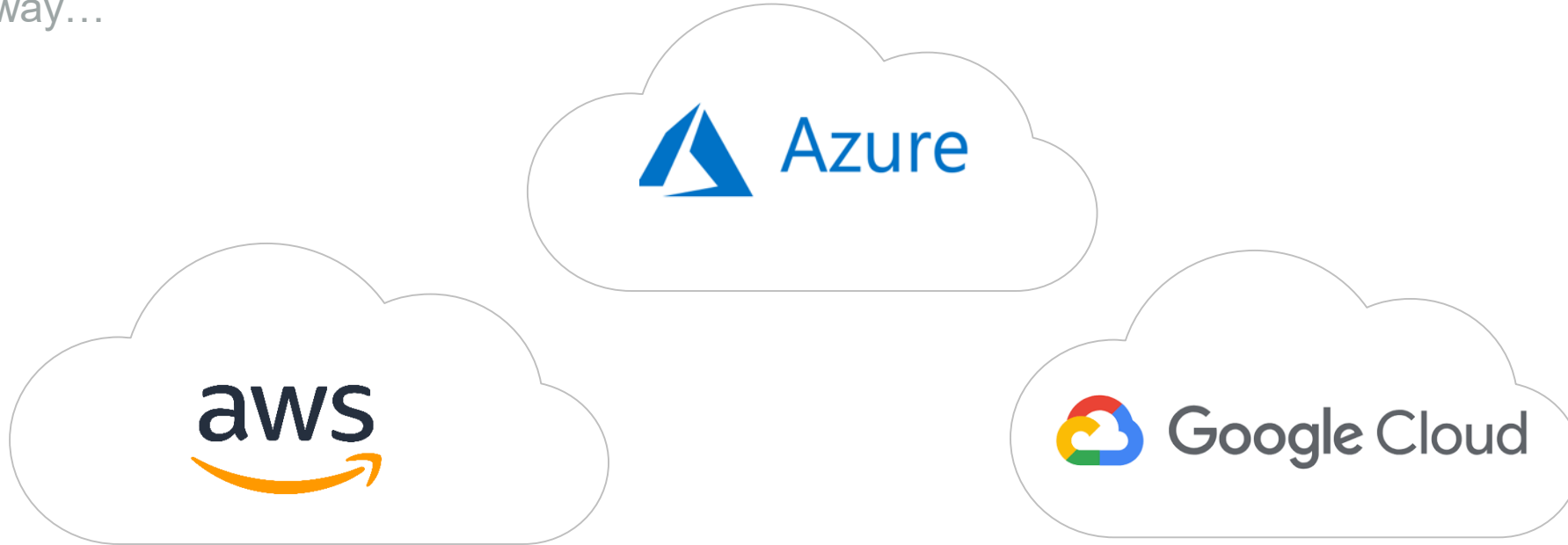
September 5, 2019 12:01 PM 12



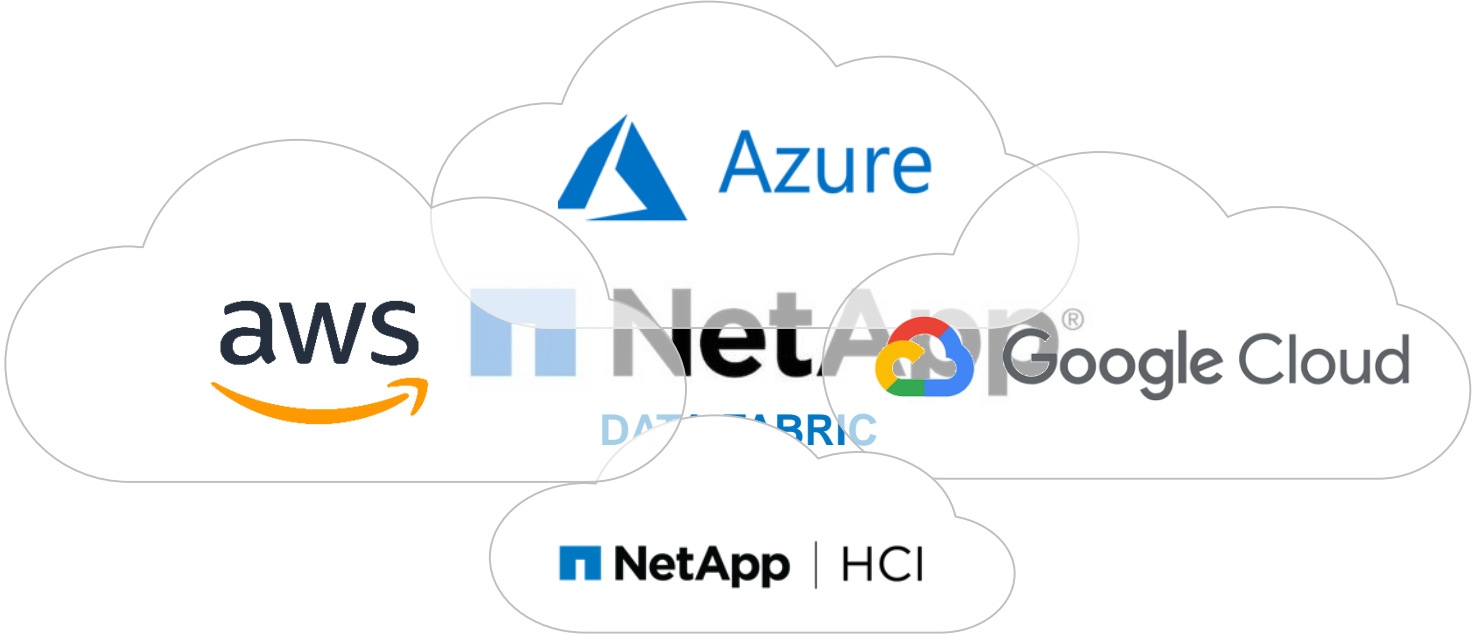
<https://www.bleepingcomputer.com/news/technology/amazon-aws-outage-shows-data-in-the-cloud-is-not-always-safe/>

What is Hybrid MultiCloud?

