



Virtualization

WYATT MACKUBBIN

MICROSOFT WANTS ME TO BUY
THEIR VM SOFTWARE NOW

What is Virtualization

Virtualization!, doesn't the computer already do virtual things?

All kinds of applications

Portable!

Background

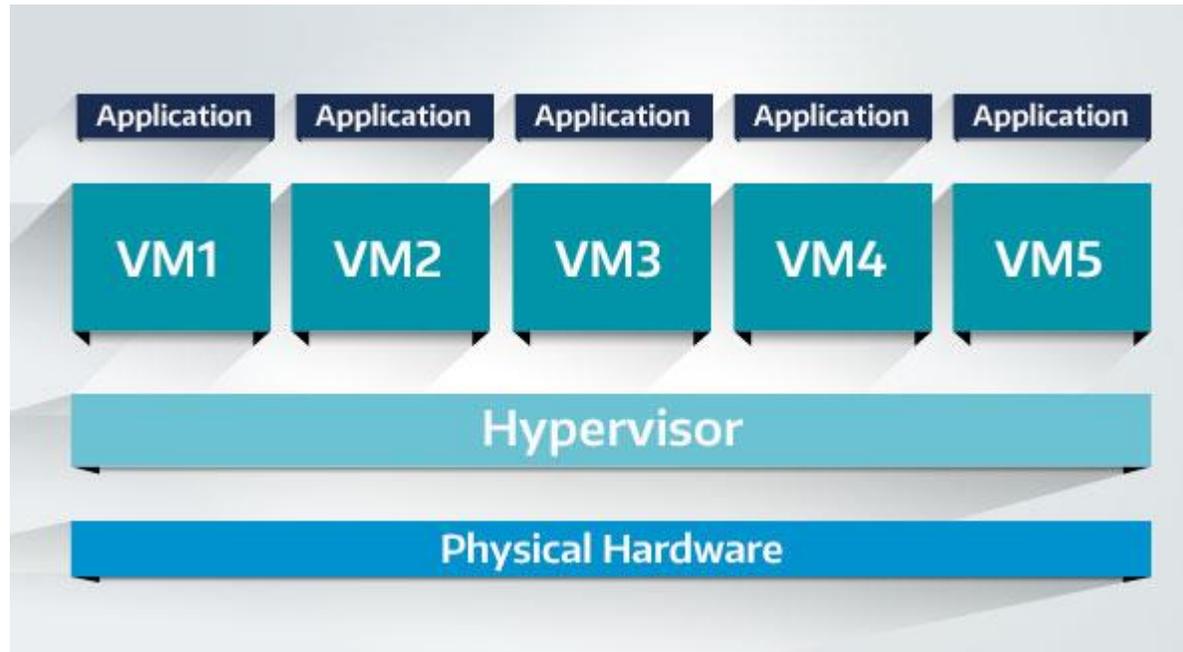
Born out of the idea of unused computer resources

Isn't a new idea

Began in the late 60's early 70's, IBM

In 99 we had VMware launch

Basic Diagram



Hypervisor

A piece of software that manages the VM's



Also known as a virtual machine manager(VMM)



Schedules the VM resources

Type 1 Hypervisor

“bare metal”

