

Data Centre Virtualisation

ACUA6001

LECTURE :

KOUSHIK MODAK

STUDENT :

1818665

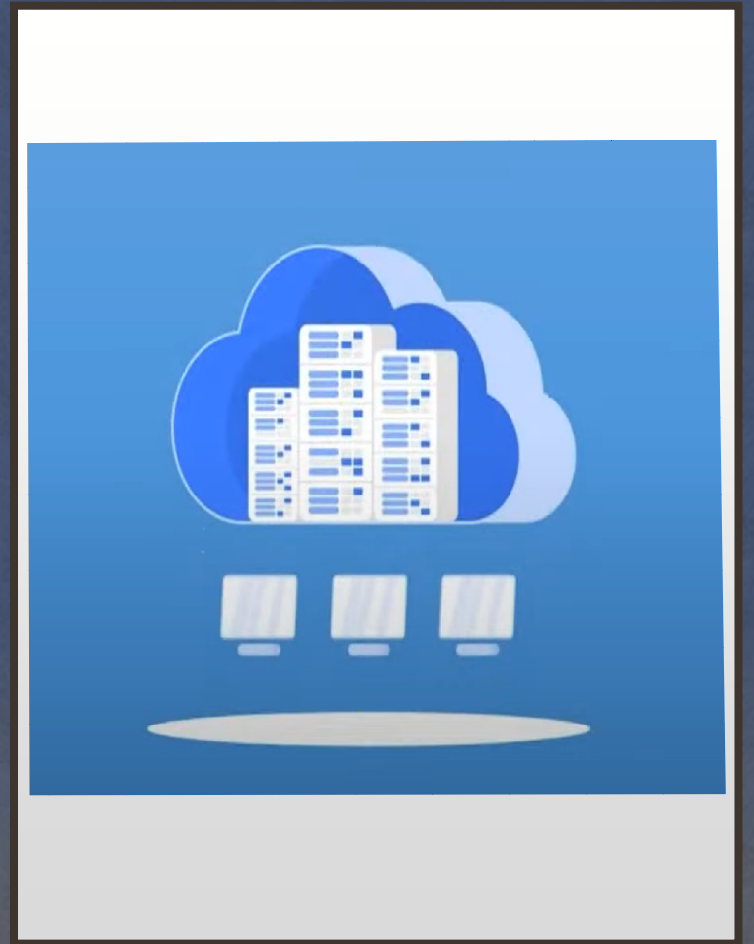
SONYA KYUCHUKOVA

KEY POINTS

- **VMware**
- **Windows VMs**
 - **Azure**
 - **Citrix**

TECHNOLOGIES THAT ENABLE VIRTUAL MACHINES WITH VMWARE

Virtualization uses software that simulates hardware functionality to create a virtual system. This practice allows IT organizations to operate multiple operating systems, more than one virtual system and various applications on a single server.



Benefits of Virtualization



Reduced capital and operating costs.



Minimized or eliminated downtime.



Increased IT productivity, efficiency, agility and responsiveness.



Faster provisioning of applications and resources.



Greater business continuity and disaster recovery.



Simplified data center management.

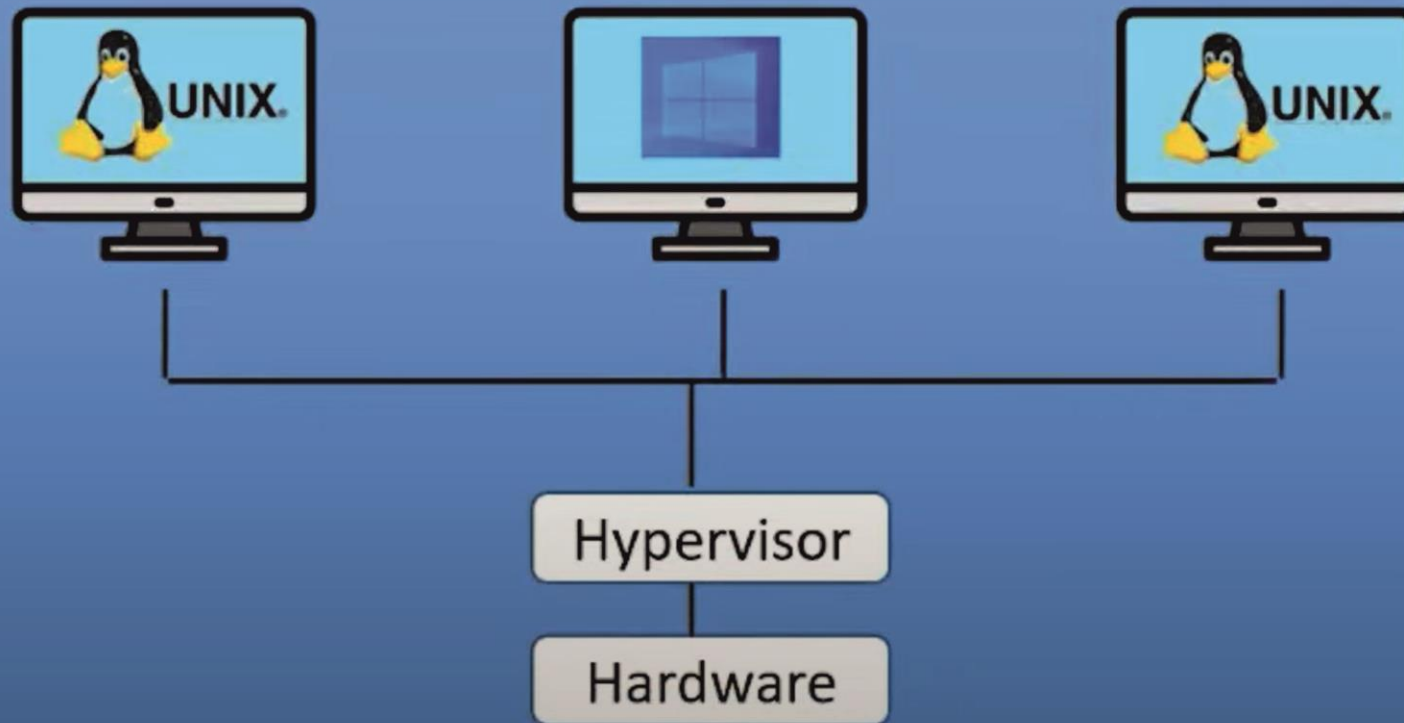


Availability of a true Software-Defined Data Center.

- Virtual machine is an emulation or a **virtual presentation** of a physical system.
- They are also referred to as **guest**, whereas the physical system they run on is referred to as the **host**.



- Hypervisor is a software that manages VMs.
- It acts as an interface between VM and physical hardware to ensure proper access to the resources needed for working.