The NetApp way...



What is Hybrid MultiCloud?



What is Hybrid MultiCloud?



Fabric Discovery

DATA

- Cloud Volumes
- Cloud Backup
- Cloud Snapshots

DATA INTEGRATION & ORCHESTRATION

- Fabric Flows
- Data Sync

DATA & CLOUD OPTIMIZATION

- Fabric Advisor 3

DATA SECURITY & COMPLIANCE

- Fabric Policies
- Spaces & Roles

EXTENDED SERVICES >

Providers Volumes Snapshots Apps Labels Audit Log 33

Assistant

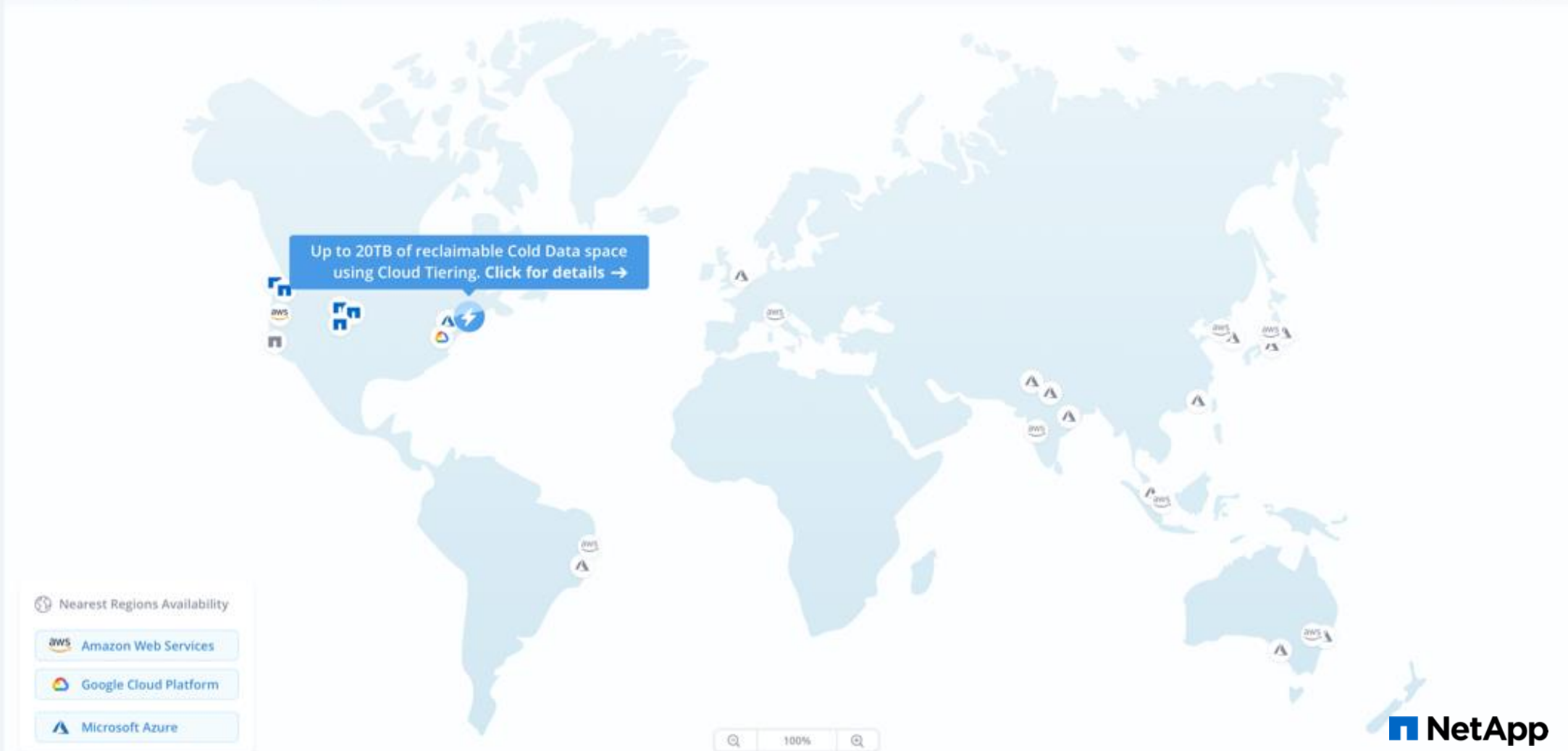
Actions Discover More Automate

All systems Filter

List view Map view

Capacity Region Version Hyperscaler: All

1-8 of 8 entries



CPU%

24.84 %
CPU Utilization - Total

IOPS

35.55 IO/s
IOPS - Total

Latency

2.75 ms
Latency - Total

MBpS

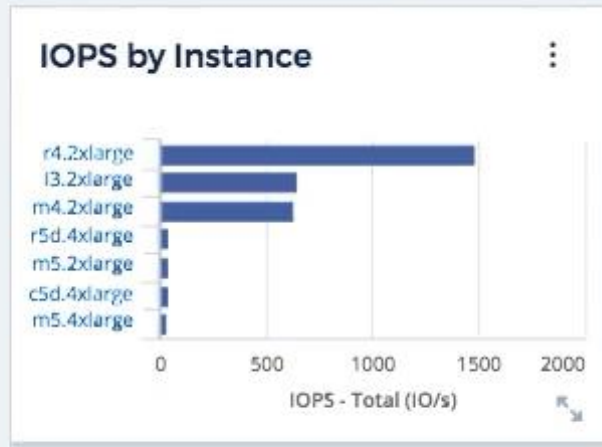
1.62 MB/s
Throughput - Total

Count

6.28k
Processors

Capacity

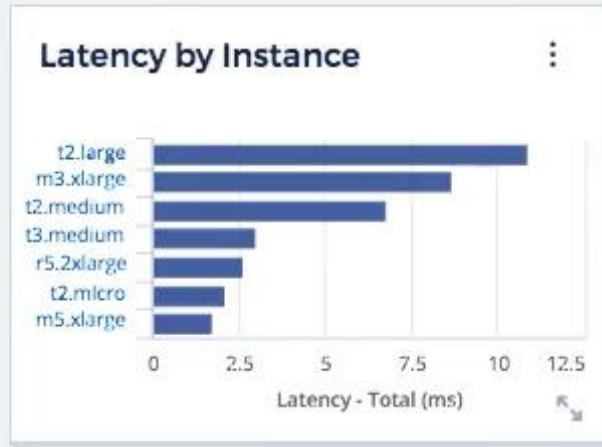
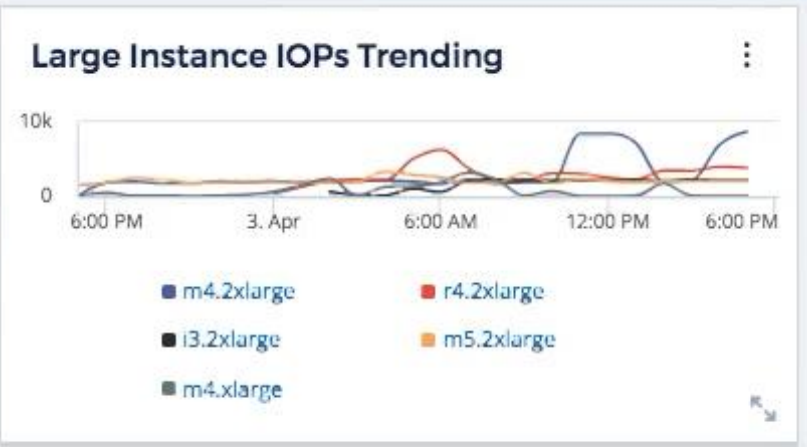
334.97 TB
Capacity - Total



AWS Instances

918 Items found in 25 groups

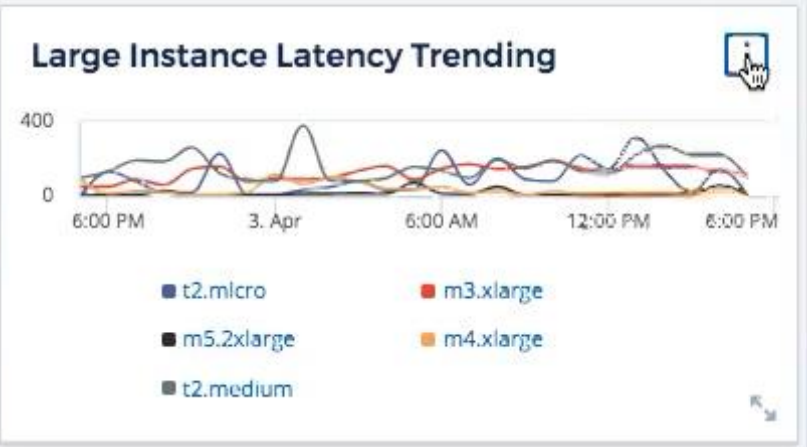
Instance Type	Creator	Processors	Launch Time
t3.medium (4)		8	
t2.xlarge (3)		12	
