



DATA CENTRE VIRTUALISATION

INVESTIGATION OF DIFFERENT VIRTUALISATION TOOLS AND SERVICES

RALITSA NIKOLOVA – BSc CLOUD COMPUTING LEVEL 6

AGENDA

- Servers and Virtualisation
- Hypervisors
- VMware vSphere/ESXi vs. Microsoft Hyper-V
- Azure and Cloud Computing
- Citrix and Virtualisation



SERVERS

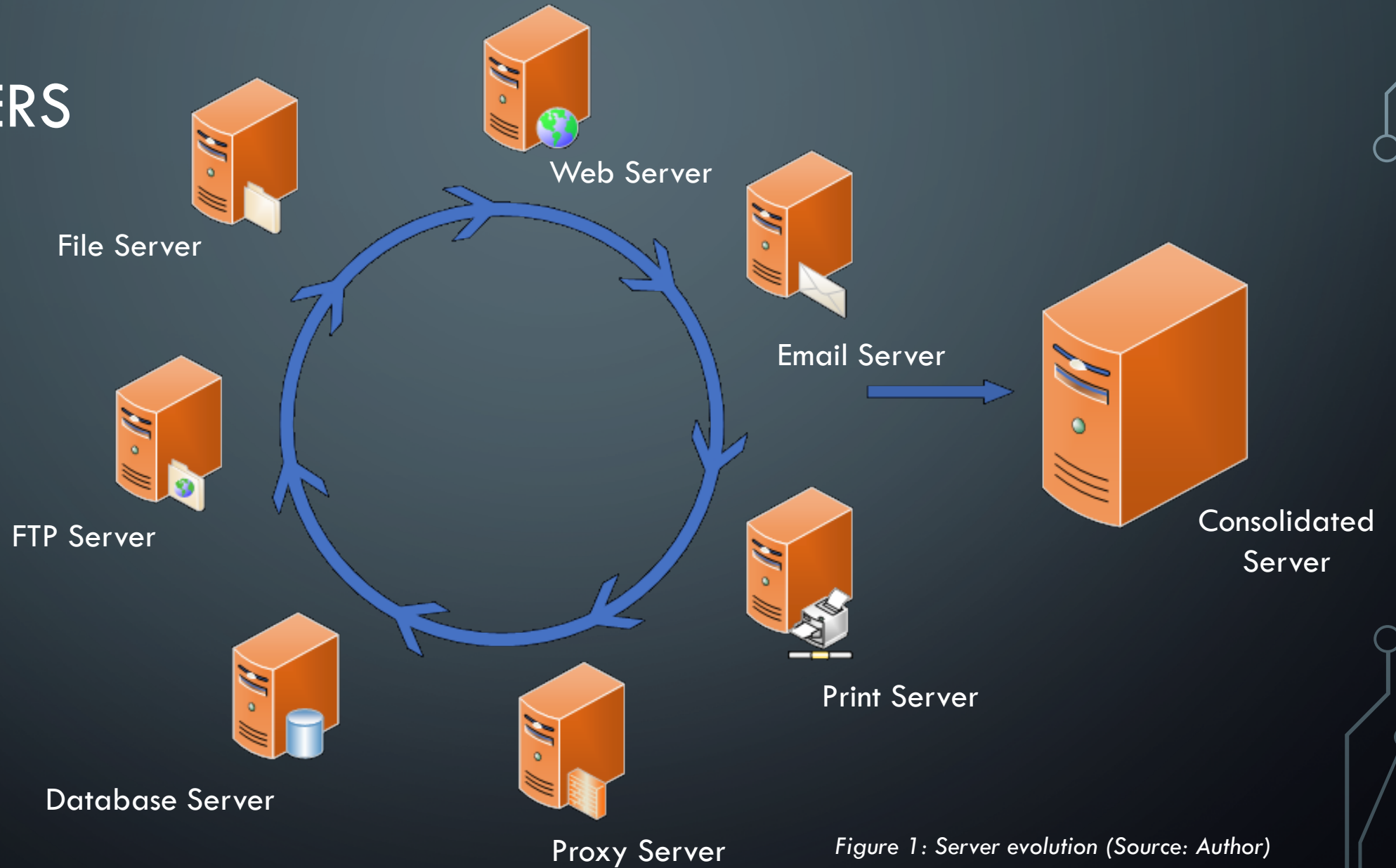
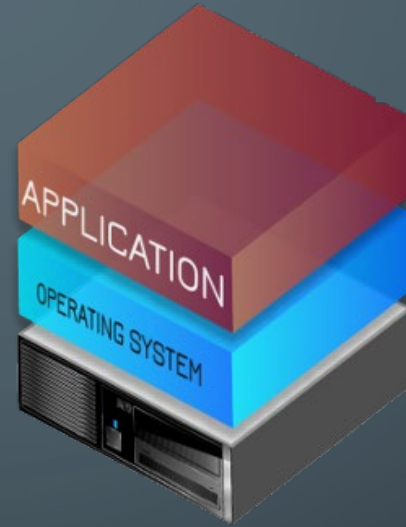


