
# Academia Multicloud

Module: SDDC and Virtualization

## Software Define Datacencer and Cloud Virtualization concepts

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# Welcome

- This module aims to provide you with knowledge and practical skills necessary to understand the basic cloud concept and know the Cloud Concept impact in companies and the world

# Welcome

- The spoken language of the workshop is Spanish but all **documents and exercises will be in English**.

- Please **provide proactive feedback** on whether you are understanding what we are teaching.

- All documents, exercises and references will be shared once the couse has ended.

# The lecturer

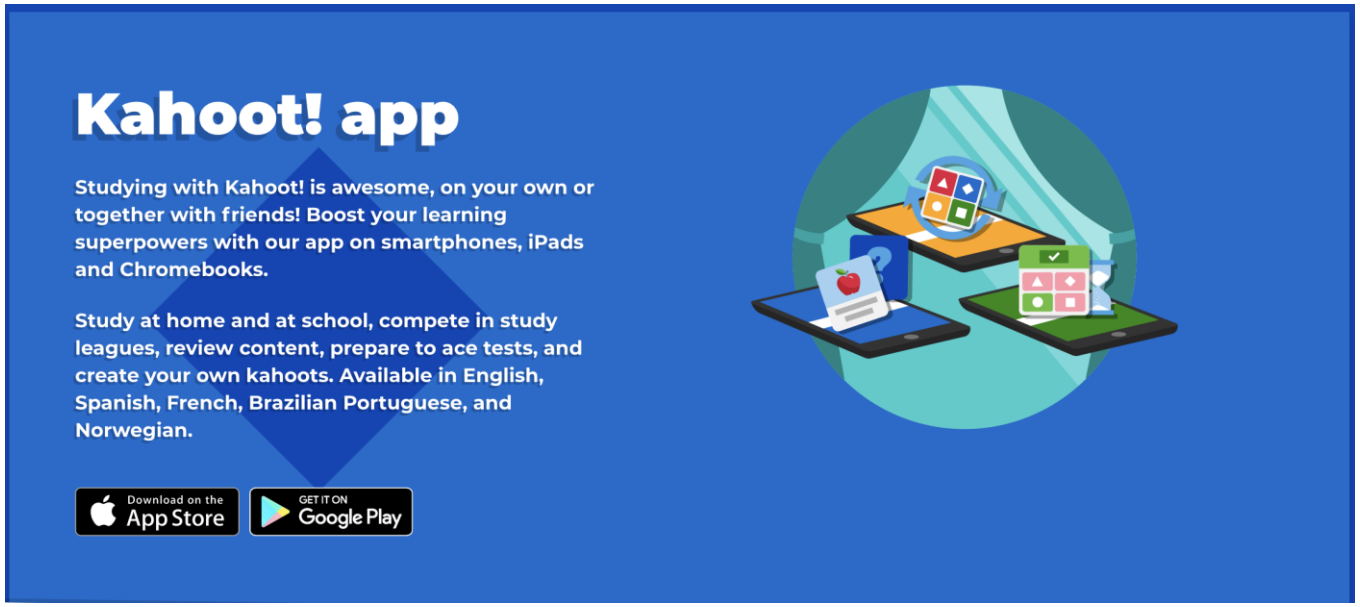
Connect with us on LinkedIn

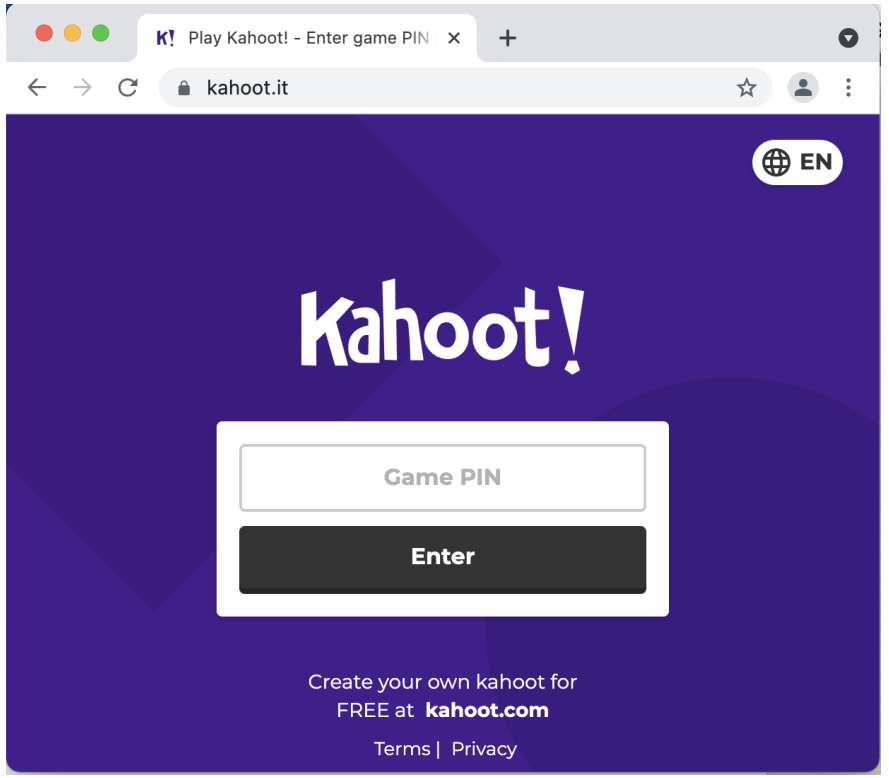
## Oscar Muñoz

## Alberto Martinez

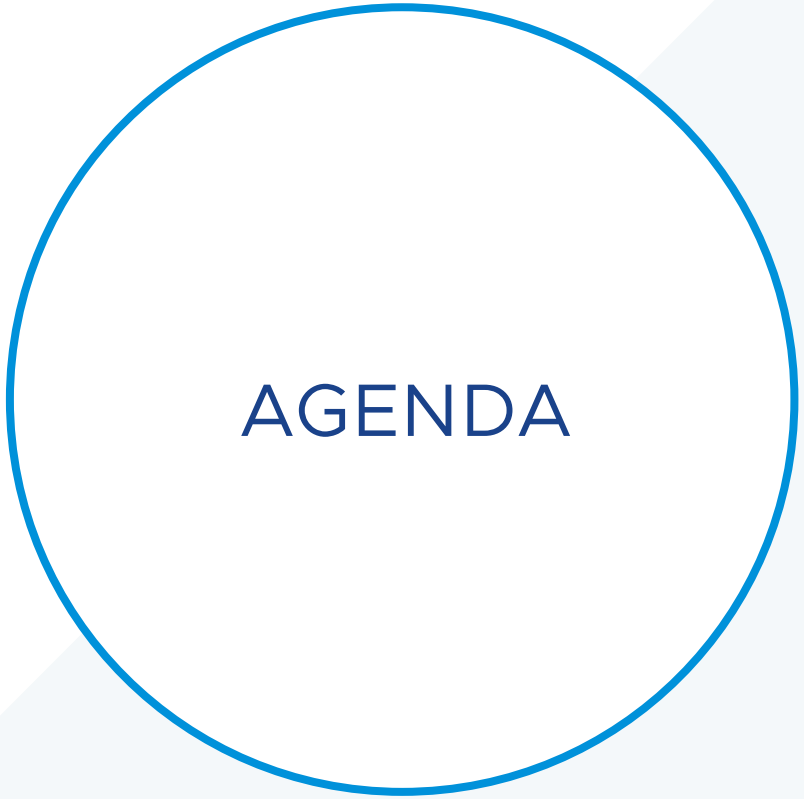
# Download Kahoot app or join kahoot.it!!!

15 minutes before end of class we will provide you with the Kahoot PIN to join the contest using the Kahoot app or joining https://kahoot.it/!!!



I. Virtualization Overview
II. Compute
III. Storage: Introduction



# 1. Virtualization Overview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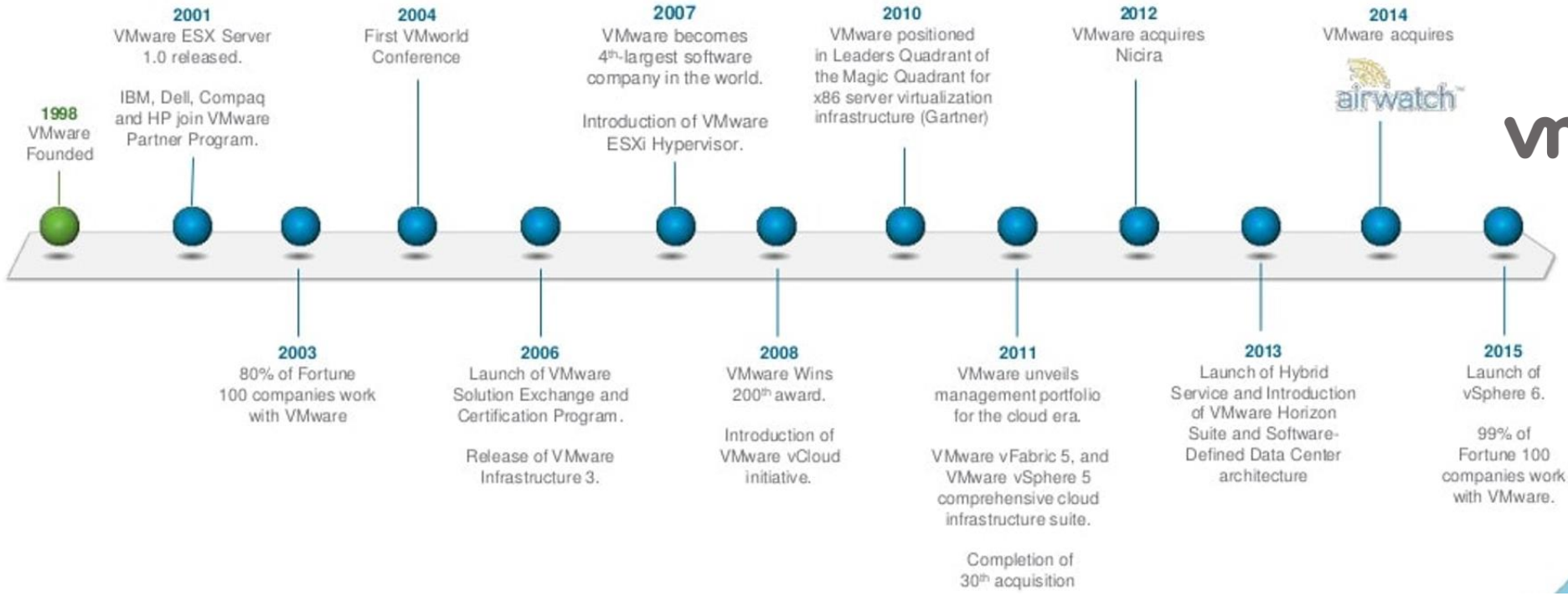
# 1. Module Objectives