t2.small (7)		7	
t2.micro (47)		47	



Azure Instances

253 items found in 23 groups

Instance Type	Capacity - Total (GB)	IOPS - Total (IO/s)	Cost value
Standard_D1_v2 (1)	32.00	0.03	
Standard_D2_v2 (1)	32.00	0.02	
Standard_A1 (1)	1,023.00	N/A	
Standard_D1 (1)	1,023.00	N/A	



GCP Instances

75 Items found in 12 groups






NetApp Data Fabric






cloud.netapp.com






CLOUD STORAGE

-  Azure NetApp Files
-  Cloud Volumes Service for AWS
-  Cloud Volumes Service for Google Cloud
-  Cloud Volumes ONTAP

DATA SERVICES

-  Cloud Sync
-  Cloud Compliance
-  Cloud Tiering
-  SaaS Backup
-  Cloud Backup Service

CLOUD CONTROLS

-  NetApp Kubernetes Service
-  Cloud Manager
-  Fabric Orchestrator

CLOUD ANALYTICS

-  Cloud Insights

Hybrid Cloud Infrastructure

Now a Cloud Region On-Premises





“NetApp has showed us the power of its comprehensive suite of solutions, from all flash storage systems, to HCI, to all the opportunities offered by NetApp cloud data services. The company has helped us capitalize on today’s business opportunities while we innovate for tomorrow.”



