A photograph of an underwater environment. A scuba diver wearing a purple wetsuit is visible in the center, swimming over a sandy ocean floor. Sunlight filters down from the surface in bright rays, creating a dappled light effect on the sand and the surrounding water. The water is a deep blue-green color.

~Deep dive into Windows Containers and Docker~

Blog: <http://www.solidalm.com>
Twitter: <https://twitter.com/cornellknulst>



Think ahead. Act now.

Xpirit



Think ahead. Act now.

Xpirit

A photograph of a man in a light-colored shirt and trousers plowing a field with two large, light-colored oxen. He is using a wooden plow and a long wooden staff to guide the oxen. The field is brown and appears to be dry. In the background, there is a lush green mango tree with many flowers. The overall scene suggests traditional agriculture.

Are we doing the
right things?

Think ahead. Act now.



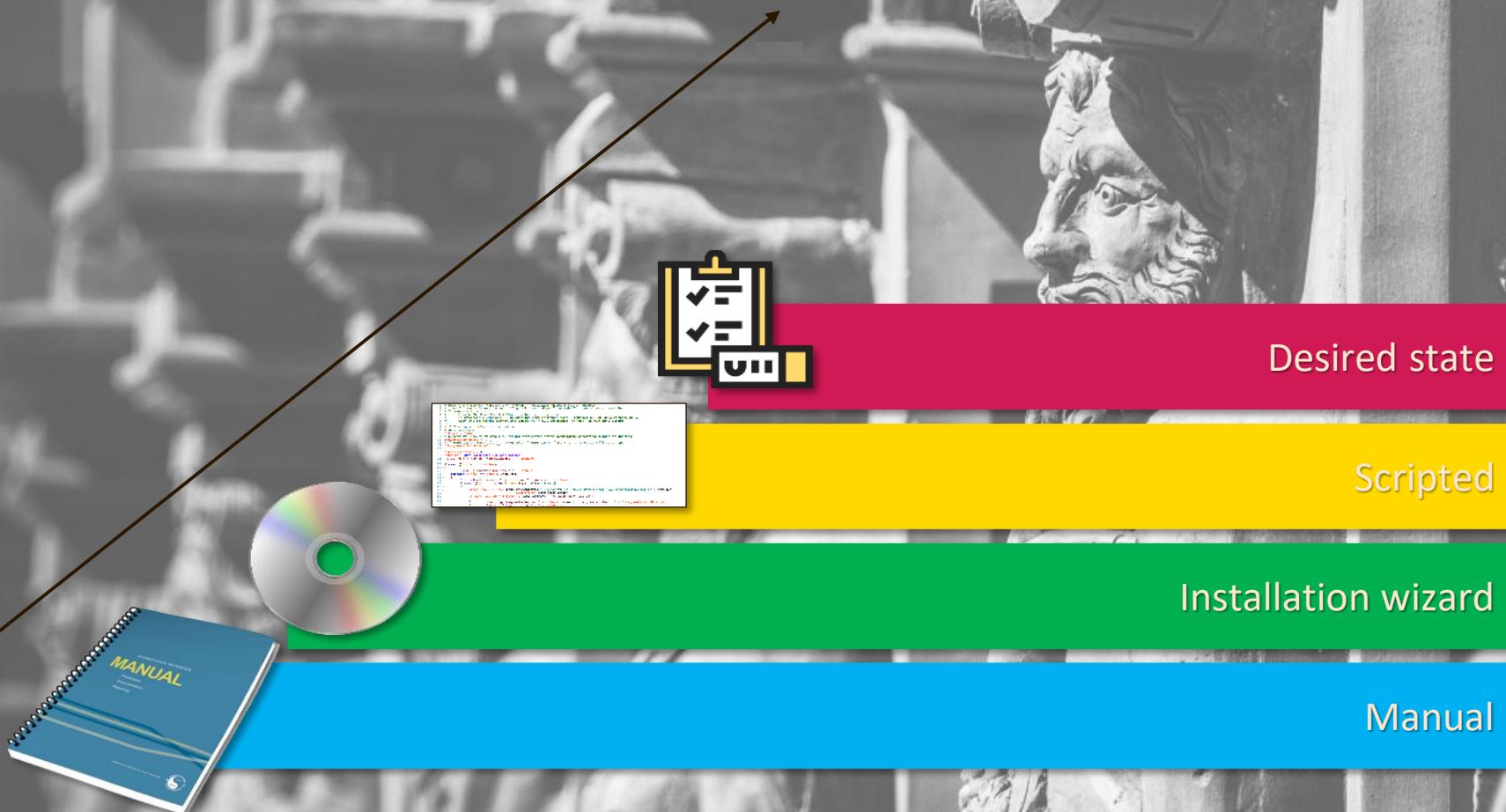


In managing
infrastructure?

Think ahead. Act now.



In deployment?



Think ahead. Act now.

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The cloud has changed expectations



Availability
100% Uptime



Hyper-scale
From startup to enterprise



Agility
Deliver just in time speed

Good & Green Guides

The world's largest taxi company, owns no vehicles

Facebook

The most valuable retailer, has no inventory

Airbnb

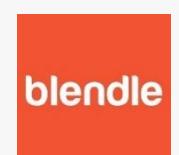
The leading sustainable travel guide specialist, has no guides

Uber

The world's most popular media owner, creates no content.

Alibaba

The world's largest accomodation provider, owns no real estate.