| Topic | Description |
| --- | --- |
| Virtualization History | Understand the origin of virtualization, Software-Defined Data Center (SDDC) and its evolution towards Cloud |
| Carbon Impact | How the virtualization, SDDC and Cloud Computing positively impacts our world |
| Victualization Overview | Basic concepts about virtualization, SDDC and Cloud Computing |

# Virtualization History

## VMware History of Investment and Innovation



# VMware Cloud on AWS Continuous Innovation

## Accelerated delivery of key milestones since launch

**Aug 2017**
Initial Availability
AWS Oregon Region
- 4 host SDDC
- Hybrid Linked Mode
- Flexible consumption

**Nov 2017**
Mission-Critical Workloads at Scale
AWS N. Virginia Region
- AWS Direct Connect
- VMware Site Recovery
- VMware HCX

**Mar 2018**
Geo and Partner Expansion
AWS London Region
- MSP Program
- Credit Card Payment
- 1 host SDDC

**Jun & July 2018**
Enterprise Compliance
AWS Frankfurt Region
- VMware Horizon 7.5
- Elastic DRS
- SOC, ISO, GDPR, HIPAA BAA

**Aug 2018**
Richer Consumption Options
AWS Sydney Region
- 3 host SDDC
- Elastic vSAN
- HCX w/ replication

**Nov 2018**
Advanced Security
AWS Ireland, N. CA, Ohio, Tokyo AWS GovCloud
- NSX-T (Micro-segmentation)
- Horizon Enterprise Suite

**Feb-April 2019**
Enhancements & Geo Rollout
AWS Canada, Paris, Singapore
- R5 instance type
- Oracle license optimization

**May-June 2019**
Advanced Networking
Mumbai, Seoul, Sao Paulo
- AWS re-sell
- Advanced networking

**Future**
VMware Cloud on AWS Outposts

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97% of organizations have adopted multi-cloud strategies for mission-critical applications

Multi-cloud deployments are here to stay, and investments look to increase over the next two years

# VMware Global Cloud Presence

**70M+**
Total Workloads

**10M+**
Workloads in the Cloud

**10K+**
Cloud Data Centers

**128**
Countries

**4.3K+**
Cloud Provider Partners

**169**
VMware Cloud Verified Partners

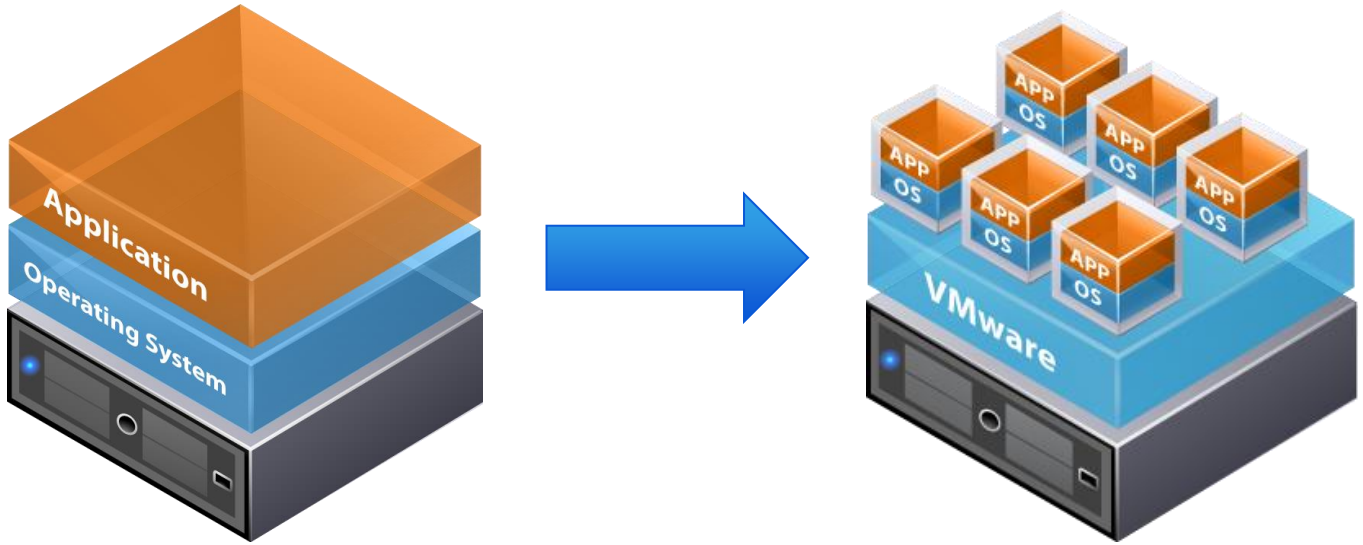
Partner Data Centers

Hyper-Scale Clouds

# Virtualization Overview

## Virtualization

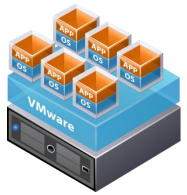
- Hypervisor abstracts traditional physical machine resources and runs workloads as virtual machines (VMs)
- Each VM runs guest OS and applications



# Virtualization Overview

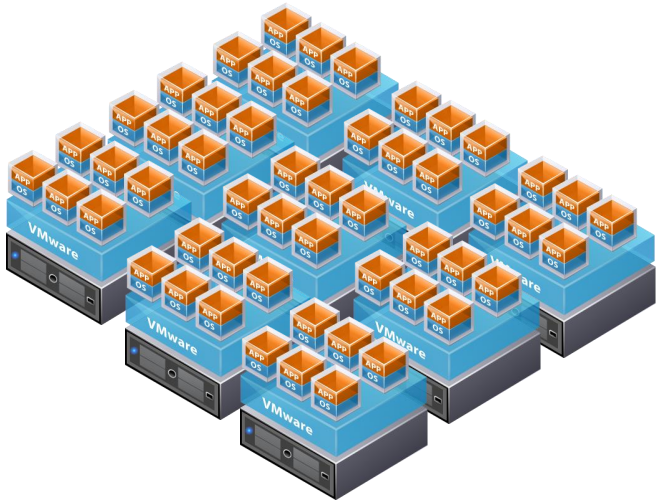
## Hypervisor

- Partitions computing resources of a server for multiple VMs
- Hypervisors alone lack coordination for higher availability and efficiency




## VMware vSphere

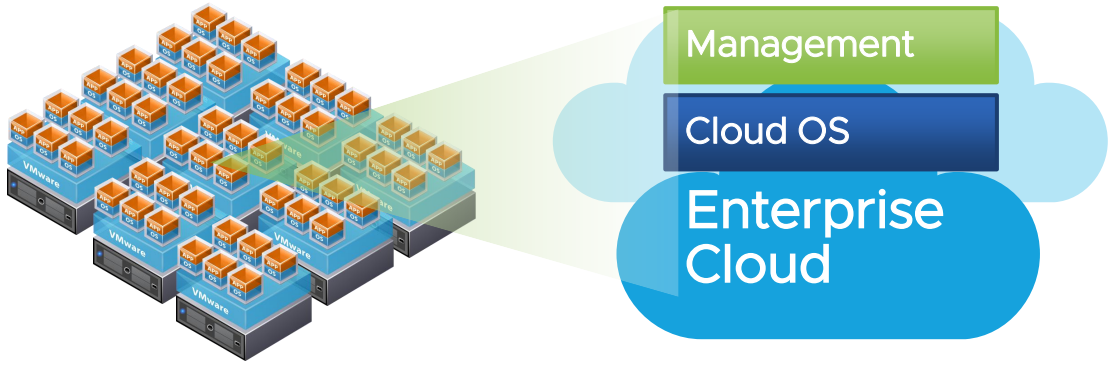
- VMware vSphere goes beyond basic host partitioning by aggregating infrastructure resources into a giant virtual computer
- Serves as a dynamic OS for a private internal cloud in your datacenter



# Cloud Computing

## IT as a Service

- Abstract complexity in the enterprise datacenter
- Achieve economies of scale
- Renew focus on application services
  - Availability
  - Security
  - Scalability



