STORAGE DEVELOPER CONFERENCE
SDC 21
BY Developers FOR Developers

Virtual Conference
September 28-29, 2021

A SNIA Event

Nextgen Connected Cloud Datacenter with programable and flexible infrastructure

Platform Agnostic

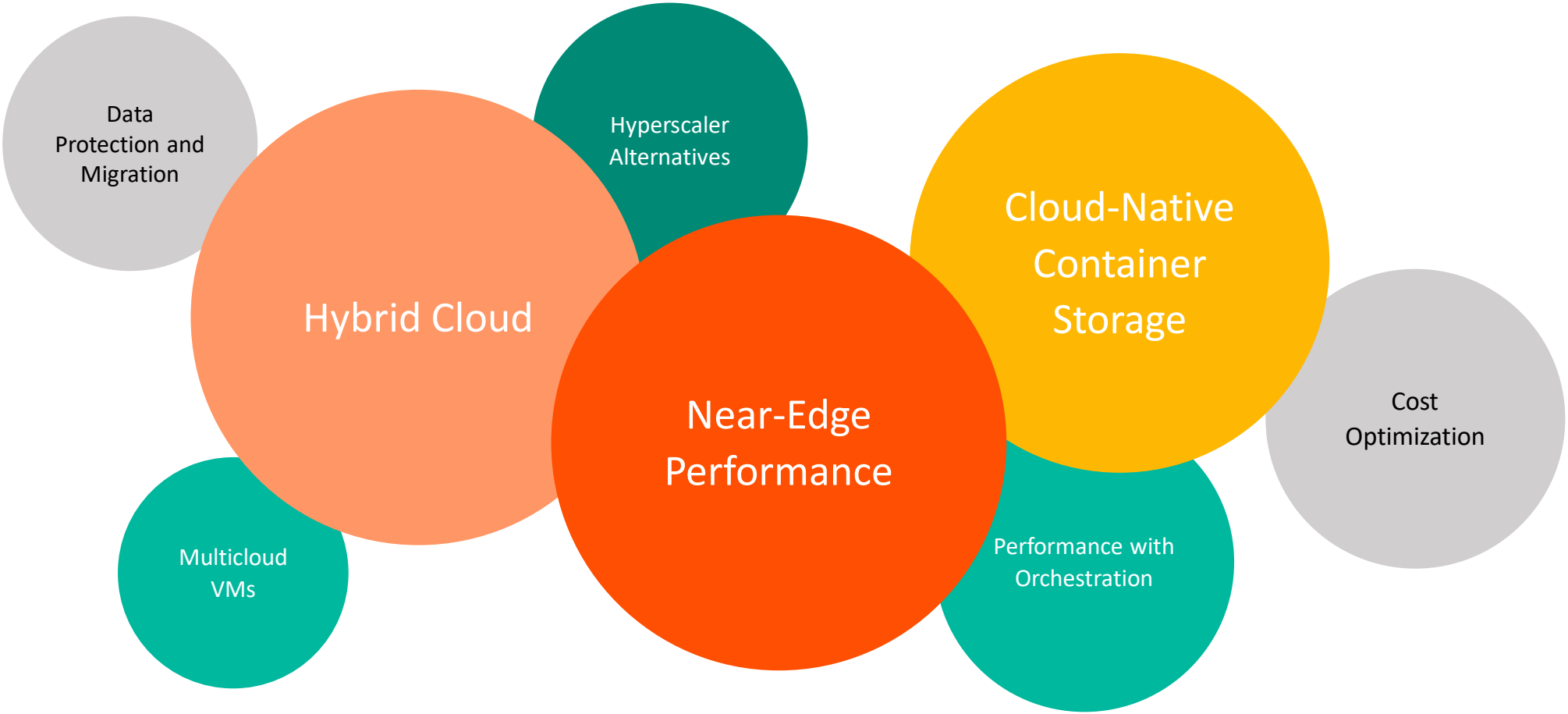
Bikash Roy Choudhury, Technical Director, Pure Storage

AGENDA

- Bare Metal as a Service (BMaaS)
- Pure Storage for Connected Cloud
- Connected Cloud validated architectures
  - Portworx and GKE/Anthos
  - FlashBlade and Azure
- Key takeaways

Challenges Facing Orgs Today

Without the right platform and solutions, these issues block innovation and growth

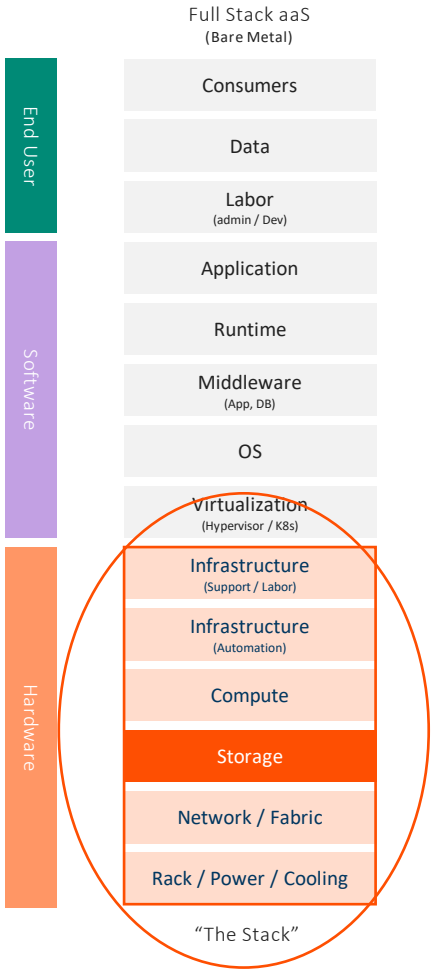


Bare Metal as a Service (BMaaS)

Connected Cloud Architecture

Emergence of Bare Metal as-a-Service

Bare metal as-a-service aka “hosted” full stack as-a-service



Provides an environment in which physical, dedicated, **single-tenanted** servers and storage can be provisioned to customers with cloud-like ease and speed.

Bare metal customers are given root-level, administrative access to the entire processing power of individual servers as well as any storage, networking, or other services they require.

“Up stack solutions” (e.g., hybrid cloud, ERP, analytics, CI/CD pipelines) are developed on top of BMaaS offerings to drive utilization.

