



VIRTUALIZATION

No Cloud without Virtualization

Agenda

What is Virtualization?

How It Logically Looks?

Reasons to Use Virtualization

What is Hypervisor?

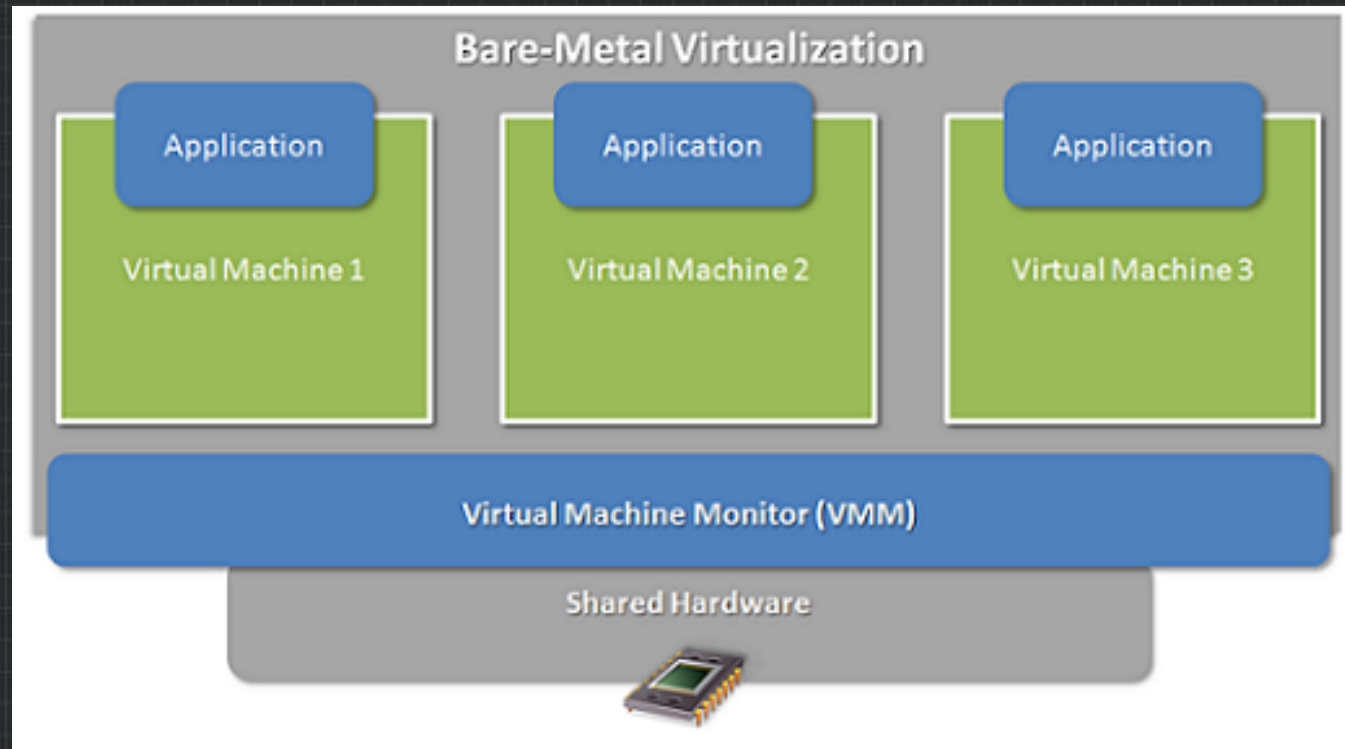
Traditional vs. Virtualization

Hyper-V

Re-cap

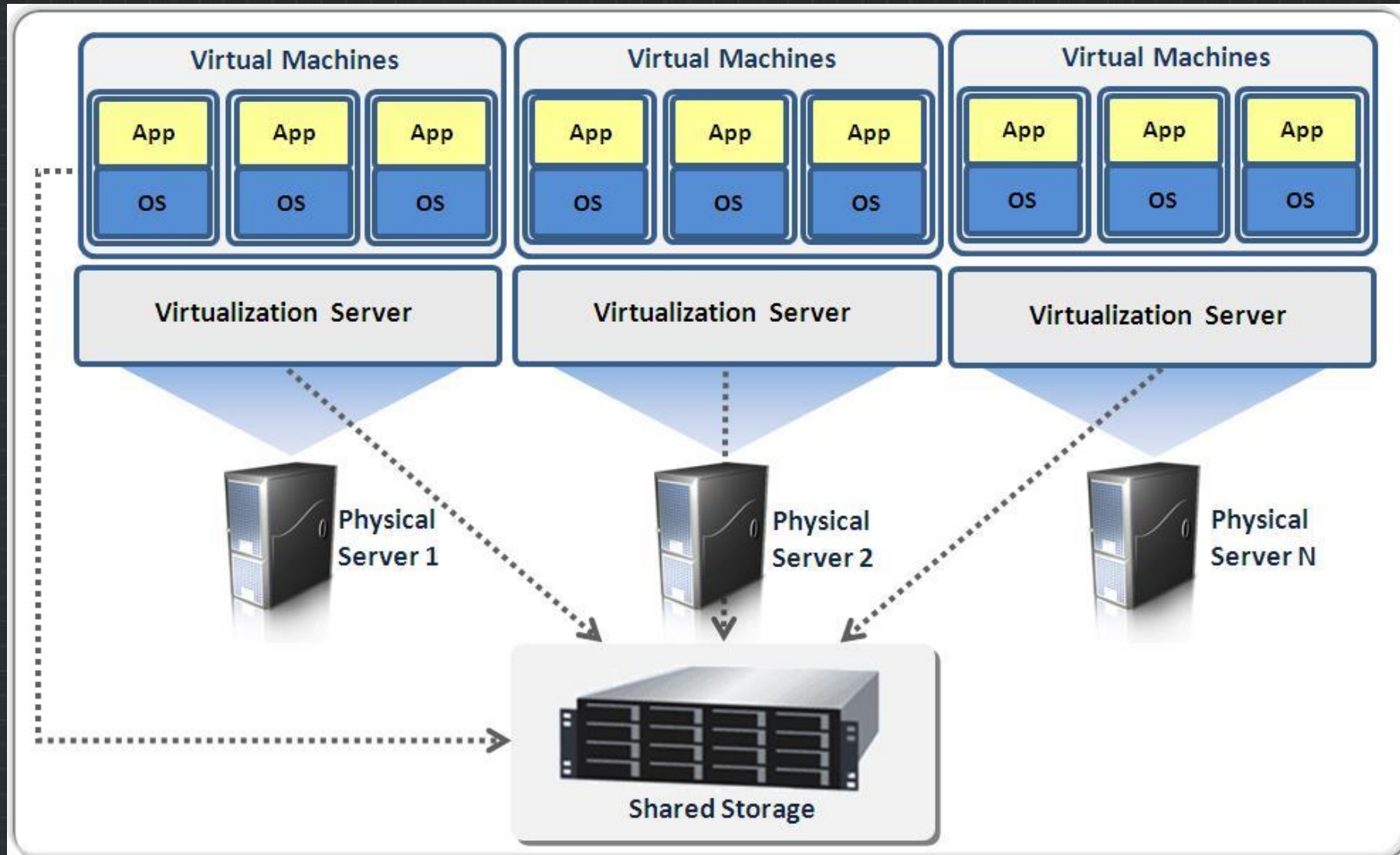
What is Virtualization?

In Computing, Virtualization is a technique, which allows to create and share single physical instance as virtually of a device or resource, such as network, server, and storage, O/s among multiple organizations or tenants (customers).



virtualization- Separate the operation system from your physical Hardware”

How It Logically Looks?



Reasons to Use Virtualization

Virtualization can increase IT agility, flexibility, and scalability while creating significant cost savings. Workloads get deployed faster, performance and availability increases and operations become automated,

- Resource optimization.
- Consolidation.
- Maximizing Uptime. (Agility)
- Automatically Protect Applications from Server Failure.
- Easily Migrate Workloads as Needs Change.
- Shared Resources.



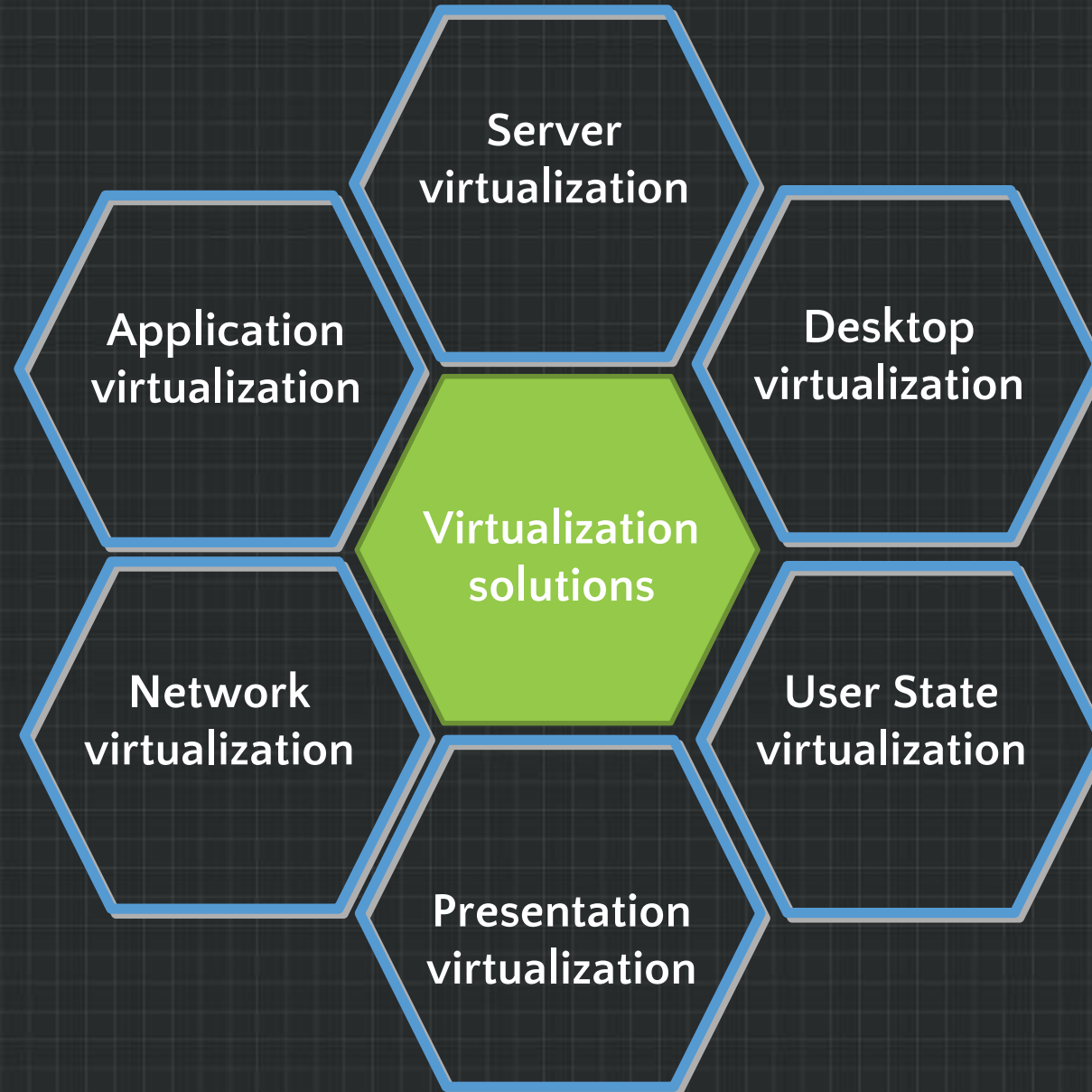
Virtualization Benefits

Virtualization brings a lot of advantages while providing the same service as a hardware server.