Figure 1: Server evolution (Source: Author)

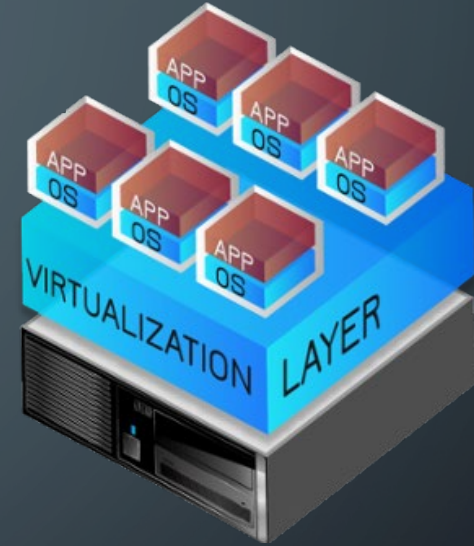
VIRTUALIZATION

DEFINITION

- Partition a physical computer into several independent VMs
- Share computing resources amongst multiple systems
- Run multiple OSs on one system in parallel



Traditional Server Architecture

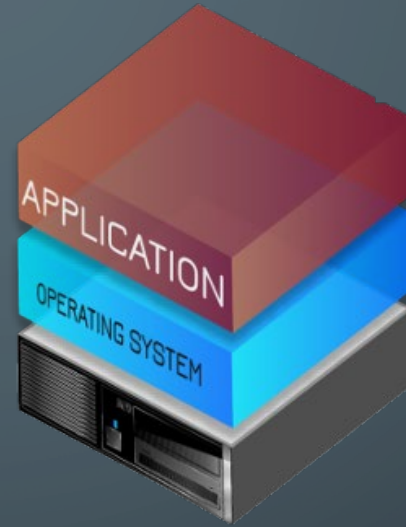


Virtualized Server Architecture

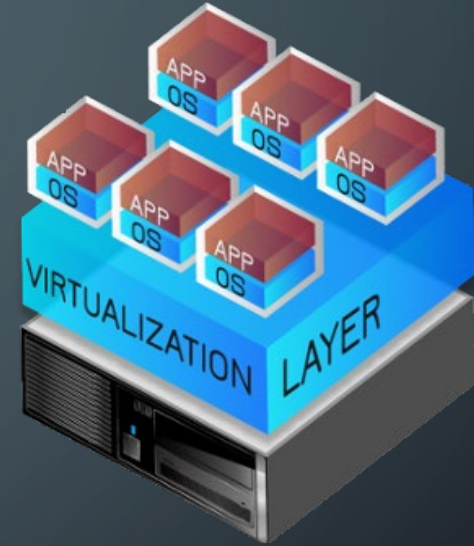
VIRTUALIZATION

MAIN CONCEPTS

- Abstraction – software layer is separated from the hardware
(transferable between physical machines)
- Remote/Centralised management
- Virtual Machines
- Hypervisors



Traditional Server
Architecture

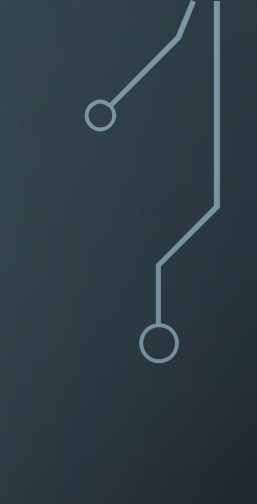
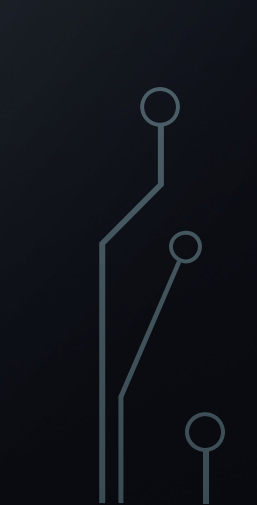


