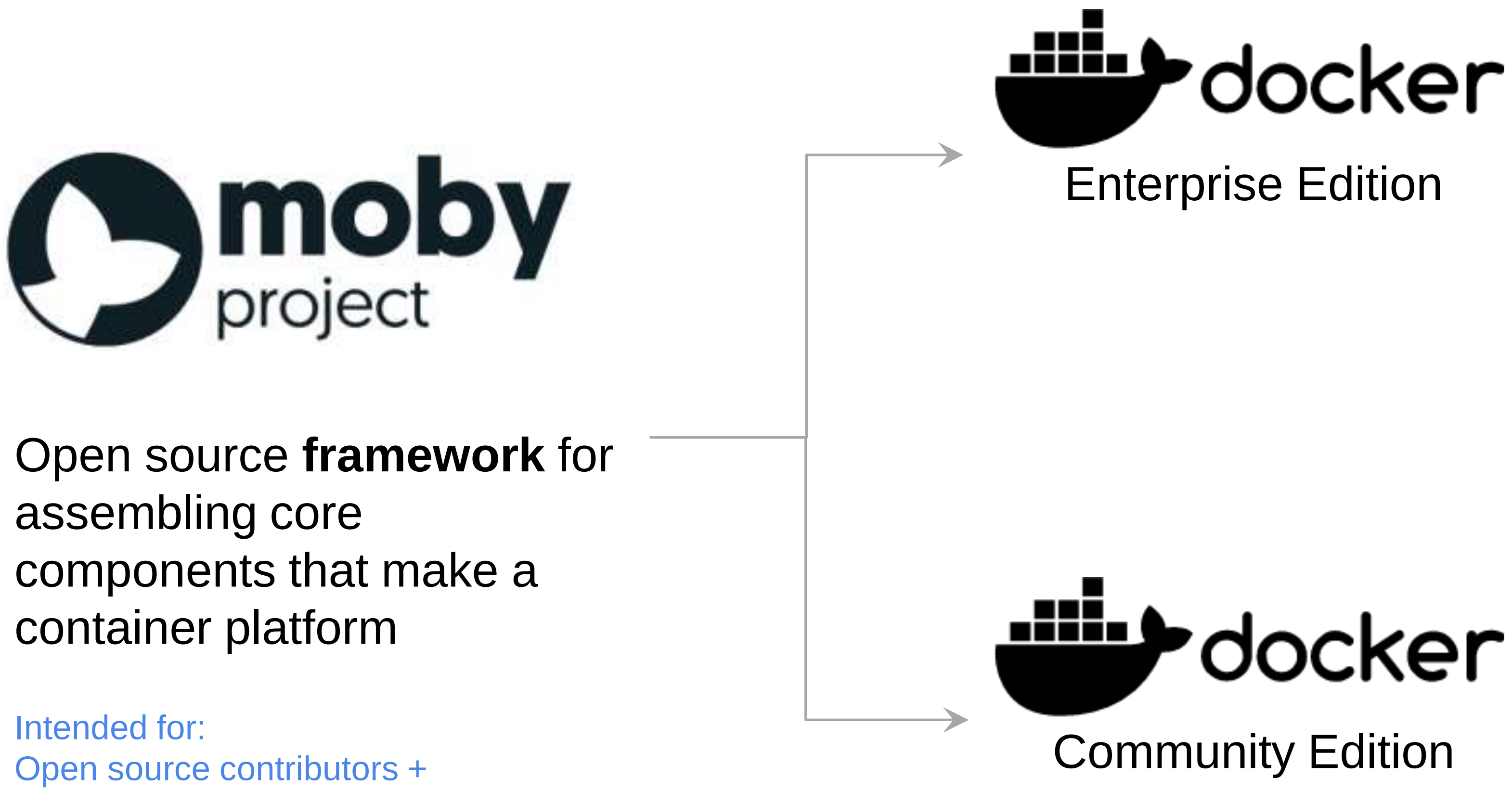
Let´s talk Windows Containers

WINDOWS SERVER 2019

The Docker Family Tree



Open source **framework** for assembling core components that make a container platform

Intended for:
Open source contributors +
ecosystem partners

Enterprise Edition

Subscription-based, commercially supported **products** for delivering a secure software supply chain

Intended for:
Production deployments +
Enterprise customers

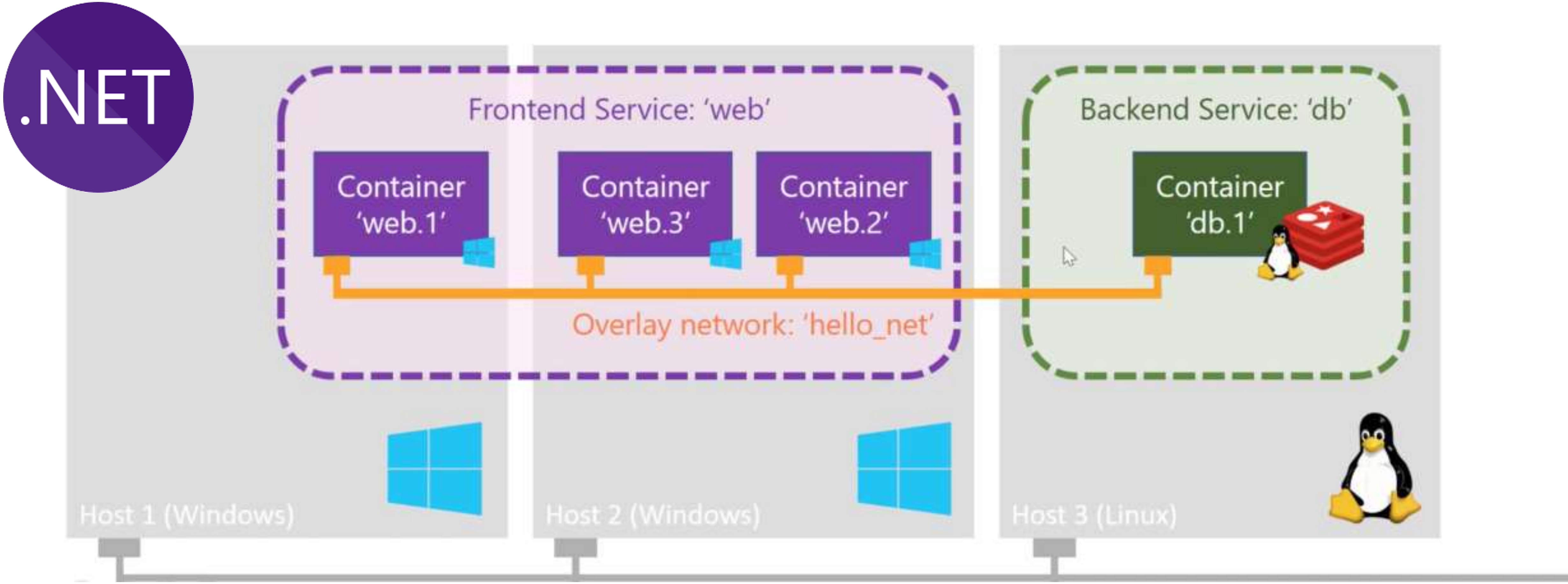
Community Edition

Free, community-supported **product** for delivering a container solution

Intended for:
Developers and small teams
Software dev & test

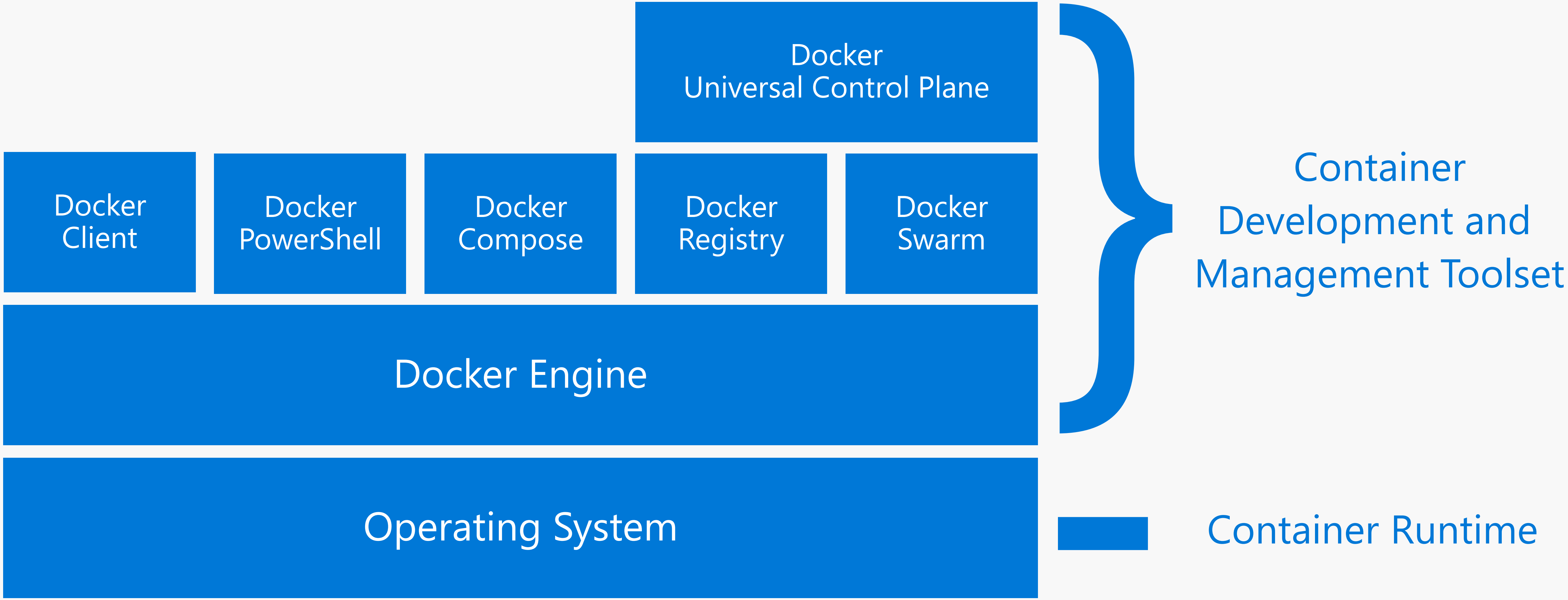
Why Windows Containers?

Run Windows workloads



How do Windows Containers work?