Bare Metal as-a-Service Journey

From on-prem to bare metal cloud—delivering new outcomes

Traditional IT/ Pure aaS

- Consumers
- Data
- Labor (admin / Dev)
- Application
- Runtime
- Middleware (App, DB)
- OS
- Virtualization (Hypervisor / K8s)
- Infrastructure (Support / Labor)
- Infrastructure (Automation)
- Compute
- Storage
- Network / Fabric
- Rack / Power / Cooling

Technology Journey

Tech Debt
Existing application and operations constraints for public cloud

Network
Layer 2/3 network controls, firewalls, load balancers/BGP, and access control

Compute
Server, OS/application licensing, and memory/compute density

Proof of Concept
Server, test server, networking, and storage configs

Data Migration
Establish connectivity to existing on-prem environment and set up migration plan

On-Prem → Bare Metal as-a-Service

Business Justification Journey

Getting Out of the Data Center Business
Challenges of maintaining a private/self-run data center operation

Security
Regulatory needs to have single tenant, bare metal control of IT environment

Flexibility
Impact of infrastructure at the speed of software

Cost
Committed vs. on-demand compute, server licensing considerations, and account sizing

Lower Operational Costs, Ability to Meet Changing Business Demands, and Pay Only for What You Use

Full Stack aaS (Bare Metal)

- Consumers
- Data
- Labor (admin / Dev)
- Application
- Runtime
- Middleware (App, DB)
- OS
- Virtualization (Hypervisor / K8s)
- Infrastructure (Support / Labor)
- Infrastructure (Automation)
- Compute
- Storage
- Network / Fabric
- Rack / Power / Cooling

EQUINIX

WHY NOW?

DATA GROWTH + MODERN DATA EXPERIENCE + MULTI CLOUD CONNECTIVITY = LOST BUSINESS OPPORTUNITY

Why Connected Cloud instead of Public Cloud?

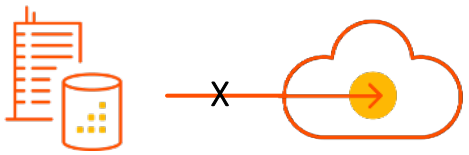
Hybrid Cloud - NextGen Datacenter

Data Sovereignty	Flexible Infrastructure	Cloud Bursting	OpEx Model
Data Ownership	Automating Infrastructure	Seamless extension to Cloud	Pay as you use

Your Cloud Journey Reimagined

Emergence of Bare Metal as-a-Service, Powered by Pure

Build, Manage, and Host Everything on Your Own

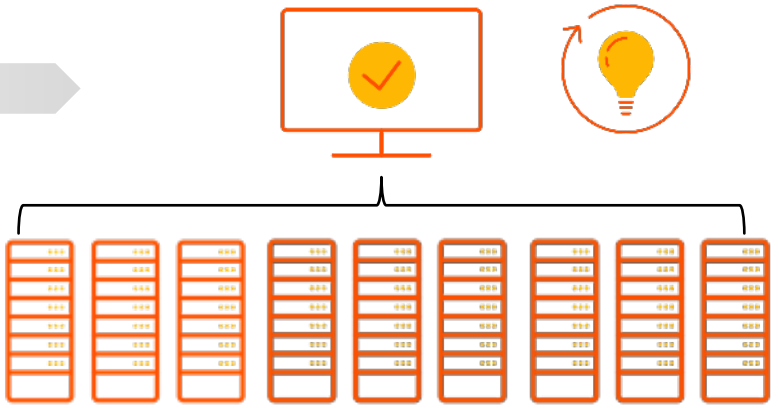


Massive cloud cost overruns

Legacy technology challenges

Many companies lack the skills to get there

Bare Metal as-a-Service aka "Hosted" Full Stack as-a-Service



Bare Metal as-a-Service, Powered by Pure

Powered by Pure Solutions provide a high-performance, on-demand, hybrid data platform under a single contract

Pure Storage for Connected Cloud

Pure Storage At A Glance

FY21 Annual Revenue

$1.68 B

Customers

9,000+*

Global Customers

Satisfaction

83.5 NPS

Top 1% of
B2B Companies

Leadership

7 Year Leader

Gartner Magic Quadrant

Q1 FY22 Revenue

$413 M

12% Y/Y Growth

Customers

~330

Q1 FY22 Customer Additions

Customers

~49%*

Of Fortune 500
companies

Subscription Services Revenue

35%

Q1 FY22 Y/Y Growth

(*) As of the end of Q1 FY22

Pure Storage is a Leader 7 Years in a Row!

Pure is named a leader in the Gartner 2020 Magic Quadrant for Primary Storage Arrays and is placed highest for Ability to Execute AND furthest for Completeness of Vision

