PURESTORAGE®

The Public Cloud, Made Enterprise

Data Interaction is Different in the Cloud

On-Prem & Hosted

Resiliency
Highly Reliable Arrays, Built-in Snaps & DR

Efficiency
Thin Provisioning, Deduplication, Compression

Cost Considerations
Capacity Planning, resources once purchased are fixed

Cloud

Resiliency
High Availability for $, Higher Durability, Globally Replicated

Efficiency
Thick Provisioned Capacity & Performance

Cost Considerations
Ingress/egress charges, Cold vs Warm, performance (IOPS) can be wasted

Different Location, Similar Problems

Choices, trade-offs, and sprawl

The public cloud has an ever-increasing number of storage options, snapshot limitations, and configuration parameters

Makes it difficult to understand, track, and implement the right option at the right time.

Storage option sprawl is a significant and potentially costly problem—especially at scale

Azure Managed Disk

Amazon Elastic Block Store

Options

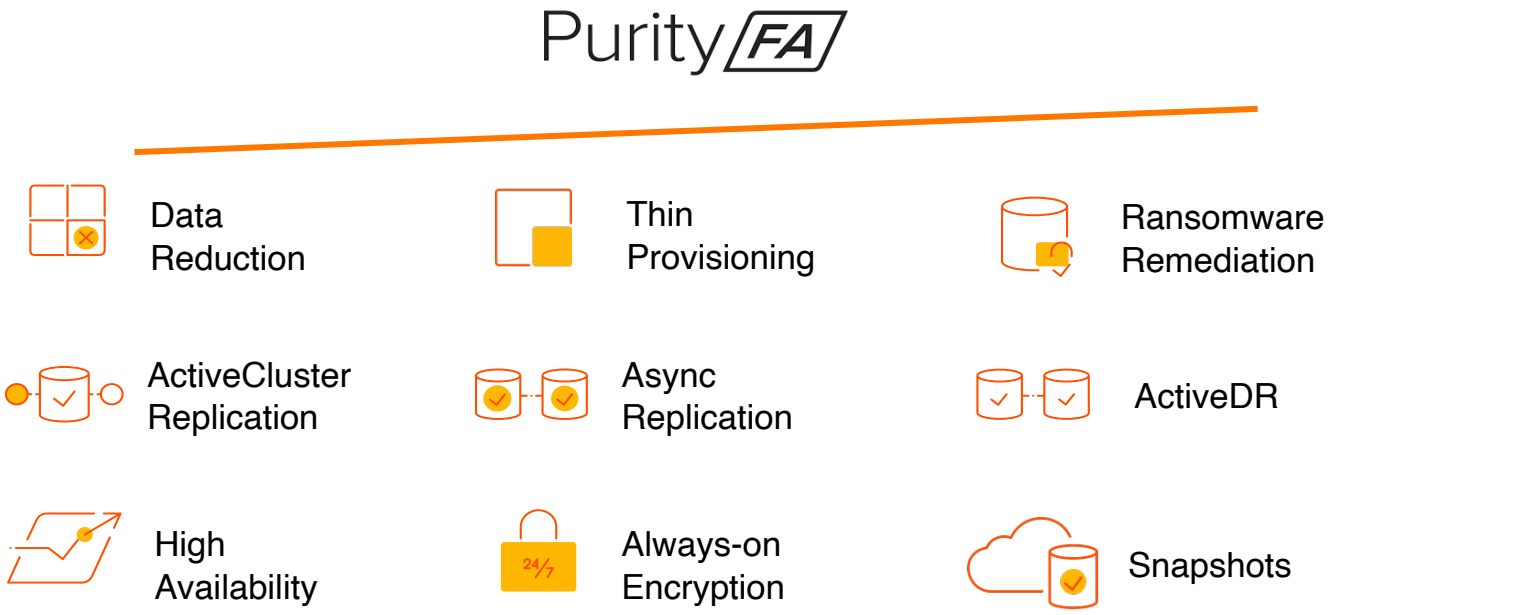
- Standard SSD
- Premium SSD
- Ultra SSD
- Ephemeral Disk

- sc1, st1 — Magnetic HDD
- gp2, gp3 — General Purpose SSD
- io1, io2, io2 BE — Provisioned IOPS SSD

Tradeoffs

- Capacity vs. Throughput
- Capacity vs. IOPS
- Performance vs Latency
- Multi-Attach: Shared Volumes
- Snapshot capabilities

Pure Data Services Make Your Public Cloud Better



Some Problems Are Best Solved in the Cloud

Cost Efficiencies for Block Storage

Pay less for your current cloud block storage with deduplication and compression – it's all upside

Flexible Disaster Recovery

Solutions to meet your varying RPO/RTO needs that don't require additional hardware

Fast, Scalable Dev/ Test and Analytics

Instantaneous replication of production environments in the cloud that can be set up and torn down with ease

Migration Made Easy

Keep your data in the same Purity operating environment to move effortlessly between on-prem and the cloud

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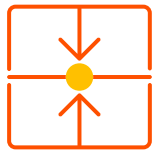
Cost Efficient Public Cloud Storage

Reduce your current block storage spend

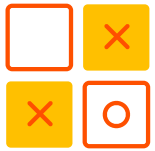
Lower the Cost of Your Cloud Storage

Data reduction strategies inherited from Purity



Deduplication / Compression

Use less cloud storage infrastructure with industry-leading deduplication and compression.

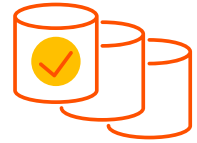


Pattern Removal

Identify and remove repetitive binary patterns to reduce the volume of data to be processed by dedupe scanner and compression engine

Thin Provisioning

Only unique data blocks that are written by the host app would consume storage resources (Azure)

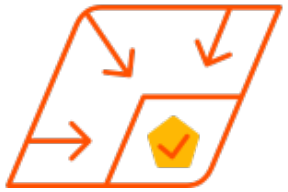


Snaps / Clones

Instantaneous snapshots and clones that are pointer-based and space efficient

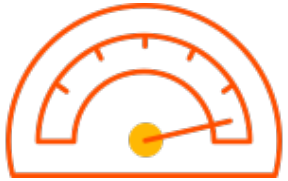
The Benefits of Purity Lower Cost Downstream

Smaller data footprint impacts other cloud charges



Ingress / Egress Traffic

Optimize egress/ingress charges for storage traffic in the cloud



Replication Bandwidth

Preserve data compression and deduplication when transferring data

Cloud products are made to serve the majority of applications and tackle cost with economies of scale. Performance and capacity are typically bundled, resulting in overprovisioning.

Configured For Savings, Optimized for Performance

Cloud Block Store Uses the Optimal Mix of Product Offerings from AWS and Azure

Amazon AWS

- **GP2**: Performance tied to capacity
  - may overprovision capacity to get required IOPS
- **GP3**: IOPS scales independently
  - low durability (2-3 9's) requires multiple copies
- **IO1, IO2, IO2BE**: IOPS scales independently
  - Requires VM's to use

Microsoft Azure

- **Premium**: capacities only offered in binary increments (1,2,4,8 TB)
  - Wasted capacity
- **Ultra**: requires provisioning for peak IOPS, peak bandwidth, and VM vCPU reserve
  - Wasted IOPS, bandwidth, vCPU off peak