High Level Architecture



Docker Universal Control Plane

Docker Client

Docker PowerShell

Docker Compose

Docker Registry

Docker Swarm

Docker Engine

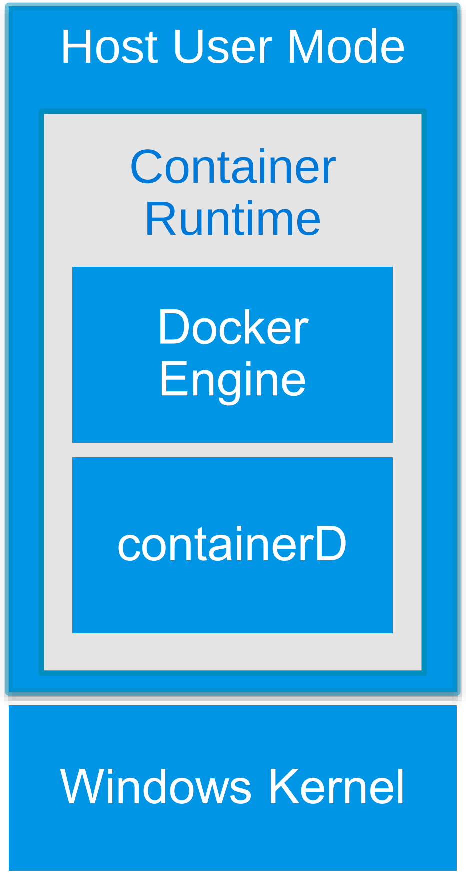
Operating System

Container Development and Management Toolset

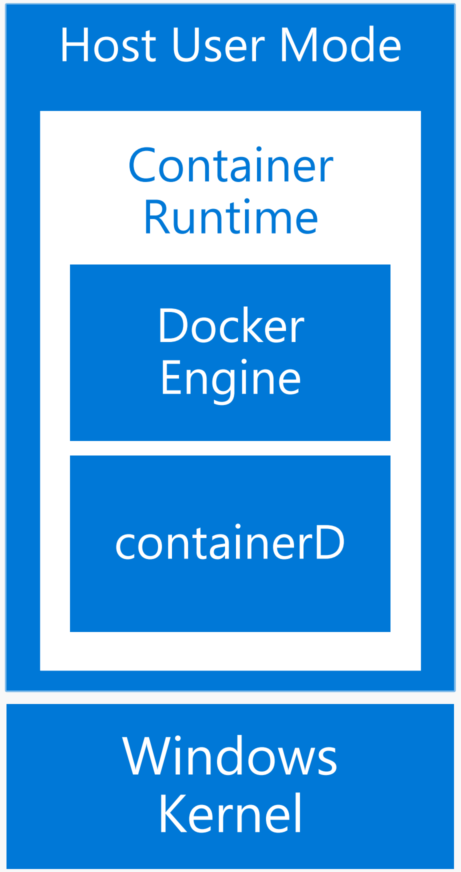
Container Runtime

Windows Server Containers

- Windows Server 2019
- Install Containers feature
- Install Docker Engine EE



Windows Containers



Host User Mode

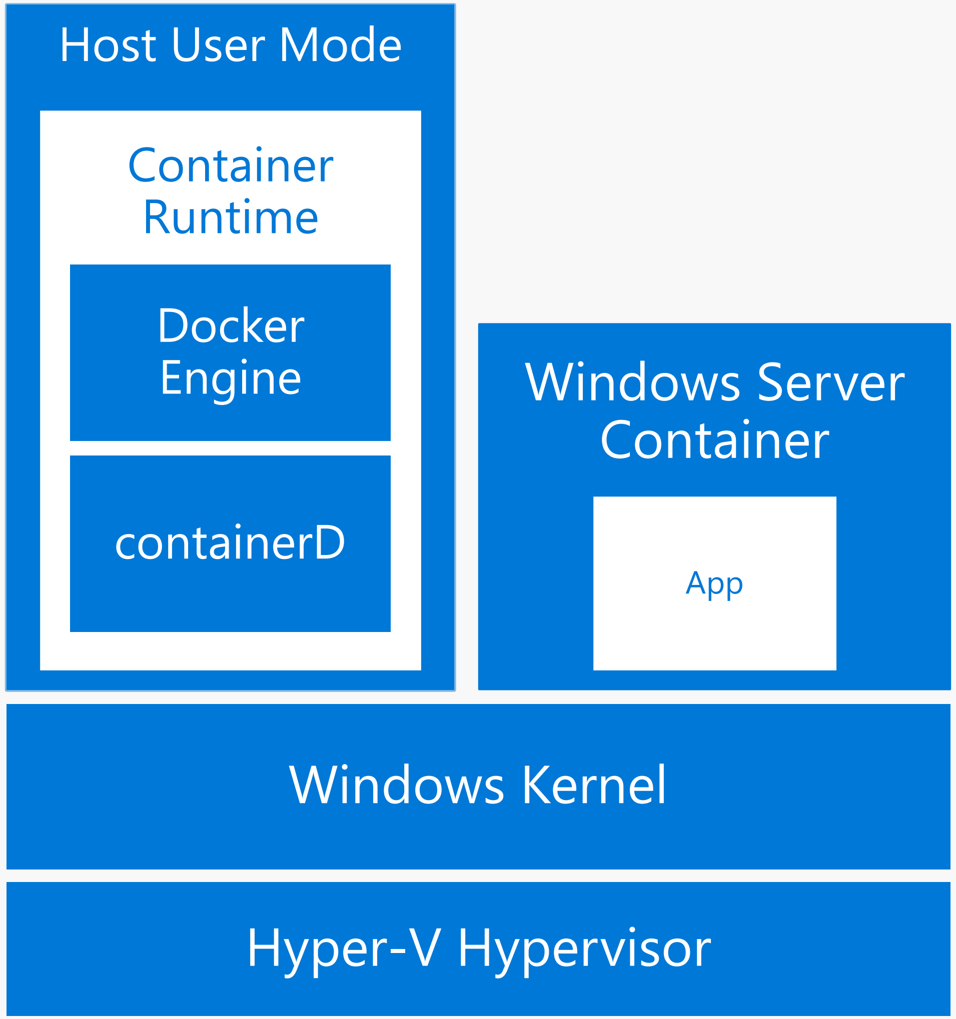
Container Runtime

Docker Engine

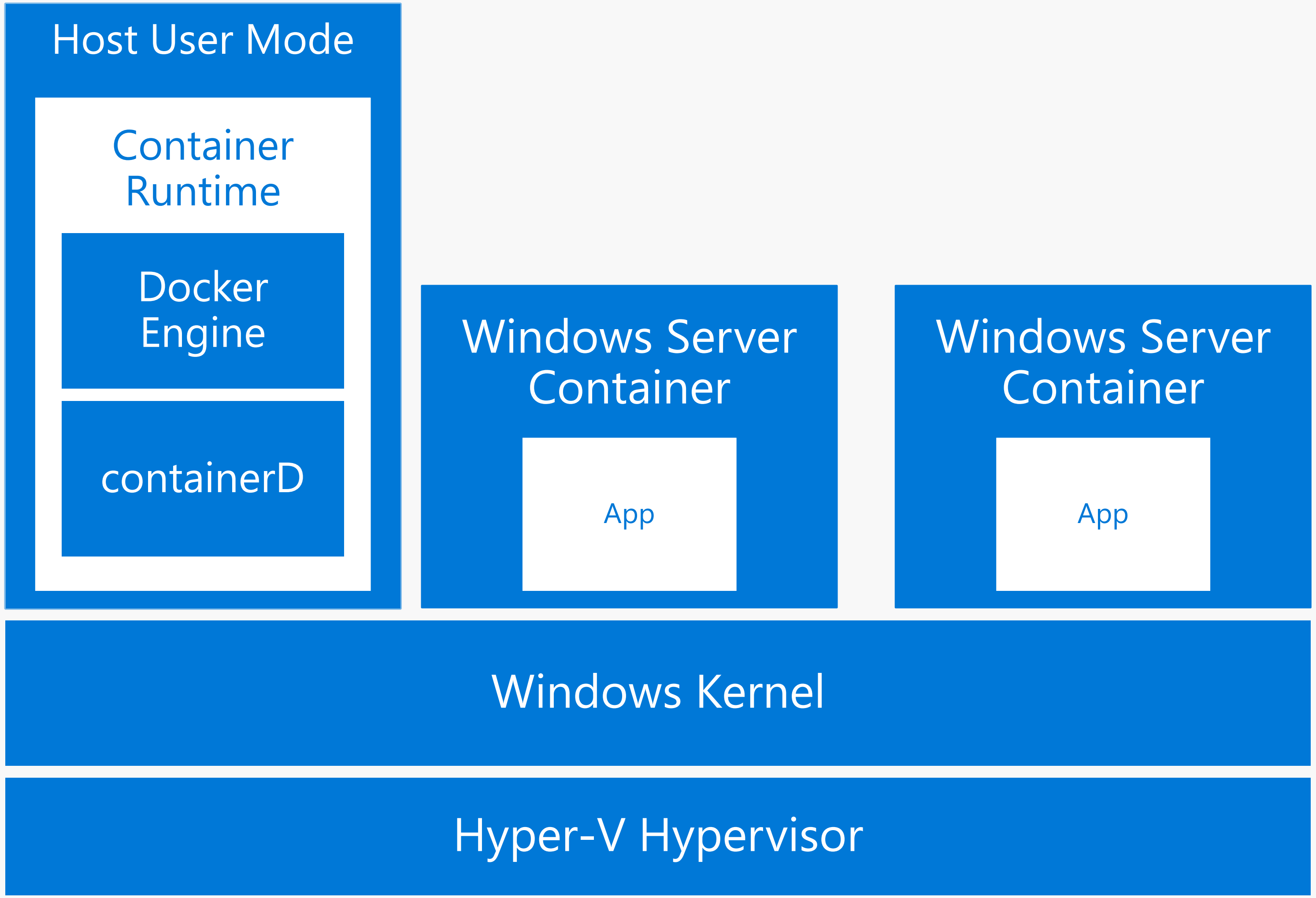
containerD

Windows Kernel

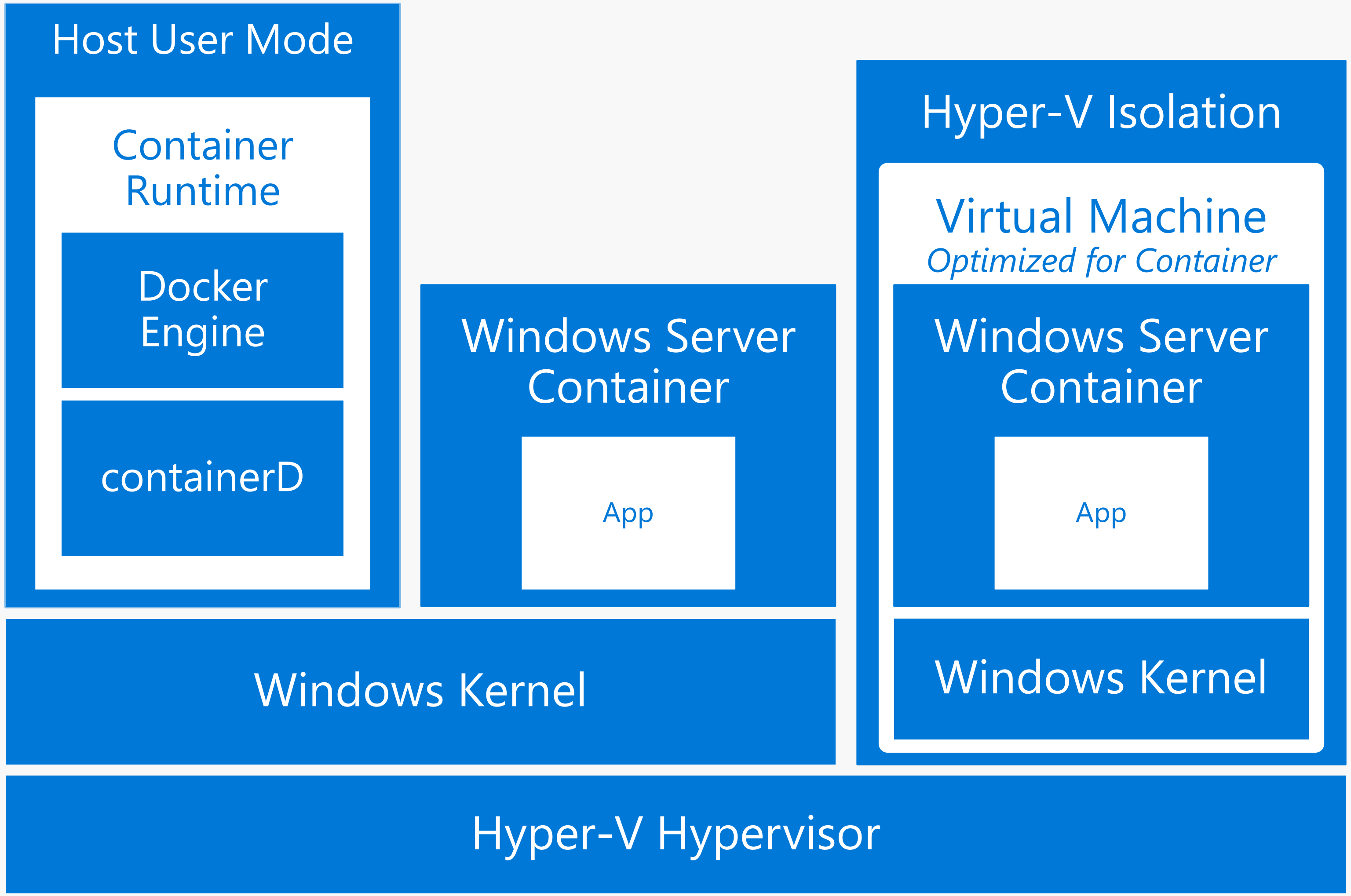
Windows Containers



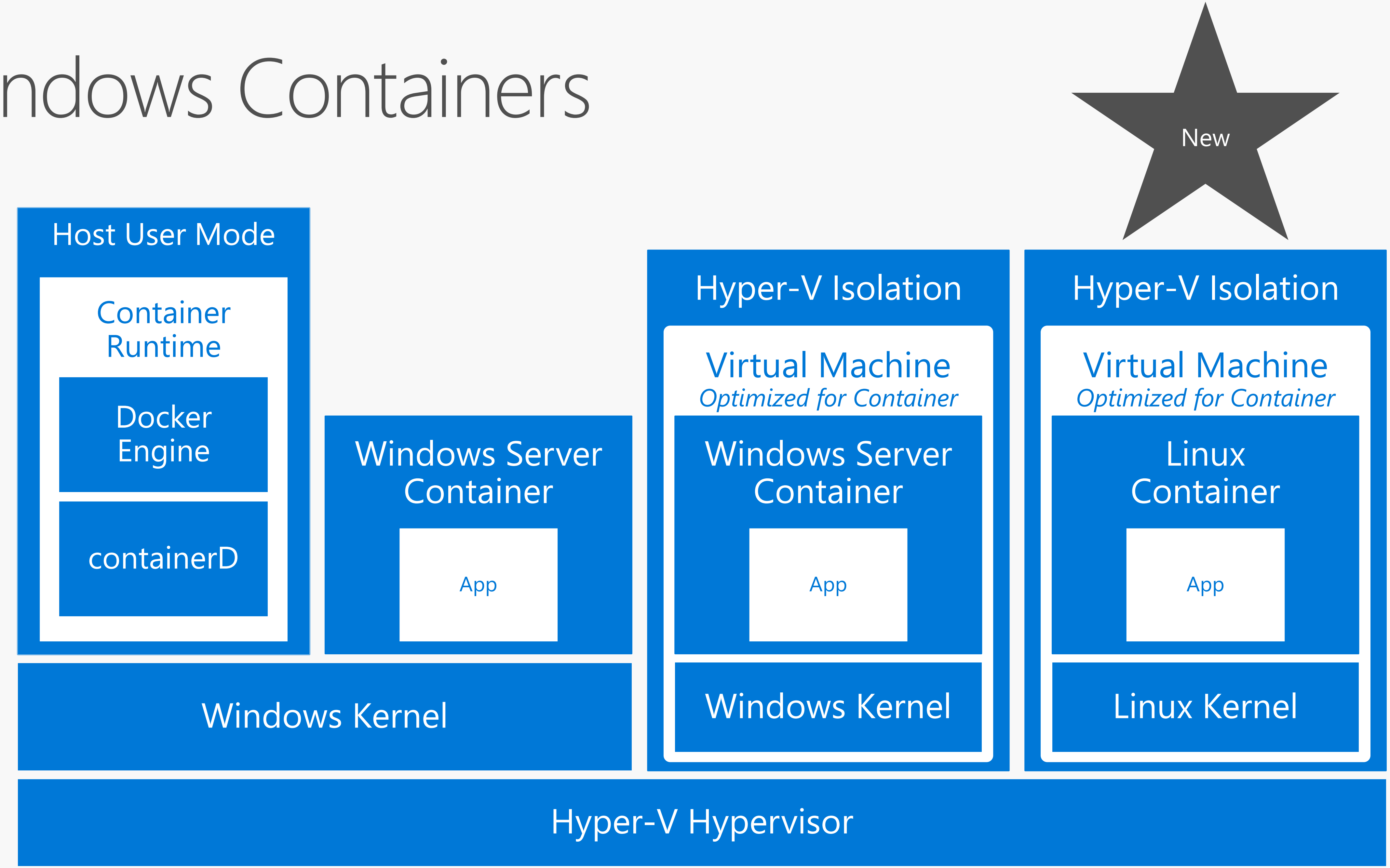
Windows Containers



Windows Containers



Windows Containers



Linux containers with Hyper-V isolation

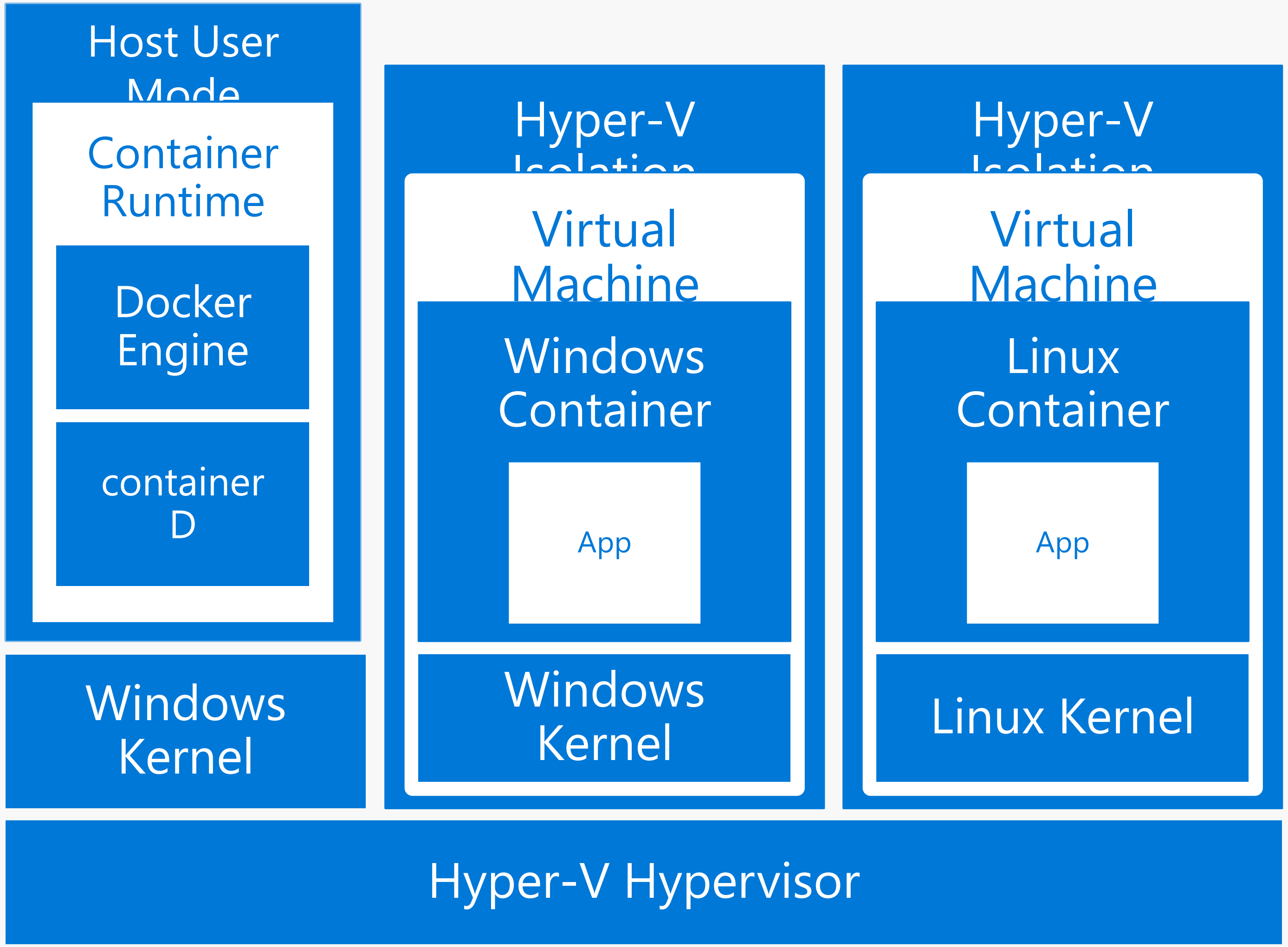
One Docker engine

One container host

Any container, *regardless* of OS

Choice of Linux kernels

Yes, this will be on Win10!



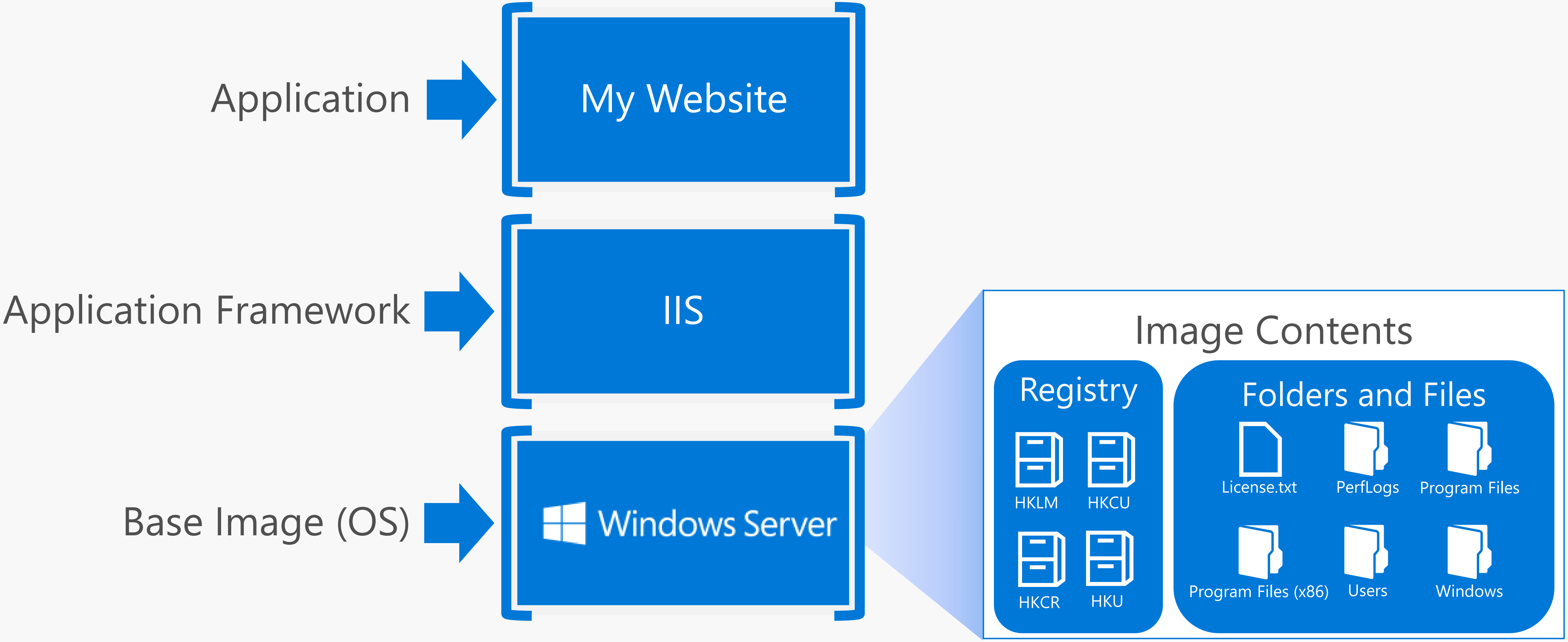
Windows Base Images

Windows Base OS Image

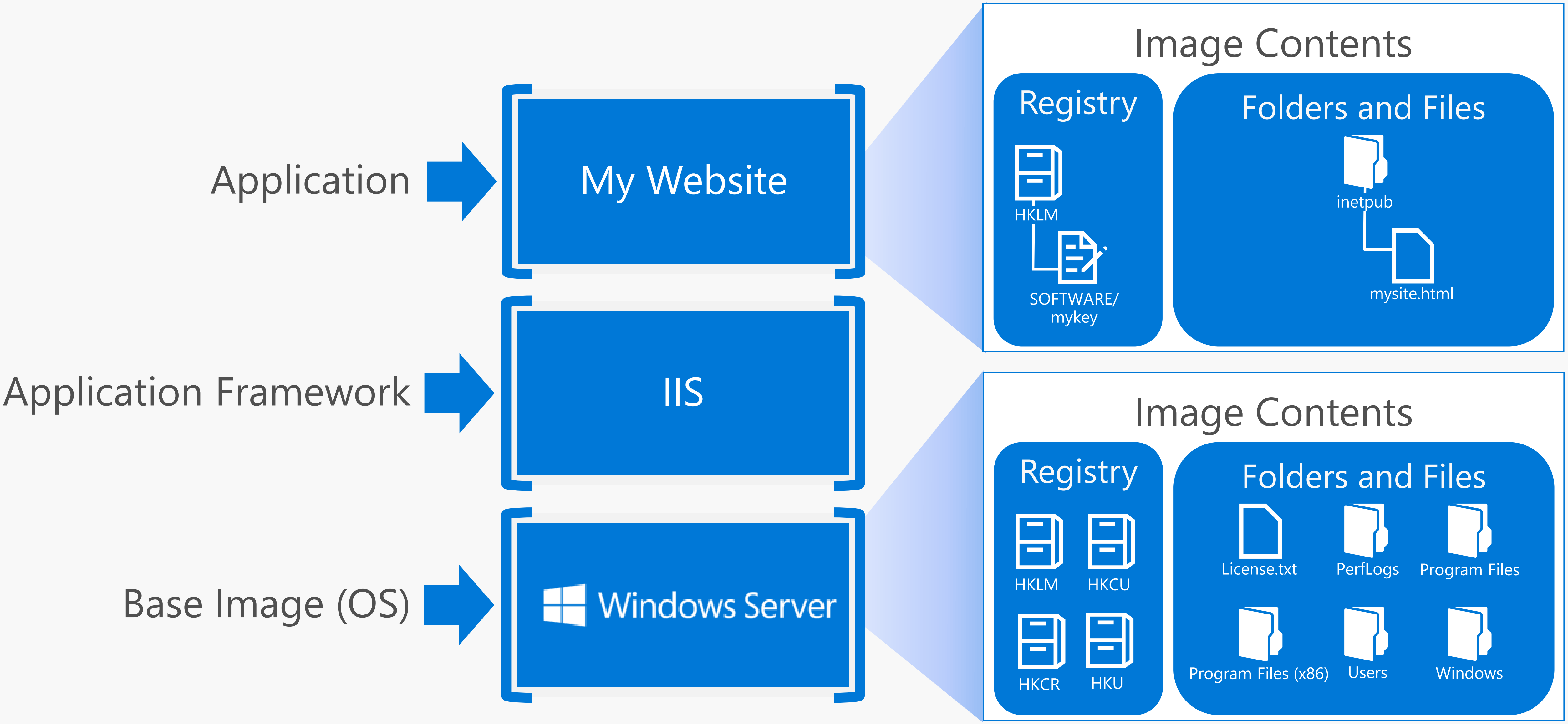
Nano Server	Windows Server Core	Windows
Born in the cloud applications	App Compatibility	Automation Workloads
.NET core Support	Full .NET framework support	Carries most Windows OS components
94 MB Image Size	1.4 GB Image Size	3.5 GB Image Size

Reflects latest WS2019 offerings

Container Images



Container Images



Automated Image Building

Docker Build and Dockerfiles

Method for automated container image build
Consumed when running “docker build”
Caches unchanged commands
Integrates into Docker Hub

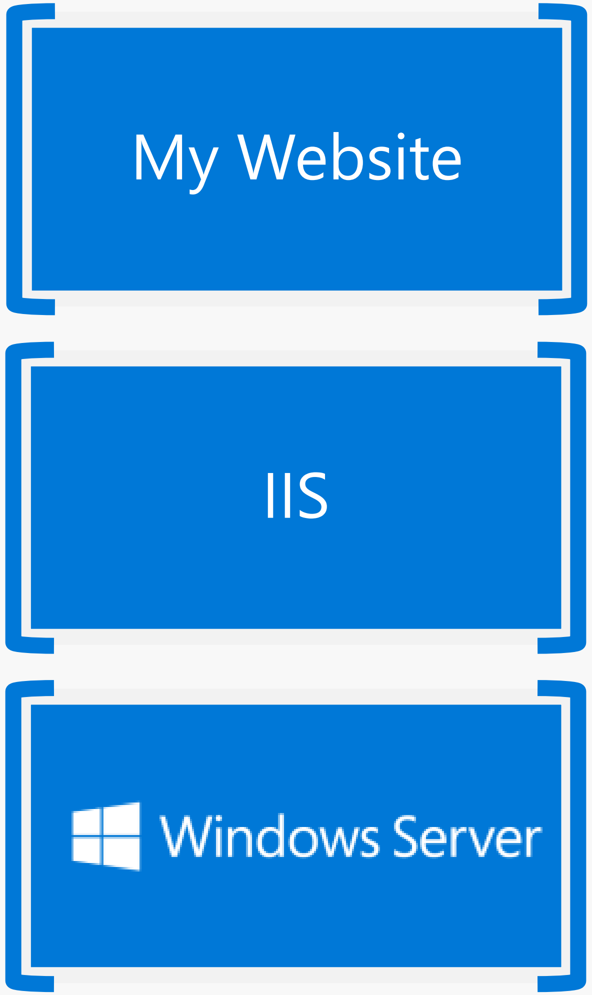
Examples

IIS

```
FROM microsoft/windowsservercore
RUN powershell –command Add-WindowsFeature Web-Server
```