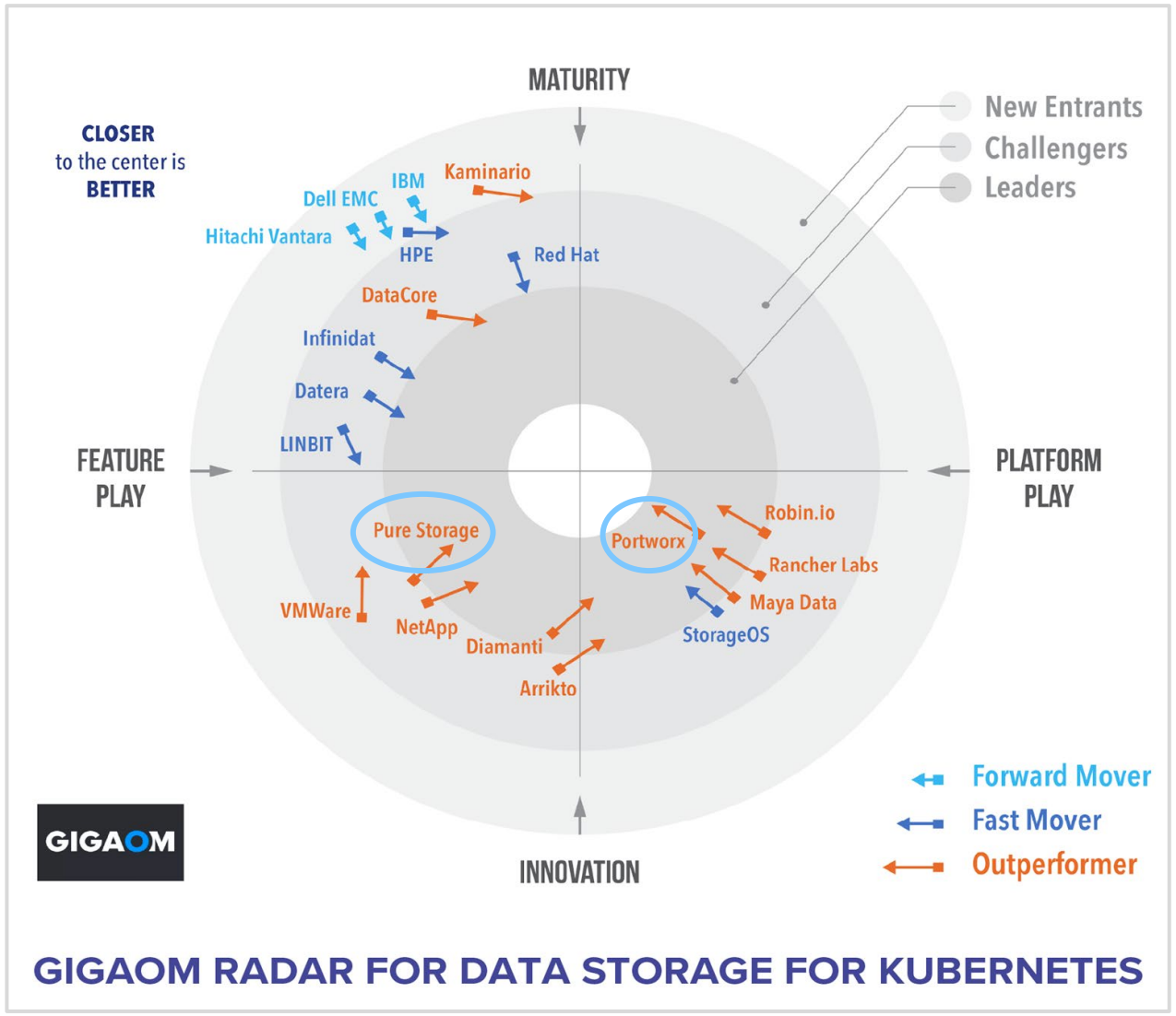
Source: Gartner Magic Quadrant for Primary Storage, Santhosh Rao, John Monroe, Roger Cox, Joseph Unsworth, November 30, 2020.

This graphic was published by Gartner, Inc. as a part of a larger research document and should be evaluated in the context of the entire document. The Gartner document is available upon request from Pure Storage. Gartner does not endorse any vendor, product, or service depicted in its research publications, and does not advise technology users to select only those vendors with the highest ratings or other designation. Gartner research publications consist of the opinions of Gartner's research organization and should not be construed as statements of fact. Gartner disclaims all warranties, expressed or implied, with respect to this research, including and warranties of merchantability or fitness for a particular purpose.

Figure 1: Magic Quadrant for Primary Storage Arrays

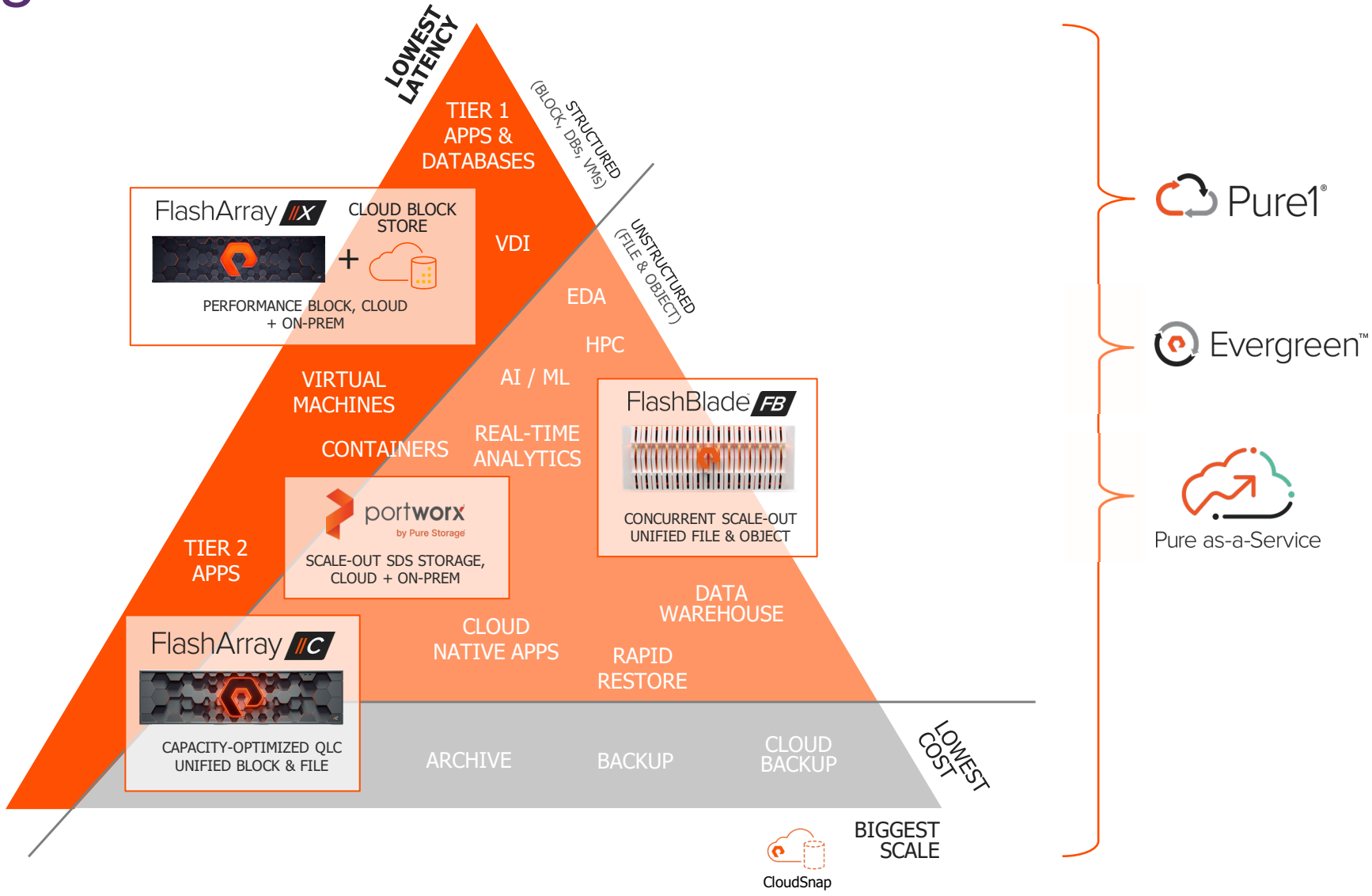
Source: Gartner (November 2020)

