vSAN 7.x

A new platform for the Developer, the Kubernetes Admin, and the vSphere Admin

Part 3 – The vSphere Admin

Duncan Epping

Chief Technologist

Cloud Platform - VMware

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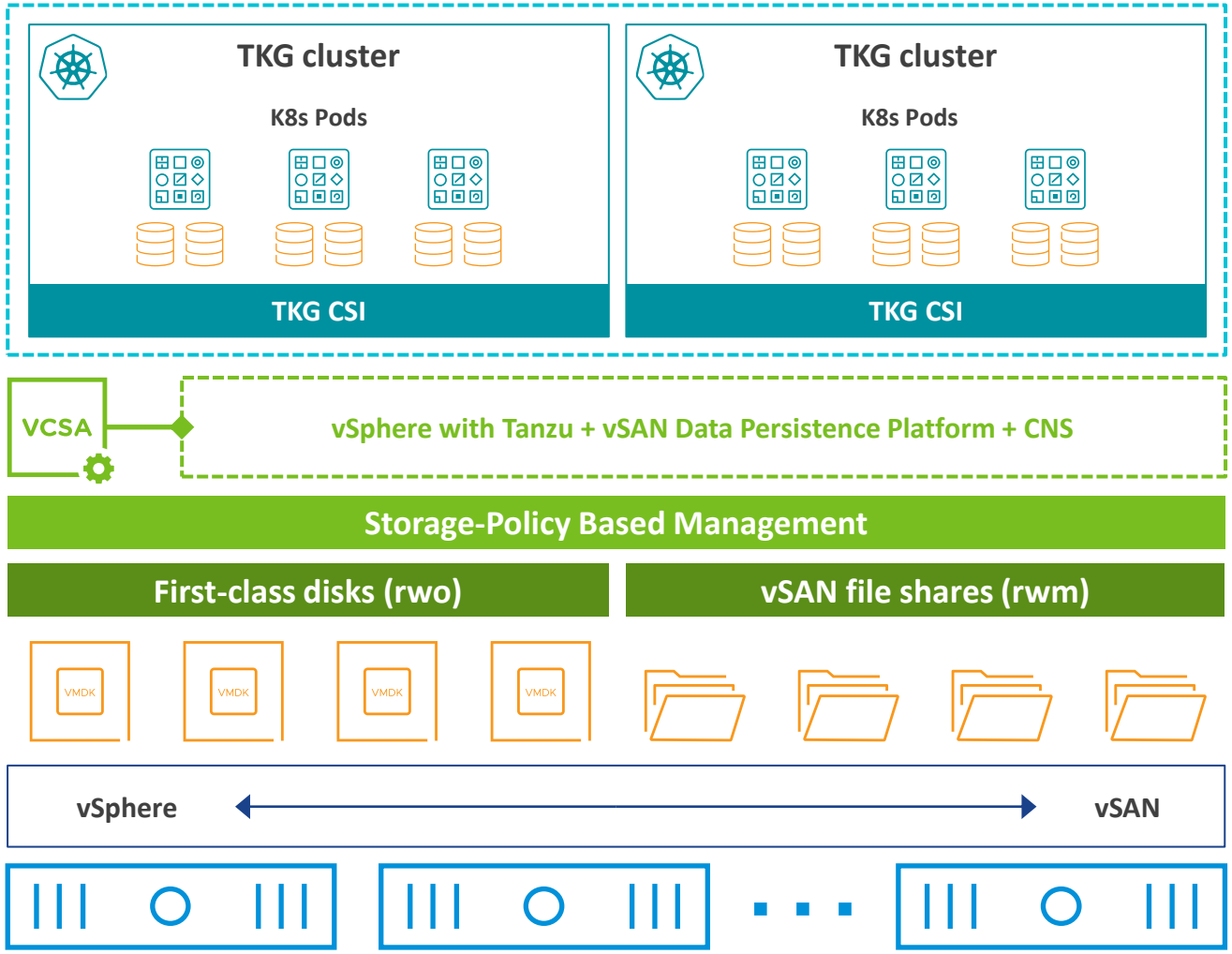
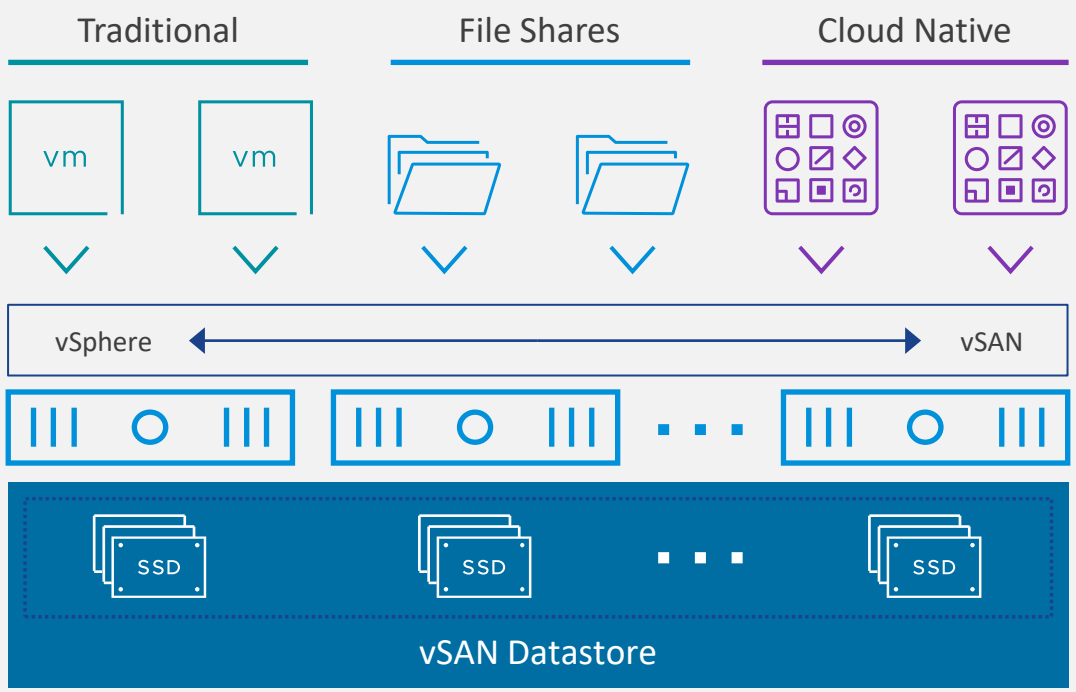
There are three layers!



Enterprise Storage in a Native vSphere Architecture

VMware vSAN



Enterprise Storage **Integrated** into hypervisor

Aggregates storage devices into single **cluster-wide shared datastore**

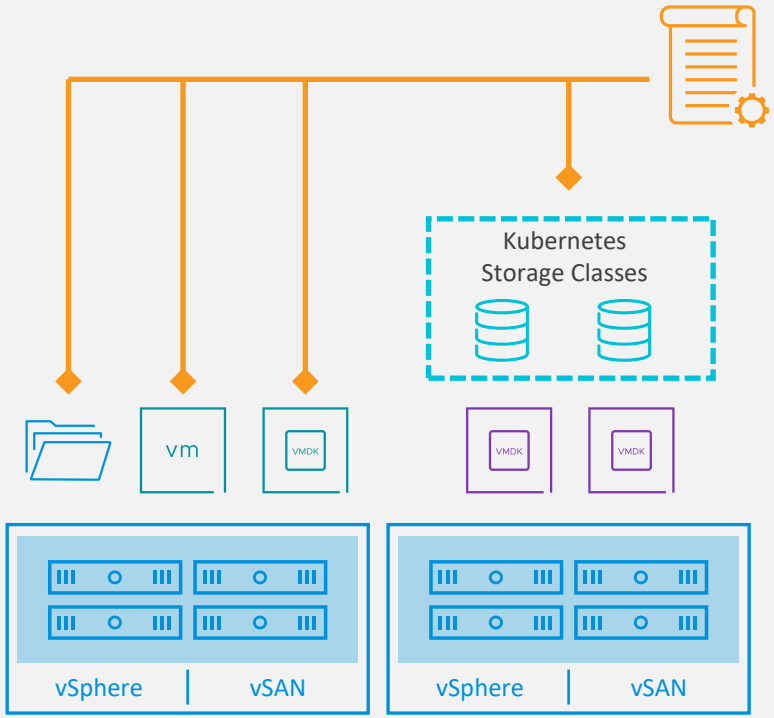
Easily scalable

Managed through storage policies in vCenter Server

Run business-critical traditional and **Cloud-Native** apps!