Used in server and enterprise data centers

KVM, Microsoft Hyper-V, and VMware vSphere

KVM

Kernel Based Virtual Machine

KVM built into Linux

Allows you to turn your kernel into a hypervisor

Mistaken for a type 2 hypervisor

Type 1 Hypervisor

Hypervisor
Type-1

Virtual Machine

Virtual Machine

Virtual Machine

Hypervisor

Hardware

Type 2 electric boogaloo Hypervisor

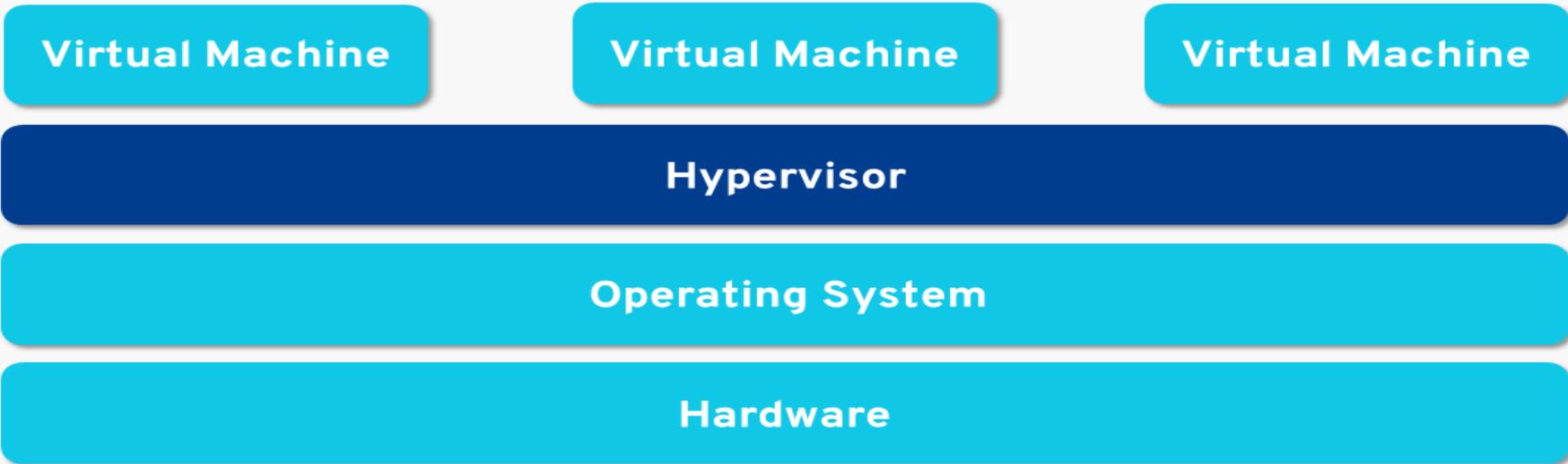
Runs on top of the OS

The VM's run against the host OS

VMware Workstation, Oracle VirtualBox

Type 2 Hypervisor

Hypervisor
Type-2



IONOS

Beans

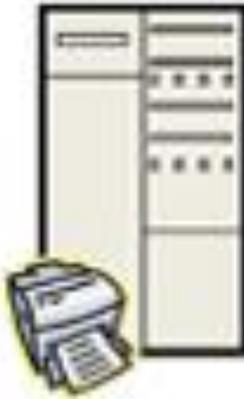
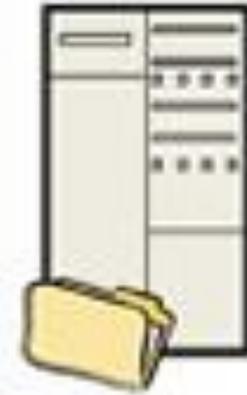
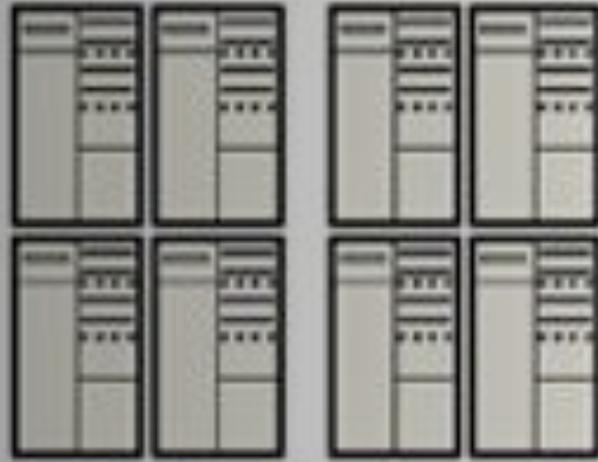
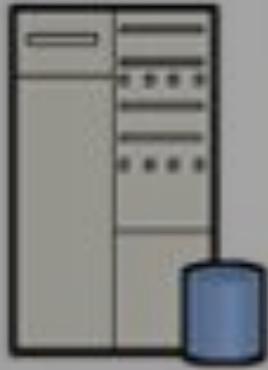
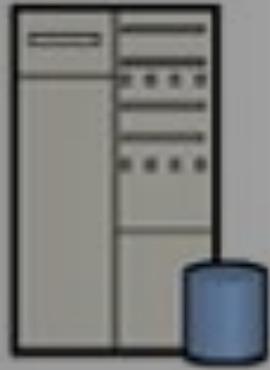
Bacon