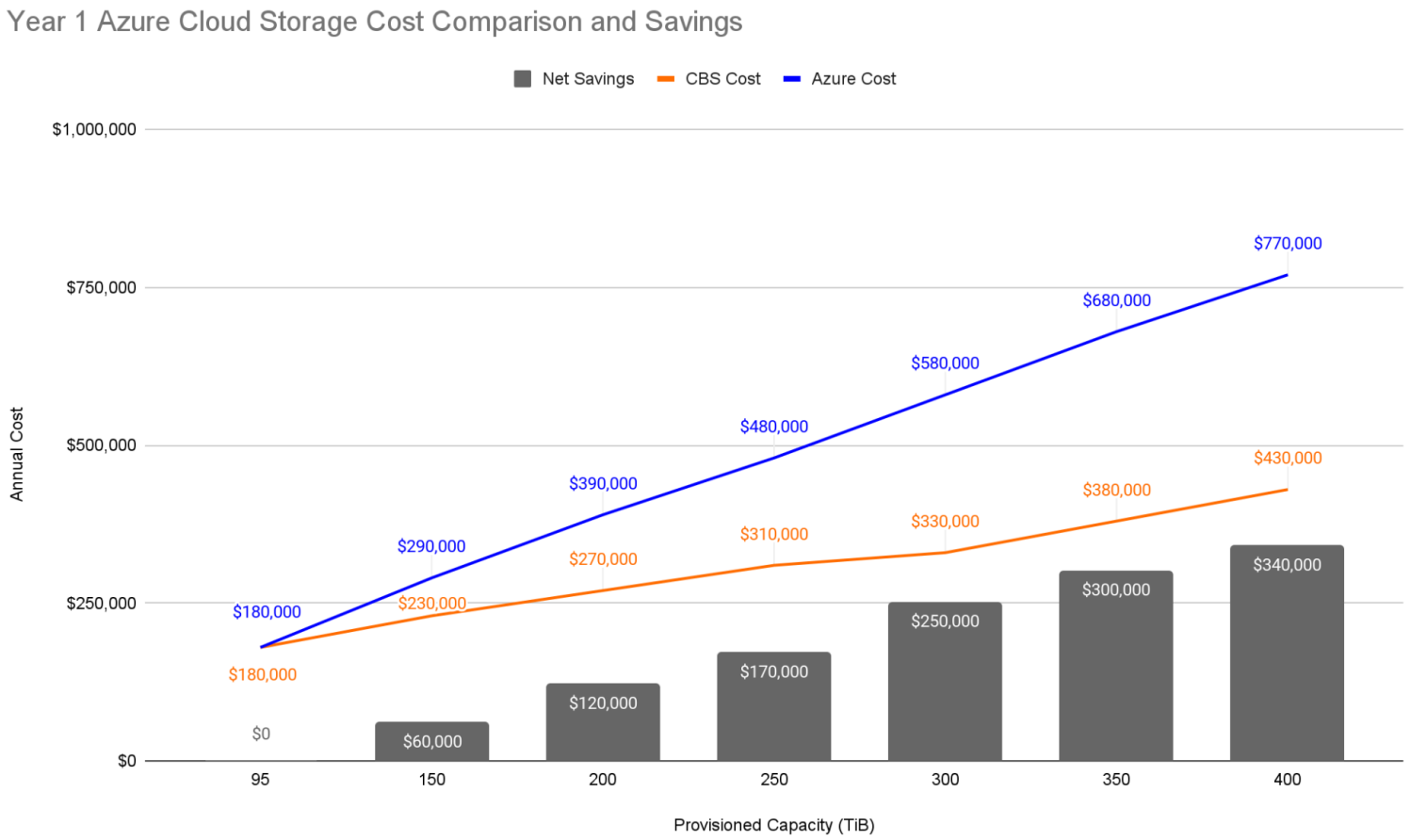
Pure Cloud Block Store

- Built on top of AWS and Azure native storage
- IOPS no longer need to be provisioned per volume
- Combines write IOPS from different workloads
  - reduces total number of IOPS by up to half

Estimated Savings by Capacity

Recognize savings on Microsoft Azure starting at 95TiB provisioned

Region*	us-east
Lease	3 years
HA %	0%
Data Reduction	4:1
Premium SSD Disk Size**	1 TiB

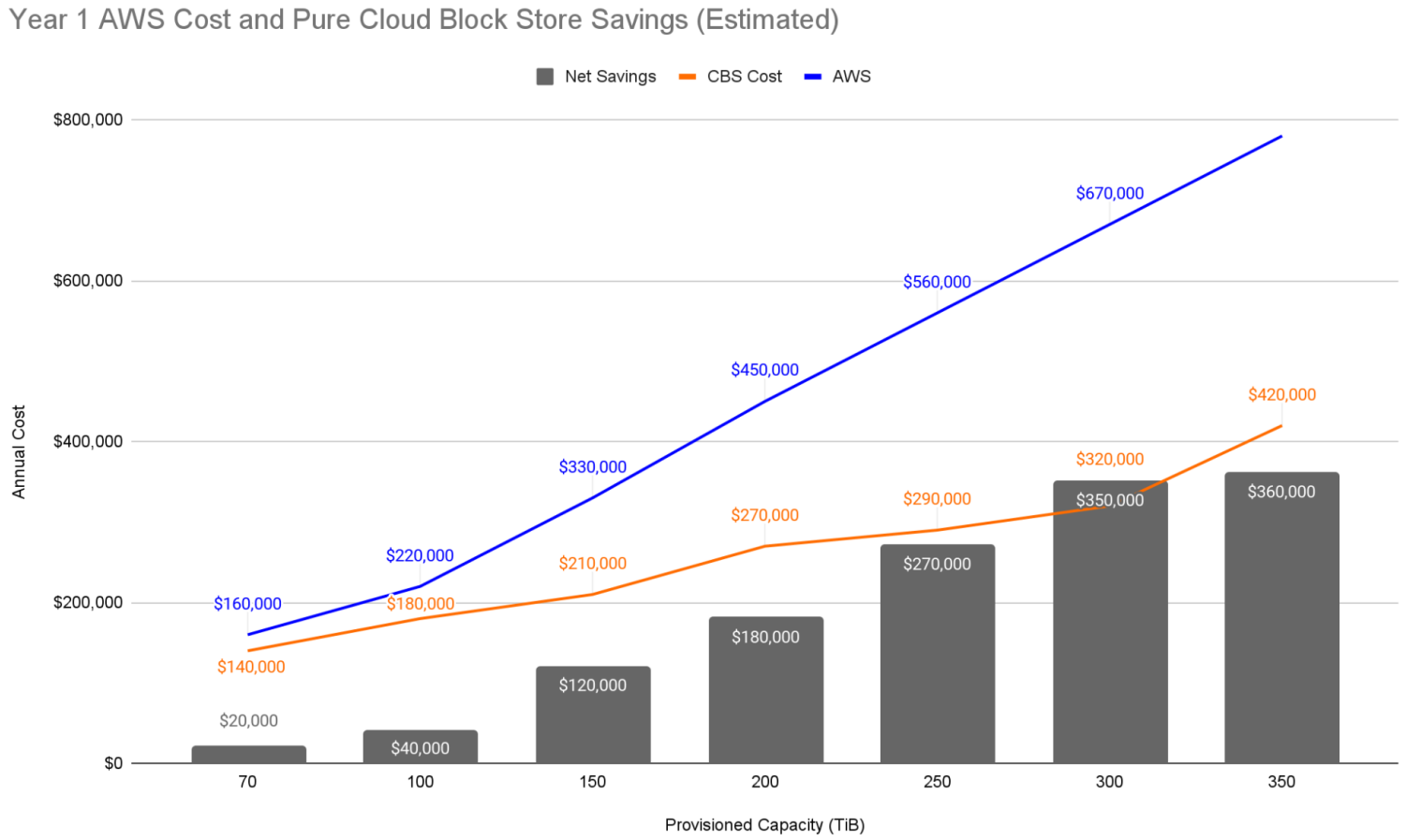


*Azure reflect cost as of Q1 2022
**1TB disks selected for max burstable IOPS

Estimated Savings by Capacity

Recognize savings on Amazon AWS starting at 70TiB provisioned

Region*	us-east
Lease	3 years
HA %**	50%
Data Reduction	4:1
Storage Type***	gp2

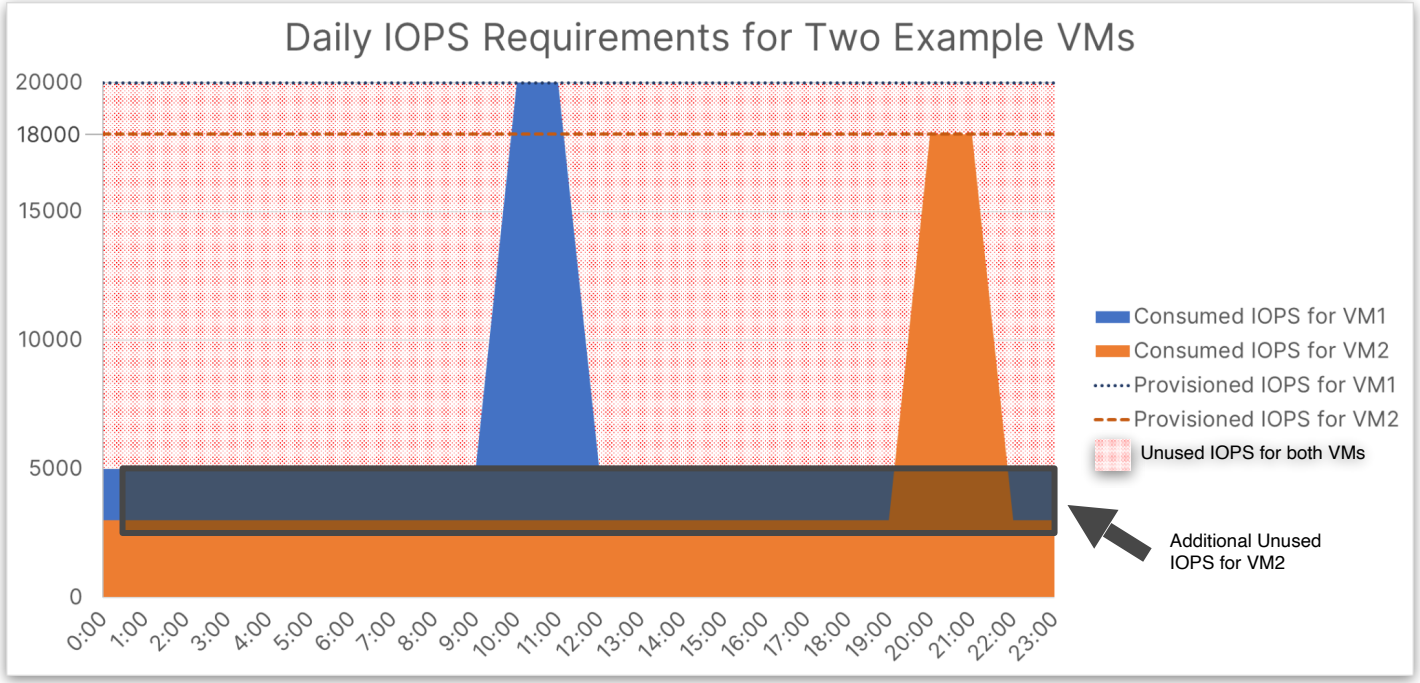


*AWS reflect cost as of Q1 2022
**HA to account for durability, S3 provides 2-3 9's
***gp2 scales at fixed 3 IOPS per GiB