Deliver Performance and Protection Based on Application Needs

Granular storage policy based management (SPBM)



Storage Policy Definition

Policy Rules	Value
Site Disaster Tolerance	None – Standard Cluster
Failures to Tolerate	1 Failure – RAID-5 (Erasure Coding)
Number of disk stripes per object	1
IOPS Limits	1000

Define storage protection and performance **outcomes**

Assign policy to:

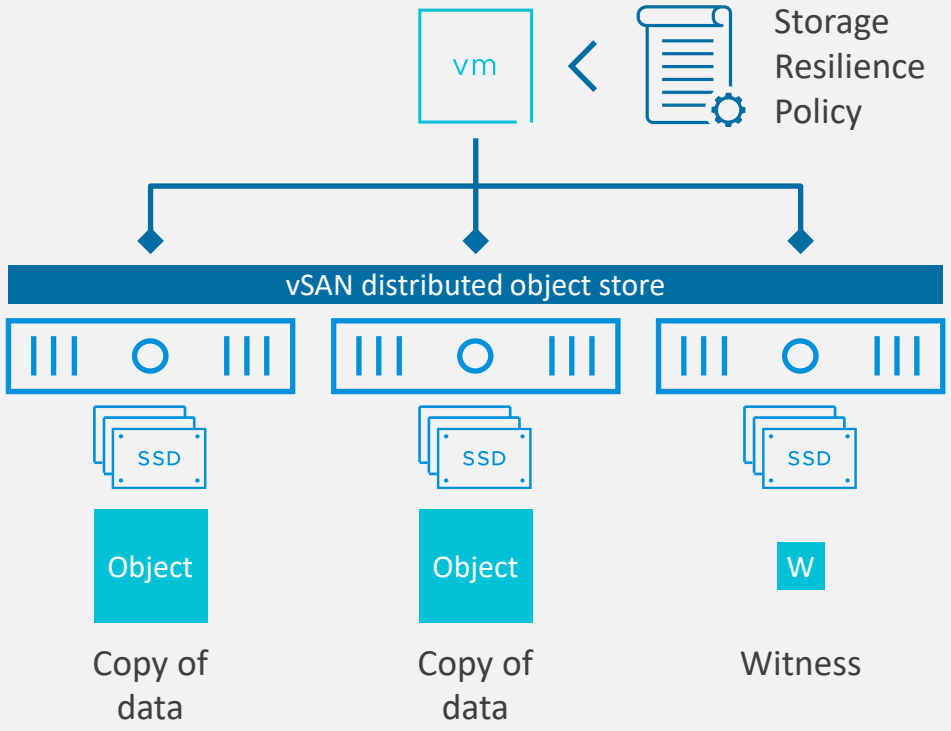
- Many VMs
- Single VM
- VMDK of VM
- First-class disks for container persistent volumes
- File share served by vSAN file services

Managed in vCenter Server

Simple and **scalable**

Modern Object-Based Storage for vSphere

vSAN's method to store and ensure resilience of data



VM is comprised of **objects**

Object data is distributed across hosts to ensure resilience. Can use:

- RAID-1 mirroring
- RAID-5/6 erasure coding

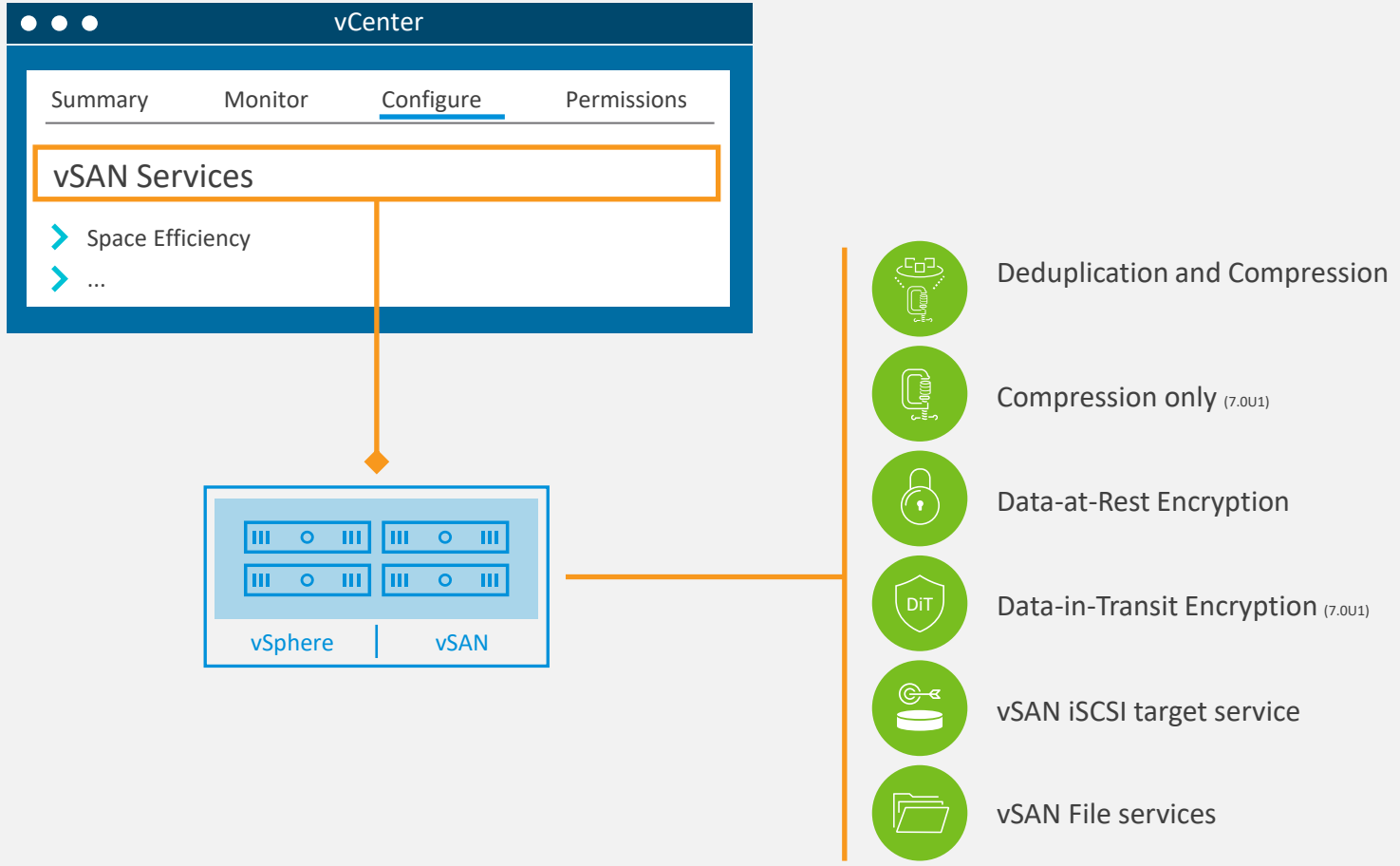
Resilience & placement defined by a **storage policy**

Storage policy can be applied to:

- Many VMs
- Single VM
- Single VMDK

Easy Configuration of Data Services

Per-cluster data services easily tailored to meet needs of the organization



Enable/disable based on **organizational needs**

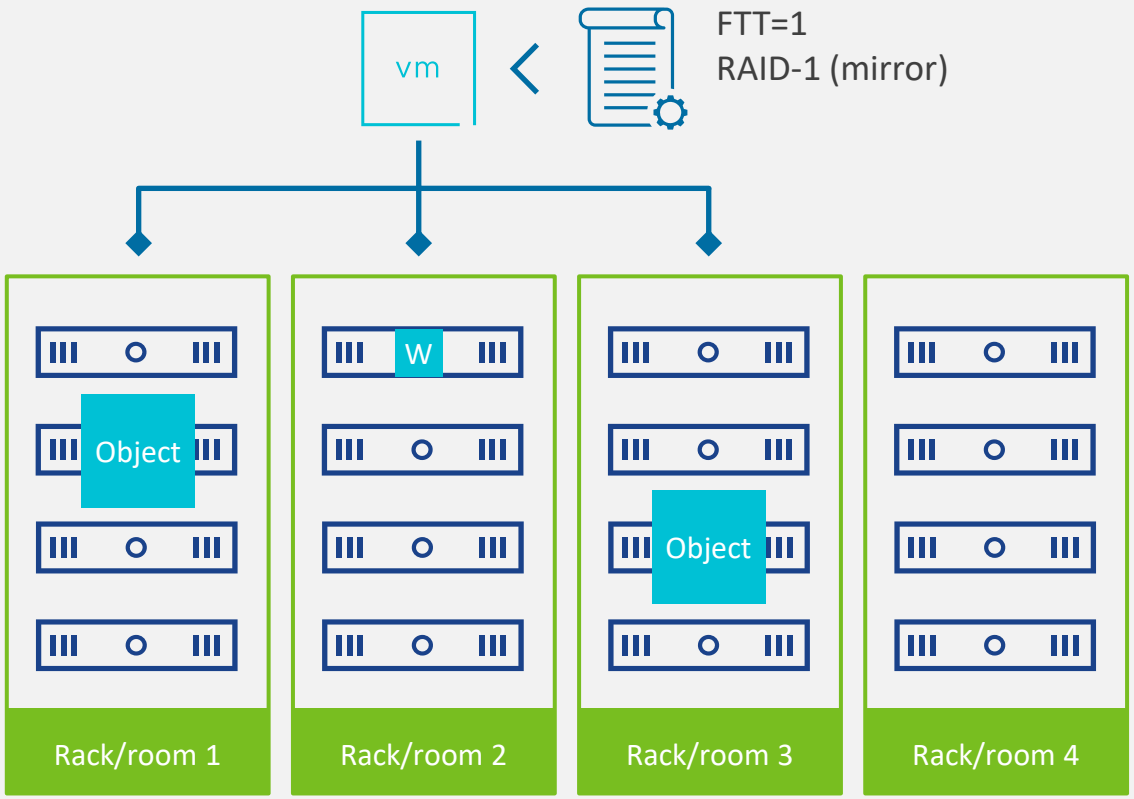
Flexibility through **per cluster** settings

- Space Efficiency
  - Deduplication & Compression
  - Compression only
- Data-at-Rest Encryption
- Data-in-Transit Encryption
- iSCSI target service
- File services

Simplifies initial design and ongoing operations

Provide Awareness of Topology and Rack Designs

vSAN custom fault domains



Create **explicit** fault domains in **cluster configuration** to increase availability

Ensures object replicas do NOT live in the same fault domain as first copy

Most common use is for **rack-level resilience**

Automatically manages data placement to adhere to:

- Assigned storage policy
- Fault domain configuration

DEMO
vSAN Cluster Creation

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vSphere Client | Menu | Search in all environments | Administrator@VSPHERE.LOCAL

- sc2-10-186-61-195.eng.vmware.com
  - Datacenter
    - 10.186.48.178 (Maintenance Mode)
    - 10.186.48.215 (Maintenance Mode)
    - 10.186.54.193 (Maintenance Mode)
    - 10.186.54.58 (Maintenance Mode)
    - 10.186.58.73

Datacenter

ACTIONS

Summary | Monitor | Configure | Permissions | Hosts & Clusters | VMs | Datastores | Networks | Updates

Hosts:	5
Virtual Machines:	0
Clusters:	0
Networks:	1
Datastores:	0

CPU — Free: 37.81 GHz — Used: 4.09 GHz — Capacity: 41.9 GHz

Memory — Free: 163.63 GB — Used: 36.35 GB — Capacity: 199.98 GB

Storage — Free: 0 B — Used: 0 B — Capacity: 0 B

Custom Attributes

Attribute	Value
No items to display	

Edit...

Tags

Assigned Tag	Category	Description
No items to display		

Assign... Remove...

Recent Tasks | Alarms

Task Name	Target	Status	Details	Initiator	Queued F	Start Time	Completion Time	Server