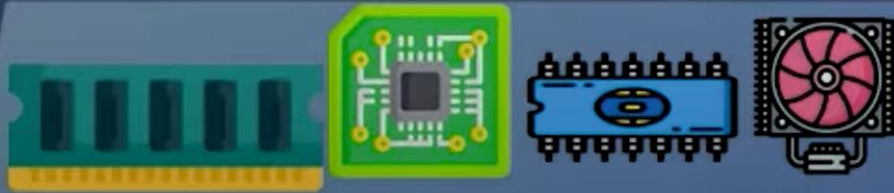
Type 1 HYPERVISOR



Guest OS

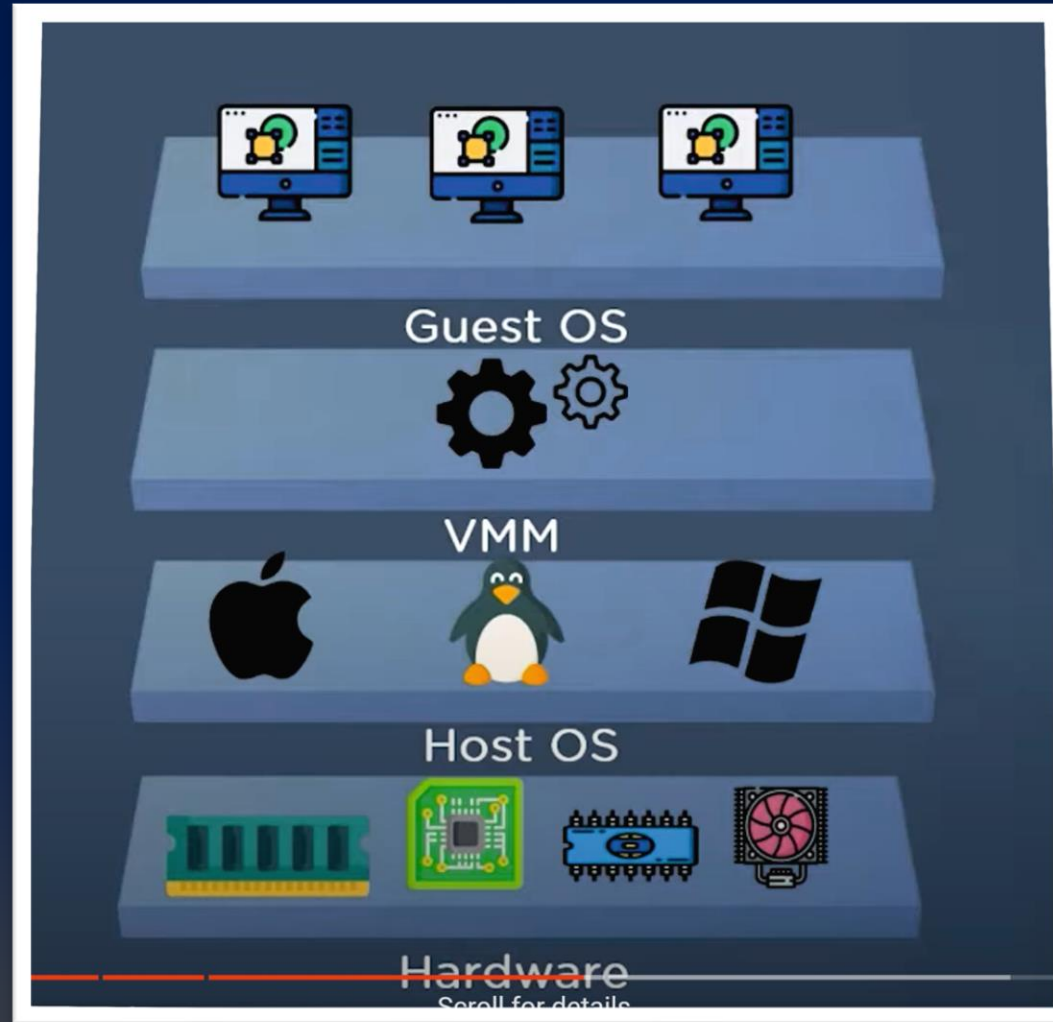


Hypervisor



Hardware

Type 2 HYPERVISOR



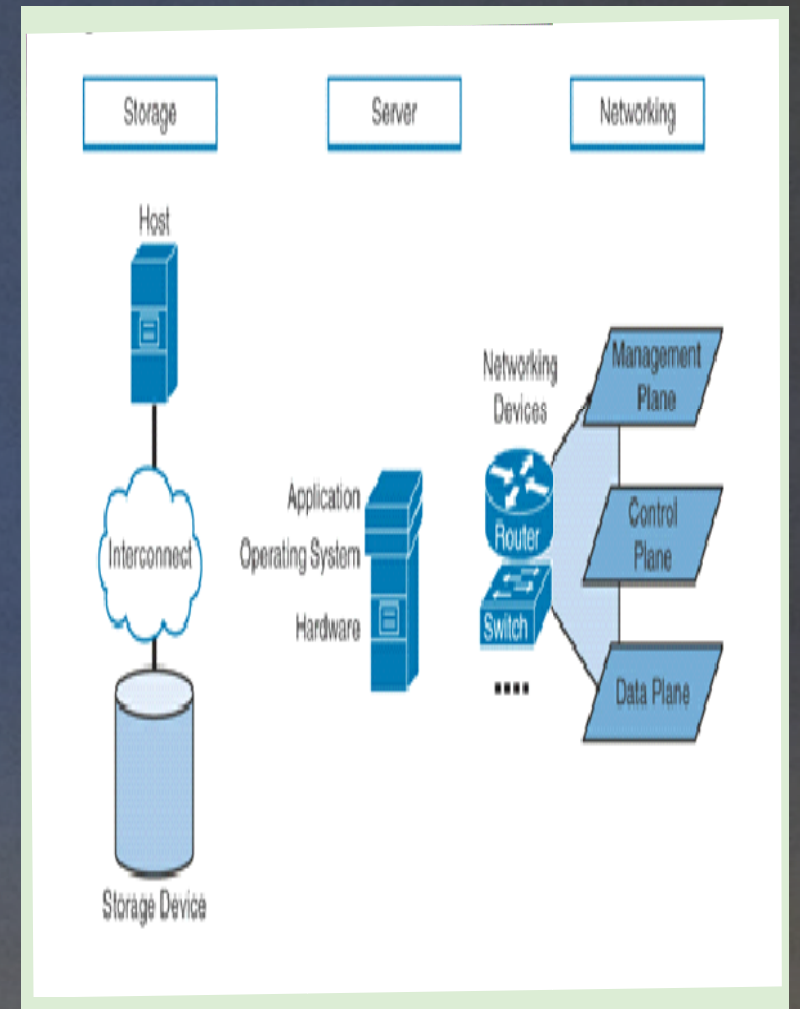
DATA CENTER VIRTUALIZATION TECHNOLOGIES AREAS

Desktop Virtualization

Network Virtualization

Storage Virtualization

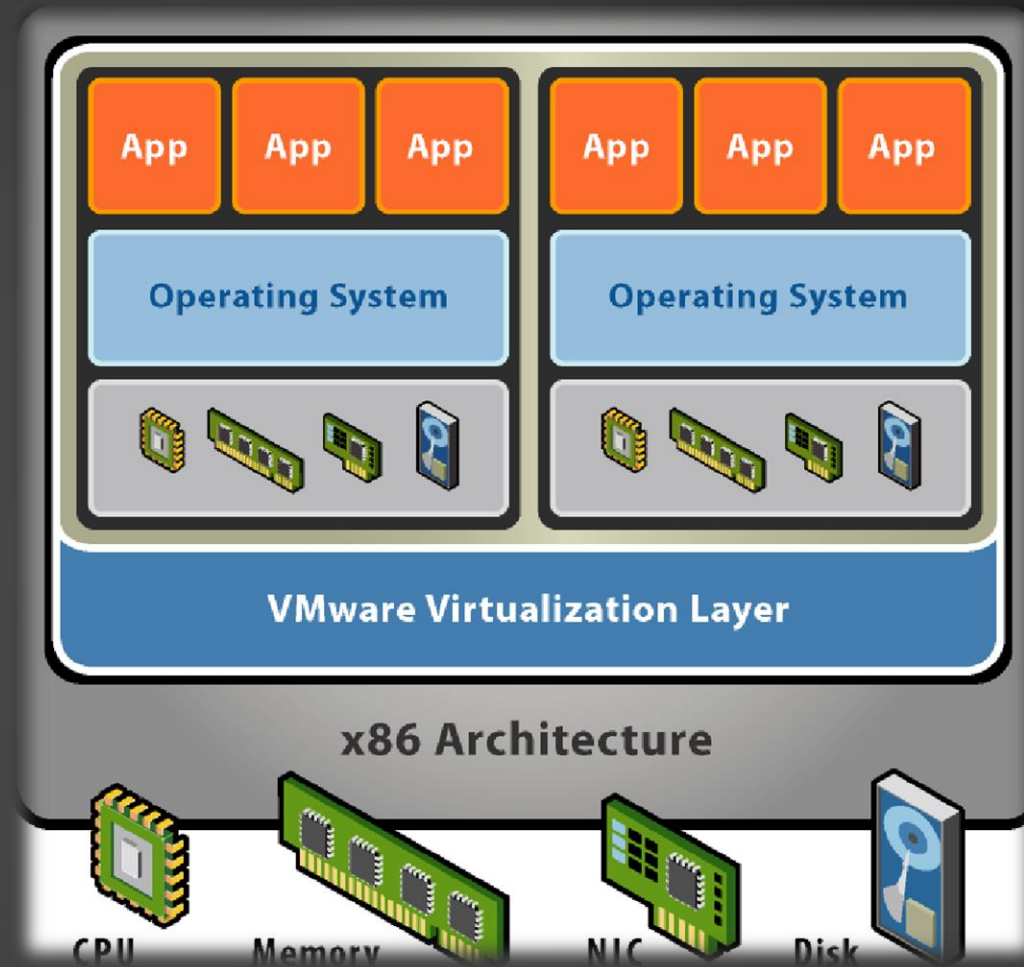
Application Virtualization



VM WARE

VMWARE IS A VIRTUALIZATION AND CLOUD COMPUTING SOFTWARE. VMWARE BASES ITS VIRTUALIZATION TECHNOLOGIES ON ITS BARE-METAL HYPERVISOR ESX/ESXI IN X86 ARCHITECTURE.

TheVMware provides allowance to the businesses to run multiple operating system and multiple application work loads on just one server, thus by enabling better management through creating a virtual machine which will behave like exactly as the actual computer.



Why Use Virtual Machines?

Physical machine

Difficult to relocate:

- Moves require downtime
- Specific to physical Hardware

Difficult to manage:

- Requires physical maintenance
- Hardware failures cause downtime

Hardware has limitations:

- Hardware changes limit application support
- Servers are physically individual



Virtual machine

Easy to relocate:

- Encapsulated into files
- Independent of physical hardware

Easy to manage:

- Isolated from other virtual machines
- Insulated from hardware changes

Provides the ability to support legacy applications

Allows servers to be consolidated



Advantages of VMware

SAVE A LOT OF COSTS WITH VMWARE

With VMware or Virtualization, you can save a lot of money on your computing. It is an affordable option for you. When the physical servers are minimized and divide physical servers into virtual servers you can save a lot of costs that you would pay otherwise. This is what decreases cooling costs, carbon footprint, diesel generator costs, energy bills, etc.

This is how VMware can save you a lot of bucks. Virtualization has changed the way companies and businesses work and thrive. You can take your company to greater heights with virtualization.

VMware/Virtualization/Virtual Machines



Run Multiple Operating System

Compatible with Windows, Linux, Mac, etc.

Setup & Delete Virtual Machine Easily

<https://www.webtechcoupons.com/advantages-vmware/>

DECREASE DOWNTIME OF SYSTEM

Virtualization reduces downtime and increases the uptime of your system.

Uptime and Downtime are the two main things that determine the performance of your computers. The better the uptime the faster speed you experience.

VMware or Virtualization increases the availability of the application on your computer. And this is what keeps your system running without any interruption.

Features like DRS, DPM, VMotion, and VMHA help increase the uptime and reduce the downtime.

DATA BACKUP AND RECOVERY

To recover the data you need to install the backup software on each virtual machine. Or you can also use a virtual server to restore your data and important files. There are various other ways for backup also. But the bottom line is that you will not lose your valuable data and other stuff with VMware.

BOOST PROFIT

VMware allows you to use multiple servers which reduces the cost of storage, energy bill, diesel generator costs, cooling costs, etc.

And when you reduce the costs you increase the profit. With virtualization, you can increase the profit of your company very fast.

This is what makes VMware cost-effective also. Less you invest but more you get out of it.

ROLLBACK SMOOTHLY

It is a matter of time when you come across any error or technical glitch while adding a new virtual machine or doing anything else on your computer.

But you don't need to worry about any damage or functions when you can rollback easily and faster to the same system as before.

Vmware allows you to rollback anytime you come across any error and get all the settings as they were earlier. The process of rolling back is simple and faster. So you don't need to worry about anything.

More Protection and Security

With VMware, your data and precious information are safe and secure. How you can secure your computer? You can increase the level of protection by creating virtual networks.

This is how all of your data can not be hacked by any third party. And this is what saves you from any kind of data or personal information breach.

Best For New Business

VMware is very good for all the new businesses that are thriving fast. As a new business, you need to save a lot of costs and increase profits. And as we earlier mentioned how cost-effective VMware or Virtualizations is.

So, for all the new businesses and startups, VMware is the right option for you to grow your business faster.

Deleting Process is Easy

This is one of the most important advantages or pros of VMware. You can delete virtual machines from your system easily and faster with a few steps.

This is how you can create free space on your computer again that you can use to download any virtual machine.

This is one of the coolest pros of VMware or Virtualization or virtual machines. You can use different software on VMware that does not work with your operating system.

For example on you can install Windows, Linux, etc on your virtual machine and run it on iOS or Mac.