- Konstantin Kosternarov
Chief Technology Officer
Ducati Motor Holding

NetApp HCI

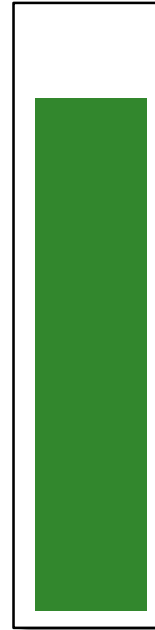
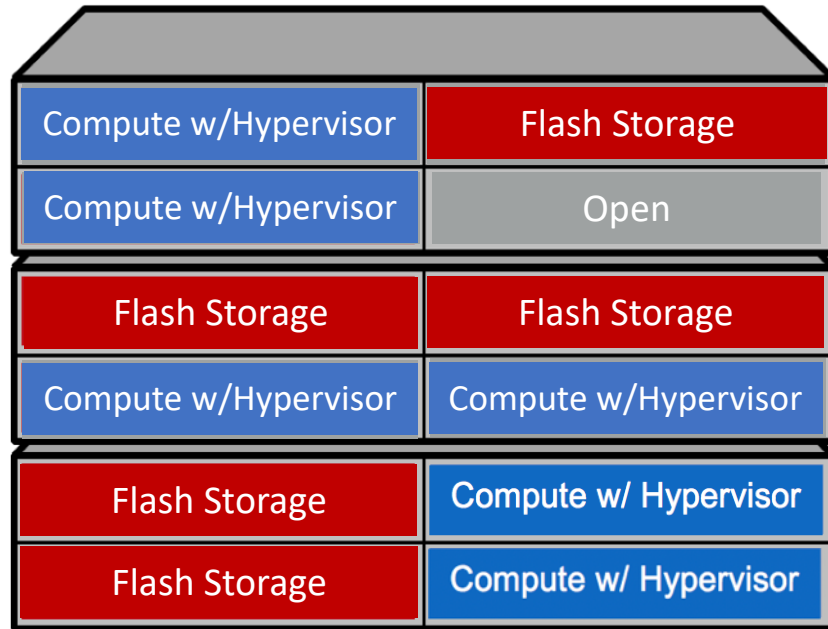


-  Elastic scalability
-  Guaranteed mixed workload performance
-  Data fabric and cloud services
-  Flexible delivery and consumption



