



Connect

Lower TCO for containers, AI, and VMs

with Red Hat OpenShift on Google Cloud and Google Cloud
NetApp Volumes

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Red Hat

NetApp



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Thank you!

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Lower TCO for containers, AI, and VMs

Proprietary & Confidential

with Red Hat OpenShift on Google
Cloud and Google Cloud NetApp Volumes

Google Cloud

 Red Hat

 NetApp





Red Hat OpenShift

Application modernization

Powers the entire application lifecycle to help you modernize your systems and reach your goals.

Hybrid platform

Delivers open-source innovation in a single, seamless platform across your on-prem and cloud environments with Kubernetes at its core.

Enterprise-grade

Trusted by industry leaders, Red Hat OpenShift offers security features paired with dedicated support, freeing your teams to focus on the innovative work that organizations, users, and customers demand.



Google Cloud

Optimized infrastructure

Purpose-built optimizations for OpenShift workloads to deliver low TCO, best reliability, and security.

AI transformation

Transform your business with the industry-leading AI full-stack platform.



NetApp

Enterprise-grade storage

Fully managed, robust, scalable, and secure storage.

Hybrid platform and simple migration

Operational consistency and seamless data mobility between on-prem, self-managed, and fully managed.

High performance, low cost

No trade-off between price, performance and management.

Outline



Google Cloud infrastructure is optimized for OpenShift 01

Google Cloud NetApp Volumes: Managed storage for OpenShift 02

Modernize virtualization and AI with an open platform 03

Outline

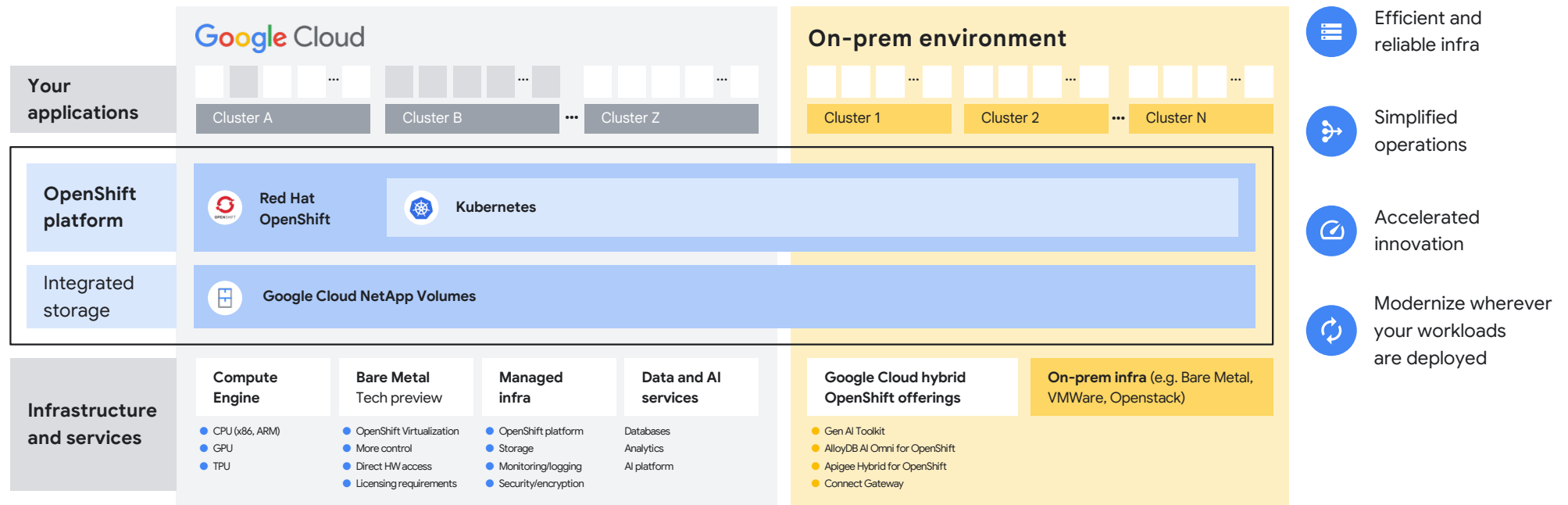


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OpenShift workloads on Google Cloud's robust and complete platform



OpenShift on Google Cloud differentiators



Reduce TCO

Operating **OpenShift on-prem is expensive** as infra costs are difficult to optimize.

50%+ infra cost savings are typical when migrating OpenShift workloads to the cloud.

Google Cloud-native technologies enable **25–40% greater infra cost savings than AWS/Azure**.



Sleep well at night

Most **reliable** and **secure** cloud.

Kubernetes leader: #1 contributor, 85% of Kubernetes tech leads → **unmatched L3/L4 support for your production workloads**.



Seamlessly migrate

Flexible across fully or self-managed OpenShift solutions **enables you to 80/20 your migration with the right approach for you**.

Broadest set of services for management of Kubernetes and OpenShift clusters.