First, it reduces the cost of your infrastructure. Servers are mainly used to provide a service to a customer, and a virtualized operating system can provide the same service, with:

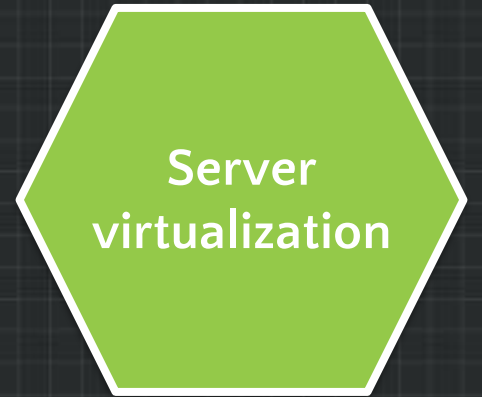
- Less hardware, power/cooling.
- Save space.
- Less management.
- Agility and productivity.
- Isolate applications.
- Easier migration to cloud.
- Improve disaster recovery.

Different Types of Virtualization



What Is Server Virtualization?

- Create and run multiple computer operating systems on a single physical computer
- Host servers share resources with all virtual machines
- Hosted on Microsoft Hyper-V
- Almost all server workloads can now run on virtual machines
- Use server virtualization to reduce the number of physically deployed servers, and to optimize resource utilization



Server virtualization

The primary advantages that server virtualization provides include the following:

- Abstraction of the physical system resources allows workloads to easily migrate between server platforms with different physical configurations to support planned and unplanned maintenance events, high-availability solutions, and business continuity solutions.
- Encapsulation of the workload into a few files provides support for rapid migration across server platforms regardless of hardware resource differences.
- Concurrent execution of multiple workloads on server platforms yields higher utilization of physical server resources.

Desktop virtualization

Client-side virtualization:

- Allows virtual machines to run on client computers
- Provides an application compatibility solution by allowing users to run virtualized instances of earlier operating systems and applications

VDI:

- Users connect to client computers that are running as virtual machines on a central server
- Users can run their apps and access their data on the virtual machine from any computer or device that supports Remote Desktop client software
- Reduces hardware costs
- Supports BYOD environments



User State virtualization

User state virtualization captures and centralizes application and Windows operating system settings for users.

This enables users to sign in to any device while retaining their settings.

User Experience Virtualization (UE-V) is a System Center 2016 tool that enables users to synchronize their user settings for both applications and operating system across multiple computers.

Virtualizing user settings is also known as user state virtualization



User State
Virtualization

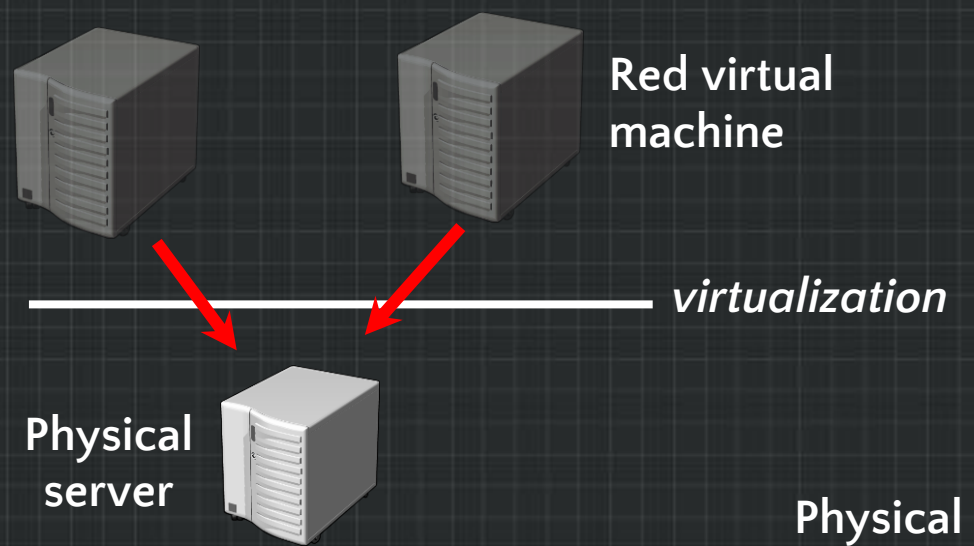
Presentation virtualization

Presentation virtualization. Presentation virtualization allows desktops and applications that are running on a Remote Desktop Services server to display on remote clients.

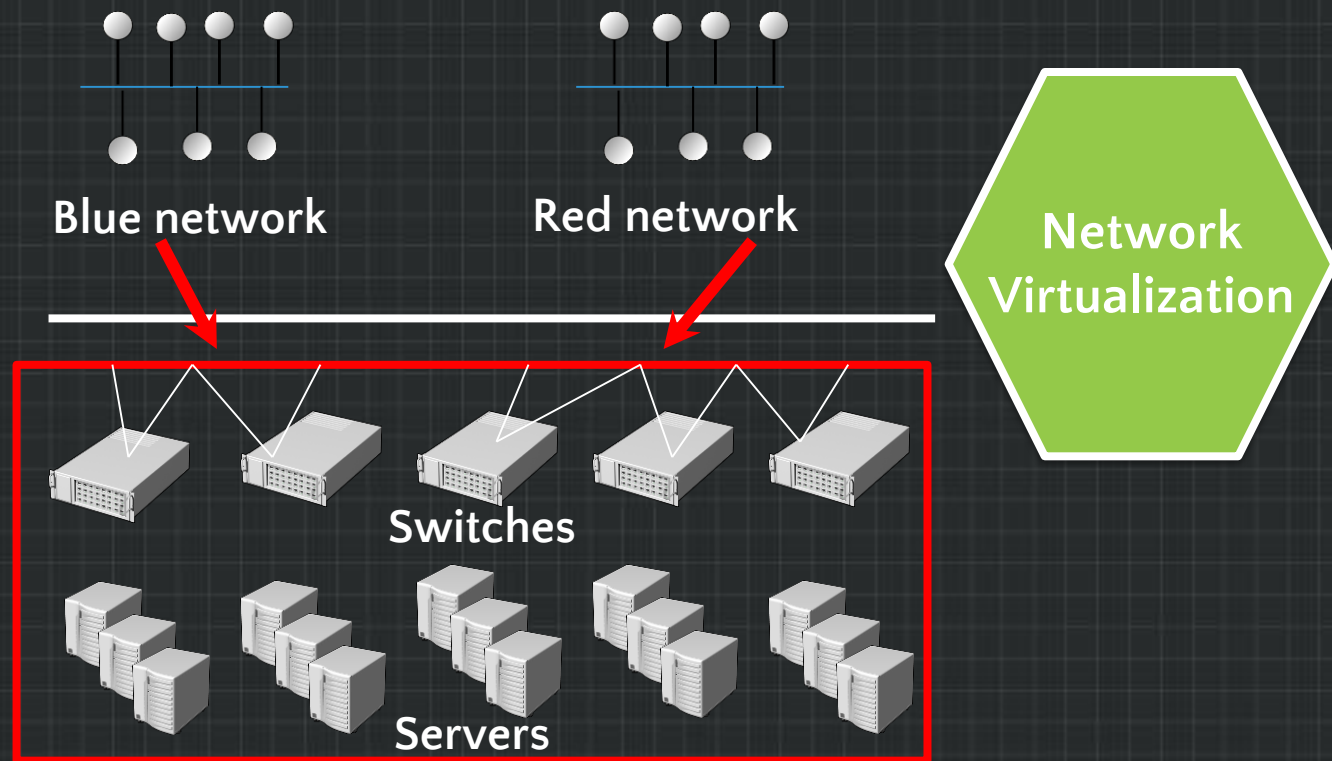


Presentation
Virtualization

Network virtualization.



Server virtualization runs multiple virtual servers on a physical server



Network virtualization allows isolation of multiple virtual networks on a physical network

Application virtualization

Application virtualization. You can use application virtualization to virtualize applications, which then enables applications to run in or be streamed to special containers on a host operating system.



TOP 5 REASONS Why You Can't Afford Not to Virtualize

If you don't virtualize – or limit what you virtualize – you risk:

Unnecessarily
high costs

Greater IT
Complexity

Losing out to
the
competition

More
business
disruption

Virtualize to build the right foundation for
Cloud computing, Mobility, Social media
and Big data
which will account for 98% of the spend on
IT growth by
2020

If you don't embrace
virtualization...

Top 5

1



You will be missing out on significant cost savings
and spending far more than your competition on IT.

2

Your IT organization will be far less efficient.



3

Your business will be less agile and less flexible
in responding to new opportunities.



4

You will put the organization at increased risk for lost revenue due to business disruption