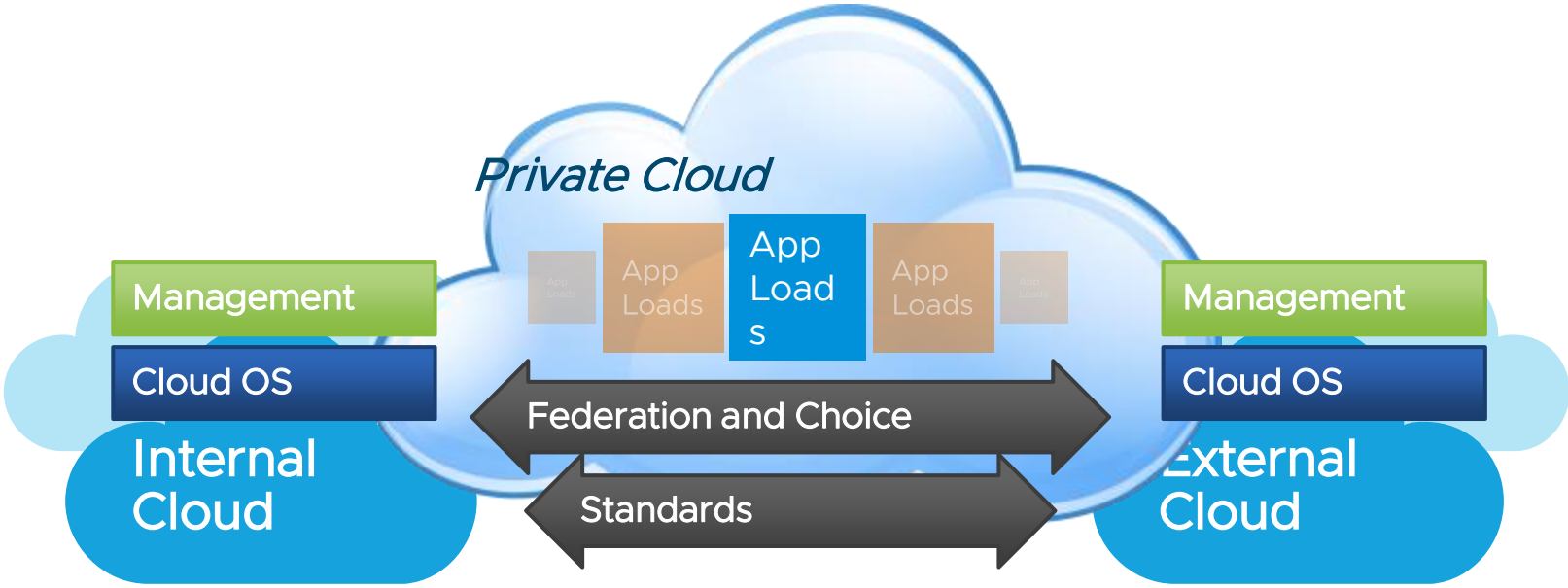
# VMware's Vision for Cloud Computing

Pay As You Go

- Leverage external clouds as needed

Ubiquity

- Choice in external cloud providers

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# Key Benefits of VMware vSphere

## Efficiency

- Highest utilization of resources

## Control

- Automated quality of service

## Choice

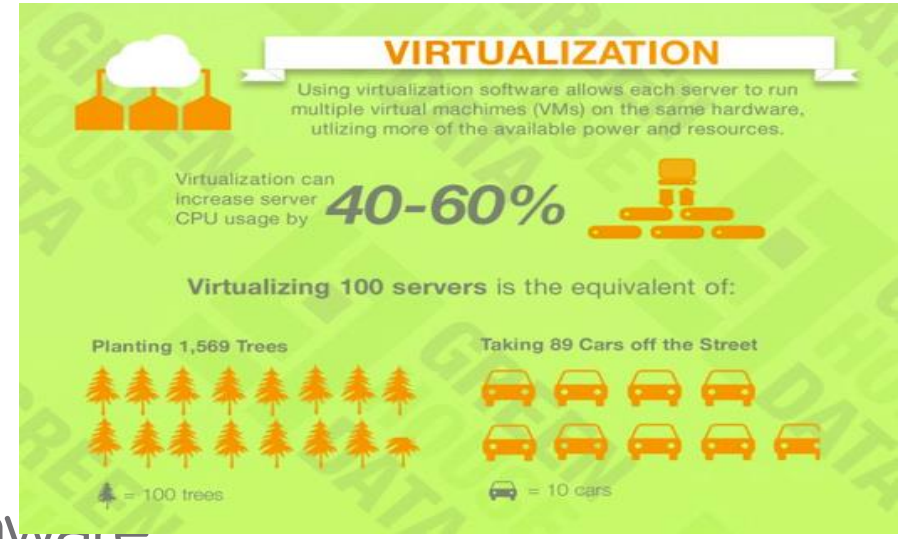
- Hardware independence
- Wide selection of guest OS support

# Virtualization Carbon Impact

Figure 2: Key Drivers of Cloud Computing's Reduced Environmental Footprint

| | Cloud Benefits |
|---|---|
| Reduce over-allocating of infrastructure (Dynamic Provisioning) | Forecasting and ongoing adjustment of allocated capacity avoids unnecessary over-allocation of resources and sizing close to actual usage. |
| Share application instances between multiple organizations (Multi-Tenancy) | Sharing application instances between client organizations (tenants) flattens peak loads and reduces overhead for tenant onboarding and management. |
| Operate server infrastructure at higher utilization | Large deployments of virtualized server infrastructure serving multiple tenants can balance compute and storage loads across physical servers and thus be operated at higher utilization rates. |
| Improve data center efficiency (PUE) | Industrialized data center design at scale and optimized for power efficiency reduces power wasted on cooling, UPS etc. and allows running servers at optimal utilization and temperature. |

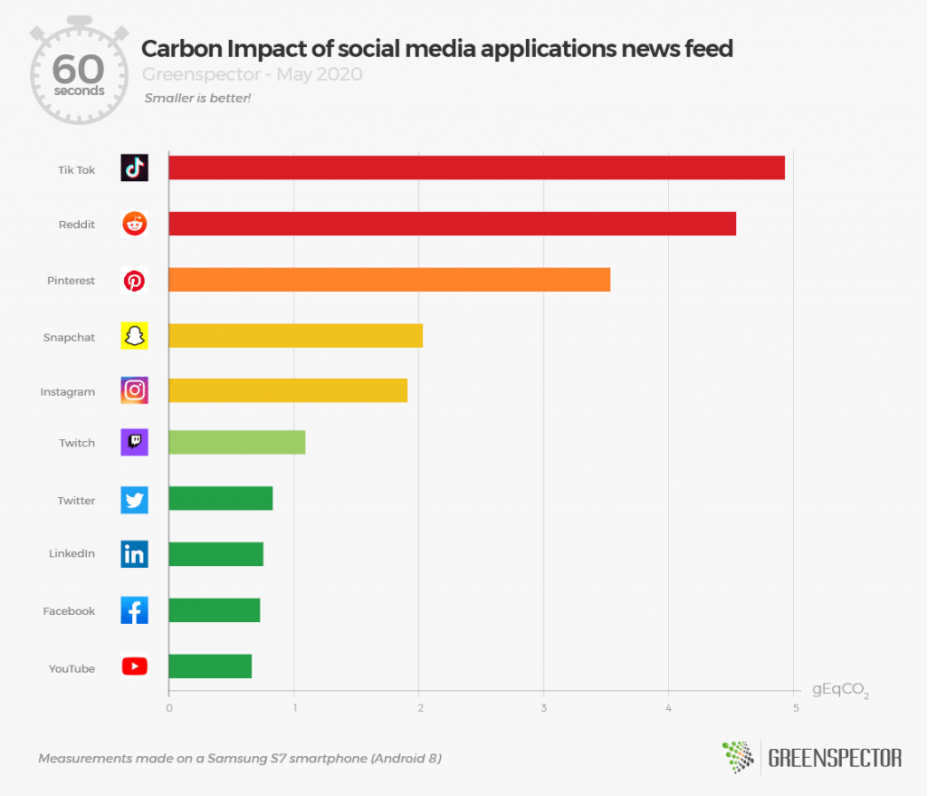
Reduce Carbon Footprint per User




SUSTAINABLE ENERGY

## Bitcoin's wild ride renews worries about its massive carbon footprint

PUBLISHED FRI, FEB 5 2021•4:32 AM EST | UPDATED TUE, FEB 9 2021•10:32 AM EST



# Cloud Types

| | IaaS<br>Infrastructure as a Service | PaaS<br>Platform as a Service | SaaS<br>Software as a Service |
|---|---|---|---|
| Gestionado por el usuario | Aplications<br>Data<br>Runtime<br>Middleware<br>O/S | Aplications<br>Data<br>Runtime<br>Middleware<br>O/S | Applications<br>Data<br>Runtime<br>Middleware<br>O/S |
| Gestionado por el proveedor | Virtualization<br>Servers<br>Storage<br>Networking | Virtualization<br>Servers<br>Storage<br>Networking | Virtualization<br>Servers<br>Storage<br>Networking |
| Usuarios | Administradores de sistemas | Desarrolladores de aplicaciones | Usuarios finales |
| Ejemplos | Azure VM, AWS EC2, Google Compute Engine | Openshift, Cloud Foundry, Elastic Beanstalk, App Service, App Engine | Office 365, Gmail, Slack, WordPress |
| Control | Alto | Medio | Bajo |
| Uso | Hospeda | Construye | Consume |