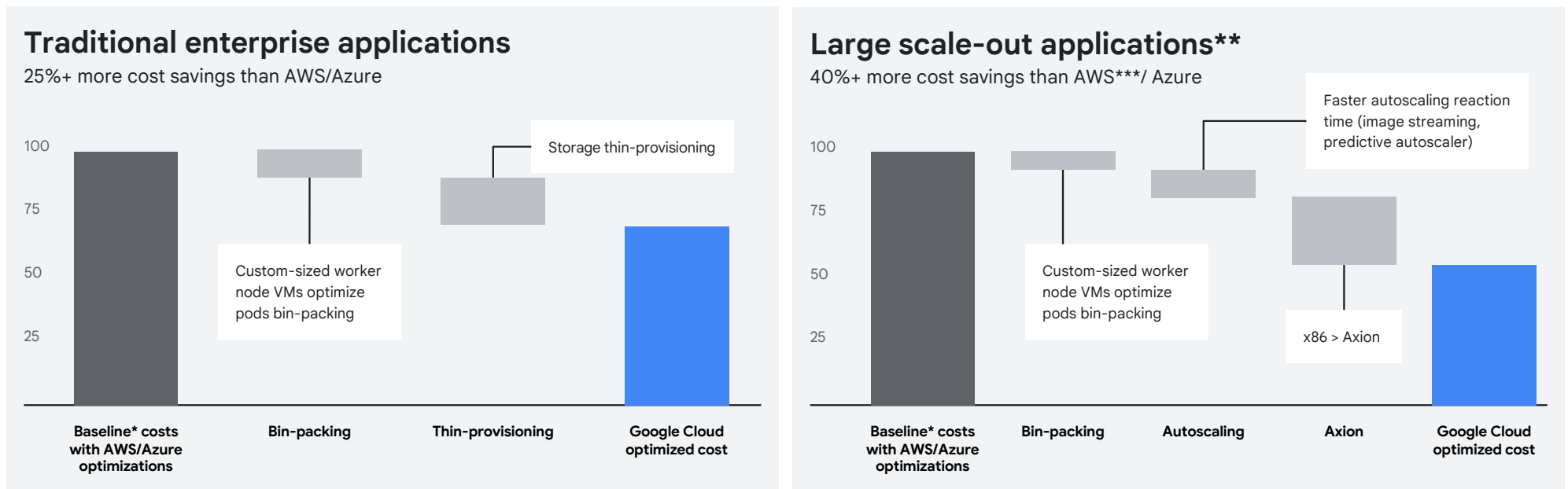
Turbocharge with AI

OpenShift/GKE-native CRDs for all Google Cloud AI services.

OpenShift/GKE-native offerings* to **integrate OpenShift-hosted APIs/DBs/apps with agentic AI workflows**.

Hybrid AI: **The only hyperscaler providing a hybrid RAG/DB solution** — AlloyDB AI Omni for OpenShift.

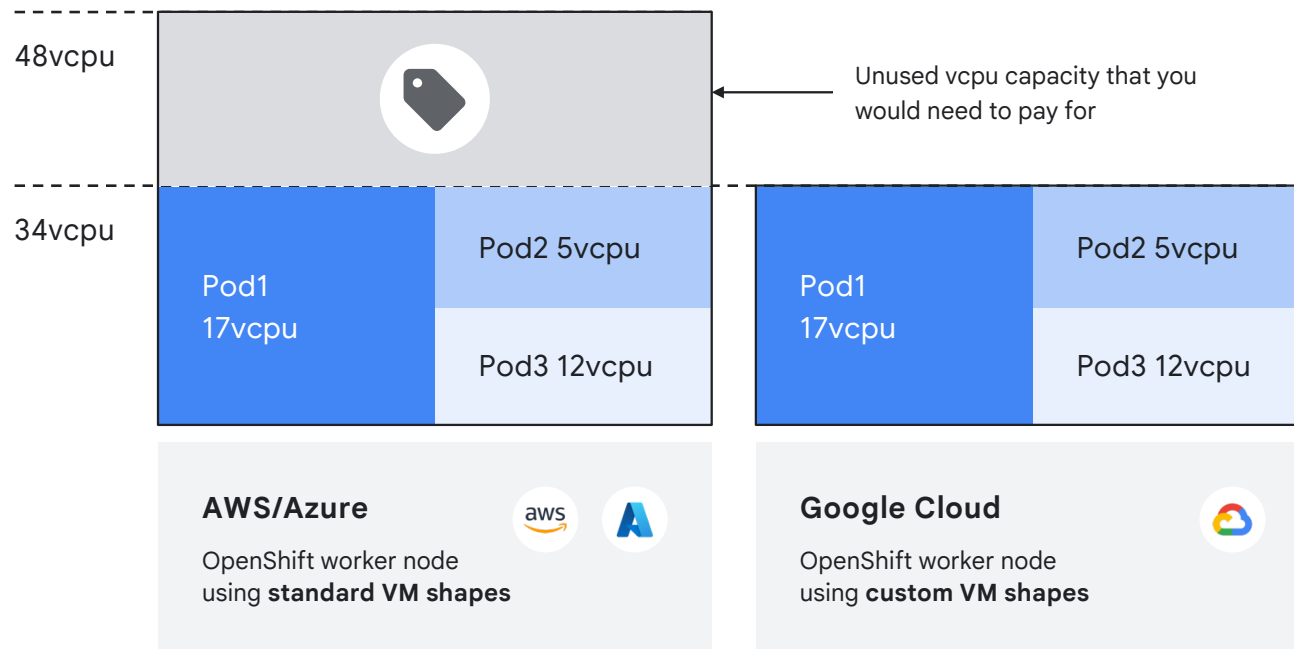
Google Cloud provides 25-40% more infrastructure cost savings than AWS/Azure