Virtualized Server
Architecture



VIRTUALIZATION

ADVANTAGES

- Fewer physical machines
 - Less capital and operational expenditure
 - Faster and easier deployment and management
 - Efficient utilisation of hardware capacity
 - Lower power consumption
 - Lower carbon footprint
- 
- 
- 

HYPERVISORS

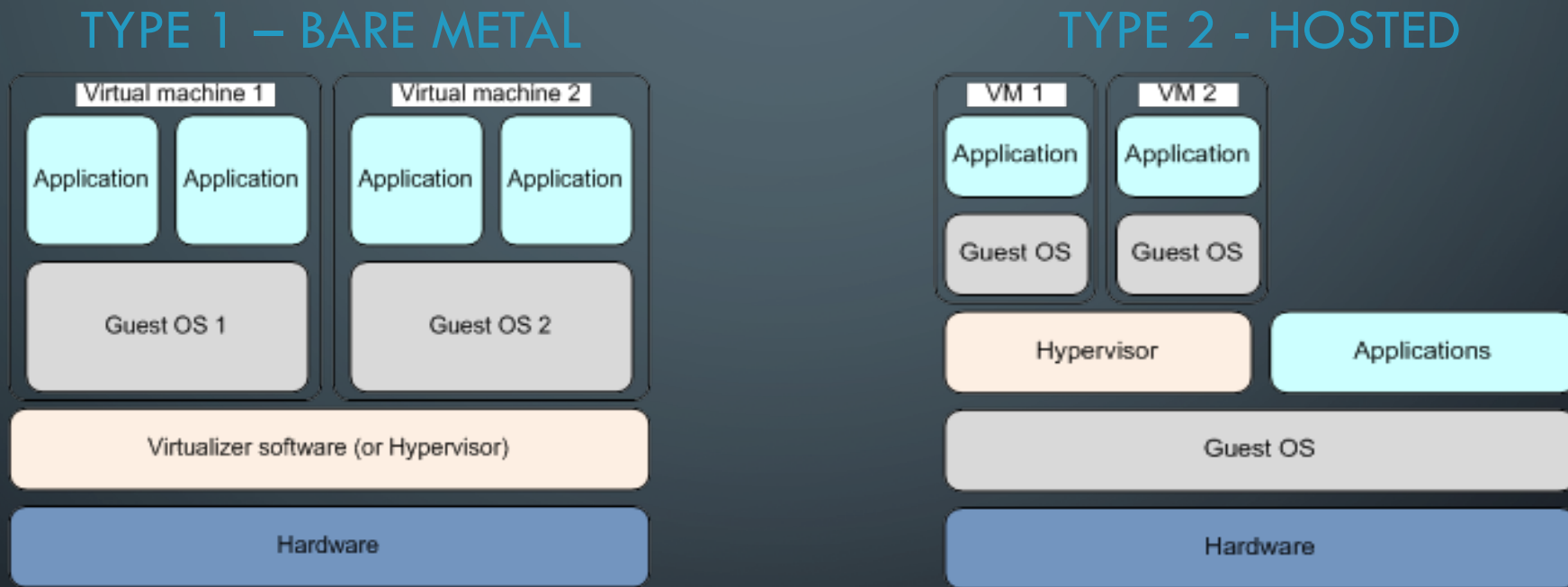


Figure 2: Hypervisor Layout [1]

HYPERVERSORS

TYPE 1 – BARE METAL

- Suitable for server-based environment
- Direct access to physical hardware
- Increased security
- Dedicated management console

TYPE 2 - HOSTED

- Suitable for individual physical machines
- Easy access to different guest OSs
- Run multiple OSs simultaneously
- Good for tests and analysis of various software platforms