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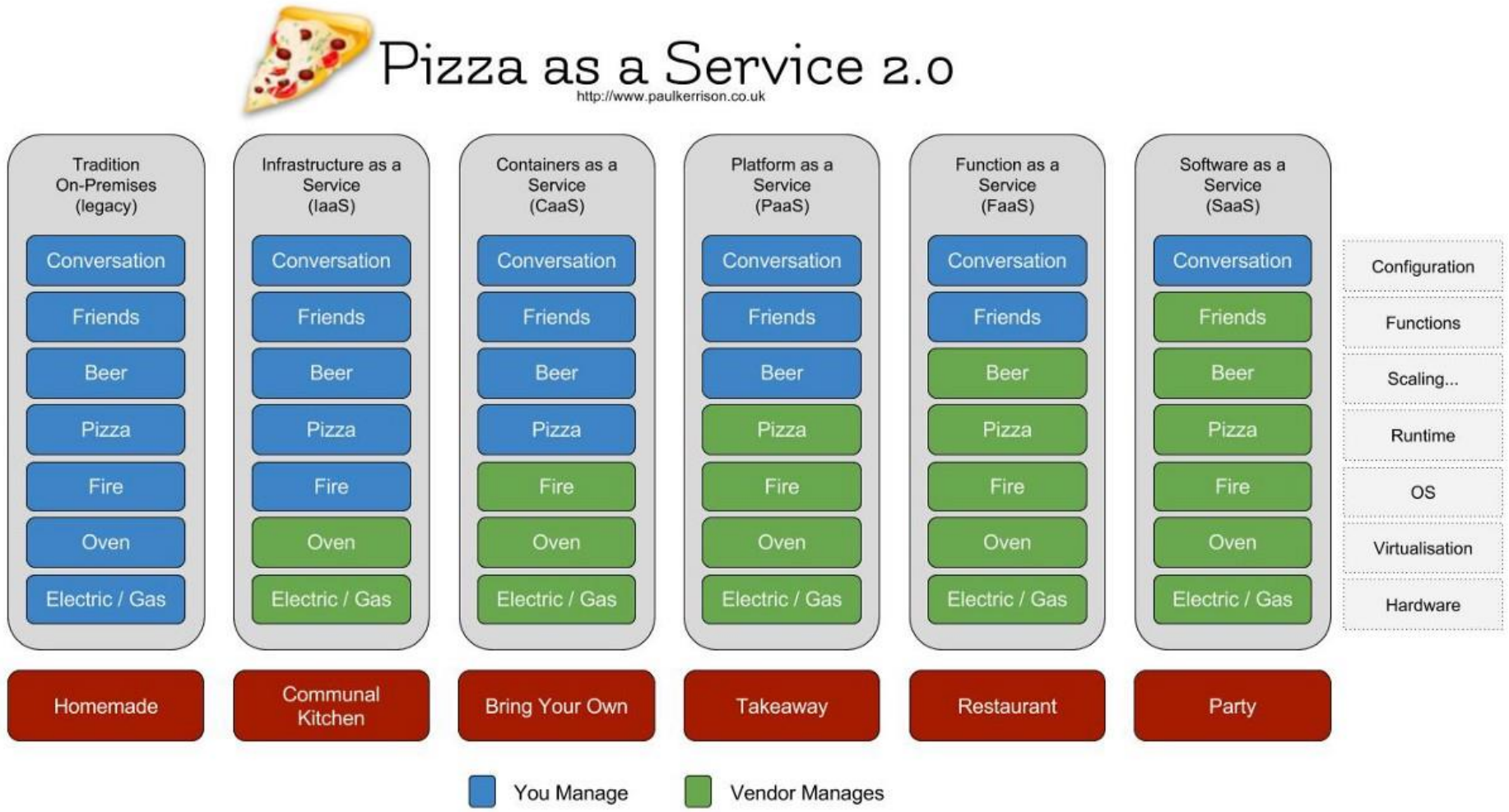
# Cloud Types. Example



# 2. Compute

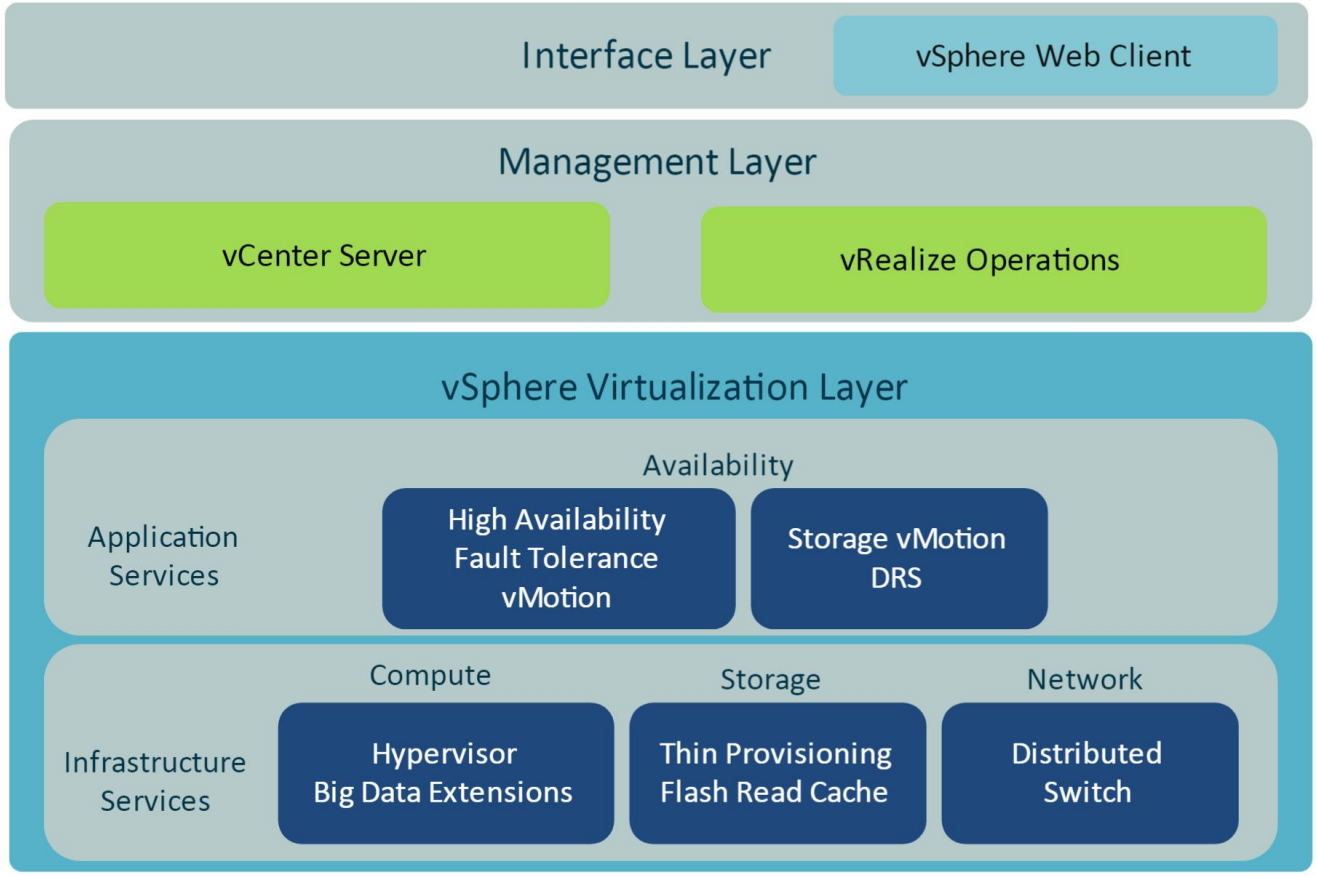
# 2. Module Objetives

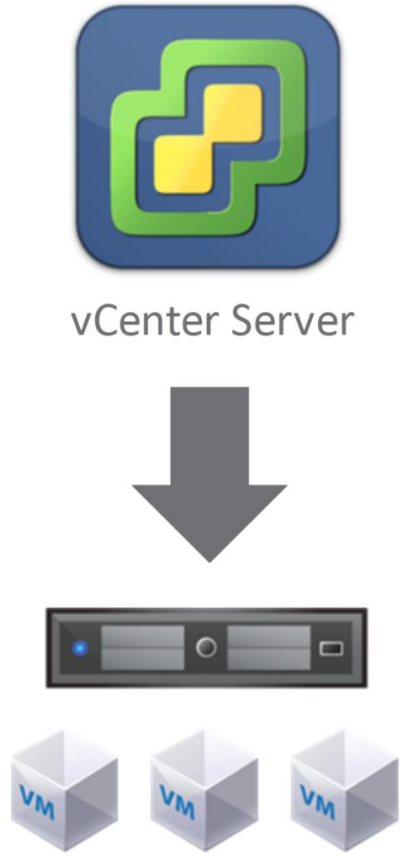
| Topic | Description |
| --- | --- |
| Hypervisor | Explain and understand the concept of the Hypervisor |
| VMware vSphere Main Features | Reviewing the key capabilities of a virtualization environment enabled by VMware vSphere technology |
| vCenter Server | Explain and understand the vCenter as the central management layer of a virtualization environment |

# Hypervisor

The hypervisor:

- Provides the virtual hardware and physical resources on which you can create virtual machines
- Is managed by vCenter Server and is installed on the server.