Underuse, Overspend Example

Overprovisioning for peak use on Azure with Ultra SSD tier

Monthly Cost	
Capacity cost (GiB)	$ 0.11972
IOPS cost	$ 0.04964
Bandwidth Cost (MB/s)	$ 0.34967

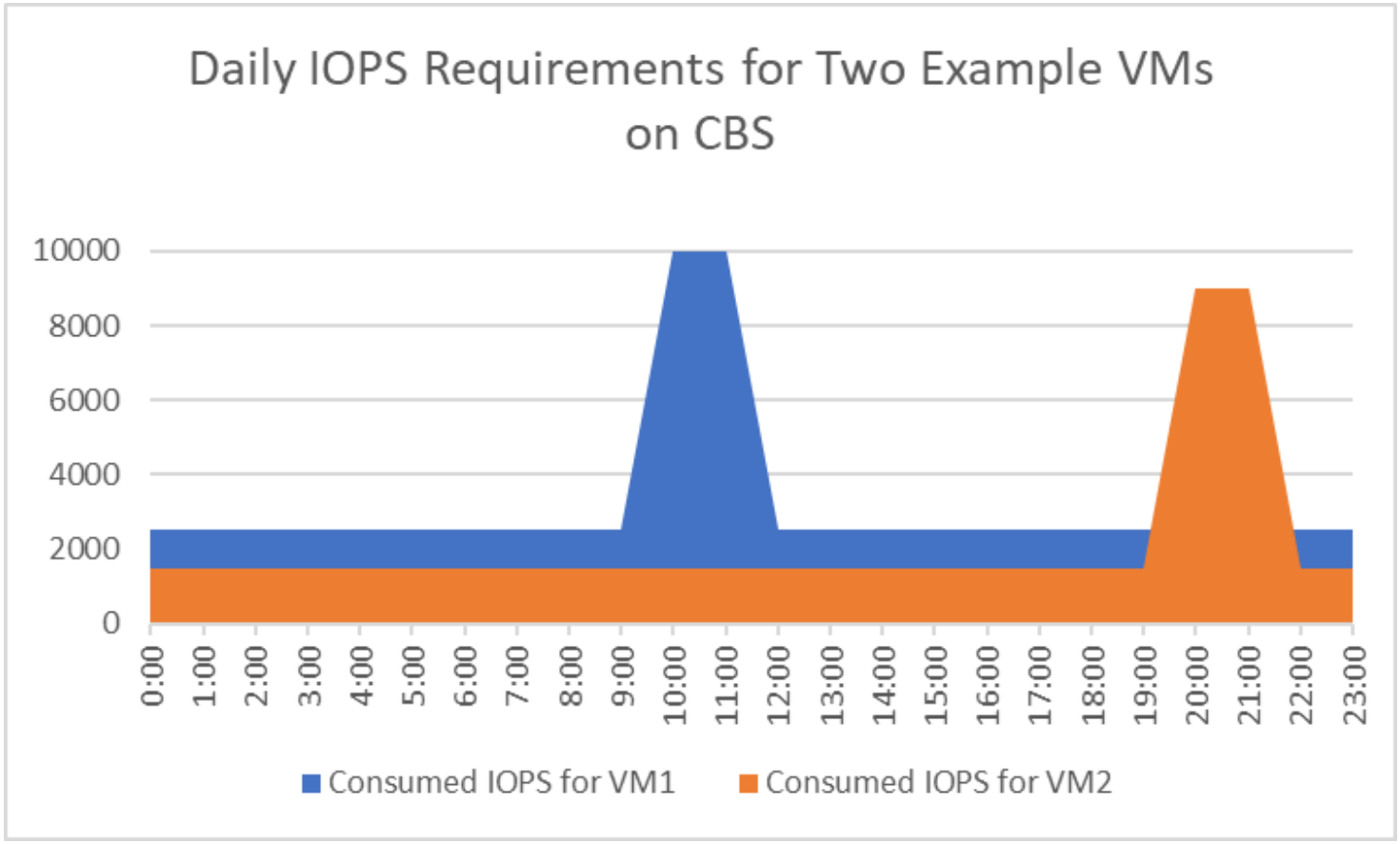


Monthly Cost							
	Provisioned Capacity (GiB)	Capacity Cost	Provisioned IOPS	IOPS Cost	Provisioned BW (MB/s)	BW Cost	Total Cost
VM1 12 TB Ultra SSD Tier	11175.84	$ 1,337.97	20,000	$ 992.80	1,000	$ 349.67	$ 2,680.44
VM2 8 TB Ultra SSD Tier	7450.58	$ 891.98	18,000	$ 893.52	1,000	$ 349.67	$ 2,135.17

Monthly Surplus		
Unused IOPS	Unused Bandwidth	Wasted Spend
67%	67%	$ 899.45
74%	74%	$ 919.96
	Total Wasted Spend	$ 1,819.41

Optimizing IOPS at Scale

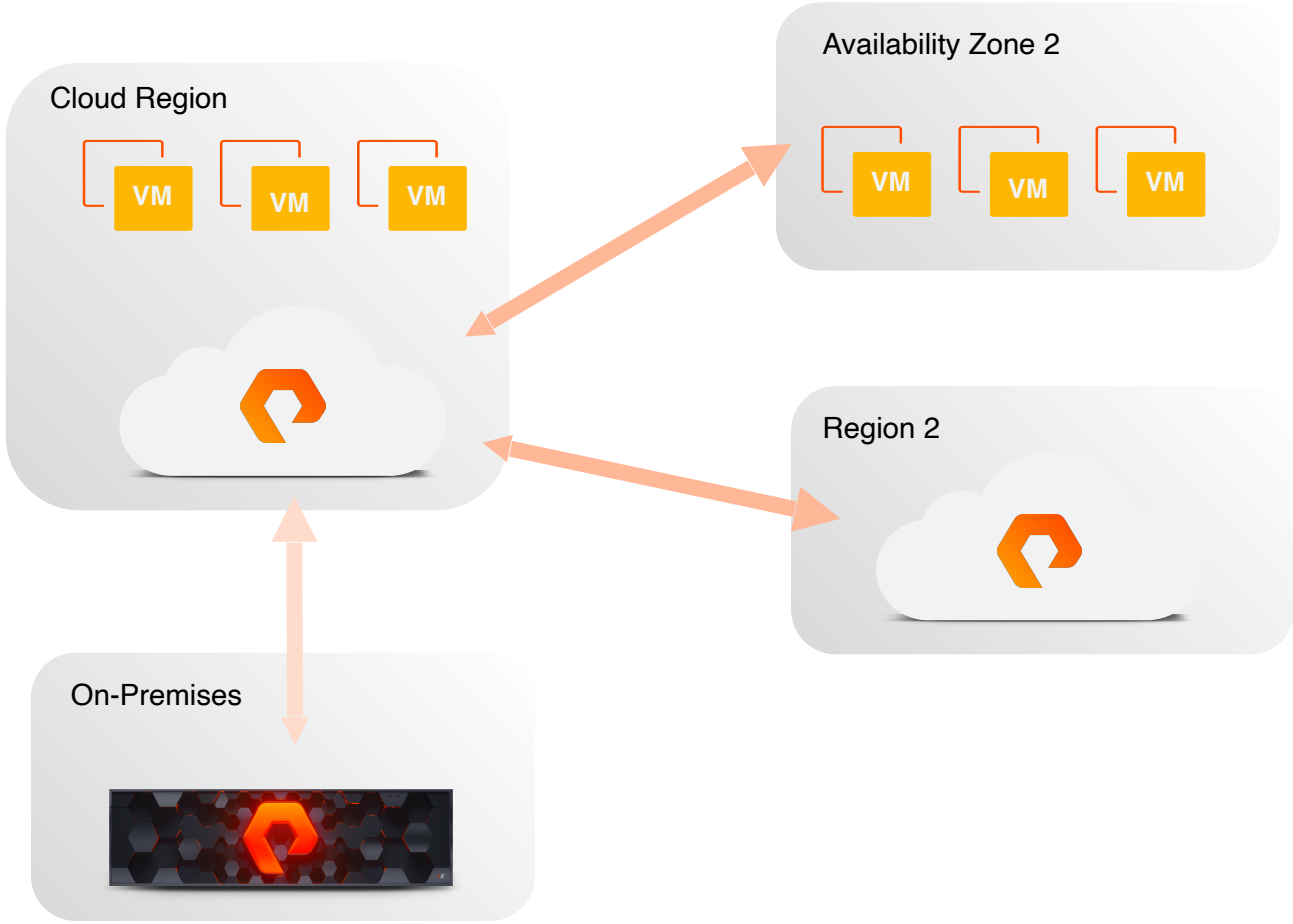
- Coalesces write IOPS across different workloads
- In this scenario - 2 VM's reduced peak and steady-state IOPS to half
- Connect one VM or many VMs to CBS
- 100% of array performance is available to any given workload
- Volumes can optionally be added to Volume Groups which enable QoS to be set for IOPS and/or Bandwidth to ensure workload fairness