VMWARE ESXI/VSPHERE/VCENTER

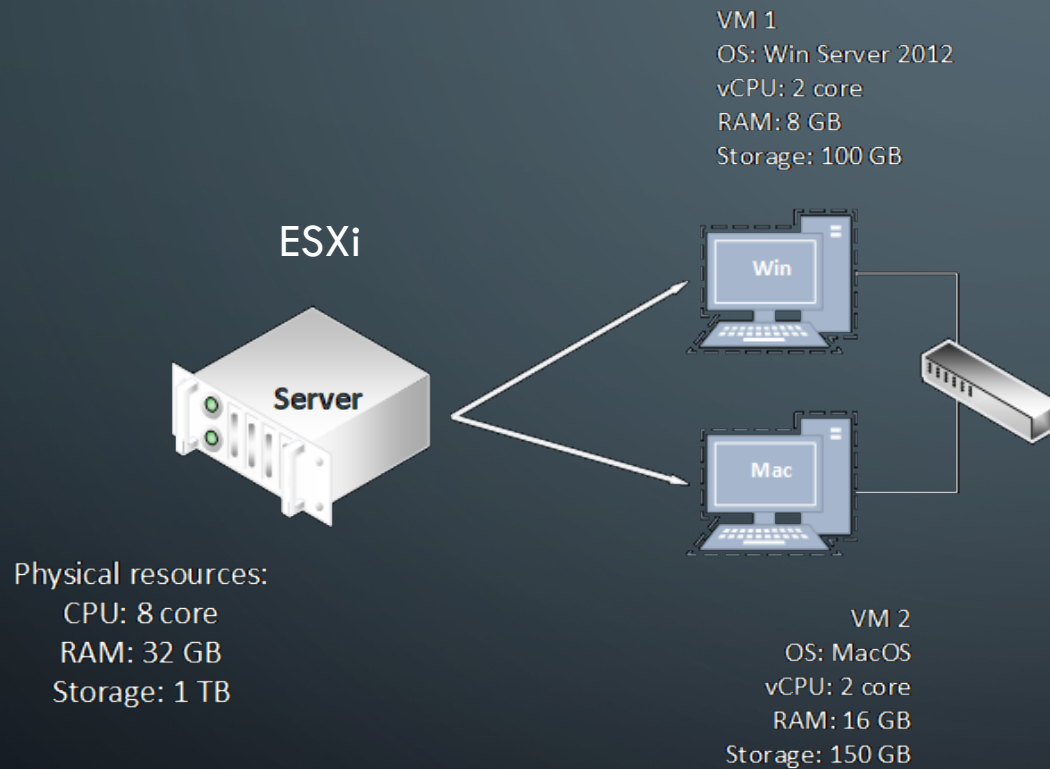


Figure 3: Virtualization concept using ESXi hypervisor
(Source: Author)