Website

```
FROM microsoft/iis
ADD mysite.htm inetpub\mysite.htm
```

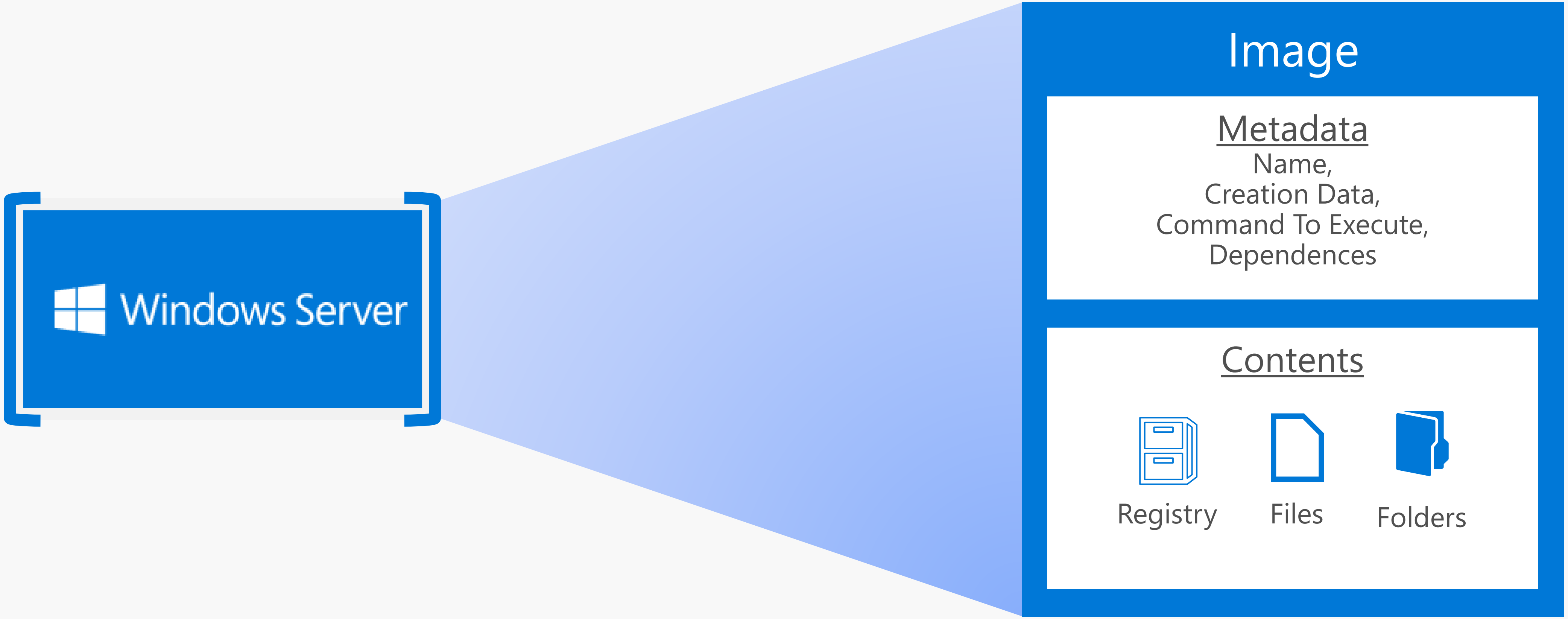


Container Image

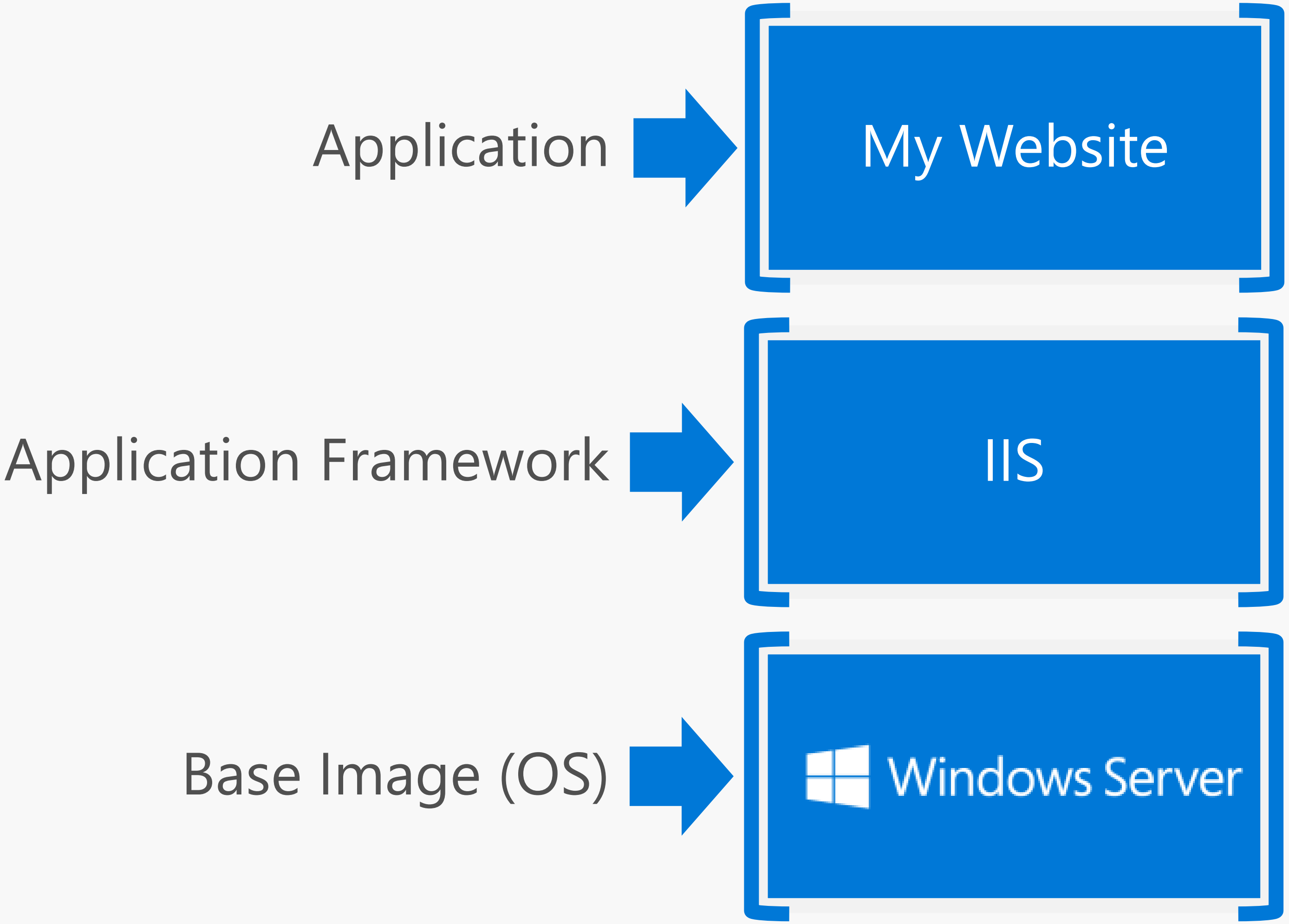
Analogous to a VHD and config file to a virtual machine

Created by running a container and capturing changes

Changes include files and registry



Container Images



Windows Images on Docker Hub

Image Registries

What is a registry?

Stores container images

- Images are **Pushed** into a registry
- Images are **Pulled** from a registry
- Images are **Searched** for within a registry

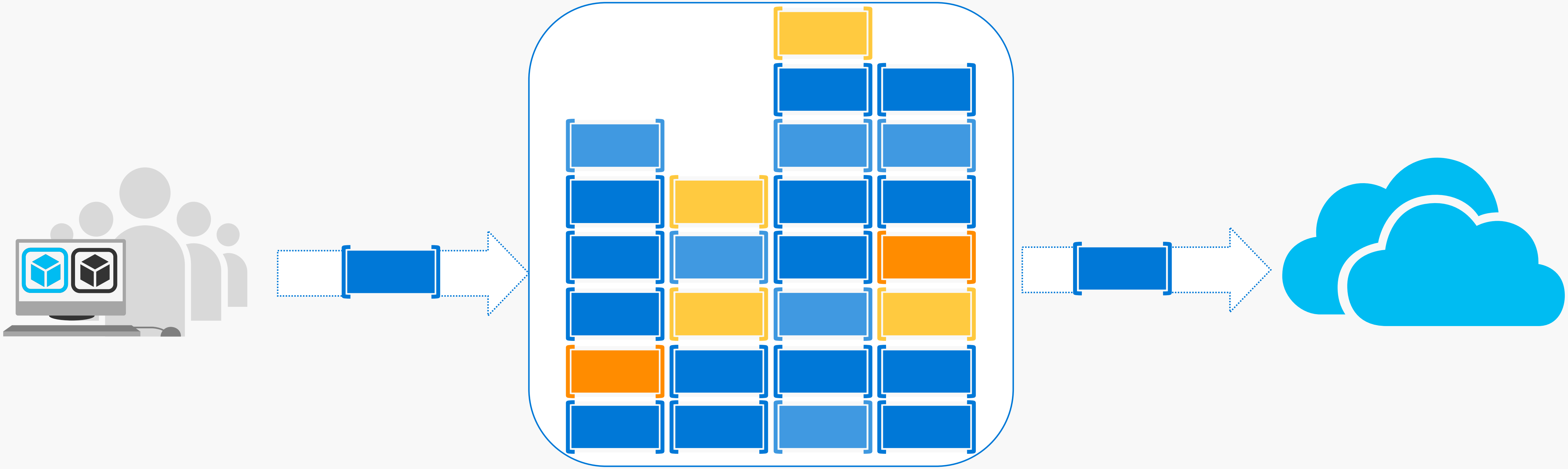


Image Registries

Docker Hub and Docker Store

Public, Official and Private image repositories

Granular access controls with organization support

Automated image build support

Docker Trusted Registry

Enterprise Grade Private Registries

Runs on your infrastructure (on-prem or cloud)

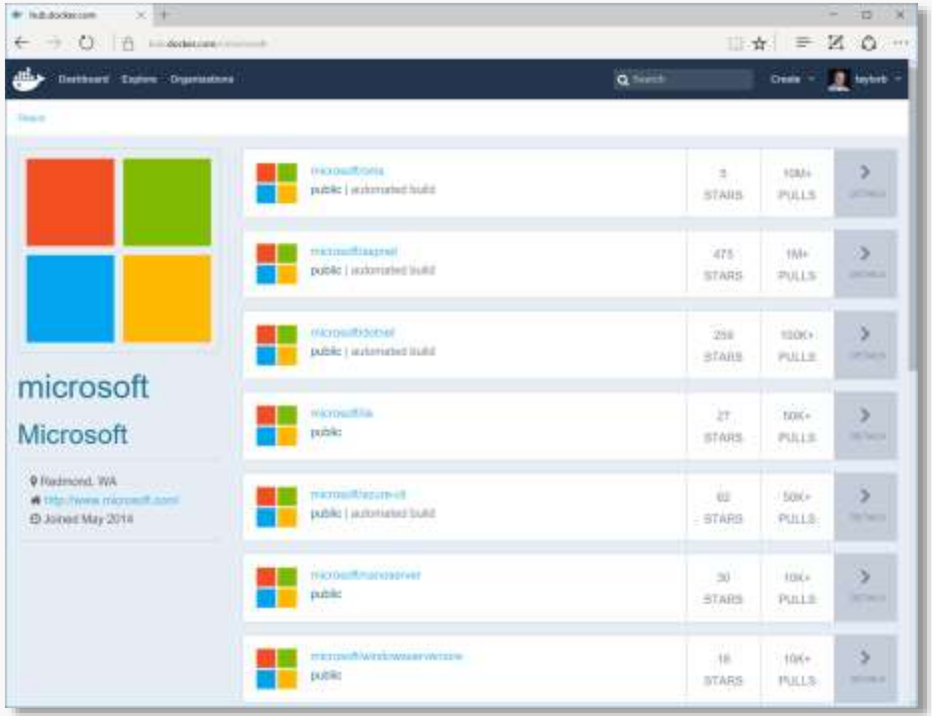
Active Directory and Role Based Access Controls

Docker Registry

Open source foundation of Hub and DTR

Runs on your infrastructure (on-prem or cloud) as a container

https://docs.docker.com/registry and or https://github.com/docker/distribution



microsoft

Microsoft

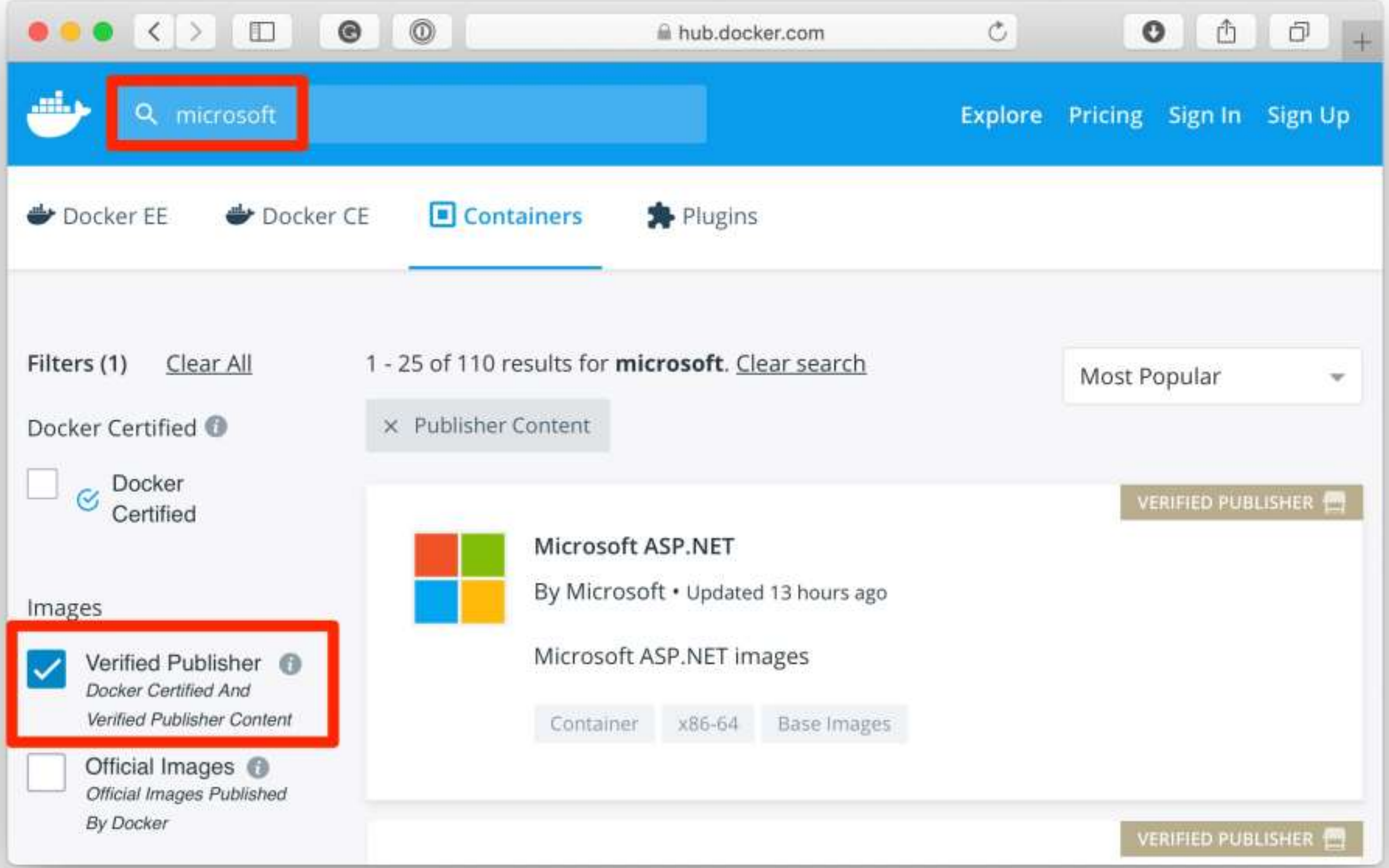
Redmond, WA

http://www.microsoft.com/

Joined May 2014

microsoft/oms public | automated build	3 STARS	10M+ PULLS
microsoft/aspnet public | automated build	475 STARS	1M+ PULLS
microsoft/dotnet public | automated build	259 STARS	100K+ PULLS
microsoft/iis public	27 STARS	50K+ PULLS
microsoft/azure-cli public | automated build	62 STARS	50K+ PULLS
microsoft/nanoserver public	30 STARS	10K+ PULLS
microsoft/windowsservercore public	18 STARS	10K+ PULLS