*Baseline = workloads running on AWS/Azure with all available cost optimizations applied **Such as large-scale web serving

***Cost reduction advantage vs AWS is 20% as the relevant Axion comparable is Graviton 4 which doesn't provide as good price/perf as Axion but it is still better than x86 equivalent

Optimized compute consumption via bin-packing with custom VM shapes

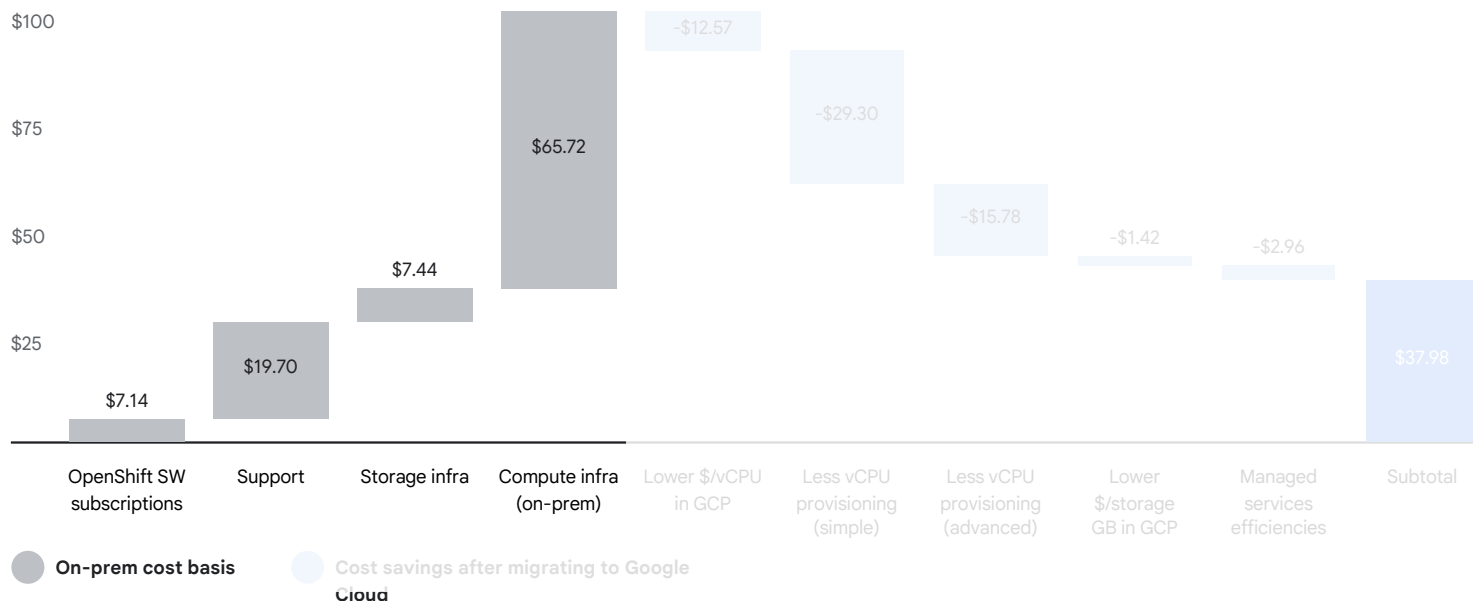


- Standard shape VMs have predefined sizes (e.g. 4, 8, 16, 32, 48... vcpu)
- OpenShift workloads often involve odd or large-sized container images
- Google Cloud enables custom VM shapes which are not available in AWS/ Azure
- Custom VM shapes provision VMs with the right amount of vcpu and ram to optimize pods bin-packing and thereby compute spend

Enables 20% compute efficiency
for typical OpenShift workloads

Cost savings of migrating OpenShift workloads to Google Cloud

Normalized costs for large FSI customers.