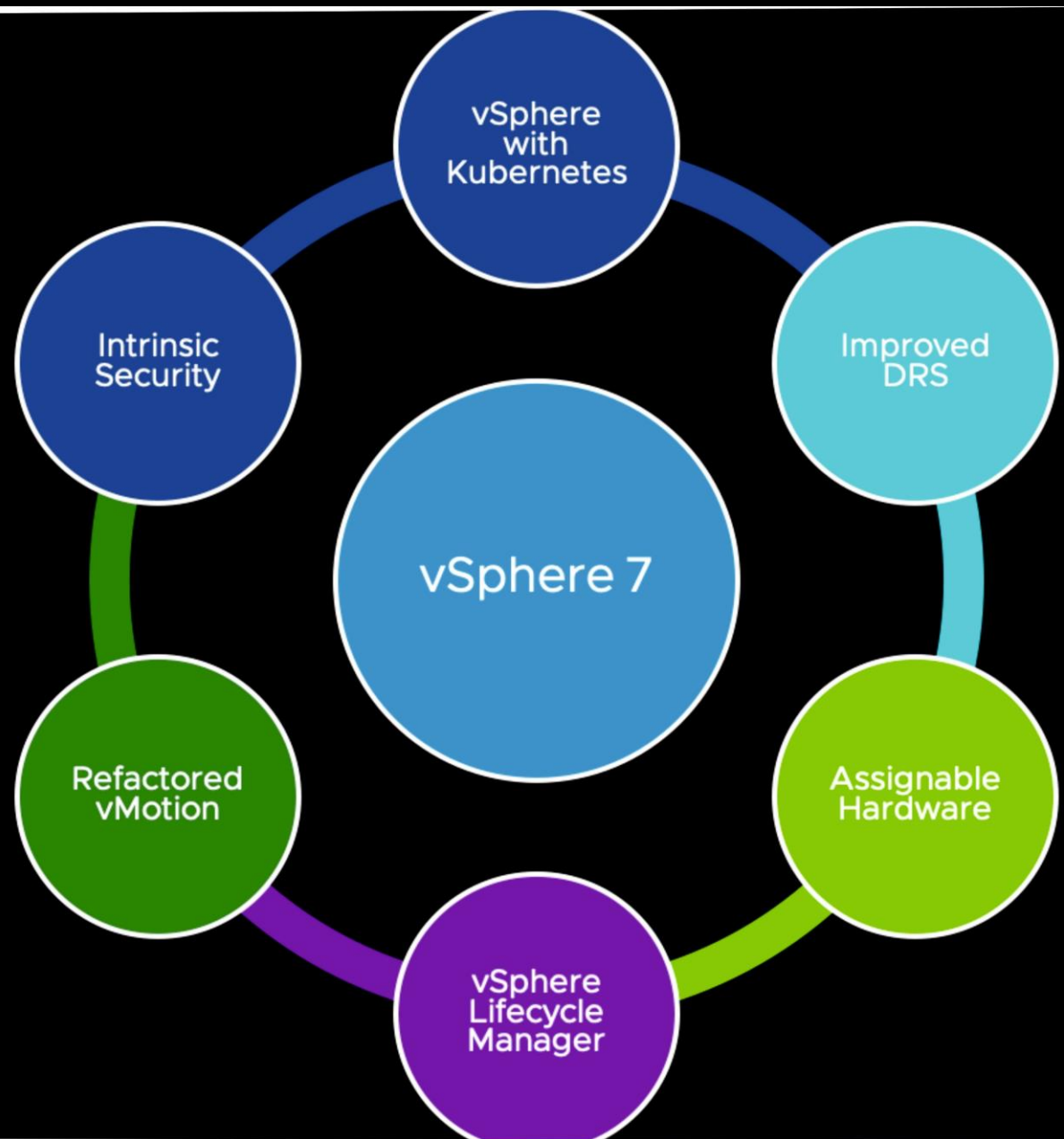
VMware vSphere

What is VMware vSphere?

– Is a product set of VMware, used to serve the needs of system virtualization.

Components and functions of vSphere.

– With VMware vSphere, administrators have many tools to use for all architectural environments ranging from several servers to thousands of servers.

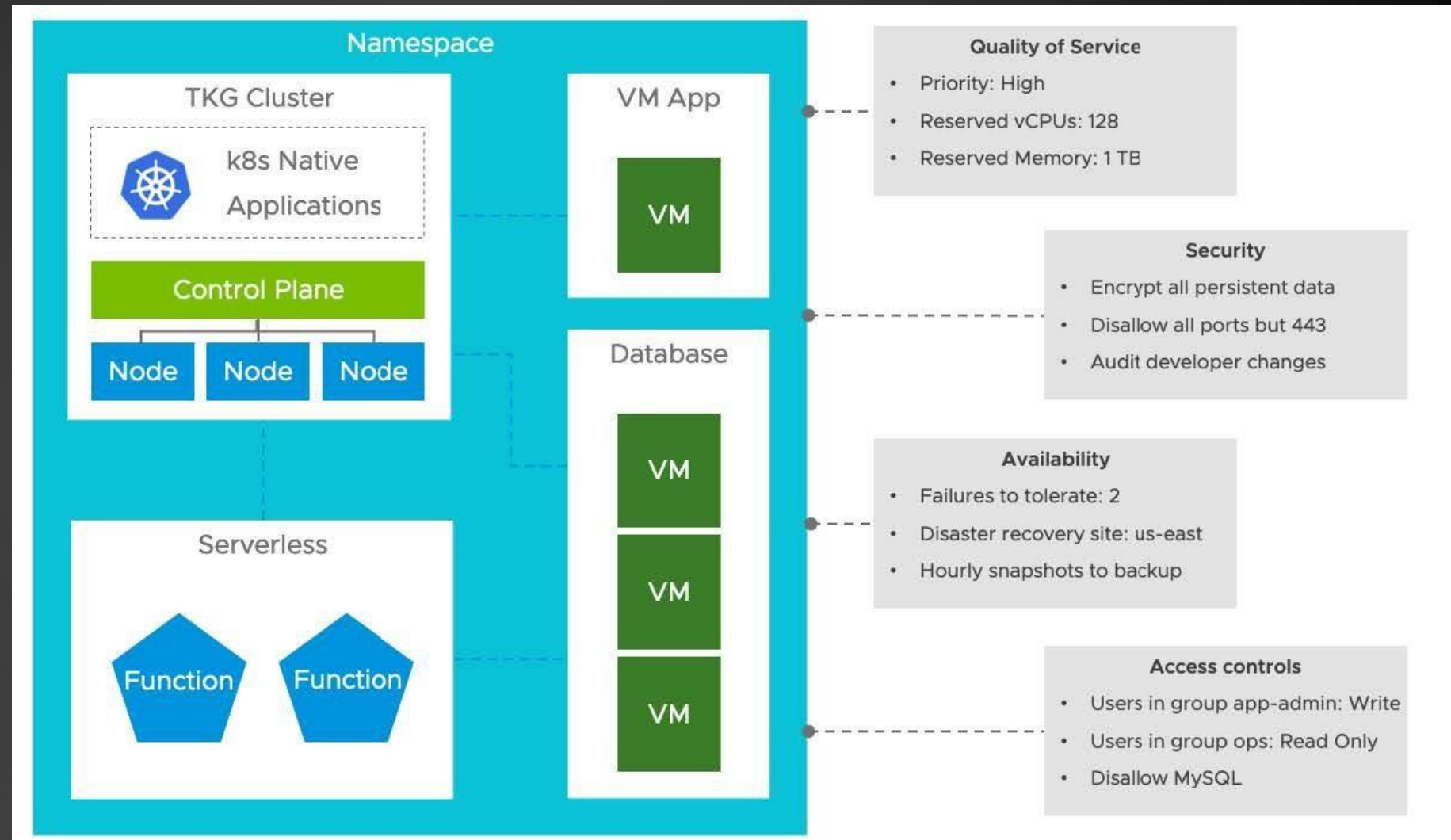


vSphere with Kubernetes

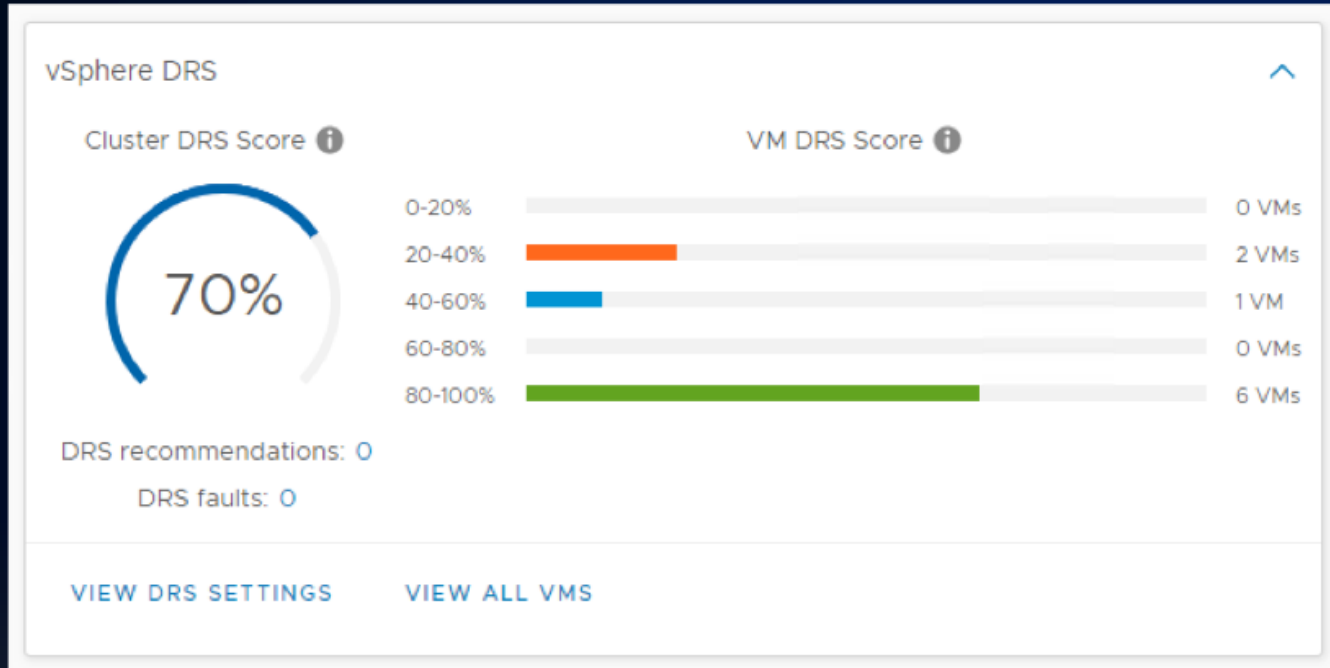
Allows developers to continue using the same industry-standard tools and interfaces they've been using to create modern applications.

vSphere Admins can help manage the Kubernetes infrastructure using the same tools and skills they have developed around vSphere.

Namespaces allowing vSphere Admins to create a logical set of resources, permissions, and policies that enable an application-centric approach.