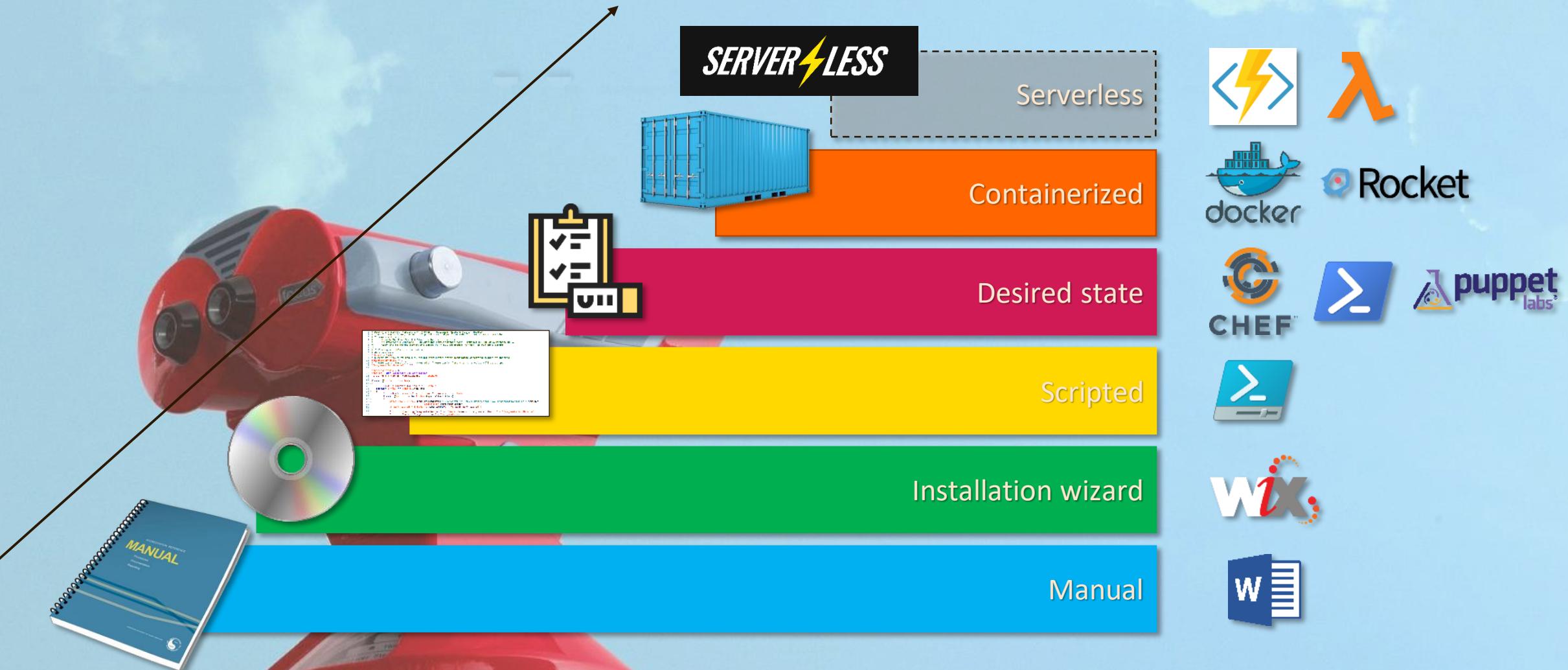


We have to change
the way we work...

Think ahead. Act now.



Future of application delivery



Think ahead. Act now.

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Faster

Better

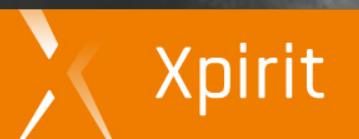
The benefits of containers

Cheaper



How to get
started?

Think ahead. Act now.





docker

Think ahead. Act now.

Xpirit

A black and white photograph of a man from the chest up, looking upwards with a thoughtful expression. He is positioned centrally against a dark background. Above him, several glowing lightbulbs hang in a curved line, suggesting ideas or innovation.

Demo

First look at container isolation

run, exec, rm



What are containers?

Think ahead. Act now.



Containers are **NOT** VM'S!