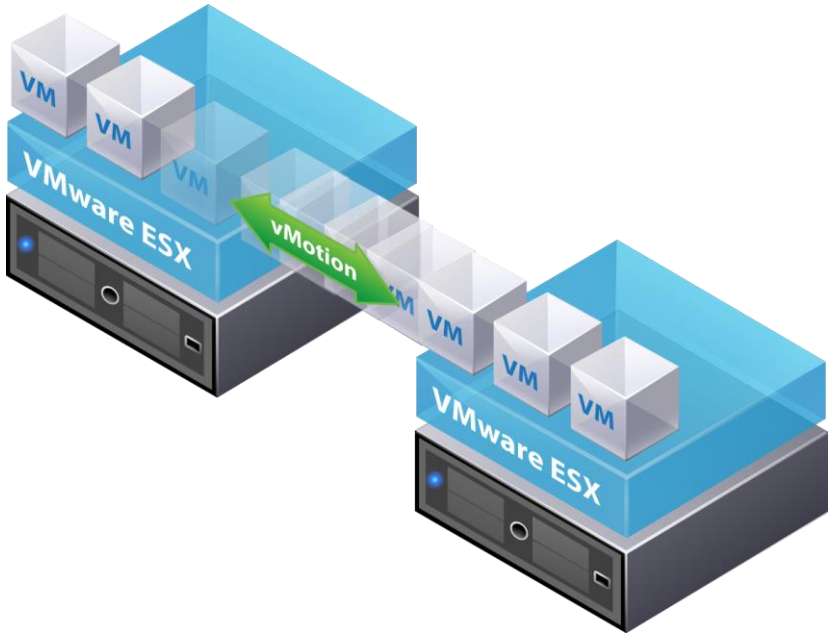


# Key VMware vSphere Features

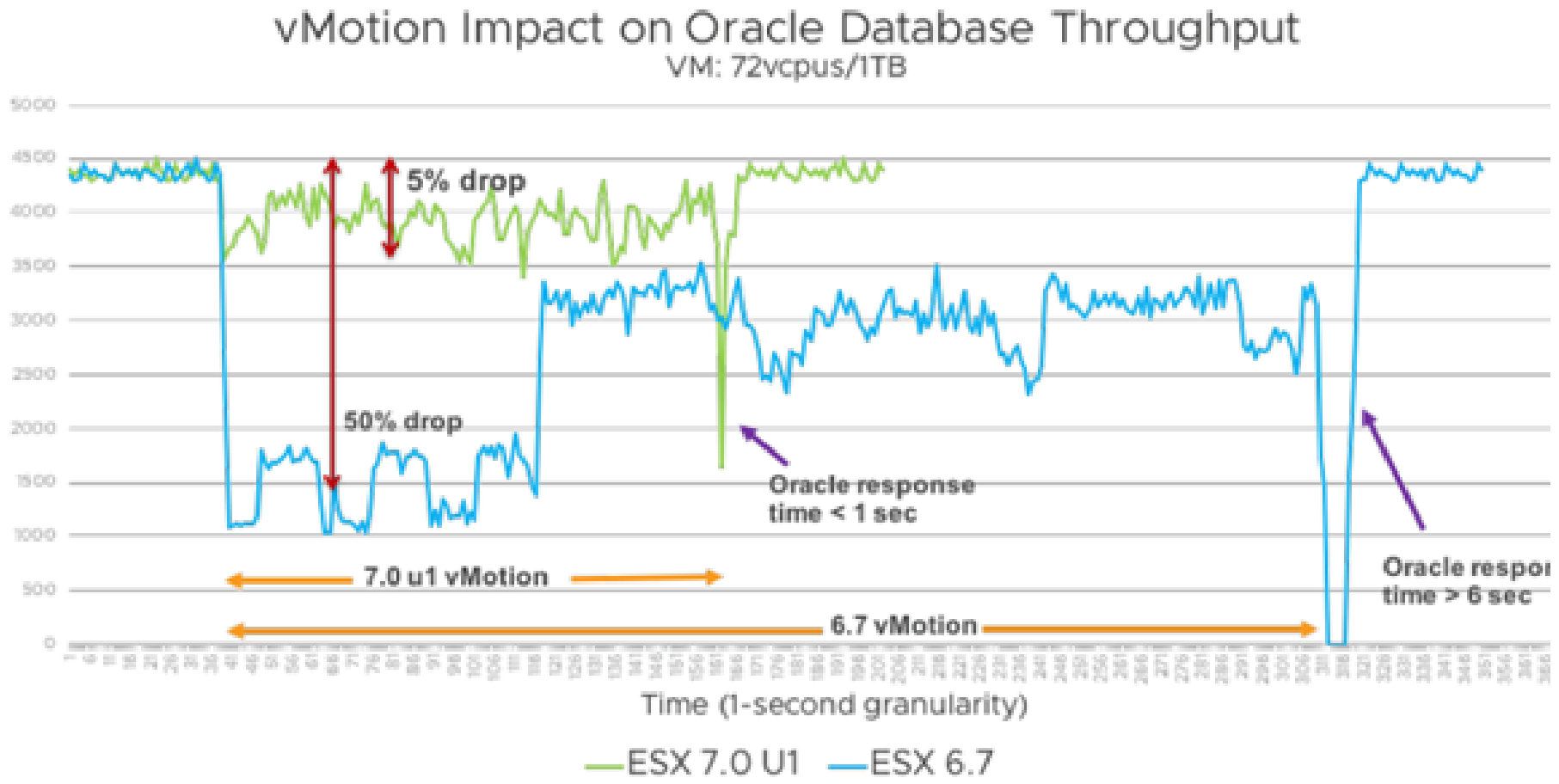
## VMware vMotion™

- Live migration of VMs from one host to another with zero downtime
- Used by other vSphere Features
  - Fault Tolerance
  - Storage vMotion
  - DRS and DPM




Key benefit: Increase the availability and resiliency

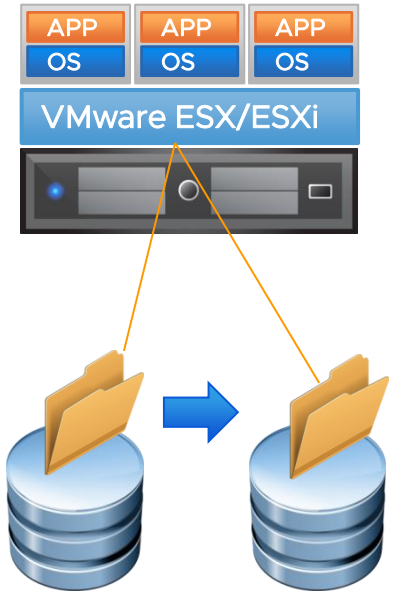
# Example of vMotion impact on Oracle Database Throughput



# Key VMware vSphere Features

## Storage vMotion

- Relocate running VM from one datastore to another datastore with zero downtime
- Relocate across different storage types
- Change VM disk format (thick or thin)




Key benefit: Increase the availability and storage resiliency

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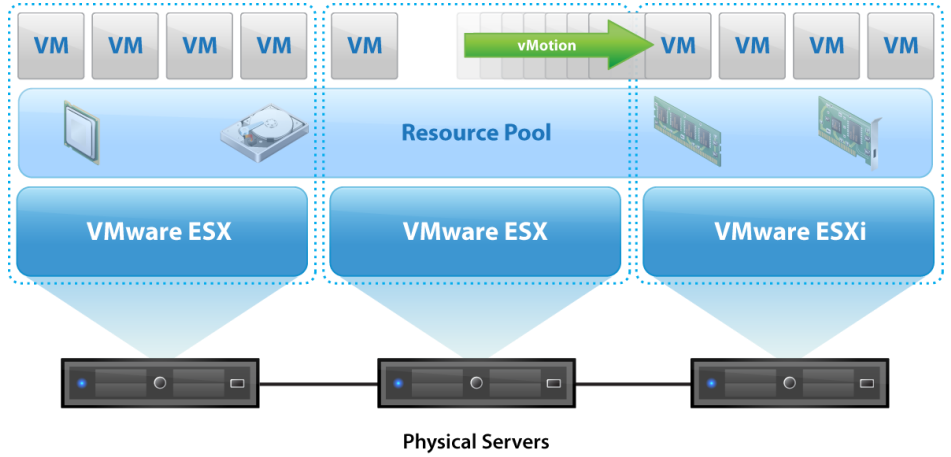
# Key VMware vSphere Features

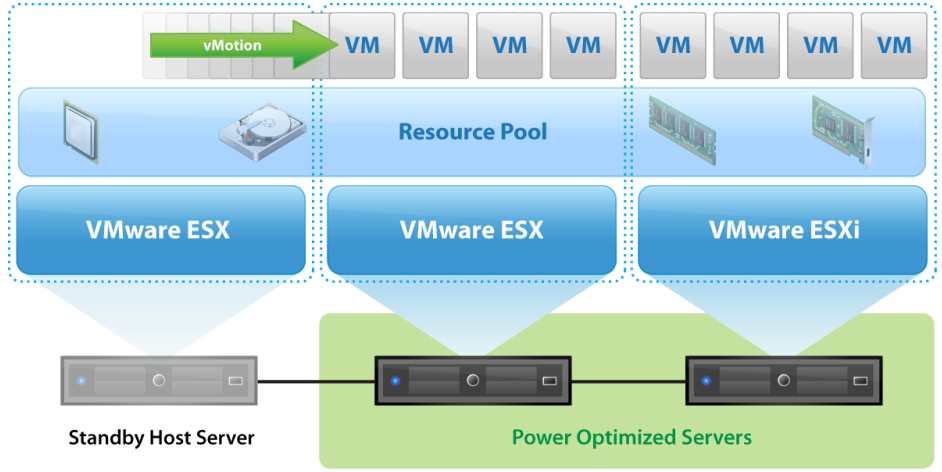
DRS

- Automated load balancing




DPM

- Optionally consolidate VMs onto fewer hosts and power off/on hosts as needed




Key benefit: Reduce the application isolations and increase the availability

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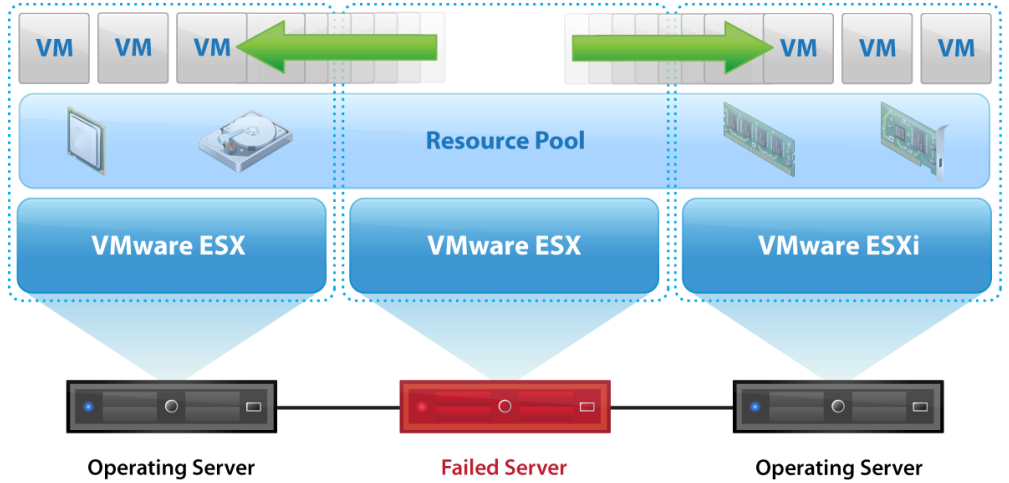
# Key VMware vSphere Features