GigaOm Radar Outperformer for Kubernetes Data Storage



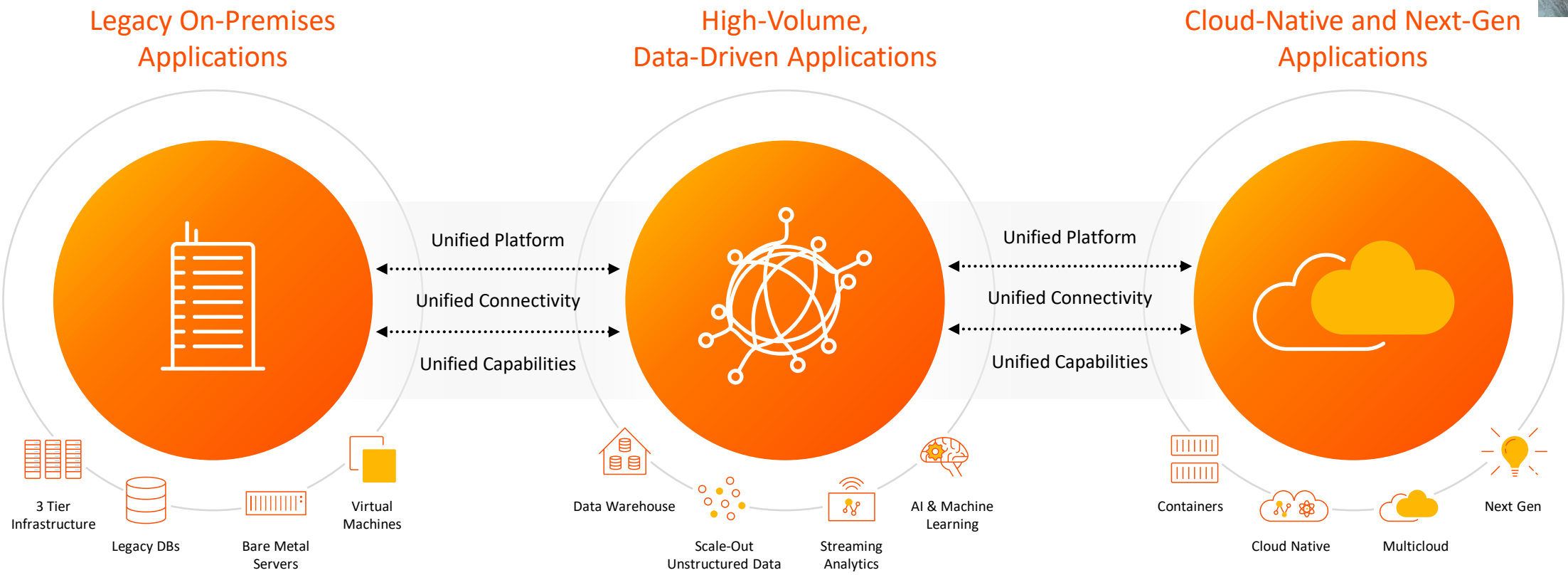
Portworx: GigaOm Radar for Data Storage for Kubernetes

Pure Storage Portfolio



Pure Storage on Equinix Metal

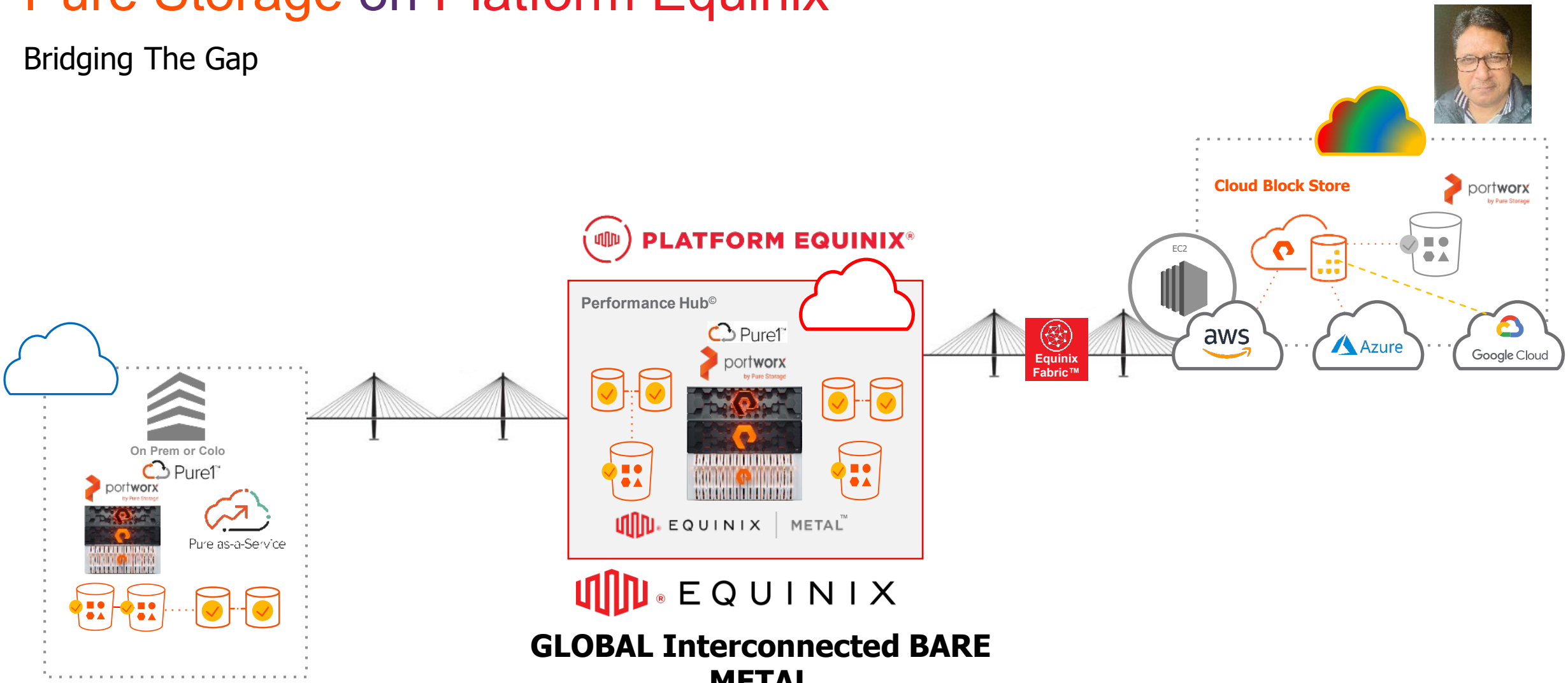
A single platform for your entire cloud journey…available at the speed of software