Containers vs VM's

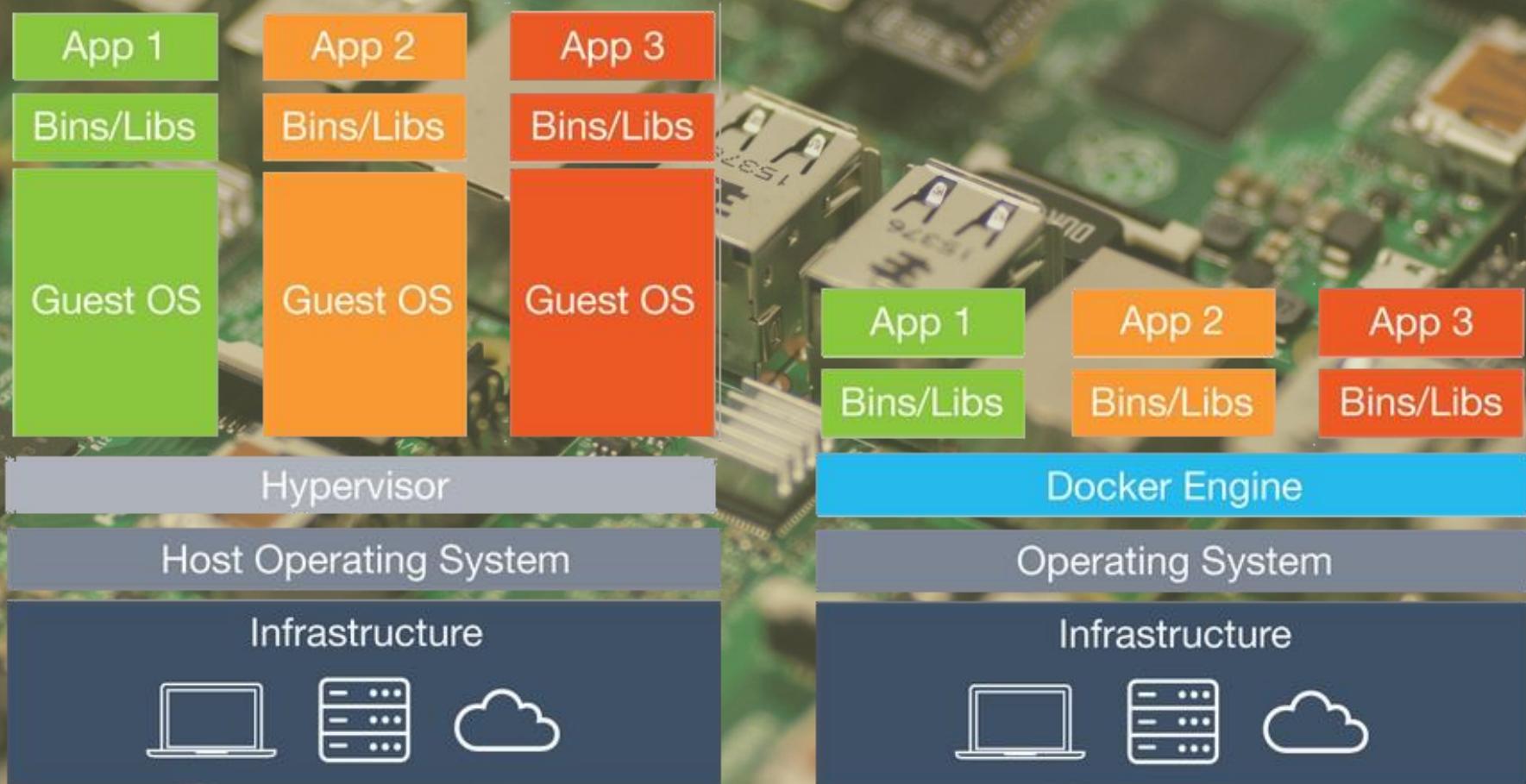
Isolated environment

Can both be moved between hosts

Resource governance



Implementation



Containers

OS virtualization
Shared OS
Same OS as host
Start small, add later

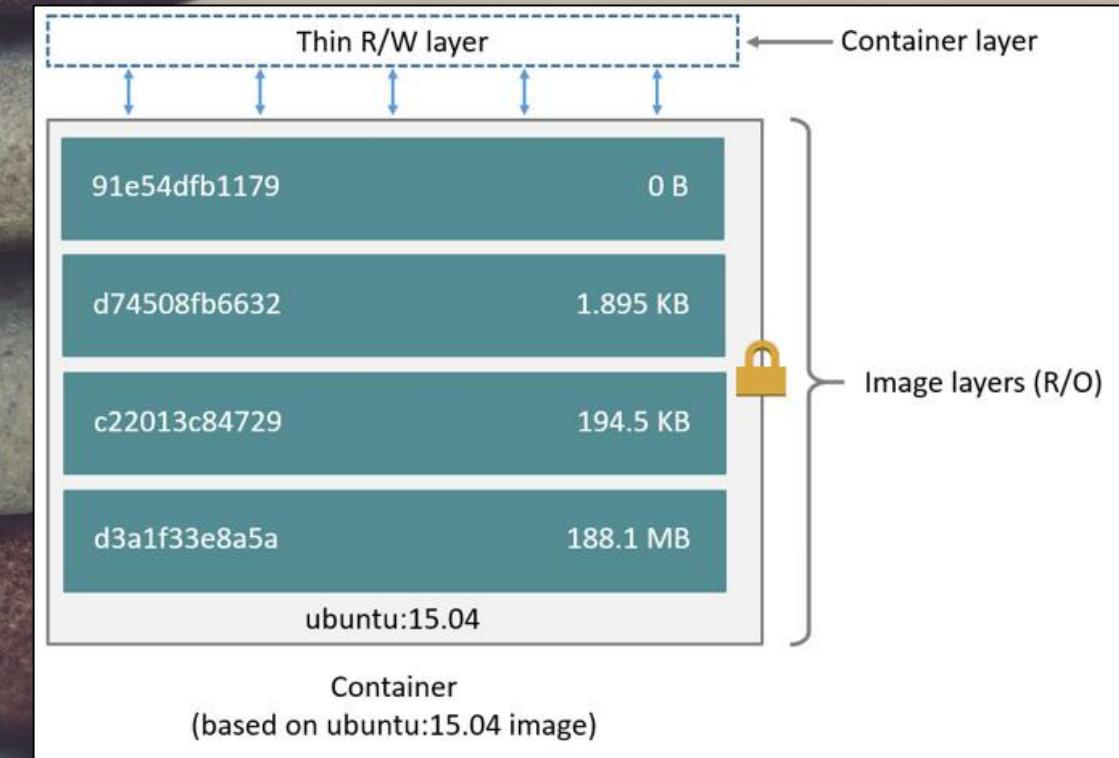
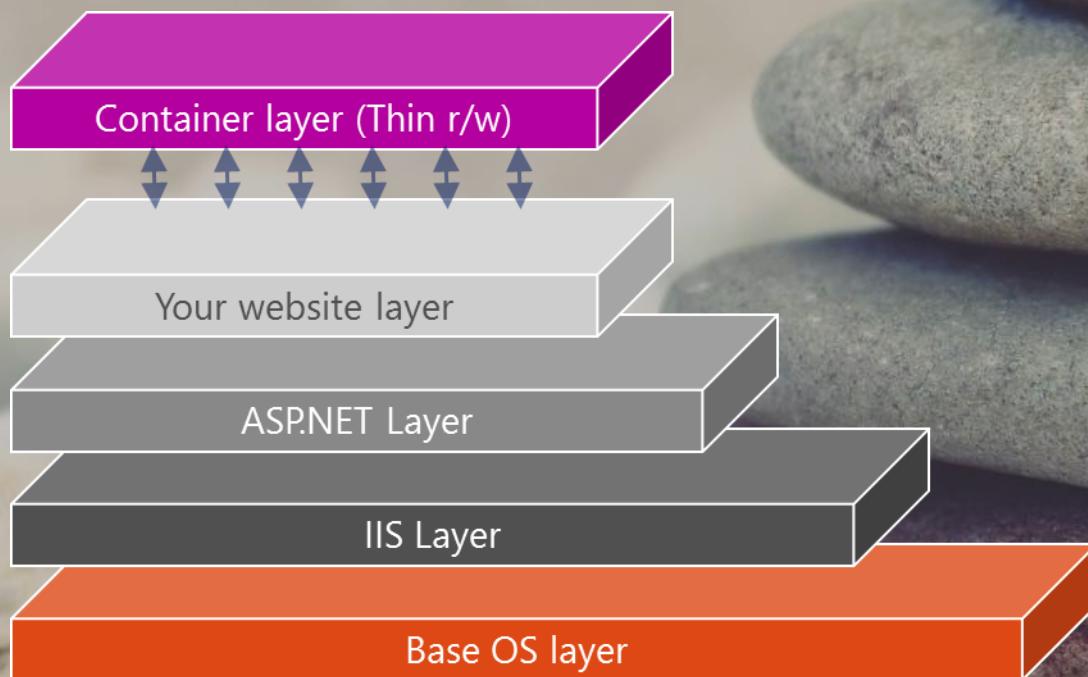


VM's

Hardware virtualization
Dedicated OS
Independent OS
Start full, strip out later



Container, images, layers...



Demo

Images and images layers

search, pull, tag, inspect

Windows Containers

Think ahead. Act now.



Architecture

Docker Client

Docker Compose

Docker Registry

Docker Swarm

REST Interface

Docker Engine

libcontainerd

libnetwork

graph

plugins

Compute Service

Control Groups
Job objects

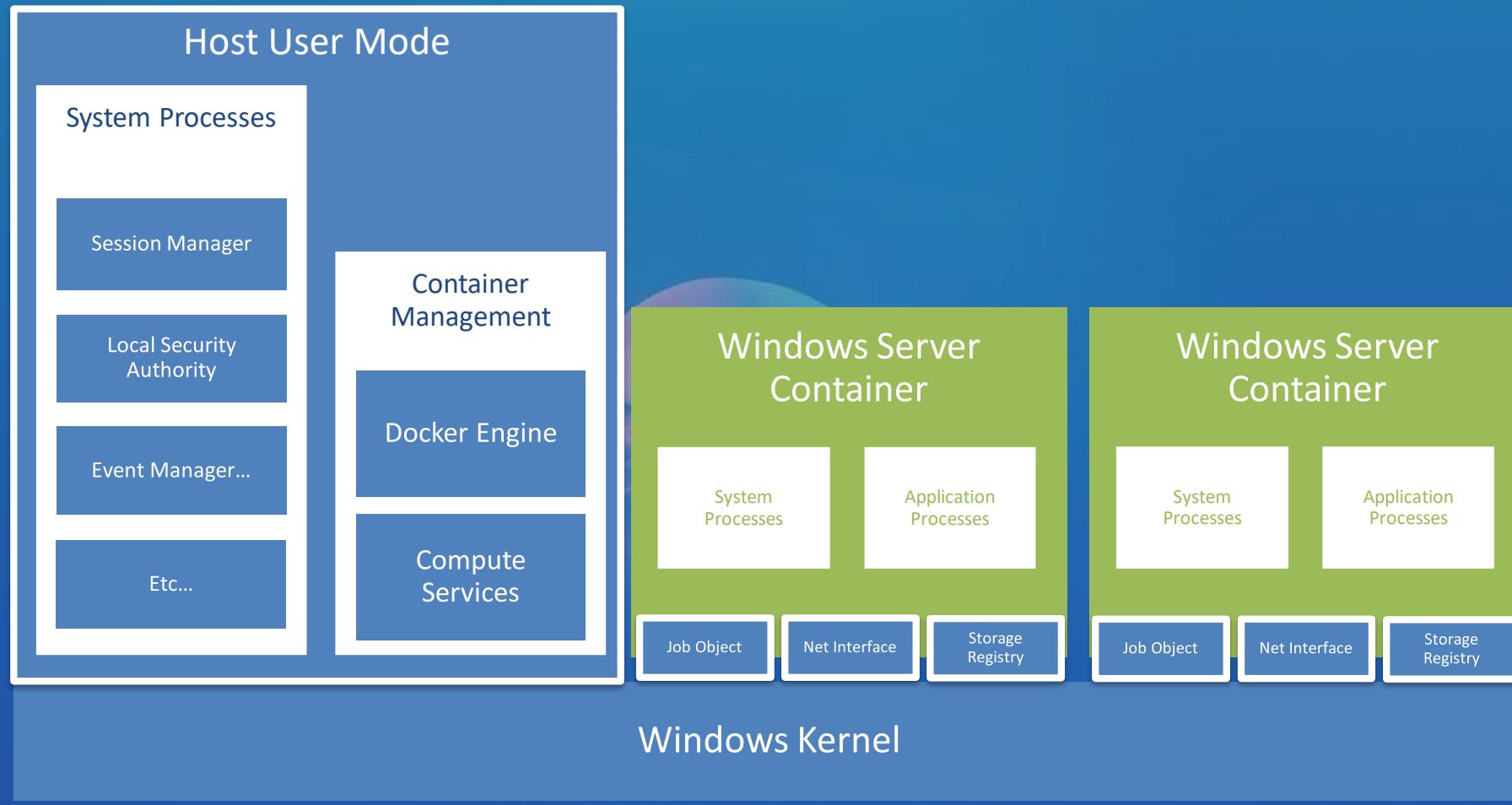
Namespaces
*Object Namespace,
Process Table,
Networking*