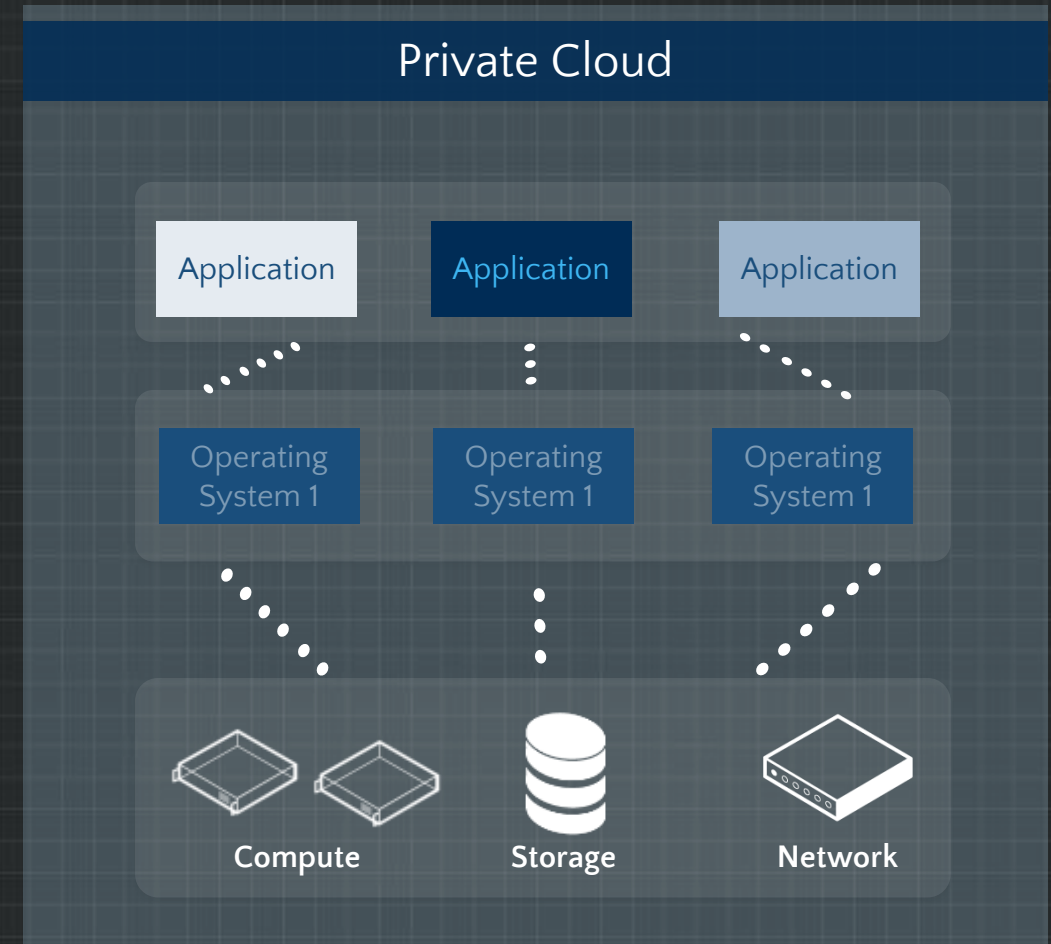
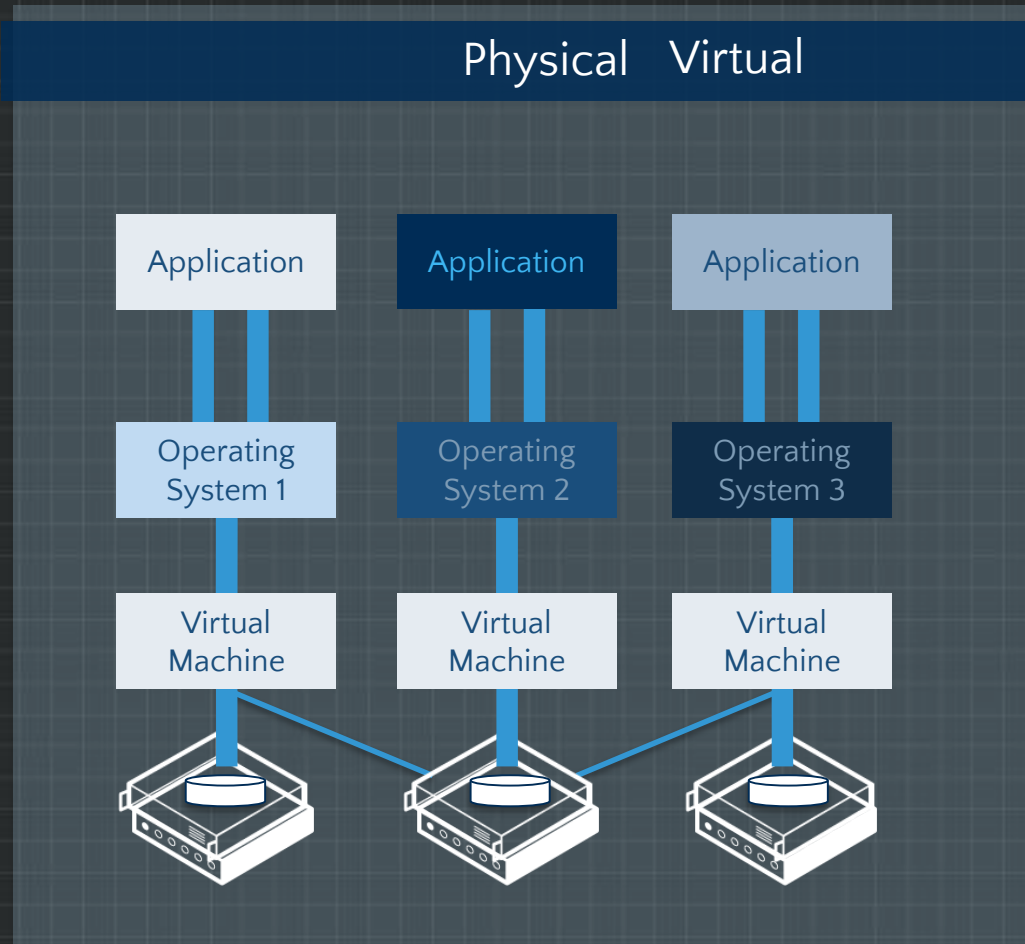




5

You won't be putting in the right technology platform for next-generation business and IT initiatives.

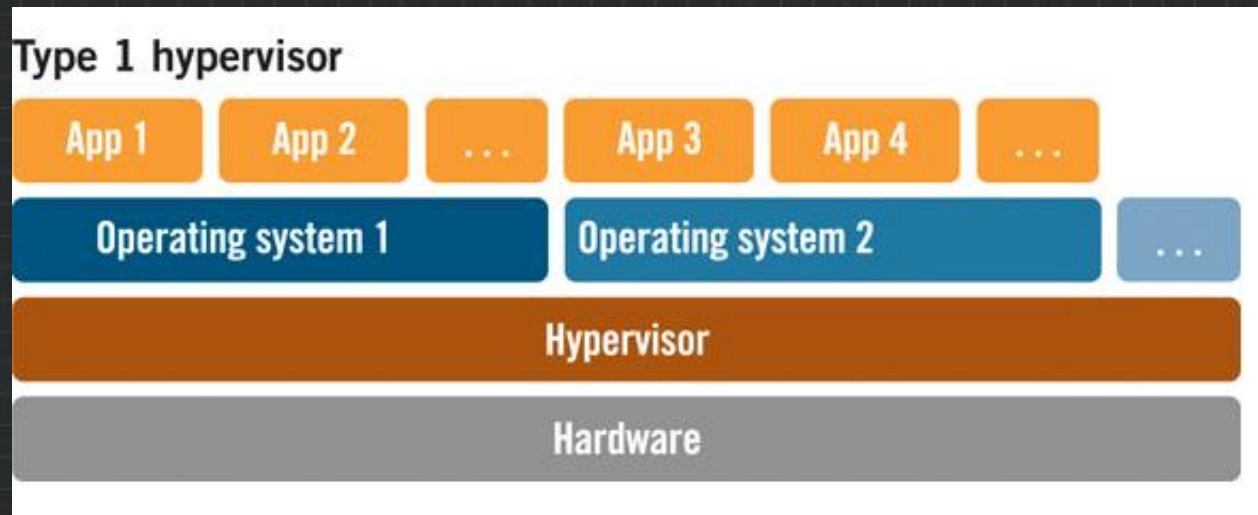
Traditional vs. Virtualization



- Each application runs in its own operating system
- Each operating system does not know it is sharing the underlying hardware with others

What is Hypervisor?

Hypervisor –A layer of software that sits between the hardware and one or more operating systems. Its primary job is to provide isolated execution environments called partitions. The hypervisor controls and arbitrates access to the underlying hardware.

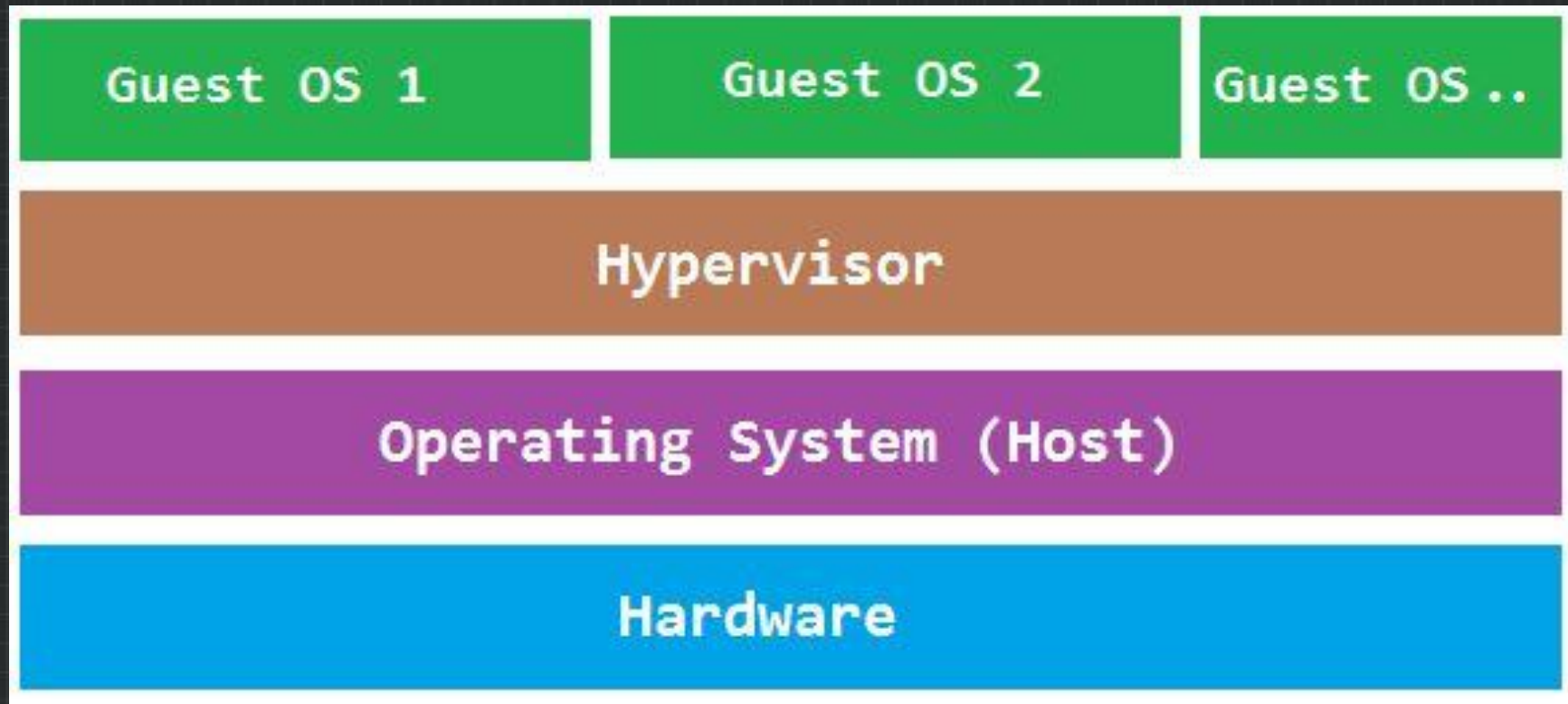


TYPE-1 HYPERVISOR (Bare Metal OS)

Paravirtualization (PV) allows direct communication between the hypervisor and the VM Guest. With less overhead involved, performance is much better than with full virtualization.

Hypervisor 2

A Type 2 Hypervisor is a virtualization layer that is installed above a host operating system (OS), such as Windows Server, Linux, or a custom OS installation.



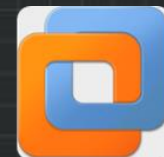
Fully Virtualized (FV)

Top Virtualization Technology Companies

A [hypervisor](#), also called a virtual machine manager, is a program that allows multiple operating systems to share a single [hardware host](#).