Ingress / Egress Charges from Data Mobility

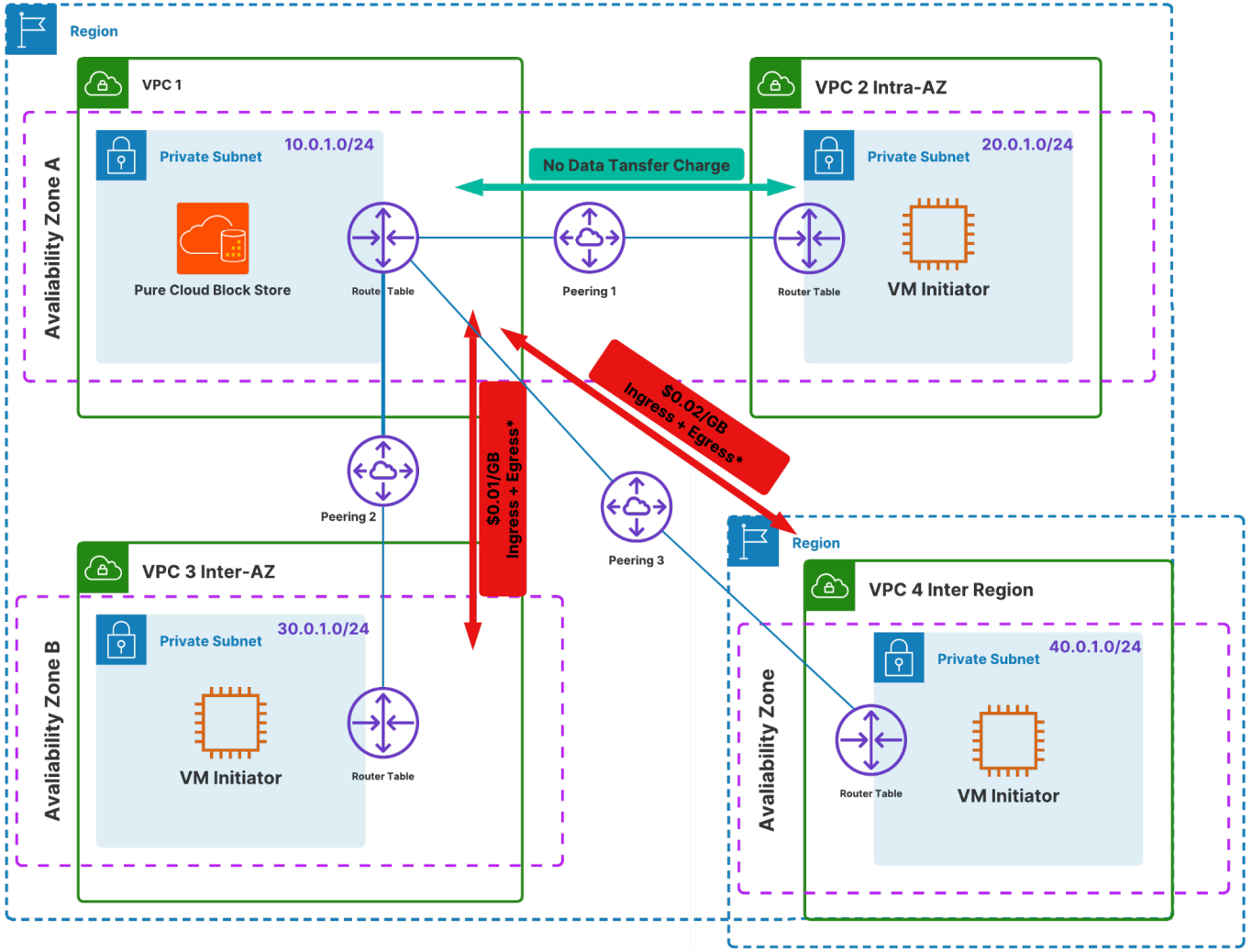
Moving data in the cloud isn't always free

- Both AWS and Azure can charge on both sides of a data migration depending on situation
- Managing cost requires knowing the nuances of each scenario
- Minimize the impact with data reduction



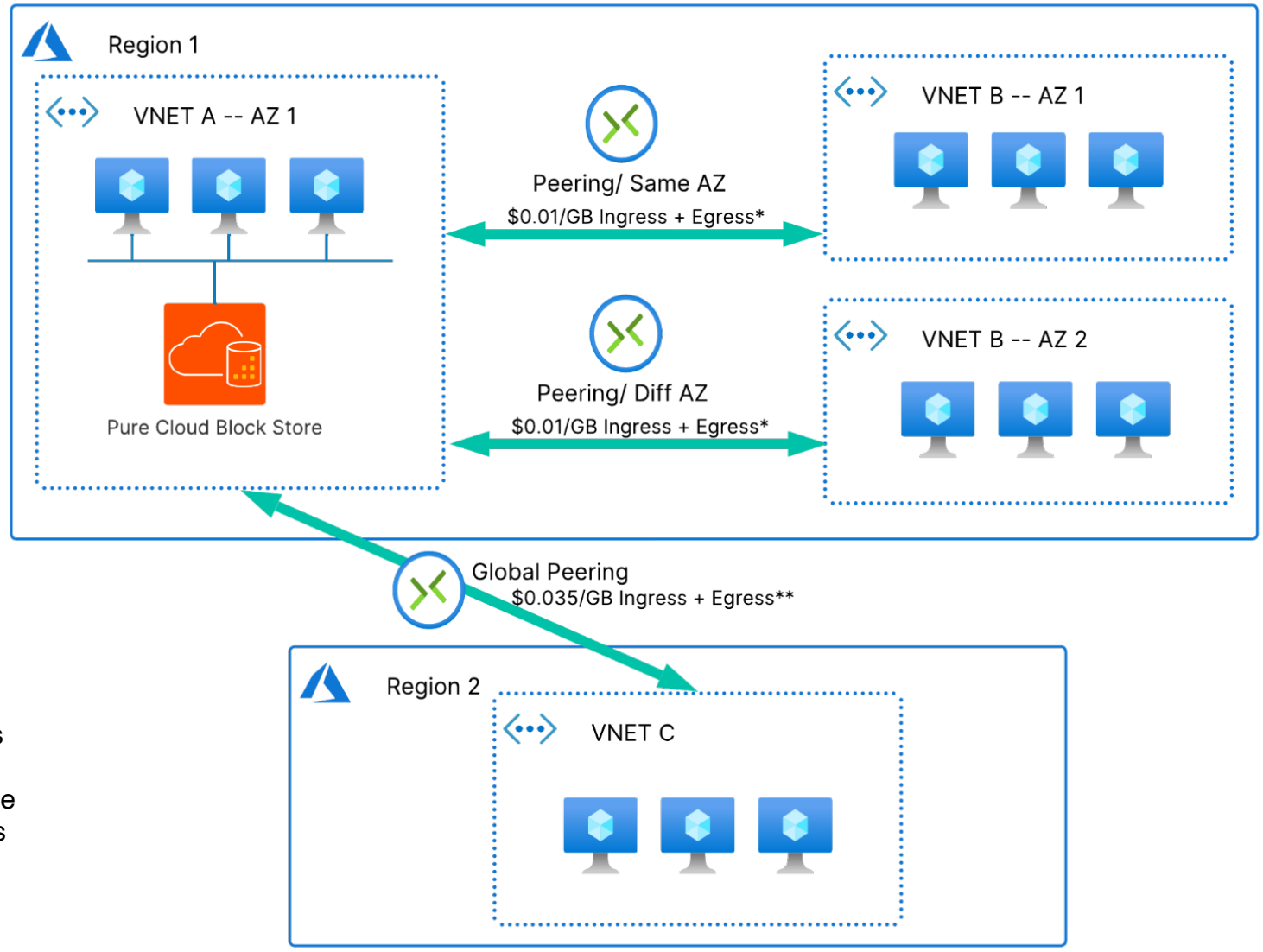
*In AWS, there is no transit cost as long as VPCs are in the same availability zone

Transferring Data in AWS - VPC Peering



* As of 04-05-2022. Prices subject to change.