Layer Capabilities
*Registry, Union like
filesystem extensions*

Other OS
Functionality

Operating System

Windows Server Containers





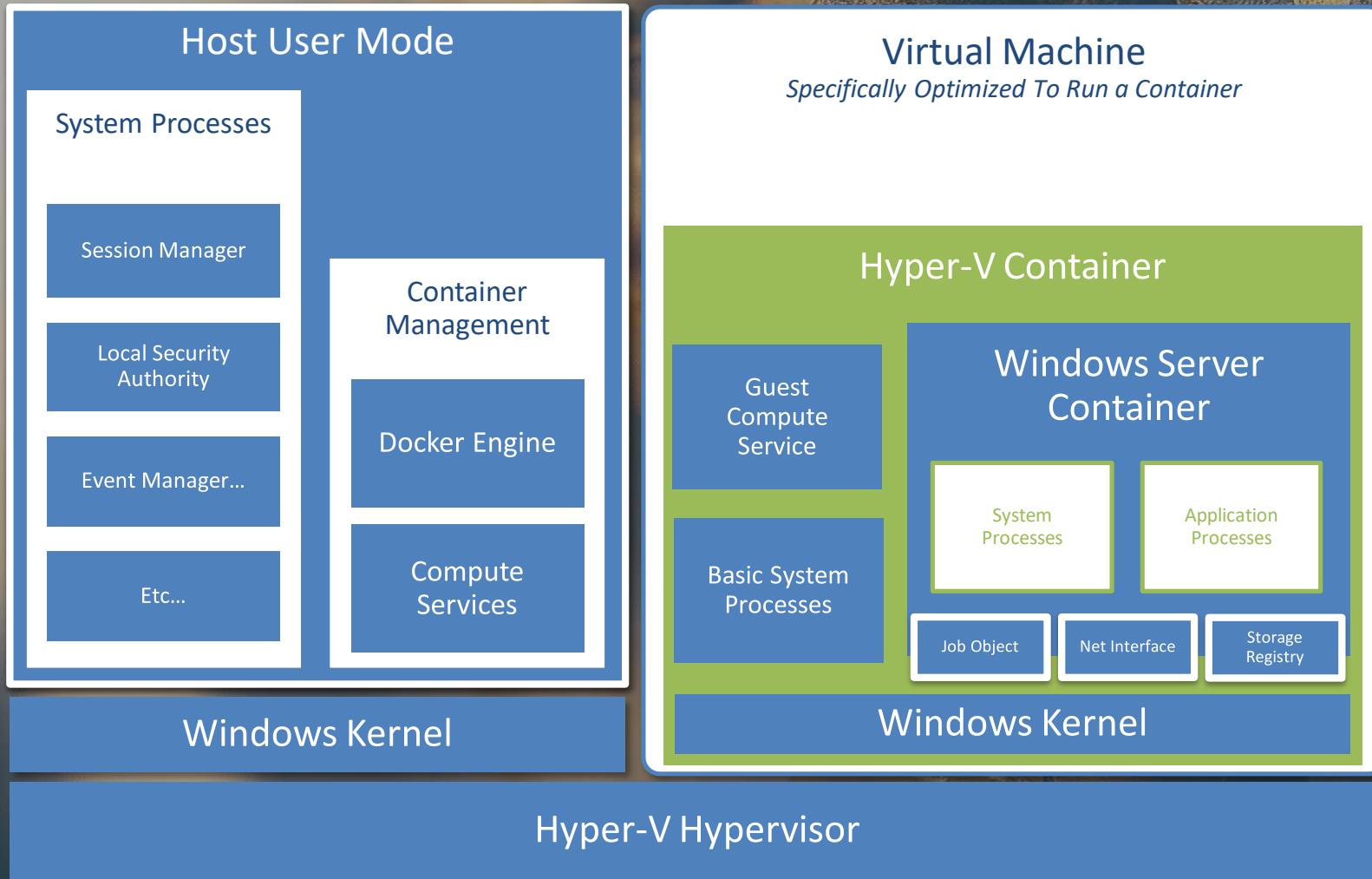
Demo

SMSS

Think ahead. Act now.