Highly Secure | Automated | Interconnected | Hybrid | Integrated

Pure Storage on Platform Equinix

Bridging The Gap



GLOBAL Interconnected BARE METAL
Powered By PURE

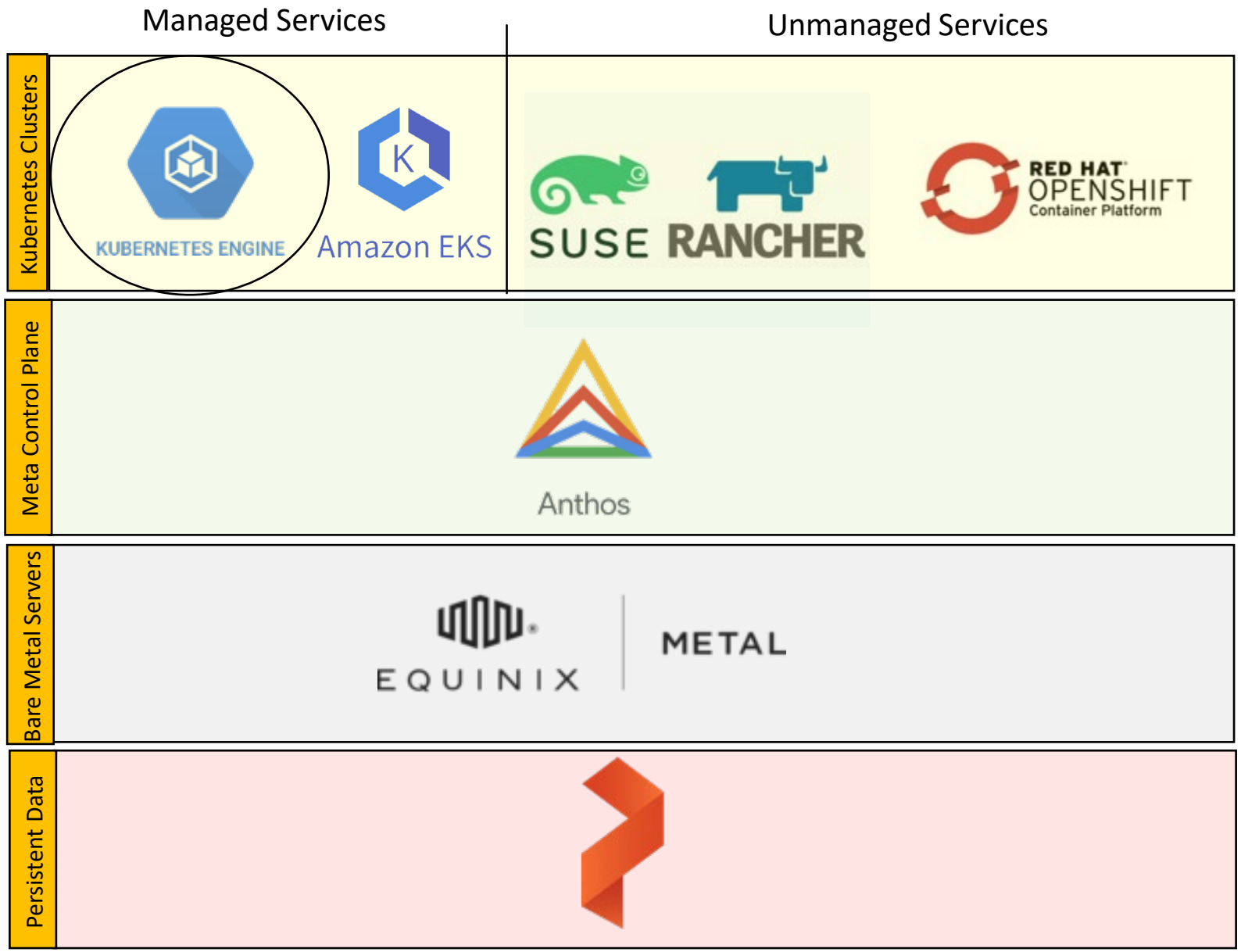
Connected Cloud Benefits with Pure Storage

Security & Control	Augment Cloud Adoption	Performance & Capacity Scaling	Cost Efficient
Secure Data Ownership	Automate Infrastructure provisioning	Disaggregated scaling of compute and storage	Reduced data footprint
Data Management & Protection	Data Staging for multi-cloud	Linear performance scaling with optimized license costs	Reduces Cloud Egress costs

Connected Cloud with Equinix Metal & Portworx

Validated architecture with GKE/Anthos for databases

Connected Cloud Architecture with GKE/Anthos/Equinix Metal/ Portworx



Source sample text

Portworx Is the Leading
Kubernetes Data Services Platform

Any App

DATABASE: cassandra, MySQL, Couchbase
ANALYTICS: Spark, CLOUDERA
STREAMING: kafka, RabbitMQ
SEARCH/LOG: elastic, Solr, splunk>
5G/IoT
AI/ML: TensorFlow, PyTorch