Scale Compute and Storage Independently

Scale Out and Scale In by node



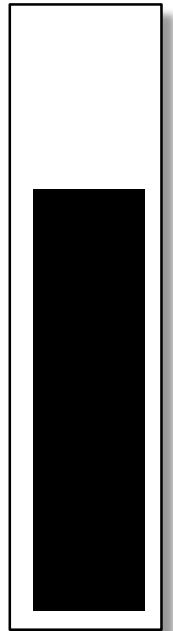
PERFORMANCE



CAPACITY



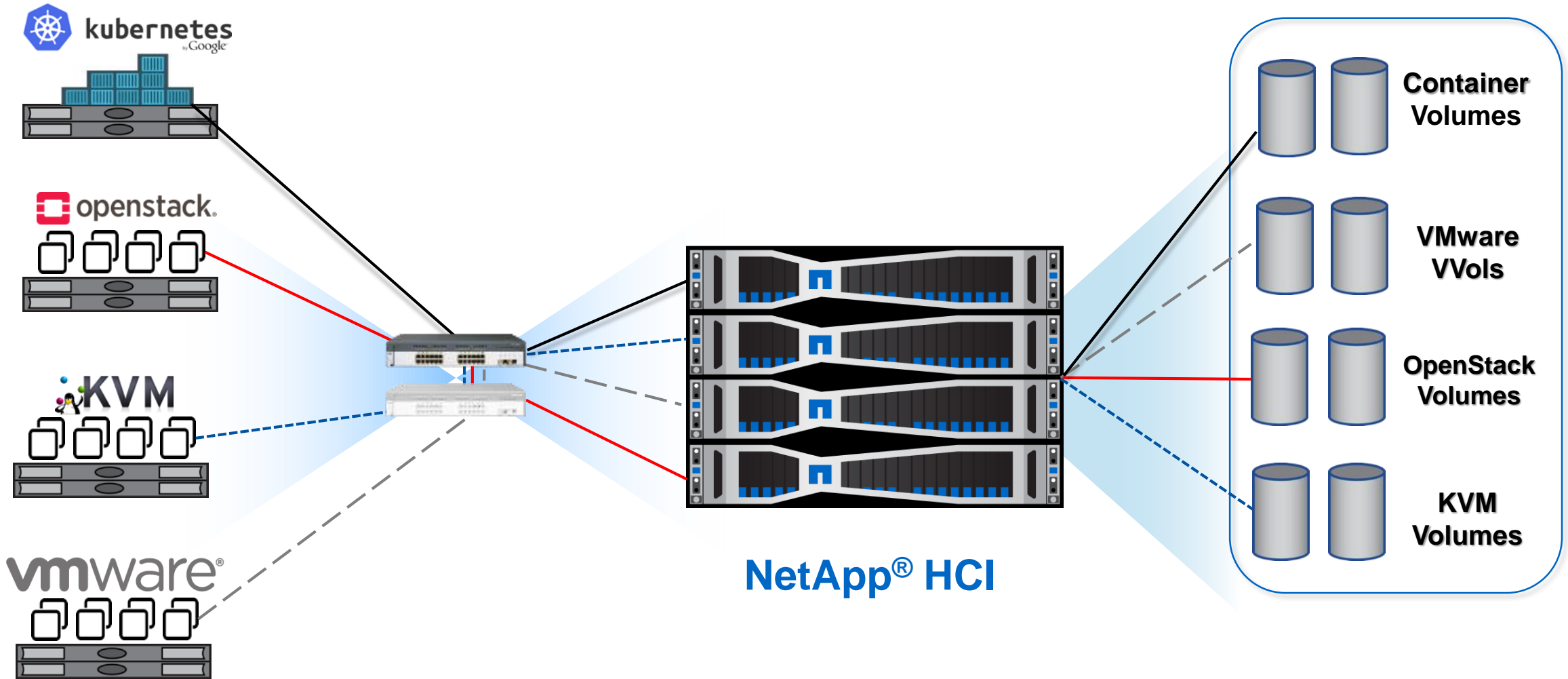
MEMORY



CPU

Open storage model

Flexibility to integrate external compute systems with NetApp HCI storage targets



NetApp HCI: A Seamless Hybrid Multicloud Experience

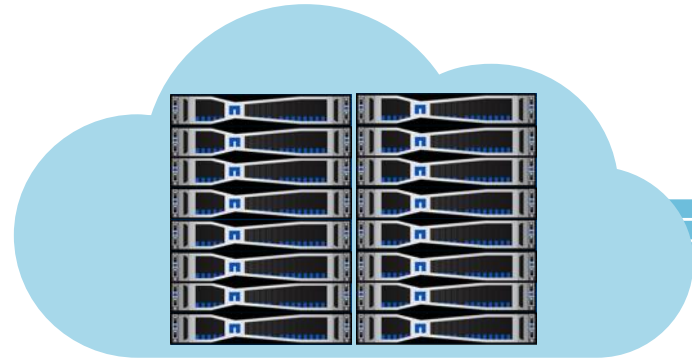
From hyperconverged infrastructure to hybrid-cloud infrastructure



NetApp HCI



Simple to deploy and operate for **mixed enterprise workloads**



Seamless private cloud delivering mixed **enterprise services**



Seamless hybrid, multi-cloud experience, cloud native services

Other HCI Vendors



Simple to deploy and operate for **single workloads**




Multiple **silos** running individual enterprise workloads

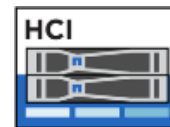
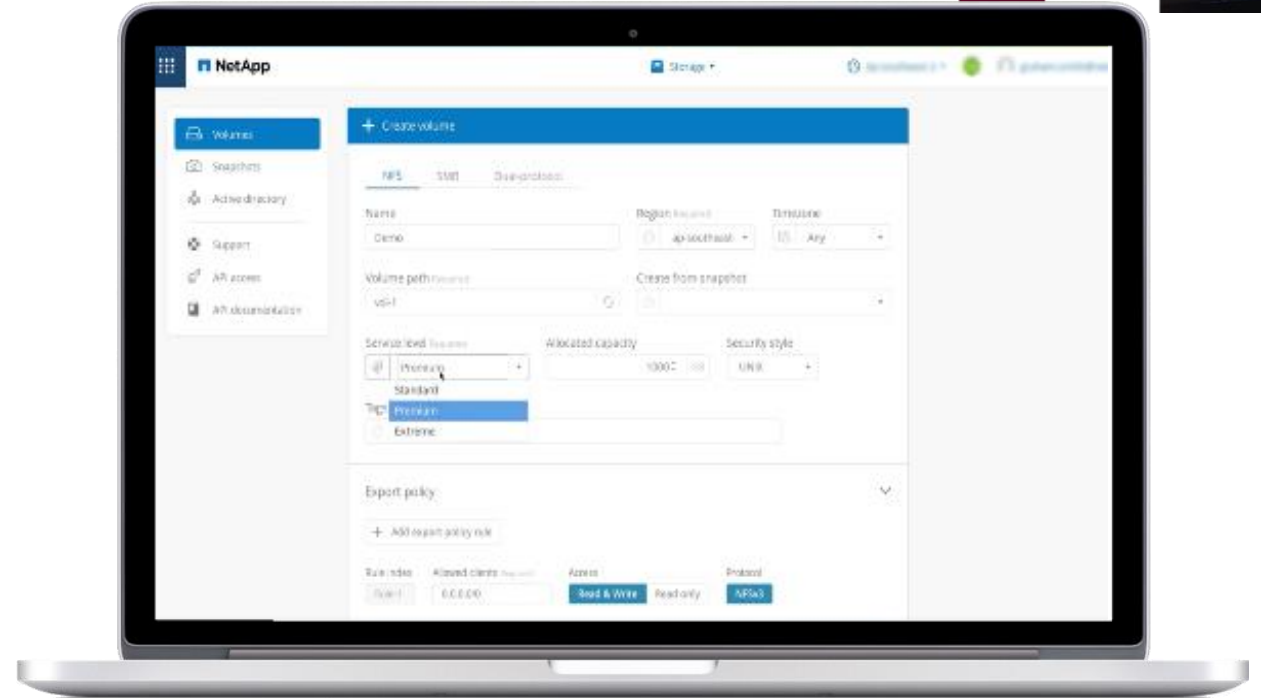


Backup, DR, **no data management** for hybrid, multi-cloud

 **NetApp Kubernetes Service:** Provides an automated Kubernetes deployment engine, Application Marketplace, and Application Orchestration - now with NetApp HCI as a deployable region.