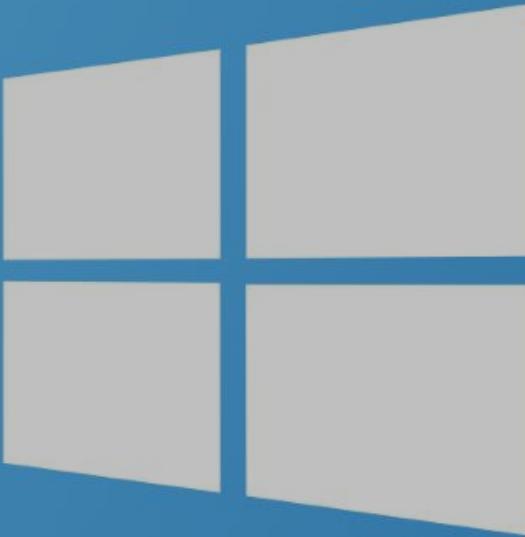


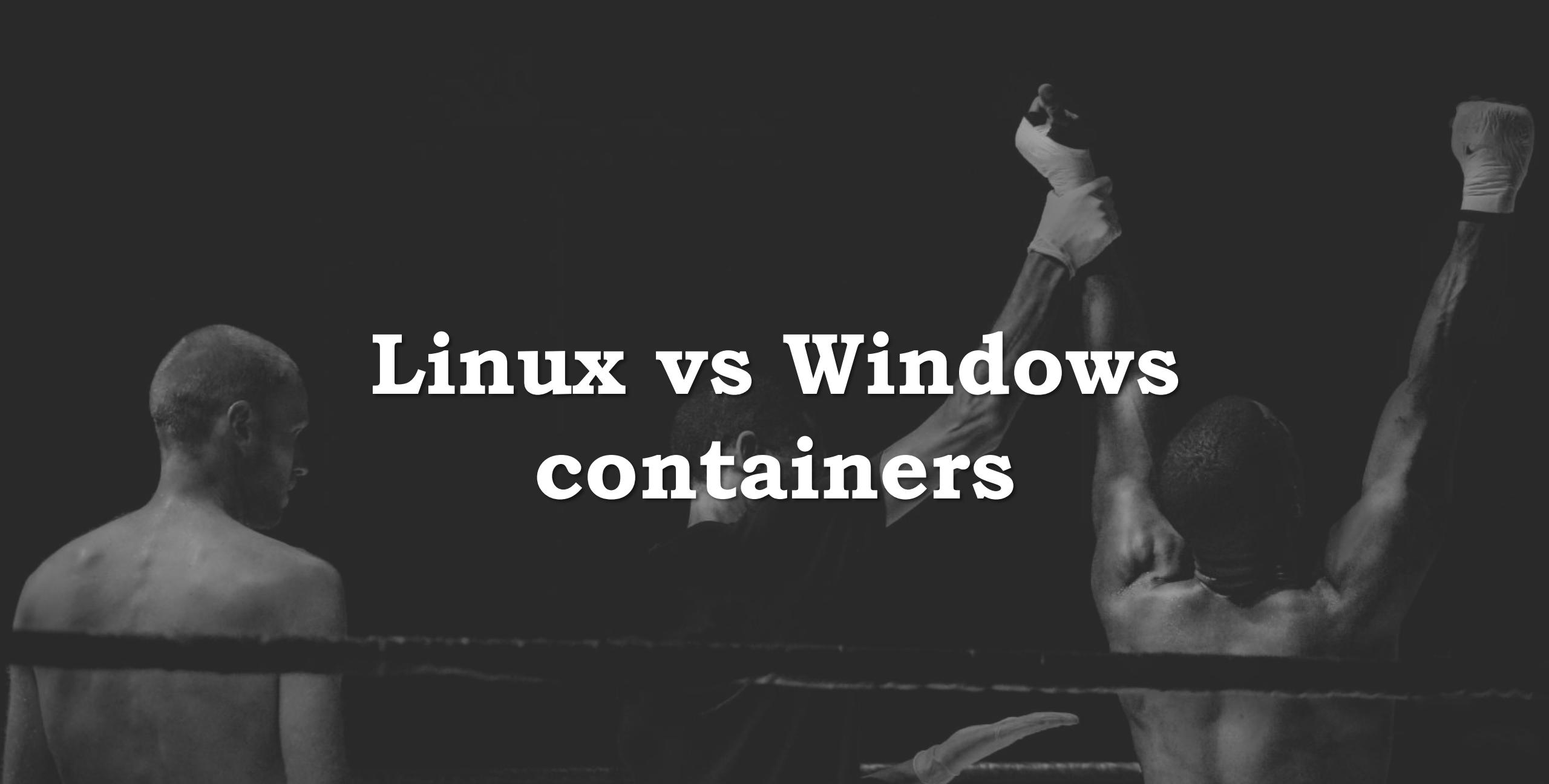
Hyper-V Containers



Demo

Hyper-V container





Linux vs Windows containers

Think ahead. Act now.



Demo

Creating our first container image

commit, build, login, tag, push

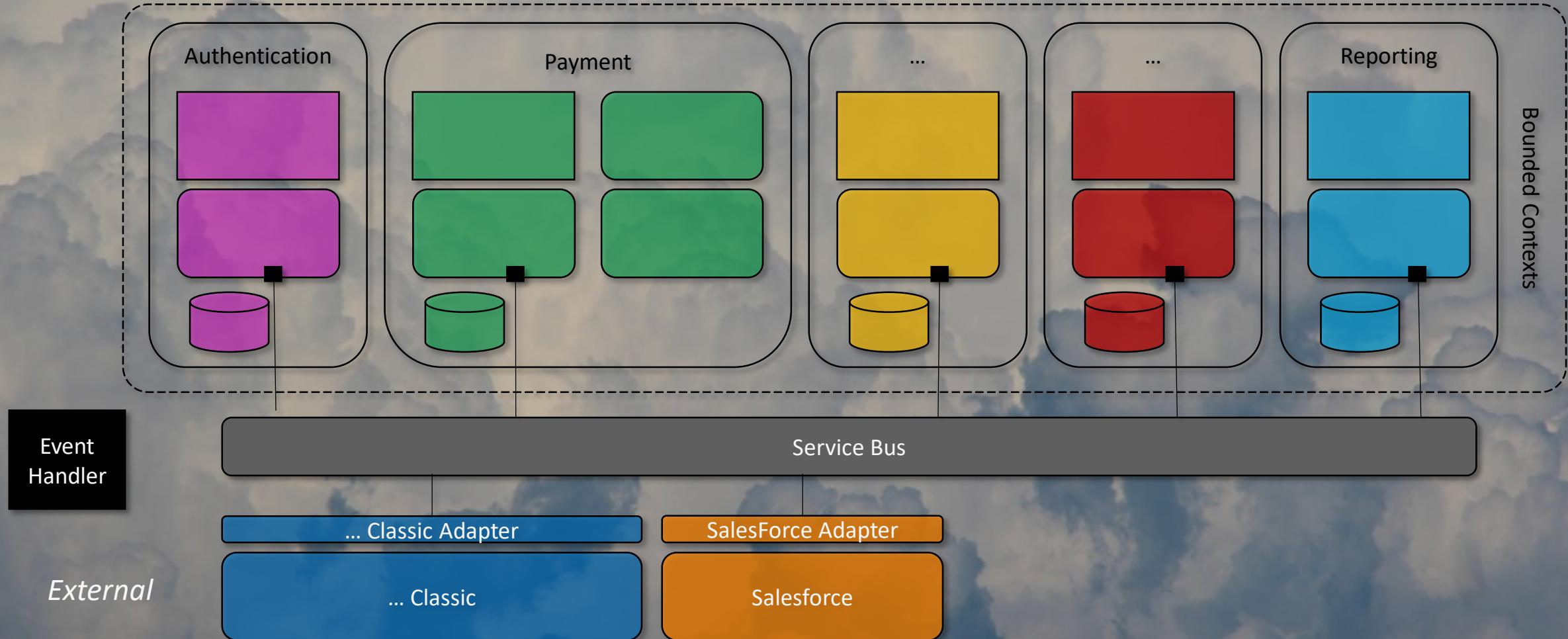


Think ahead. Act now.