Explore Docker Hub - Verified Publisher - Microsoft



Filters (1) Clear All

1 - 25 of 110 results for **microsoft**. Clear search

Docker Certified

□ Docker Certified

Images

☑ Verified Publisher *Docker Certified And Verified Publisher Content*

□ Official Images *Official Images Published By Docker*

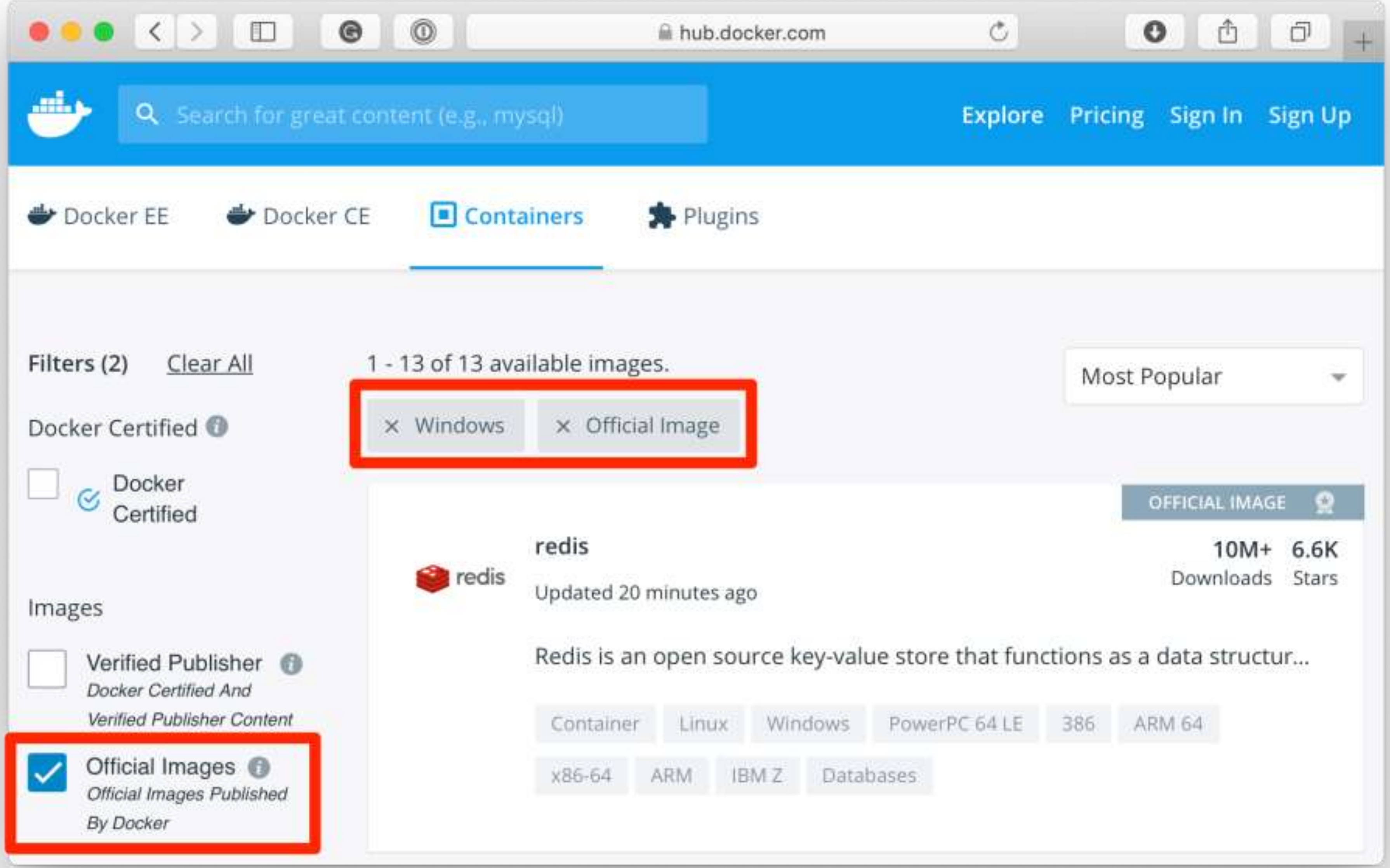
VERIFIED PUBLISHER

Microsoft ASP.NET

By Microsoft • Updated 13 hours ago

Microsoft ASP.NET images

Explore Docker Hub – Official Images for Windows



Filters (2) Clear All

Docker Certified

□ Docker Certified

Images

□ Verified Publisher
Docker Certified And Verified Publisher Content

☑ Official Images
Official Images Published By Docker

1 - 13 of 13 available images.

× Windows × Official Image

Most Popular

OFFICIAL IMAGE

redis

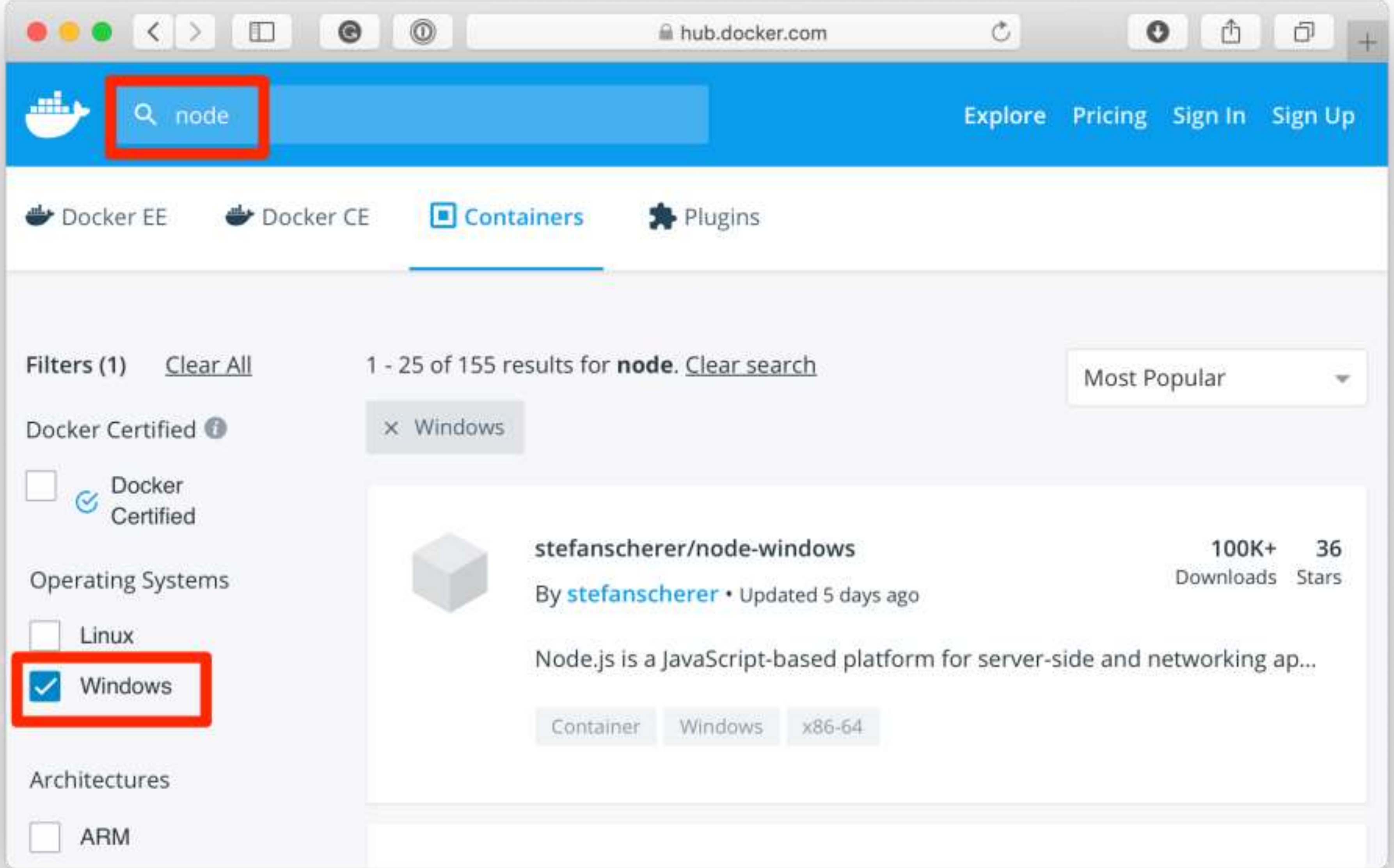
Updated 20 minutes ago

10M+ Downloads 6.6K Stars

Redis is an open source key-value store that functions as a data structur...

Container Linux Windows PowerPC 64 LE 386 ARM 64 x86-64 ARM IBM Z Databases

Explore Docker Hub – Community Images for Windows



node

Filters (1) Clear All

Docker Certified

□ Docker Certified

Operating Systems

□ Linux

☑ Windows

Architectures

□ ARM

1 - 25 of 155 results for **node**. Clear search

Most Popular

× Windows

stefanscherer/node-windows

By stefanscherer • Updated 5 days ago

100K+ Downloads 36 Stars

Node.js is a JavaScript-based platform for server-side and networking ap...