Each operating system appears to have the host's [processor](#), [memory](#), and other [resources](#) all to itself. Examples of hypervisors include:

- VMWare
- Microsoft
 - Hyper-V
 - SCVMM
- Red Hat



Hyper-V virtualization

- Hyper-V is the hardware virtualization role in Windows Server 2016 The hypervisor controls access to hardware
- Hardware drivers are installed in the host operating system
- Many guest operating systems are supported:
 - Windows Server 2008, 2012, 2016, 2019 or newer
 - Windows Vista SP2, 8.1, 10
 - Linux
 - FreeBSD

Storage options in Hyper-V

Virtual hard disk formats:

- .vhd
- .vhdx
- .vhds

Virtual hard disk types:

- Fixed-size
- Dynamically expanding
- Pass-through
- Differencing

Managing checkpoints

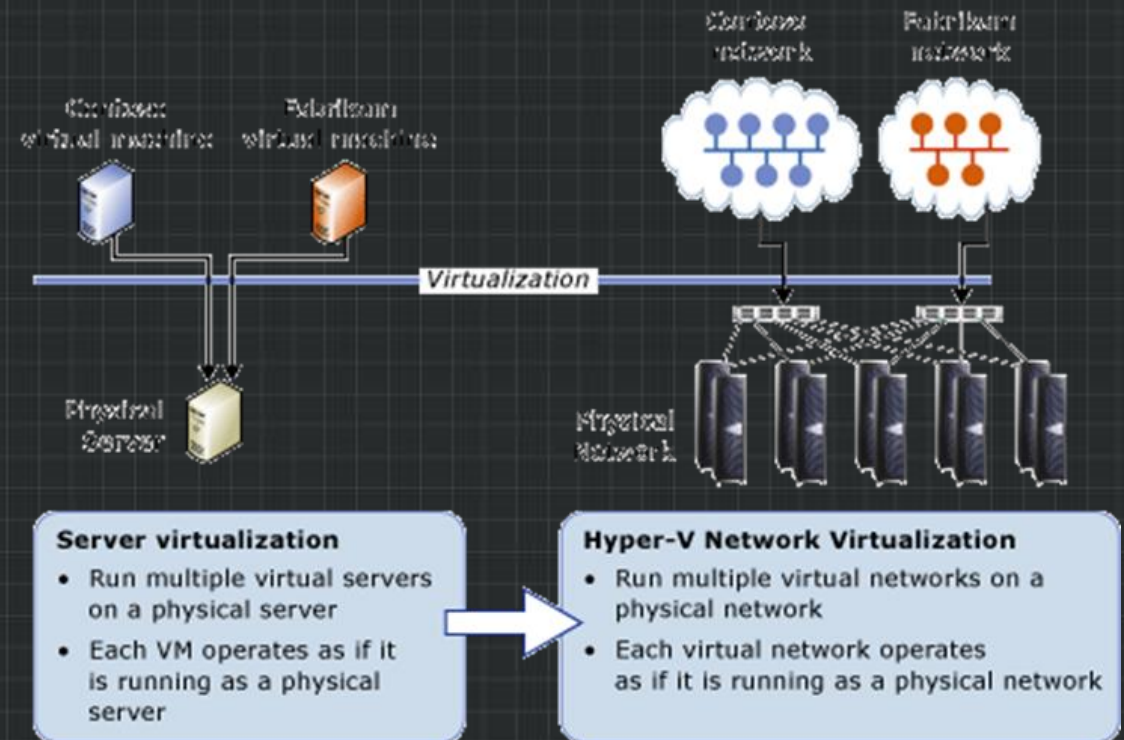
- Checkpoints allow administrators to make a snapshot of a virtual machine at a particular point in time
- Checkpoints do not replace backups
- Standard checkpoints create .avhd files (differencing disks), which merge back into the previous checkpoint when the checkpoint is deleted
- Production checkpoints are created by using VSS and require starting from an offline state

Overview of Hyper-V Networking

Networking in Hyper-V is managed by using Virtual Switches

Virtual Switches can be in form of

- External
- Internal
- Private

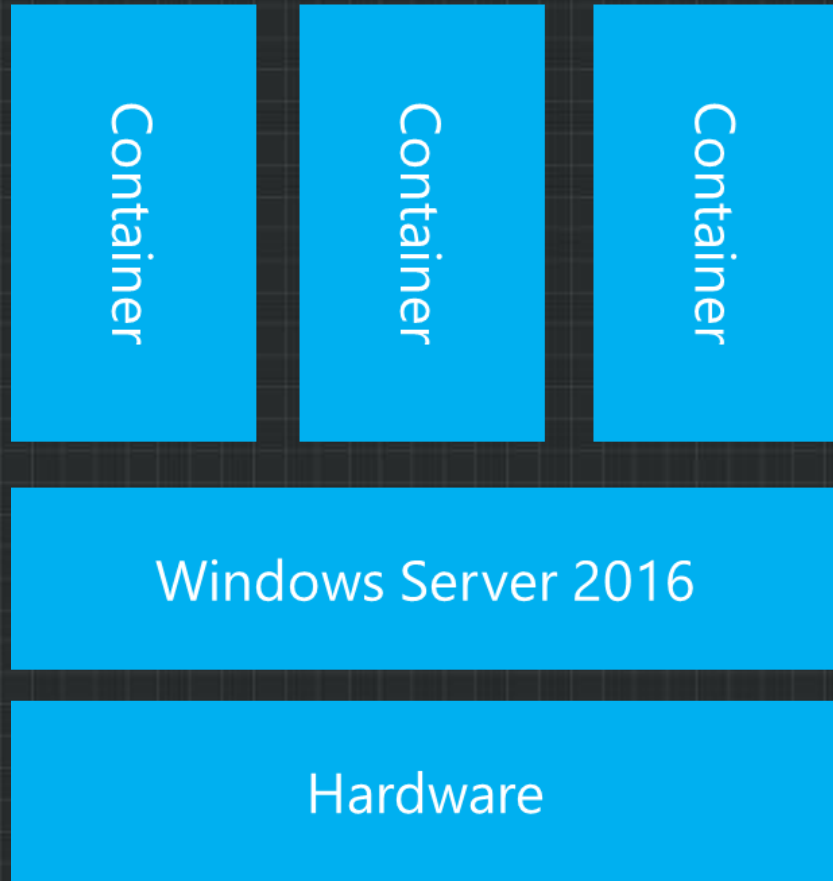


Windows Server Containers and Docker in Hyper-V

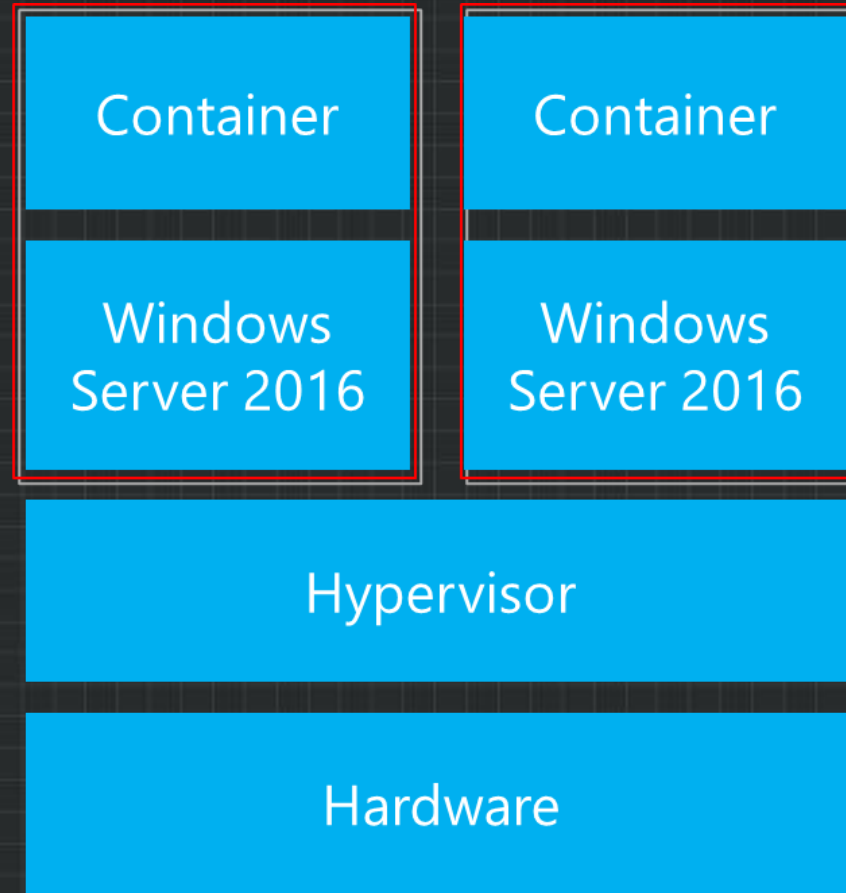
- Virtual machines provide hardware virtualization
- Containers provide operating system virtualization:
 - Isolated namespace
 - Controlled access to hardware
- Benefits of containers:
 - Faster startup and restarts
 - High deployment density
- Docker is the management software for containers
- Hyper-V containers provide greater isolation

Windows Server Containers and Docker in Hyper-V

Containers



Hyper-V containers



Understanding the Cloud Movement

**BUILT FOR THE
FUTURE. READY
NOW.**

Understanding the Cloud Movement

- Why the Cloud?
- Cloud Terminology
- Public Cloud vs. Private Cloud
- Changing Roles & Required Skills

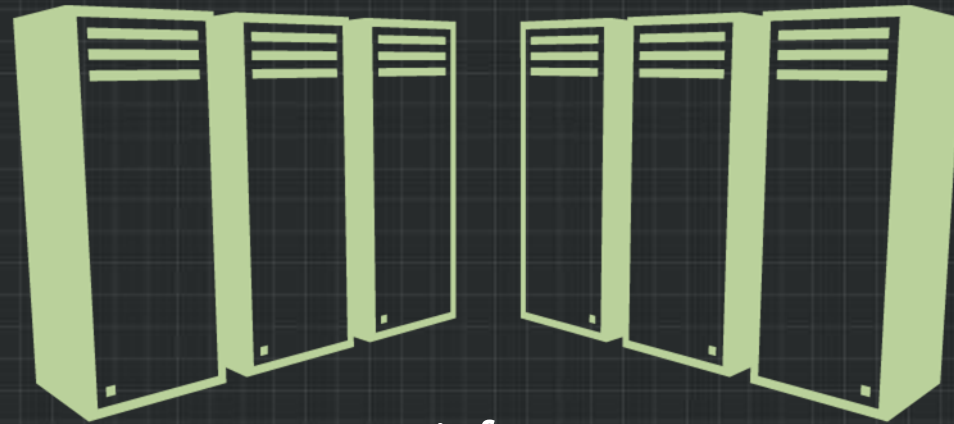
Job Eliminator or Job Creator?

“Cloud Computing to generate 14 million jobs globally... and increase business revenue by \$1.1 trillion by 2015.”



“Many companies’ IT spending is tied to the maintenance of ‘legacy systems,’ and moving to the cloud would free up some of that budget... There are ‘lower capital constraints with cloud, that translates to job creation.’”

Industry Transformations



Mainframe

Industry Transformations



Client / Server

Industry Transformations

Web



Industry Transformations



Virtualization

Industry Transformations



What will that next transformation be?

Industry Transformations



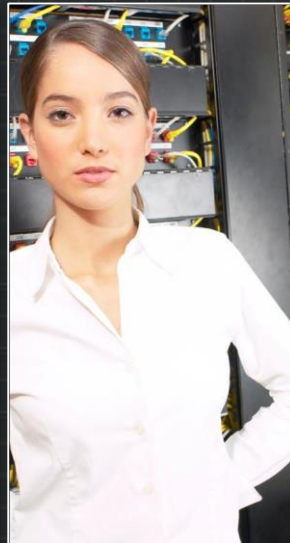
What will that next transformation be?

IT as a Service

What is IT? A Typical Business Perspective...