Transferring Data in Azure - VNET Peering

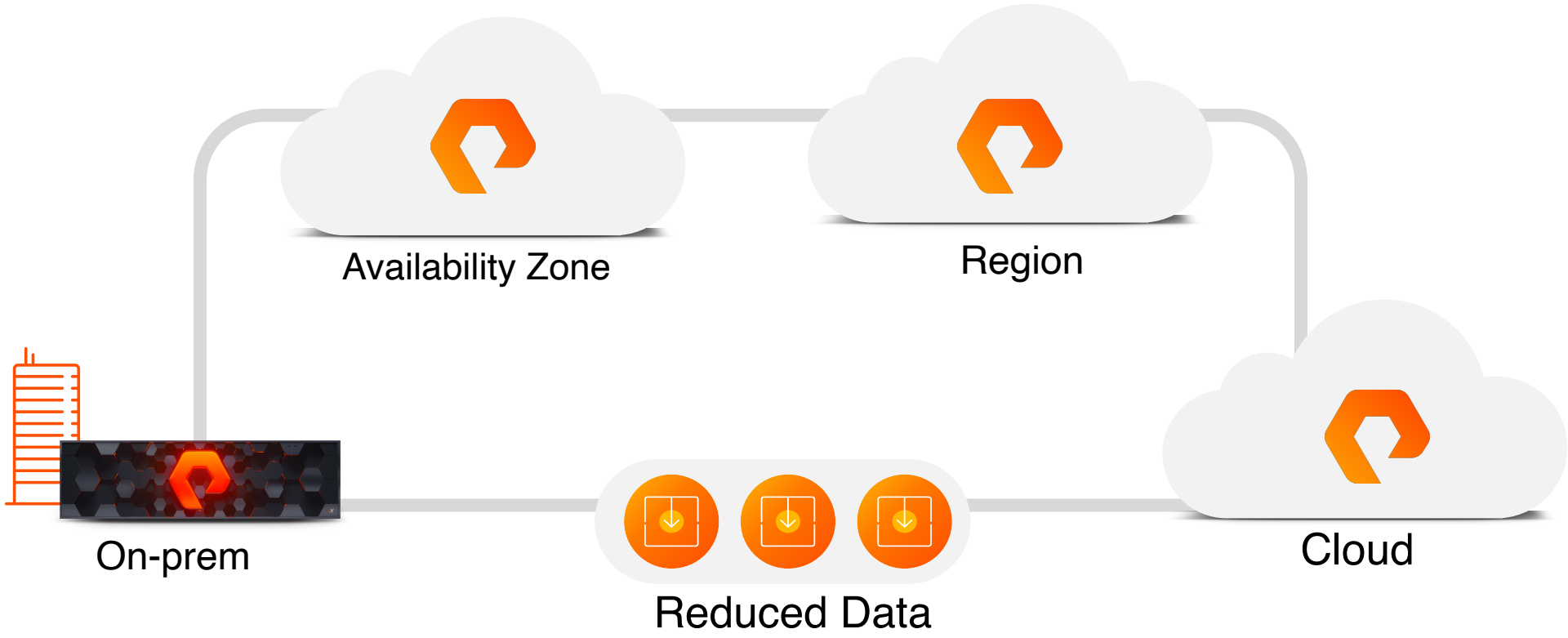


* As of 04-05-2022. Prices subject to change.
** Global Peering prices are based on diff, region zones

Optimizing Replication Reduces Bandwidth

Preserve data compression and deduplication when transferring between Pure products

- The storage footprint is reduced, lowering Cloud costs
- Data transfer costs and network utilization are minimized
- Replication times are shorter



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Flexible Disaster Recovery

Expand your portfolio of options

Enterprise Data Services Powering DR

Available on FlashArray, available on Cloud Block Store

ActiveCluster™

Active-Active stretch clustering between cloud availability zones or your on-prem hardware

ActiveDR™

Use the cloud rather than a second datacenter to run operations on incident

Asynchronous Replication

Use less cloud storage infrastructure with industry-leading deduplication and compression

CloudSnap™

Offload snapshots to the cloud for cost efficiency and free up capacity on your on-prem hardware

Solutions for Various DR Scenarios

Pick the solution that matches your business objectives

Business Continuity	ActiveCluster™	Campus or Metro Region
Disaster Recovery	ActiveDR™	Virtually Any Distance or cloud
Near-Term Recovery	Async Replication	Any Distance or Cloud
Long-Term Archive	CloudSnap™	Any Distance or Cloud

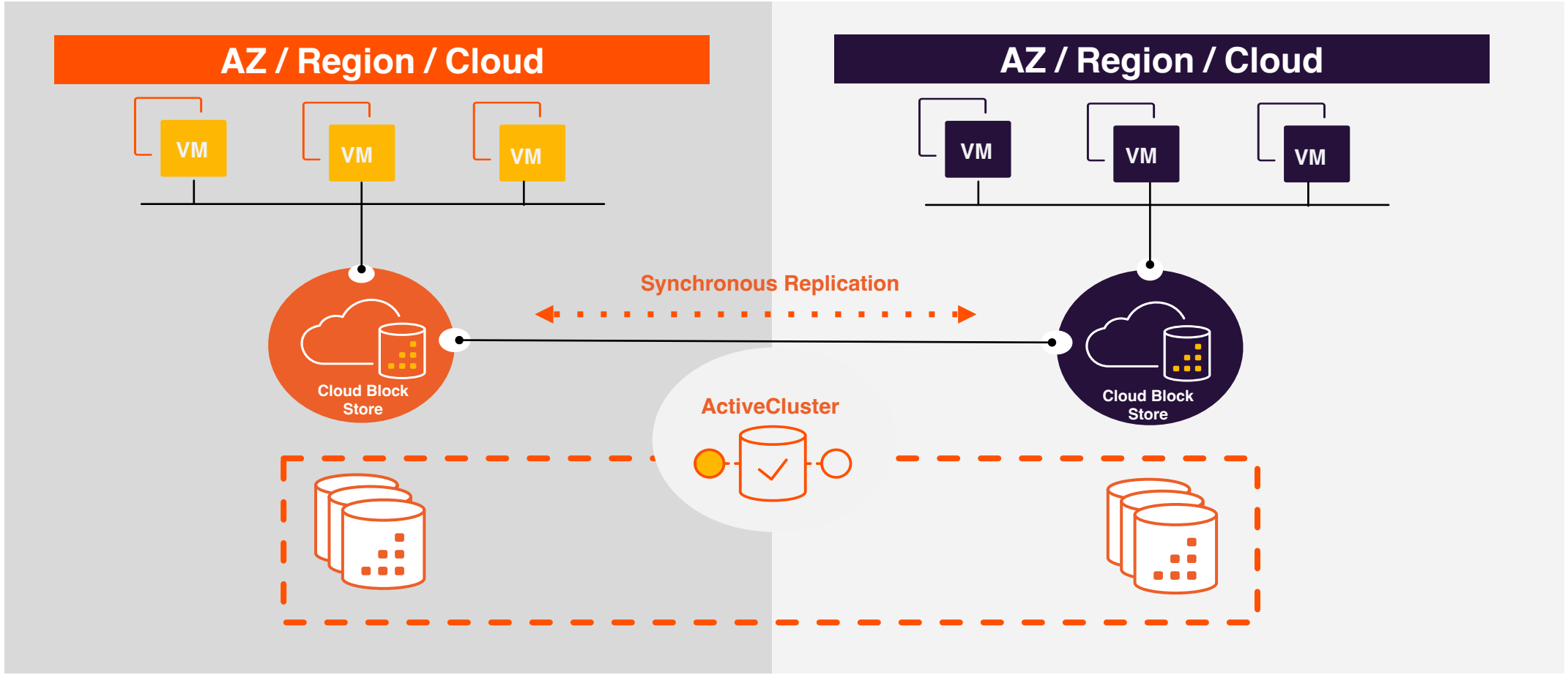
Simplicity When and Where It's Needed

See the impact of each cloud DR solution, before and after an incident

Solution	Setup Complexity	Recovery Complexity	RPO	Total Cost	Objective
CloudSnap + Recovery Steps	Low	High	High (Hours)	$ (blob /S3) No CBS running continuously	Recover from backup Lowest RPO/RTO Manual steps involved
Async Replication	Low	Medium	Low to High (Minutes)	$$ / $$$ CBS running continuously (compute, VM)	Warm DR site, ready to go, Manual steps involved
ActiveDR / Nearsync	Medium (Network speed between on-prem / cloud considerations)	Medium	Low (Seconds)	$$$ CBS running (storage + compute)	Continuous replication No replication schedule Manual steps involved
ActiveCluster	High	Low	Low (Instant)	$$$$ 2x CBS running, On-prem to cloud constrained by latency	Cloud-to-cloud Zero RPO/RTO Fully automated