Any kubernetes Distribution

OPENSHIFT, Amazon EKS, GKE, AKS, Tanzu

portworx by Pure Storage

The Kubernetes Data Services Platform

PX-Store | PX-Backup | PX-DR | PX-Migrate | PX-Secure | PX-Autopilot

Any Cloud

aws

Any Infrastructure

Bare Metal, vmware, IBM, DELL, Hewlett Packard Enterprise, NetApp, PURE STORAGE

Every Stage

Pilot, Test/ Dev, Go Live, Global CaaS

Automating PX install along with GKE/Anthos/EQM using Terraform

https://github.com/equinix/terraform-metal-anthos-on-baremetal

```
469   provisioner "remote-exec" {
470     inline = [
471       "VER=$(kubectl version --short | awk -Fv '/Server Version: / {print
          $3}')",
472       "URL='https://install.portworx.com/${var.portworx_version}?mc=false&
          kbver='$VER'&b=true&j=auto&kd=${urlencode("/dev/pwx_vg/pwxkvdb")}&
          c=${local.cluster_name}&stork=true&st=k8s'",
473       "kubectl --kubeconfig /root/baremetal/bmctl-workspace/${local.
          cluster_name}/${local.cluster_name}-kubeconfig apply -f $URL"
474     ]
475   }
476 }
477
```

```
129   type         = string
130   default      = "https://raw.githubusercontent.com/plunder-app/kube-vip/
          bb7d2da73eeb6c4712479b007ff931a12180e626/docs/manifests/kube-vip-em.
          yaml"
131   description = "The deploy url for the Kube-VIP Daemonset"
132 }
133
134 variable "portworx_version" {
135   type         = string
136   description = "Portworx Version to install"
137   default      = "2.6"
138 }
```

```
1  #!/usr/bin/env bash
2  createlvm=true
3  deletelvm=false
4  dsksize="0"
5
6  function largest_free_disk {
7    lsblk -f -d -b -n -oNAME,SIZE | while read disk size; do
8      # ignore disks with filesystems
9      if ! lsblk -f -b -n  -oNAME,SIZE,FSTYPE -i /dev/$disk | egrep "xfs|
       ext3|ext4|btrfs|sr0" >/dev/null; then
10       echo -en "$disk $size"
11     fi
12   done | sort -n -k2 | head -n1 | cut -f1 -d" "
```

Source sample text

Performance validation with YCSB benchmark and MongoDB

GCloud

Equinix Metal

KUBERNETES ENGINE

Local SSD Storage

KUBERNETES ENGINE

portworx by Pure Storage

KUBERNETES ENGINE

Anthos

EQUINIX METAL

ceph ROOK

KUBERNETES ENGINE

Anthos

EQUINIX METAL

portworx by Pure Storage

Source sample text

Anthos Bare metal integration with Portworx

Highlights

1. Up to **3x** throughput improvement with Anthos/EM/PX over GKE/GCLOUD
2. Up to **3x** latency improvement with Anthos/EM/PX over GKE/GCLOUD
3. Up to **25%** throughput improvement with Anthos/EM/PX over Anthos/EM/Rook
4. Up to **30%** latency improvement with Anthos/EM/PX over Anthos/EM/Rook
5. Setting up Anthos/GKE/EM/PX start to completion under 40 minutes