Container Windows x86-64

Windows is not only .NET

portainer.io
.NET
OpenJDK
node
JS
python™
Golang

Windows Named Pipe

- Access the Docker API from a Windows Container

- Linux: `/var/run/docker.sock`
- Windows: `//./pipe/docker_engine`

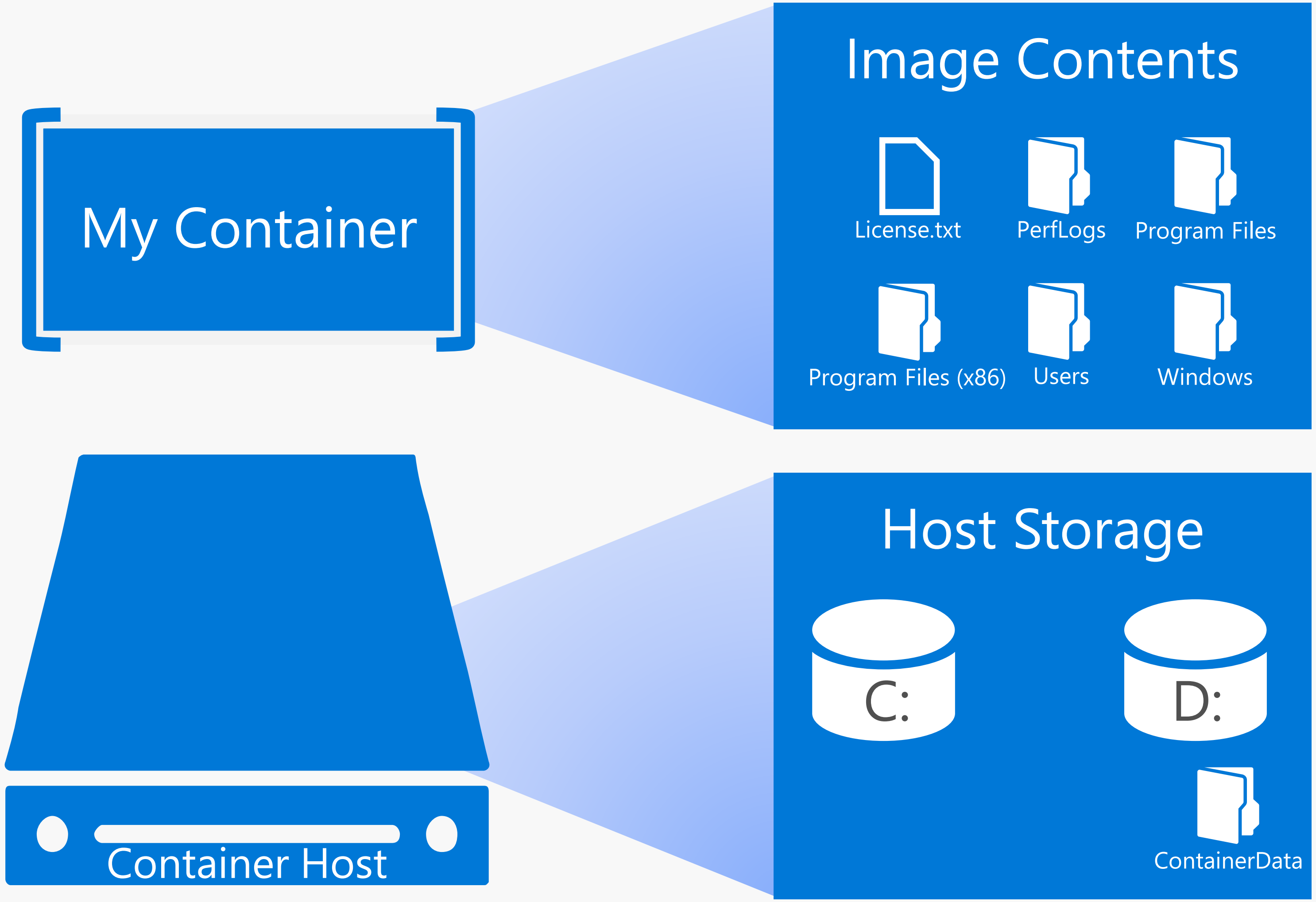
Demo

building a container image

Volume Mapping

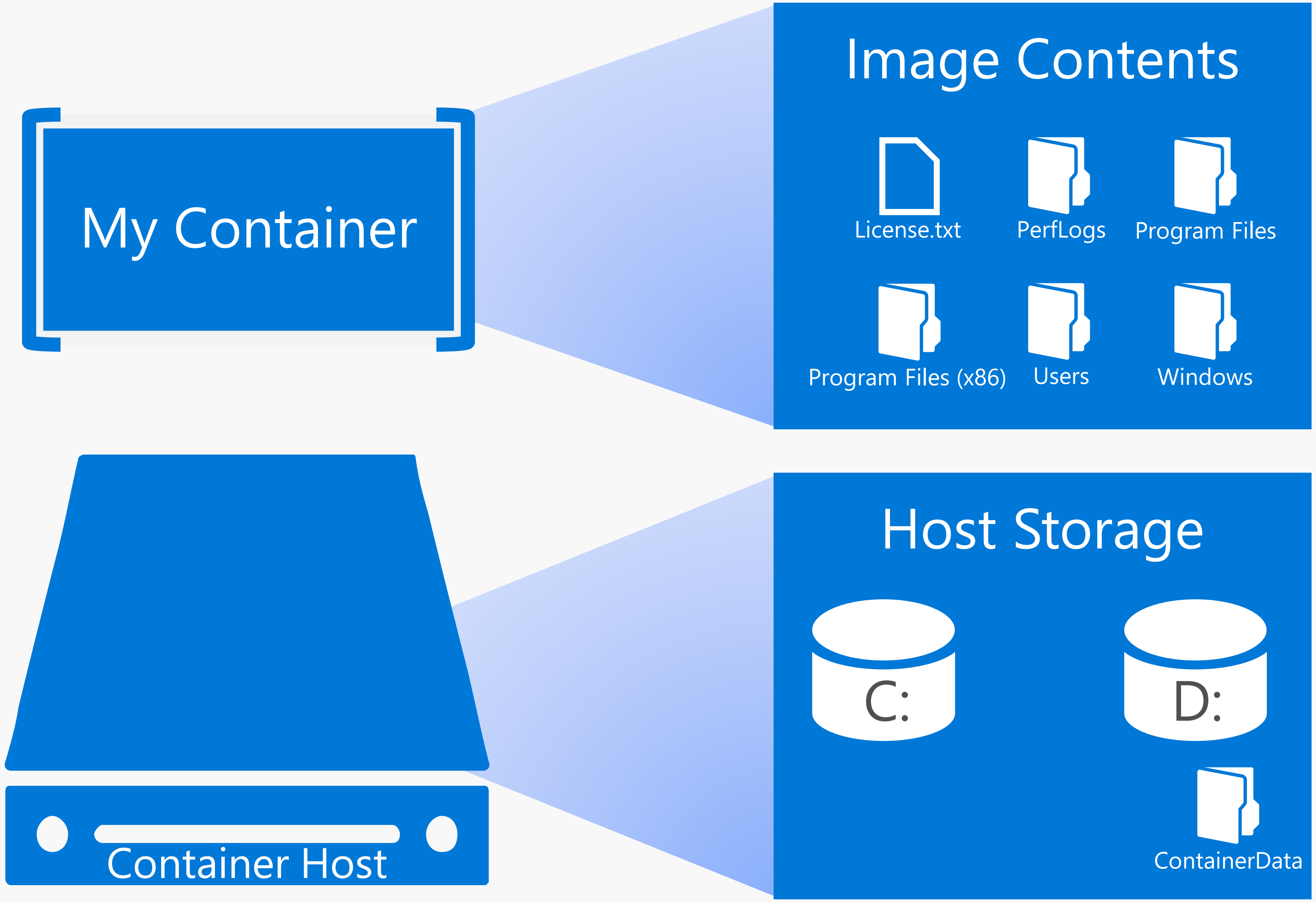
My Container
Container Host

Volume Mapping



Volume Mapping – Running a Container

```
docker run -v d:\ContainerData:c:\data mycontainer
```



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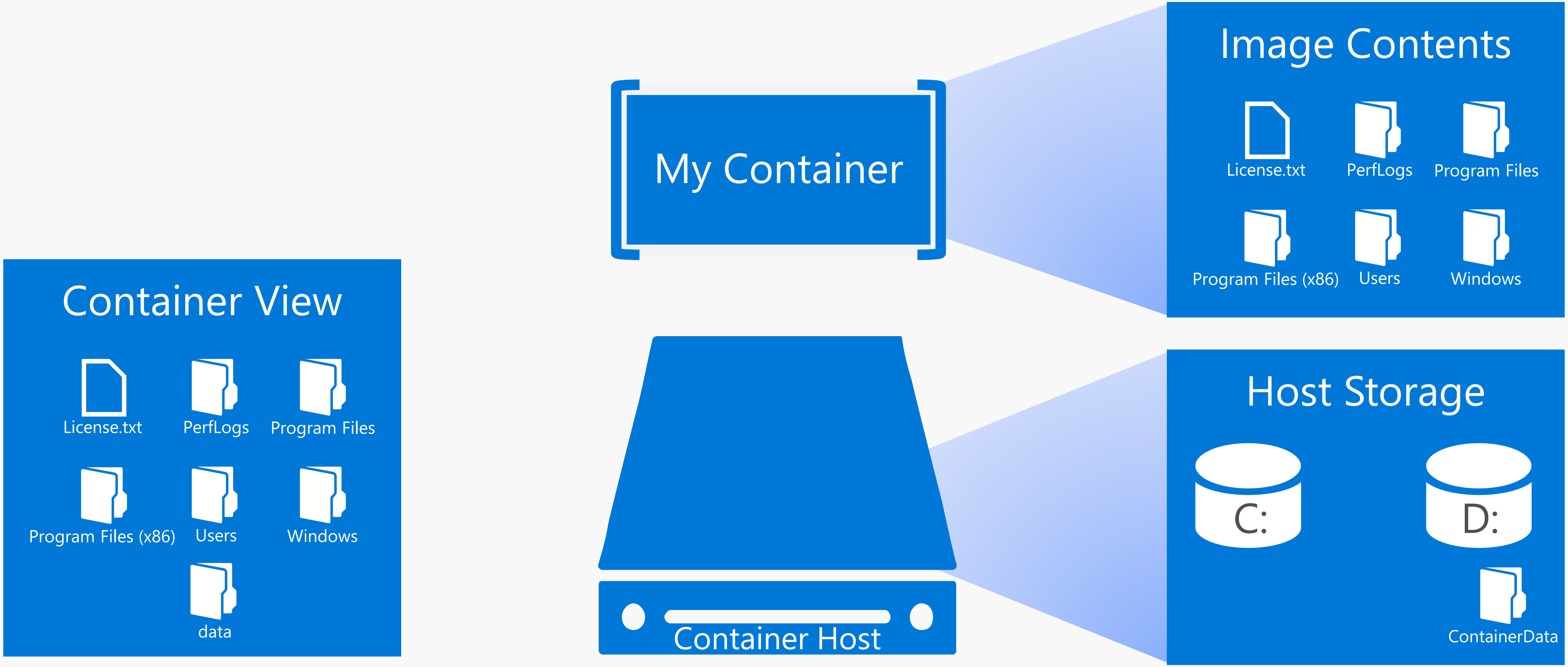