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Microservices



Think ahead. Act now.



Demo

How to share data?

run, volume, inspect

Think ahead. Act now.

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Hmm, a docker run overload

docker run ApplicationA

docker run ApplicationB

docker run ApplicationH

docker run ApplicationC

docker run ApplicationI

docker run ApplicationF

docker run ApplicationJ

docker run ApplicationE

docker run ApplicationG

docker run ApplicationD

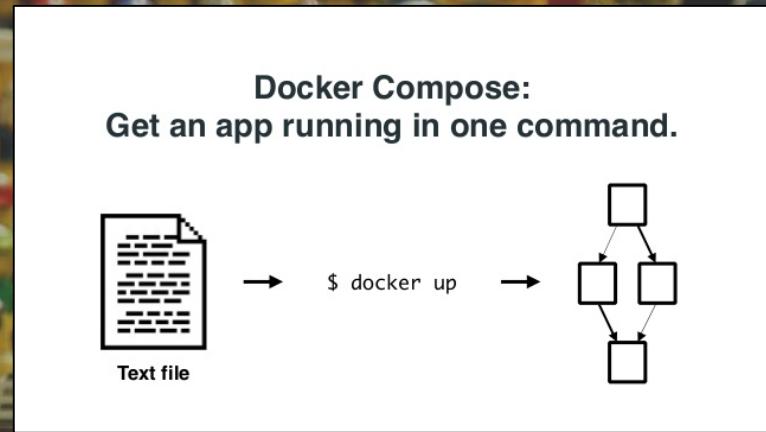
docker run ApplicationK

docker run ApplicationL

docker run ApplicationN

docker run ApplicationM

Docker compose



```
version: '2'
services:
  dotnedsaturdaydata:
    build:
      context: ./src/DotNedSaturday.Data/
      dockerfile: Dockerfile
    ports:
      - "53000:53000"
  dotnedsaturdaydemo:
    build:
      context: ./src/DotNedSaturday.Demo/
      dockerfile: Dockerfile
    depends_on:
      - "dotnedsaturdaydata"
    ports:
      - "80:54000"
networks:
  default:
    external:
      name: nat
```



Demo

Docker compose

Think ahead. Act now.

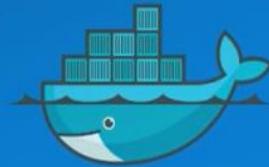




CONTAINER OVERLOAD

Think ahead. Act now.