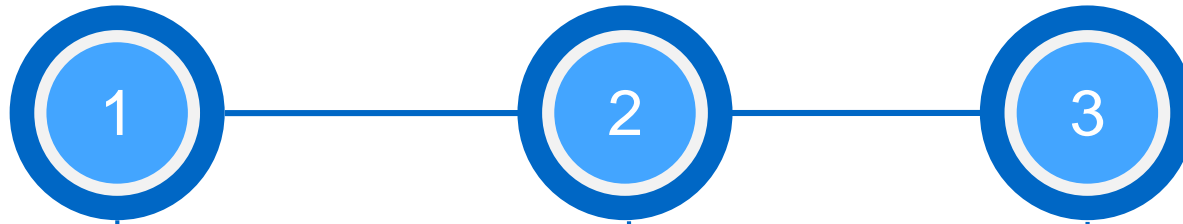
 **Cloud Volumes:** High performance persistent storage, delivered through a streamlined and simplified user experience, in all major public clouds, now extended on-premises with NetApp HCI.

 | HCI
Hybrid Cloud Infrastructure



NetApp Kubernetes Service [NKS] Overview

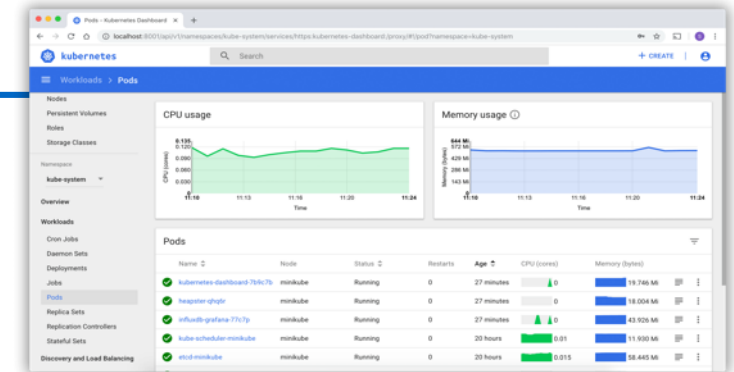
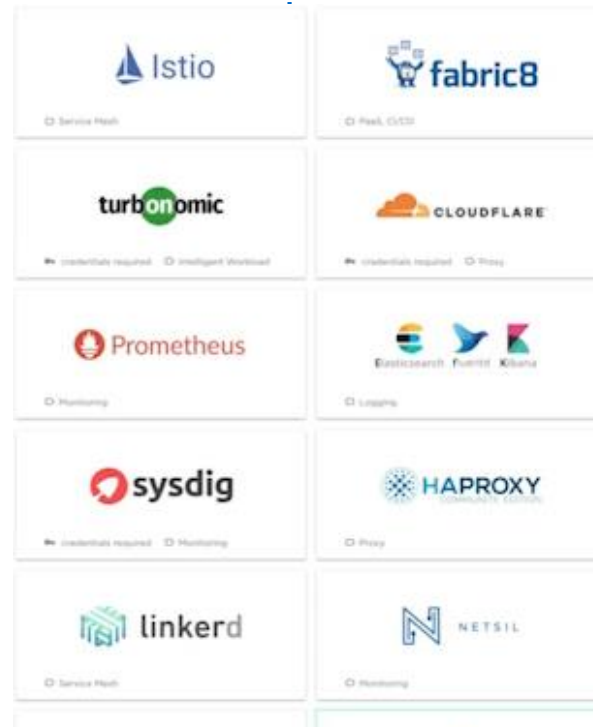
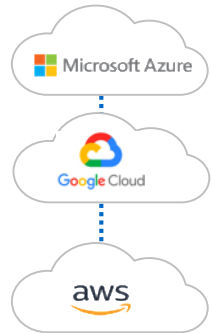
Cluster Deployment on multiple clouds in 3 clicks



1
CHOOSE A PROVIDER

2
CONFIGURE YOUR PROVIDER

3
CONFIGURE YOUR CLUSTER



- Set up, deploy and manage clusters across clouds, and now on-premises
- Scale from an individual developer to enterprise grade Kubernetes management
- The Universal Control Plane for Managed Kubernetes now available for everyone

Cluster Name

Workspace

Provider

Distribution

State



You haven't created any clusters yet!





- 1 Choose a provider
- 2 Configure your provider
- 3 Configure your cluster

<p>PREVIEW</p>	<p>NVIDIA GPU Support Available</p>
	<p>NVIDIA GPU Support Available</p>
	<p>NVIDIA GPU Support Available</p>
	<p>PREVIEW</p>
<p>PREVIEW</p> A Cisco and NetApp Solution	




- 1 Choose a provider
- 2 Configure your provider**
- 3 Configure your cluster

COMPUTEENGINE

Recommendation

-  1 Master
Size: N1 Standard 2
Disk: 50 GB
- 2 Workers
Size: N1 Standard 2
Disk: 50GB

 US West 1a

 EDIT

Workspace
Your cluster will be created in the workspace you select.

Default 

Enable GPU Support
Leverage the power of NVIDIA Tesla GPUs in your cluster.