Improved Distributed Resource Scheduler (DRS)



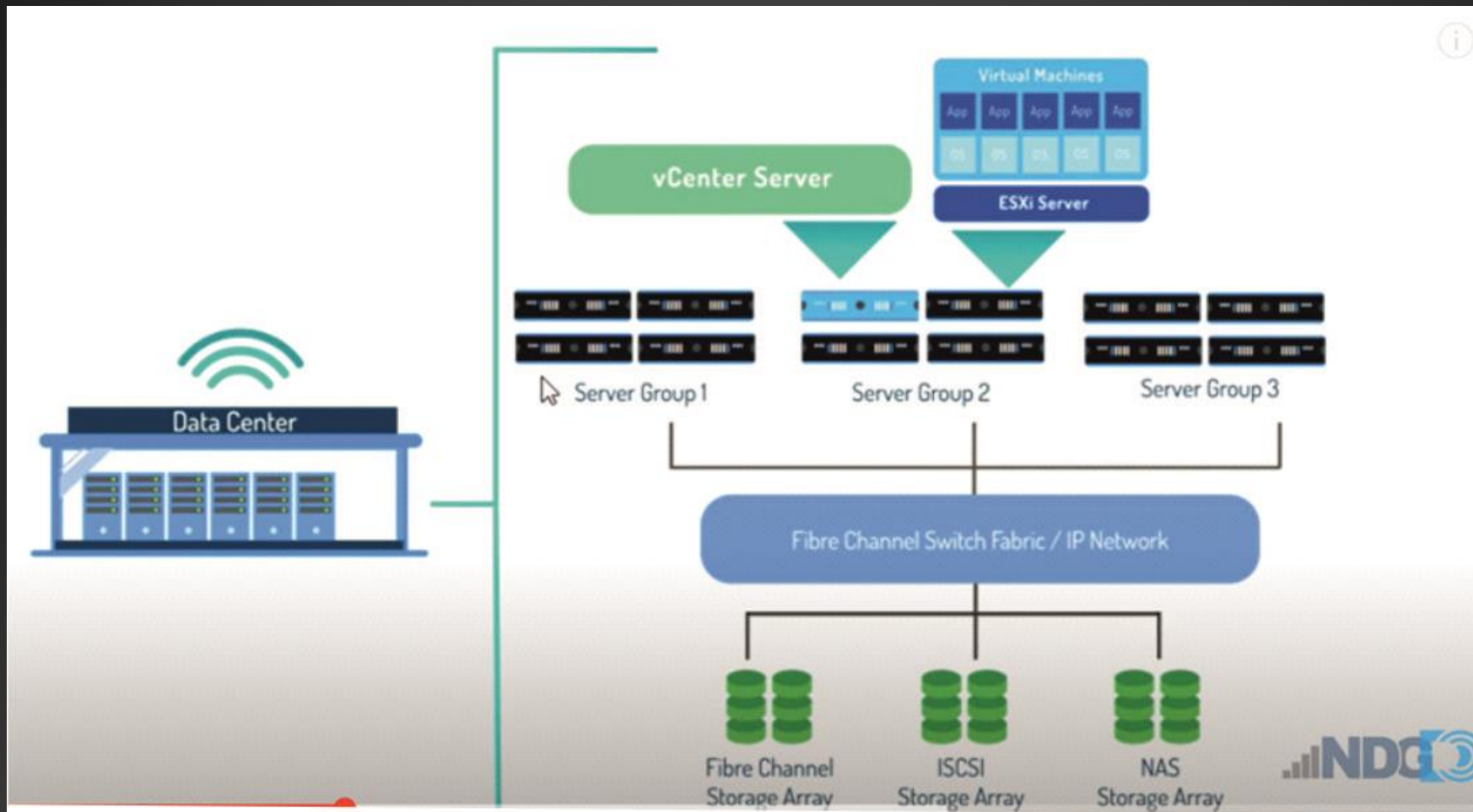
The new DRS logic takes a very different approach that addresses these questions. It computes a VM DRS score on the hosts and moves the VM to a host that provides the highest VM DRS score. The biggest difference from the old DRS version is that it no longer balances host load.

Assignable Hardware

In vSphere 7, there is a new framework called Assignable Hardware that was developed to extend support for vSphere features when customers utilize hardware accelerators.

Refactored vMotion

Improved was the memory copy Tracers where vMotion keeps track of memory paging activity during a migration



vCenter Server

Manage

Virtual Machine Virtual Machine Virtual Machine Virtual Machine Virtual Machine

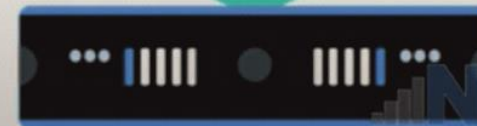
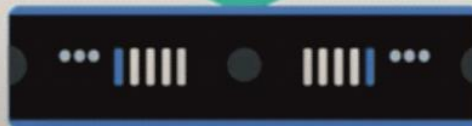
Virtual Machine Virtual Machine Virtual Machine Virtual Machine Virtual Machine

Virtual Machine Virtual Machine Virtual Machine Virtual Machine Virtual Machine

ESXi Server

ESXi Server

ESXi Server



NDG



vSphere Lifecycle Manager

vLCM Cluster ACTIONS ▾

Summary Monitor Configure Permissions Hosts VMs Datastores Networks Updates

Hosts ▾

- Image
- Hardware Compatibility
- VMware Tools
- VM Hardware

Image

Hosts in this cluster are managed collectively. This image below will be applied to all hosts in this cluster.

ESXi Version 7.0 GA - 15458156

Vendor Addon ⓘ None

Firmware and Drivers Addon ⓘ Lab Cluster Profile 4.0.0-0

Components ⓘ 1 additional components [Show details](#)

⚠ Image of the cluster has changed. Please re-run Hardware Compatibility check. [See details](#)

Image Compliance

[CHECK COMPLIANCE](#) ⋮

Last checked on 01/22/2020, 4:56:32 AM (0 days ago)

ⓘ 2 of 2 hosts' compliance status are unknown

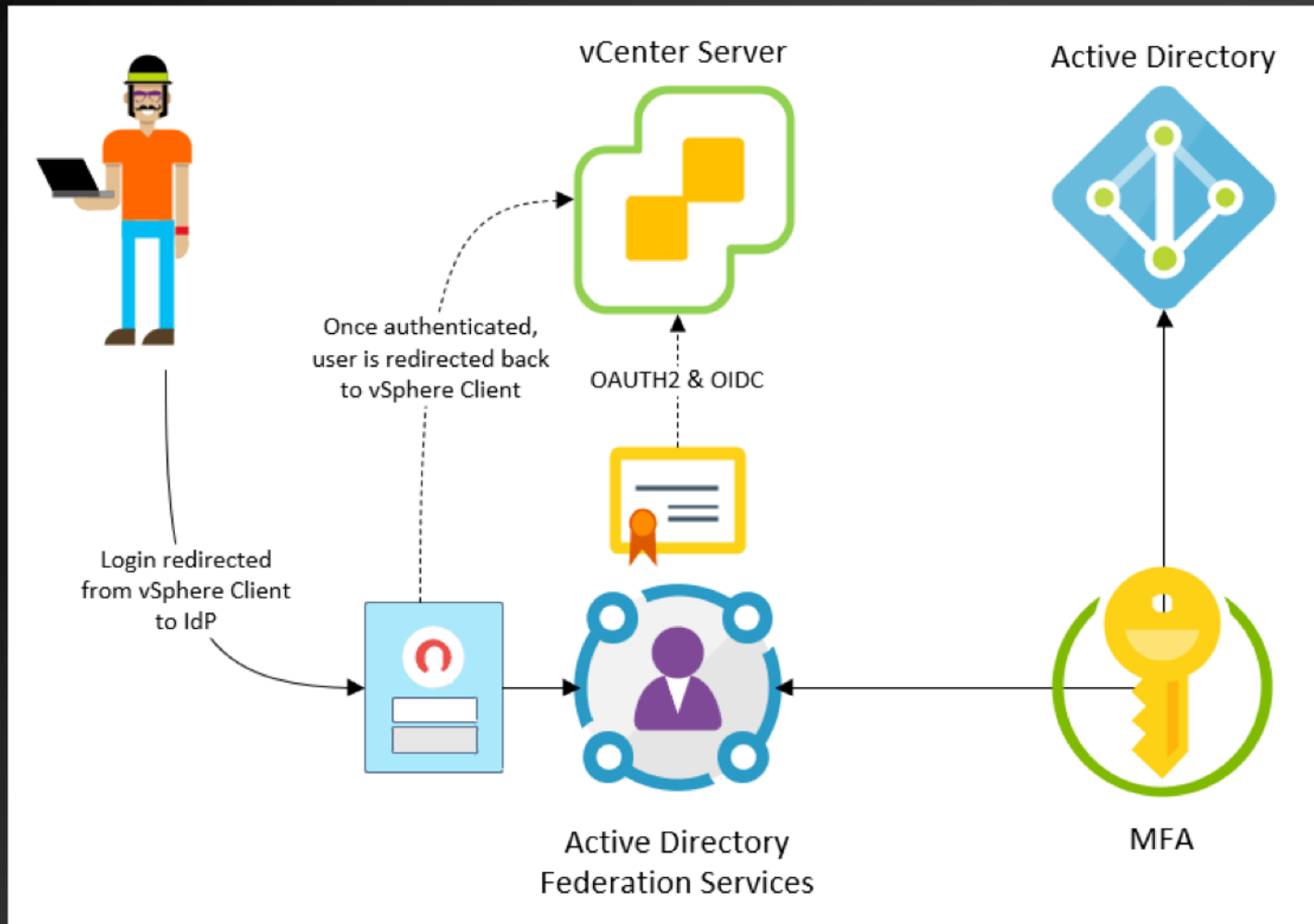
[REMEDiate ALL](#) [RUN PRE-CHECK](#)