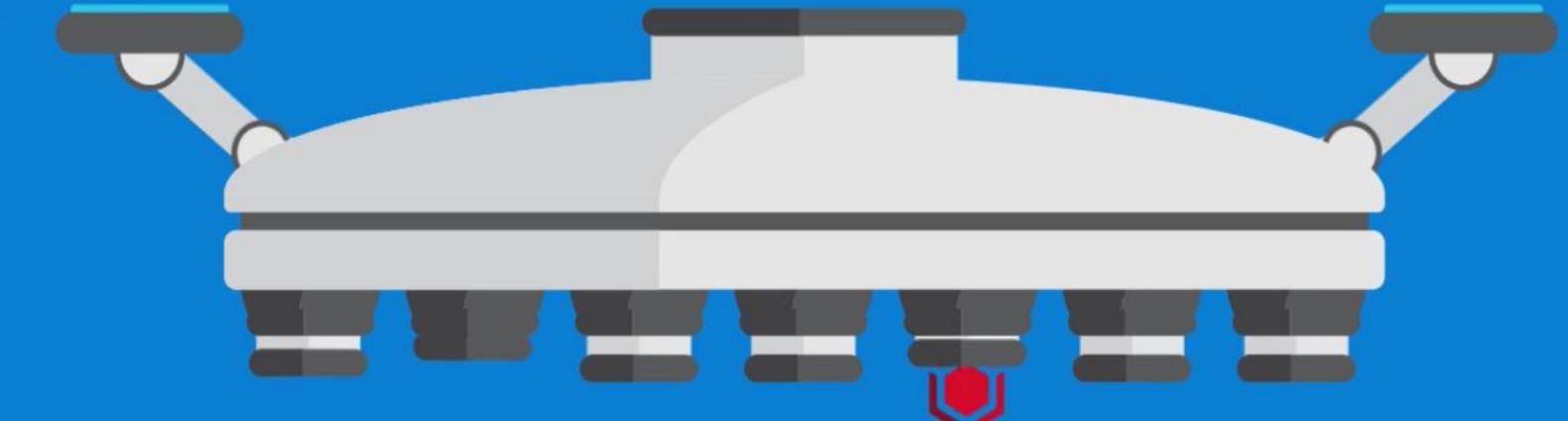




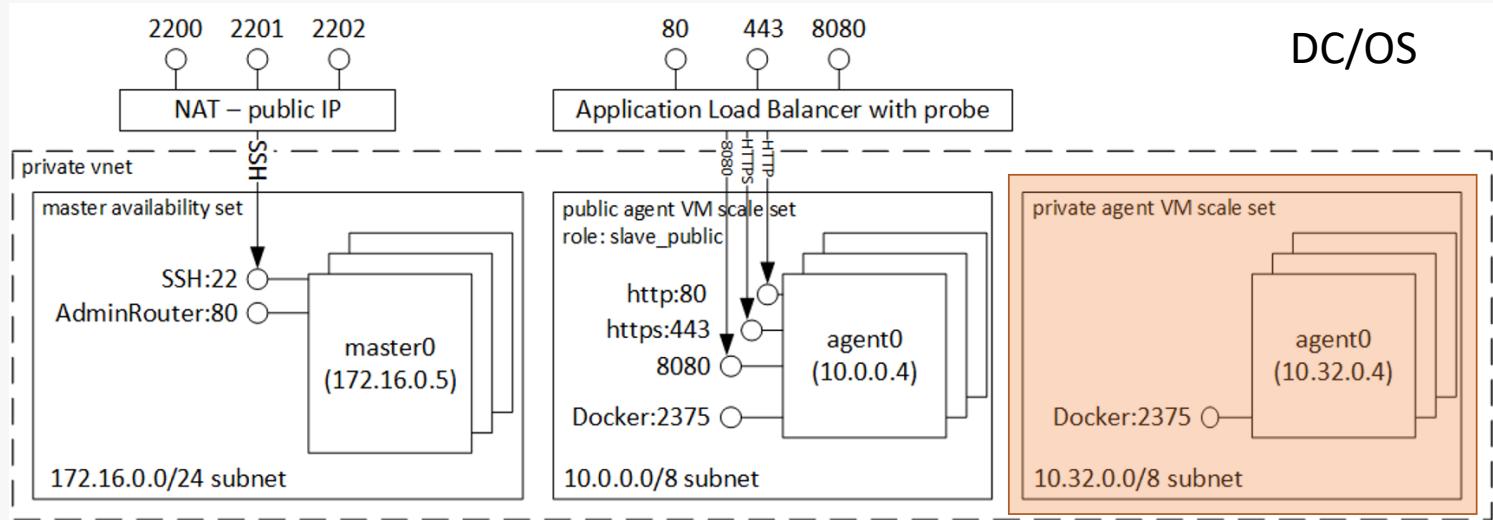
docker



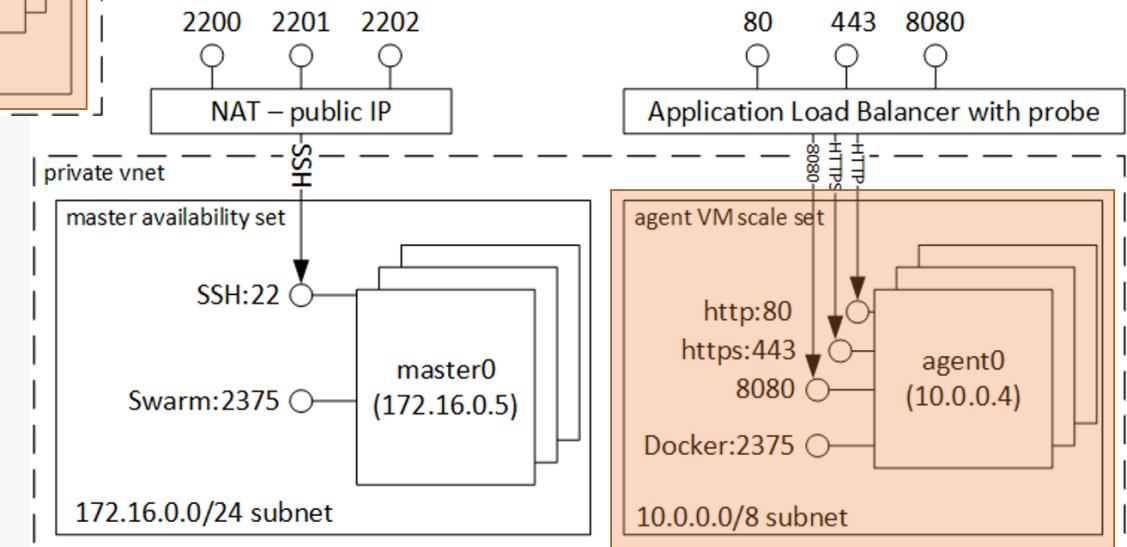
DC/OS



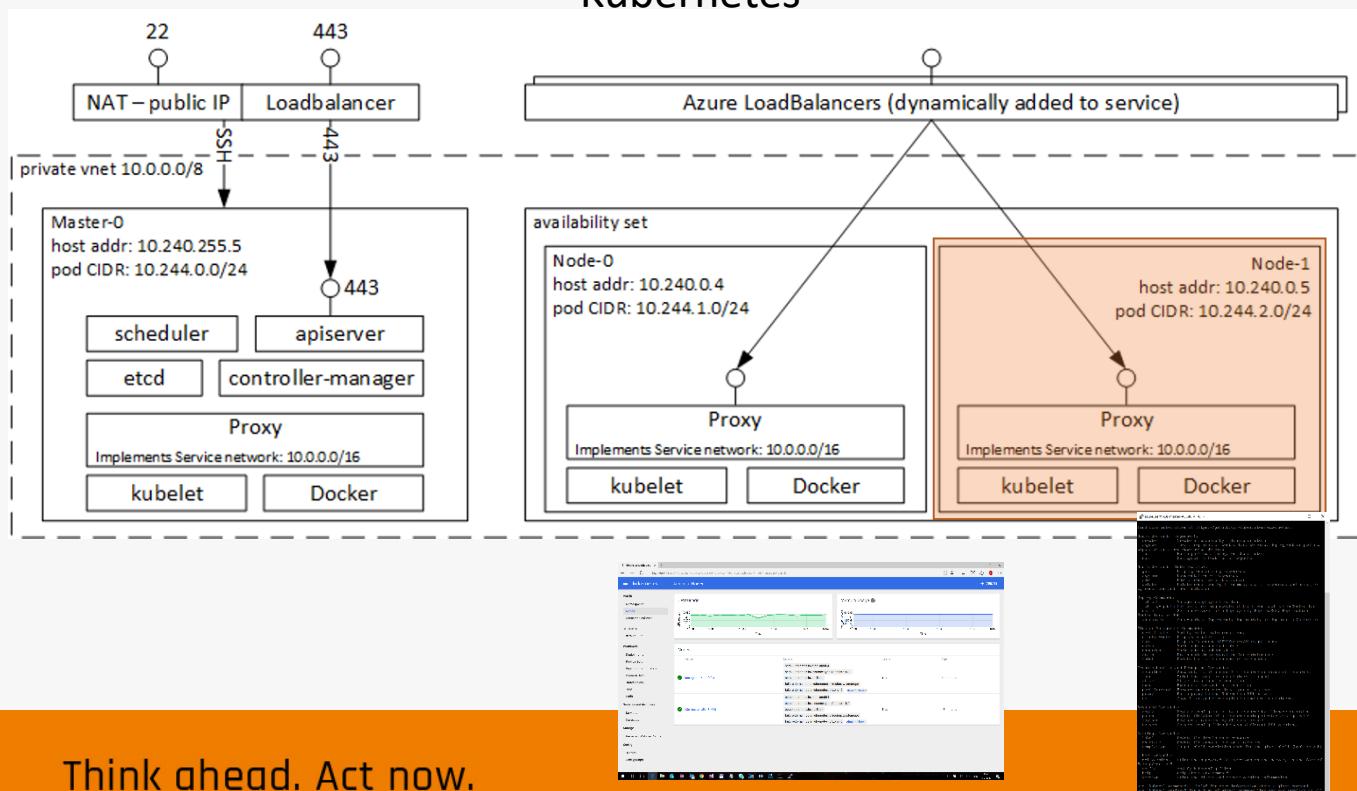
Azure Container Service



Swarm



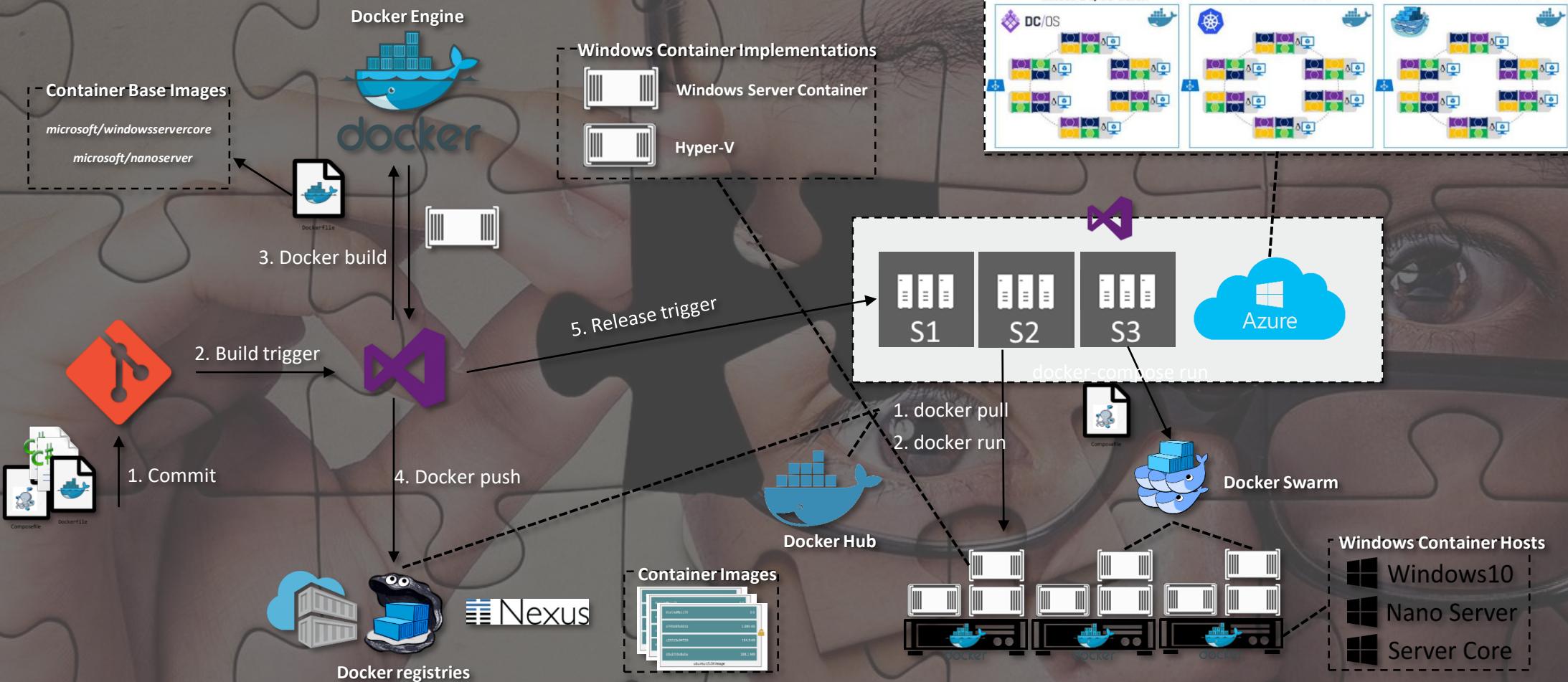
Kubernetes



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Putting it all together...



Just enable features you really need
 (Install-WindowsFeature/Enable-
 WindowsOptionalFeature)

Data volume containers

```
(docker create -v C:/DockerData:C:/data --name DataContainer microsoft/windowsservercore
docker run -it -d --volumes-from DataContainer --name Consumer1 microsoft/windowsservercore)
```

Registries

(internal vs cloud?)

Registry type	Public/ private	On-premise/ cloud	Support for other package management technologies	License and security vulnerability scanning	Technical maintenance	Costs
Nexus Repository OSS	Private	On-premise	Maven, Docker, NuGet, Npm, PyPi, Bower,...	No	Internal/no support from Nexus side	Free
Nexus Repository Pro	Private	On-premise	Maven, Docker, NuGet, Npm, PyPi, Bower,...	For some technologies.	Internal/support from Nexus side	\$10 per user/per month.
Artifactory	Private	On-premise	Docker, NuGet, Npm, PyPi, Bower, PHP, Vagrant, ...	Via Black Duck add-in. Support for Java (using Maven, Ivy or Gradle) and NuGet artifacts.	Internal	\$2,850 (without security scan) \$34,400/year
Docker Trusted Registry	Private	On-premise	No support	Docker Security Scanning	Internal	\$150 per month
Docker Hub registry	Public	Cloud	No support	Docker Security Scanning Add-On.	Docker	---
Docker Trusted Registry	Private	Cloud	No support	Docker Security Scanning Add-On	Docker	\$7 per month* (Docker Security Scanning included)
Azure Container Registry	Private	Cloud	No support	Via integration with Aqua and TwistLock .	Microsoft	TwistLock (free dev edition) \$64 per month*