No items found

Running | More Tasks

0 items

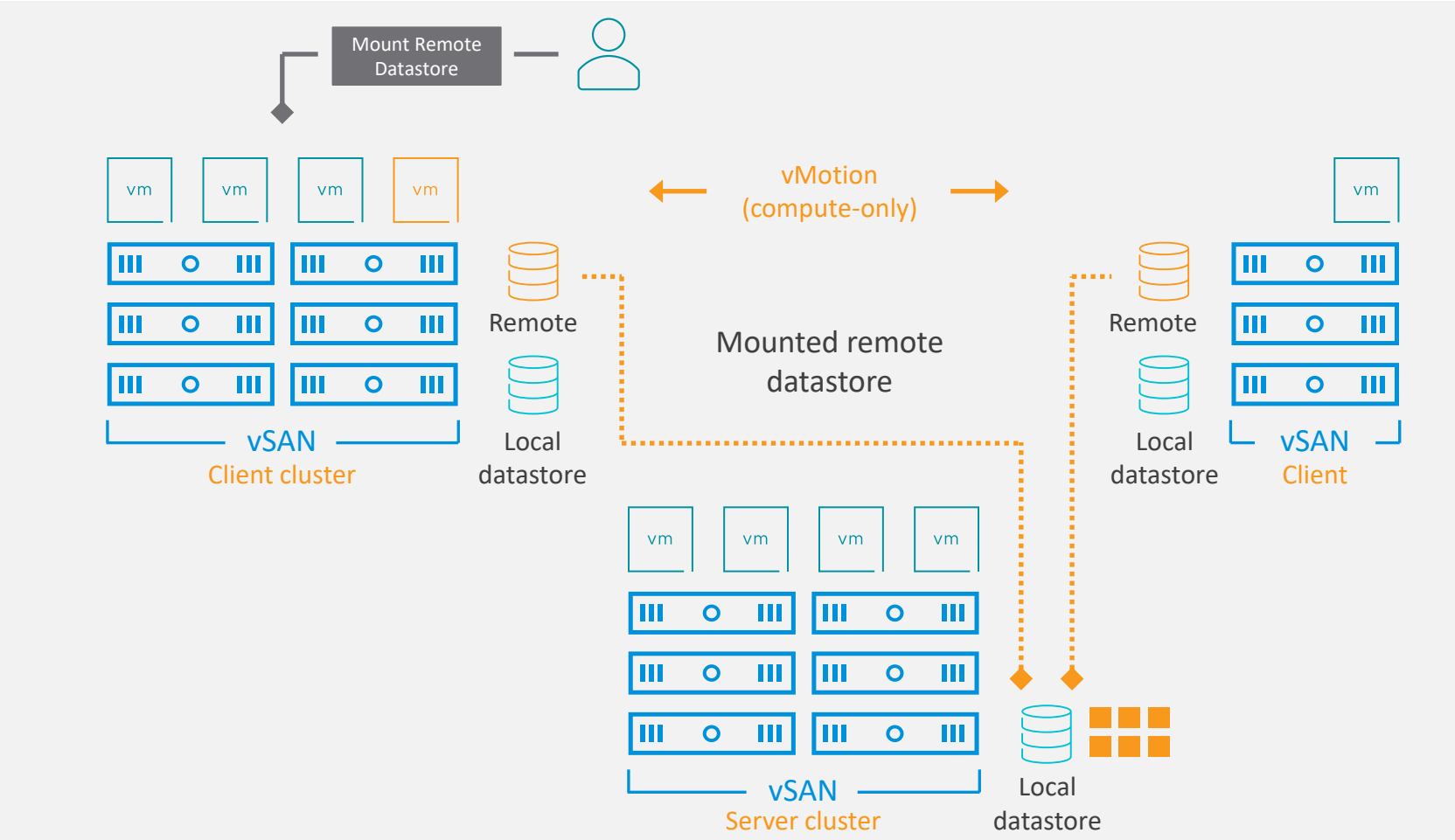
Scale Without Compromise

Accommodate growth through new topology offerings

Efficient Consumption of Storage Across vSAN Clusters

Software-based disaggregated hyperconverged using VMware HCI Mesh™

7.0 U1



Use **capacity across independent vSAN clusters**

Separate compute from storage for flexible provisioning

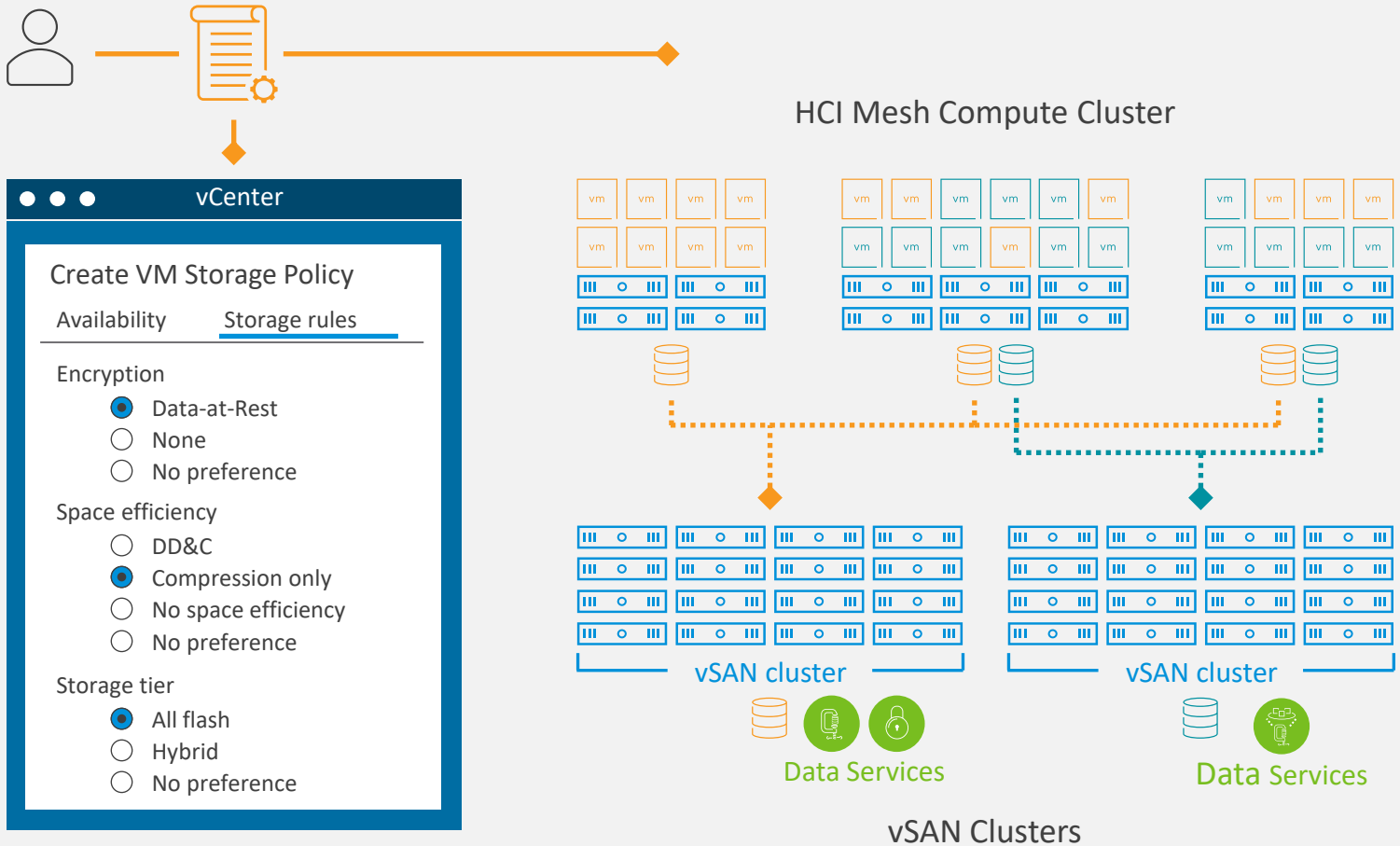
Uses **vSAN's native protocol** for efficiency and simplicity

Compliments vSAN's storage model by adding **flexibility**

Improved Flexibility and Scalability using Disaggregated HCI

Consume vSAN storage resources through HCI Mesh compute clusters

7.0 U2



Mount **remote vSAN** datastore from **non-vSAN based vSphere cluster**

Storage policy integrations with vSAN datastores

- DD&C or compression-only
- Data-at-rest encryption
- Hybrid or All-flash

No vSAN license needed for **HCI Mesh compute clusters**

DEMO
vSAN HCI Mesh

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vSphere Client | Menu | Search in all environments | Administrator@VSPHERE.LOCAL

- vcsa-duncan.eng.vmware.com
  - vSAN Datacenter
    - Compute Cluster
      - 10.161.167.9
      - 10.161.184.117
      - vSAN Cluster
        - w4-hs4-i1505.eng.vmware.com
        - w4-hs4-i1506.eng.vmware.com
        - w4-hs4-i1507.eng.vmware.com
        - w4-hs4-i1508.eng.vmware.com
      - openmanage
      - vcsa-duncan.eng.vmware.com

vSAN Cluster

ACTIONS

Summary | Monitor | Configure | Permissions | Hosts | VMs | Datastores | Networks | Updates

Total Processors: 160
Total vMotion Migrations: 0
Fault Domains:

CPU — Free: 333.81 GHz — Used: 1.39 GHz — Capacity: 335.2 GHz
Memory — Free: 1.86 TB — Used: 145.03 GB — Capacity: 2 TB
Storage — Free: 24.36 TB — Used: 1.48 TB — Capacity: 25.84 TB

Related Objects

Datacenter	vSAN Datacenter

vSphere HA

Cluster Services

Custom Attributes

Attribute	Value
com.vmware.vcenter.cluster.edrs.upgradeHostAdded	

1 items

Edit...

vSphere DRS

Cluster Consumers

Tags

Assigned Tag	Category	Description

No items to display

Assign... Remove...