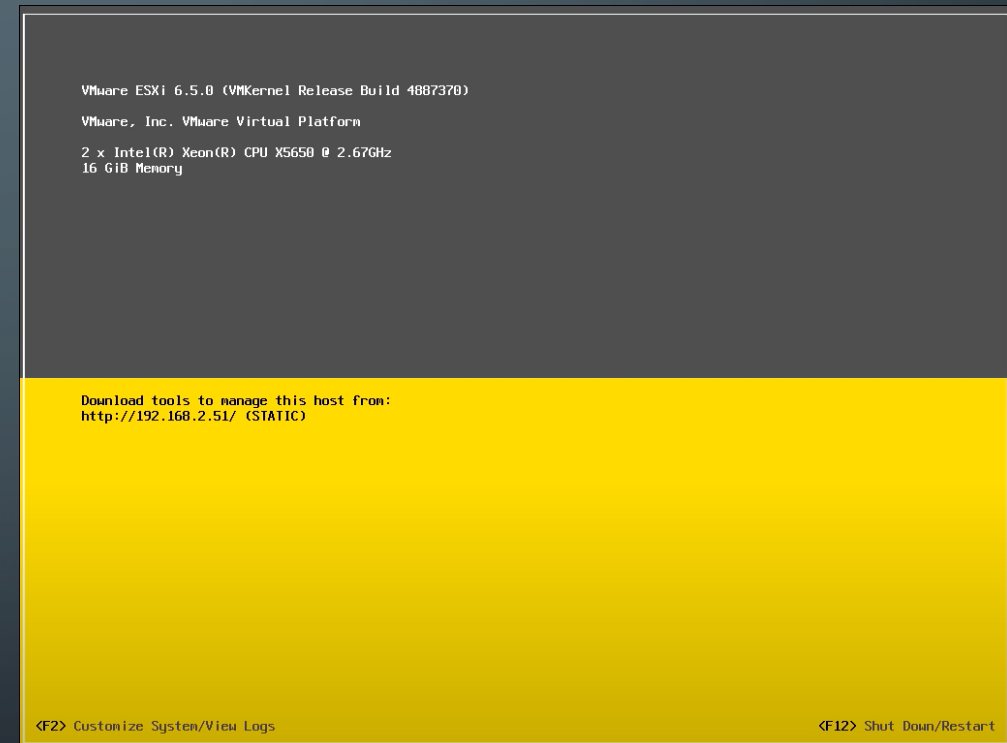


Figure 4: Boot-up screen for ESXi hypervisor

VMWARE ESXI/VSPHERE/VCENTER

User name

Password

Log in

vmware ESXi™

vmware ESXi™

root@192.168.2.51 | Help | Search

Navigator

Host

Manage

Monitor

Virtual Machines 0

Storage 1

Networking 2

localhost.localdomain

Get vCenter Server

Create/Register VM

Shut down

Reboot

Refresh

Actions

localhost.localdomain

Version: 6.5.0 (Build 4887370)

State: Normal (not connected to any vCenter Server)

Uptime: 0.06 days

CPU

FREE: 15.9 GHz

USED: 79 MHz

CAPACITY: 16 GHz

0%

MEMORY

FREE: 14.51 GB

USED: 1.49 GB

CAPACITY: 16 GB

0%

STORAGE

FREE: 496 MB

USED: 16 MB

CAPACITY: 512 MB

3%

You are currently using ESXi in evaluation mode. This license will expire in 60 days.

Hardware

Manufacturer: VMware, Inc.

Model: VMware Virtual Platform

CPU: 6 CPUs x Intel(R) Xeon(R) CPU X5650 @ 2.67GHz

Memory: 16 GB

Virtual flash: 0 B used, 0 B capacity

Networking

Hostname: localhost.localdomain

IP addresses: 1. vmk0: 192.168.2.51

DNS servers: 1. 192.168.2.1

Default gateway: 192.168.2.1

IPv6 enabled: No

Host adapters: 1

Networks

Name: VM Network

VMs: 0

Configuration

Image profile: ESXi-6.5.0-20171004001-standard (VMware, Inc.)