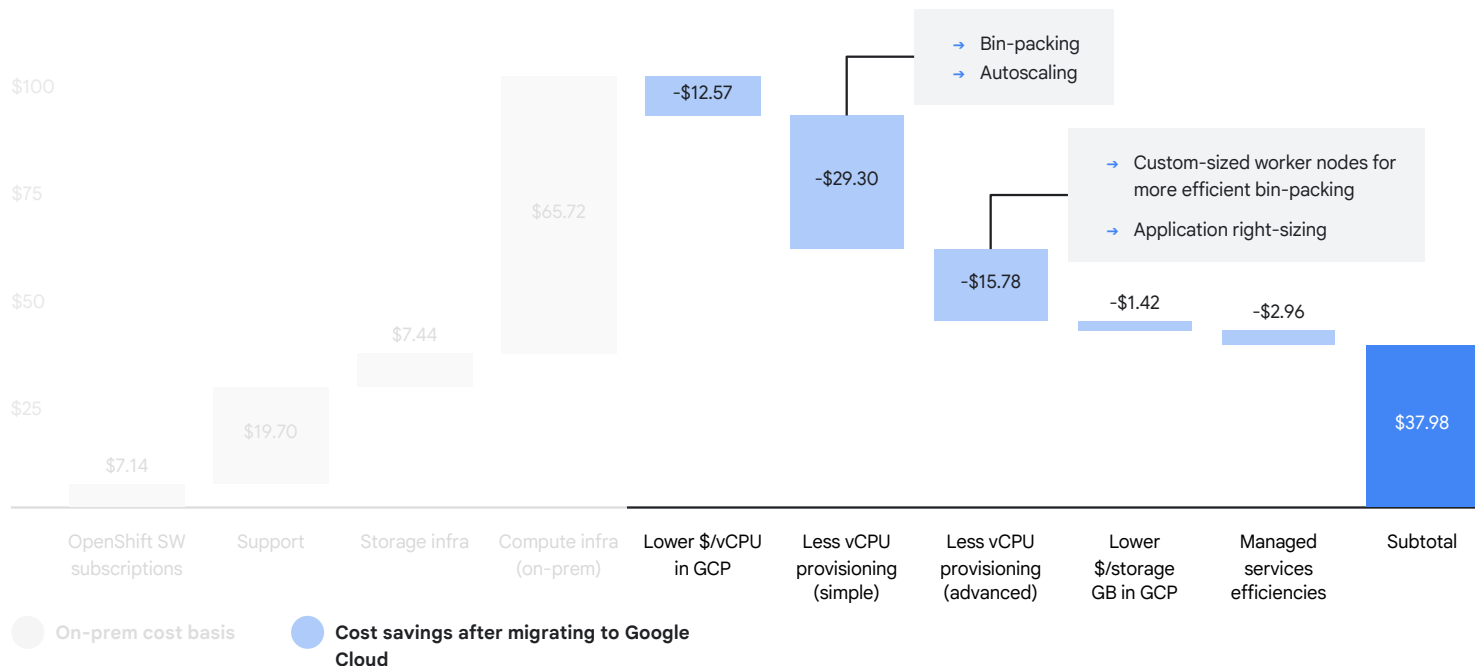


On-prem clusters

- Provisioned for peak capacity to ensure stability and performance
- Can result in lower utilization rates (8% worker nodes utilization on average)
- Costs are tied to fixed infrastructure

Cost savings of migrating OpenShift workloads to Google Cloud

Normalized costs for large FSI customers.



Google Cloud migration

- Lower infra unit costs
- Easy to apply relatively simple optimizations
- Access to advanced optimization features
- 50% worker nodes utilization target

~60% overall cost savings

Get a free assessment...

...of how OpenShift on Google Cloud can optimize costs while minimizing migration effort through your Google Cloud account team.

Phase	Initial BOM and cost savings opportunity assessment	Landing zone options/ migration journey optimization	Migration planning
Data request	<ul style="list-style-type: none"> For all OpenShift clusters, export snapshot of metrics from all core Kubernetes System Components Specifically in default OpenShift/OCP configurations, get snapshot of data from <code>/metrics</code> endpoints captured from each worker node's node-exporter and kubelet and each master node kube-scheduler Absolute bare minimum data ask is this Prometheus query: <code>"100 - (avg by (instance) (rate (node_cpu_seconds_total {mode="idle"}[5m]))) * 100"</code> for all OpenShift clusters and with as much timespan as possible 	<ul style="list-style-type: none"> For all OpenShift clusters, export snapshot of metrics associated with Kubernetes Object States, the OpenShift Core Operators, and presence of CRDs for plug-in/add-ons such as IngressController CRDs (from K8s API) Absolute bare minimum data ask (to get started) is this Prometheus query: <code>service="kube_state_metrics"</code> for all OpenShift clusters and with as much timespan as possible 	<ul style="list-style-type: none"> Comprehensive application/system/services inventory (e.g. CMDB, ITAM, ...) Application dependencies, including with other applications and other systems or services Costs and cost allocation information for all applications, systems, ... Categorization along business criticality, data regulations; other requirements with regards to cloud migration and interviews w/ BU/ application teams...
Analyses	<ul style="list-style-type: none"> Analysis of current level of optimization of compute infrastructure given workloads demands Assessment of potential future compute/infra cost optimization targets on Google Cloud 	<ul style="list-style-type: none"> Analysis of in-OpenShift dependencies for the clusters and applications (along providers/solutions for networking, storage, observability, ...) Estimate of migration effort for different options (keep dependencies/L&S, move to managed services, ...) 	<ul style="list-style-type: none"> Migration waves and prioritization Capacity and regional planning; including architectural blueprints high level network architecture

Salling Group cut capacity time to market amid retail surges



Situation

Salling Group needed to migrate from their on-premise OKD in order to scale more rapidly during peak retail periods.



Solution

Looking for a more dynamic, robust and flexible environment, Salling Group adopted Red Hat OpenShift 4 on Google Cloud.



Impact

- 20x less downtime during critical peak periods
- Freed up five person-days each quarter
- Reduced time to market for new nodes and clusters from 45 minutes to 3 minutes



With Red Hat OpenShift 4 on Google Cloud, we now have a stable environment that we spend almost zero time maintaining.”