## High Availability (HA)

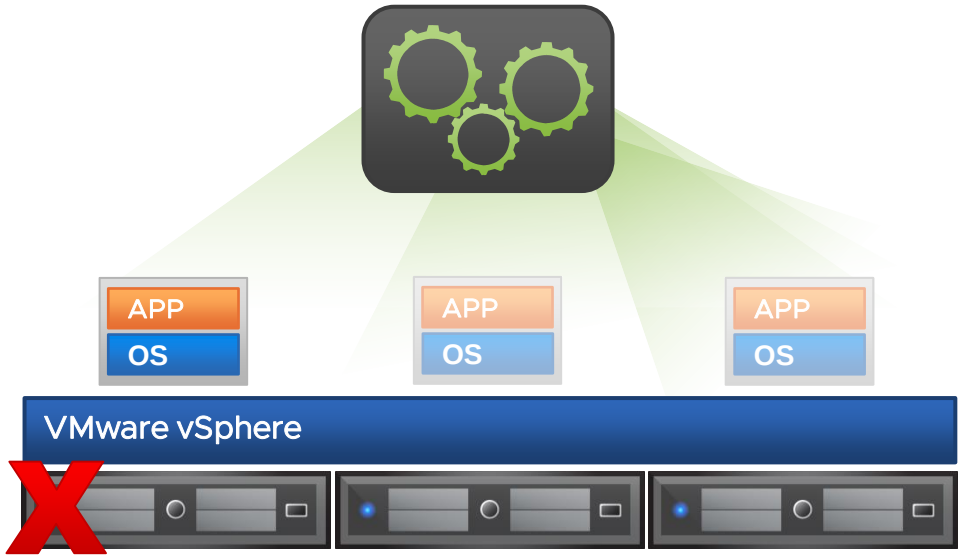
- Protects VMs and automatically restarts VMs in the event of:
  - Host failure
  - VM failure (loss of heartbeat)



# Key VMware vSphere Features

## Fault Tolerance (FT)

- A protected VM has a shadow VM in lockstep on another host
- Zero downtime in the event of primary host failure
- Automatic secondary protection after initial failover



# Key VMware vSphere Features

## Distributed Switch

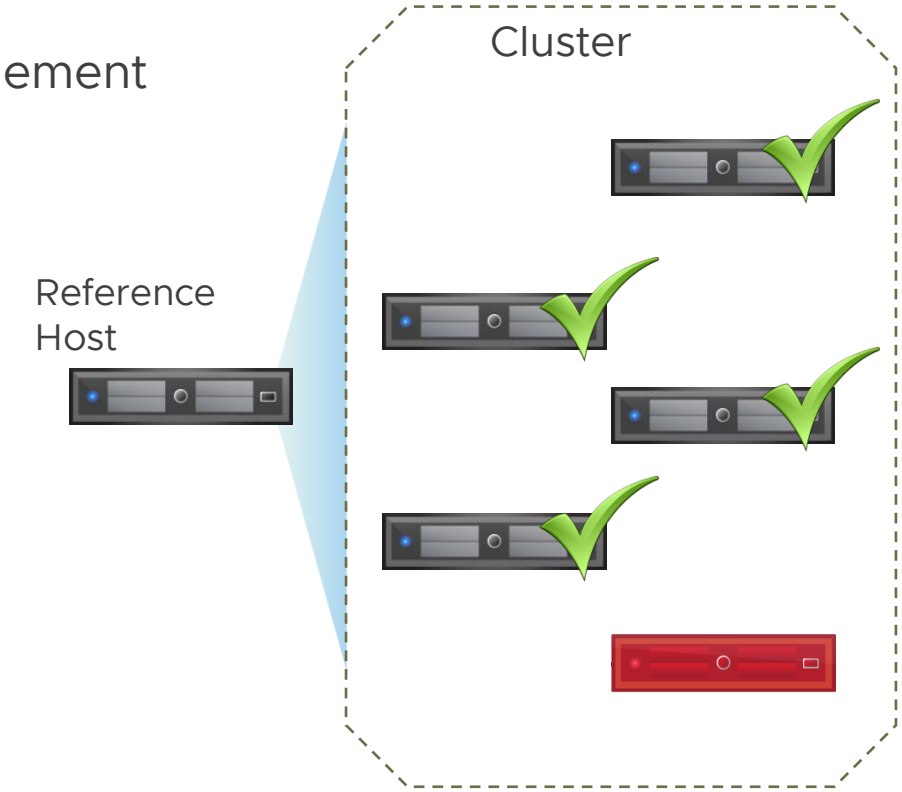
- Aggregated datacenter-level virtual networking (versus per-host)
- Simplified management
- Network statistics follow VMs


Key benefit: Reduce the Deployment Time (MTTD)

# Key VMware vSphere Features

## Host Profiles

- Simplified ESX/ESXi host configuration management
- Create “gold” reference configurations
- Compliance checks
- Remediation

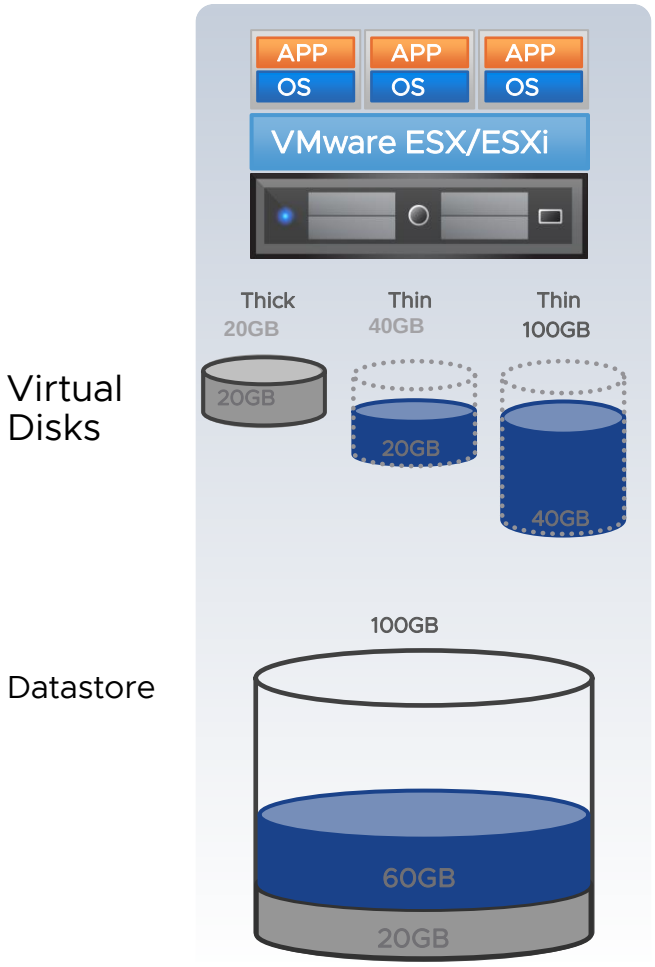



Key benefit: Reduce the hosts deployment failures

# Key VMware vSphere Features

## Thin Provisioning

- Virtual machine disks consume only actual physical space in use
- Virtual machine sees full logical disk at all times
- More efficient disk storage than pre-allocated thick disks




Key benefit: Afford us to make storage more efficient

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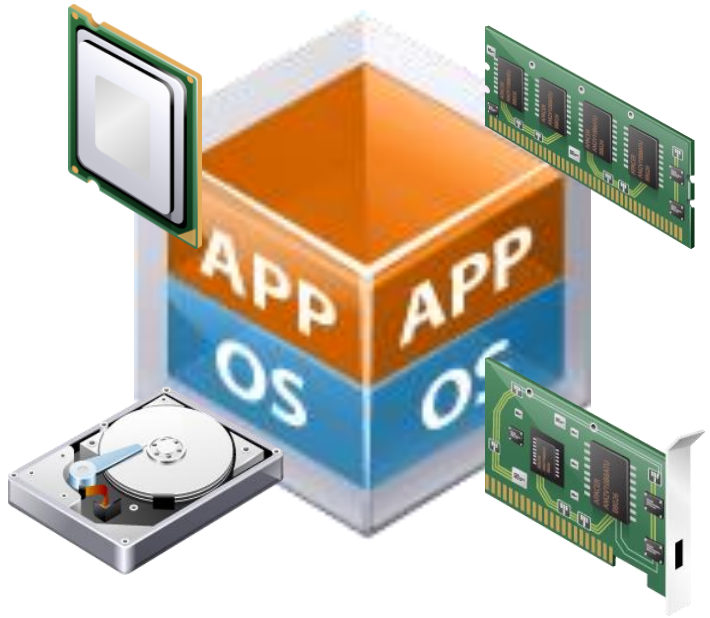
# Key VMware vSphere Features