Hosts
⋮ ⓘ 10.40.194.6

10.40.194.6 ⓘ Host status is unknown

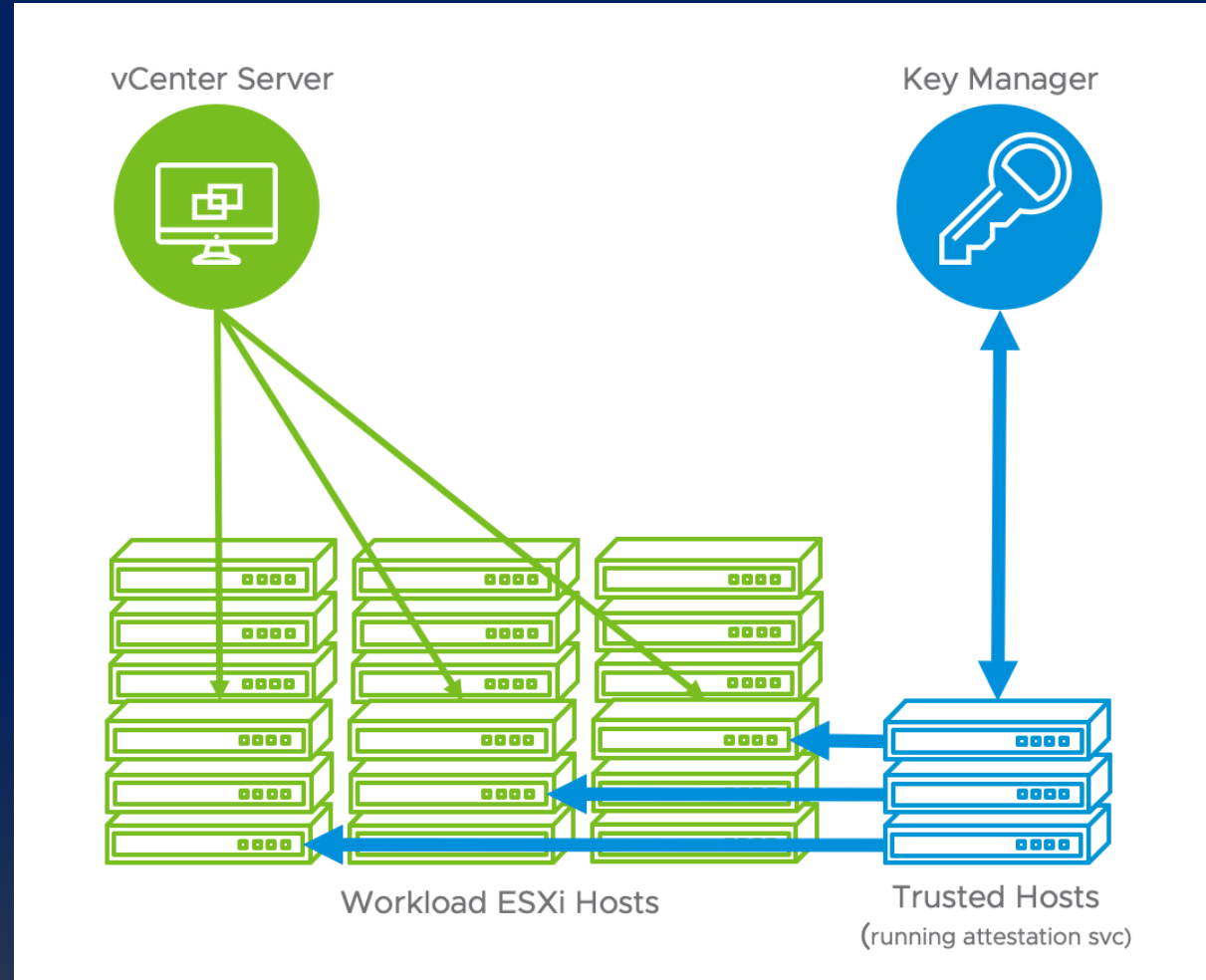
Using a desired state configuration model, vSphere Administrators can create configurations once, apply them, and continue to monitor that desired state through new tools called vCenter Server Profiles and Image Cluster Management. vCenter Server Profiles enable administrators to standardize on a configuration for all of their vCenter Servers and monitor to protect against configuration drift.

Intrinsic Security



With vSphere 7 and Identity Federation, vCenter Server can talk to an enterprise identity provider and get the vSphere Admins and vCenter Server out of the process. This simplifies the vSphere Admin's job and reduces helps reduce compliance audit scope.

vSphere Trust Authority creates a hardware root of trust using a small, separately-managed cluster of ESXi hosts.



Windows VMs

Hyper V VERSUS VMware

Hyper V

A server virtualization product developed by Microsoft Corporation that provides virtualization services through hypervisor-based emulations

Helps in creating and running virtual machines

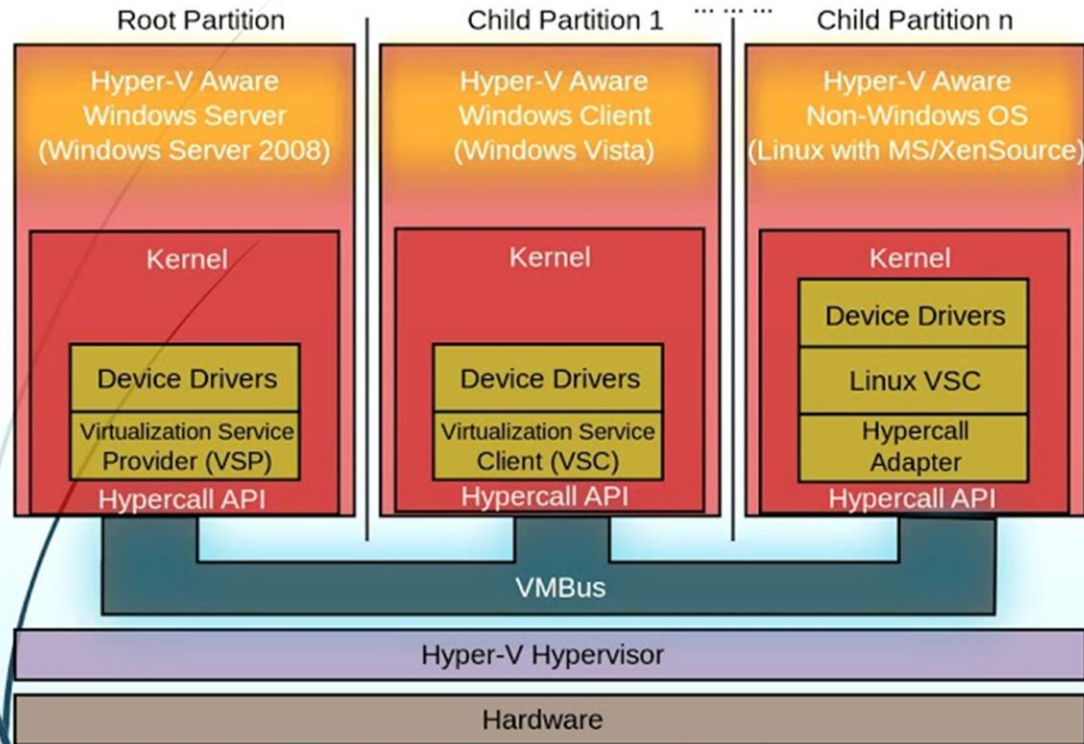
VMware

A company established in 1998 that provides different software and applications for virtualization