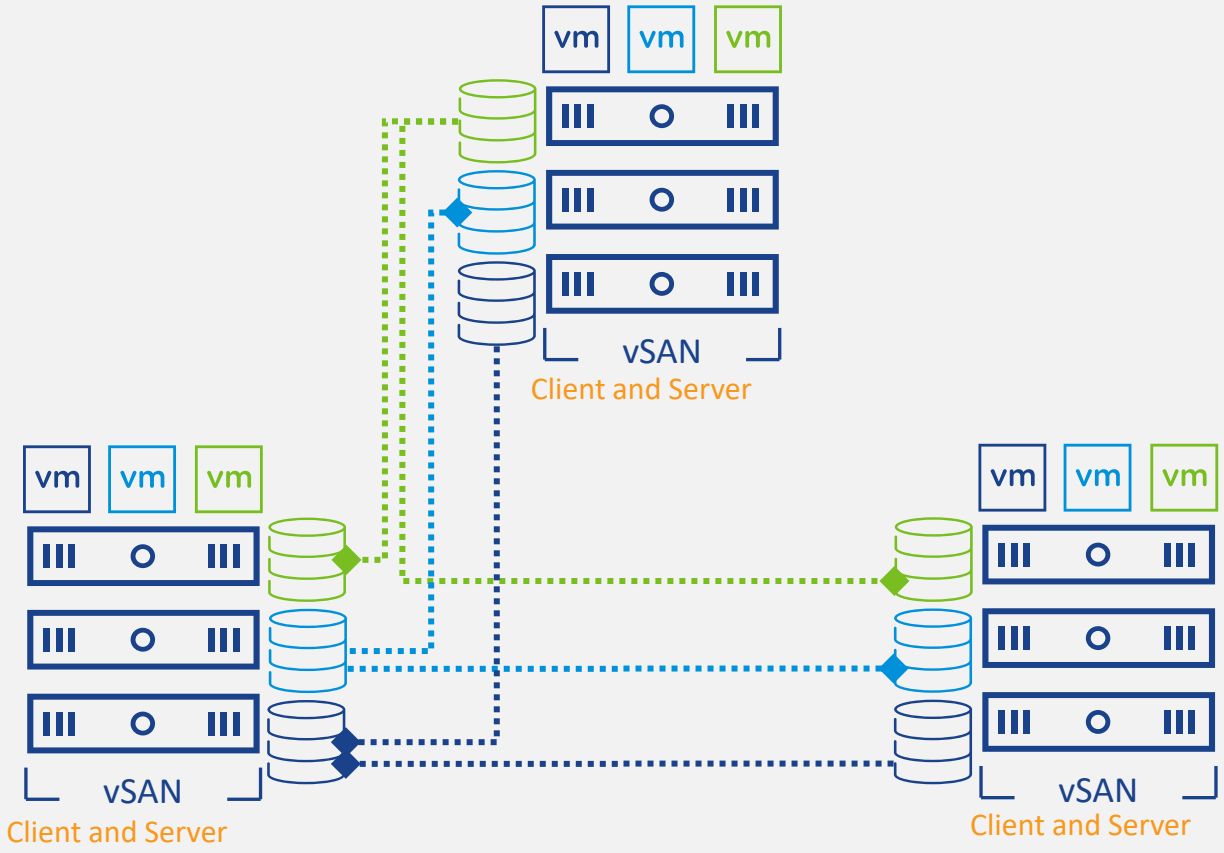
Cluster Resources

Recent Tasks | Alarms

Task Name	Target	Status	Details	Initiator	Queued F	Start Time	Completion Time	Server
Unconfiguring vSphere HA	10.161.184.117	Completed		System	3 ms	03/10/2021, 12:21:47 PM	03/10/2021, 12:21:47 PM	vcsa-duncan.eng.vmware.com
Unconfiguring vSphere HA	10.161.167.9	Completed		System	2 ms	03/10/2021, 12:21:47 PM	03/10/2021, 12:21:47 PM	vcsa-duncan.eng.vmware.com

All | More Tasks | 1 - 25 of 26 items | 1 / 2

HCI Mesh Considerations



Considerations

- Design for redundancy everywhere for highest availability
- Inter and intra-cluster traffic uses the same vSAN vmkernel interface
- L2 or L3 fully supported
- Achieve sub-ms latency across clusters for optimal performance
- **Use 25Gbps NICs**, storage-class switches, and NIOC with vDS
- LACP offers benefits but is operationally complex; LBT or A/P failover is a simpler alternative
- A **single da**tastore can be mounted to a **max** of **128** hosts
- **Client clusters** can mount a **max** of **5 remote datastores**, and server clusters can export up to a max of 5 client clusters

Flexible Use Cases

Efficiency and flexibility to meet various workload demands

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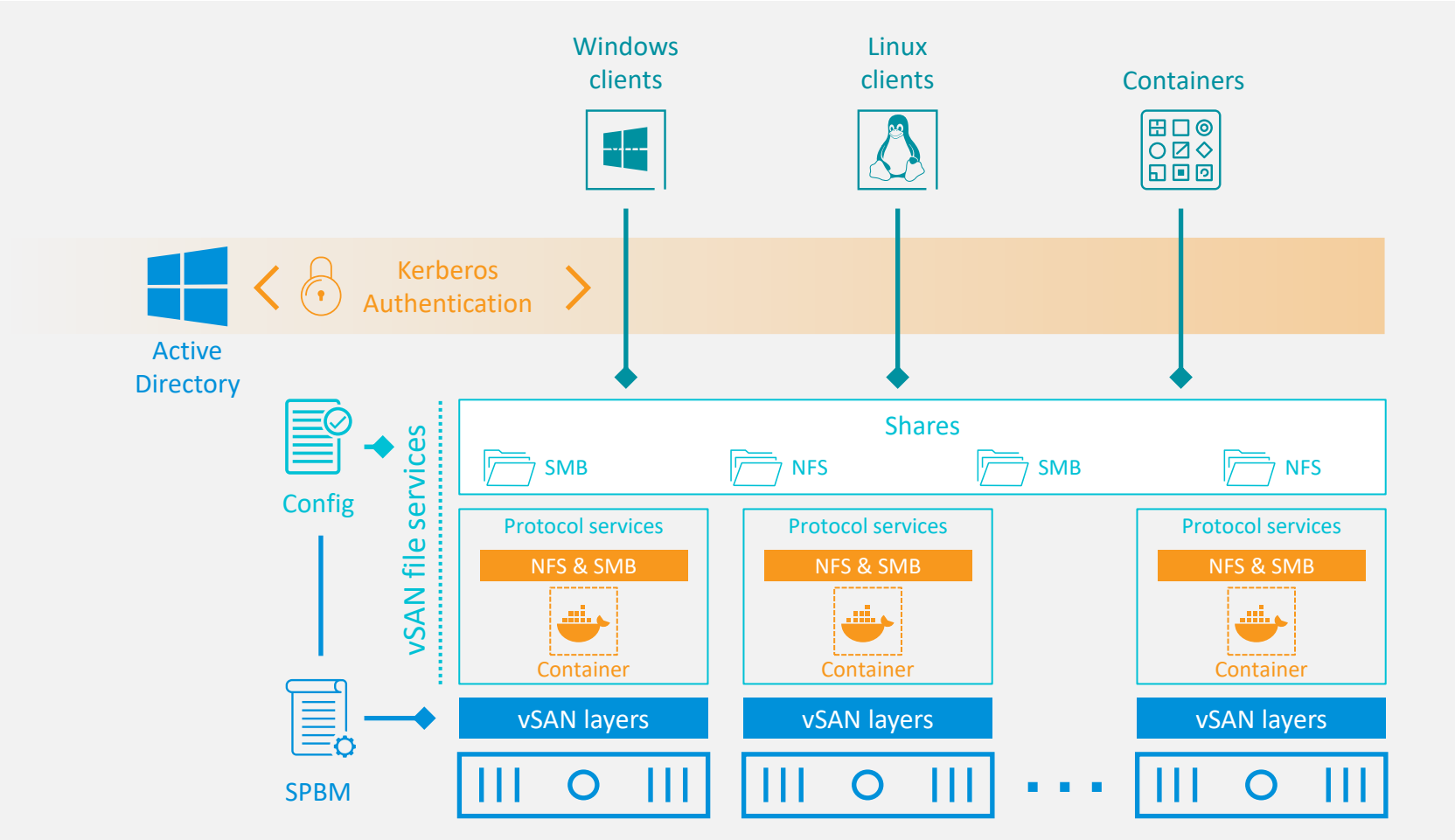
Integrated File Services Managed through vCenter