Source sample text

Anthos-Equinix Metal integration with Portworx

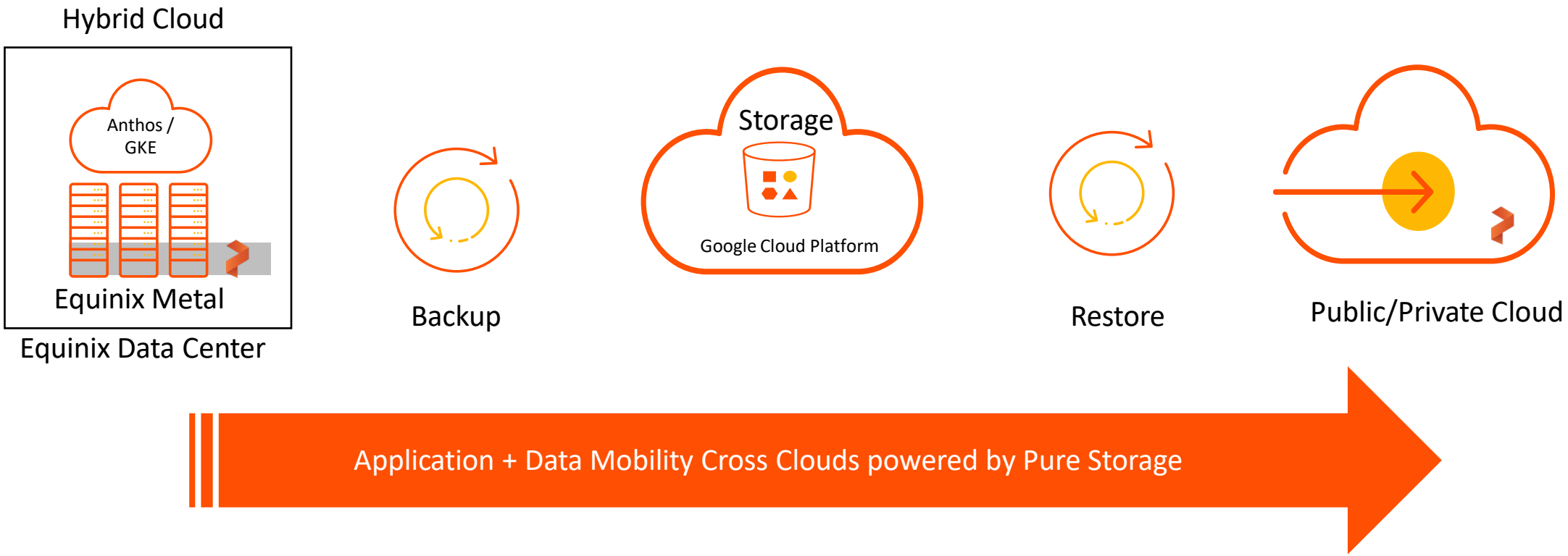
Additional benefits

1. Data Protection for Cloud Native Applications
2. Application and data mobility cross clouds

Source sample text

Multi Cloud with Portworx

Data Protection for Cloud Native Applications

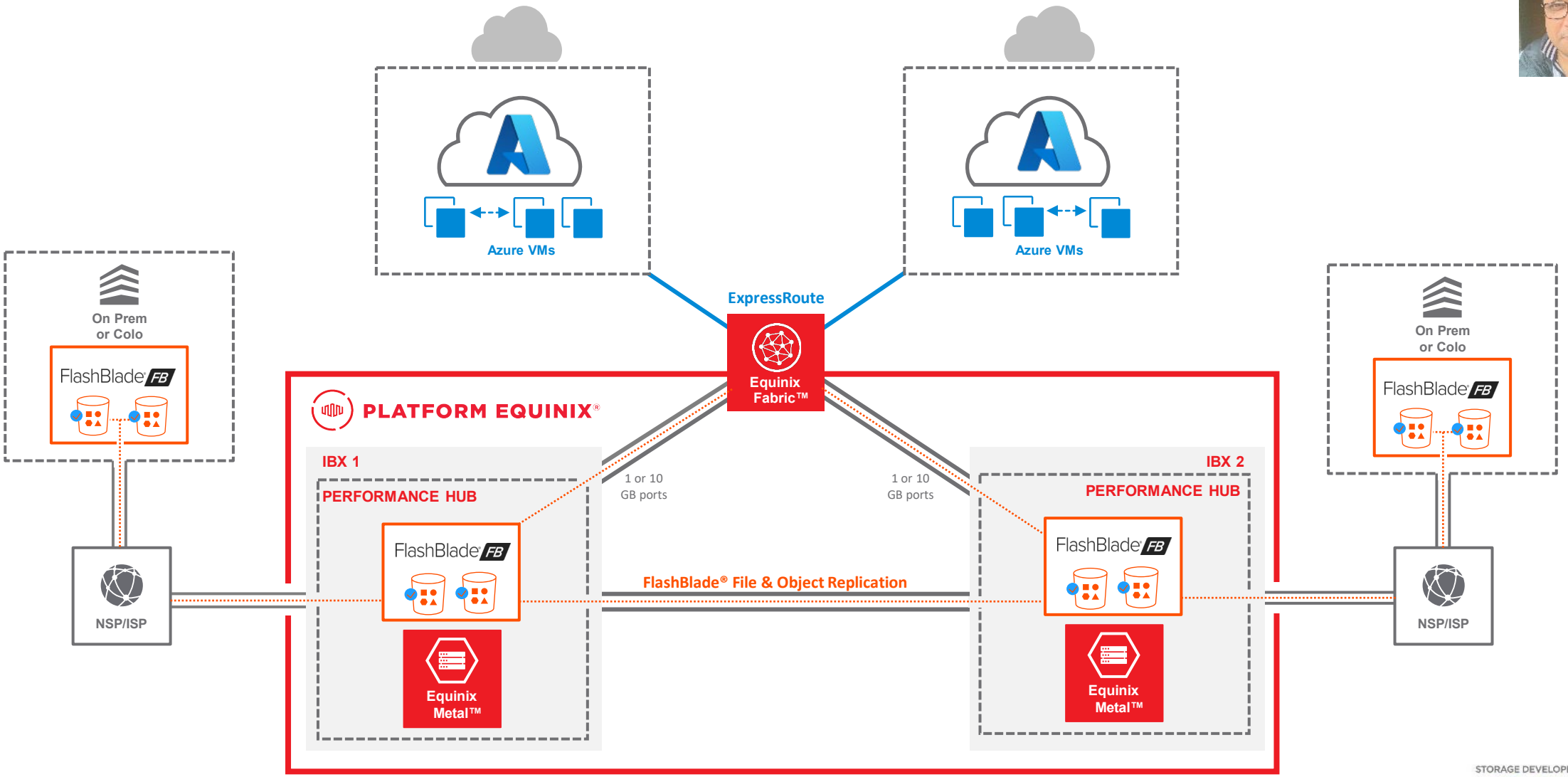


Source sample text

Connected Cloud with Equinix Metal and FlashBlade

Validated architecture in Azure Cloud for HPC/EDA workloads

Azure Scale Compute with FlashBlade in Equinix



FLASHBLADE IS Unified Fast File & Object (UFFO)

Technical Computing | **Analytics** | **AI** | **Cloud-Native Apps** | **Data Protection**

File Protocols

- High-performance NFS & SMB protocols
- Cross-protocol interoperability
- Enterprise management: quotas, LDAP/AD/NIS integration, ACLs

Object Storage

- AWS S3-compatible object APIs
- Low latency, high throughput performance from all-flash core
- Rich object features: versioning, custom metadata, lifecycle policies

Management APIs

- Storage provisioning via common automation libraries
- Monitoring of capacity, performance, and hardware health
- Advanced telemetry for troubleshooting at scale

>_ NF >_ SMB | >_ OBJECT | >_ REST AUTOMATION

Purity FB

SNAPSHOTS | REPLICATION | SECURITY | HYBRID CLOUD | INFRASTRUCTURE & SCALE

Protect data from user and administrator errors

- Simple, fast APIs
- Flexible policies
- Granular file recovery

Protect data from rack- or site-level failures

- Async file & object replication
- High-performance, native implementation
- Advanced DR capabilities

Protect data from malicious actors

- SafeMode snapshots to mitigate ransomware attacks
- Always-on encryption at rest
- Protocol-level authentication and transport encryption

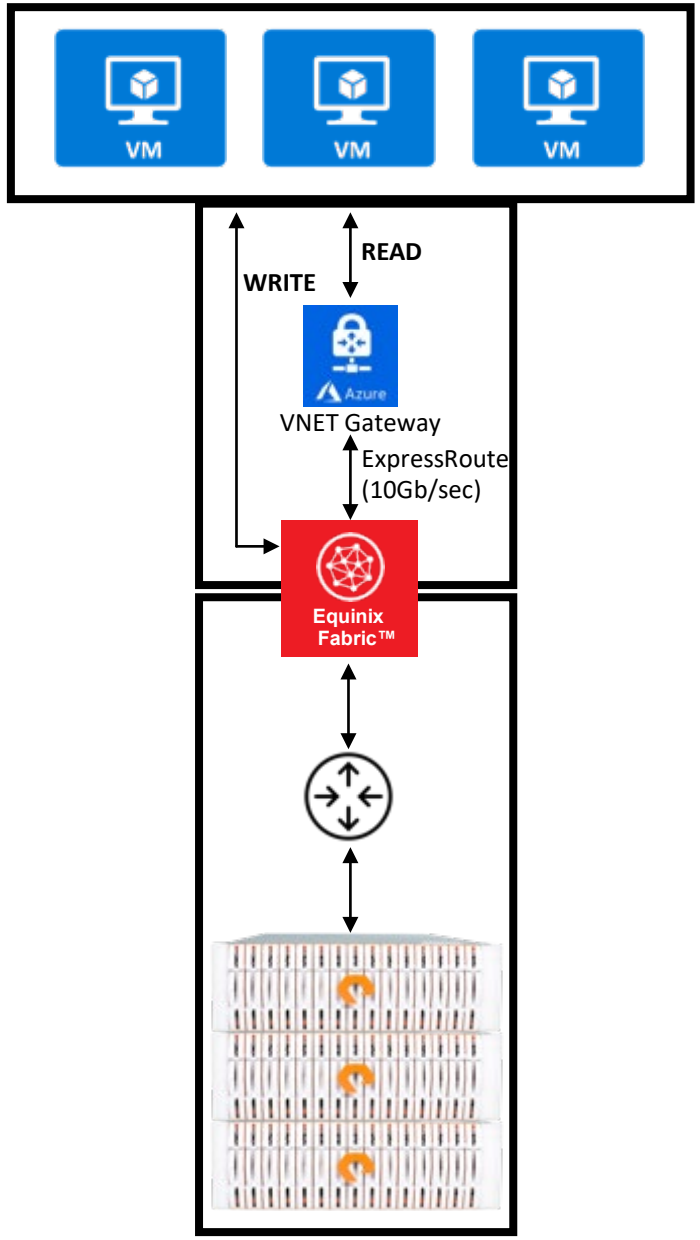
Connect workflows from on-prem to public cloud