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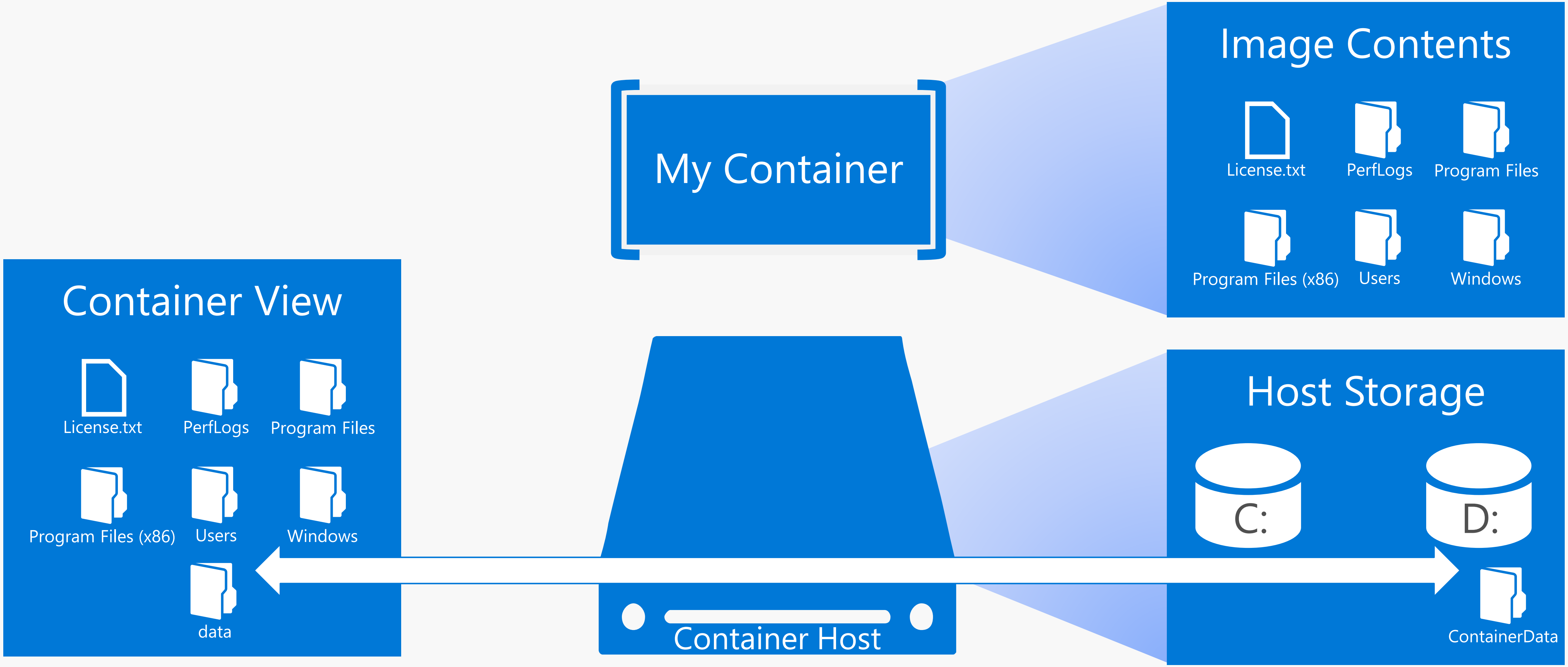
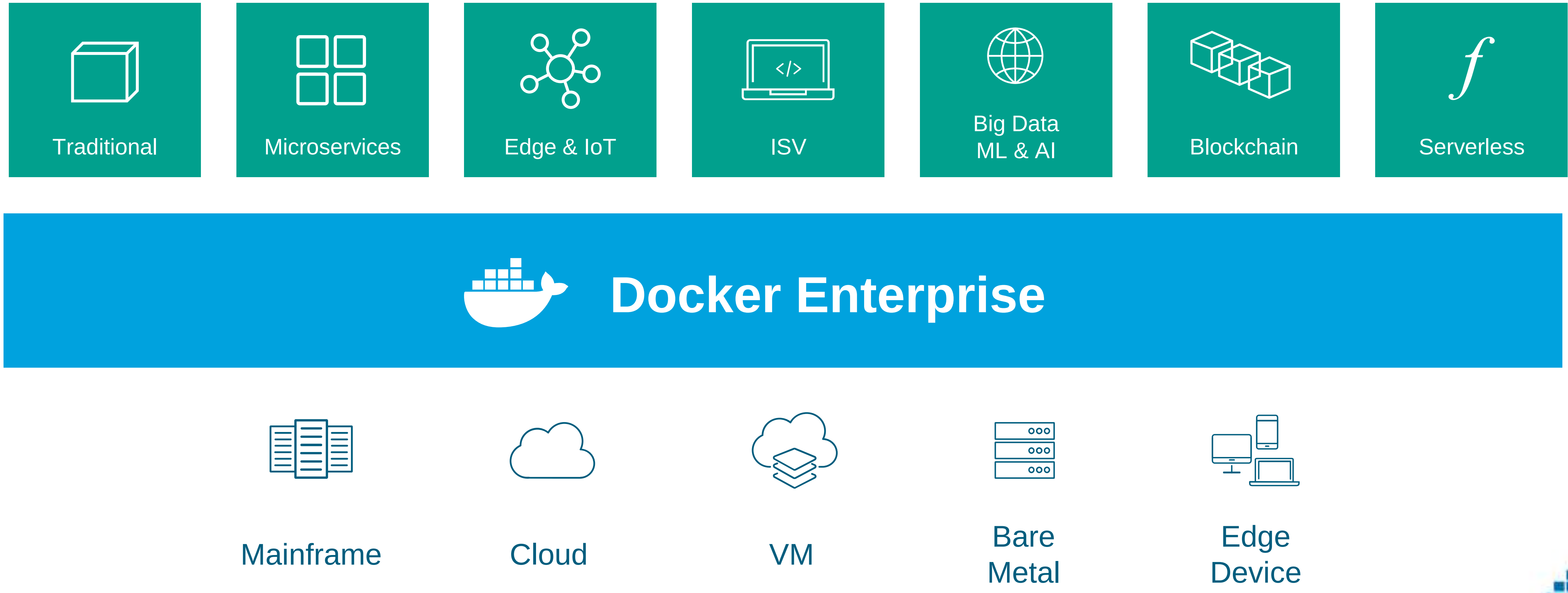
```



Orchestrators

Foundation for Future Innovation:
Any App, Any Infrastructure – One Platform

FOUNDATION FOR
FUTURE INNOVATION



Traditional

Microservices

Edge & IoT

ISV

Big Data
ML & AI

Blockchain

Serverless

Docker Enterprise

Mainframe

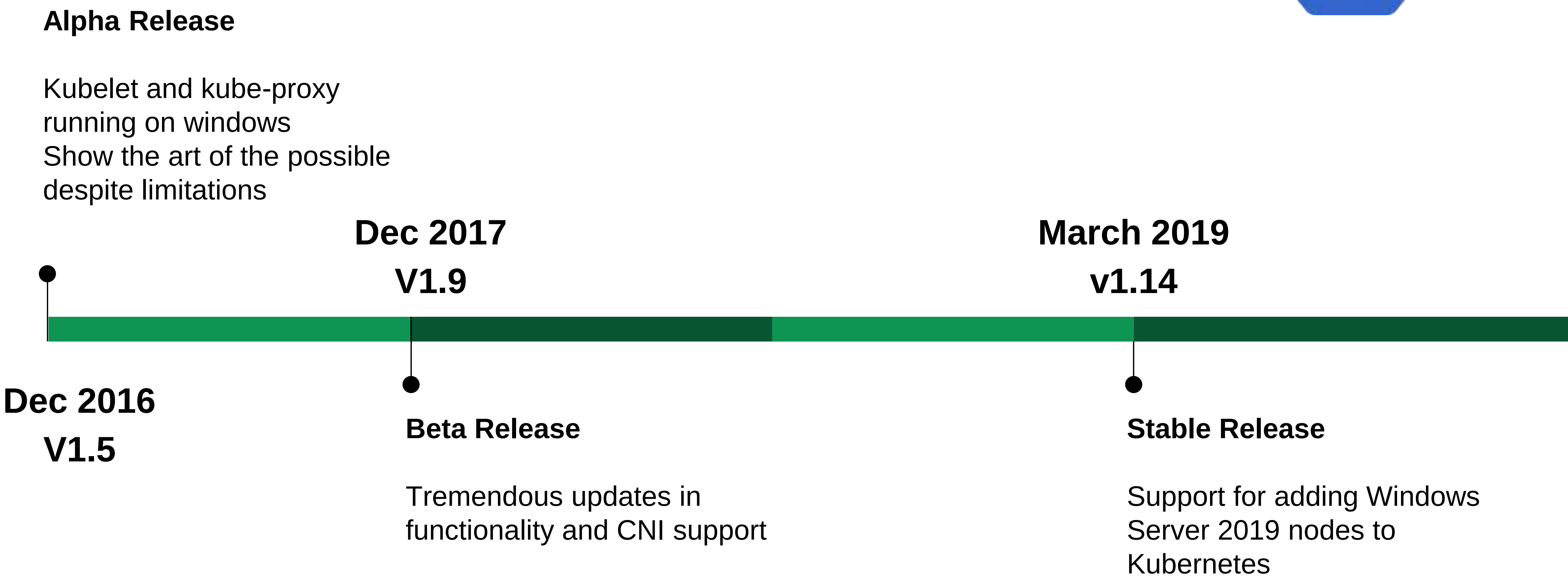
Cloud

VM

Bare
Metal

Edge
Device

History of Windows in Kubernetes



Dec 2016
V1.5

Alpha Release

Kubelet and kube-proxy running on windows
Show the art of the possible despite limitations

Dec 2017
V1.9

Beta Release

Tremendous updates in functionality and CNI support

March 2019
v1.14

Stable Release

Support for adding Windows Server 2019 nodes to Kubernetes

Docker Swarm

- Windows workers can join a Linux swarm
- Windows manager nodes beginning with 17.05
- Overlay network between Linux and Windows nodes
- Use a Linux manager to publish services
- Docker Secrets on Windows with 17.06

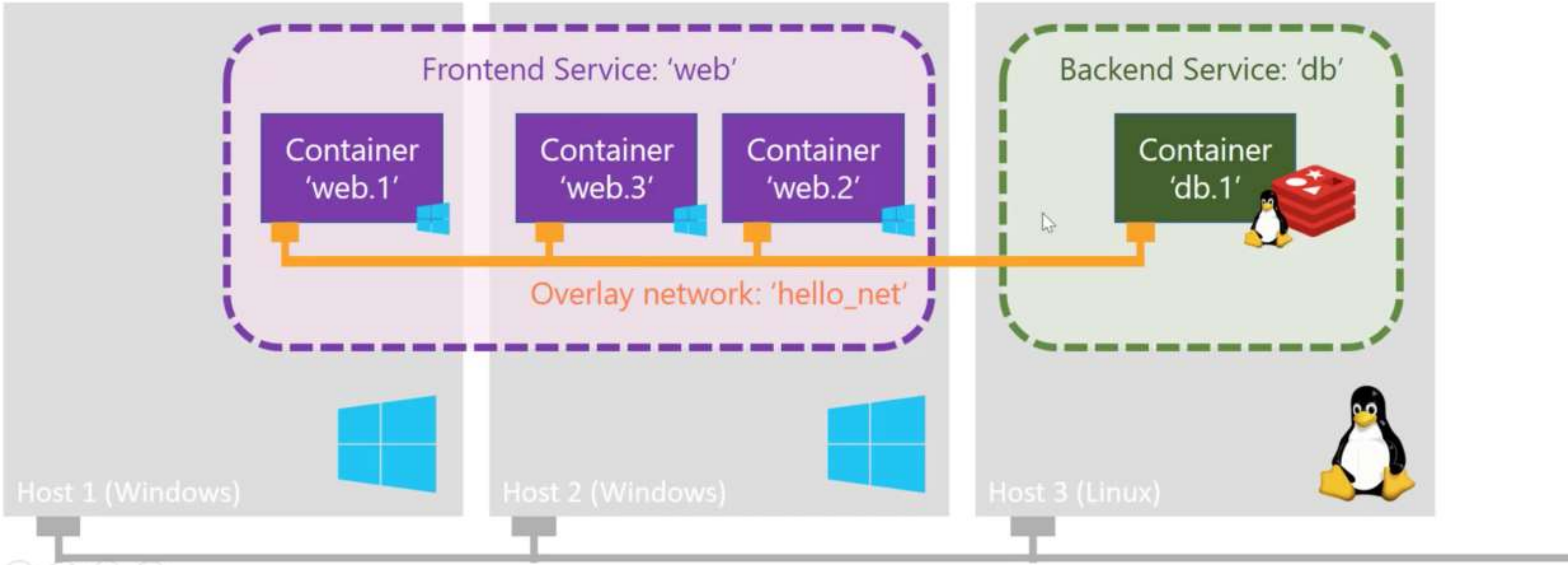
Docker on Windows

docker™

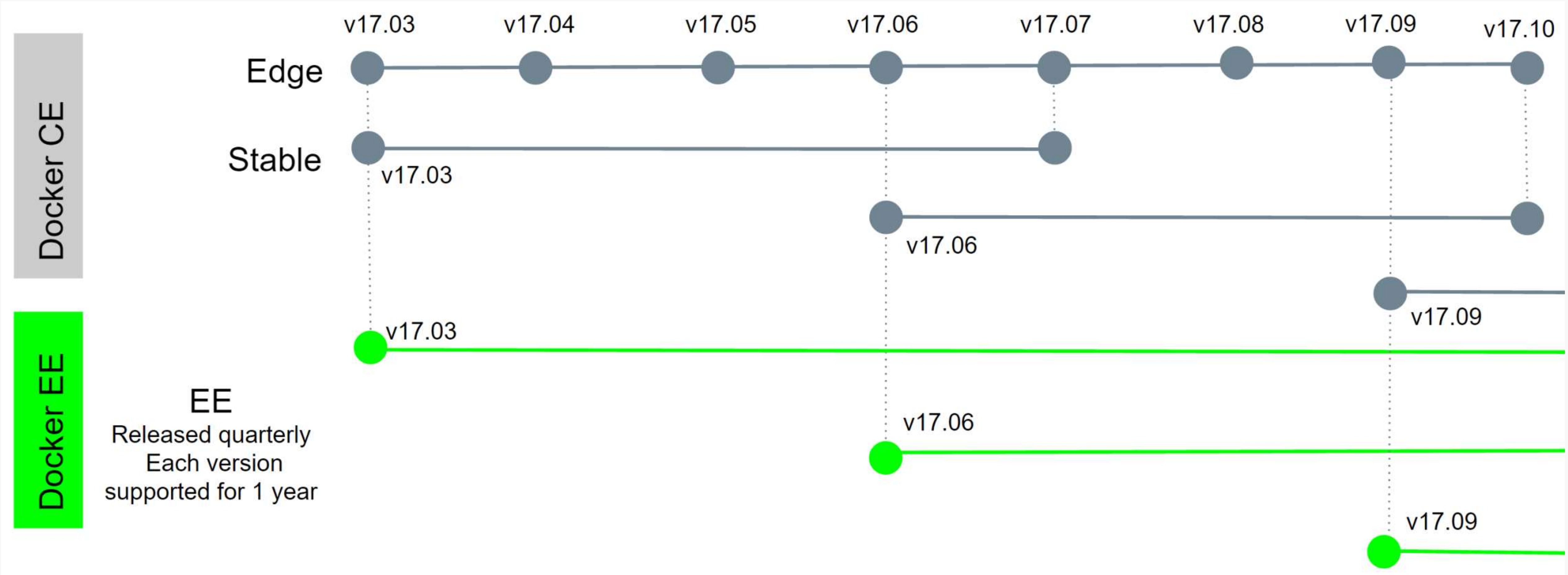
The Setup

Infrastructure view…

- Container hosts
  - 2 Windows hosts
  - 1 Linux host
  - Same network
- Application
  - ‘web’ service (Windows containers)
  - ‘db’ service (Linux Redis container)
  - ‘hello_net’ overlay network

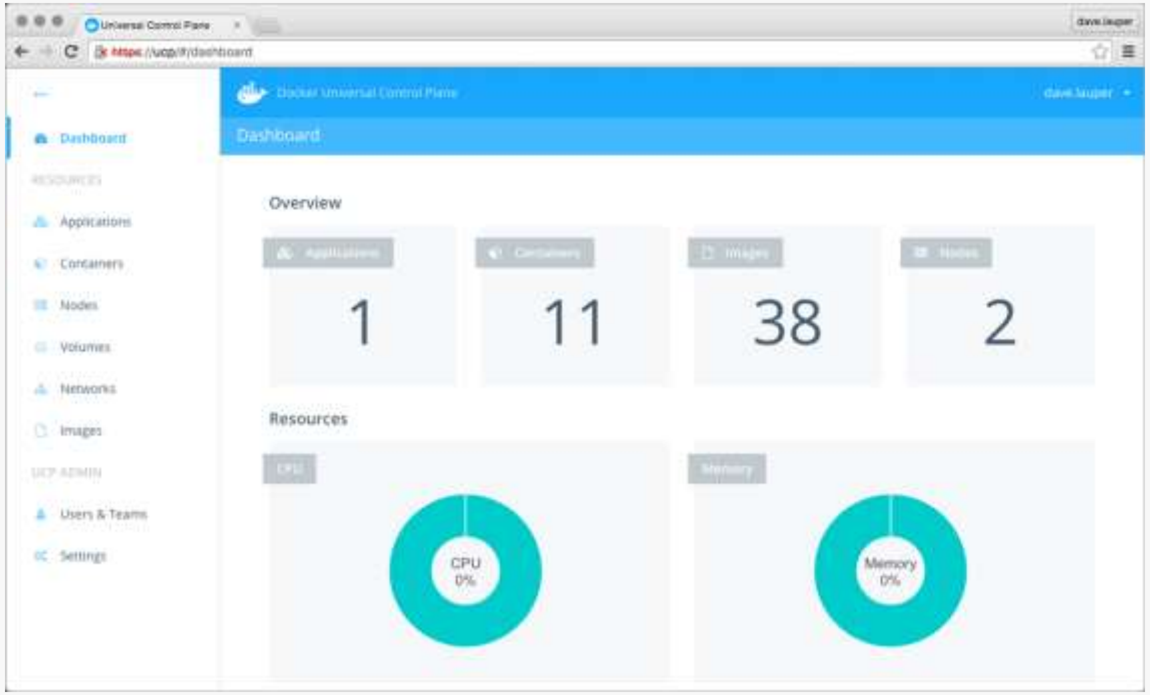


Lifecycle Docker CE / Docker EE



Docker Enterprise Edition: Docker Datacenter

- Beta Support for Windows Server Containers
- Frictionless deployment experience
- Integrated web management portal
- Role Based and LDAP/AD Access Control
- Self-healing and rolling app deploy/upgrade
- Image scanning, signing & E2E security



Overview

Applications 1

Containers 11

Images 38

Nodes 2

Resources

CPU: CPU 0%

Memory: Memory 0%

Azure Service Fabric

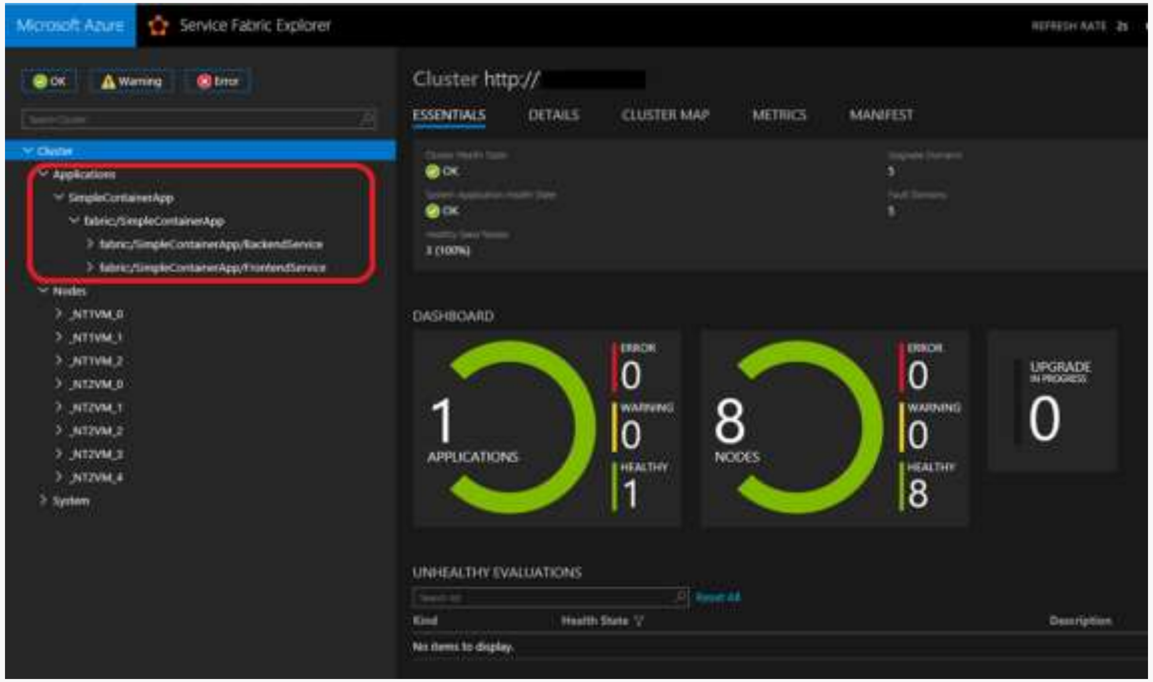
Support for Windows Server Containers and Hyper-V isolation

Image deployment and activation

Volume driver support

Networking and DNS discovery

Resource governance



Cluster http://[redacted]

Cluster Health State: OK

System Application Health State: OK

Healthy Seed Nodes: 3 (100%)

Upgrade Domains: 5