Native file services for vSAN

7.0 U1



Provision vSAN cluster capacity for **file shares**

Supports **NFS v4.1 & v3, SMB v2.1 and v3.**

- Kerberos for NFS
- Active Directory for SMB

Supports quotas for file shares

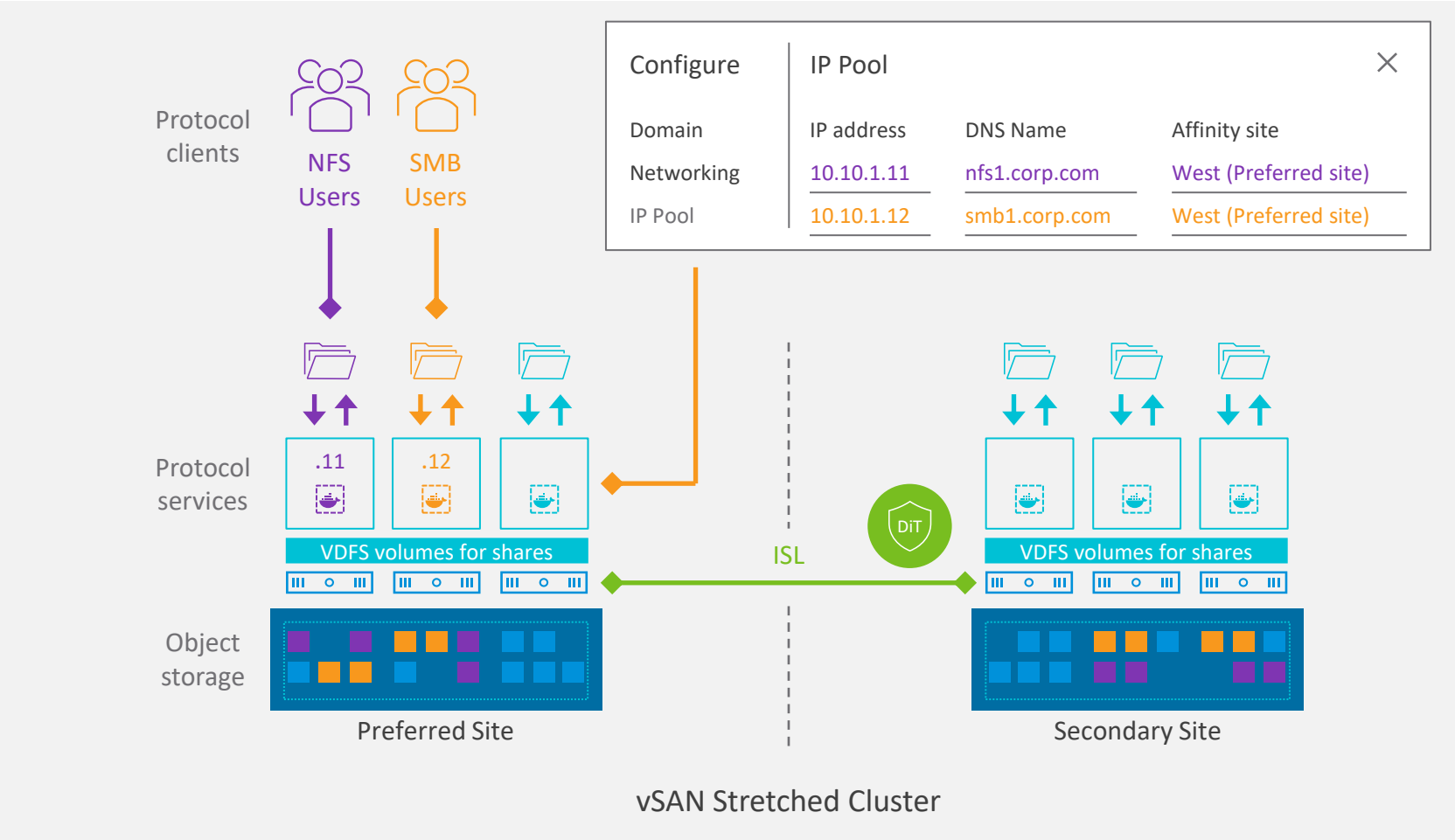
Suited for **Cloud Native & traditional** workloads on vSAN

Works with common vSAN/vSphere services

Improved Flexibility for Native File Services

Enhancements to vSAN File Services

7.0 U2



Support for vSAN **stretched clusters** and **2-node** topologies

Support of **Data-in-Transit Encryption** and **UNMAP**

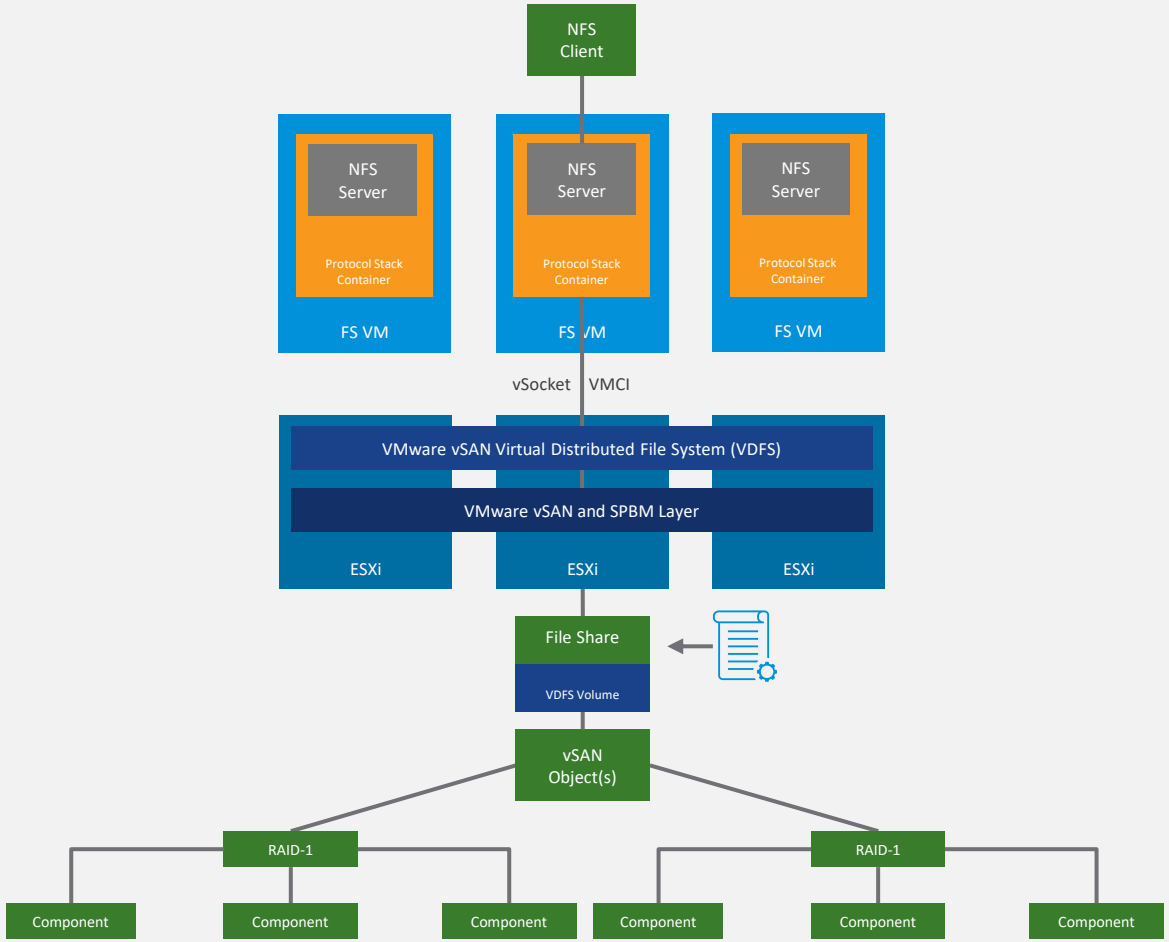
Snapshots for file services volumes

- via API
- Extract differences between two snapshots

Improved **scale, performance and efficiency**

Elastic Scaling and Efficiency from Integration with the Hypervisor

vSAN file services architecture at a glance



Stateless **containers** provide service resilience

Resilience assigned per share though **storage policy**

Virtual Distributed File System (**VDFS**) for optimal

- Load balancing
- Performance

Control and Data Path **via vSocket**

Allows efficient data transfer through zero-copy

DEMO
vSAN File Services

vSphere Client | Menu | Search in all environments | Administrator@VSPHERE.LOCAL

- 10.198.17.247
  - vSAN-DC
    - Resources
    - vSAN-Cluster
      - 10.198.17.236
      - 10.198.17.237
      - 10.198.17.238
      - 10.198.17.239
      - 10.198.17.241
      - 10.198.17.242
      - 10.198.17.243
      - 10.198.17.244
    - 10.198.17.49

vSAN-Cluster

ACTIONS

Summary | Monitor | Configure | Permissions | Hosts | VMs | Datastores | Networks | Updates

Services
- vSphere DRS
- vSphere Availability

Configuration
- Quickstart
- General
- Key Provider
- VMware EVC
- VM/Host Groups
- VM/Host Rules
- VM Overrides
- I/O Filters
- Host Options
- Host Profile

Licensing
- vSAN Cluster
- Supervisor Cluster

Trust Authority
Alarm Definitions
Scheduled Tasks

vSAN
- Services
- Disk Management
- Fault Domains
- Remote Datastores

vSAN Services

TURN OFF VSAN

Performance Service — Enabled

Stats object health	Healthy
Stats object UUID	c90e5a60-2185-8990-6eec-0050569c3ee8
Stats object storage policy	vSAN Default Storage Policy
Compliance status	Compliant
Verbose mode	Disabled
Network diagnostic mode	Disabled

EDIT

File Service — Disabled

ENABLE

Network

EDIT

Historical Health Service — Enabled

The historical health service keeps all vSAN Skyline Health data for up to 30 days depending on the vCenter Server Database available capacity.