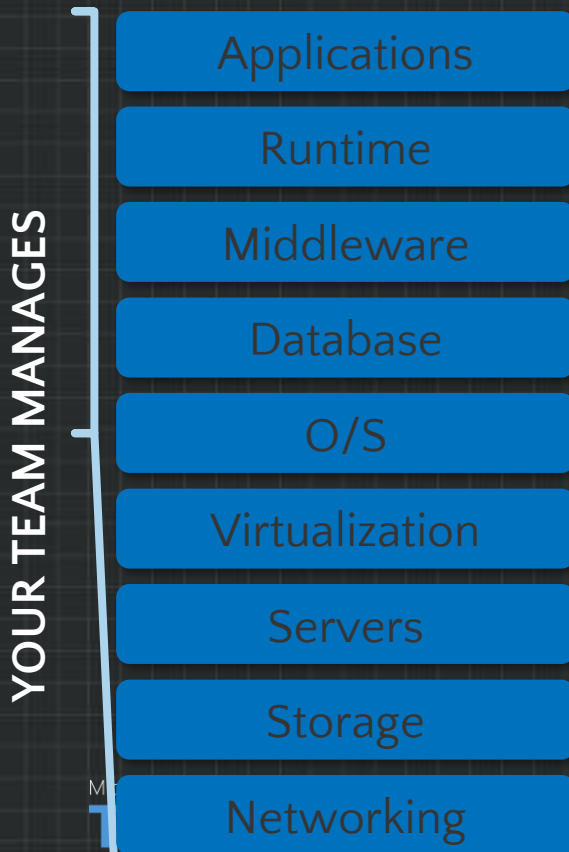
Applications

- “They provide applications...”
 - Horizontal (email, portals, collaboration)
 - Vertical (manufacturing systems, CRM, etc.)



Modern Applications

You thought you needed this...



Web Server



Database Server

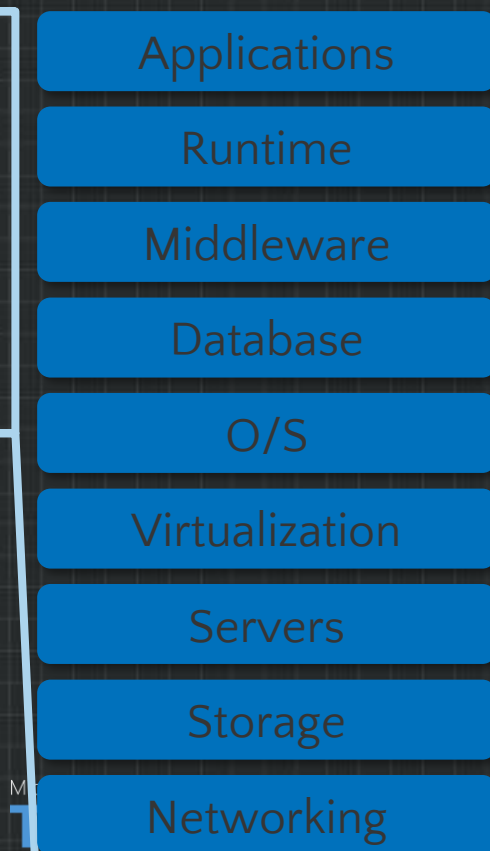
Modern Applications

But were quickly told you needed this...



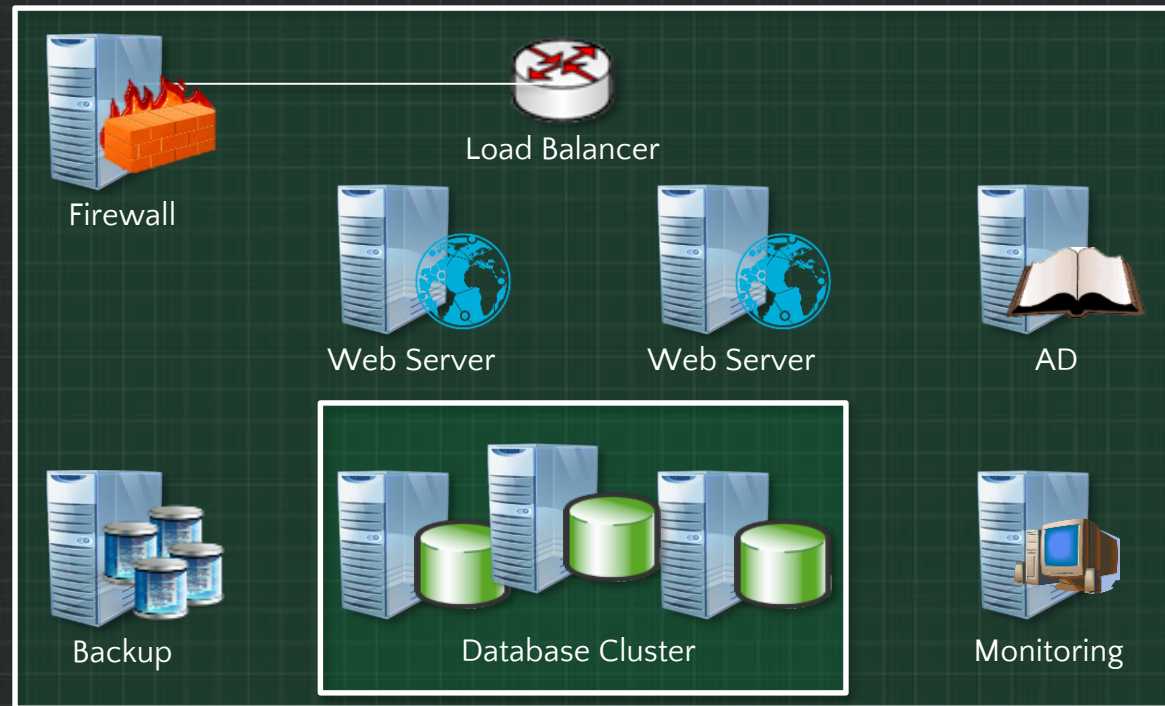
PRODUCTION

YOUR TEAM MANAGES



Modern Applications

Wait a minute... it turns out you really need this ...



PRODUCTION

YOUR TEAM MANAGES

Applications

Runtime

Middleware

Database

O/S

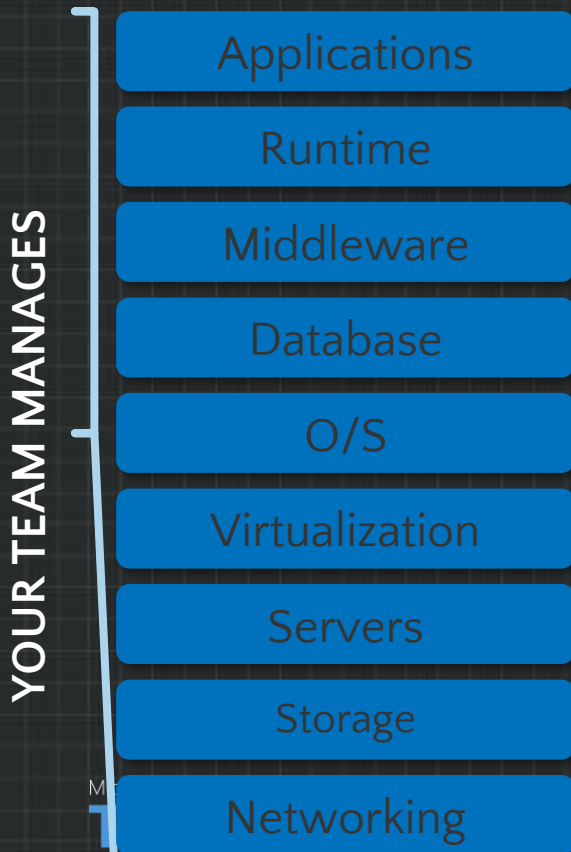
Virtualization

Servers

Storage

Networking

Modern Applications—What's the Problem?



Australia 2012

- Expensive: Requires many components
 - Dedicated hardware & software
 - Multiple environment\$ (Prod, Staging, Test, Dev, etc.)
- Under-utilized
 - Must scale to worst-case scenarios
- Inflexible: Everything is ALWAYS ON
- Brittle
- Takes too long

Where is all this hardware and software?

- Your data center(s) / co-location site(s)
- Your server closet(s)
- Every component must be managed

Applications

Runtime

Middleware

Database

O/S

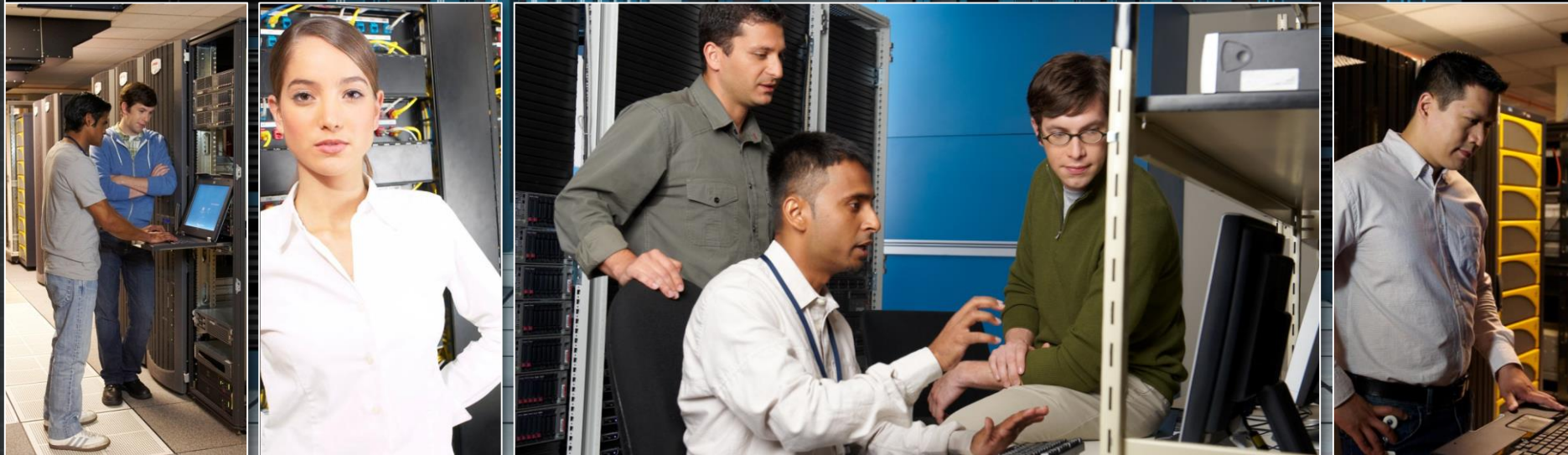
Virtualization

Servers

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Networking

YOUR TEAM MANAGES



The Cloud: Cloud Vendor's Datacenters

YOUR TEAM MANAGES

Applications

Runtime

Middleware

Database

O/S

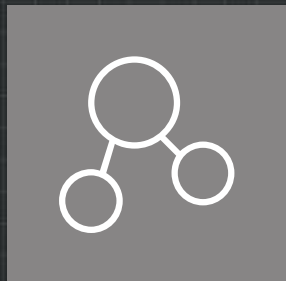
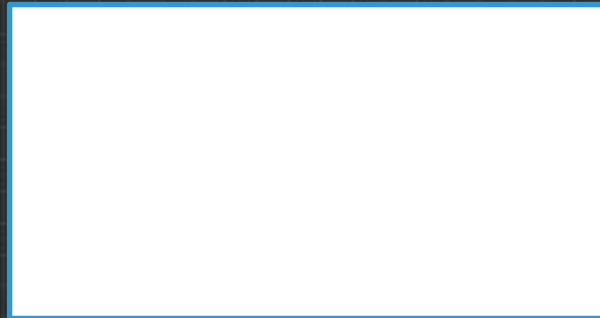
Virtualization

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- Cloud vendor manages some components providing scale and dynamic elasticity
- IT focuses on strategic differentiators



Deployment Models

Cloud Deployment Models (Contd.)