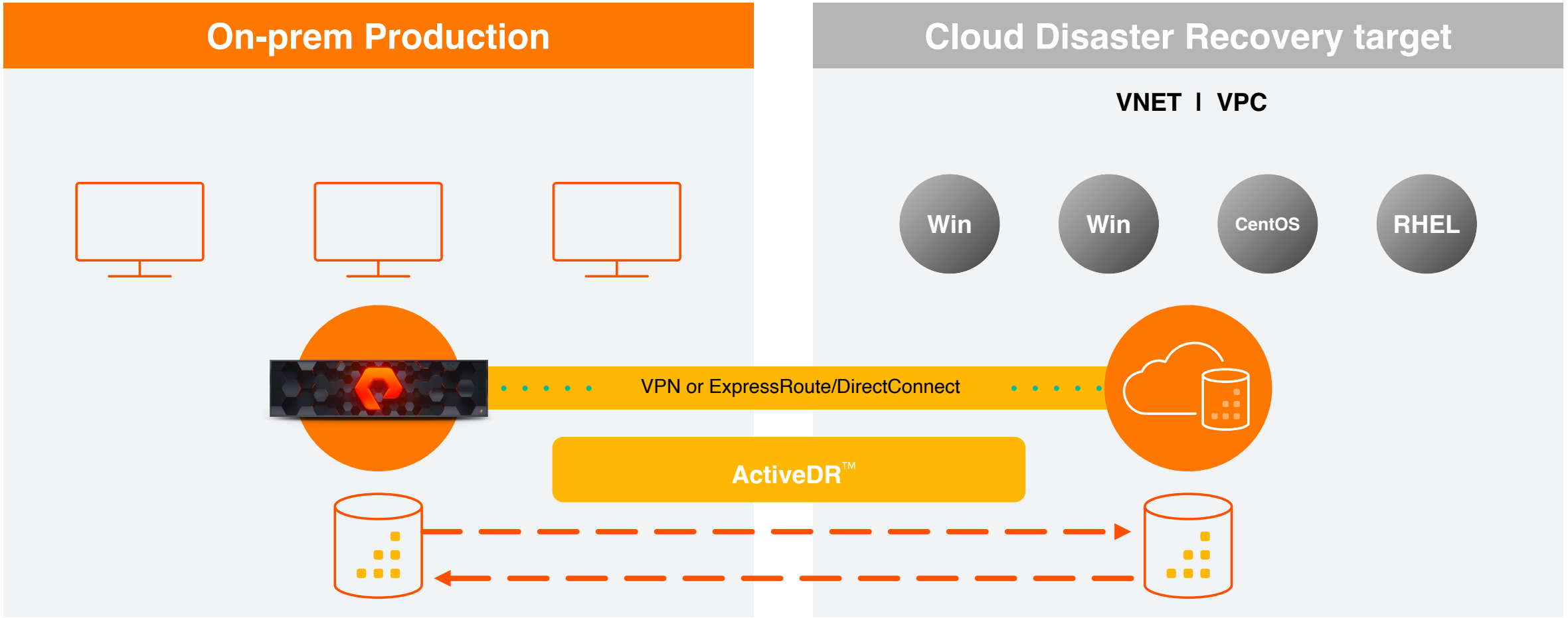
Business Continuity with ActiveCluster

Storage Metro Cluster with Pure ActiveCluster™



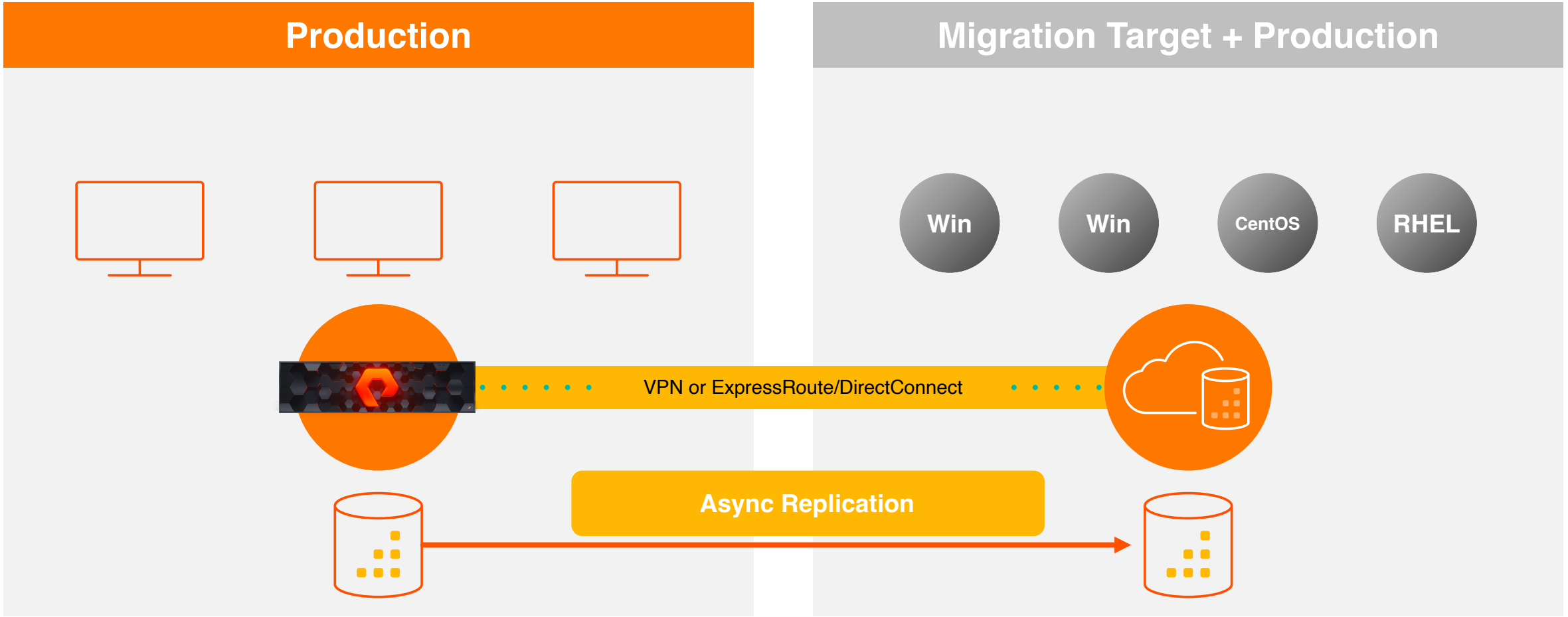
Disaster Recovery with Continuous Replication

Enable seamless failover and failback with ActiveDR™



Near Term Recovery With Scheduled Replication

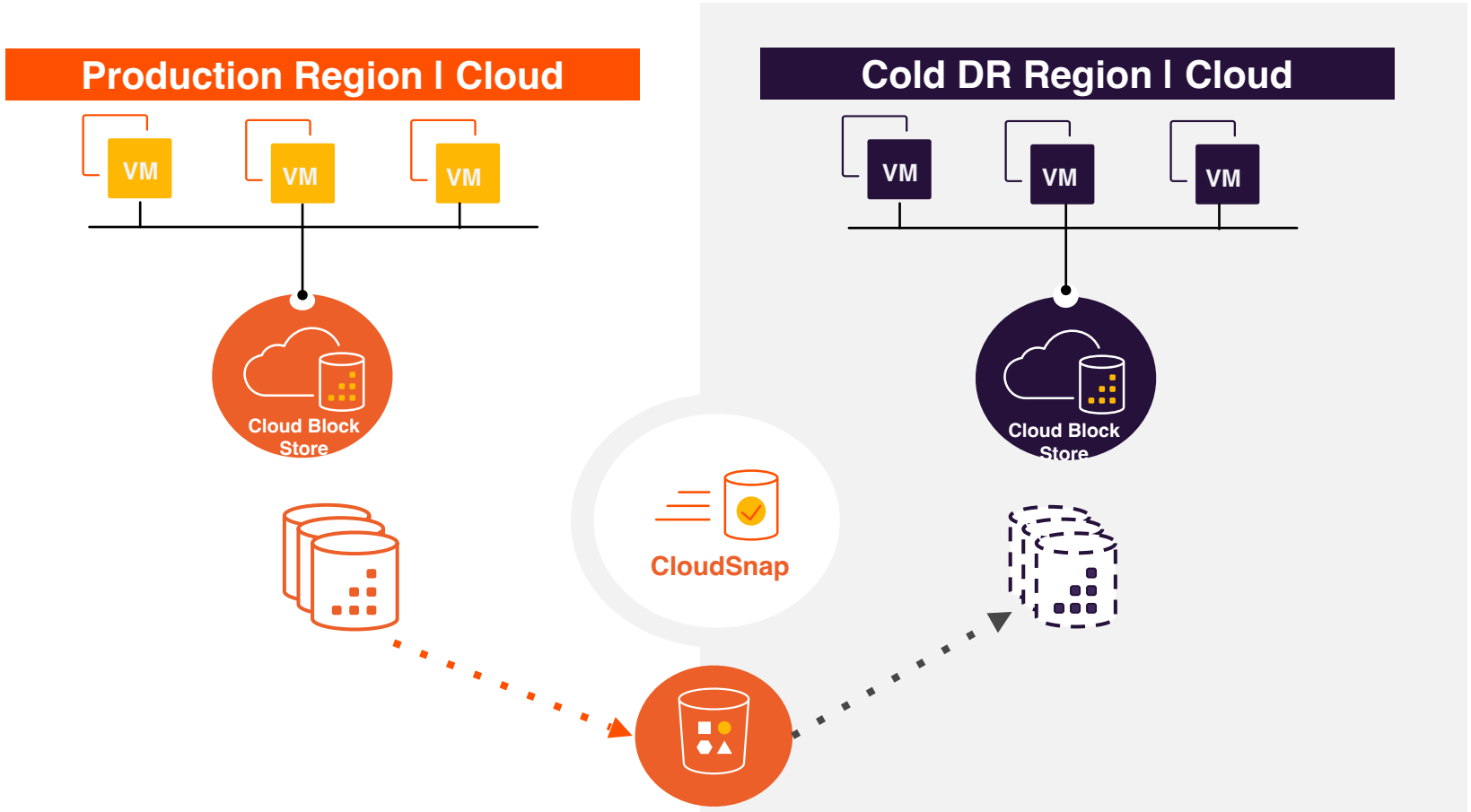
Customizable to meet business needs



Low-Cost Archive Targets or Cold DR

Natively move snapshots to the cloud for backup & compliance

- Offload snapshots to Azure Blob or Amazon S3
- Low cost archive target for long term retention
- On-demand Cold Disaster Recovery
- Built-in feature, requires no additional licenses or plugins