DISABLE

vSAN iSCSI Target Service — Disabled

ENABLE

Data Services

Space efficiency	None
Data-at-rest encryption	Disabled
Key provider	--
Disk wiping	Disabled
Data-in-transit encryption	Disabled
Rekey interval	--

EDIT | GENERATE NEW ENCRYPTION KEYS

Reservations and Alerts

EDIT

Advanced Options

EDIT

Recent Tasks | Alarms

Task Name	Target	Status	Details	Initiator	Queued F	Start Time	Completion Time	Server
Download vSAN File Service OVF	10.198.17.247	Completed		VSPHERE.LOCAL\Administrator	10 ms	03/23/2021, 5:05:31 PM	03/23/2021, 5:06:12 PM	10.198.17.247
Reconfigure vSphere HA host	10.198.17.237	Completed	Waiting for cluster election to co	VSPHERE.LOCAL\Administrator	2 ms	03/23/2021, 5:03:48 PM	03/23/2021, 5:04:20 PM	10.198.17.247

All | More Tasks

1 - 25 of 27 items | 1 / 2

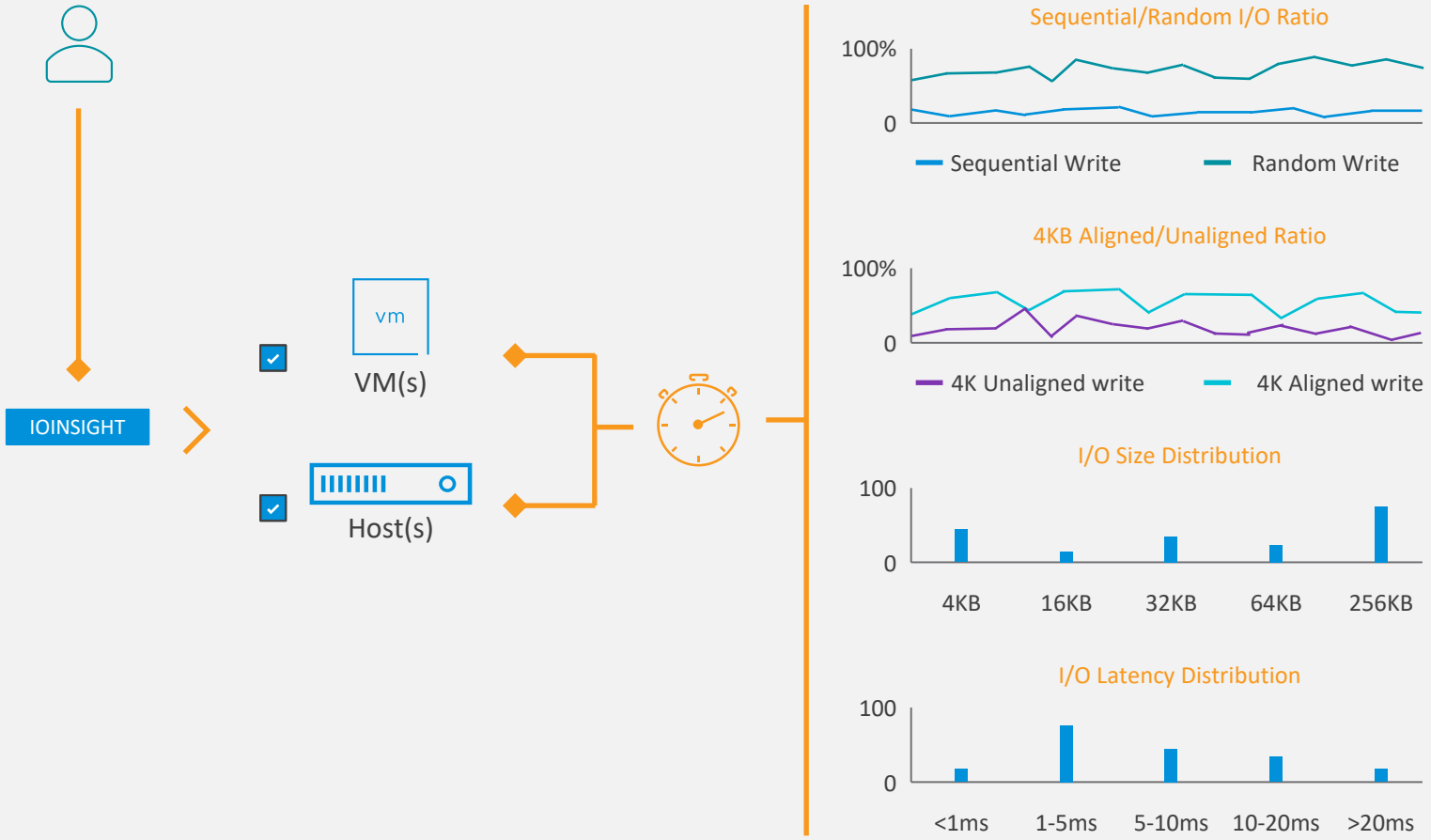
Agile, Integrated Management

Deploy, operate, and optimize using software you already know

Insight to Workload Characteristics Directly in vCenter

Analyze VM I/O metrics with vSAN I/O Insight

7.0 U1



Detailed views of all common **I/O metrics** on selected workload(s)

Select VMs, hosts and duration to monitor

Provides **histogram** showing **distribution of I/O sizes**

Ideal for **day-2 monitoring** and **troubleshooting performance**

DEMO 3
VM IO Insight

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vSphere Client | Menu | Search in all environments | Administrator@VSPHERE.LOCAL

- vcsa-duncan.eng.vmware.com
  - OCTO
    - Cormac
      - w4-hs4-i1501.eng.vmware.com
      - w4-hs4-i1502.eng.vmware.com
      - w4-hs4-i1503.eng.vmware.com
      - w4-hs4-i1504.eng.vmware.com
    - Duncan
      - w4-hs4-i1505.eng.vmware.com
      - w4-hs4-i1506.eng.vmware.com
      - w4-hs4-i1507.eng.vmware.com
      - w4-hs4-i1508.eng.vmware.com
      - vcsa-duncan

Duncan

ACTIONS

Summary | Monitor | Configure | Permissions | Hosts | VMs | Datastores | Networks | Updates

Total Processors: 160
Total vMotion Migrations: 0
Fault Domains:

CPU — Free: 332.88 GHz — Used: 2.32 GHz — Capacity: 335.2 GHz
Memory — Free: 1.88 TB — Used: 124.22 GB — Capacity: 2 TB
Storage — Free: 48.63 TB — Used: 2.68 TB — Capacity: 51.31 TB

Related Objects

Datacenter	OCTO

vSphere HA

Cluster Services

Custom Attributes

Attribute	Value
com.vmware.vcenter.cluster.edrs.upgradeHostAdded	

1 items

Edit...

vSphere DRS

Cluster Consumers

Resource pools	0
vApps	0
Virtual machines	4

Tags

Assigned Tag	Category	Description

No items to display

Assign... Remove...

Recent Tasks | Alarms

Task Name	Target	Status	Details	Initiator	Queued For	Start Time	Completion Time	Server

Waiting for vcsa-duncan.eng.vmware.com...