Lead Engineer
Salling Group

Learn more about
Red Hat OpenShift 4,
Google Cloud



UPS delivered flexibility with Red Hat OpenShift Dedicated on Google Cloud



Situation

UPS needed a highly responsive and accurate dynamic pricing platform to provide greater flexibility for their customers.



Solution

Red Hat consulted with UPS to implement Red Hat OpenShift Dedicated on Google Cloud.



Impact

Improved performance, reliability, and speed to market, providing greater flexibility and optionality for customers — all while prioritizing security.



We were looking for a platform that could provide performance, reliability and ensure speed to market. The Red Hat team listened and, most importantly, they took action.”

Software Engineering Director
UPS Technology Group

Learn more about
**Red Hat OpenShift
Dedicated, Google Cloud**



Optimizing OpenShift storage with Google Cloud Netapp Volumes



Situation

A large FSI needed a cost-effective, native file storage solution smaller than 1TB for OpenShift workloads.



Solution

Google Cloud NetApp Volumes delivered a fully managed, first-party storage service meeting sizing and performance needs for flexible and efficient Red Hat OpenShift deployments.



Impact

Reduced costs and elevated operational efficiency significantly by precisely allocating high-performance storage to the specific application needs.



By using Google Cloud Netapp Volumes we succeeded in gaining the flexible store requirements for our Red Hat OpenShift clusters on Google Cloud while using a first-party, fully managed storage solution.”

Technical leader

Large EMEA FSI Company

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Why Google Cloud NetApp Volumes?



Enterprise storage

Fast, secure, and built for OpenShift.



Move your data fast and save big

with seamless hybrid cloud agility.



Maximize operational efficiency

with fully managed, cloud-native instances.





Ready for AI

Trusted, compliant, and always protected.

Google Cloud NetApp Volumes

Simplified storage, seamless integration, and unified access.

	<div>Red Hat OpenShift</div> <div>Container Platform</div> <div>GA on Google Marketplace globally</div>	<div>Red Hat OpenShift</div> <div>Dedicated</div> <div>GA on Google Marketplace globally</div>	<div>Red Hat OpenShift</div> <div>Virtualization</div> <div>Self-managed tech preview in Google Cloud</div>
<div>Kubernetes control plane</div>	<div>Self-managed OpenShift control plane</div>	<div>Managed OpenShift control plane (OSD)</div>	<div>Self-managed OpenShift control plane</div>
<div><div>Trident CSI Driver</div></div>	<div><div>Storage: Google Cloud NetApp Volumes</div></div>		

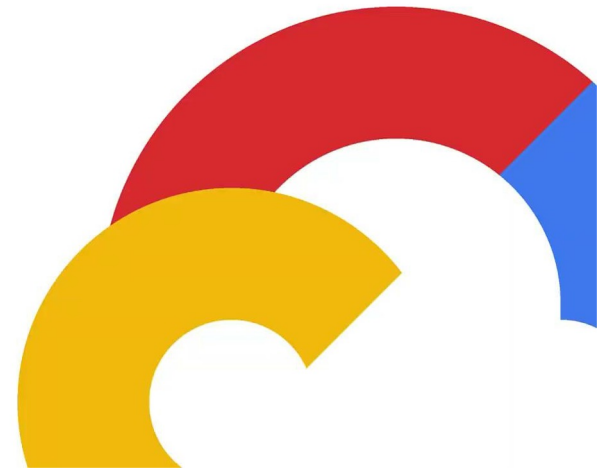
- Fully managed storage — no infrastructure cost or maintenance — that works the same across all OpenShift configurations.
- Space efficient, low-cost and high-performance storage with simple, unified and robust data management backed by robust NetApp technology
- NetApp Trident (open-source CSI) **certified and optimized for Red Hat OpenShift** to support for seamless management of persistent storage in containerized applications
- In-built data protection and disaster recovery supported by NetApp Volumes. Optional CSI configuration using NetApp Trident Protect

Demo:

Google Cloud NetApp Volumes

Google Cloud NetApp Volumes for Openshift Dedicated

Google Cloud



NetApp Trident installation

The screenshot displays the Red Hat OpenShift OperatorHub interface in a web browser. The left sidebar shows the navigation menu with 'Operators' selected. The main content area shows a search for 'Trident' with a list of results. The 'Astra Trident' operator is highlighted, showing it is provided by NetApp, Inc. and is a Trident Operator to manage Astra Trident installations. On the right, a detailed view of the 'Astra Trident' operator is shown, including its version (24.6.0), channel (stable), and a 'Community Operator' warning. The 'Install' button is visible at the top of the details panel.

OperatorHub

Discover Operators from the Kubernetes community and Red Hat partners, curated by Red Hat. You can purchase commercial services to your developers. After installation, the Operator capabilities will appear in the [Developer Catalog](#) provided by Red Hat.

All Items

A list of comma separated categories that your operator falls under.

AI/Machine Learning
Application Runtime
Big Data
Cloud Provider
Database
Developer Tools
Development Tools
Drivers and plugins
Integration & Delivery
Logging & Tracing
Modernization & Migration
Monitoring
Networking
OpenShift Optional
Security
Storage
Streaming & Messaging
Other

Source

☐ Red Hat (0)

Astra Trident
24.6.0 provided by NetApp, Inc.