The [National Institute of Standards and Technology \(NIST\)](#) has published a definition of cloud computing its basic categorization for cloud services based on deployment, provisioning, and consumption.

Private clouds

Provisioned for use by a single user or group of users within an organization, the private cloud is owned, managed, and operated by the organization.

Private clouds

reside on a private network owned or managed by the organization itself.

Community clouds

Provisioned for use by a group of related organizations with shared concerns, such as a group of governmental or educational institutions that choose to share a common cloud of services not available to the general public,

Public clouds

Provisioned for use the general public, public cloud services represent the most thoroughly virtualized cloud infrastructural design, removing data center information resources partially or completely. Public clouds reside on hosting data center resources and are accessed via public Internet connectivity by users located anywhere in the world.

Contd.

Hybrid clouds

Provisioned using components of private, community, or public clouds, the hybrid cloud provides access to two or more infrastructures bridged by standardized technologies or proprietary cloud services.

Public Cloud

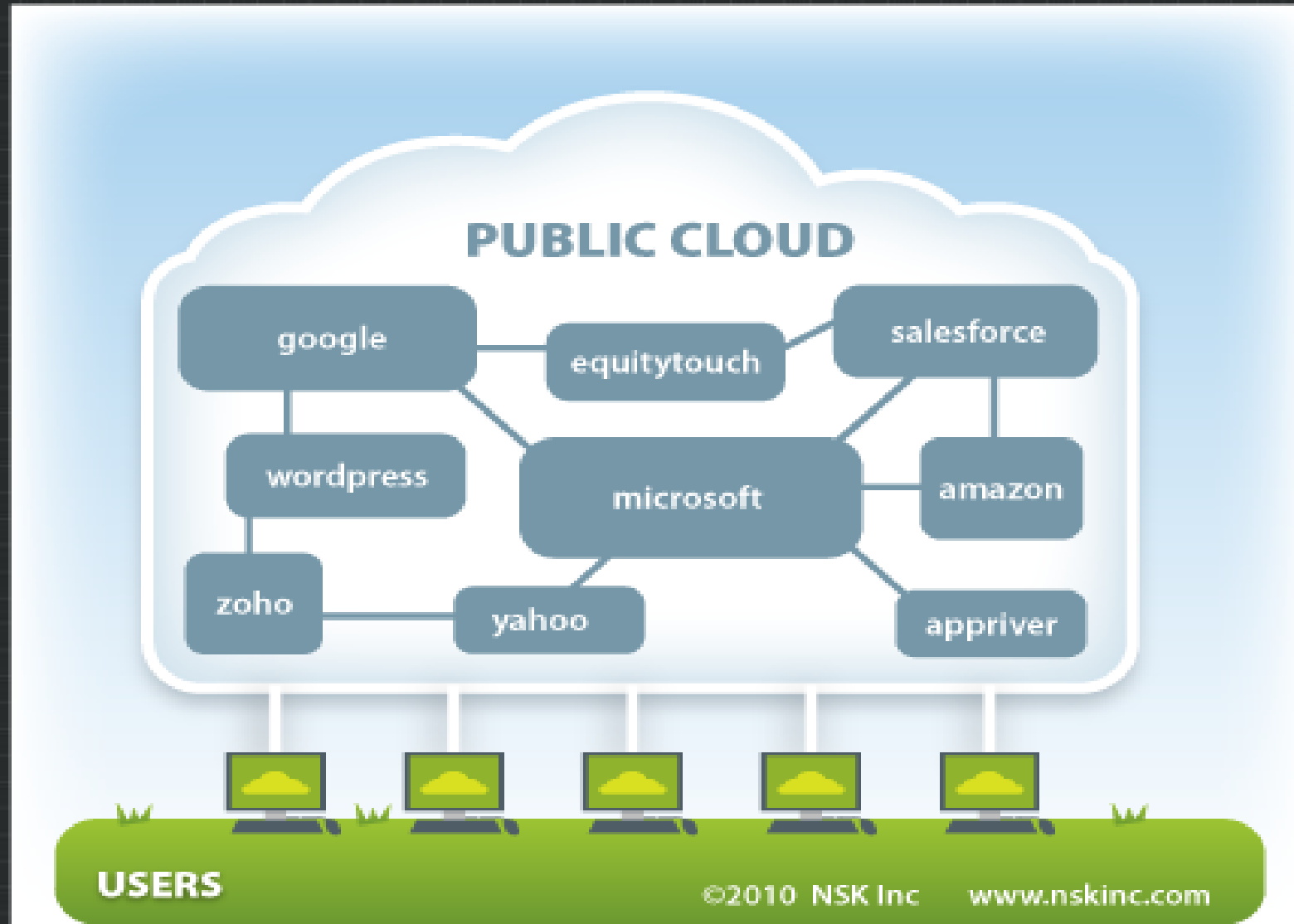
A public cloud is one based on the standard cloud computing model, in which a service provider makes resources, such as applications and storage, available to the general public over the Internet.

Public cloud services may be free or offered on a pay-per-usage model.

The main benefits of using a public cloud service are:

- Easy and inexpensive set-up because hardware, application and bandwidth costs are covered by the provider.
- Scalability to meet needs.
- No wasted resources because you pay for what you use

Public Cloud

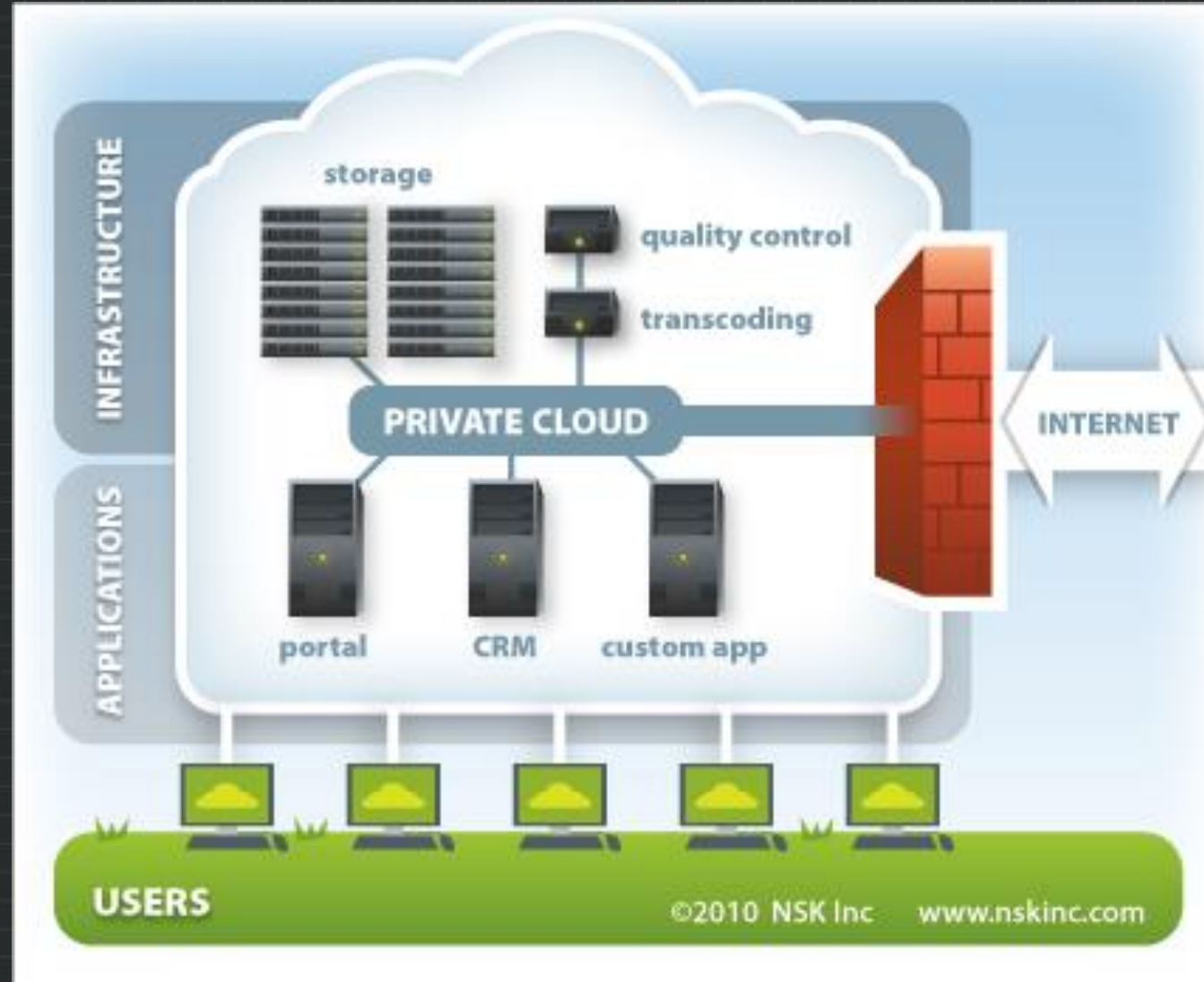


Private cloud (internal cloud or corporate cloud)

Private cloud (also called internal cloud) is a marketing term for an enterprise computing architecture that's protected by a firewall.

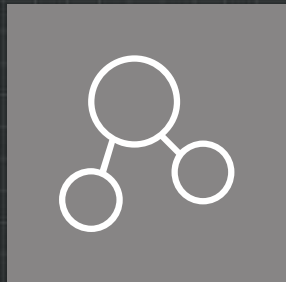
Promotion of the private cloud model is designed to appeal to an organization that wants more control over their data than they can get by using a third-party hosted service such as Amazon's Elastic Compute Cloud (EC2) or Simple Storage Service (S3).

Private Cloud



Cloud Computing is a Service

- A basic definition of cloud computing is the use of the Internet for the tasks you perform on your computer. The "cloud" represents the Internet.
- The simplest thing that a computer does is allow us to store and retrieve information. We can store our family photographs, our favorite songs, or even save movies on it. This is also the most basic service offered by cloud computing.