Provides platform virtualization and cloud computing services

Visit www.PEDIAA.com

Hyper-V

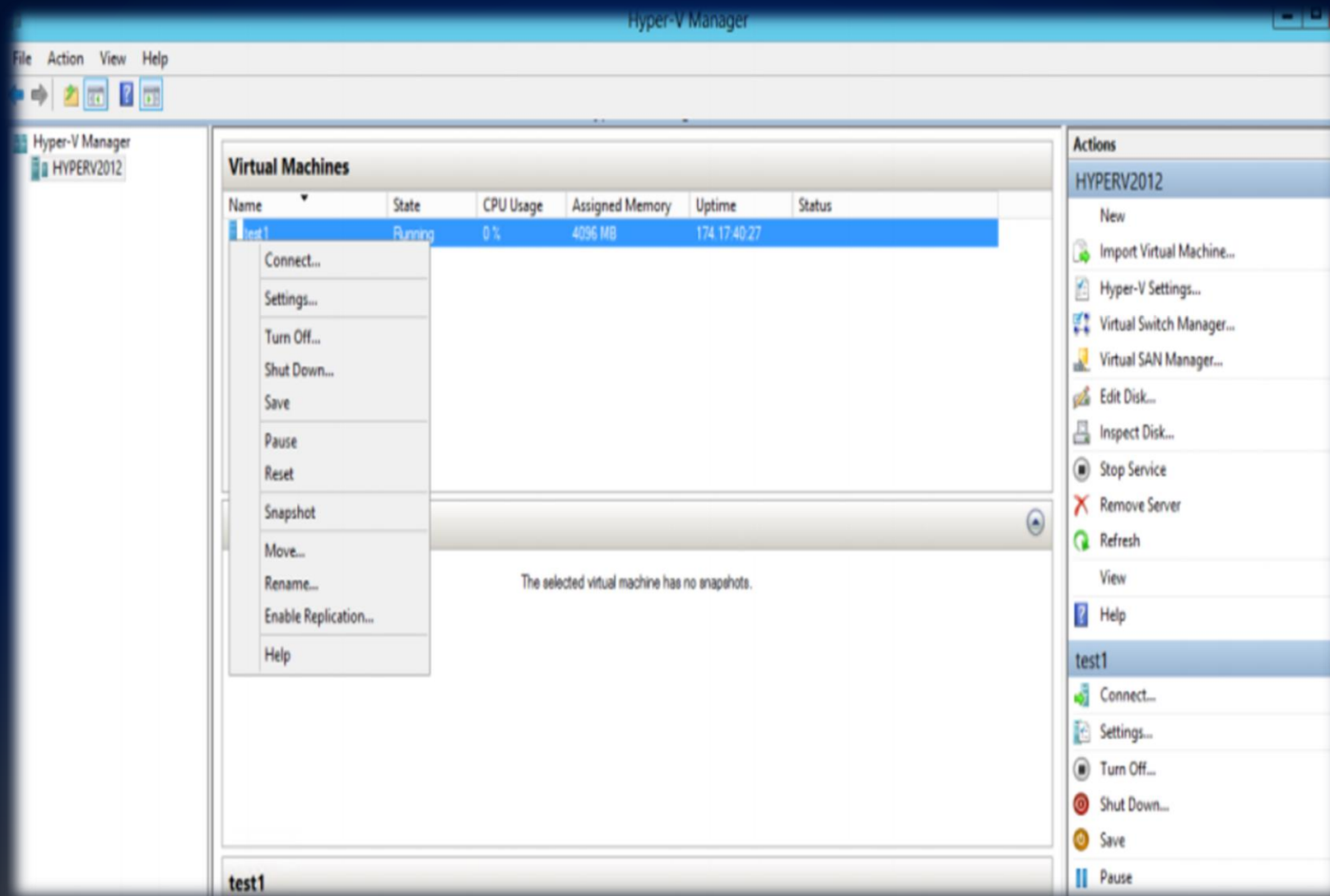


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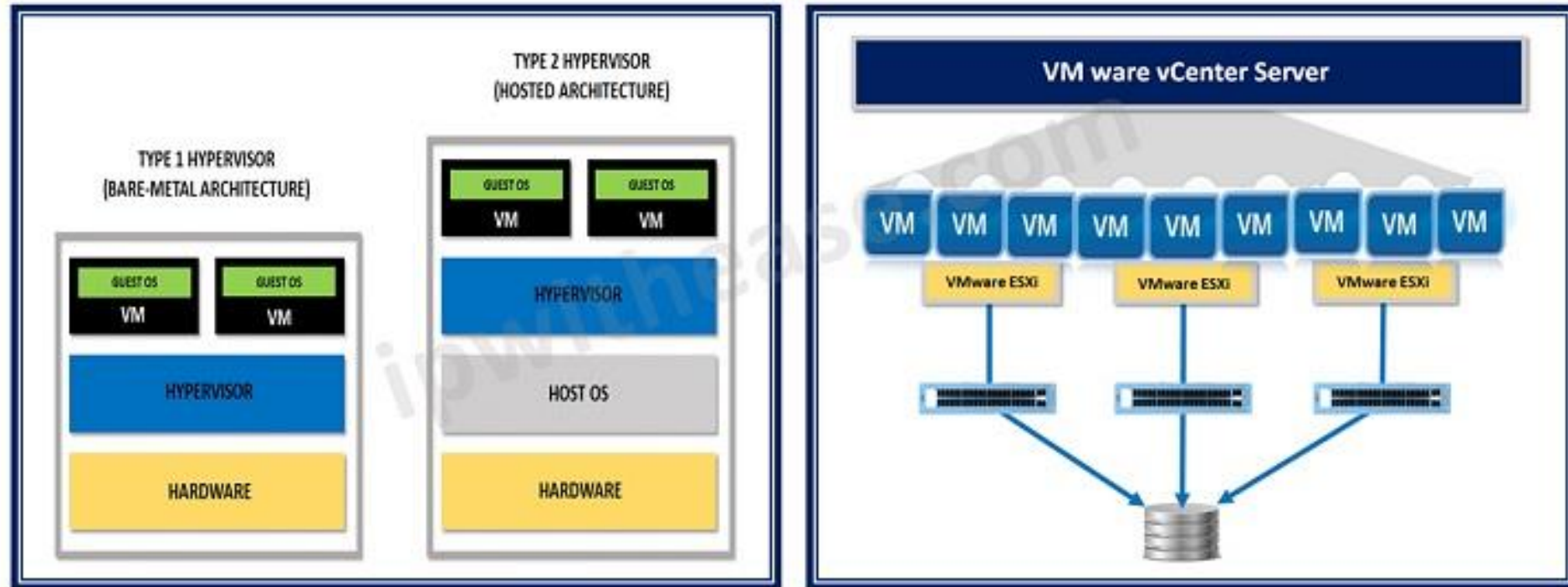
- Hyper-V is software like VMware that allows a multitude of virtual machines to run.
- Hyper-V is included with the installation of Windows Server 2008 and Windows server 2016.
- There is a standalone version of Hyper-V, that can run bare bones, as that is does not require an underlying operating system to run. However, you can lose that functionality of running multiple server roles on that machine plus there is no graphical interface.

The Virtual machine is actually a virtual type of environment which can work like a computer within a computer system. It basically runs on an isolated type of partition of the host based computer with the own resources of CPU, OS, memory and other resources. The MS hyper V virtualized can reduce costs in a great way [5]. After purchasing just very few powerful servers the users can virtualize most of the entire infrastructure at the time of reducing the cost of hardware.

Just as other hypervisors, the Hyper V provides the a way to the user so that they can create as well as they can manage the virtual machine for helping the organisations or users. It is provide the ability to develop and test application, operating system as well as upgrades. The Hyper V can isolate each of the VMs within a similar physical machine that provide allowance to multiple users in accessing various system in an independent way on the similar hardware [4]. This kind of isolation can ensure that even if one virtual machine will crash, there will not be any such impacts on other work loads which are running on the similar physical machine.



HYPER-V vs VMWARE



networkinterview.com
(An Initiative By ipwithease.com)

Microsoft Azure

What is Azure?

The Azure cloud platform is more than 200 products and cloud services designed to help you bring new solutions to life—to solve today's challenges and create the future. Build, run, and manage applications across multiple clouds, on-premises, and at the edge, with the tools and frameworks of your choice.

MICROSOFT AZURE,

Microsoft Azure, commonly referred to as Azure, is a cloud computing service created by Microsoft for **building, testing, deploying, and managing** applications and services through Microsoft-managed data centers.

It provides software as a service (SaaS), platform as a service (PaaS), and infrastructure as a service (IaaS) and supports many different programming languages, tools, and frameworks, including both Microsoft-specific and third-party software and systems.

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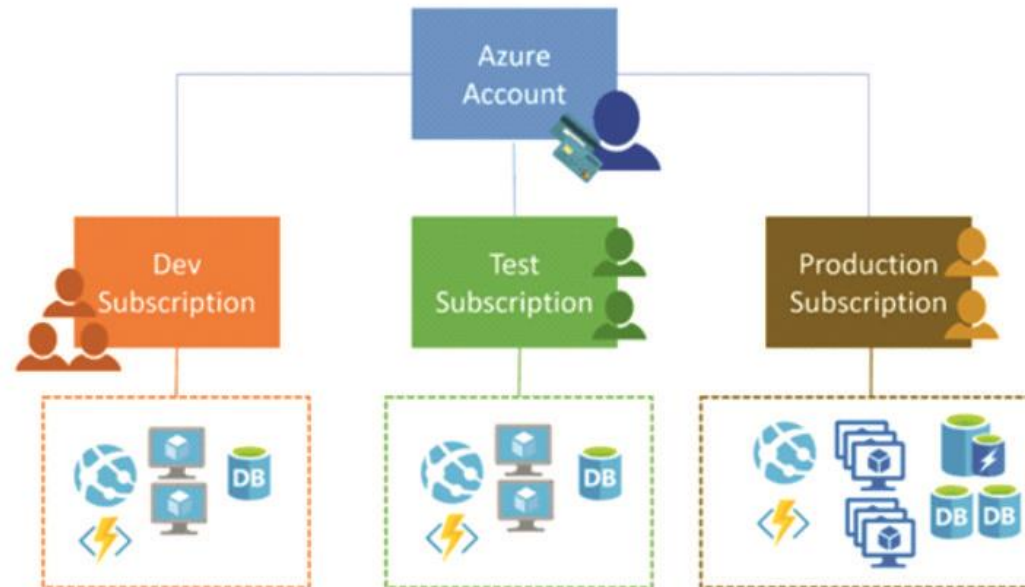


How does Microsoft Azure work?

Once customers subscribe to Azure, they have access to all the services included in the Azure portal. Subscribers can use these services to **create** cloud-based resources, such as **virtual machines** and **databases**.

Accounts and Subscriptions

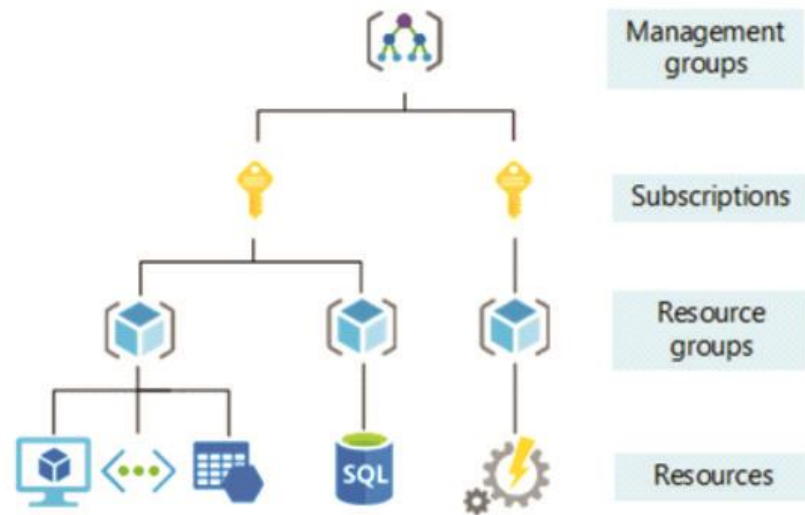
An Azure account is a **globally unique entity** that gets you access Azure and your Azure subscriptions. You can create **multiple** subscriptions in your Azure account to create separation, for example – for billing and management purposes.



Resource Groups

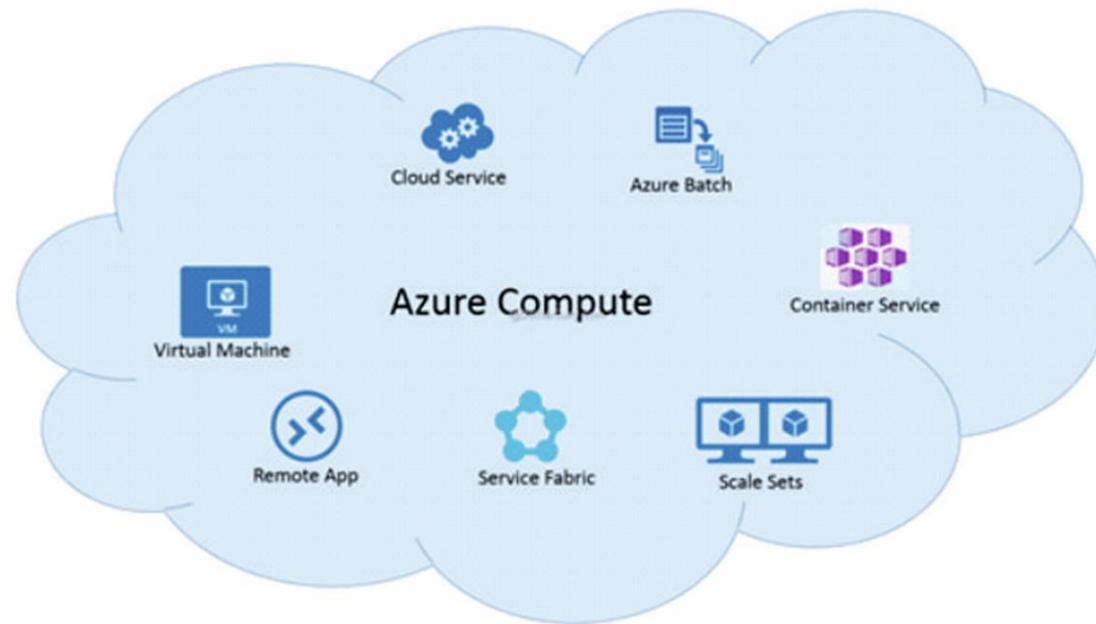
A resource group is a **logical container** that holds related resources for an Azure solution. It helps in managing all the resources in a group. It helps us to allocate resources to a resource group. Generally, it adds resources that share the same lifecycle to the same resources group so you can easily **deploy**, **update**, and **delete** them as a group.

Check more on [Resource Groups](#).