## Hot Add Virtual Devices

- Hot add
  - CPU
  - Memory
- Hot add or remove
  - Storage devices
  - Network devices

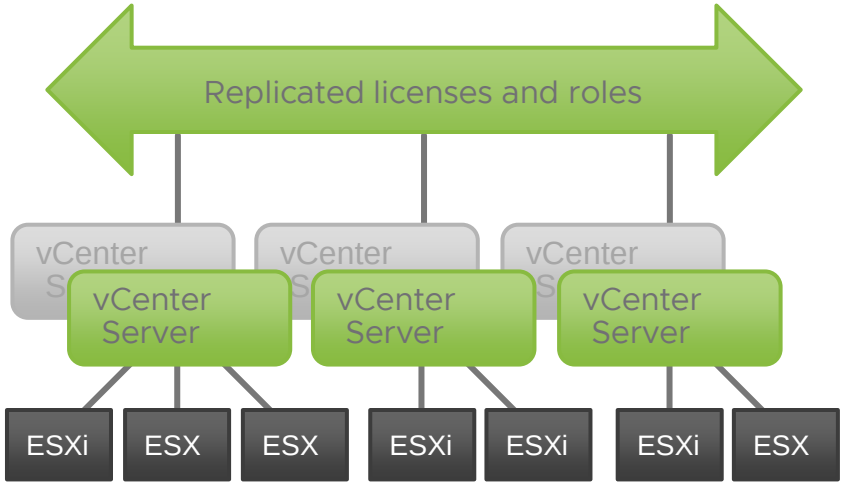



Key benefit: Change or increase the HW using Hot & Plug way

# vCenter Server Features

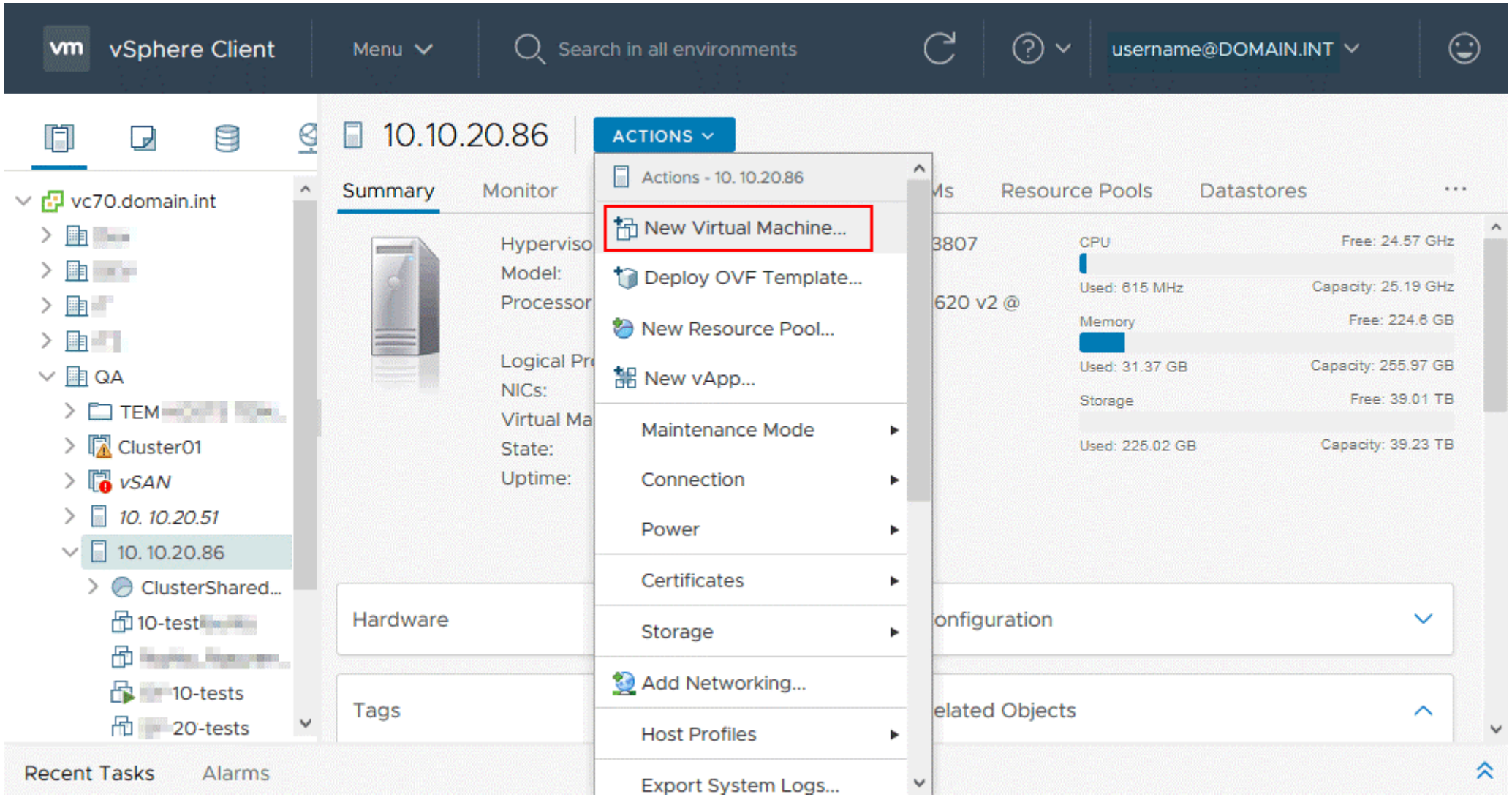
## Linked Mode

- “Single pane of glass”
- Links multiple vCenter Server instances
- View and search combined inventory of vCenter Server instances
- Shared licenses and roles




Key benefit: Manage whole Infrastructure connected to each other

# vSphere Demo

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# 3. Storage: Introduction

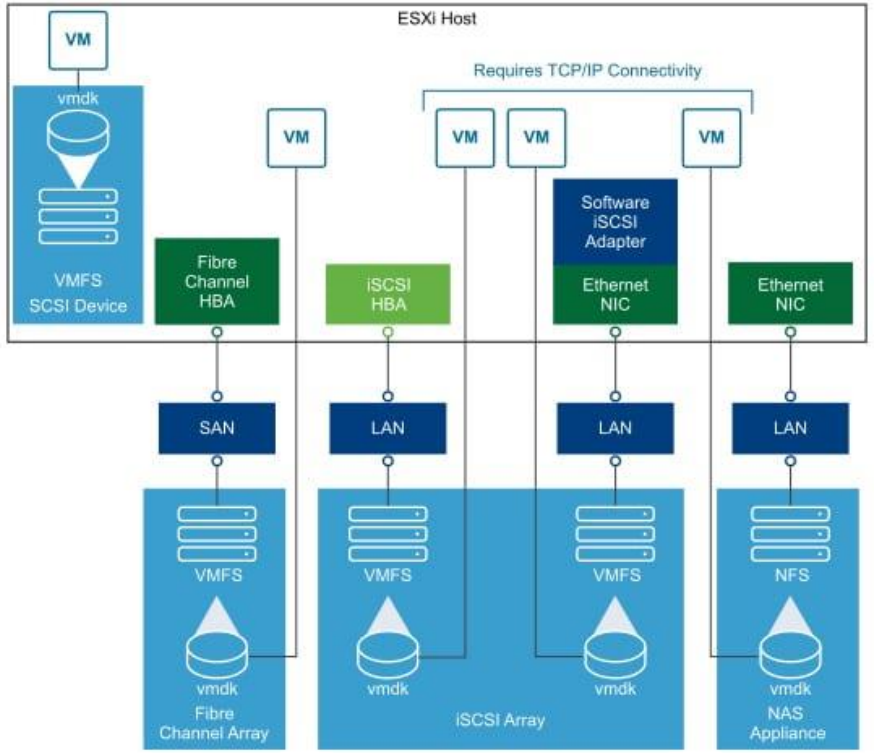
# 3. Module Objetives

| Topic | Description |
| --- | --- |
| Storage Options | Explain and understand the cloud storage |
| Software-Defined Storage Models (SDS) | What is SDS? (including several consumption models) |