Application Servers

Whiskey

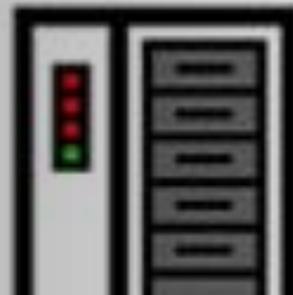
Lard

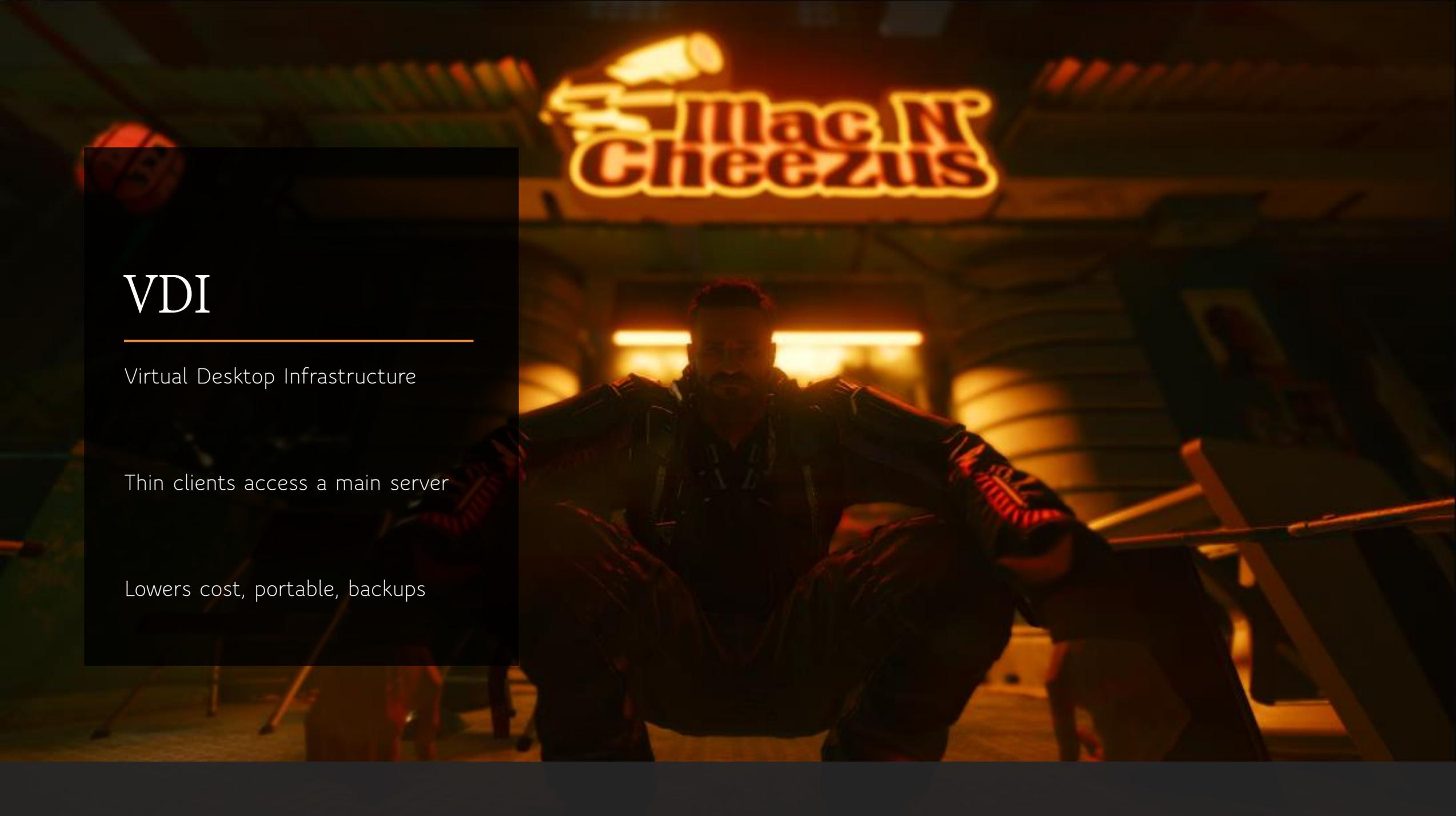
Print



Consolidation

HERE'S THE FUN PART





VDI

Virtual Desktop Infrastructure

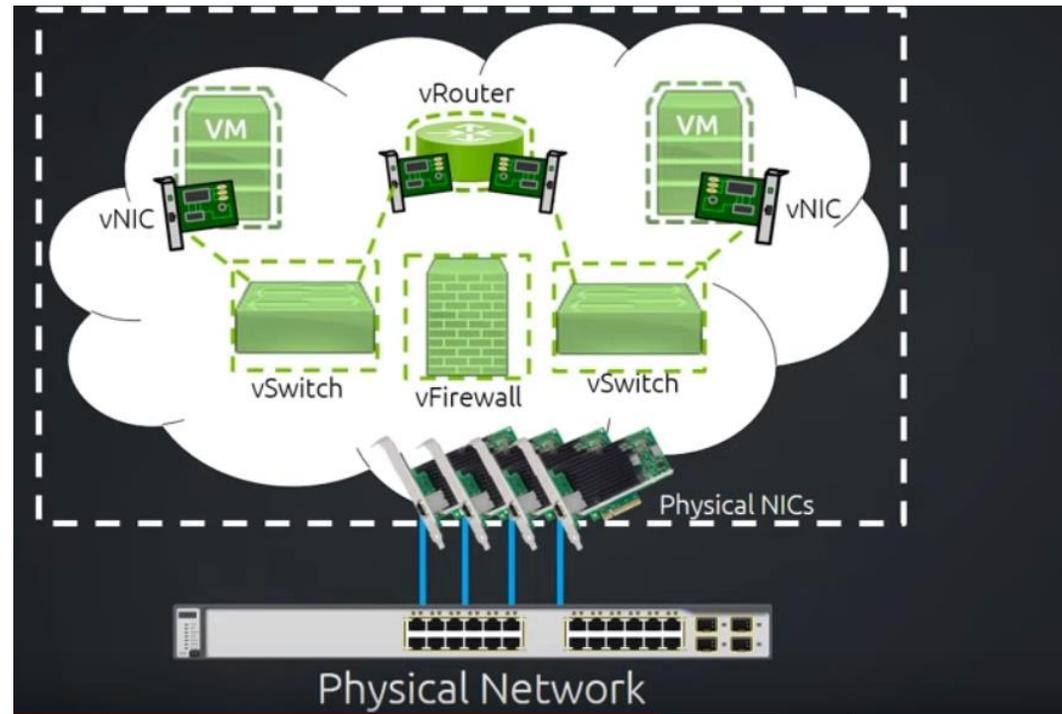
Thin clients access a main server

Lowers cost, portable, backups

Virtual Networks

Networks can be virtualized as well

Each component as well



Public Cloud Computing



People pay for only what they need metered service

Data is stored in a large datacenter

Nested Virtualization

Virtual machines running inside of virtual machines

Does have its uses

Can't be done willy-nilly and is usually a pain to set up

Microsoft Server 2016 added support for this

Security

You can use virtualization to isolate dangerous files

Researchers use VM's to study malware

However, VM's are not perfect

Security(cont)