Install

Channel
stable

Version
24.6.0

Capability level

- ☒ Basic Install
- ☒ Seamless Upgrades
- ☐ Full Lifecycle
- ☐ Deep Insights
- ☐ Auto Pilot

Source
Community

Provider
NetApp, Inc.

Repository
<https://github.com/netapp/trident>

Container image
docker.io/netapp/trident-operator:24.06.0

Created at

Community Operator

This is a community provided Operator. These are Operators which have not been vetted or verified by Red Hat. Community Operators should be used with caution because their stability is unknown. Red Hat provides no support for community Operators.

[Learn more about Red Hat's third party software support policy](#)

Astra Trident is an open source storage provisioner and orchestrator maintained by NetApp. It enables you to create storage volumes for containerized applications managed by Docker and Kubernetes. For full release information, including patch release changes, see <https://docs.netapp.com/us-en/trident/trident-m.html>.

Storage Backends and Storage Classes

```
$ ls
gcnv_backend_osd.yaml  scflex.yaml  secret_osd.yaml
$ oc create -f secret_osd.yaml -n trident
secret/tbc-gcnv-secret created
$ cat gcnv_backend_osd.yaml
apiVersion: trident.netapp.io/v1
kind: TridentBackendConfig
metadata:
  name: tbc-osd-gcnv
spec:
  version: 1
  storageDriverName: google-cloud-netapp-volumes
  backendName: volumes-for-openshift
  projectNumber:
  location: europe-west3
  apiKey:
    type: service_account
    project_id: openenv-xlqf1
    client_email: gcnvaccount@openenv-xlqf1.iam.gserviceaccount.com
    client_id:
    auth_uri: https://accounts.google.com/o/oauth2/auth
    token_uri: https://oauth2.googleapis.com/token
    auth_provider_x509_cert_url: https://www.googleapis.com/oauth2/v1/certs
    client_x509_cert_url: https://www.googleapis.com/robot/v1/metadata/x509/gcnvaccount%40openenv-xlqf1.iam.gserviceaccount.com
  credentials:
    name: tbc-gcnv-secret
  storage:
    - labels:
        performance: flex
        serviceLevel: flex
        storagePools:
          - euwest3-osd-netappvolumes
```

StorageClasses

Name Search by name... /

Name	Provisioner	Reclaim policy
 gcnv-flex-osd - Default	csi.trident.netapp.io	Delete
 ssd	kubernetes.io/gce-pd	Delete
 ssd-csi	pd.csi.storage.gke.io	Delete
 standard-csi	pd.csi.storage.gke.io	Delete

PersistentVolumes

The screenshot shows the Red Hat OpenShift console interface. On the left is a navigation sidebar with categories like Pods, Deployments, ConfigMaps, and Storage. The 'Storage' section is expanded, showing 'PersistentVolumes'. The main panel displays a table of PersistentVolumes with columns for Name, Status, Claim, Capacity, Labels, and Created. A red box highlights a specific row in the table.

Name	Status	Claim	Capacity	Labels	Created
pvc-5c5fd949-21d9-47c-a3c1-b828560190c6	Bound	prometheus-data-prometheus-k8s-1	100Gi	No labels	Oct 7, 2024, 12:24 PM
pvc-6af80f23-8736-4061-922b-271900a860a	Bound	alertmanager-data-alertmanager-main-0	10Gi	No labels	Oct 7, 2024, 12:24 PM
pvc-18af917-2104-4be3-a774-60c984076de6	Bound	alertmanager-data-alertmanager-main-1	10Gi	No labels	Oct 7, 2024, 12:24 PM
pvc-59f6a2bf-7bb7-450d-9071-278caef251d	Bound	data-blog-mariadb-0	8Gi	No labels	Oct 8, 2024, 3:41 PM
pvc-ea3040fe-dbd6-4422-a024-886149ef393e	Bound	blog-wordpress	10Gi	No labels	Oct 8, 2024, 3:41 PM
pvc-1330402f-8c37-404f-b201-09f28b85cd3	Bound	prometheus-k8s-0	100Gi	No labels	Oct 7, 2024, 12:24 PM

The screenshot shows the Google Cloud console interface for NetApp Volumes. It displays a table of volumes with columns for Status, Name, Location, Service level, Share name, Capacity, Used, Protocol(s), Storage pool, and Labels. A red box highlights a specific row in the table.

Status	Name	Location	Service level	Share name	Capacity	Used	Protocol(s)	Storage pool	Labels
Ready	pvc-59f6a2bf-7bb7-450d-9071-278caef251d	eu-west-3	Flex	pvc-59f6a2bf-7bb7-450d-9071-278caef251d	8	0%	NFSv3	netappvolumes	backend_unit: 7486dad6-650a-460a-918a-185734671685 platform: kubernetes platform_version: v1.27.16.03a957c plugin: google-cloud-netapp-volumes performance: flex
Ready	pvc-ea3040fe-dbd6-4422-a024-886149ef393e	eu-west-3	Flex	pvc-ea3040fe-dbd6-4422-a024-886149ef393e	10	0%	NFSv3	netappvolumes	version: 24.06.0 backend_unit: 7486dad6-650a-460a-918a-185734671685 platform: kubernetes platform_version: v1.27.16.03a957c plugin: google-cloud-netapp-volumes performance: flex

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Coming soon!