AWS Container Registry	Private	Cloud	No support	Via integration with Aqua and TwistLock .	AWS	TwistLock (free dev edition) \$64 per month*
Google Container Registry	Private	Cloud	No support	Via integration with Aqua and TwistLock .	Google	TwistLock (free dev edition) \$92 per month*

Think ahead. Act now.

**No containers
running and
filesystem full?**

(docker ps -a)

ENV vs ARG

**Be aware of
sensitive
information!**

What we learned...

Order of layers

(new layer can mean a rebuild)

**Exec and shell form
of running scripts**

(Shell: CMD executable param1

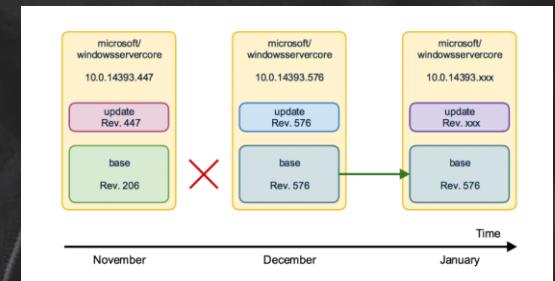
param2,

EXEC: CMD

["executable", "param1", "param2"])

((Smrity, Smrity, Smrity))

EXEC: CWD



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4-character rule
(ID's)

Portainer

(<http://portainer.io/overview.html#demo>)

DockerTLS

```
(docker run --rm -e  
IP_ADDRESSES=127.0.0.1,192.168.254.123 -v  
"C:\ProgramData\docker;C:\ProgramData\docker" -v  
"$env:USERPROFILE\.docker;C:\Users\ContainerAdmi  
nistrator\.docker" stefanscherer/dockertls-windows)
```

Group Managed Service Accounts

(https://github.com/Microsoft/Virtualizat_i on-Documentation/tree/live/windows-server-container-tools/ServiceAccounts)

Winspector

(<https://stefanscherer.github.io/winspector/>)

```
Install-Module Image2Docker  
Import-Module Image2Docker ConvertTo-Dockerfile  
-ImagePath C:\win-2016-iis.vhd -Artifact IIS -  
OutputPath c:\i2d2\iis
```

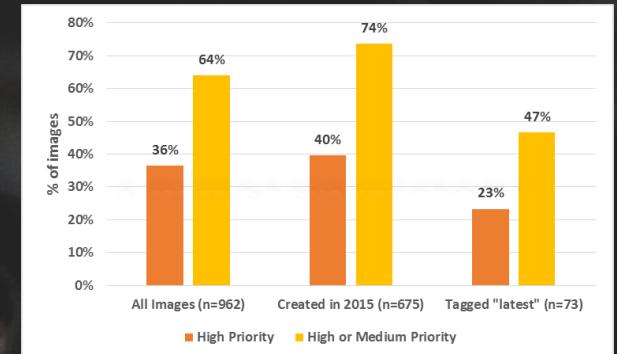
Image2Docker
(<http://dockr.ly/2gHLjkF>)

Tips & tricks

Ctrl+P+Q

(step out the container prompt)

Be aware of
vulnerabilities!



Other escape
character
(# escape=)

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Think ahead. Ask now.



<http://www.xpirit.com/>



@xpiritbv



<http://blogs.Xpirit.com/>