Disabled

GCE Credentials
Your GCE Service Account Data. Used for provisioning servers.
For instructions, visit [obtaining credentials for GCE](#)

My GCE Credentials

 ADD CREDENTIALS

SSH Key
Key to access nodes of the cluster.

Default SPC SSH Keypair

 ADD SSH KEY

SUBMIT



- 1 Choose a provider
- 2 Configure your provider
- 3 Configure your cluster

COMPUTEENGINE

Recommendation

- 1 Master
Size: N1 Standard 2
Disk: 50 GB
- 2 Workers
Size: N1 Standard 2
Disk: 50GB

US West 1a

My GCE Credentials

Default SPC SSH Keypair

EDIT

Key-Value Store



Packaging and Deployment



Cluster Name
Weathered Heart 
15 / 255

Orchestration

 **kubernetes** 1.15.3 

Install Dashboard

Enable RBAC

Pod Network: 10.2.0.0 /16 Service Network: 10.3.0.0 /24






Distribution

 **container linux** Stable 

Solutions

 ADD SOLUTIONS

SUBMIT

Cluster Name	Workspace	Provider	Distribution	State	
Weathered Heart	Default	 v1.15.3 w/ RBAC kubeconfig	 COMPUTE ENGINE 3 Nodes US West 1a	 container linux Stable <input type="checkbox"/>	



- 1 Choose a provider ————— 2 Configure your provider ————— 3 Configure your cluster

<p>PREVIEW</p> <p>NetApp HCI</p>	<p>NVIDIA GPU Support Available</p> <p>aws</p>
<p>Amazon EKS</p>	<p>NVIDIA GPU Support Available</p> <p>COMPUTE ENGINE</p>
<p>KUBERNETES ENGINE</p>	<p>NVIDIA GPU Support Available</p> <p>Microsoft Azure</p>
<p>Microsoft AKS</p>	<p>PREVIEW</p> <p>vmware®</p>
<p>PREVIEW</p> <p>FlexPod® A Cisco and NetApp Solution</p>	



- 1 Choose a provider
- 2 Configure your provider**
- 3 Configure your cluster

| HCI

Recommendation

-  1 Master
Size: m
Disk: 50 GB
- 2 Workers
Size: m
Disk: 50GB

 DC

 EDIT

Workspace

Your cluster will be created in the workspace you select.

Default 

SSH Key

Key to access nodes of the cluster.

Default SPC SSH Keypair

 ADD SSH KEY

SUBMIT



Choose a provider




Configure your provider




Configure your cluster

NetApp | HCI

Recommendation

-  1 Master
Size: m
Disk: 50 GB
- 2 Workers
Size: m
Disk: 50GB

 DC

 Default SPC SSH Keypair

 EDIT

Key-Value Store



Cluster Name

Divine Snow



11 / 255

Orchestration



1.14.3



Install Dashboard

Enable RBAC

Pod Network

10.2.0.0 /16

Service Network

10.3.0.0 /24












Distribution



Stable



SUBMIT

Cluster Name	Workspace	Provider	Distribution	State	
Divine Snow	Default	 v1.14.3 w/ RBAC kubeconfig	 3 Nodes DC	 Stable 	
Weathered Heart	Default	 v1.15.3 w/ RBAC kubeconfig	 3 Nodes US West 1a	 Stable 	



Choice - we know you want it. Select any combination from below and quickly spin them up in a cluster.

+ ADD TO CLUSTER

- Show All 10
- Platform-as-a-Service 0
- Cloud Volumes 1
- Scaling 1
- Proxy 1
- Logging 1
- Monitoring 1
- Intelligent Workload 0
- Continuous Integration 2
- Network Policy 0
- Service Mesh 1
- Security 1
- Enterprise Registry 1

MANAGE CHART REPOS

Don't see the latest version?

If you see outdated version numbers on your Charts, you may need to re-sync the Repository with our systems. Click to the [Manage Chart Repos](#) page and use the "Re-sync" action under the actions menu for the Repository you wish to sync.



Istio

Service Mesh



JFrog
ARTIFACTORY

credentials required Registry




JFrog
XRAY

Security




NetApp Cloud
Volumes for AWS
AUTOMATED BY TRIDENT

credentials required Cloud Volumes



Prometheus

Monitoring



Elasticsearch fluentd Kibana

Logging



HAPROXY
COMMUNITY EDITION

Proxy



autoscaler

Scaling



GitLab

CI/CD



GitLab
ENTERPRISE

CI/CD



- 1 Select Source ————— 2 Select Repository ————— 3 Review Repository

Chart Repository Name

Provide a name representing your chart repo. Lowercase Letters, digits, & dashes only.

mysql-charts

12 / 255

Source

Specify repository type.

Github

Packaged Charts

Github Repository URL

URL for Github repository containing charts. Repo and immediate sub-directories will be scanned for charts.

Example 1: <https://github.com/bitnami/charts>

Example 2: <https://github.com/mdn/helm-charts>

Example 3: <https://github.com/kubernetes/charts/tree/master/stable/sugarcrm>

<https://github.com/helm/charts/tree/master/stable/mysql>

Private repo?