Service Models

Cloud Service Models



Cloud Service Models

YOUR TEAM MANAGES

Traditional On-Premises

Applications

Runtime

Middleware

Database

O/S

Virtualization

Servers

Storage

Networking

EXAMPLES

 Microsoft Office

 Microsoft Exchange

 Microsoft SQL Server

 Microsoft SharePoint

 Microsoft Lync

 Microsoft Dynamics

Third-Party Applications
Custom Applications

 Microsoft Office 365

 Microsoft Exchange Online

 Microsoft SharePoint Online

 Microsoft Lync Online

 Windows Intune

 Microsoft Dynamics CRM Online

Third-Party Applications
Custom Applications

Software as a Service

Applications

Runtime

Middleware

Database

O/S

Virtualization

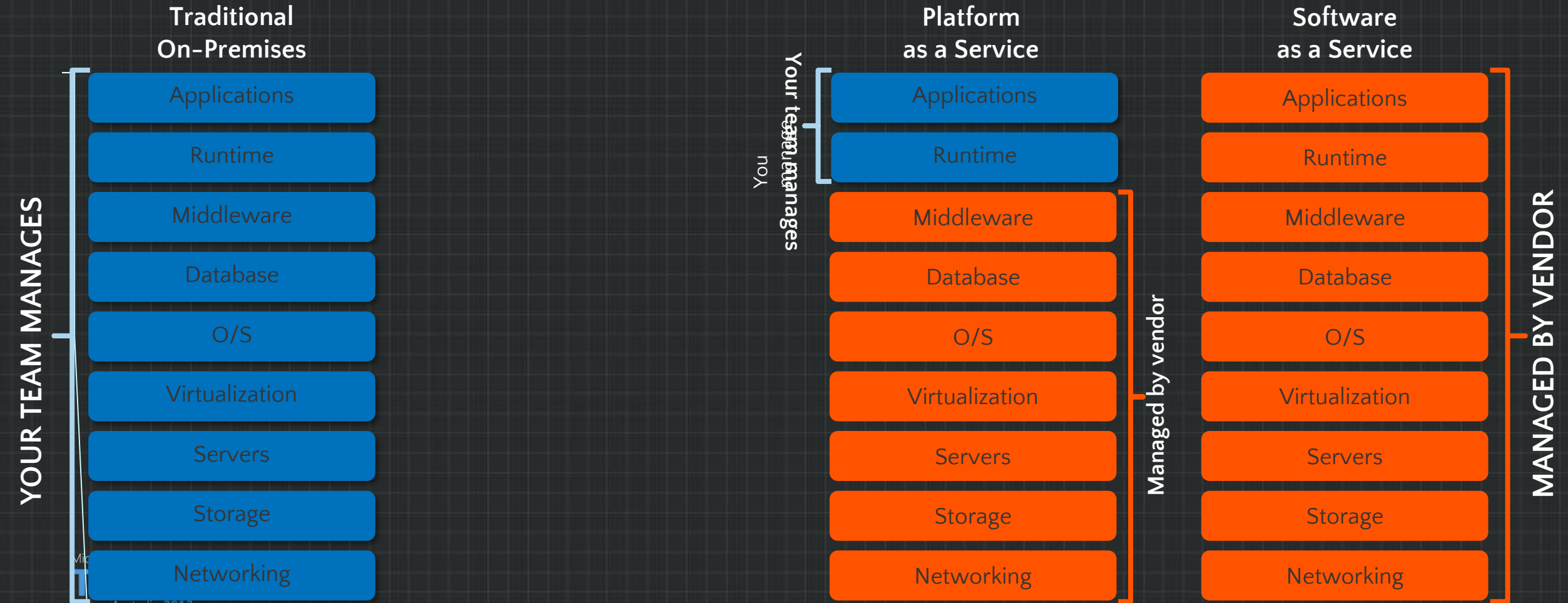
Servers

Storage

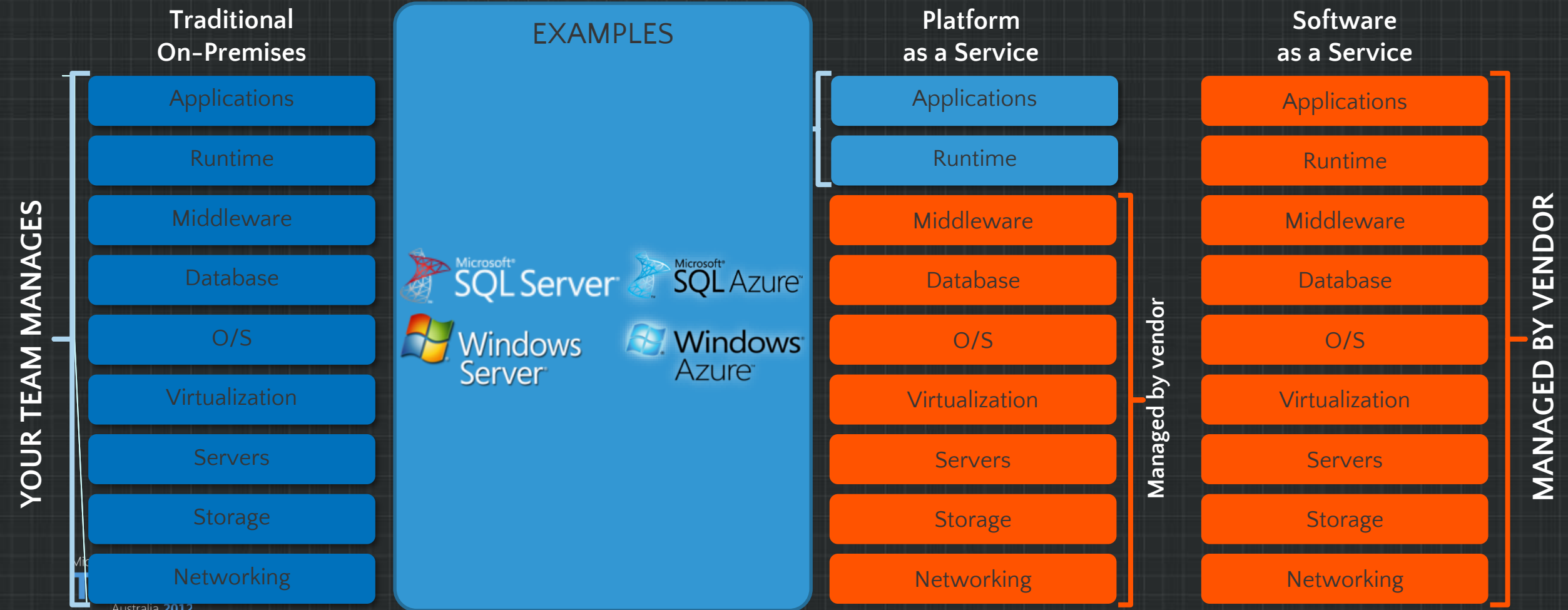
Networking

MANAGED BY VENDOR

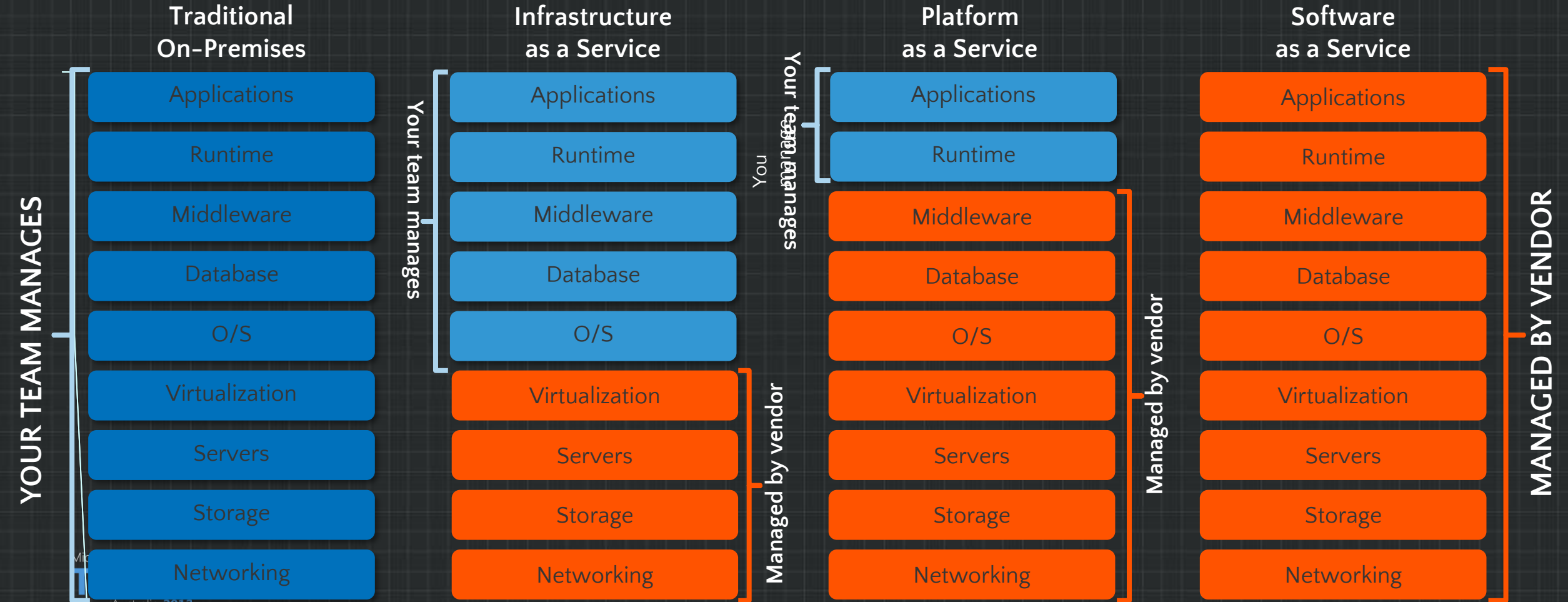
Cloud Service Models



Cloud Service Models



Cloud Service Models



Cloud Service Models

Higher Cost & More Control

Lower Cost & Higher Agility

Traditional On-Premises

Applications

Runtime

Middleware

Database

O/S

Virtualization

Servers

Storage

Networking

Your team manages

IaaS

Applications

Runtime

Middleware

Database

O/S

Virtualization

Servers

Storage

Networking

Your team manages

Managed by vendor

PaaS

Applications

Runtime

Middleware

Database

O/S

Virtualization

Servers

Storage

Networking

Managed by vendor

SaaS

Applications

Runtime

Middleware

Database

O/S

Virtualization

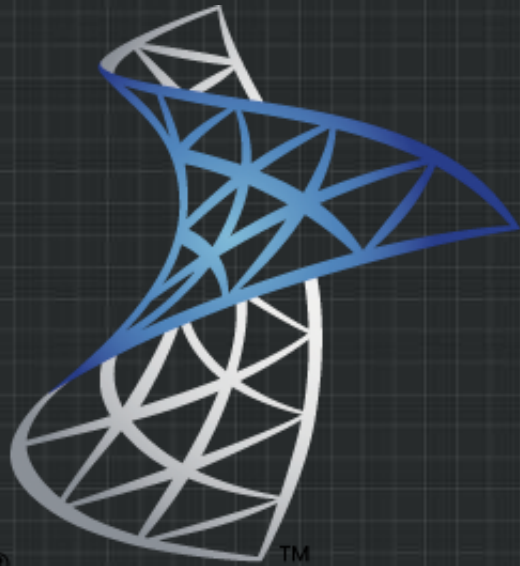
Servers

Storage

Networking

MANAGED BY VENDOR

YOUR TEAM MANAGES



Microsoft®
System Center

What is System Center 2016

System Center is a family or suite of management tools from Microsoft that help organizations manage their servers, client systems, and applications to be more proactive in responding to the needs of the IT [data center](#).