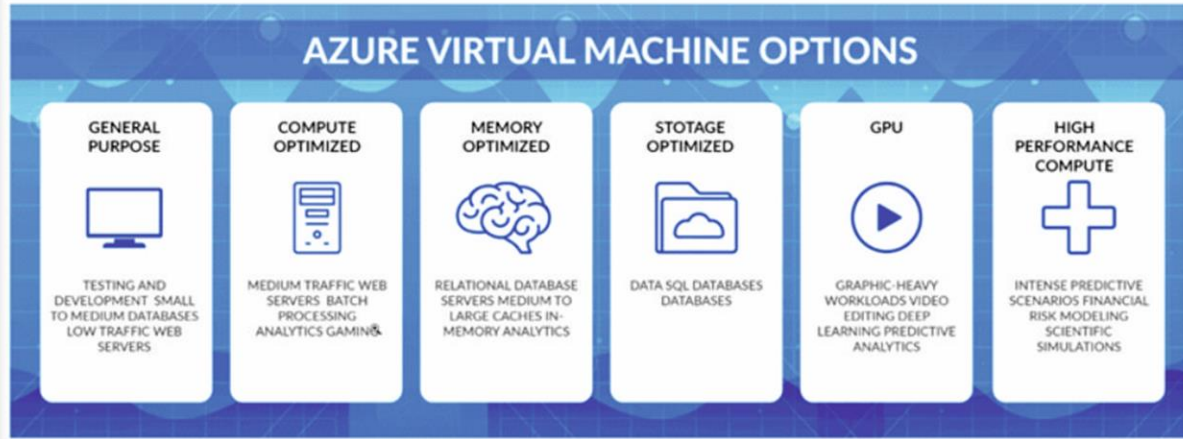
Azure Compute Service

Azure offers several ways to host your application code. The term **compute** refers to the hosting model for the computing resources that your application runs on.



1. Azure Virtual Machine

A Virtual Machine (VM) is a **computing** service that performs most functions of a physical computer, actually behaving like a **separate** computer system.

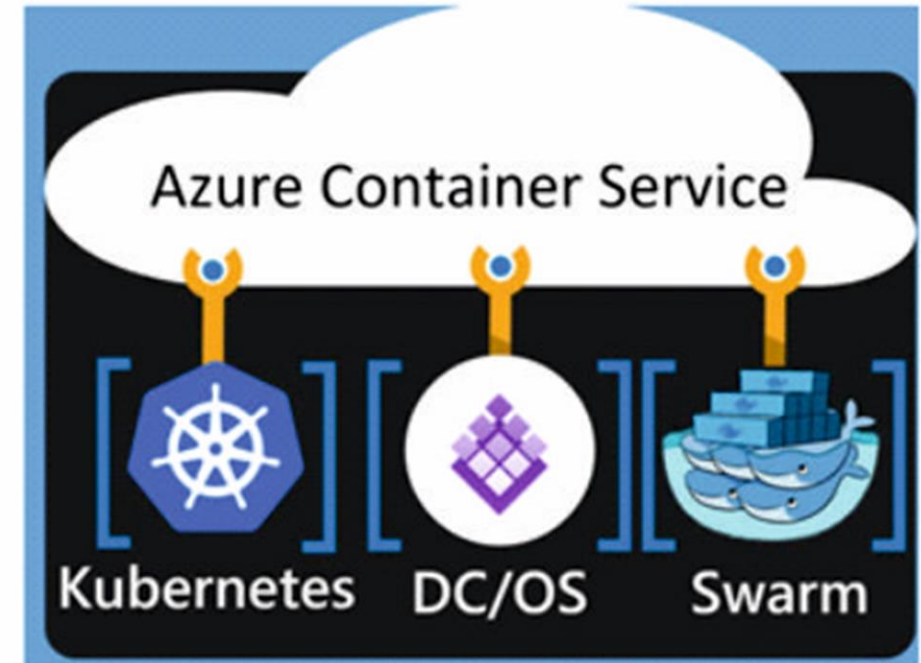


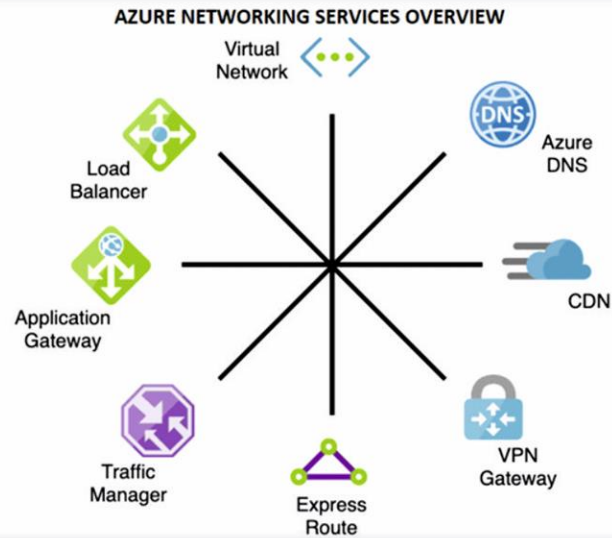
- **Azure Virtual Network (VNet)** enables Azure resources to communicate with each other, the internet, and on-premises networks.
- **Virtual Private Network Gateway (VPN)** sends encrypted traffic between an Azure virtual network and an on-premises location over the public internet.
- **Azure Express Route** extends on-premises networks into Azure over a private connection facilitated by a connectivity provider.

Azure Containers are a lightweight, virtualized environment that does not require operating system management and can respond to changes on demand.

- **Azure Container Instances:** a PaaS offering that runs a container in Azure without the need to manage a virtual machine or additional services.

Azure Kubernetes Service: an orchestration service(The process of automating the tasks needed to manage connections and operations of workloads on private and public clouds) for containers with distributed architectures and large volumes of containers

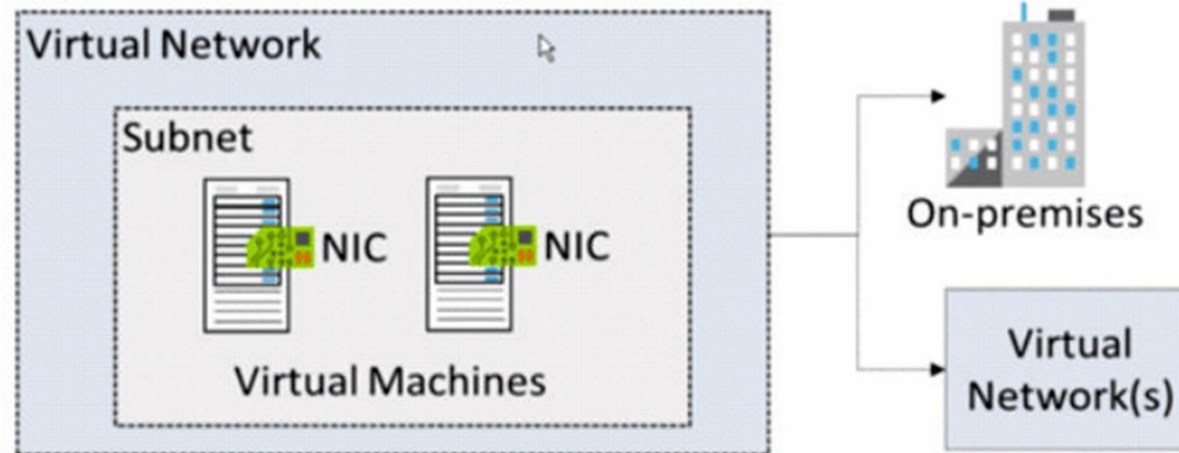




Azure Networking Services

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Virtual Networks (VNet)



Microsoft Azure

Search resources, services, and docs (G+)

All services

Virtual networks

Create virtual network

Create virtual network

Basics

IP Addresses

Security

Tags

Review + create

Azure Virtual Network (VNet) is the fundamental building block for your private network in Azure. VNet enables many types of Azure resources, such as Azure Virtual Machines (VM), to securely communicate with each other, the internet, and on-premises networks. VNet is similar to a traditional network that you'd operate in your own data center, but brings with it additional benefits of Azure's infrastructure such as scale, availability, and isolation. [Learn more about virtual network](#)

Project details

Subscription *

Azure for Students

Resource group *

Create new

Instance details

Name *

Region *

Review + create

< Previous

Next > IP Addresses

[Download a template for automation](#)

A resource group is a container that holds related resources for an Azure solution.

Name *

VN_2_43781

OK

Cancel

Microsoft Azure

Search resources, services, and docs (G+)

All services

Virtual networks

Create virtual network

Create virtual network

Basics

IP Addresses

Security

Tags

Review + create

The virtual network's address space, specified as one or more address prefixes in CIDR notation (e.g. 192.168.1.0/24).

IPv4 address space

10.20.0.0/16

Add IPv6 address space

The subnet's address range in CIDR notation (e.g. 192.168.1.0/24). It must be contained by the address space of the virtual network.

+ Add subnet

Remove subnet

Subnet name

Subnet address range

VN_2_43781

10.20.0.0/24

Microsoft Azure

Search resources, services, and docs (G+)

All services

Virtual networks

Create virtual network

Create virtual network

Validation passed

Basics

IP Addresses

Security

Tags

Review + create

Basics

Subscription

Resource group

Name

Region

IP addresses

Address space

Subnet

Tags

None

Security

BastionHost

DDoS protection plan

Firewall

Azure for Students

(new) VN_2_43781

VN_2_43781

East US

10.20.0.0/16

VN_2_43781 (10.20.0.0/24)

Disabled

Basic

Disabled

Create

< Previous

Next >

[Download a template for automation](#)

Azure Storage Services

- **Container storage (blob)** is optimized for storing **massive** amounts of unstructured data, such as text or binary data.
- **Disk storage** provides disks for virtual machines, applications, and other services to access and use.
- **Azure Files** sets up highly available network file shares that can be accessed using the **Standard Server Message Block(SMB)** protocol.

Azure Storage Services

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Check more on [Azure Storage Services](#).



Blob



Table



Queue



File



Disk

-Unstructured
-Large
-Page / Block

-Key/value
-Small

-Queue
-Reliable
-MSMQ

-File share
-Legacy
-SMB

-Premium
-High I/O
-VM Disks

Azure Database Services

- **Azure Cosmos Database** is a globally distributed database service that elastically and independently scales throughput and storage.
- **Azure SQL Database** is a relational database as a service (DaaS) based on the latest stable version of the Microsoft SQL Server engine.
- **Azure Database for MySQL** is a fully managed MySQL database service for app developers.
- **Azure Database for PostgreSQL** is a relational database service based on the open-source Postgres database engine.