More Tasks

IO Trip Analyzer

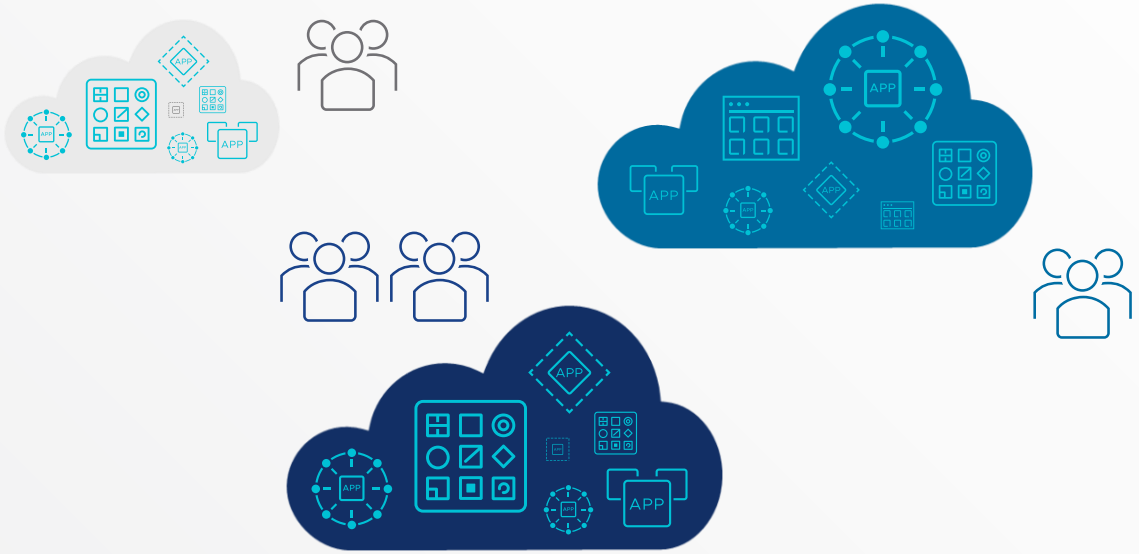
VISION

1-click analysis

IO patterns (r/w metrics, sequentiality, seasonality)

IO trip topology

Latency breakdown over trip



The Hybrid-Cloud Era

Building an agile data center with efficiency and simplicity

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Disasters & cyberattacks are prevalent

What analysts are saying

76%

Reported an incident during the past two years that required an IT DR plan, while more than 50% reported at least two incidents[1]

52%

Experienced 1, or more, sensitive data breaches in past 12 months[2]

17%

Tests their DR implementations more than twice a year[3]

1 Gartner, "Survey Analysis: IT Disaster Recovery Trends and Benchmarks", J. Rozeman, R. Blair, 30 April 2020
2 Forrester, "Top Cybersecurity Threats in 2020", January 24, 2020
3 Source: 451 Research, a part of S&P Global Market Intelligence, study: Voice of the Enterprise: Storage, Budgets and Outlook 2020

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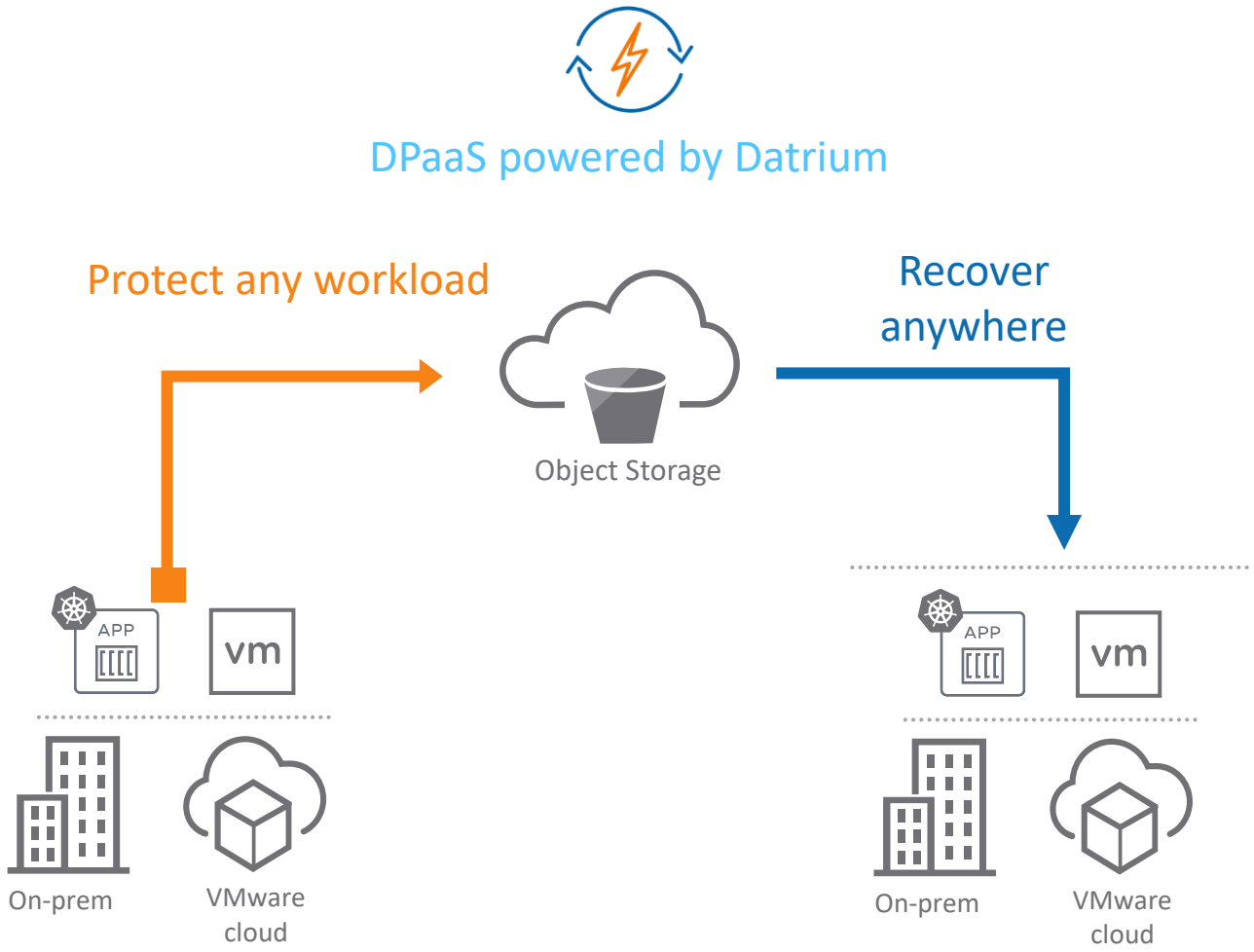
Introducing VMware Cloud DR

With Acquisition of Datrium



Value Prop

- Cost-effective Data Protection delivered as a service for on-prem and in-cloud workloads

Customer Benefits

- IT resiliency against infrastructure failures
- Operational recovery after data loss
- Recovery from ransomware attacks
- Lower TCO with cloud economics

Relevant Capabilities

- Super cost-effective secondary storage in cloud
- Combined Backup and DR
- Orchestration for DR of 1000s of workloads
- Instant restore into VMware Cloud
- End-to-end SaaS experience

Support for Additional VMC on AWS regions

VMware Cloud Disaster Recovery

Protect your workloads to new VMC on AWS regions: **Dublin**, **Paris** and Mumbai

Existing regions supported:

- United Kingdom (**London**)
- **Europe** (**Frankfurt**)
- US West (Oregon)
- US East (N. Virginia)
- US East (Ohio)
- US West (N. California)
- Canada (Central)
- Asia Pacific (Sydney)
- Asia Pacific (Singapore)

VMware Q4'FY21 ends Jan 29, 2021

Looking Forward…

VISION

Today

DRaaS with VMC as target

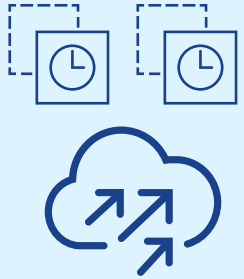
Cost effective DRaaS for VMC

Expansion

DRaaS with MaaS as target

Software and service to expand DRaaS to other mega-clouds

Expansion to Backup as a Service (BaaS)



DPaaS for any app

Future

Cloud storage for Data Management

Efficient storage repository in the cloud

Thanks for your time!

Twitter: @DuncanYB
LinkedIn: linkedin.com/in/depping/
YouTube: youtube.com/c/DuncanEpping/