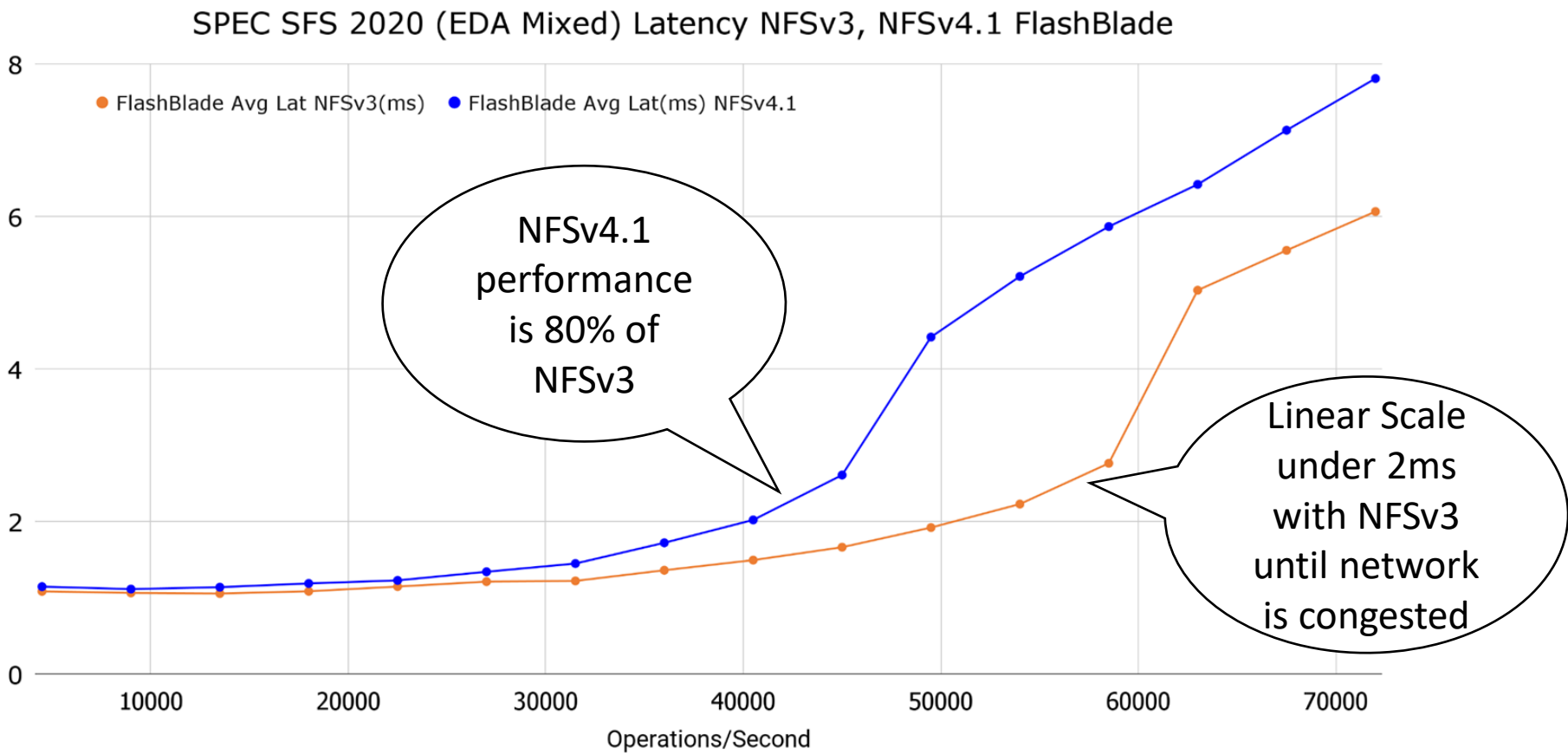
- AWS-compatible S3
- Object replication to AWS
- Pure Service Orchestrator (PSO) for containers/k8s

Scale capacity and performance with ease

- Up to 8PB effective in 150x52T cluster
- No external load balancers or DNS config: min 1 data VIP

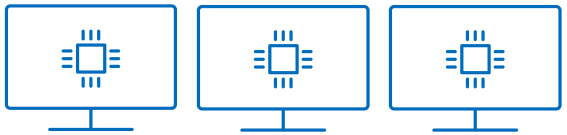
Performance Benchmark using SpecStorage2020





Data Mobility from on-premise to Connected Cloud

On-premise Compute Resources



Azure West US Region

On-Premise Network

ExpressRoute (10Gb/sec)

(Ultra Performance Gateway)

~10GB/sec transfer rate for 2.3TB Filesystem

Array-level filesystem replication

On-Premise FlashBlade

Equinix Router

EQUINIX

Automating data mobility using Ansible Playbooks

Source sample text

Key takeaways

Connected Cloud Architectures with Pure Storage

Validated cloud augmented architectures with Portworx and FlashBlade for Tier 1 /2 and HPC workloads respectively

Scalable performance for applications running on Kubernetes and non-Kubernetes environments

Addresses concerns about data in cloud - security, control, governance and compliance

Flexible infrastructure with automation to provision on-premise and connected cloud environments

Please take a moment to rate this session.

Your feedback is important to us.