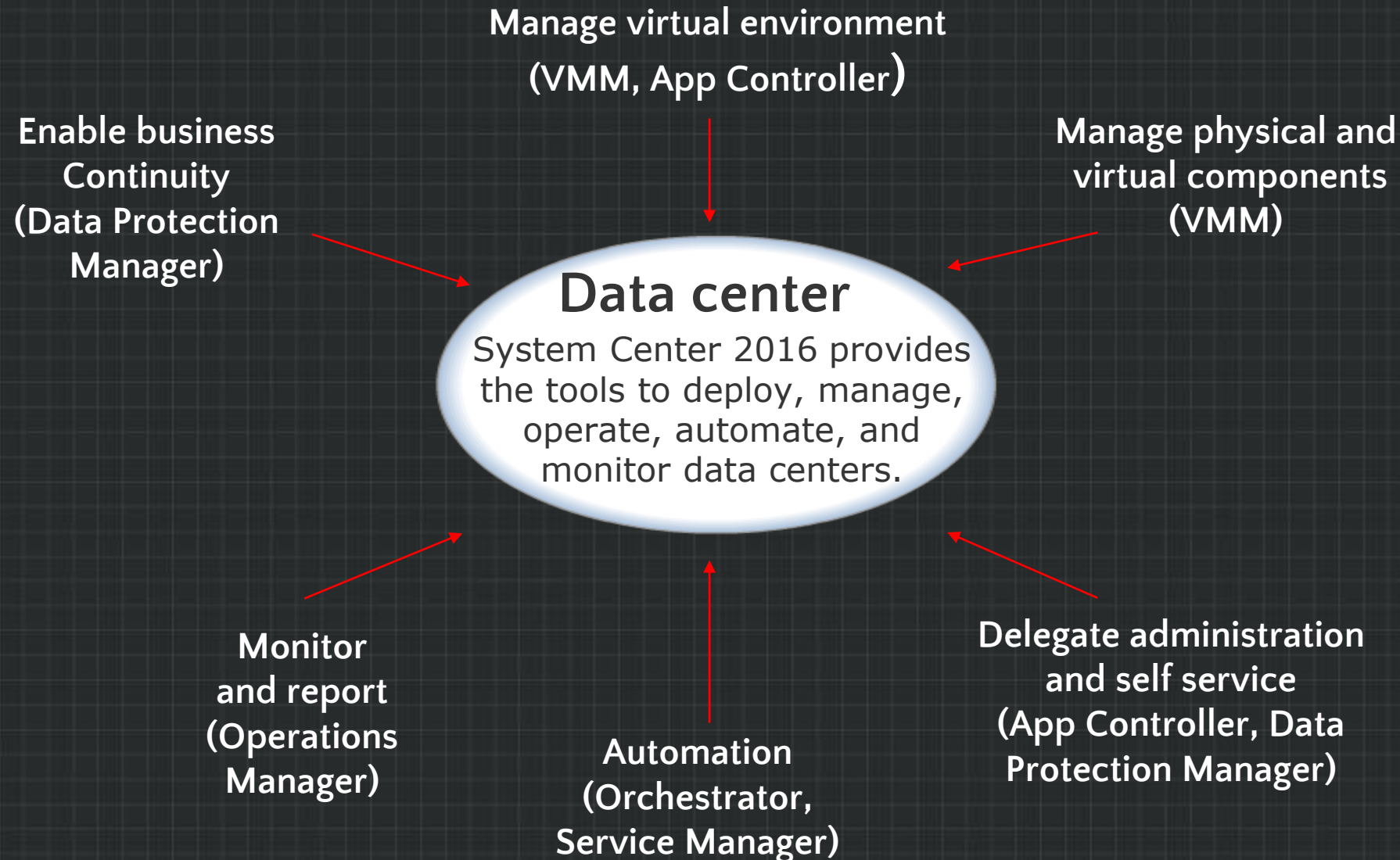
System Center 2016 is composed of a total of eight System Center [products](#):

- Orchestrator
- Virtual Machine Manager
- App Controller
- Operations Manager
- Configuration Manager
- Endpoint Protection (included with Configuration Manager)
- Service Manager
- Data Protection Manager

System Center 2016 editions

- System Center 2016 Datacenter
For highly virtualized datacenter and cloud environments
- System Center 2016 Standard
For physical or minimally virtualized environments

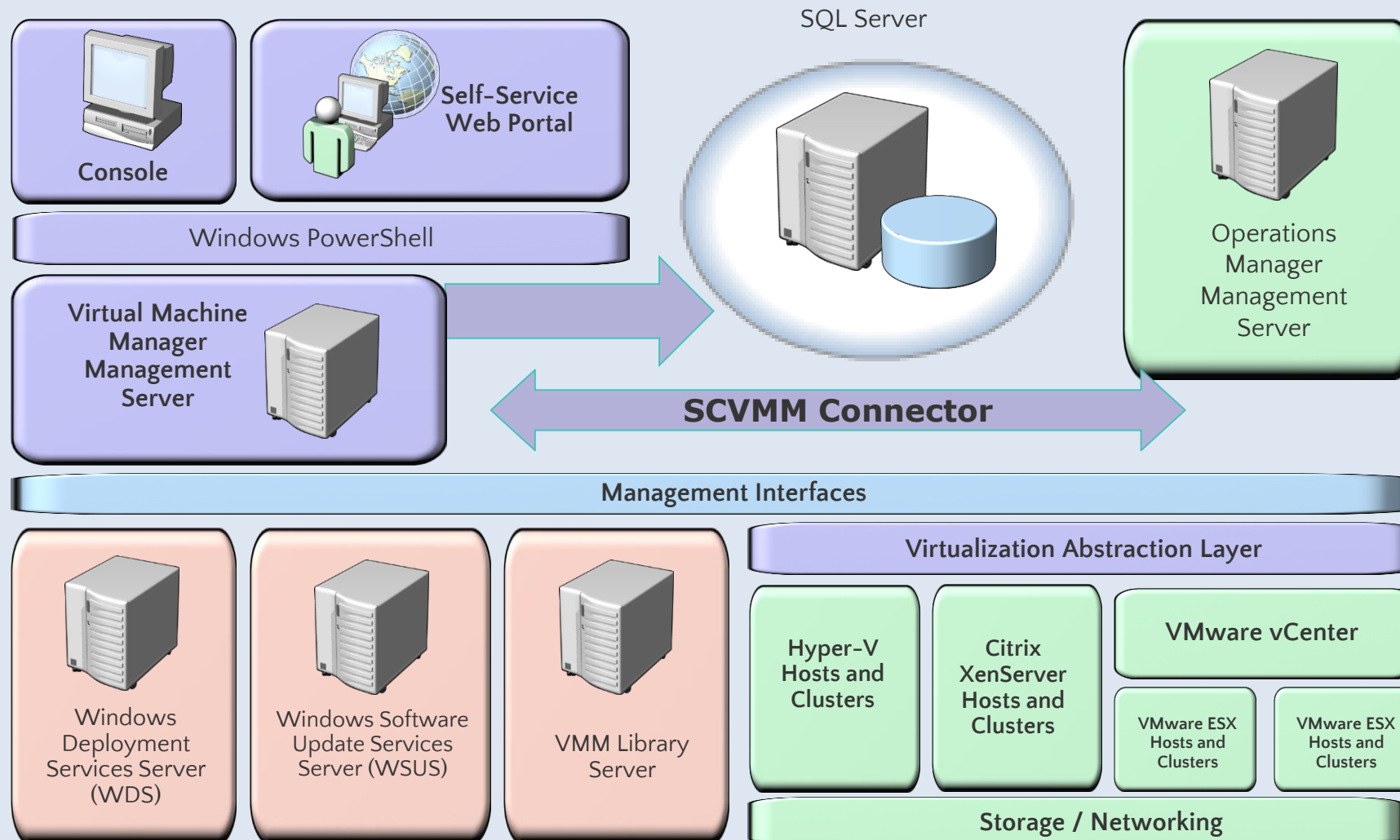
Using Microsoft System Center 2016 to Manage the Enterprise Data Center



System Center Virtual Machine Manager (SCVMM)

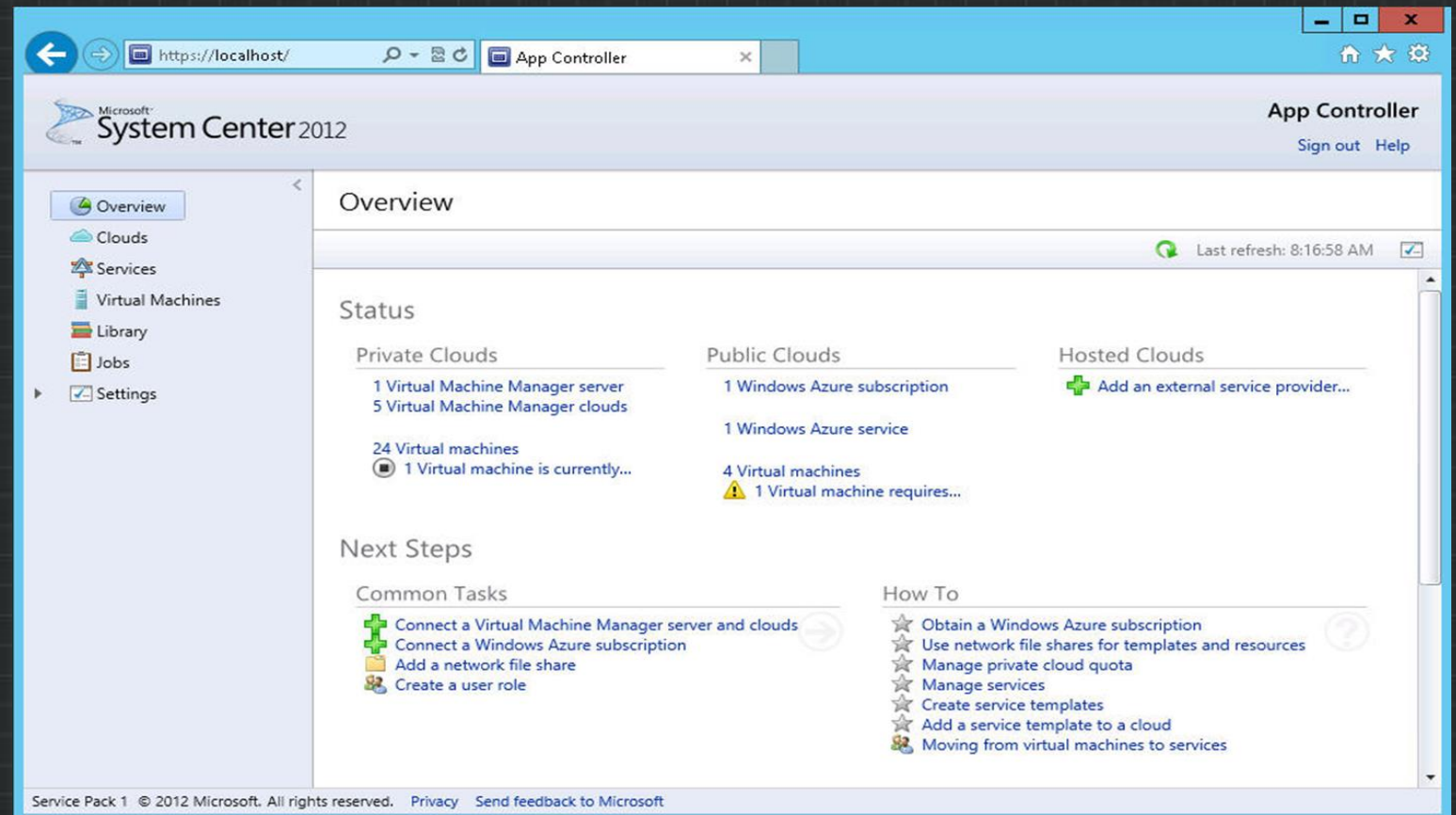
Virtual Machine Manager (VMM) enables you to configure and manage the virtualization hosts and infrastructure resources used to create and deploy virtual machines (VMs) and services to private clouds.

Introduction to Virtual Machine Manager



System Center App Controller

App Controller is tightly integrated with System Center 2012 R2 Virtual Machine Manager and is considered an extension of Virtual Machine Manager.



Thanks for listening!