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Fast, Scalable Environments for Dev/Test and Analytics

Take advantage of the scalability of the cloud

Hybrid Cloud Capabilities Included with FlashArray

Deploy and tear down environments from your FlashArray to the public cloud

FlashArray

Production workloads that need to be replicated for dev/test running on-prem

Purity

FlashArray and Cloud Block Store both run the same Purity operating environment

Snapshots & Clones

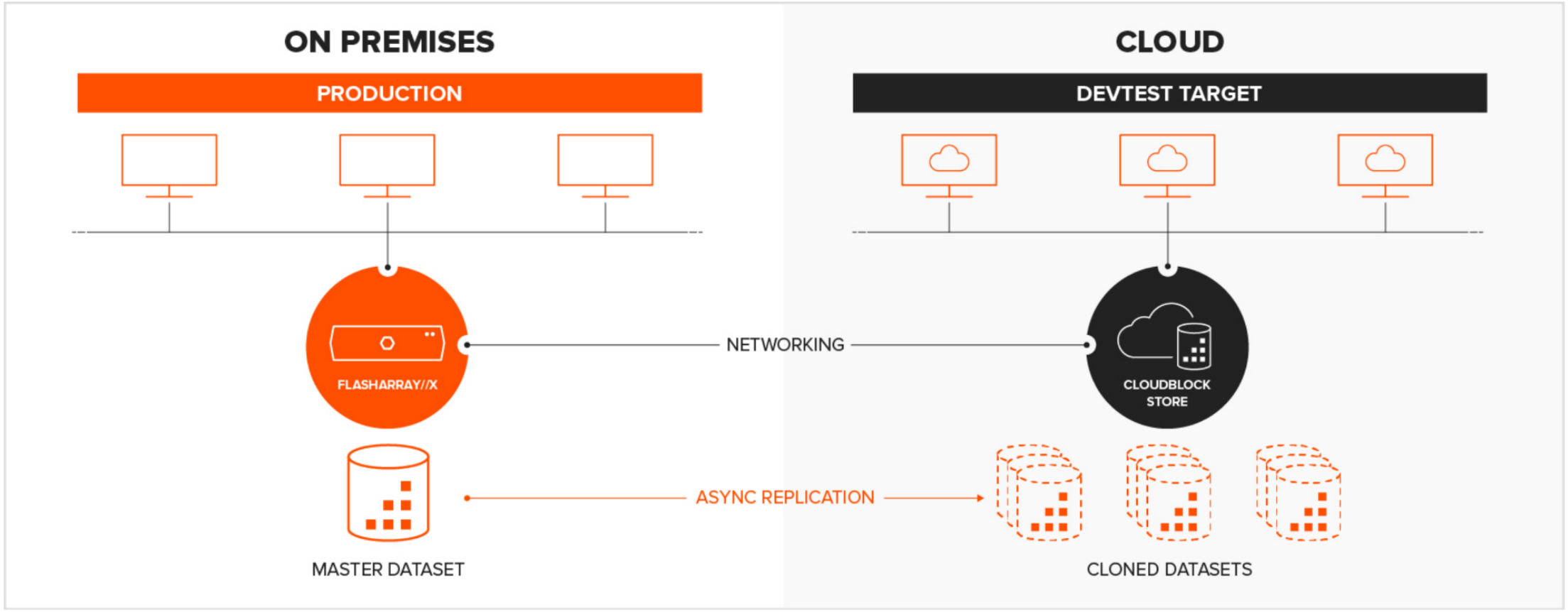
Snapshots are immutable, space efficient, and can be instantaneously converted into volumes

Asynchronous Replication

Ensure that fresh production environments are always available and automatically overwrite old volumes for deployments

Dev/Test and Business Analytics at Scale

Replicate datasets instantaneously with near zero cost



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Data Migration Made Easy

Data mobility powered by Purity

Seamless Data Migration Made Possible With Purity

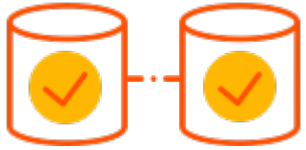
Seamless Data Migration Made Possible With Purity

FlashArray

Production workloads running on-prem to lift + shift to the cloud

Purity

FlashArray and Cloud Block Store both run the same Purity operating environment



Asynchronous Replication

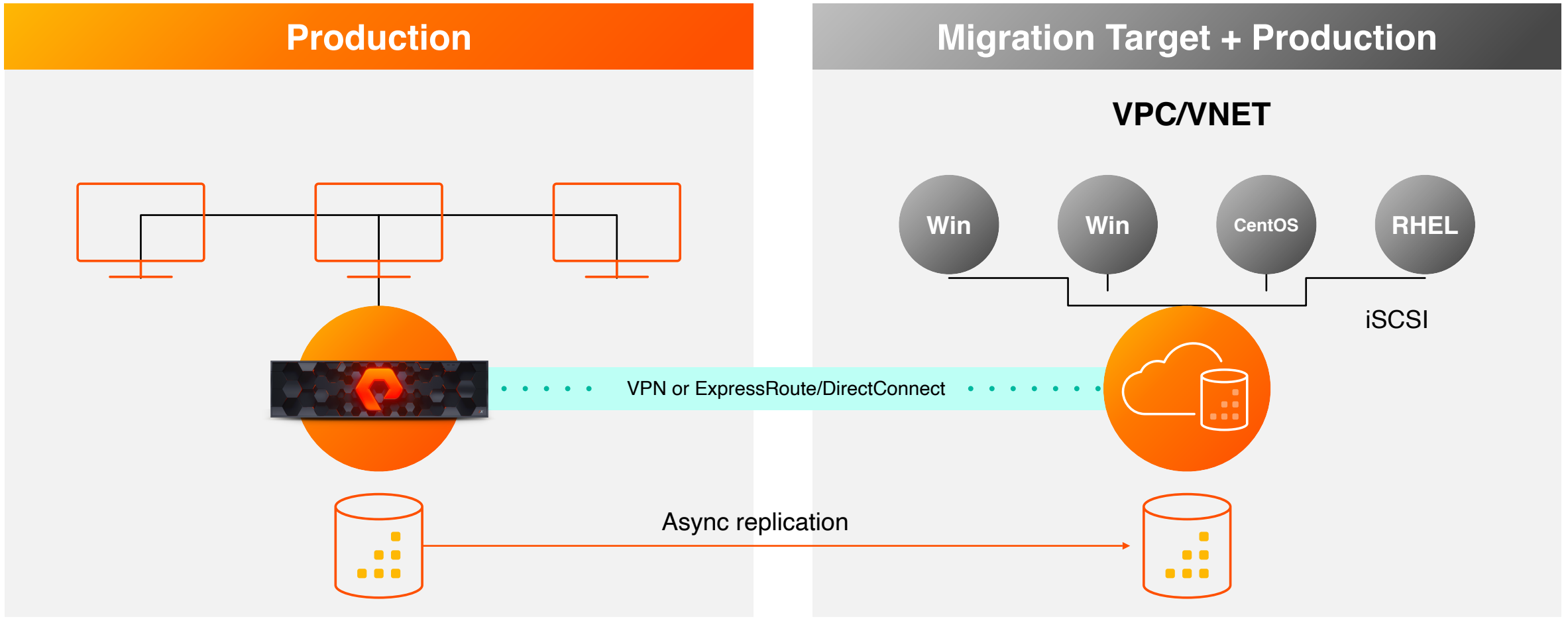
Copy snapshots to an active volume for use

ActiveCluster™

Upgrade non-disruptively among CBS instances with ActiveCluster

Lift + Shift Migration to AWS or Azure

Something here



AWS Migration Service Support

AWS Migration Services migrate and convert VMware VMs to the clouds by only including the boot/OS volumes. The migration steps are easy to follow, cost-effective, with minimal downtime.

Detailed Walkthroughs, Videos, and More

AWS Server Migration Service

AWS Database Migration Service

AWS Application Migration Service

AWS Migration Services

Agentless service to migrate virtual-only workloads from on-premises infrastructure or elsewhere to AWS

https://aws.amazon.com/application-migration-service/when-to-choose-aws-mgn/

Azure Migrate and Site Recovery Support

Detailed Walkthroughs, Videos, More

Microsoft Azure Site Recovery

Site Recovery replicates workloads running on physical and virtual machines (VMs) from a primary site to a secondary location.