Tech preview



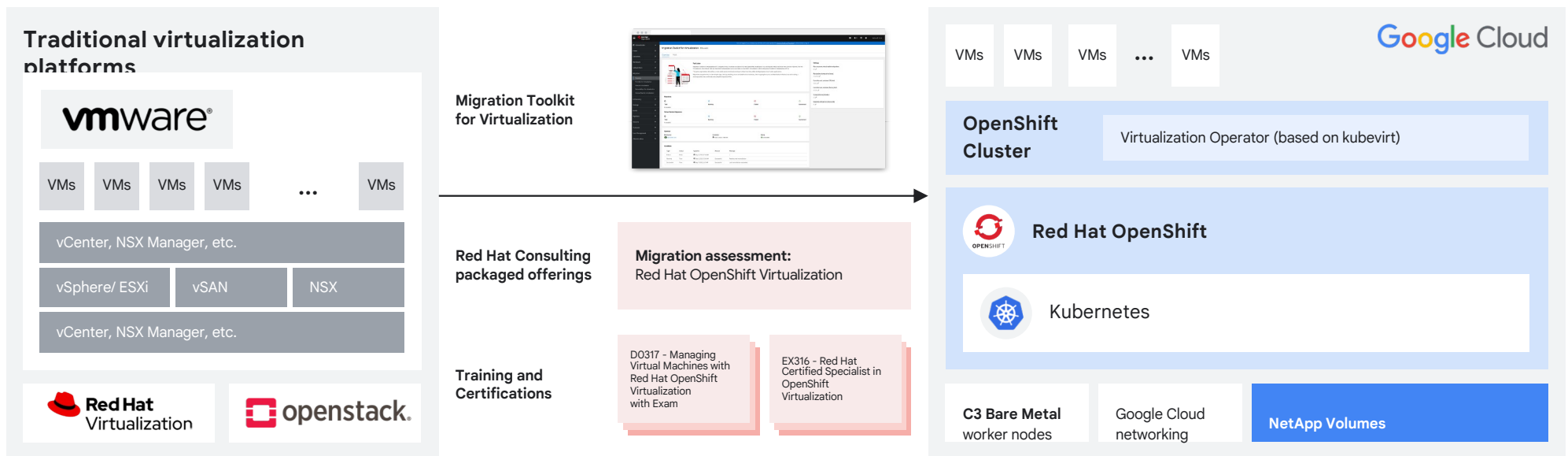
Red Hat OpenShift Virtualization
on GCP Bare Metal

Coming soon



Red Hat AI Inference Server on
Google Cloud Marketplace

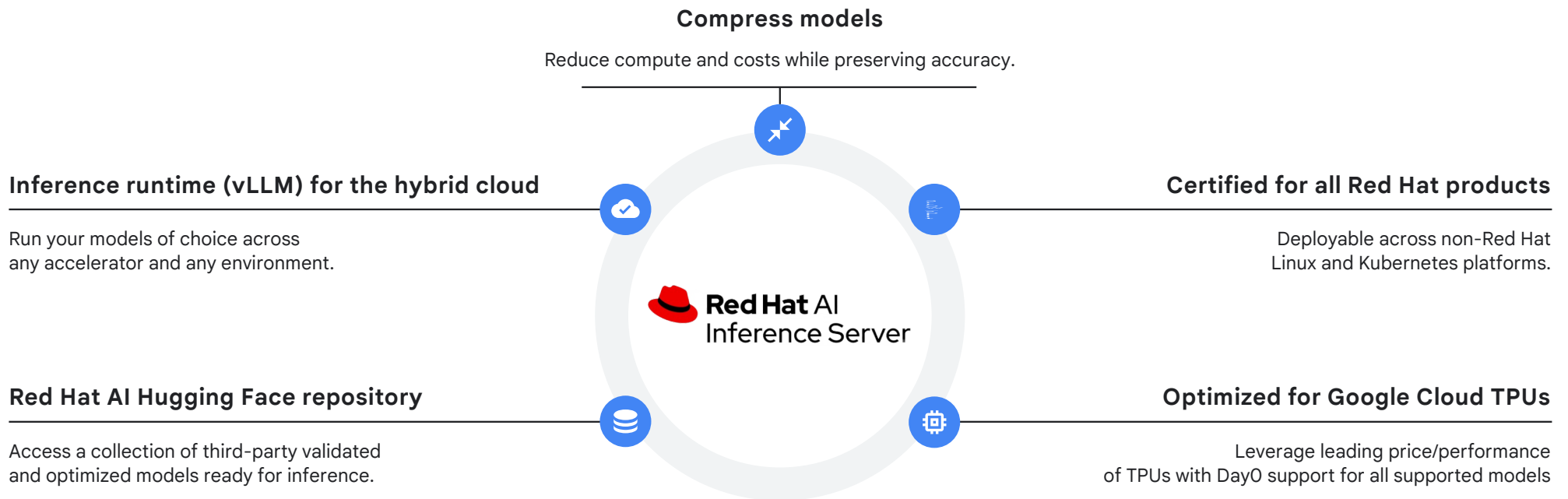
Efficiently run traditional virtual machines alongside containers on OpenShift on Google Cloud managed as native Kubernetes objects



Red Hat AI Inference Server

Red Hat AI Inference Server is
included in OpenShift AI and RHEL AI

Gain consistent, fast, and cost-effective inference at scale.