Azure SQL
Database



Azure
Databases
MySQL



Azure
Databases for
PostgreSQL



Azure
Databases for
MariaDB

Critix

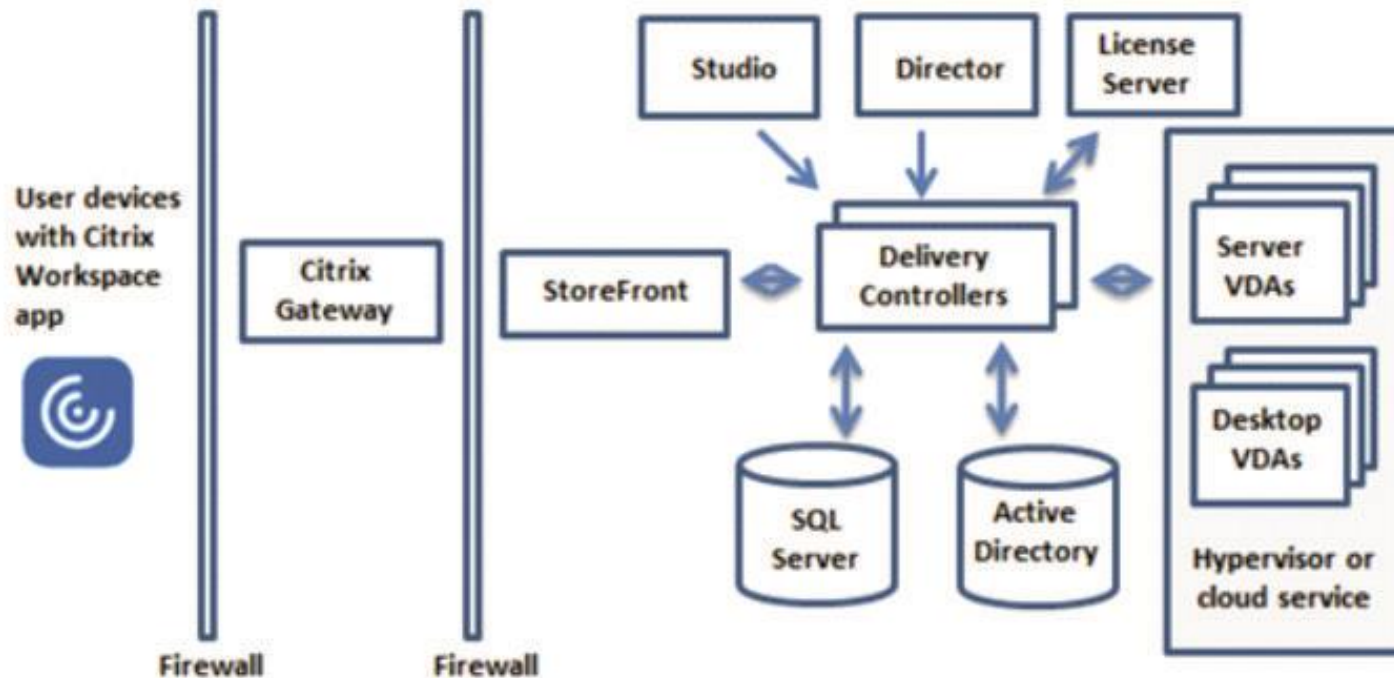
Citrix Virtual Apps and Desktops are virtualization solutions that give IT control of virtual machines, applications, licensing, and security while providing anywhere access for any device.

Citrix Virtual Apps and Desktops allow:

- **End users to run applications and desktops independently of the device's operating system and interface.**
- **Administrators to manage the network and control access from selected devices or from all devices.**
- **Administrators to manage an entire network from a single data center.**

Citrix Virtual Apps and Desktops share a unified architecture called FlexCast Management Architecture (FMA). FMA's key features are the ability to run multiple versions of Citrix Virtual Apps or Citrix Virtual Desktops from a single site and integrated provisioning.

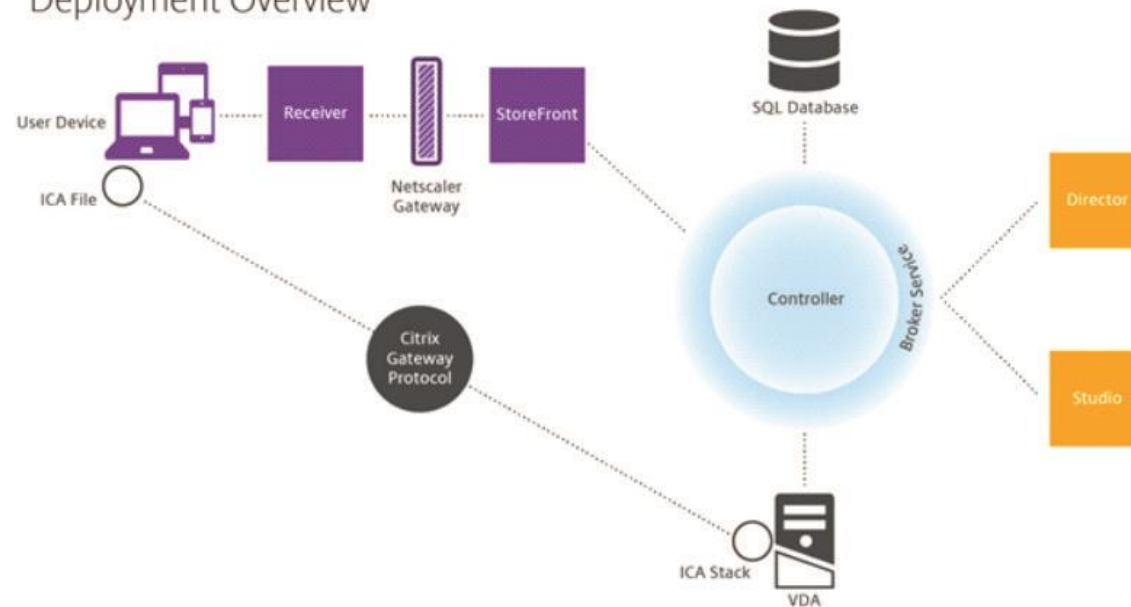
This illustration shows the key components in a typical deployment, which is called a site.



How typical deployments work

A site is made up of machines with dedicated roles that allow for scalability, high availability, and failover, and provide a solution that is secure by design. A site consists of VDA-installed servers and desktop machines, and the Delivery Controller, which manages access.

Deployment Overview



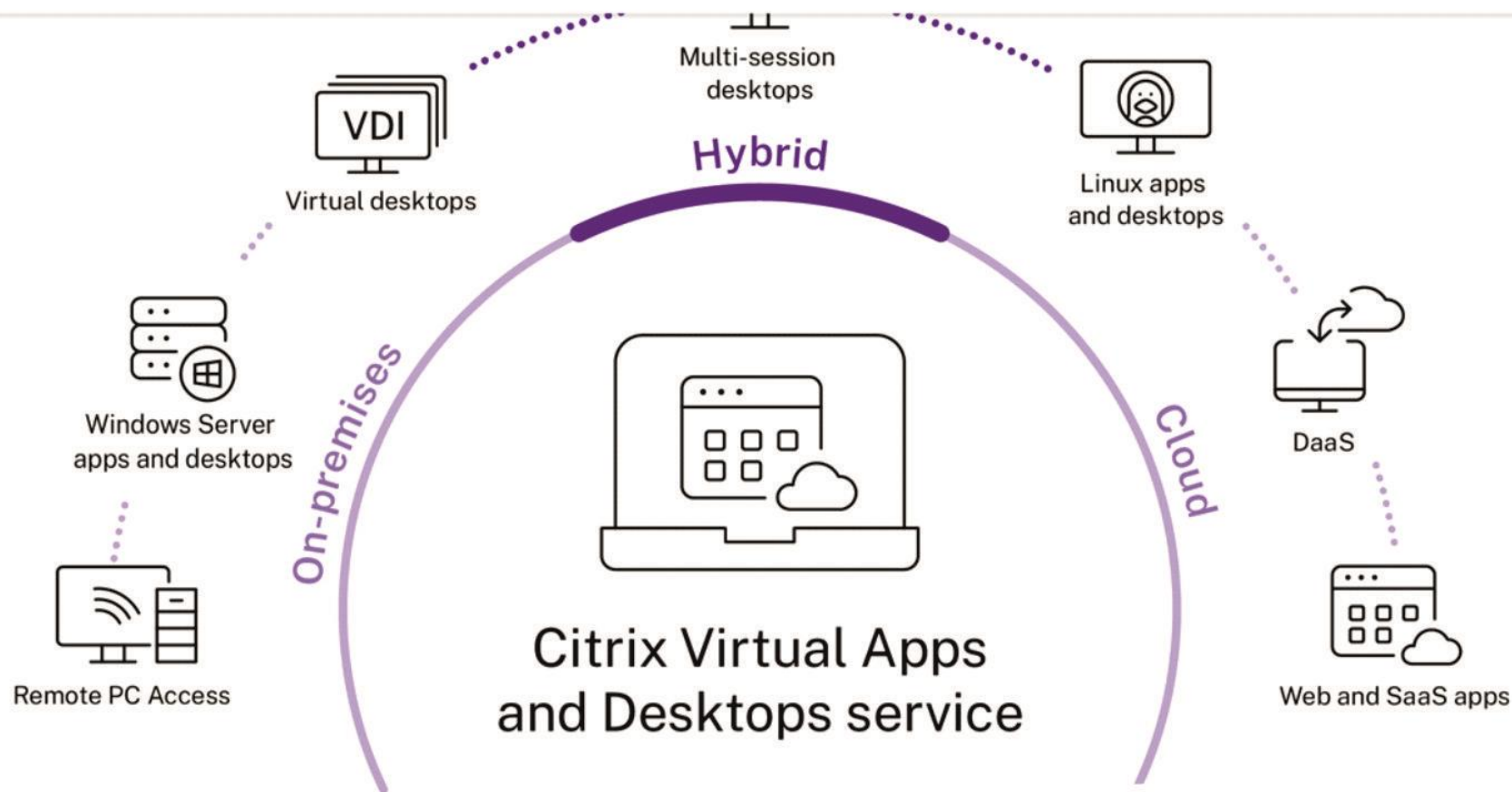
Citrix Virtual Apps and Desktops

Overview

Simplified DaaS

Compare

Resource Library



References:

- [1] [Bakker, W., N. den Otter, Cees de Laat, Cedric van Bockhaven, and Marat Nigmatullin. "Tunneling data over a Citrix virtual channel." \(2020\).](#)
- [2] [Kurniawan, Dwi Ely, Muhammad Nashrullah, Nuning Kurniasih, GS Achmad Daengs, and Citra Kurniawan. "Performance analysis virtual server VMware Vsphere 5.5 with physical enterprise server." In *IOP Conference Series: Materials Science and Engineering*, vol. 420, no. 1, p. 012107. IOP Publishing, 2018.](#)
- [3] [Rodríguez-Ortiz, Arlene. "Considerations on SQL Optimization Tools in MS Azure SQL Server Database using SQL language." *Computer Engineering Program*; 2021.](#)
- [4] [Syrewicze, Andy, and Richard Siddaway. *Pro Microsoft Hyper-V 2019*. Apress:, 2018.](#)
- [5] [Thullen, Eve, and Tamhoo Kim. "White Wine Quality Prediction A Big Data Case Study Based on MS Azure." *Big Data Research*, 2018.](#)
- [6] [VMware, Inc, and R. O. I. Calculator. "VMware." \(2018\).](#)
- [7] [CCNA Data Center DCICT 640-916 Official Cert GuideFile](#)
- [8] [CITRIX.pdf](#)
- [9] [What is vSphere 7 | Server Virtualization Software | VMware | UK](#)
- [10] [Introducing vSphere 7: Features & Technology for the Hybrid Cloud - VMware vSphere Blog](#)