vSphere HA state: Not configured

vMotion: Supported

System Information

Date/time on host: Sunday, May 21, 2017, 08:41:36 UTC

Install date: Sunday, May 21, 2017, 07:03:06 UTC

Asset tag: Unknown

Service tag: Unknown

BIOS version: 6.00

BIOS release date: Monday, April 04, 2016, 19:00:00 -0500

Performance summary last hour

Consumed host CPU: 100%

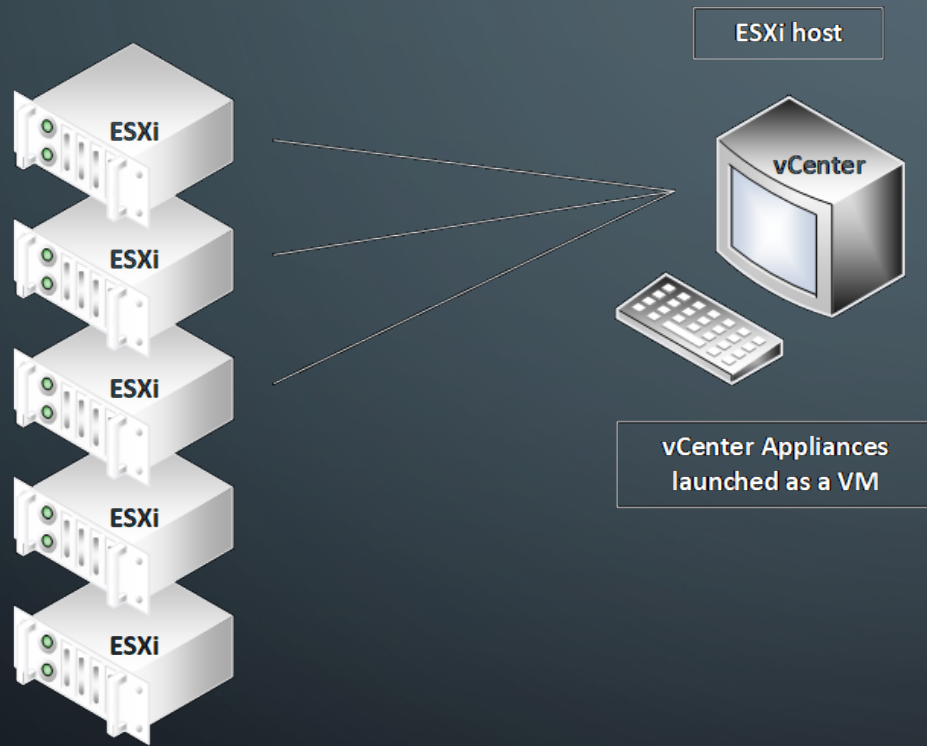
Consumed host memory: 0%

Recent tasks

Task	Target	Initiator	Queued	Started	Result	Completed
Update Options	localhost.localdomain	root	05/21/2017 03:34:33	05/21/2017 03:34:33	Completed successfully	05/21/2017 03:34:33

Figure 5: Vmware management console

VMWARE ESXI/VSPHERE/VCENTER



- Add all ESXi hosts to the inventory
- Manage all hosts and VMs
- Clone (VM Cloning), migrate (vMotion) VMs from host to host
- DRS
- High Availability
- Fault Tolerance
- Advanced networking features [3]

Figure 6: Virtualization concept using vCenter
(Source: Author)

MICROSOFT HYPER-V

- Requires Windows OS
- After reboot it launches before the OS
- High availability – Windows Failover Clustering
- Live Migration
- Cluster to cluster migration [2]

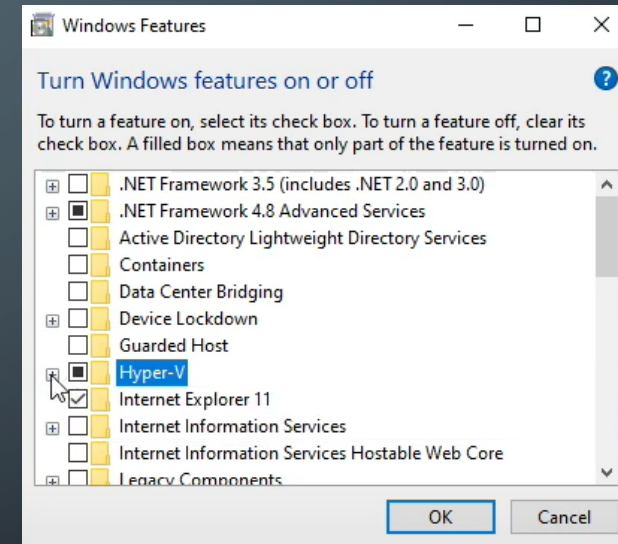


Figure 7: Windows Features console

CLOUD COMPUTING

- Consolidated servers and virtualisation as a foundation
- On-demand distribution of services and resources
- Abstraction



MICROSOFT AZURE



Figure 8: Azure Services [6]

- Online portal to all provided services and resources
- Pay-per-use model
- Provides services in most Cloud Computing domains
- Supports multiple programming languages
- Most number of data centres around the globe [5]

AZURE SERVICES [5]



COMPUTE

- Virtual machines
- Cloud service
- Service Fabric
- Functions

NETWORKING

- Azure CDN
- Express Route
- Virtual Network
- Azure DNS

STORAGE

- Disk Storage
- Blob Storage
- File Storage
- Queue Storage

CITRIX – VIRTUAL APPS AND DESKTOPS



- Deliver on-demand apps and virtual desktops to any device from any cloud
- Provide secure access and storage of the data managed with those apps
- Minimal to no limitations from hardware or underlying OS

THANK YOU!

REFERENCES

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- [4] A. Mayer, "VMware ESXi vs vSphere vs vCenter: Key Differences," Nakivo, 19 Feb 2020. [Online]. Available: <https://www.nakivo.com/blog/vmware-esxi-vs-vsphere-vs-vcenter-key-differences/#:~:text=vSphere%20is%20an%20industry%2Dlevel,with%20just%20a%20few%20clicks..> [Accessed 18 03 2021].
- [5] Simplilearn, "What is Azure and How Does It Work?," Simplilearn, 12 Feb 2021. [Online]. Available: https://www.simplilearn.com/tutorials/azure-tutorial/what-is-azure?&utm_medium=Description&utm_source=youtube. [Accessed 18 03 2021].
- [6] Tchnovert, "END-TO-END ENTERPRISE-GRADE SOLUTIONS ON AZURE," Technovert, 2020. [Online]. Available: <https://technovert.com/microsoft-azure/>. [Accessed 18 03 2021].