If VM's are connected to a network, just like any machine they must be protected



VM's can be broken out of

Juniper's security solution



Containers

What is a container?

Microservices

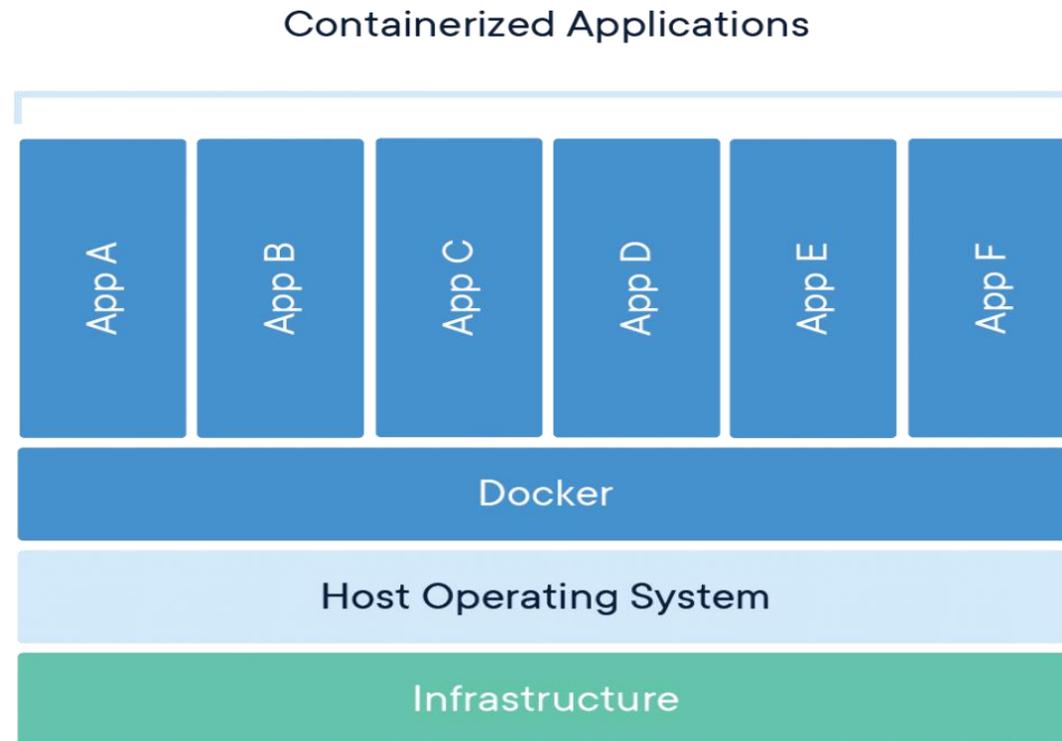
Useful when multiple OSs aren't needed

Standardized



Container Diagram

Docker Example



Containers vs. Virtualization

Virtualization runs entire OS

Containers run singular apps

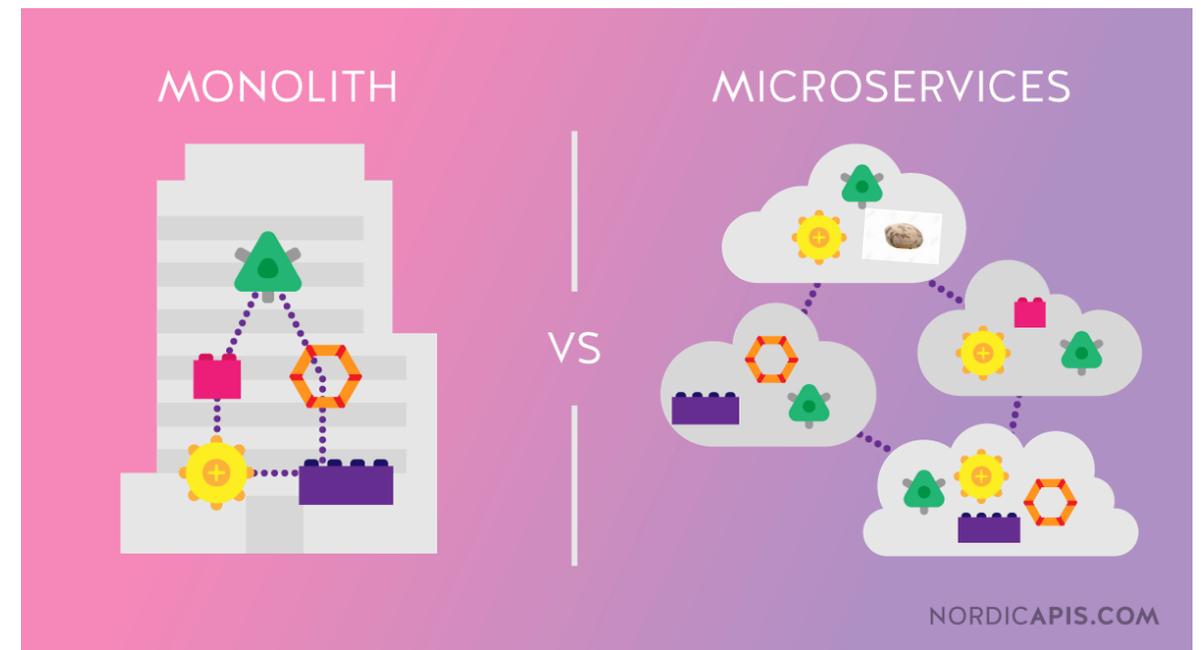
Why not both



Monoliths and Micro Services

Monolith one large service that contains every thing

Micro services small portion of service



Kubernetes

Created by google in 2014

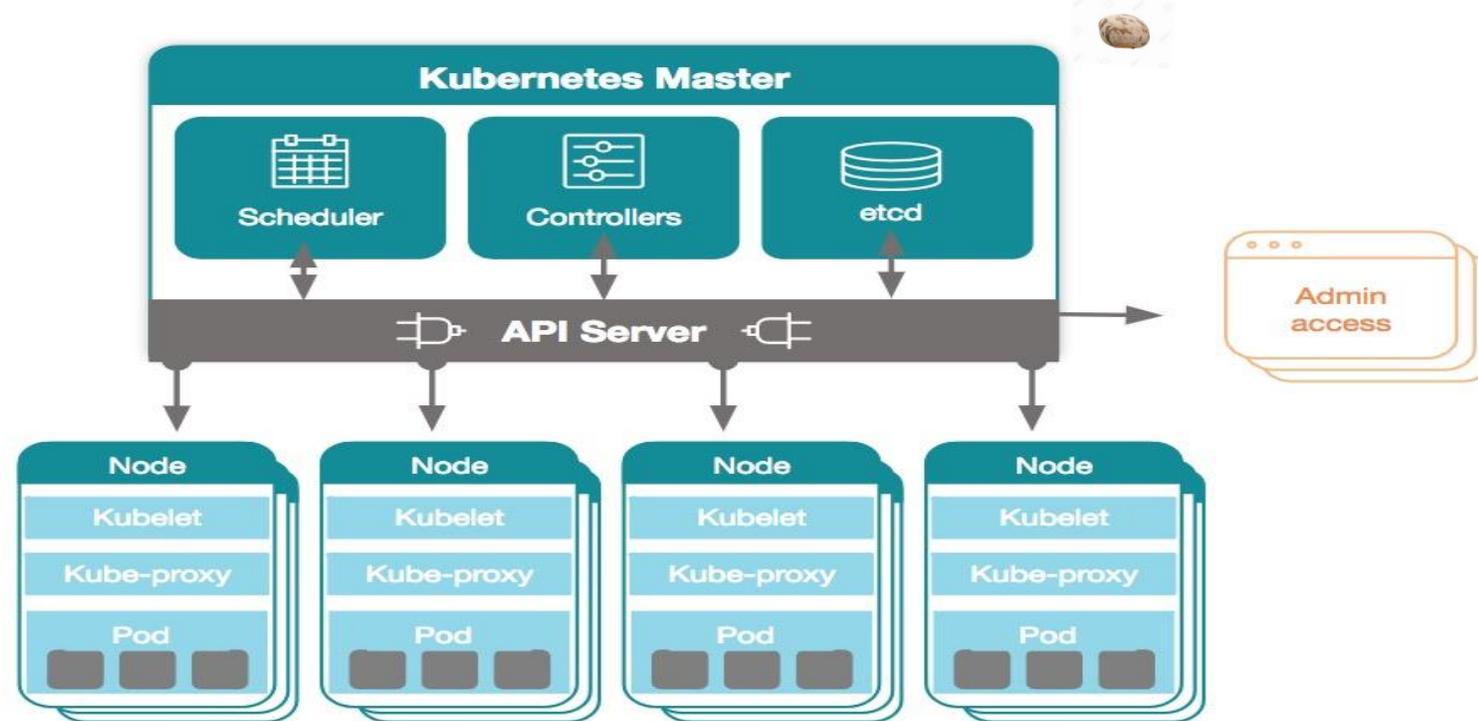
Kubernetes orchestrates groups of containers

Useful when deploying many containers

Scalable

Kubernetes

Kubernetes Architecture



Kubernetes break down