Fault Domains: 5

DASHBOARD

1 APPLICATIONS — ERROR 0, WARNING 0, HEALTHY 1

8 NODES — ERROR 0, WARNING 0, HEALTHY 8

UPGRADE IN PROGRESS 0

UNHEALTHY EVALUATIONS

Kind	Health State	Description
No items to display.		

Kubernetes

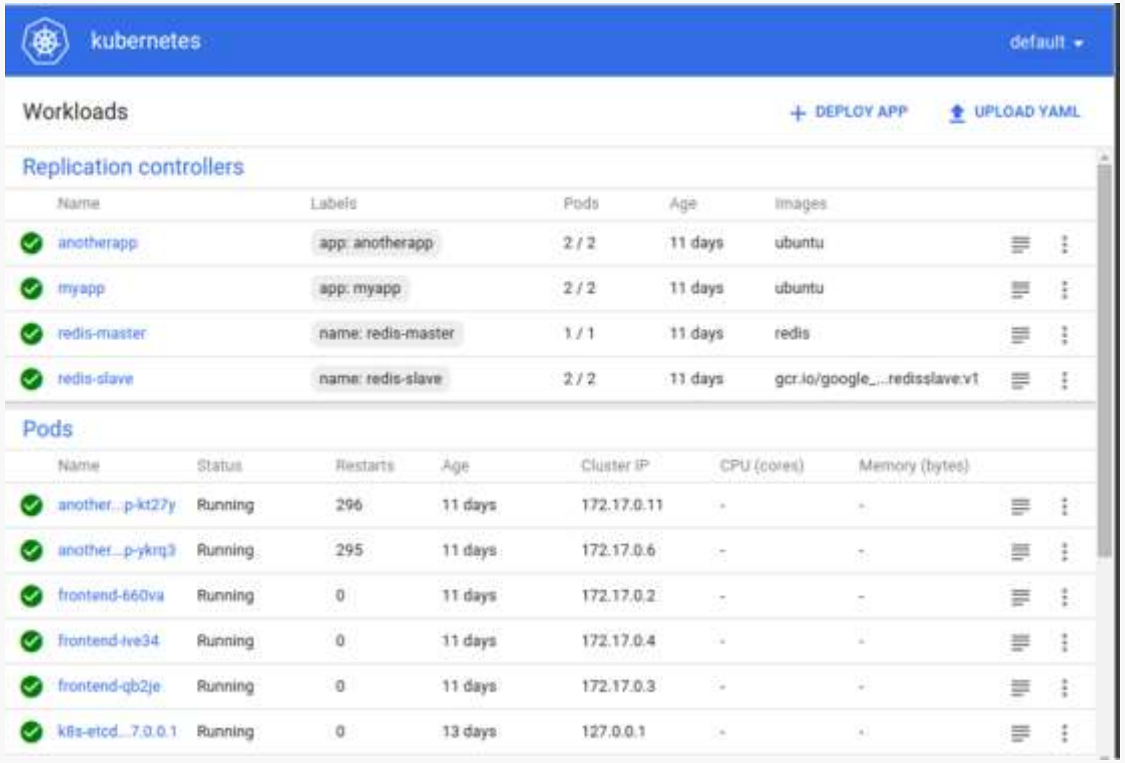
Alpha Support for
Windows Server Containers

Control plane runs on Linux nodes,
Kubelet/kube-proxy run on Windows

Network is achieved using L3 routing

Only One Container Per Pod

https://kubernetes.io/docs/getting-started-guides/windows/



Workloads

Replication controllers

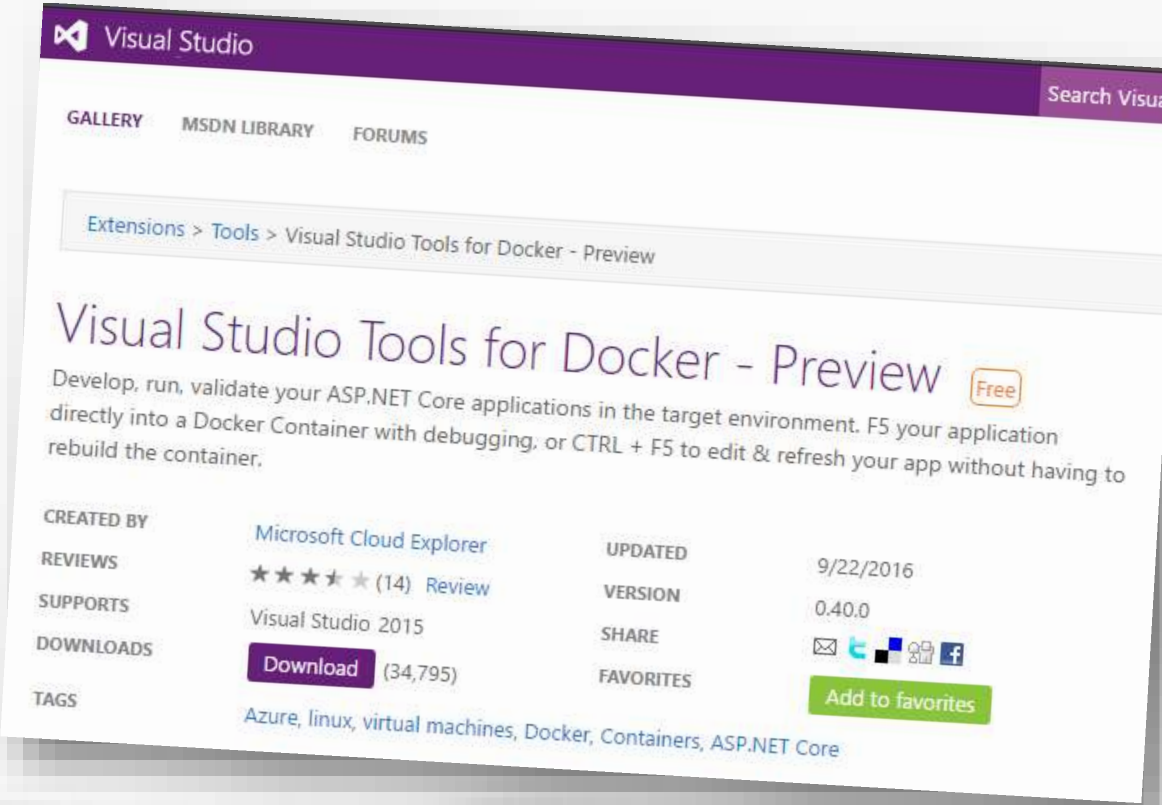
	Name	Labels	Pods	Age	Images
✓	anotherapp	app: anotherapp	2 / 2	11 days	ubuntu
✓	myapp	app: myapp	2 / 2	11 days	ubuntu
✓	redis-master	name: redis-master	1 / 1	11 days	redis
✓	redis-slave	name: redis-slave	2 / 2	11 days	gcr.io/google_...redisslave:v1

Pods

	Name	Status	Restarts	Age	Cluster IP	CPU (cores)	Memory (bytes)
✓	another...p-kt27y	Running	296	11 days	172.17.0.11	-	-
✓	another...p-ykrq3	Running	295	11 days	172.17.0.6	-	-
✓	frontend-660va	Running	0	11 days	172.17.0.2	-	-
✓	frontend-ive34	Running	0	11 days	172.17.0.4	-	-
✓	frontend-qb2je	Running	0	11 days	172.17.0.3	-	-
✓	k8s-etcd...7.0.0.1	Running	0	13 days	127.0.0.1	-	-

Visual Studio Docker Tools

- Run, Debug, Test Web & Console apps in docker containers
  - *Linux today, Windows Server & Nano Server coming soon*
- F5 Debugging
- Edit & Refresh of code
- Scaffolds docker assets
  - Dockerfile, docker-compose.yml

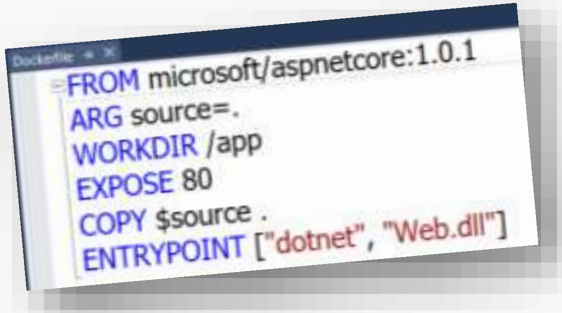


Extensions > Tools > Visual Studio Tools for Docker - Preview

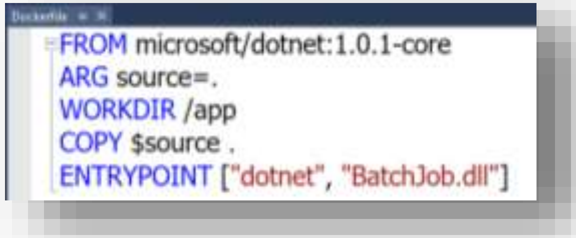
Visual Studio Tools for Docker - Preview Free

Develop, run, validate your ASP.NET Core applications in the target environment. F5 your application directly into a Docker Container with debugging, or CTRL + F5 to edit & refresh your app without having to rebuild the container.

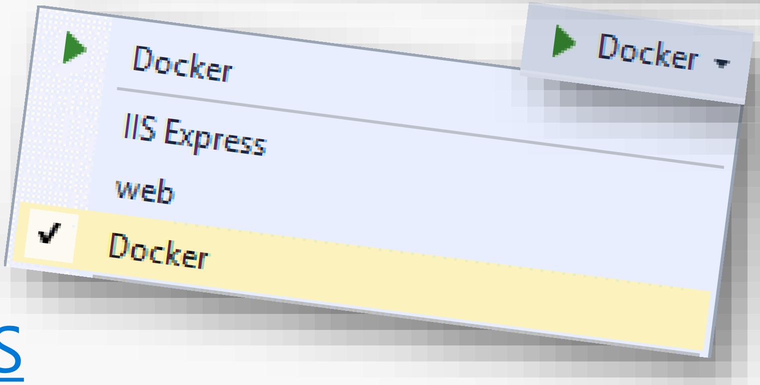
CREATED BY	Microsoft Cloud Explorer	UPDATED	9/22/2016
REVIEWS	★★★★☆ (14) Review	VERSION	0.40.0
SUPPORTS	Visual Studio 2015	SHARE	
DOWNLOADS	Download (34,795)	FAVORITES	Add to favorites
TAGS	Azure, linux, virtual machines, Docker, Containers, ASP.NET Core		