FETCH MY REPOS

REVIEW REPOSITORY



- ✓ Select Source
- ✓ Select Repository
- 3** Review Repository

mysql-charts

Source Github

URL <https://github.com/helm/charts/tree/master/stable/mysql>

Private? No

Access Verified 












Repo Type Single-chart

BACK

SAVE REPOSITORY



Chart Repo Name	Source	Private?	URL	Chart Count	State	
mysql-charts	Github	No	github.com/helm/charts/stable/mysql	0	<input type="checkbox"/>	
soft-tooth-charts	Github	No	github.com/helm/charts/stable/mongodb	1	<input checked="" type="checkbox"/>	

Cluster Name	Workspace	Provider	Distribution	State	
Divine Snow	Default	 v1.14.3 w/ RBAC kubeconfig	 3 Nodes DC	 Stable 	
Weathered Heart	Default	 v1.15.3 w/ RBAC kubeconfig	 3 Nodes US West 1a	 Stable 	



NetApp Kubernetes Service
Solutions

10

Trusted Charts

0

My Charts

2

1.3.1



mysql

▢ database, sql

7.2.8



mongodb

▢ database, nosql, cluster, replicaset, replication

NetApp Kubernetes Service Solutions

Trusted Charts

My Charts

Release Name

mysql-billowing-hall

20 / 255

Namespace

mysql

5 / 255

Edit values.yaml

Inputs to be passed to Helm. Required values specified above will replace corresponding values in yaml.

```
1 ## mysql image version
2 ## ref: https://hub.docker.com/r/library/mysql/tags/
3 ##
4 image: "mysql"
5 imageTag: "5.7.14"
6
7 busybox:
8   image: "busybox"
9   tag: "1.29.3"
10
11 testFramework:
12   image: "dduportal/bats"
13   tag: "0.4.0"
14
15 ## Specify password for root user
16 ##
17 ## Default: random 10 character string
18 # mysqlRootPassword: testing
19
20 ## Create a database user
```

CANCEL

INSTALL

7.2.8



nongodb

cluster, replicaset, replication



- Kubernetes Dashboard
 - My GCE Credentials
 - Default SPC SSH Keypair
 - kubeconfig
 - Quick Start Guide
 - Event Log
 - Report an Issue
- Display:
- Cluster
 - Workloads

Version stable US West 1a My GCE Credentials

Master Nodes (1)

Hostname	Node Size	Private IP	Public IP	
net6162gu-master-1	N1 Standard 2 (50GB)	10.136.0.26	35.227.169.8	

+ ADD MASTER

Worker Node Pools (1)

Hostname	Node Size	Nodes	
Default Worker Pool	N1 Standard 2 (50GB)	2	

+ ADD WORKER

Deployments (6)

Name	Namespace	Labels	Pods	Age
calico-typha	kube-system	k8s-app: calico-ty...	0 / 0	an hour
coredns	kube-system	k8s-app: kube-dns	2 / 2	an hour
dashboard-proxy	kube-system	k8s-app: dashboar...	1 / 1	an hour
heapster	kube-system	k8s-app: heapster version: v1.4.2	1 / 1	an hour
kubernetes-dashboard	kube-system	k8s-app: kubernet...	1 / 1	an hour
tiler-deploy	kube-system	app: helm name: tiler	1 / 1	an hour

Solutions

Solution	Information
HELM	Version: latest
MySQL	Chart Name (Version): mysql (3.3) Release Name: mysql-billowing-hall Namespace: mysql Version: 3.3

Heptio Ark

Enable Heptio Ark to backup and restore your Kubernetes cluster resources and persistent volumes. Volumes are currently supported for AWS, GCE, Azure & DigitalOcean clusters.

Enable State Backup





NetApp Kubernetes Service

Application Lifecycle Management for Kubernetes

Kubernetes for Everyone. We Make it Easy!

[Deploy a Cluster Now](#)[▶ Watch Video](#)

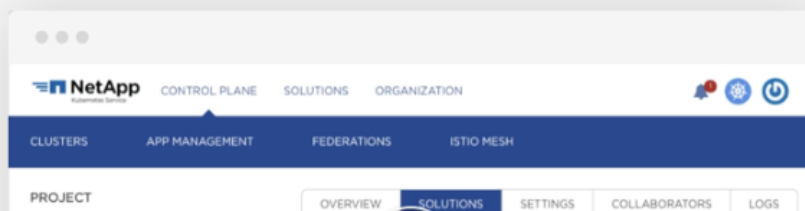
30 day trial. No Credit Card Required.

[About](#)[Highlights](#)[Use Cases](#)[Features](#)[Pricing](#)[Customer Stories](#)[Cloud Native Solutions](#)[Managed K8s](#)[More ▾](#)

Any Cloud, Public or Private

NetApp Kubernetes Service is agnostic giving customers the power of choice:

▸ Choose your cloud

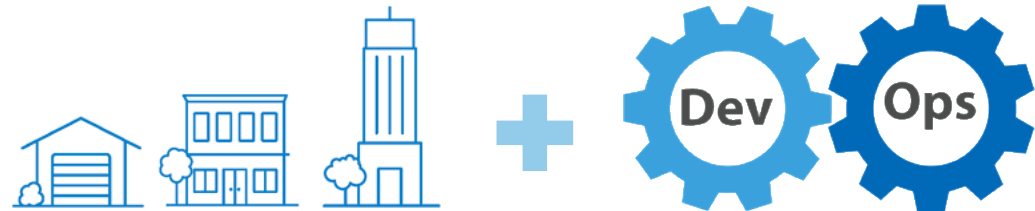


NetApp HCI – Starter Kit

Start small and grow big!

- 2 computer node and 4 storage node
- **200'000 IOPS**
- Fit perfect for ROBO and DevOps
- Scale Up as you grow!

CORES	RAM	TiB
32	768	16





Grazie!