# Storage: Introduction

## Storage Options

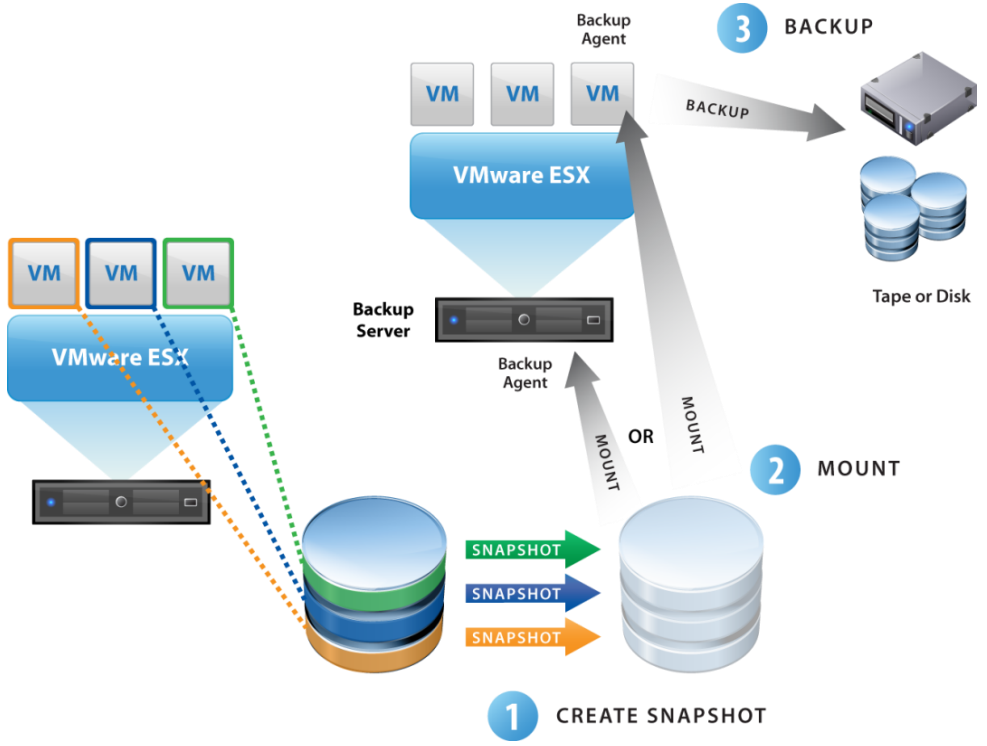
- **Local and networked storage**—storage devices attached to ESXi hosts
- **Storage Area Network (SAN)**—a high-speed network aggregating storage from multiple ESXi hosts. Access to storage on hosts can be performed via:
  - **Fiber Channel**—a high-speed storage protocol that can use either copper or fiber cable as its transport. Supporting performance from 266 megabits/second to 16 gigabits/second.
  - **iSCSI**—a high-performance storage protocol using Ethernet connections.
- **Virtual Disks (VMDK)**—large physical files stored on physical storage devices attached to the VM. Each virtual disk appears to the VM as an independent SCSI drive.
- **Network File System (NFS)**—storage devices mounted remotely using the NFS protocol and hosted on a NAS server.
- **Raw Device Mapping (RDM)**—allows guest operating systems within a VM to gain direct access to storage devices.



# Key VMware vSphere Features

## VCB/vStorage API

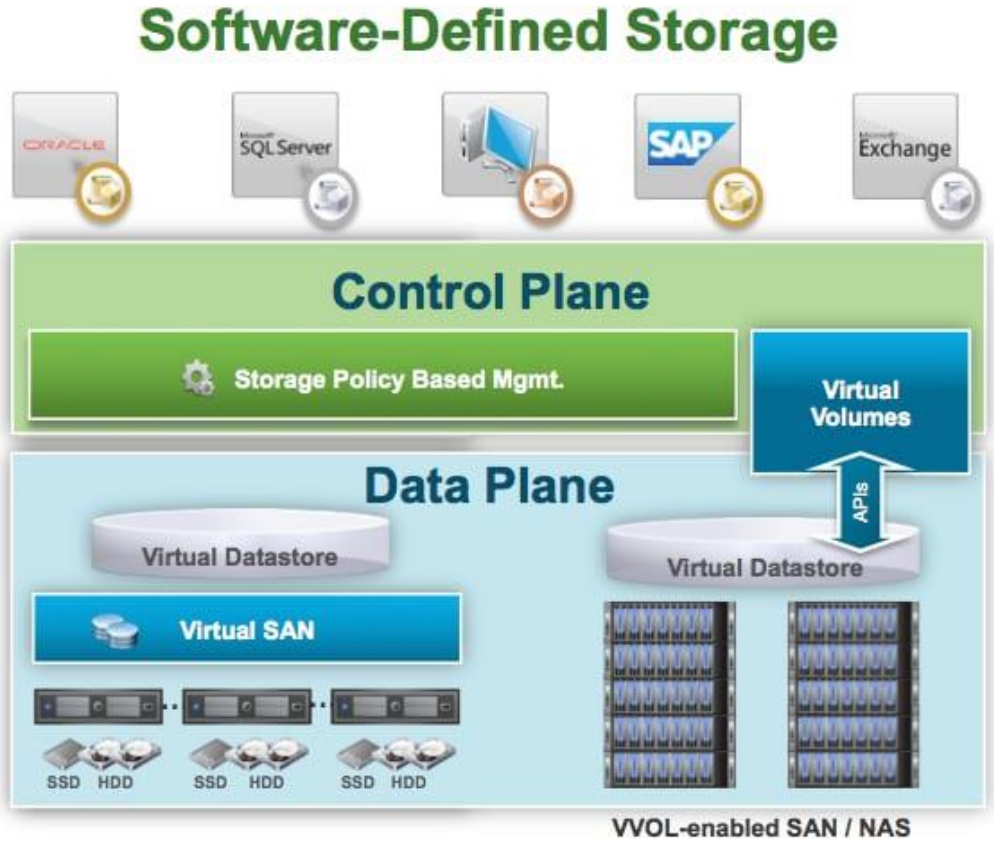
- Centralized, off-host VM backups
- Third-party backup vendors to leverage
  - Full, incremental, and differential backups
  - File-level backup and restore
  - Windows and Linux VMs



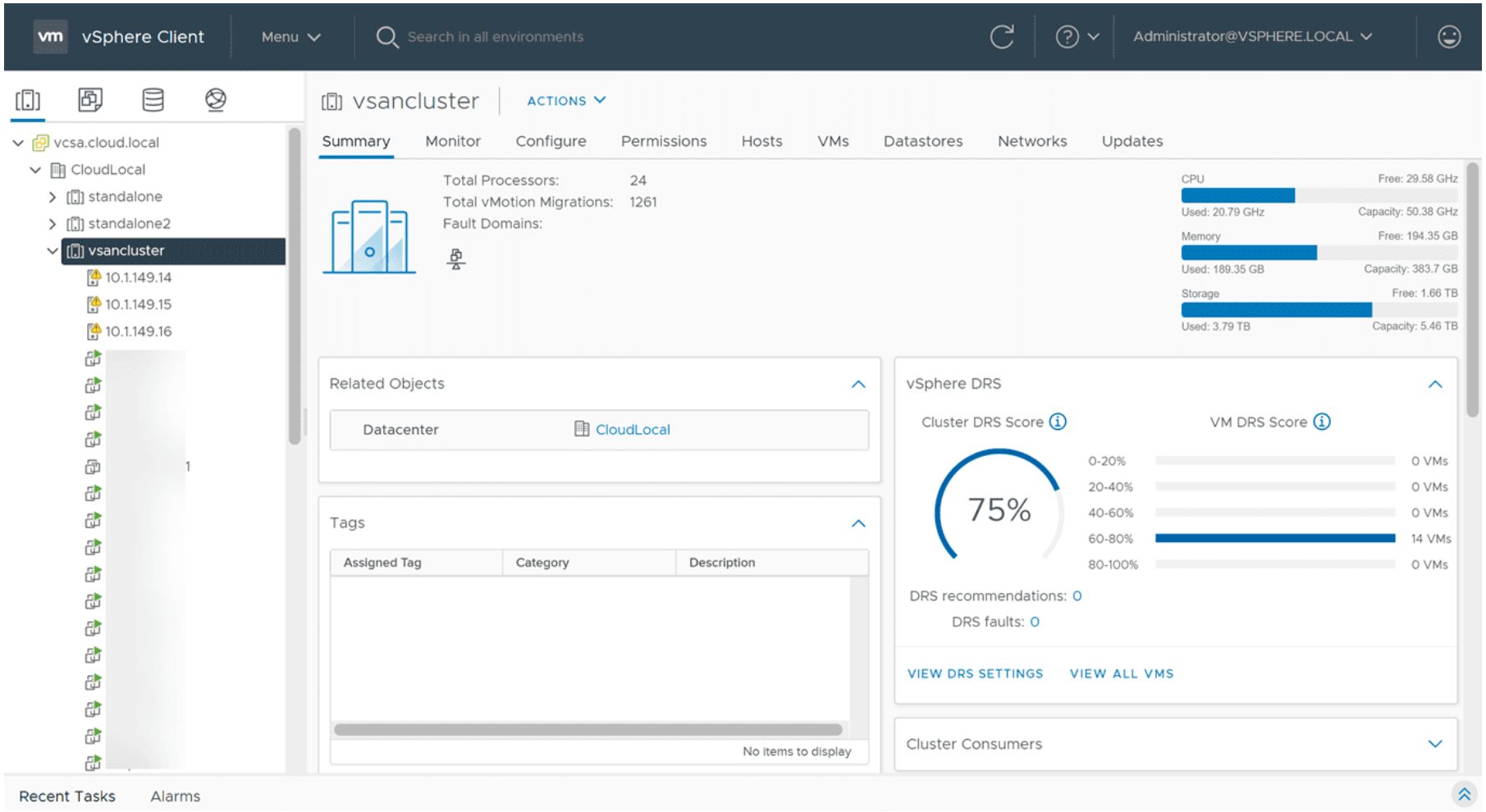
# Storage: Introduction

## Software-Defined Storage Models

- **Storage Policy-Based Management**—a single control panel for all data and storage services, including vSAN and Virtual Volumes, and provisions storage according to application requirements.
- **vSphere Virtual Volumes**—manages storage objects packaged into virtual storage arrays. This makes the virtual machine a unit of storage management, comprising one or more virtual disks, which appear to storage hardware as a regular disk drive.
- **Virtual SAN (vSAN)**—runs as part of the ESXi hypervisor. Aggregates local and direct-attached storage devices within VM hosts, and creates a single storage pool and share it between all hosts.
- **I/O filters**—agents installed on ESXi hosts that provide data services to other machines, including replication, caching, and encryption. This enables each machine to function as part of a distributed storage cluster.



# Storage Demo

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