Pod group of containers working together

Deployment defines the scale



Service comprised of several replaceable pods

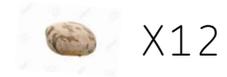
Kubernetes continued

Node, machine physical or virtual that runs the pods

Cluster collection of nodes, pods, control-planes, etc.

Control plane, schedulers API Server, controllers

Conclusion



VM's created to concurrently run different OS's on same hardware

VM's are used to make full use of hardware or to consolidate

Containers are a standardized way to encapsulate software

Kubernetes

Sauce

<https://community.connection.com/rethinking-virtualization-containers-in-the-data-center/>

<https://www.ionos.com/digitalguide/server/know-how/what-is-a-hypervisor/>

<https://www.webopedia.com/definitions/nested-virtualization/>

<https://docs.microsoft.com/en-us/virtualization/hyper-v-on-windows/user-guide/nested-virtualization>

<https://theintercept.com/2015/09/16/getting-hacked-doesnt-bad/>

<https://www.trendmicro.com/vinfo/us/security/news/security-technology/security-by-design-a-checklist-for-safeguarding-virtual-machines-and-containers>

<https://www.docker.com/resources/what-container>

<https://www.redhat.com/en/topics/containers/what-is-kubernetes>

<https://blog.newrelic.com/engineering/what-is-kubernetes/>

<https://www.youtube.com/watch?v=L8A9PHeyRrY>

<https://www.youtube.com/watch?v=FWpnbGnzK08&t=56s>

<https://nordicapis.com/should-you-start-with-a-monolith-or-microservices/>

https://www.youtube.com/watch?v=og5vDmwub54&list=RDCMUCSMtI5UvjQMkFnMjNCrtA&start_radio=1&t=5

https://rust.fandom.com/wiki/Can_of_Beans

https://en.wikipedia.org/wiki/Timeline_of_virtualization_development