Get started

Get a free OpenShift migration assessment

Get in touch with a Google Cloud expert for a [free, no-obligation assessment](#) of your existing Red Hat OpenShift footprint to better understand your cost saving potential.



Try Google Cloud Netapp Volumes yourself

Explore NetApp Volumes in [Google Cloud Skills Boost](#) or let us set up a customer Hands-on Lab workshop!

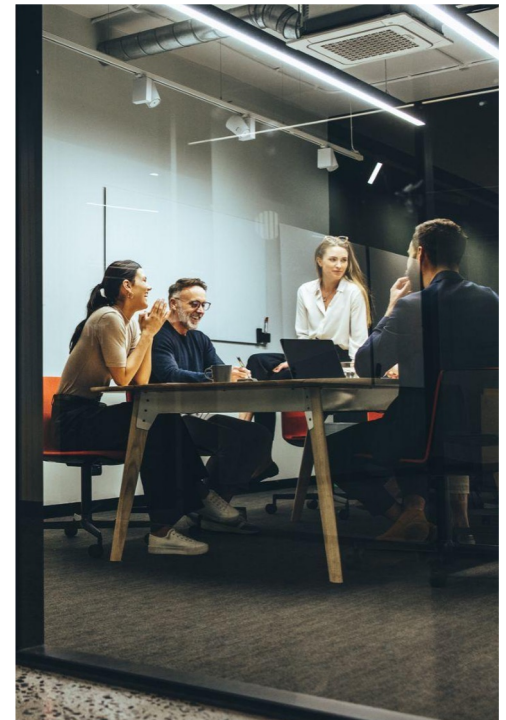


Resources

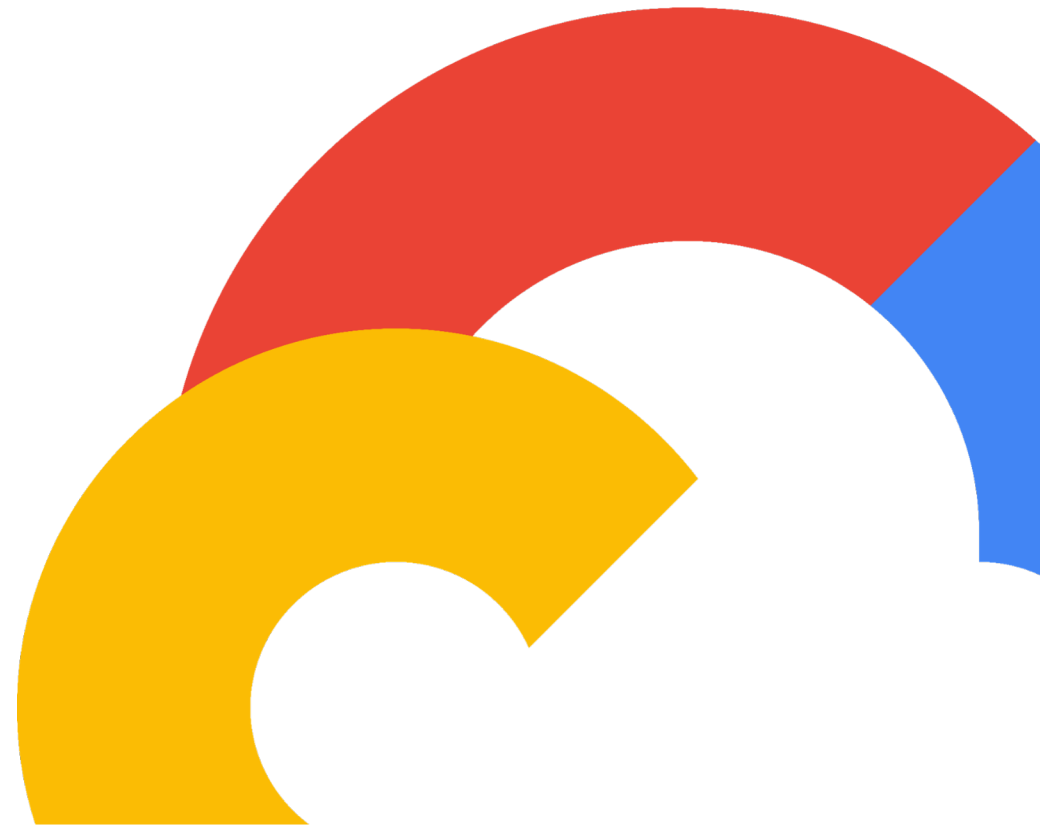
Read: [Save storage costs simply by enabling NetApp Volumes in your environment today](#)

Read: [Deploy and configure the Red Hat OpenShift Container Platform on Google Cloud with NetApp](#)

Watch: [Google Cloud NetApp Volumes for Openshift Dedicated](#)



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