```
FROM microsoft/aspnetcore:1.0.1
ARG source=.
WORKDIR /app
EXPOSE 80
COPY $source .
ENTRYPOINT ["dotnet", "Web.dll"]
```



```
FROM microsoft/dotnet:1.0.1-core
ARG source=.
WORKDIR /app
COPY $source .
ENTRYPOINT ["dotnet", "BatchJob.dll"]
```



aka.ms/DockerToolsForVS

Image2Docker

Image2Docker

```
ConvertTo-Dockerfile `
    -RemotePath \\192.168.1.5\c$ `
    -OutputPath c:\newDockerFile `
    -Artifact IIS
```

```
# escape=`
FROM microsoft/aspnet:windowsservercore-10.0.14393.693
SHELL ["powershell", "-Command", "$ErrorActionPreference = 'Stop'; $ProgressPreference = 'SilentlyContinue';"]

RUN Remove-Website 'Default Web Site';

# Set up website: iis-env
RUN New-Item -Path 'C:\iis\iis-env' -Type Directory -Force;

RUN New-Website -Name 'iis-env' -PhysicalPath 'C:\iis\iis-env' -Port 8090 -Force;

EXPOSE 8090

COPY ["iis-env", "/iis/iis-env"]
```

Image2Docker

Open source PowerShell module

WIM, VHD, VHDx or Live Servers

Roles and Features along with installed programs

Internet Information Services (IIS)

- HTTP Handlers in IIS configuration
- IIS Websites and filesystem paths
- ASP.NET web applications

Microsoft SQL Server Instances

Apache Web Server

Get It

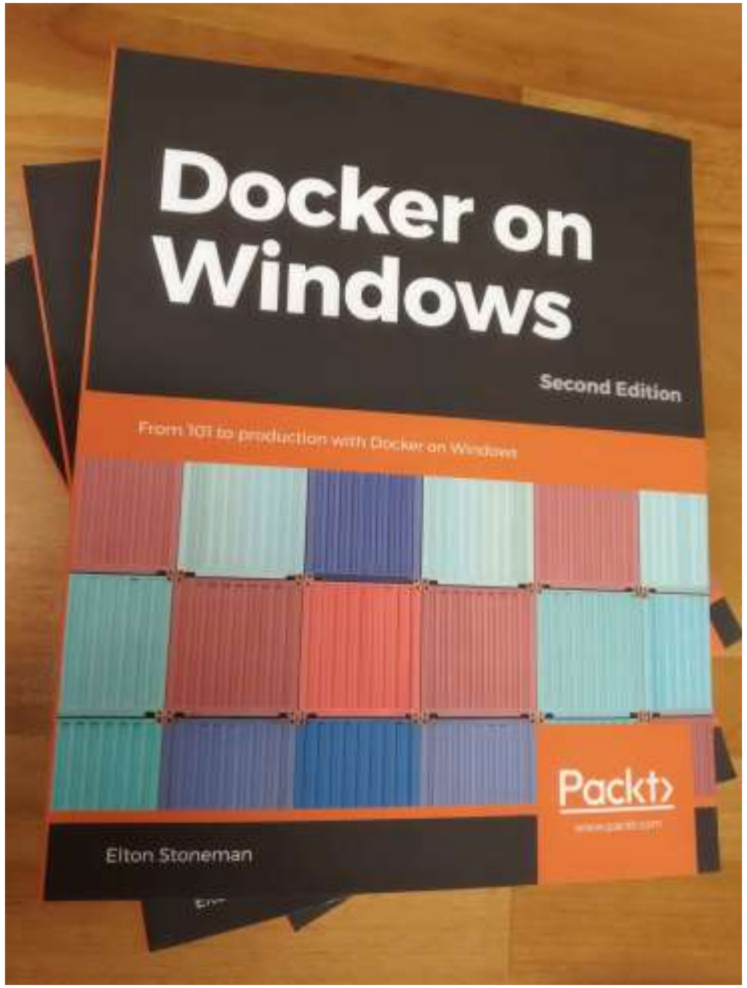
https://www.powershellgallery.com/packages/Image2Docker/

https://github.com/docker/communitytools-image2docker-win

Call for action

- Docker on Windows, Second Edition
- Elton Stoneman | @EltonStoneman

- Fully updated to Windows Server 2019



THANK YOU :)

antonio.minelli@etlforma.com