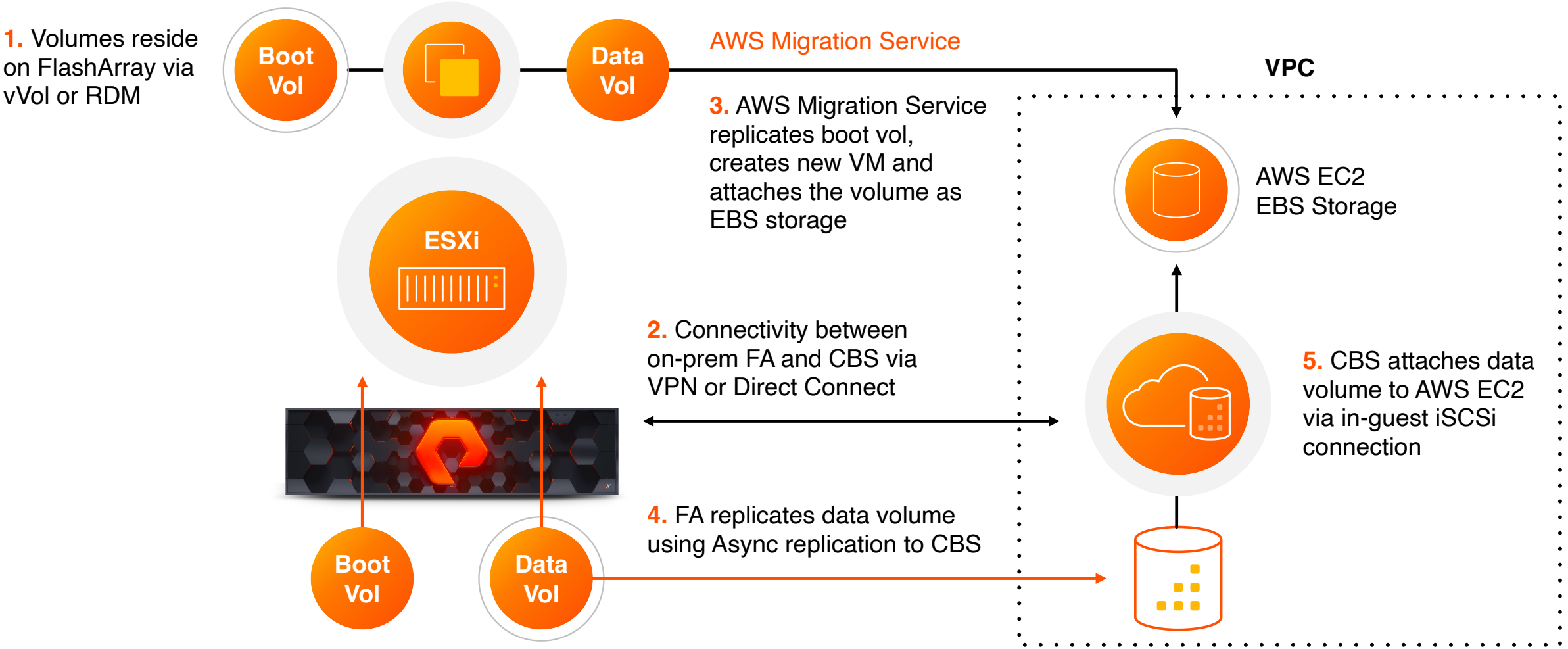
Azure Migrate

Azure Migrate is agentless based tool which provides a centralized hub for discovery, assessment and migration.

Azure Migrate and Azure Site Recovery convert VMware VMs to the clouds by only including the boot/OS volumes. The migration steps are easy to follow, cost-effective, with minimal downtime.

Example Migration to AWS

Leverage AWS Migration Service and Pure Asynchronous replication



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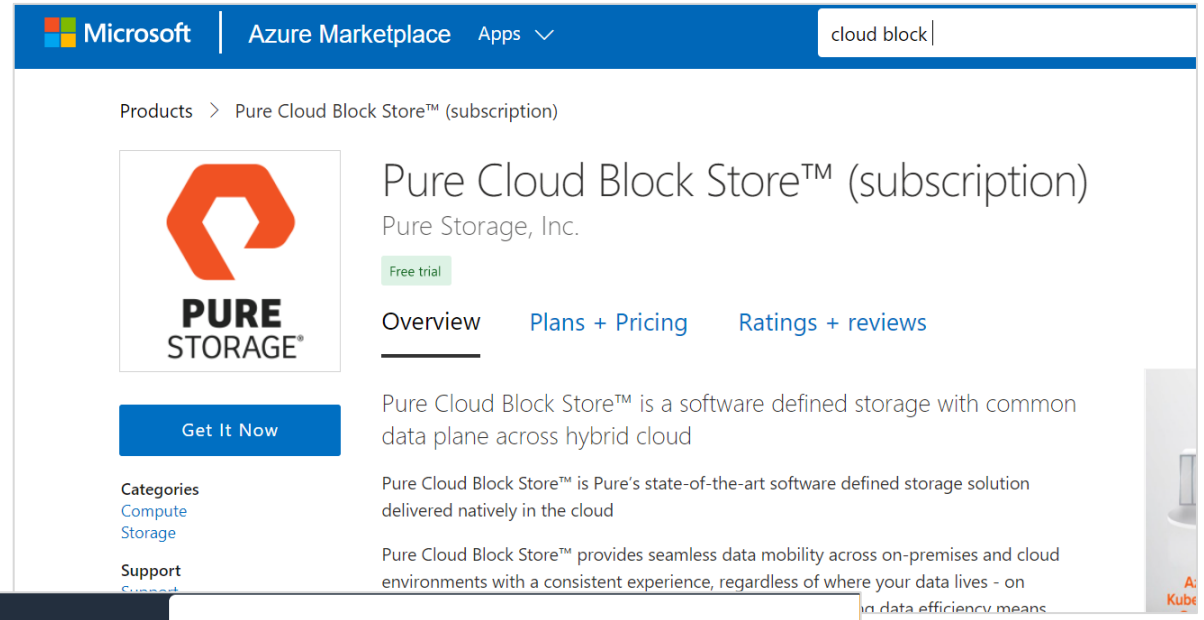
Next Steps

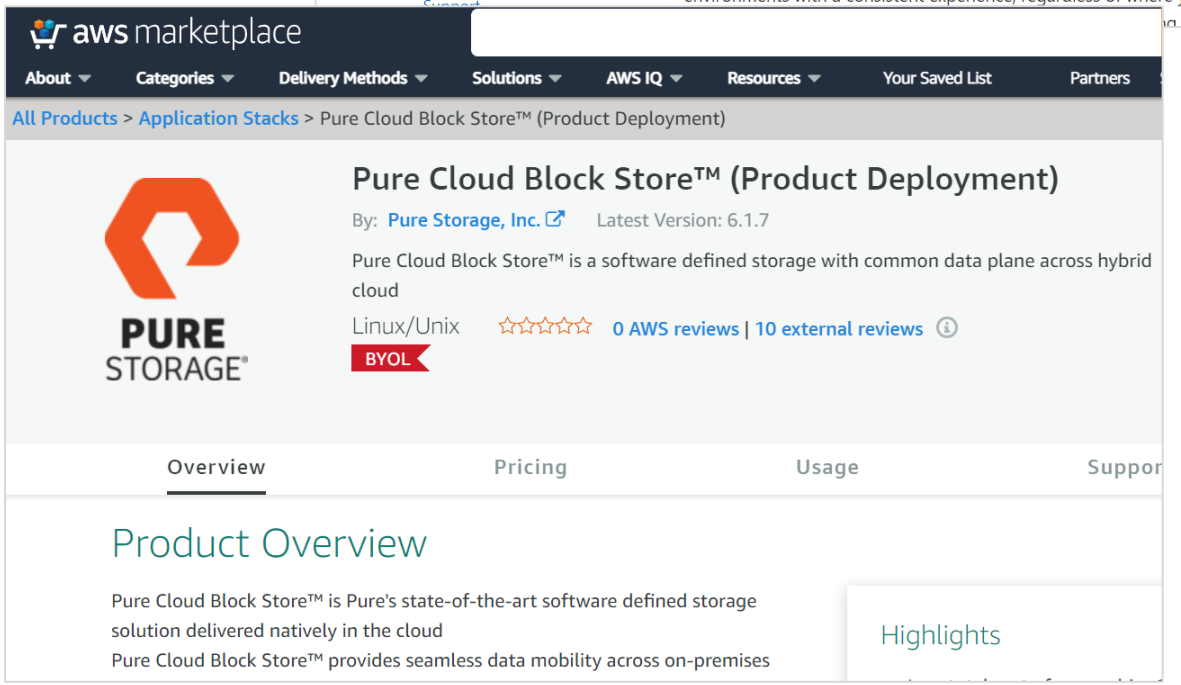
Free Trials, Deployment, and More Information

Pure Cloud Block Store POC

Free Trial License

- Trial License for POCs
- Deploy using Azure/AWS Marketplace
- Only Pay for Underlying Cloud Infrastructure





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Learn More About Pure Cloud Block Store